# From Waste to Value

Purpose:
Give an overview of restrawmaterials and their use/application in TINE

Content:
Restrawmaterials in general
Use/Application
New possibilities

# Definitions

**Restrawmaterial**

1. **Restrawmaterial** is a secondary product from a process, not the intended product.
2. **Restrawmaterial** a product that is produced at the same time as the mainproduct.
3. **Restrawmaterial** is a material that is a waste in the production of a mainproduct.

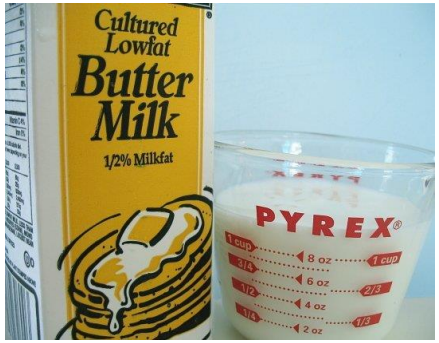
**Waste**

1. Waste : (no value) remains from the industry, workplace, household etc.
2. Waste is items, materials, restrawmaterials, or energycarriers that no longer has its intended value.

# Churning of butter

- 2,3 L cream makes approximately 1 kg butter and 1,2 L buttermilk
- Most of the butter is produced from sweet cream, thus resulting in sweet buttermilk.

- Sweet buttermilk is a resource that has approximately the same application and use as skimmed milk
- Most of the sweet buttermilk is used as animal feed.



# Potential advantages of Buttermilk

What makes sweet buttermilk different from skimmed milk?

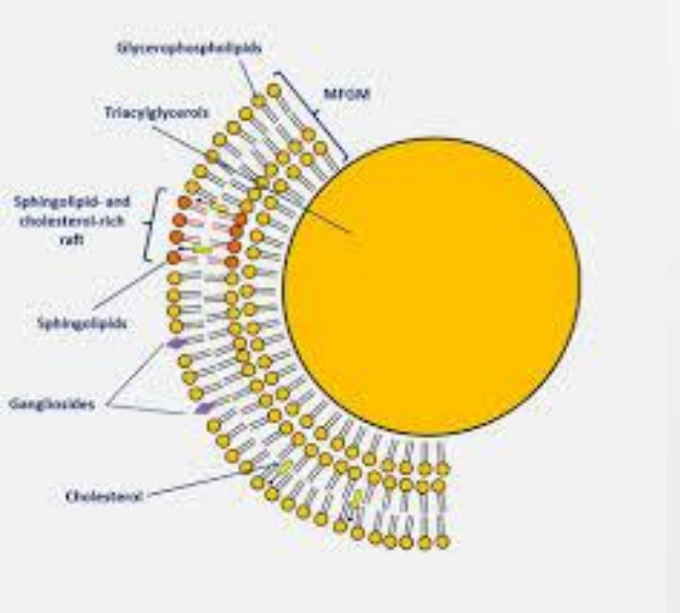
- Milk fat globule membrane (MFGM)

How can this be used as an advantage?

