

# Functional Dairy Beverages

## Ingredient Functionality & Formulation Challenges

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# Presentation outlines

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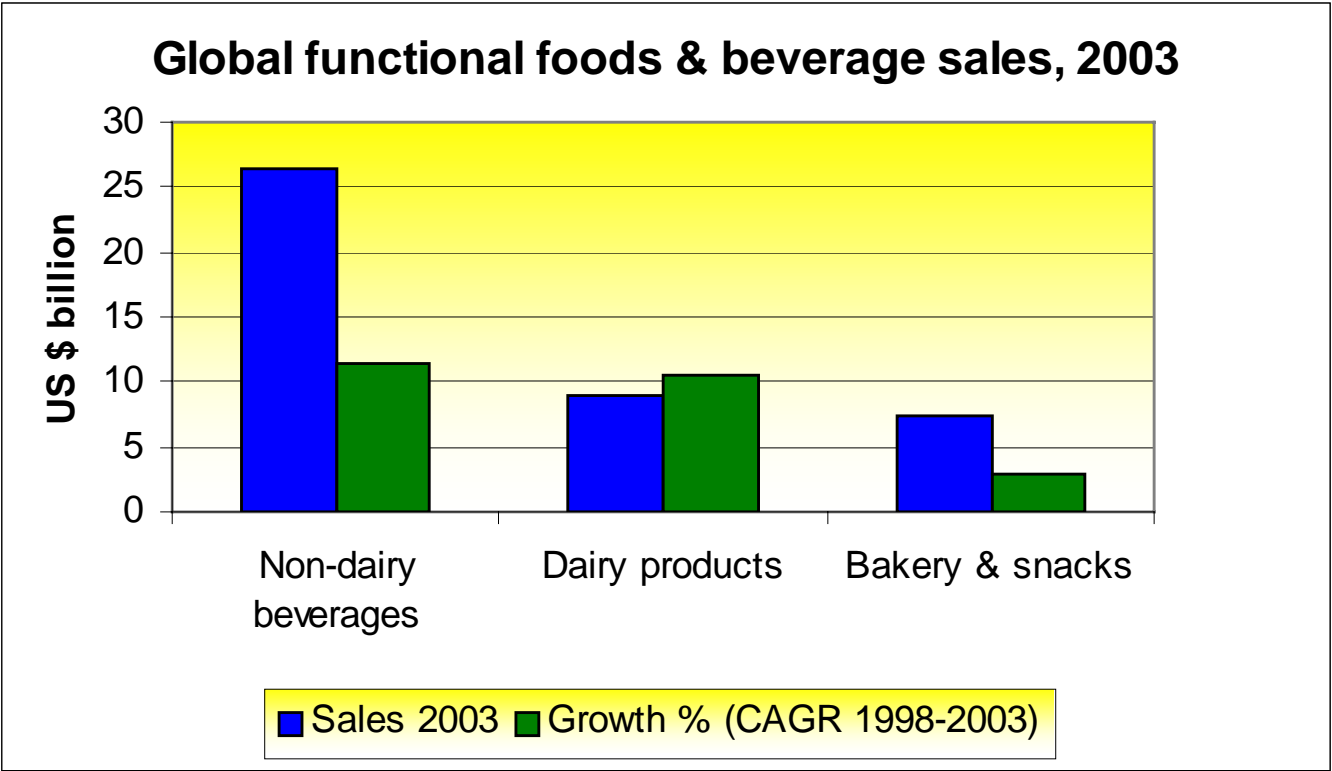
- Introduction
- Functional dairy beverages
  - Market share
  - Types of beverages
- What makes dairy beverages functional
- Formulating functional dairy beverages
  - Unlocking inherent bioactivity
  - Incorporating non-dairy bioactive components
- Conclusions

# Introduction

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- Functional foods & functional dairy beverages
  - Functional foods refer to foods and ingredients with health benefits above and beyond their nutritional value
  - Dairy beverages are widely formulated as functional foods – dairy a preferred carrier for bioactive ingredients due to convenience, flavour and nutritional value

