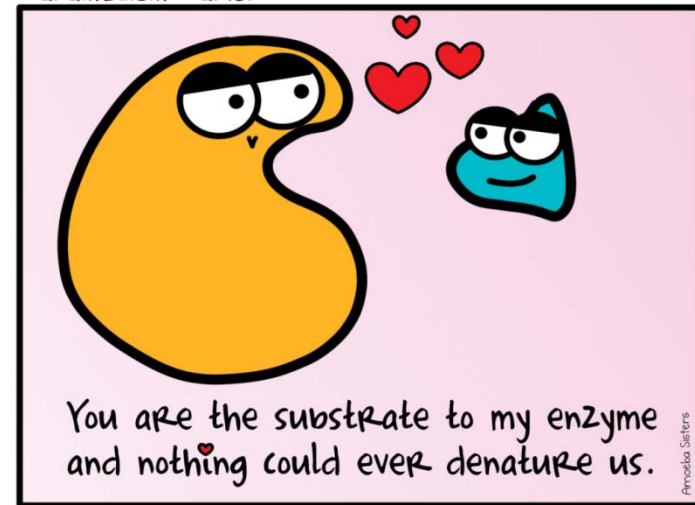


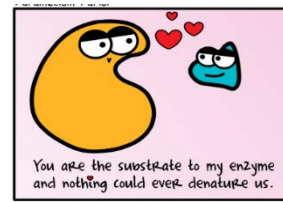
Development of New Dairy Enzymes at Chr. Hansen

Hans van den Brink, Chr. Hansen A/S

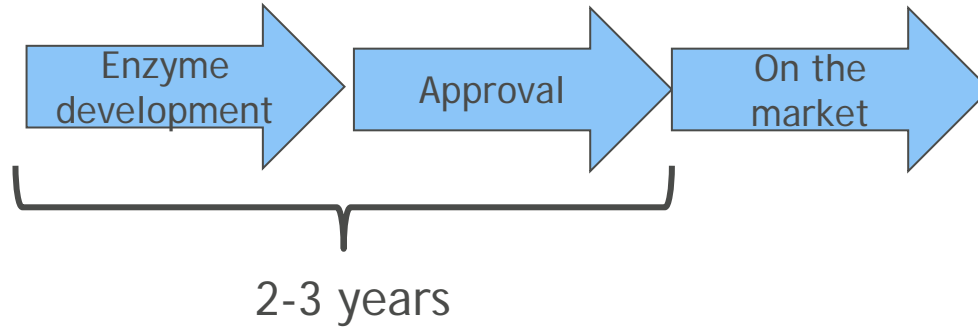
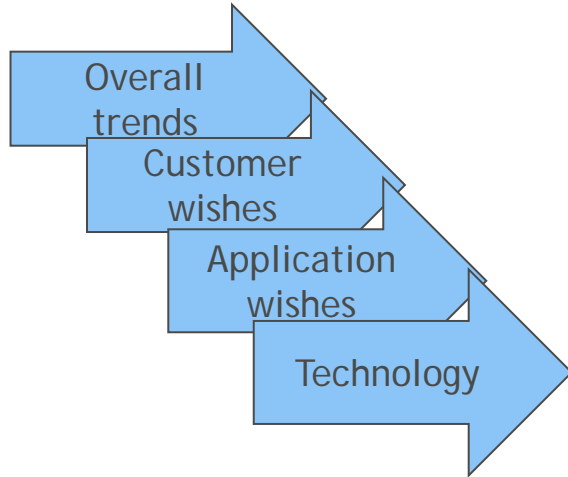
- Introduction
- Camels and cheese
- Texture in low fat yoghurt



