

Fermented milks - Moscow 2007



The structure dimension of sensory perception in fermented milks

Lisbet Bjerre Knudsen, Arla Foods

&

Michael Bom Frøst, Univ. Copenhagen, Faculty of Life Sciences



Agenda

- A consumer perspective on fermented milks -
Case study
- Research challenge:
 - Measuring the structure dimension
 - Understanding perception of consistency
- Taking advantage of research results in
creation of creamy low fat products

Take home messages

- Much emphasis has been put into measuring viscosity - but there is something more important...
- ... Which can now be measured instrumentally!
- By understanding and exploiting the possibilities for creation of a creamy microstructure we can make excellent low fat products

A consumer perspective on fermented milks

- In-home-test answered by 530 Danish consumers
- Every consumer had 6 plain fermented products in neutral beakers (blind test)
- Each consumer evaluated a combination of 6 samples (uncomplete, balanced block design), which means that each product was evaluated 180-200 times.



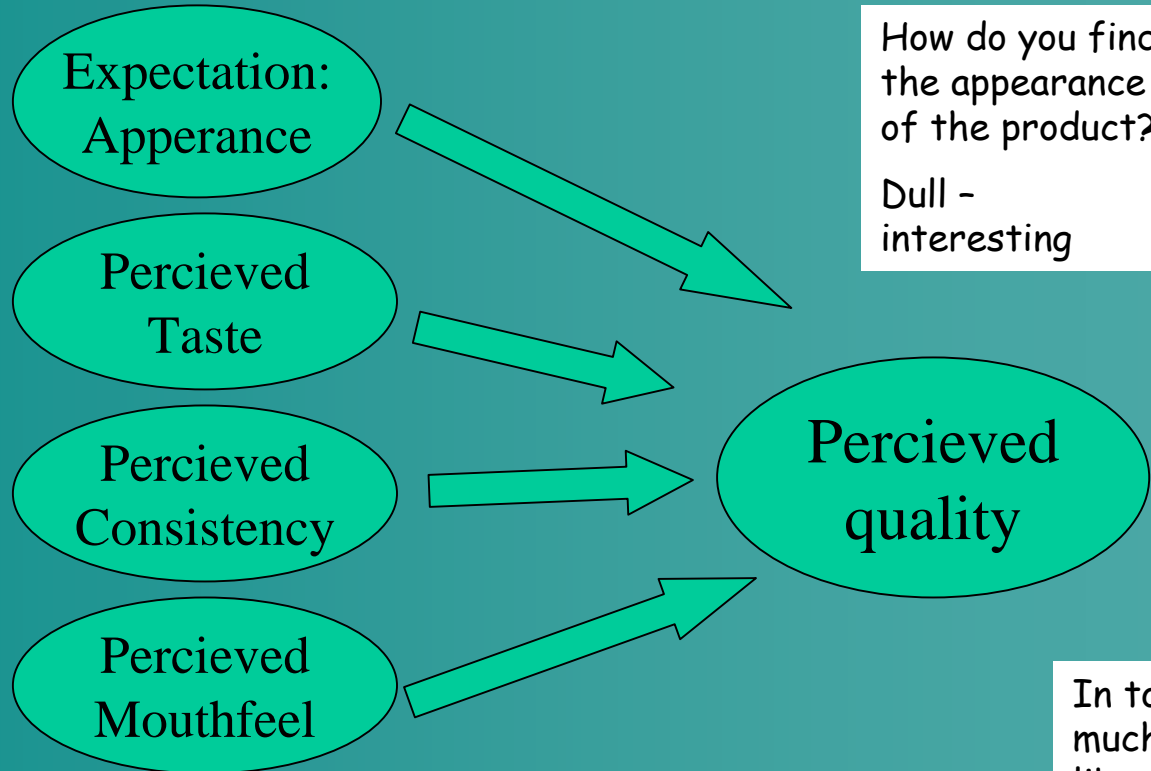
A consumer perspective on fermented milks

19 Samples (13 market and 6 from experimental design) spanning the product area of plain, stirred-type fermented products in Denmark - which is spoonable products used for breakfast mainly.



A consumer perspective on fermented milks

Sensory analyses
Microstructure
Viscosity
Stability
Chemistry



How do you find the appearance of the product?