- Functional properties
  - Emulgating properties
  - Foaming
- Bioactivity

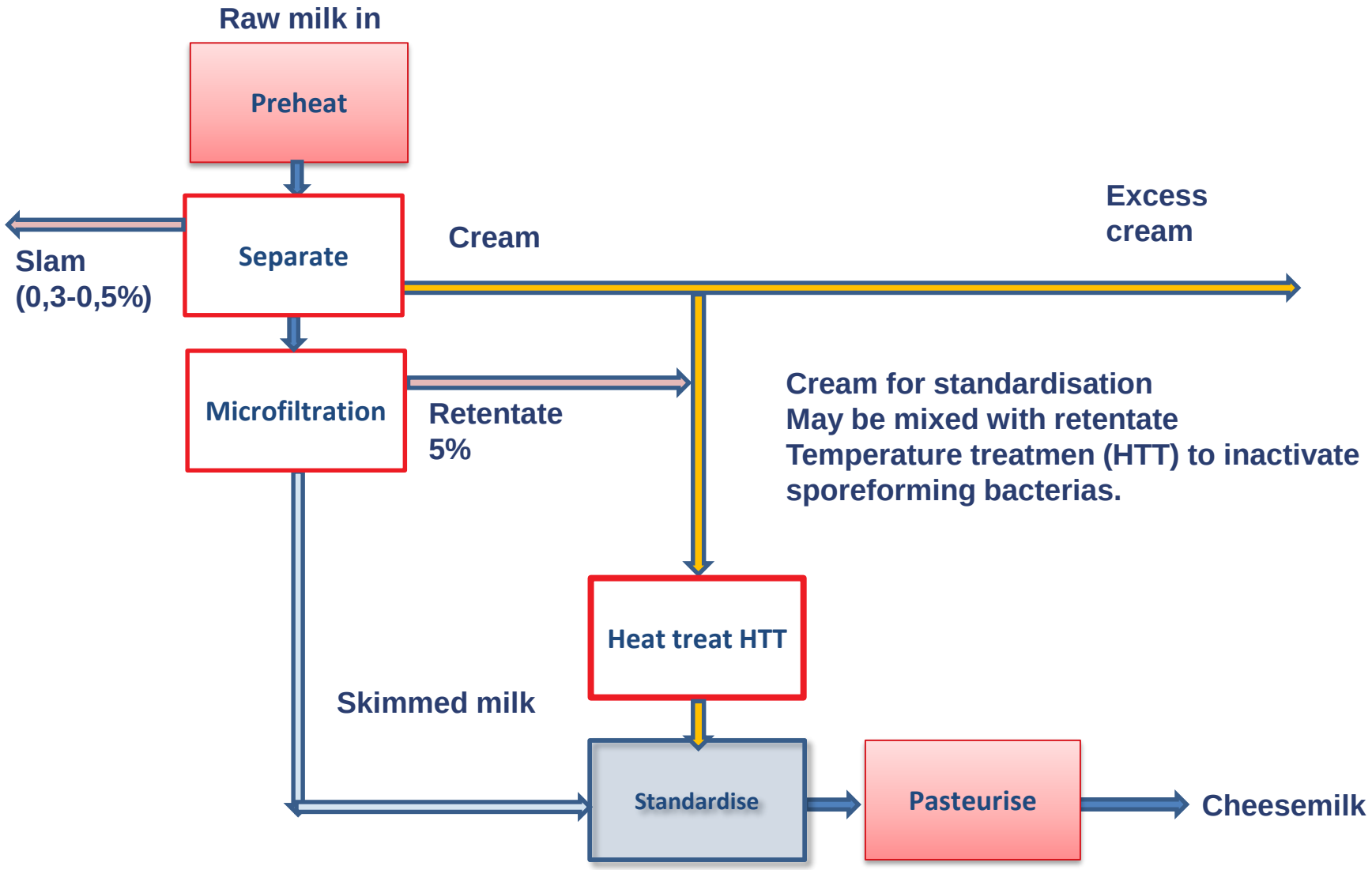
International research

- Technological aspects and analytical methods
- Functional properties
- Nutritional properties, and bioeffects.