# Global functional foods & beverage sales

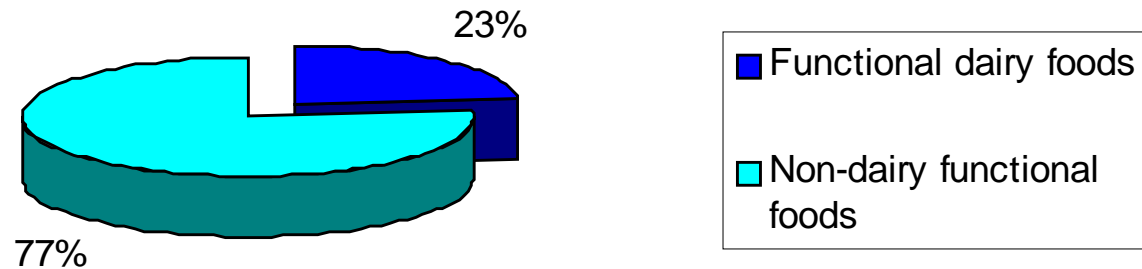


Euromonitor, 2004



# Global market share of functional dairy foods

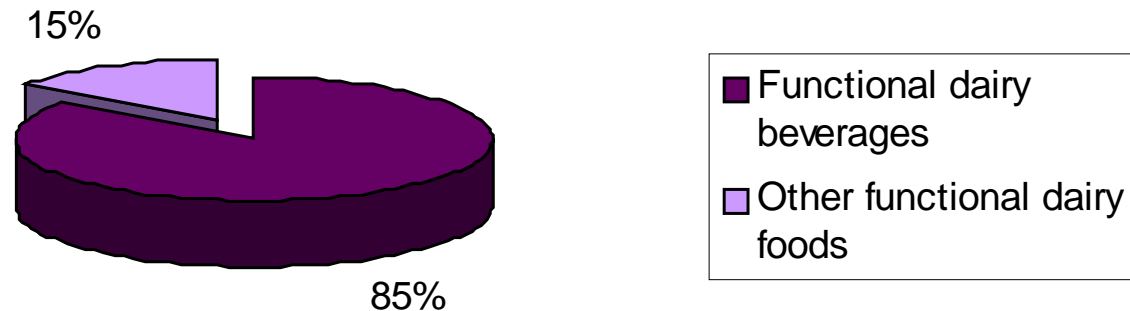
**Dairy products represent 23% of functional foods**



Euromonitor, 2004

# Market share of functional dairy beverages

**Functional dairy beverages represent 85% of functional dairy foods**



Euromonitor, 2004

# Functional dairy beverages

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- Functional milk beverages
  - Dry milk beverages
  - Liquid milk beverages
    - Fresh
    - Recombined
    - UHT
- Functional yogurt drinks
  - Single serve
  - Bulk pack

# What makes dairy beverages functional?

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- Unlocking inherent bioactivity - *in-situ* reaction
  - Mainly through hydrolysis of milk protein to release bioactive peptides
- Adding bioactive components
  - Through addition of bioactive components from non-dairy sources