Dull - interesting

Percieved quality

How do you find the taste of the product?

Very bad - very good

How do you find the mouthfeel of the product?

Very thin - very thick

How do you find the consistency of the product?

Very unpleasant - very pleasant

In total - how much do you like the product?

A consumer perspective on fermented milks

Conclusions from our study (1)

There is no difference in the way the consumers evaluated product properties !

when presented to "blind" samples of plain fermented milk.

When applying other dimensions: Organic, fat level, brand, flavour, price etc., differences appear and explains why consumer segments differ in buying behaviour.

This first conclusion implies that our findings are very general and valid (within this market)

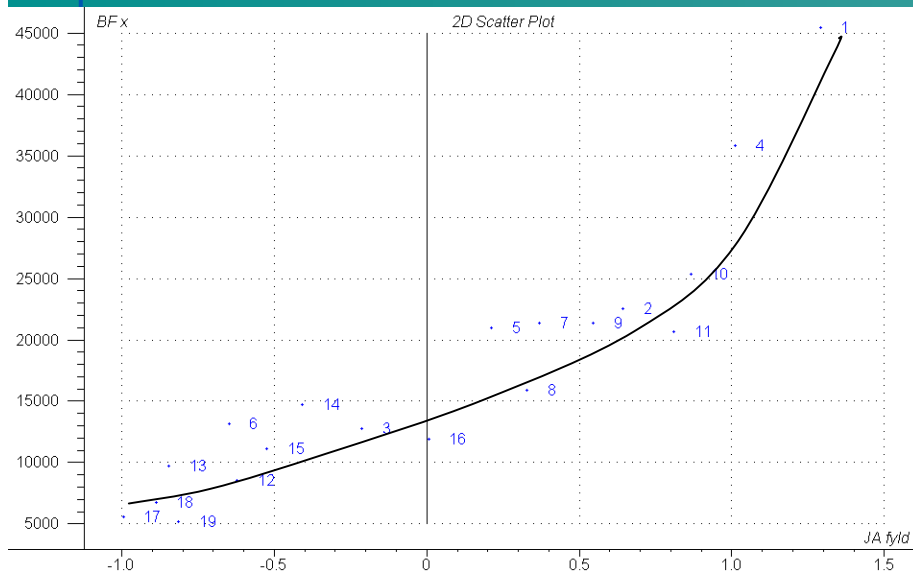
A consumer perspective on fermented milks

Conclusions from our study (2)

Consumers can “measure” viscosity – when asked how thin or thick a product is

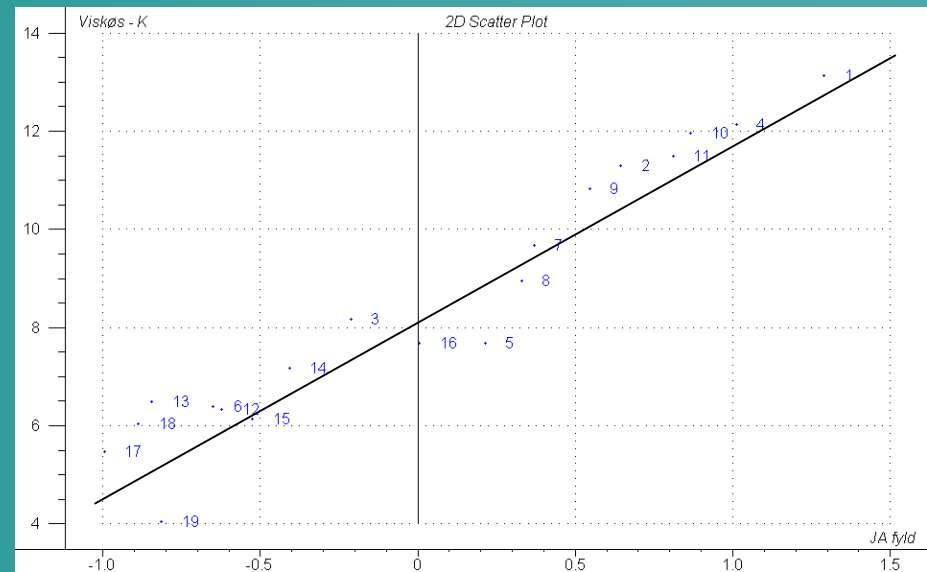
A consumer perspective on fermented milks