# Production of cheesemilk

## Microfiltration



# Membranefiltration

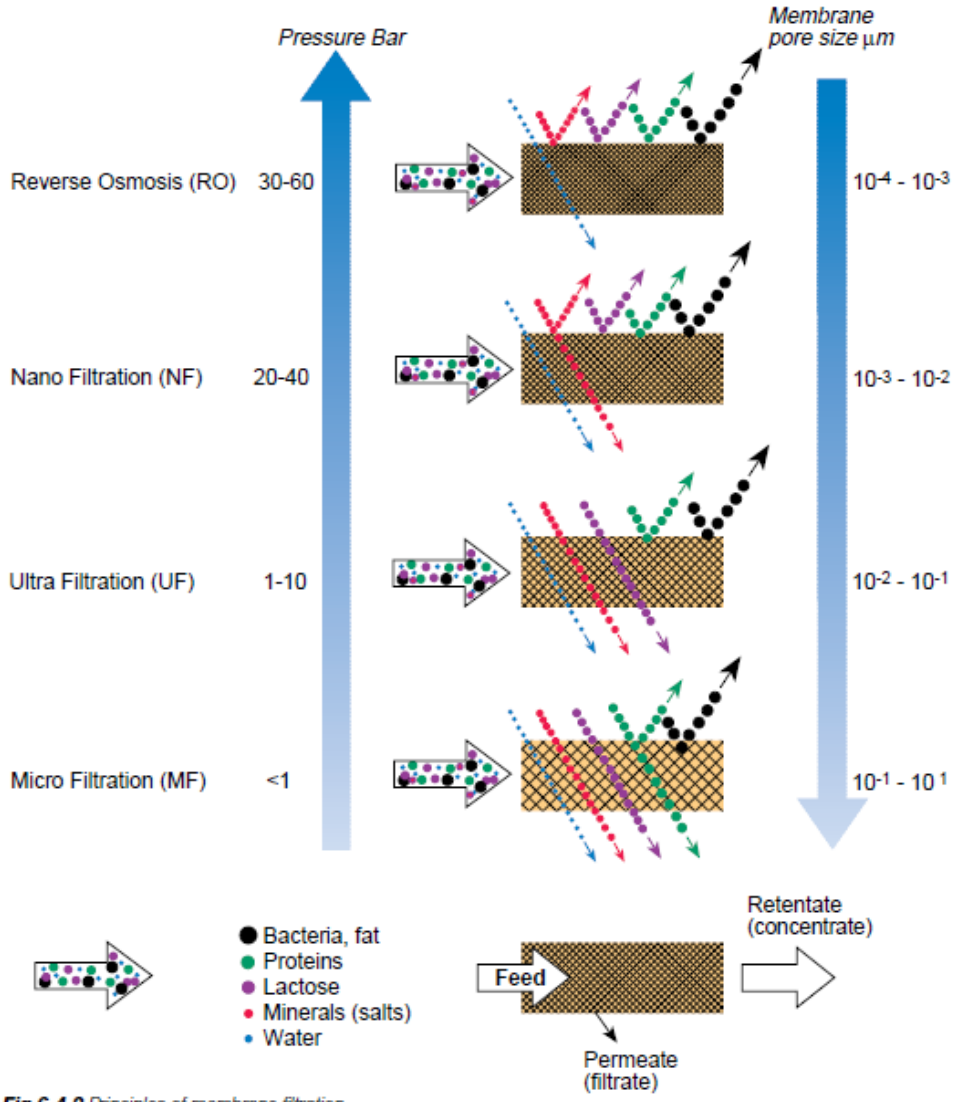



**Fig 6.4.3** *Principles of membrane filtration.*

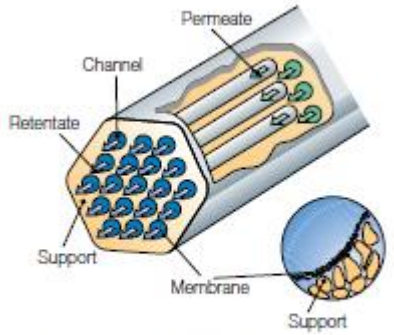



**Fig.6.4.6** *Cross-flow filtration in a multichannel element (19 channels).*

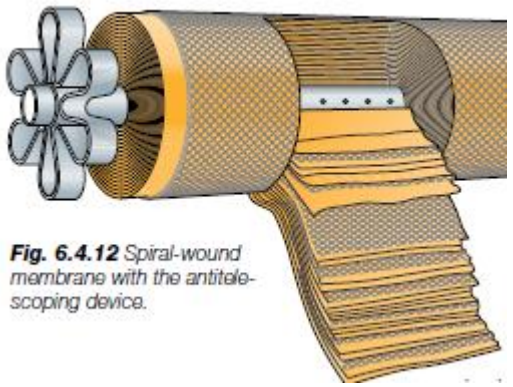
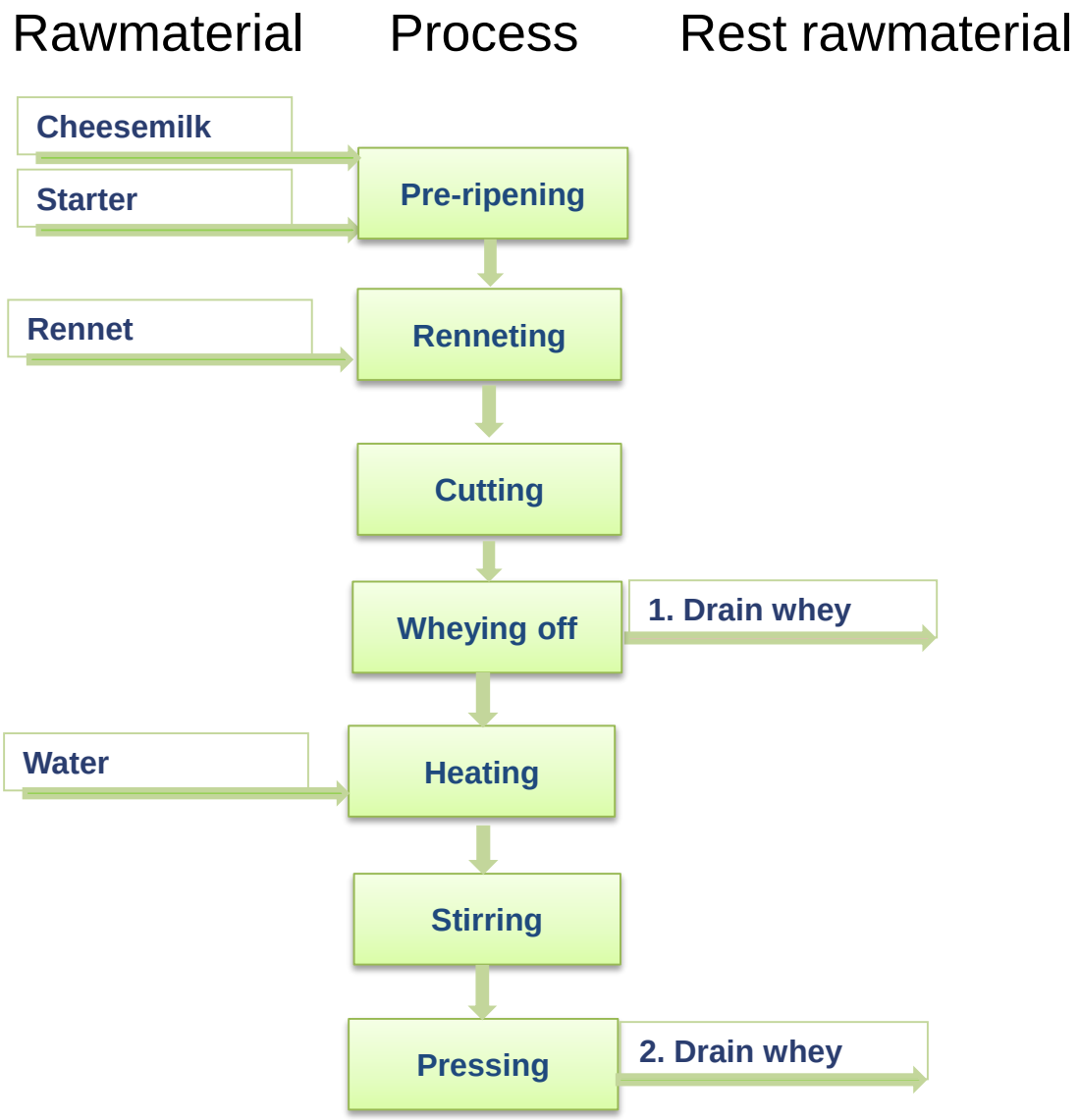


