

New Generation Lactose Free Milk

DSS, A Tetra Pak Company

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Karsten Lauritzen
Director, Business Development



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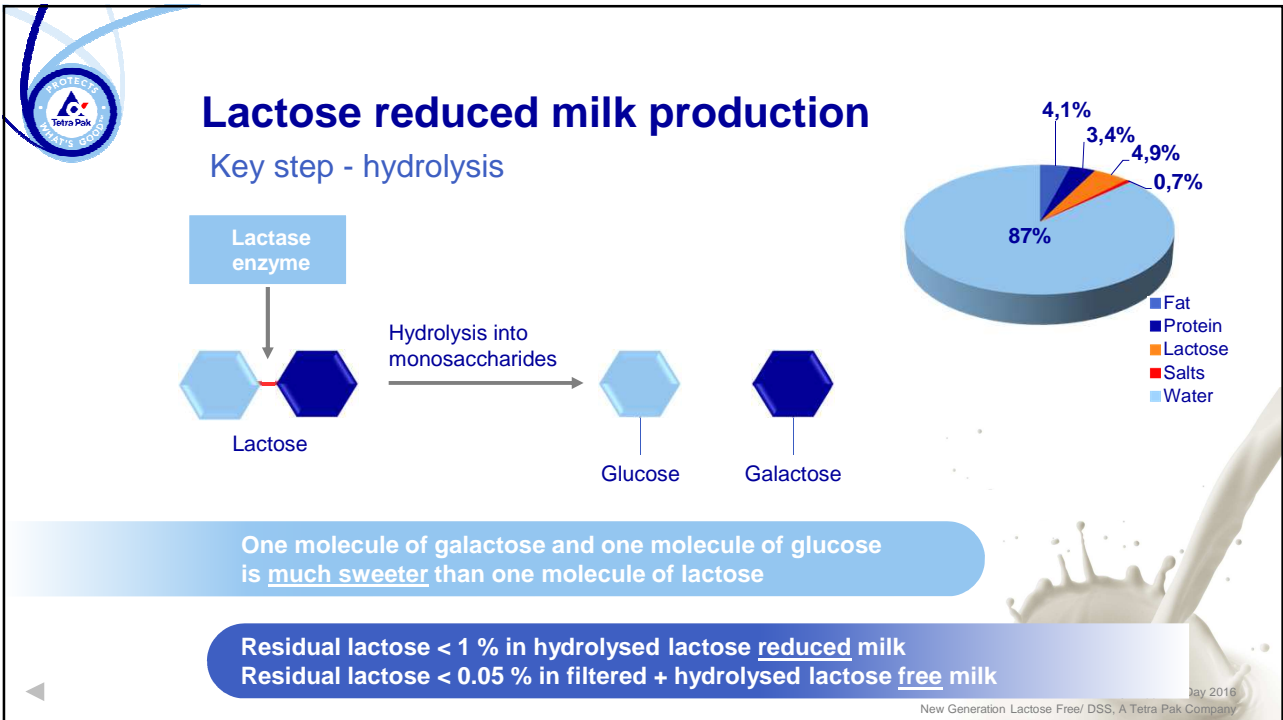


Agenda

- ▶ Lactose intolerance?
- ▶ Presentation of product samples
- ▶ Production concepts
- ▶ Hydrolysis or filtration and ESL processing alternatives



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Lactose free dairy products



Filtration
Carbohydrate 2.6 – 3,1%
Lactose < 0.01%



Hydrolysis
Carbohydrate 4.8%
Lactose < 0.1%

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Lactose free dairy products – UK



€1.87/ltr €1.90/ltr

Filtration – white milks



€1.96/ltr €1.83/250ml (€7.32/ltr) €2.23 for 4 €2.82/6750ml (€3.76/ltr)

Hydrolysis – flavoured milk & products

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Production concepts...