Viscosity



Consumer perception of thin - thick

Sensory expert panel, viscosity



Consumer perception of thin - thick

A consumer perspective on fermented milks

Conclusions from our study (2)

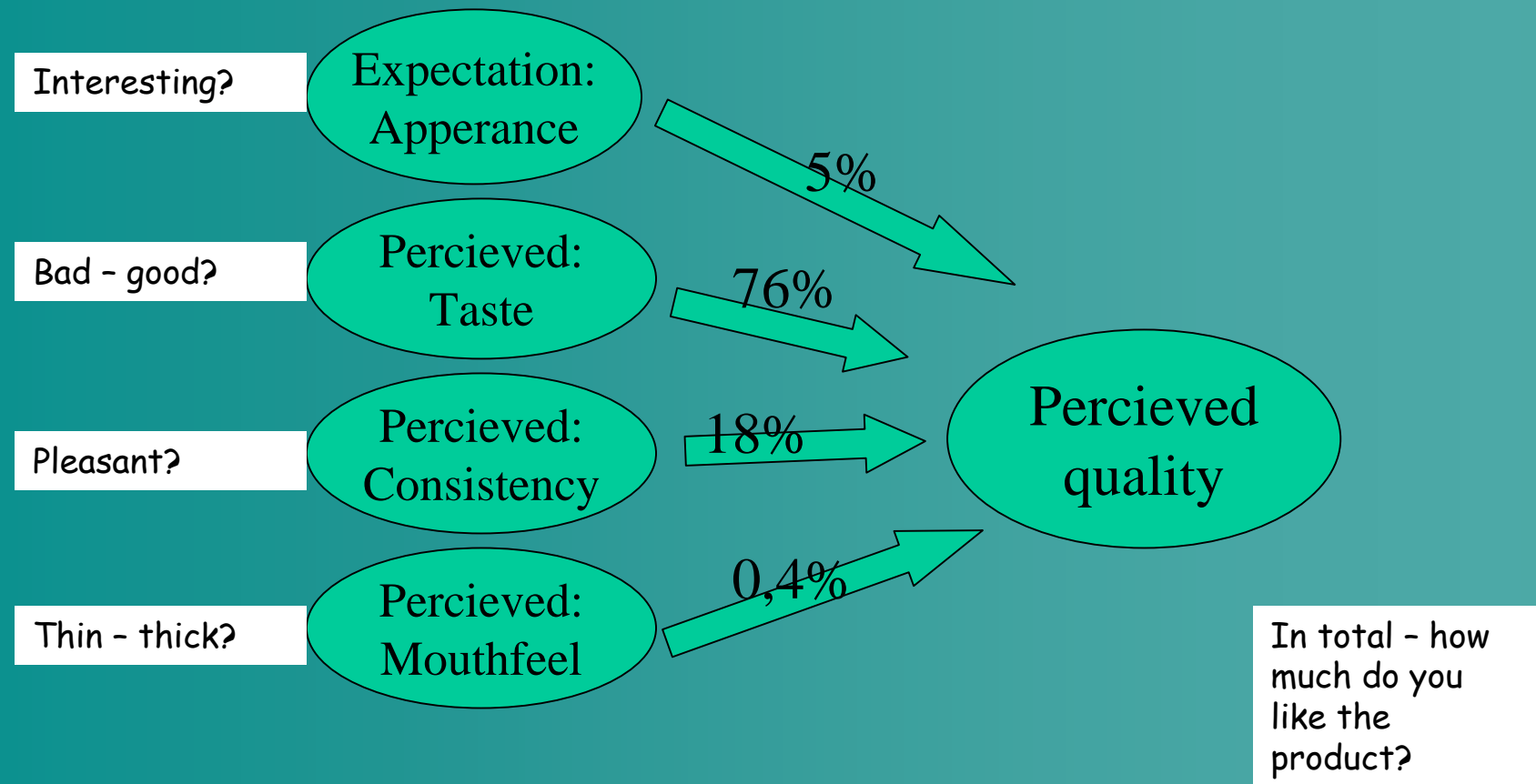
Consumers are sensitive to viscosity

Viscosity is the most used quality measure of fermented products, and the topic of many articles

But is it important?