**Fig. 6.4.12** *Spiral-wound membrane with the antitelescoping device.*

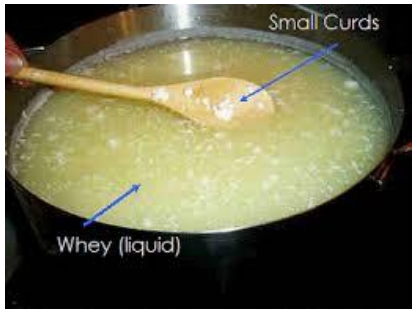
Illustrasjoner from TP Dairy Processing Handbook

# Cheesemaking



# Whey quality

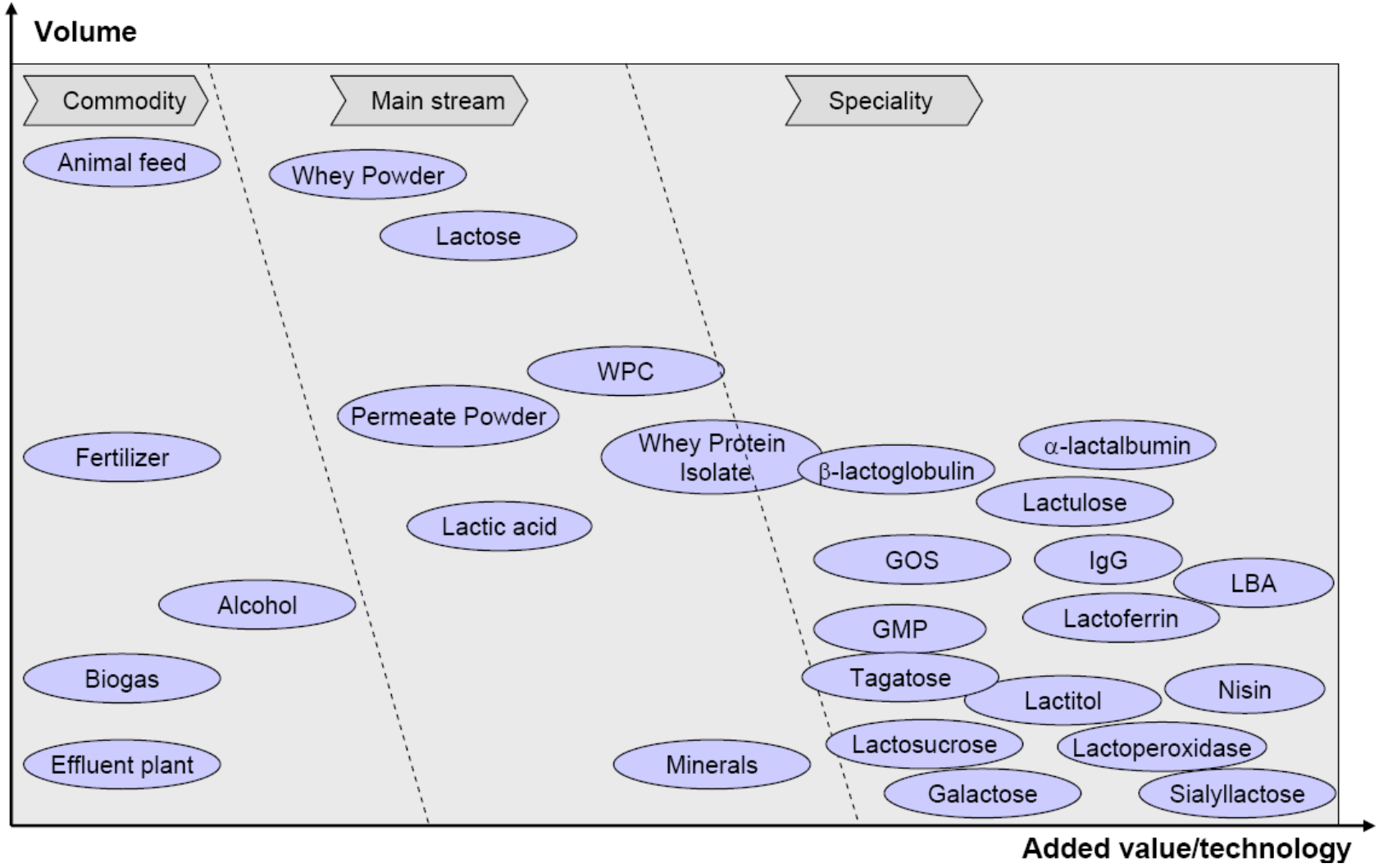
**Sweet whey**
- From cheesemaking of rennetcoagulated cheese
- pH 6,0 – 6,7