...for lactose free milk

- ▶ That offer unique benefits
 - Lowest investment concept or...
 - Concept for staying closer to original milk composition
 - High production efficiency
 - Attractive Total Cost of Ownership

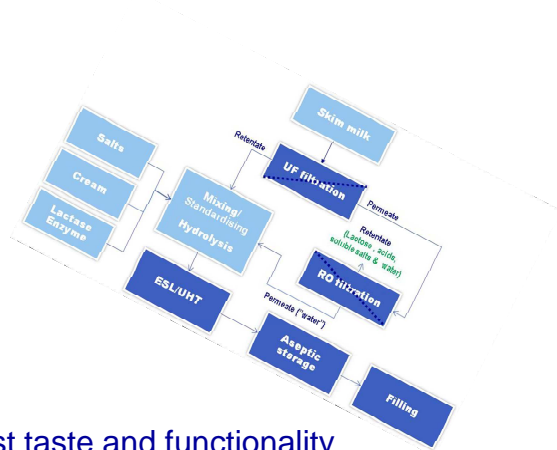






Low investment concept

Lactose free milk production

- ▶ Low investment – two alternatives
 - addition of potable water
 - recovery of water
- ▶ Simple process
- ▶ No protein loss possible
- ▶ Loss of vitamins, citric acid, salt
- ▶ Addition of ingredients/salts to adjust taste and functionality


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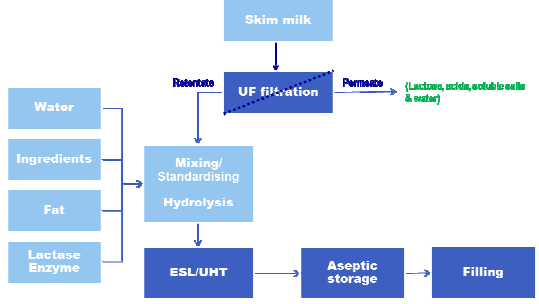


Low investment concept

Addition of potable water

- ▶ Lowest investment
- ▶ Usage of potable water needs to be declared on the package
- ▶ Dependency on water quality






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            graph TD
            SkimMilk[Skim milk] --> UF[UF filtration]
            UF --> Retentate[Retentate]
            UF --> Permeate[Permeate]
            Retentate --> Mix[Mixing/Standardising Hydrolysis]
            Water[Water] --> Mix
            Ingredients[Ingredients] --> Mix
            Fat[Fat] --> Mix
            Lactase[Lactase Enzyme] --> Mix
            Mix --> ESL[ESL/UHT]
            ESL --> Aseptic[Aseptic storage]
            Aseptic --> Filling[Filling]
            UF --> Waste["(Lactose, acids, soluble solids & water)"]
            
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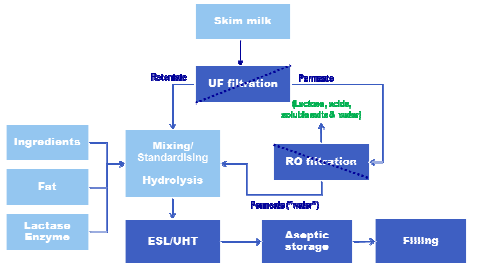


Lactose free milk production

Low investment concept – including recovery of water

- ▶ Recovers water from the original skim milk
- ▶ No dependency on water quality
- ▶ Less by-product generated in the process
- ▶ Slightly higher investment cost for RO filtration step