A consumer perspective on fermented milks



A consumer perspective on fermented milks

Conclusions from our study (3)

The consumers overall liking of the products is mainly influenced by taste, and to a lesser degree consistency

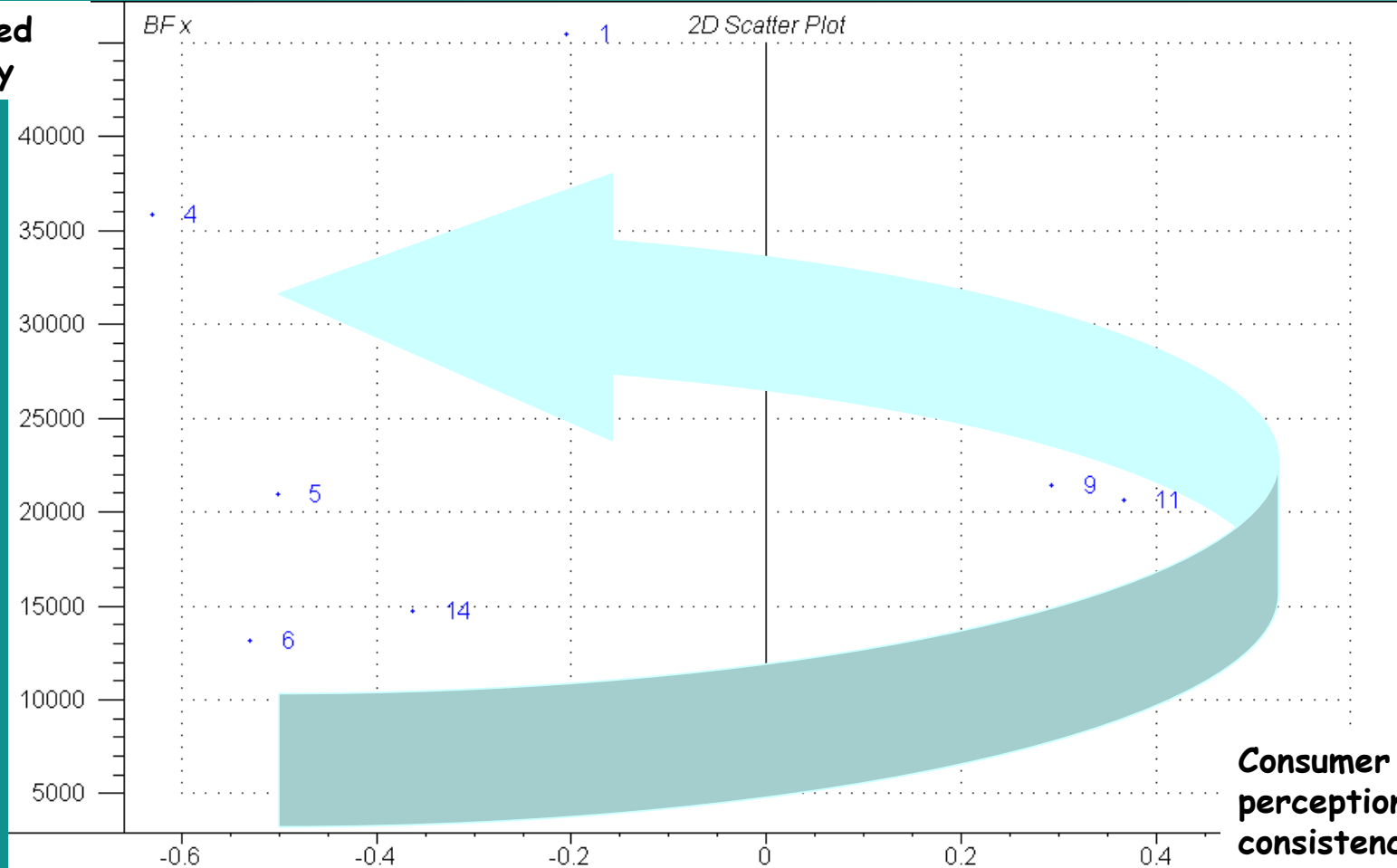
- and viscosity is not well correlated with liking

But maybe there is more to it....