Development of New Dairy Enzymes

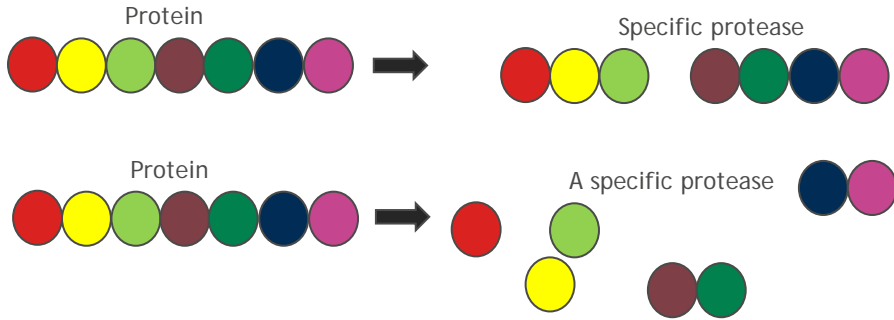


GLOBAL



Chymosin /Osteløbe

- ▶ Chymosin is a very specific protease

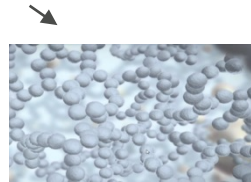
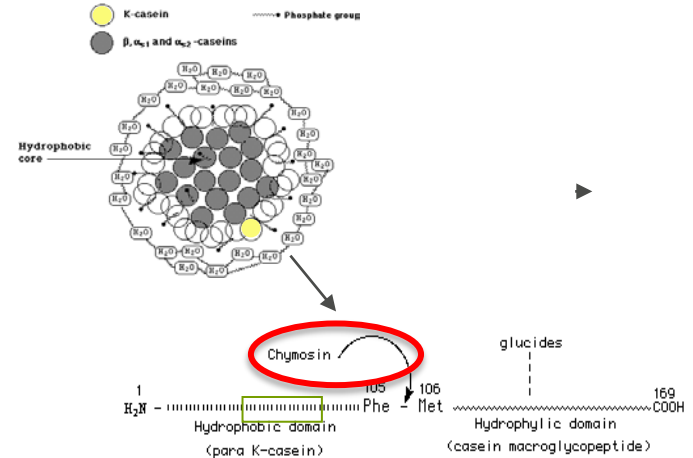


- ▶ High activity at Phe105-Met106

- ▶ Low activity on other caseins

- ▼ Yield

- ▼ Bitterness

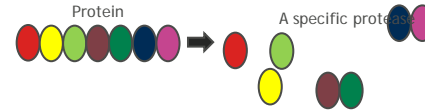


A **good** rennet has :

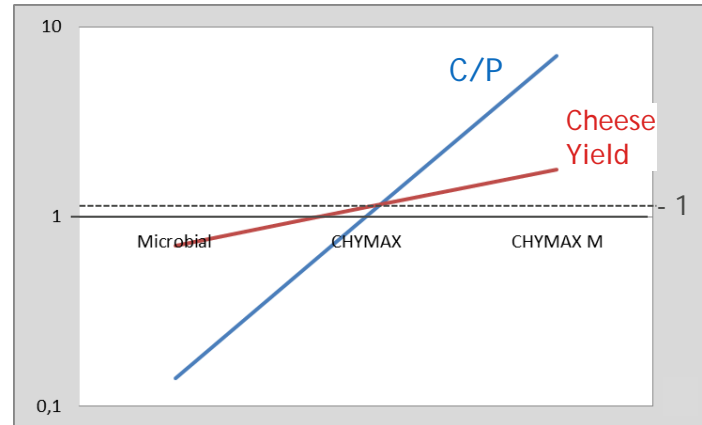
- High Clotting activity (**C**)



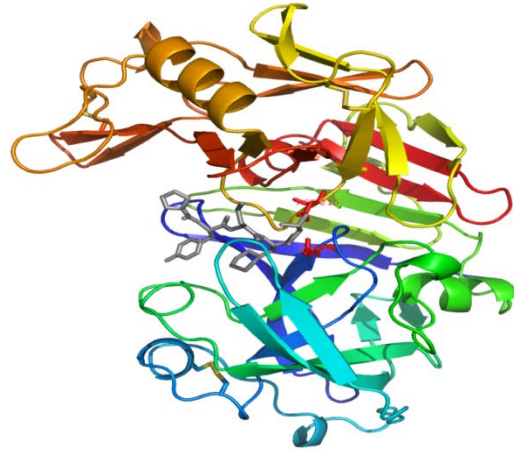
- Low aspecific Protease activity (**P**)