# What makes dairy beverages functional?

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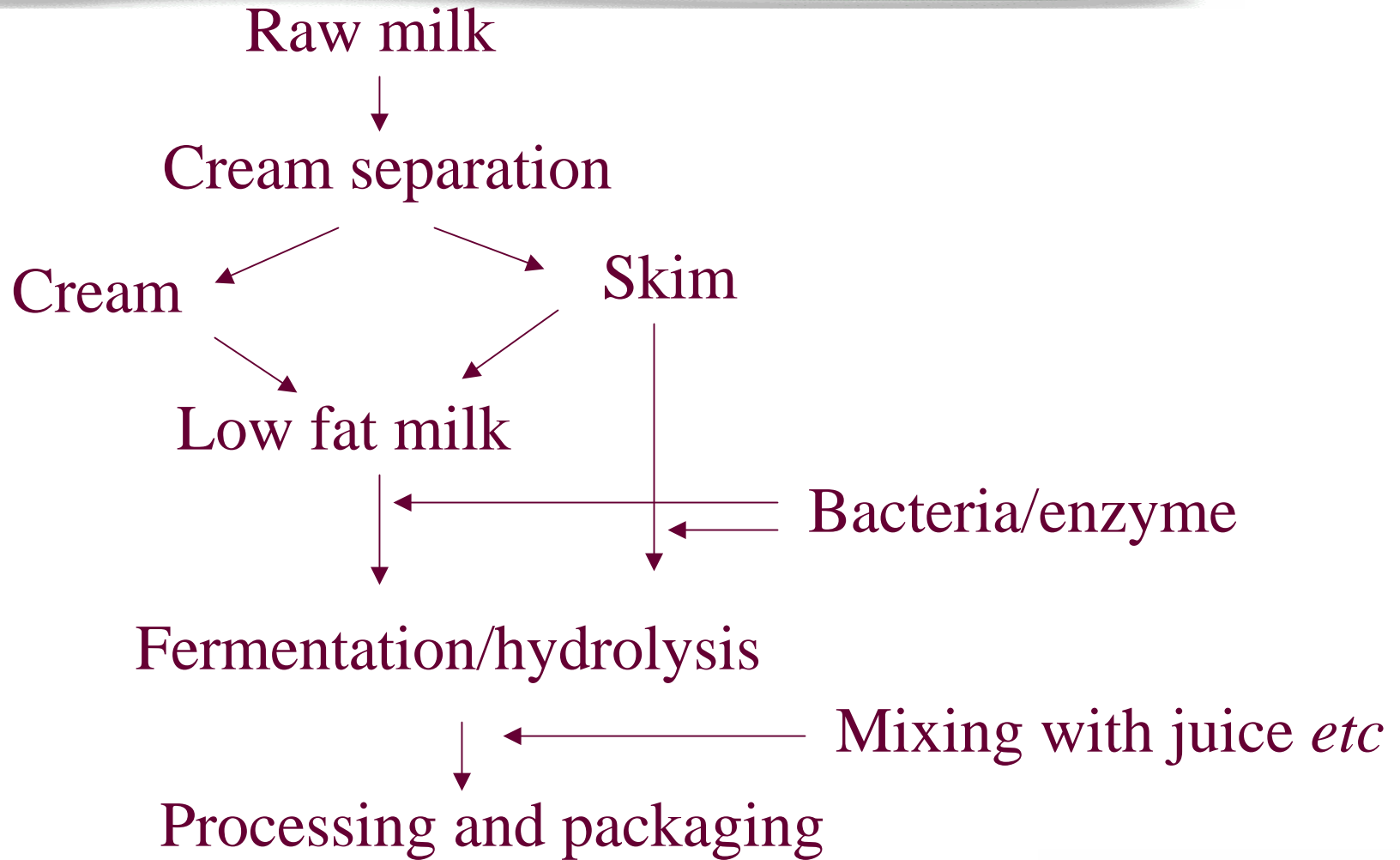
- Unlocking inherent bioactivity - *in-situ* reaction
  - Bioactive peptides using enzymes from lactic acid bacteria
  - Bioactive peptides using proteases

# What makes dairy beverages functional?

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- Adding bioactive components
  - Minerals – calcium, iron, zinc, selenium, magnesium
  - Vitamins
  - Omega-3
  - Proteins (lactoferrin, soy protein)
  - Phytosterols
  - Probiotic bacteria
  - Prebiotics
  - Fibre
  - Plant extracts (aloe vera, tea catechins)

# Formulating functional dairy beverages – unlocking inherent bioactivity of milk



# Formulating functional dairy beverages – unlocking inherent bioactivity of milk

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- Major processing steps
  - Homogenisation/emulsification
  - Fermentation – pH reduction
  - Heating – pasteurisation, UHT