**Acid whey**
- From production of CC, Kesam, etc
- pH 4,5 – 6,0


**Native whey**
- Sweet whey
- From milk

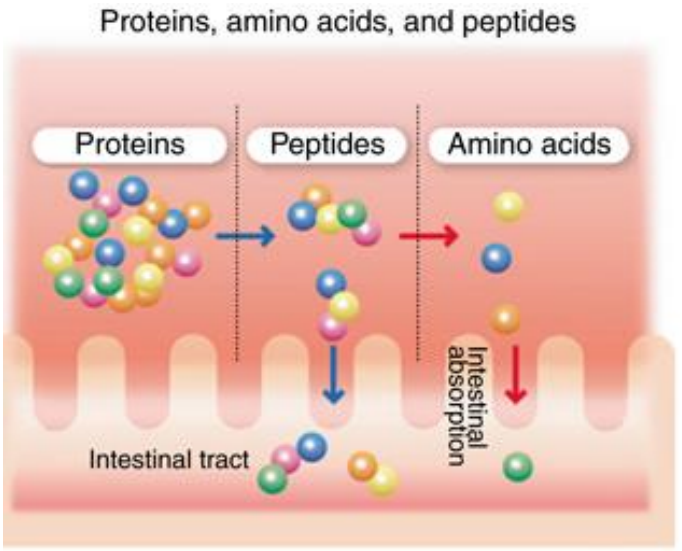
# Whey is a versatile source of raw material

