

## **NEW ERA IN MICROBIAL COAGULANTS**

DANISH SOCIETY OF DAIRY TECHNOLOGY - APRIL 5, 2018

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- 1. Short introduction to CSK
- 2. Elements to choose the right coagulant
- 3. Landscape of coagulants
- 4. Characteristics of coagulants
- 5. Proteolysis
- 6. Experiences





## **INTRODUCTION TO CSK**



#### 15% of natural cheese worldwide produced made with CSK cultures

- International presence with focus on Europe and USA
- European market leader in Bulkstarter and Flavour Adjuncts
- Market leader in a number of European cheeses
- Market leader in Swiss type cheese
- Market leader in cheese coating and full range of coagulants







## CSK WAGENINGEN IN THE HEART OF THE FOOD VALLEY







## CSK is ready for the future with a new factory and innovation centre.







## OUR ROLE IN THE DAIRY INDUSTRY



## CHOICE OF COAGULANT









## **CONSUMER DEMANDS**



specific diets, flexitarian, vegetarian

> animal welfare

> > • I • •

Halal

# Kosher

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Organic

VLOG

## FUNCTIONALITY

- Clotting activity
- Protease activity
- Whey quality
- Yield
- Taste development
- Texture development









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## LANDSCAPE OF COAGULANTS

Туре	Source	Active enzyme	Non animal	Kosher	Halal	Organic	VLOG
Animal rennet	Mainly bovine stomachs	chymosin pepsin			√	✓	√
FPC coagulant	Typically from strains of Aspergillus niger and Kluyveromycis lactis	chymosin	V	✓	√		
Microbial coagulant	Typically from Rhizomucor miehei	mucor protease	V	√	~	~	✓
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## NEW ERA OF MICROBIAL COAGULANT

#### Milase<sup>®</sup> Premium

A food-grade natural enzyme preparation produced by fermentation of Rhizomucor miehei with increased specificity matching the performance of animal rennet.





## **MILASE<sup>®</sup> PREMIUM**

### **PROTEOLYSIS INTENSITY**

#### Very low

#### High

Flat flavour in young cheese

Risk of development of off-flavours during ageing

Delay in knitting

Fast degradation of texture during shelf life

**Milase<sup>®</sup> Premium – low proteolysis** 

Good flavour also at young age

No risk of development of off-flavours

Good knitting

Slower texture softening





## **RELEVANCE OF PROTEASES**



BRIDGE







## **PROTEOLYSIS SPECIFICITY**





## **PROTEASE ACTIVITY**



At cheese ripening conditions pH protease activity is significant lower for **Milase® Premium** whereas clotting activity is hardly effected.

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![](_page_14_Picture_4.jpeg)

## αs - CASEIN DEGRADATION

![](_page_15_Picture_1.jpeg)

Non treated α<sub>s</sub>-casein Milase<sup>®</sup> Premium Microbial Coagulant XL FPC

RP-HPLC analysis of digested  $\alpha$ s casein by several coagulant. (5 mg of  $\alpha_s$ -casein was digested by 50 unit coagulant at 35°C)

![](_page_15_Picture_4.jpeg)

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## $\beta$ - CASEIN DEGRADATION

![](_page_16_Picture_1.jpeg)

Non treated β-casein Milase<sup>®</sup> Premium Microbial coagulant XL FPC

RP-HPLC analysis of digested  $\beta$ -casein by several coagulant. (5 mg of  $\beta$ -casein was digested by 50 unit coagulant at 35°C)

![](_page_16_Picture_4.jpeg)

## **PROTEIN DEGRADATION IN CHEESE**

![](_page_17_Figure_1.jpeg)

![](_page_17_Picture_2.jpeg)

![](_page_18_Picture_0.jpeg)

## **EVALUATION CHEESE AT 25 WEEKS**

![](_page_18_Figure_2.jpeg)

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![](_page_18_Picture_3.jpeg)

## VARIATION

What is your cheese type?

- Natural (short or long) ripened
- Foil ripened
- Ripened in high temperatures
- Low fat cheese
- Fresh cheese
- Swiss type

.. to offer you what you need.

![](_page_19_Picture_9.jpeg)

![](_page_19_Picture_10.jpeg)

![](_page_19_Picture_11.jpeg)

## **INDUSTRIAL EXPERIENCES**

![](_page_20_Picture_1.jpeg)

Maasdam – shelf life extension with 3 month compared to regular microbial miehei rennet (Milase<sup>®</sup>XQL) based on flavour stability

Mozzarella – increased shelf life based on texture stability

Non ripened soft cheese – alternative to FPC based on organic statements

![](_page_20_Picture_5.jpeg)

![](_page_20_Picture_6.jpeg)

## **YOUR CHOICE**

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![](_page_21_Picture_1.jpeg)

![](_page_21_Picture_2.jpeg)

![](_page_21_Picture_3.jpeg)

## YOUR BENEFITS

- Excellent taste development
- No bitter off notes during shelf-life
- Supporting optimal texture development
- Suitable for any dietary requirement, Kosher and Halal
- No residues in your whey
- Not derived from GM sources
- Stable coagulation times
- Specific activity to case in resembling the animal rennet
- Potentially improving cheese yield

![](_page_22_Picture_10.jpeg)

![](_page_22_Picture_11.jpeg)

## TAKE-HOME MESSAGE

![](_page_23_Picture_1.jpeg)

**Milase<sup>®</sup> Premium** is the next generation microbial coagulant:

Application:

- Improved texture stability (rindless gouda, mozzarella)
- Improved flavour stability (traditional gouda, low fat gouda, maasdam)

No declaration issues:

- Clean labelling
- VLOG / non GMO-derived
- Kosher, Halal
- Organic

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![](_page_23_Picture_12.jpeg)

# Milase<sup>®</sup> Premium

taste can build the bridge