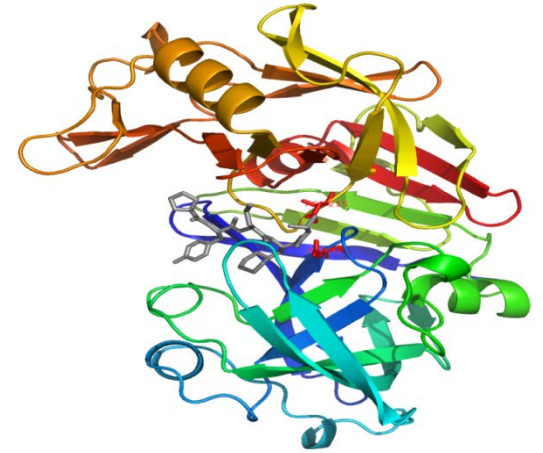
Resulting in a high **C/P ratio**



- Collaboration with ETH on camel chymosin



Bovine chymosin



Camel chymosin

➤ Overexpression of camel chymosin in *Aspergillus*

<http://www.camelgate.com/>

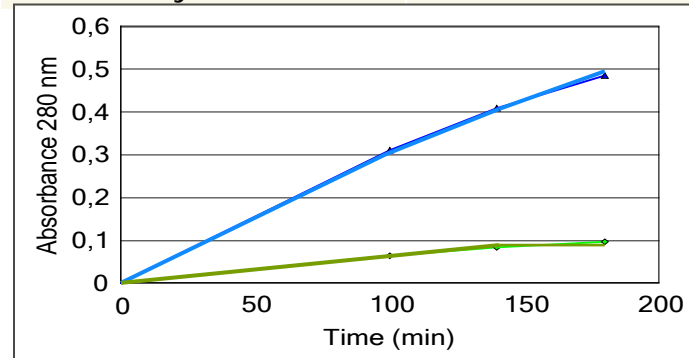
Camel Chymosin efficiently clots Bovine milk

Clotting (cow's milk)

	Clotting
Bovine chymosin	100 %
Camel chymosin	100 %

Aspecific proteolytical activity (cow's milk)

	Proteolytic
Bovine chymosin	100 %
Camel chymosin	14 %



Camel chymosin has 7x higher **C/P** ratio with **Cow's milk**

- Less off-taste
- More cheese (0.2 %)

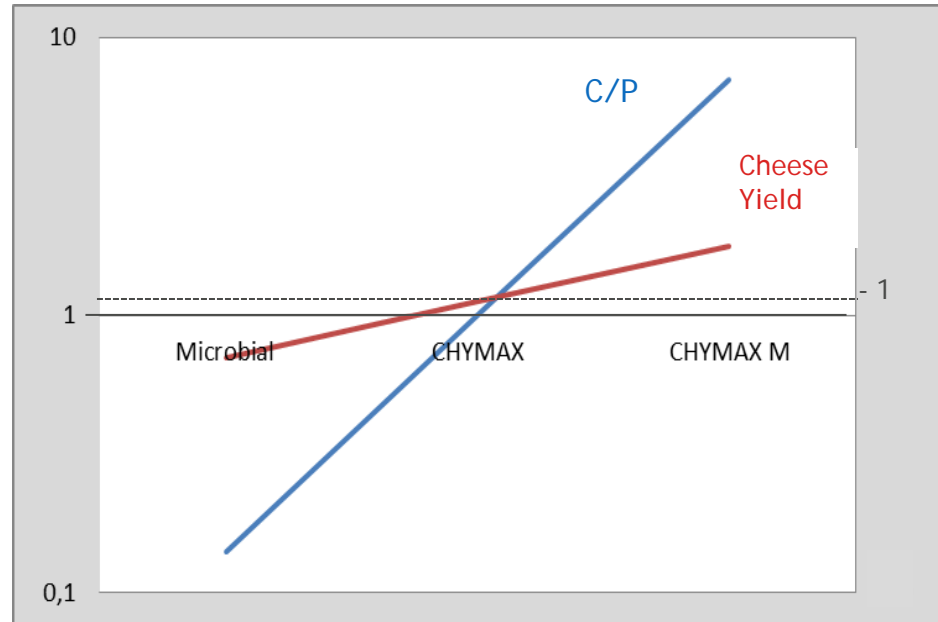
Camel chymosin is a superior clotting enzyme for bovine milk