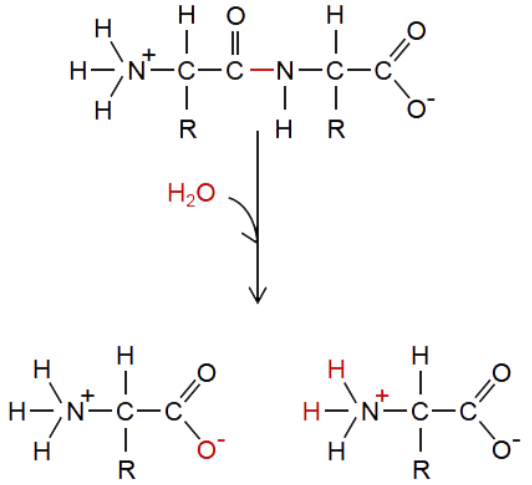



Source: 3A Business Consulting

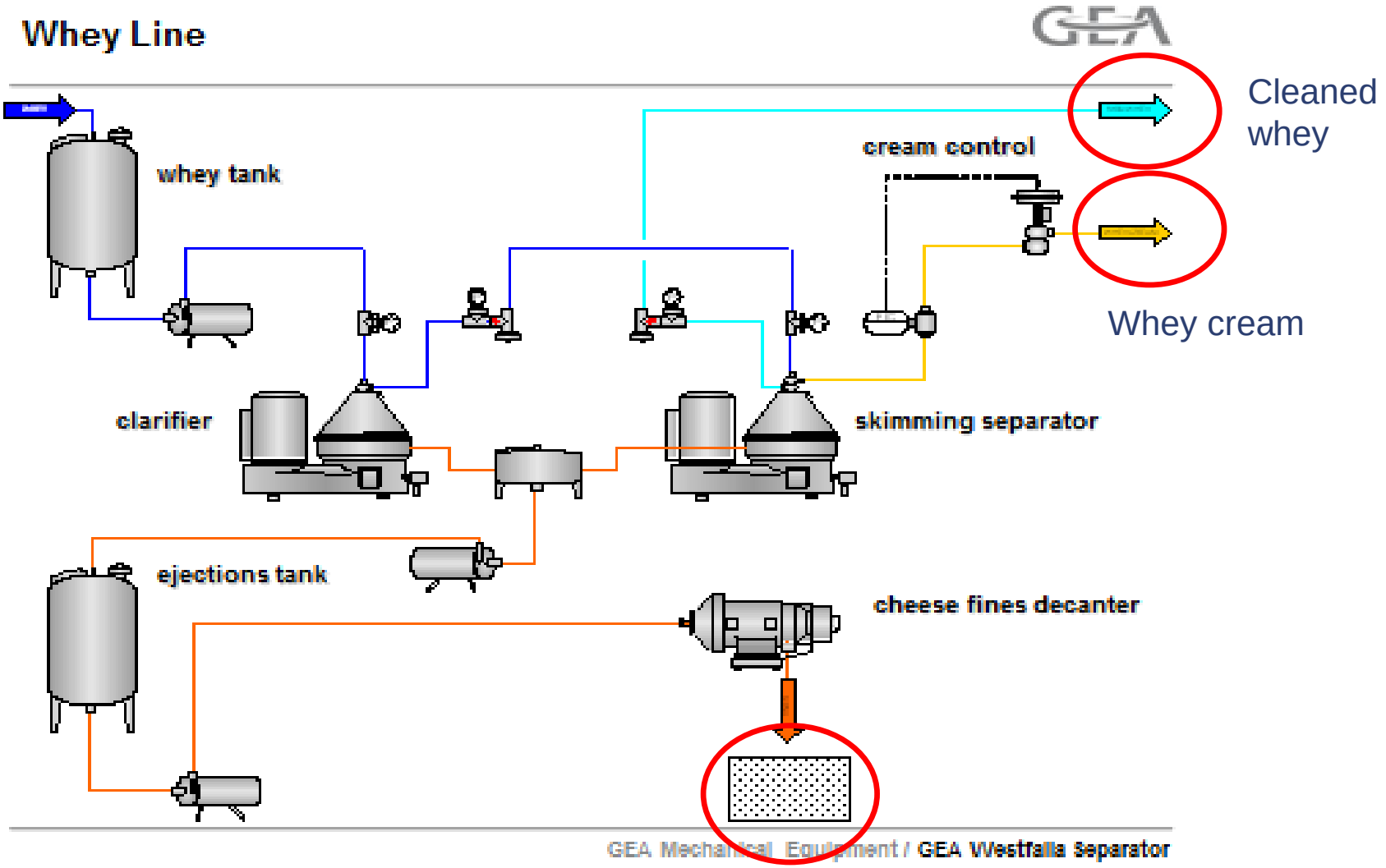
# Hydrolysation

- Whey proteins, Caseins
- Modify nutritional and/or functional properties of whey proteins.
- Application:
  - Nutrition
    - Infant, Medical, Sport and/or Nutraceutical
  - Functionality
    - Water holding capacity, Viscocity, etc.
  - Pharma
  - Microbial Nutrition