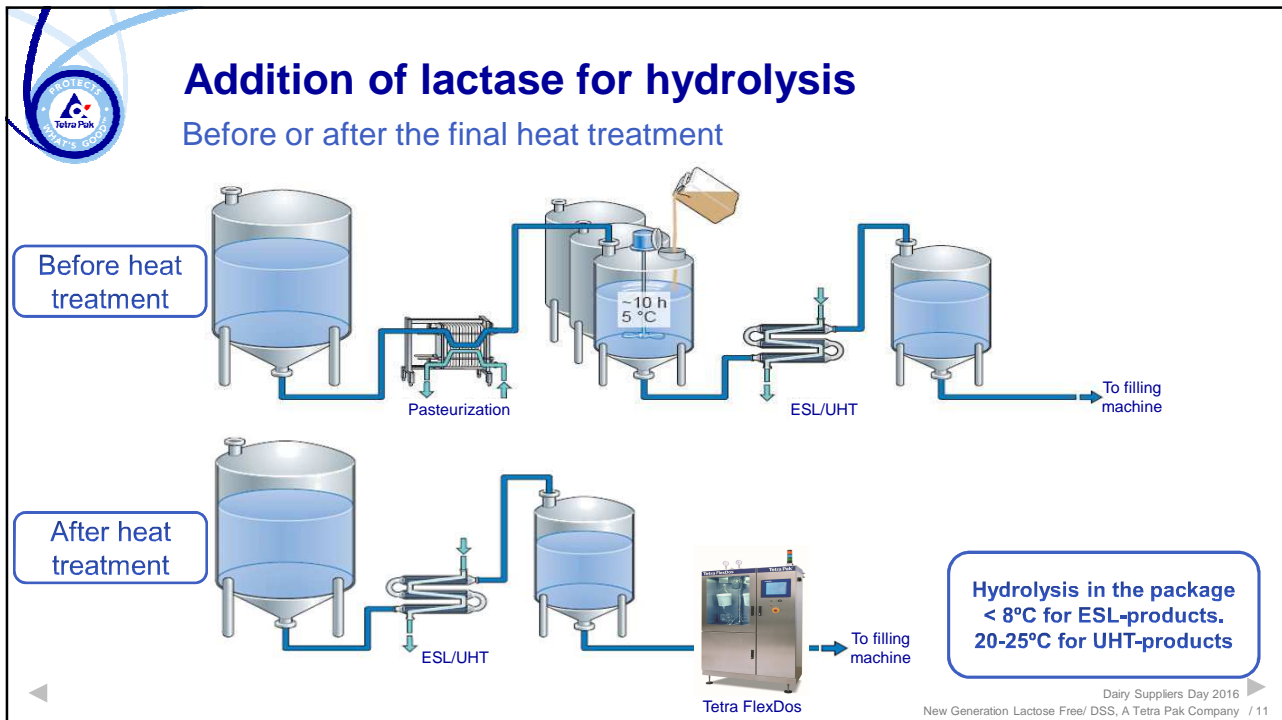




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            Mix --> ESL[ESL/UHT]
            ESL --> Aseptic[Aseptic storage]
            Aseptic --> Filling[Filling]
            UF --> Waste["(Lactose, acids, soluble solids & water)"]
            Permeate --> RO[RO filtration]
            RO --> WaterRecovery["Permeate (water)"]
            WaterRecovery --> Mix
            
```

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Quality impact of lactase hydrolysis
Hydrolysis before or after ESL/UHT treatment

- ▶ **Hydrolysis before heat treatment**
Increased tendency of browning due to Maillard reactions
- ▶ **Hydrolysis after heat treatment**
Risk of off notes when lactase is not inactivated.
Lactase quality important
- ▶ **General recommendations:**
Cold storage (4-8°C) to reduce the Maillard browning during shelf life

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Tetra Pak supports the growth of lactose free milk

Summary

- ▶ Tetra Pak offers new production concepts based on combined expertise in dairy and membrane technology
- ▶ Concept for minimum investment
 - The easy-step into the market
- ▶ Concept for taste and composition similar to normal milk
 - Holistic concept where use of by-product is also considered
 - Enabling of long running times on ESL/UHT-treatment
- ▶ Customized solutions to deliver **your** product of lactose free milk



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Karsten Lauritzen
Director, Business Development
karsten.lauritzen@tetrapak.com
www.dss.eu

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