A **good** rennet has :

- High Clotting activity (**C**)
- Low aspecific Protease activity (**P**)

Resulting in a high **C/P ratio**

Higher Cheese Yield
Lower bitterness



Example 2

Texture in dairy; Can we use enzymes to help



frozen culture

General dairy trend: **LOW**

- Low fat
- Low sugar
- Low calories
- Low salt

But:

Same taste, same texture.....



The challenge of a good low fat yoghurt

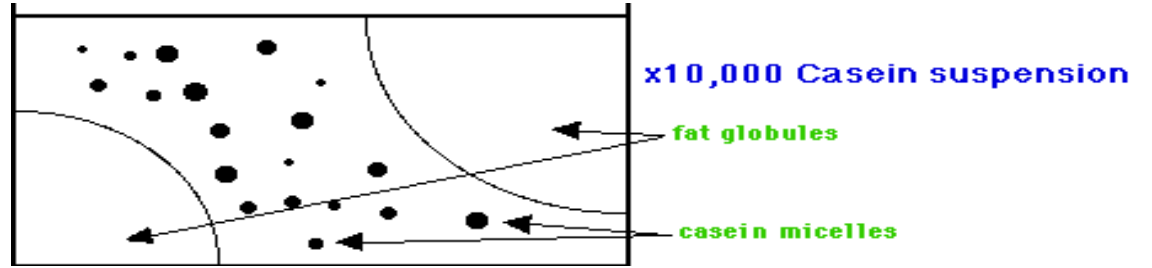
► Challenges

- ▼ Texture; Gel firmness + Viscosity is down
- ▼ Syneresis is up
- ▼ Protein enrichment; Costly (2% SMP is €65/ton of milk; Prices rising)
- ▼ Protein enrichment; Calories up
- ▼ Stabilizers; Labeling issue

Can we use Enzymes ??