A consumer perspective on fermented milks

Measured viscosity



Consumer perception of consistency

Non pleasant

very pleasant

A consumer perspective on fermented milks

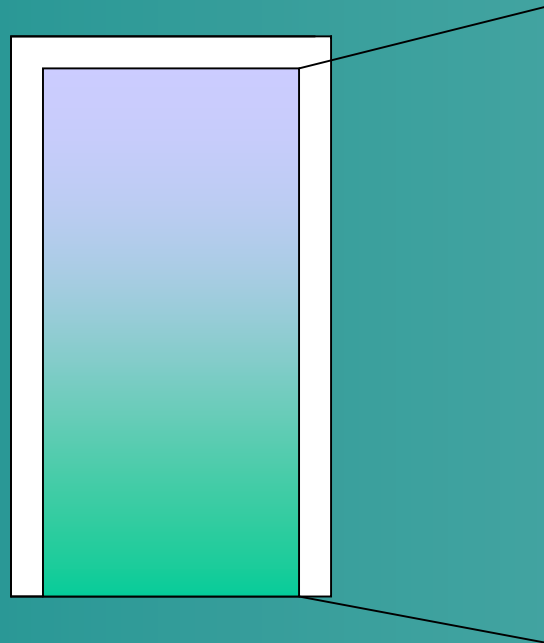
Conclusions from our study (4)

Consumers know what they do *not* want: they do not want graininess, airbubbles, or too thin OR THICK a consistency!

This third conclusion implies that consistency to the consumer is a mix of appearance, structure and viscosity - and a matter of rejection if not OK

A consumer perspective on fermented milks

Conclusions from our study (4)



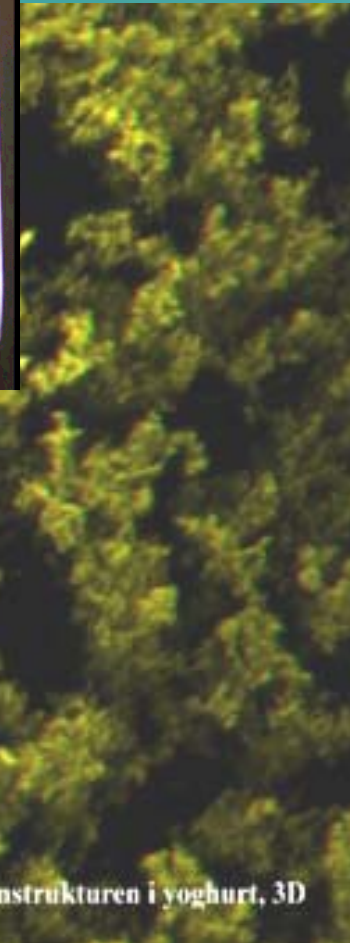
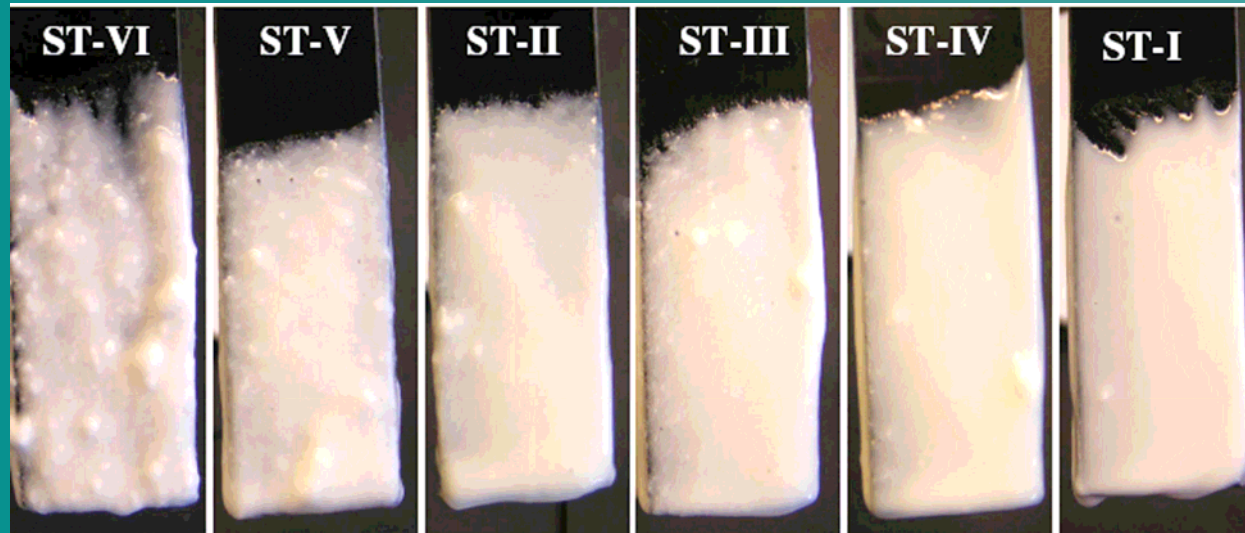
Make the right consistency and pass on....
- the consumers will appreciate the flavour!