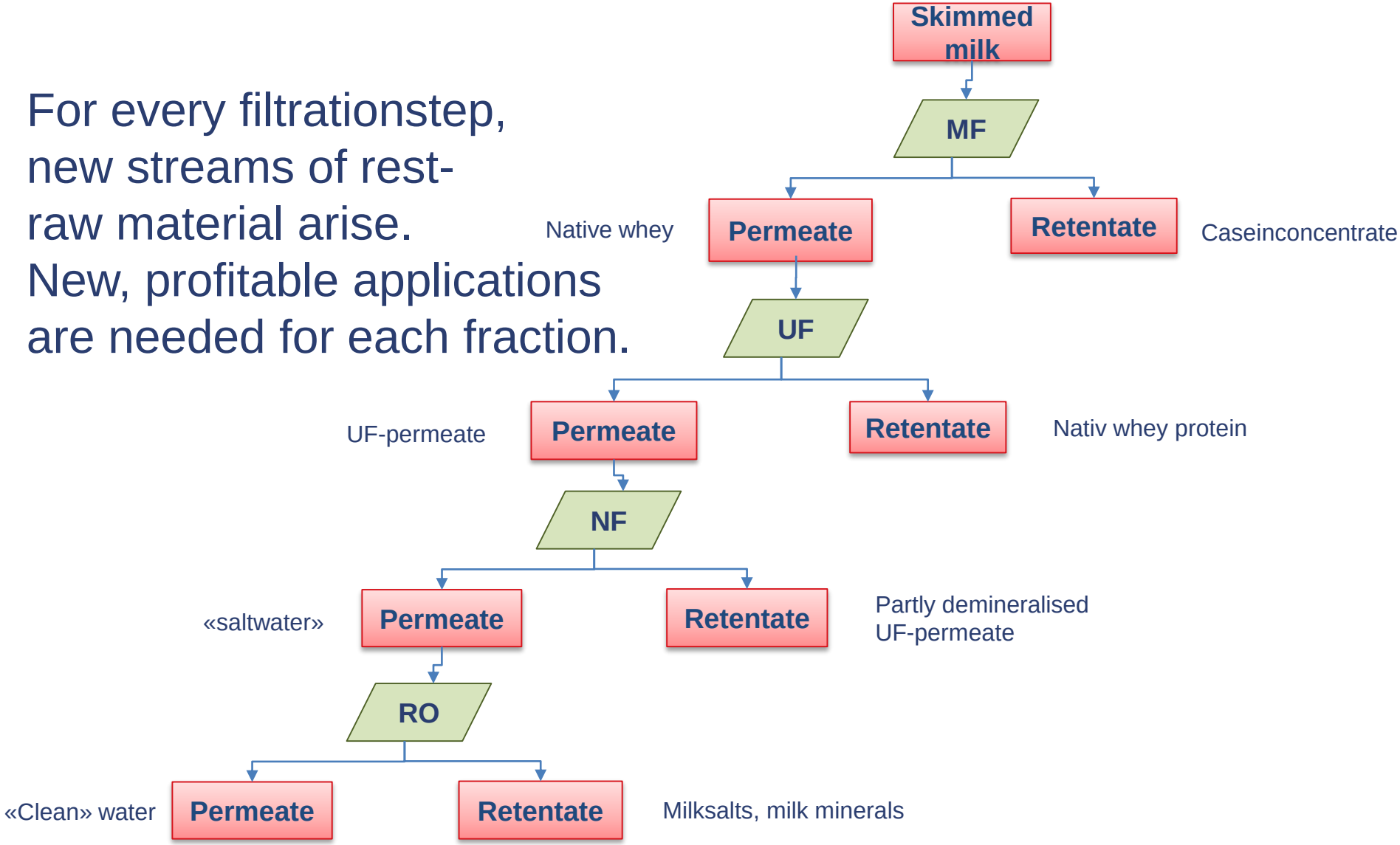



# Pretreatment of whey



# Filtration and new restrawmaterials

For every filtrationstep, new streams of rest-raw material arise. New, profitable applications are needed for each fraction.



# Restrawmaterials from concentrated products


**UF-permeate**

- UF-permeate from proteinenrichment of Styrk-milk (milk containing 50% more protein, compared to normal milk)
- UF-permeate from concentration of milk prior to cheesemaking or yoghurt production
- UF-permeate from concentration of whey proteins to WPC80

# Use and possible applications of UF-permeate

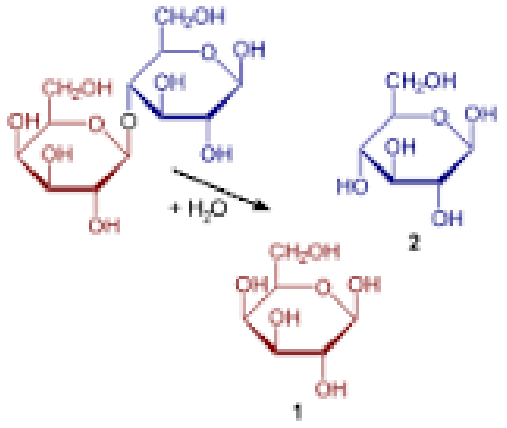
## UF-permeate contains water, lactose and minerals