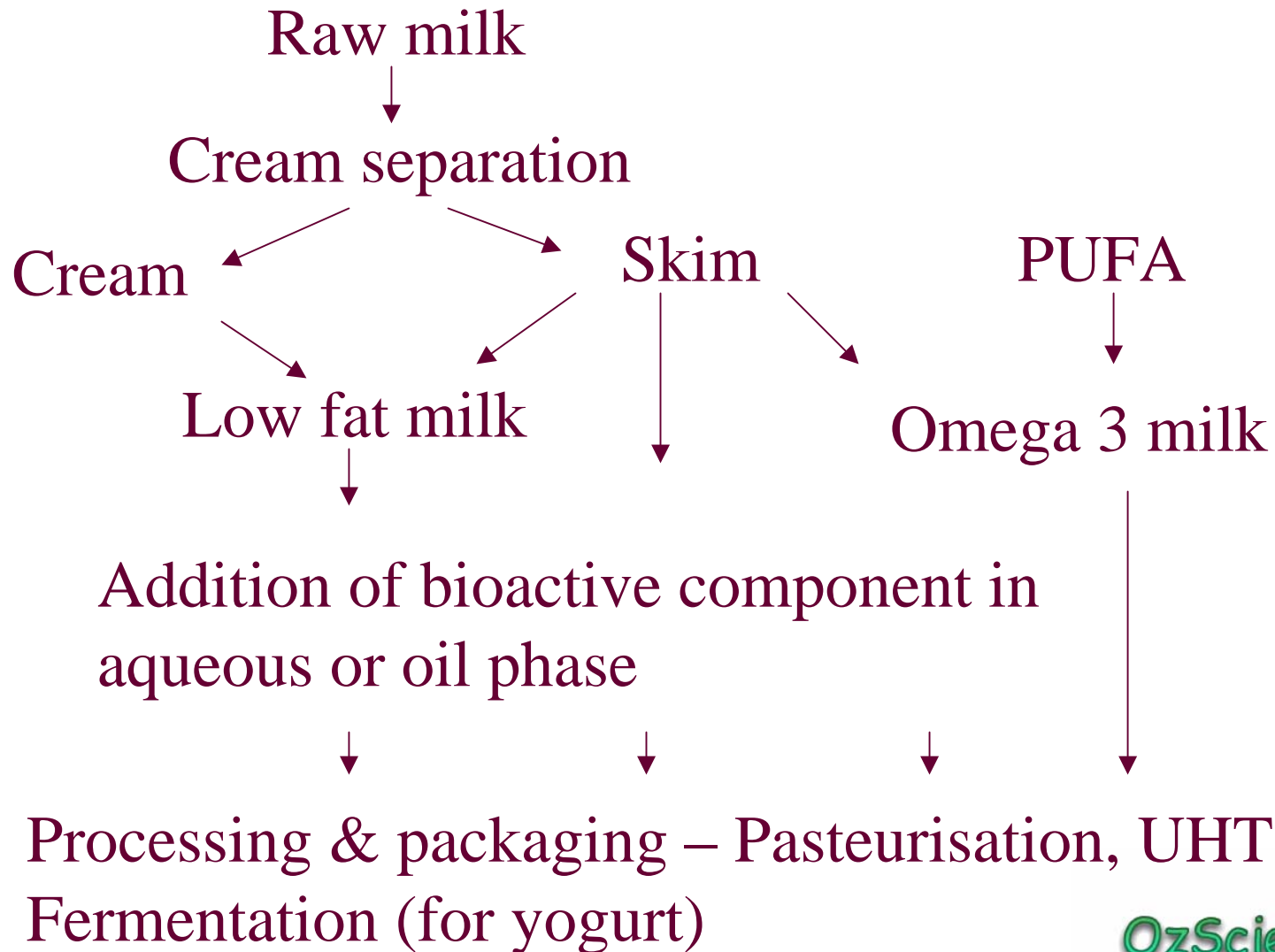
# Formulating functional dairy beverages – unlocking inherent bioactivity of milk

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- **Challenges**

- Selection of lactic acid bacteria or enzyme
- Measurement of bioactivity
- Emulsification problems
- Heat stability during processing
- Flavour defects – e.g. bitterness
- Shelf life – flavour, physical stability

# Formulating functional dairy beverages – incorporating bioactive ingredient



# Formulating functional dairy beverages – incorporating bioactive ingredient

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- Major processing steps
  - Homogenisation/emulsification
  - Fermentation – pH reduction
  - Heating – pasteurisation, UHT

# Formulating functional dairy beverages – incorporating bioactive ingredient

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- Challenges
  - Specific to individual bioactive ingredient and dairy beverage



# Formulating functional dairy beverages – incorporating bioactive ingredients

Bioactive	Challenges
Calcium	Soluble (chloride) – heat stability, protein instability Insoluble (milk minerals, phosphate, citrate, carbonate) – sedimentation, grittiness
Iron	Flavour, colour, heat stability
Vitamins	Poor solubility and activity loss due to heating

# Formulating functional dairy beverages – incorporating bioactive ingredients

Bioactive	Challenges
Fish oil (EPA & DHA)	Undesirable flavour and taste, rancidity, microencapsulated products still difficult to incorporate in high heat beverages
Microalgae (EPA & DHA)	
Flaxseed oil (ALA)	

# Formulating functional dairy beverages – incorporating bioactive ingredients

Bioactive	Challenges
Phytosterol	Insolubility in water and difficulty in incorporating in low or no-fat beverages
Isoflavones	Bitterness, poor solubility in water
Dietary fibre, prebiotics	Poor suspension and sedimentation
Probiotics	Exposure to heat, oxygen, low pH, moisture and direct light

# Functional dairy beverages – future opportunities and challenges

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- **Opportunities**

- Dairy beverages will remain a preferred delivery vehicle for non-dairy bioactive ingredients – due to convenience, flavour and nutritional value
- Opportunities for innovative dairy beverages targeting functional food trends – obesity, CVD, diabetes, child and elderly nutrition

- **Challenges**

- Milk inherently a challenging environment for non-dairy bioactives - mainly due to interactions with proteins and required processing

# OzScientific Food Research & Innovation

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## Dairy research & innovation

- Business direction & market intelligence, Product/ingredient development (functional foods, nutraceutical & bioactive ingredients), Scientific & IP literature review, consultancy
- “OzScientific Weekly Digest” Market intelligence & innovations newsletter

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