A consumer perspective on fermented milks

We found that at that time, we were able to measure some microstructural features, but

- We needed precise methods for measuring appearance (macrostructure)
- We needed understanding of the influence of structure on perception of creaminess

Research challenge: Measuring the structure dimension



Proteinstrukturen i yoghurt, 3D

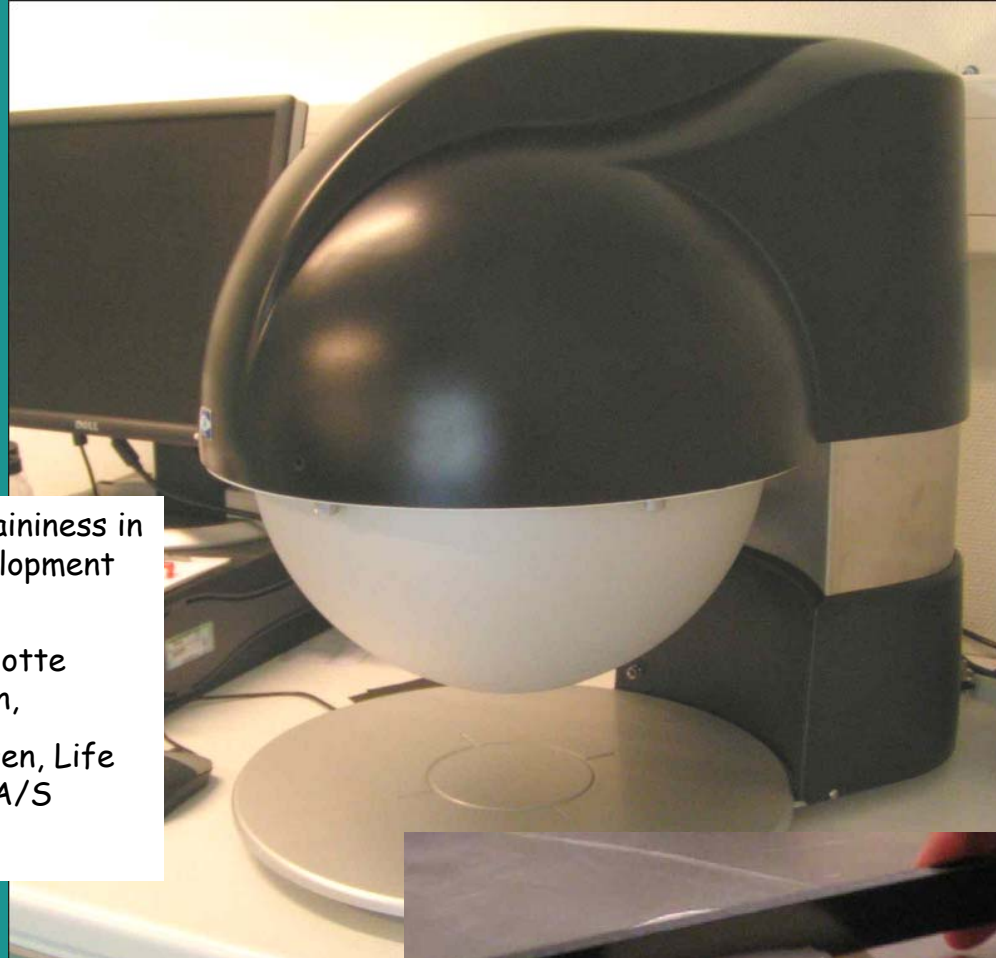
Research challenge: Measuring macro structure

The phenomenon of *Graininess* in Yoghurt - method development and application.