### Some applications for lactose:

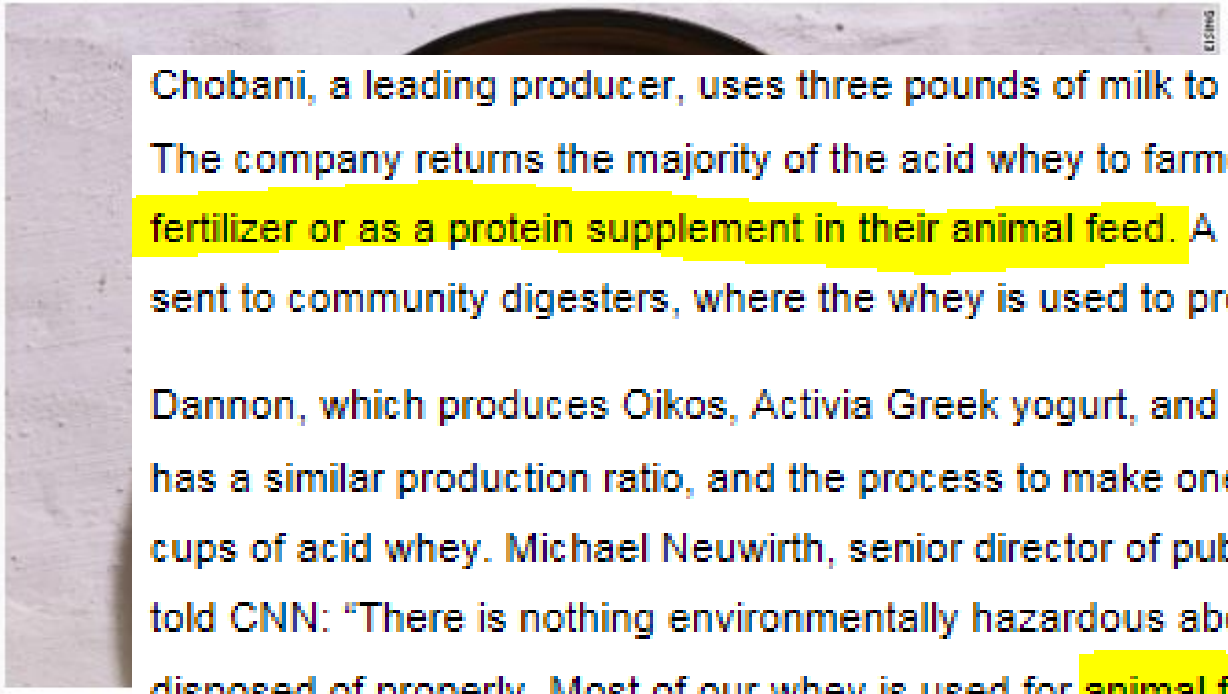
- Penicillin production
- Addition as nucleuses lactose crystallisation in sweetened condensed milk
- Lactose hydrolyzed products
- Fermented products
- Some chemicals

### Processing alternatives for lactose:

- Chemical modification
- Hydrolysis
- Lactose for fermentation



# Acid whey



June 12th,
01:19 PM ET

Chobani, a leading producer, uses three pounds of milk to make one pound of yogurt. The company returns the majority of the acid whey to farmers, who use it as part of a fertilizer or as a protein supplement in their animal feed. A small percentage is also sent to community digesters, where the whey is used to produce energy.

Dannon, which produces Oikos, Activia Greek yogurt, and Dannon Light & Fit Greek, has a similar production ratio, and the process to make one cup of yogurt leaves two cups of acid whey. Michael Neuwirth, senior director of public relations for Dannon, told CNN: "There is nothing environmentally hazardous about it when it is re-used or disposed of properly. Most of our whey is used for animal feed for local farms, about one-third is used for land application as fertilizer, and the majority of the rest is treated in a biodigester."

Scott Gilmore, director of global communications for Müller Quaker Dairy, claims that the company's yogurt making process doesn't produce whey waste because it adds in milk protein from strained milk to maintain consistency.

The suggestion that acid whey is some toxic material is just plain silly.

TINE FoU

# Application of UF-permeate and acid whey.

| | To deal with volume | To create a profit |
|---|---|---|
| **Sweet UF-Permeate** | • Feed | • Standardising proteincontent<br>  • SMP<br>  • Milk<br>  • Products<br>• Drying |
| **Acid Whey** | • Feed<br>• Substrate for fermentation (lactose) | • «Ricotta»<br>• Proteinconcentrates<br>• Recombine with dry dairybased ingredients (Arla-konseptet)<br>  • Whey drinks<br>  • Fresh cheeses<br>  • Dips<br>  • GY |

Lactose originated from acid whey is a challenge!

# From Waste to Value

- Restrawmaterials vs waste
- Volume vs (and?) profit


TINE FoU

# Consumer trends


plantbottle™