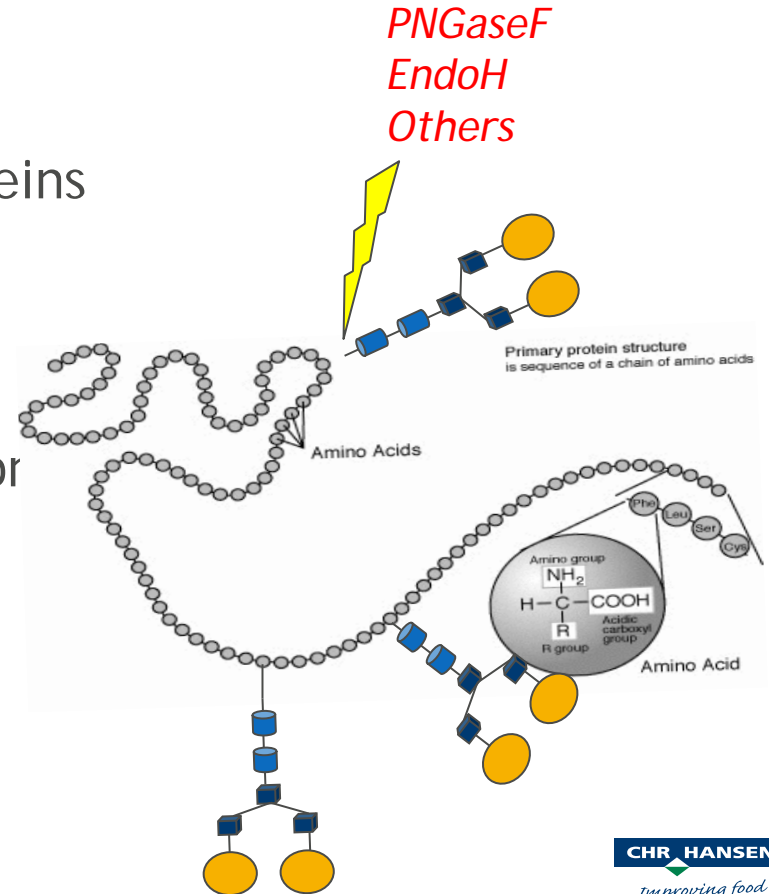
“Texture” in cheese



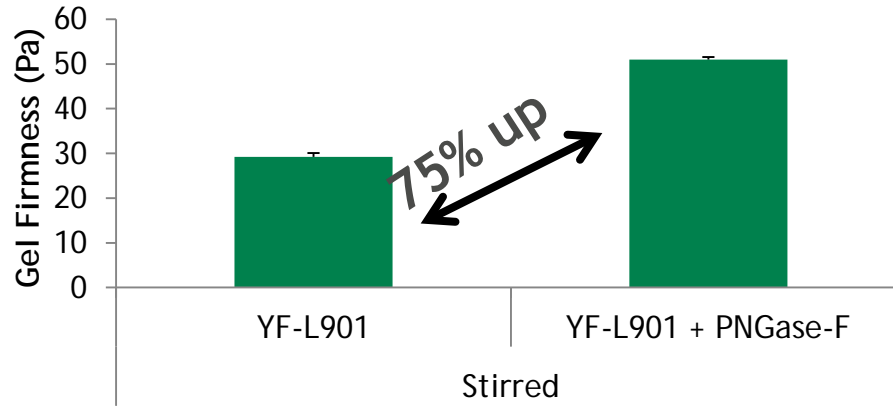
Deglycosylation for texture

► Deglycosylation

- ▼ Removal of sugar groups from proteins
 - ▼ Whey proteins only
 - ▼ Reduced water solubility
 - Increased network formation
 - ▼ Limited substrate in mik



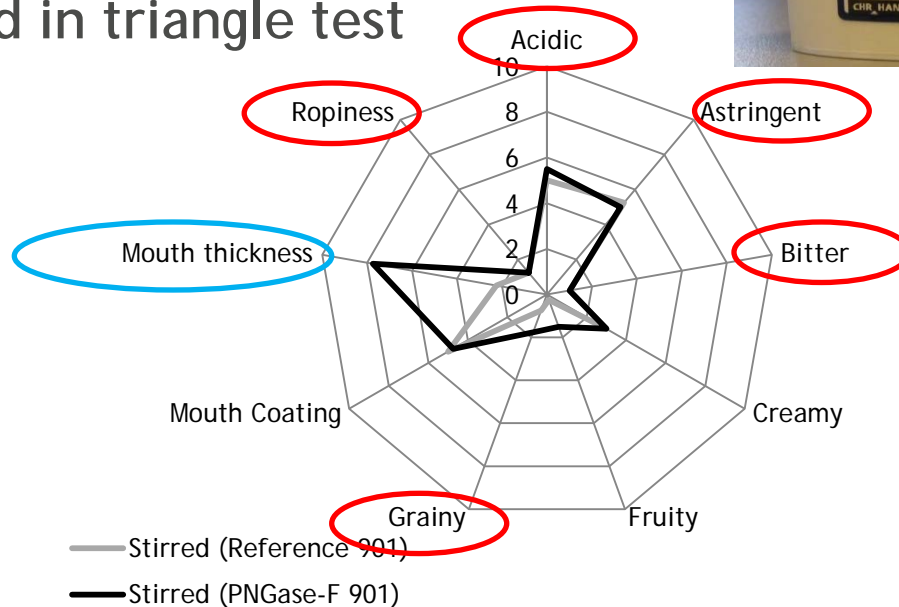
PNGase-F improves gel firmness in yoghurt



- ▶ YF-L901 texturizing culture (High in gel firmness)
- ▶ PNGase-F dosing 250 U/ml milk, 0.5 ppm

Sensoric evaluation

- ▶ Strong positive effect on the descriptors gel firmness and **mouth thickness**
- ▶ None of the “**negative descriptors**” affected
- ▶ No off-flavors detected in triangle test



Conclusions

- ▶ Development of new dairy enzymes is a major effort
- ▶ New dairy enzymes can change your daily life
 - ▼ Higher yield
 - ▼ Lower Cost in use
 - ▼ New properties