Kathrine Købke & Charlotte Clemen Keinicke Hansen,

University of Copenhagen, Life Sciences, and Danisco A/S

Master thesis 2006

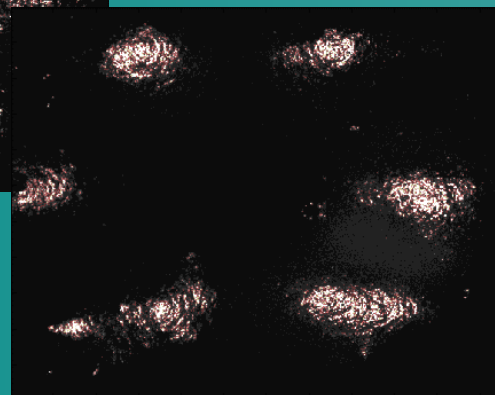
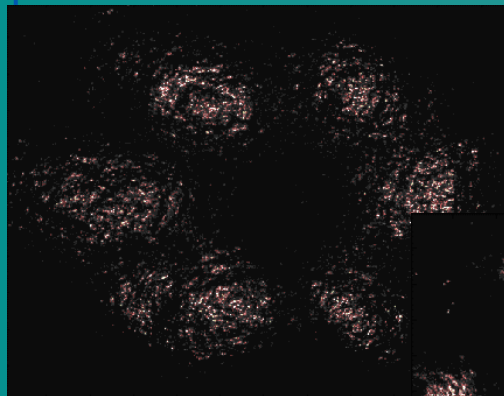
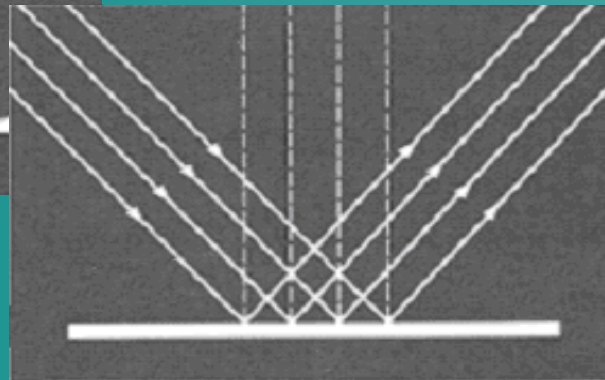
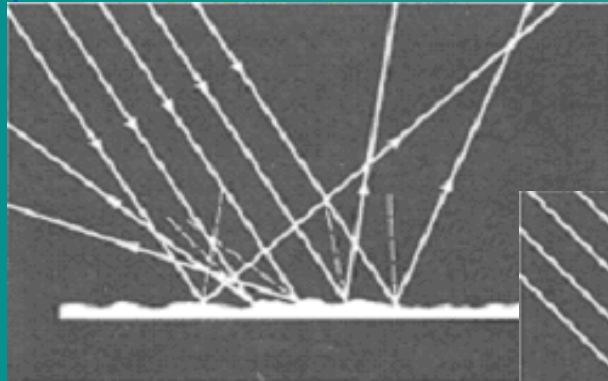


Videometer A/S
Lyngsø Allé 3
DK-2970 Hørsholm
Tel. +45 45761077
Fax +45 45761041

www.videometer.com
mail@videometer.com



'The Surface gloss method' Videometer



- Ring light: 6 diodes (637 nm)
- Photos by digital camera
- Pixels converted to Image feature extraction parameters
- Different patterns of the pixels (light intensity)
- Multivariate data analysis (PLS-1 model based on a reference method)

Taking advantage of research results - creation of creamy low fat products

Creaminess is system dependent

- in acidified milk drinks and e.g. cream cheese, there is a straight forward relationship between texture properties and creaminess
- in plain yoghurt the relationship between structure and creaminess is more complex...

Michael Bom Frøst, 2006. One of more conclusions from a 3 year projet on creaminess of dairy products

Taking advantage of research results - creation of creamy low fat products

In order to obtain a high creaminess
the viscosity must not be too low or high, and graininess has to be absent
- certain flavours affect the perception of creaminess

Michael Bom Frøst, 2006. One of more conclusions from a 3 year projet on creaminess of dairy products:

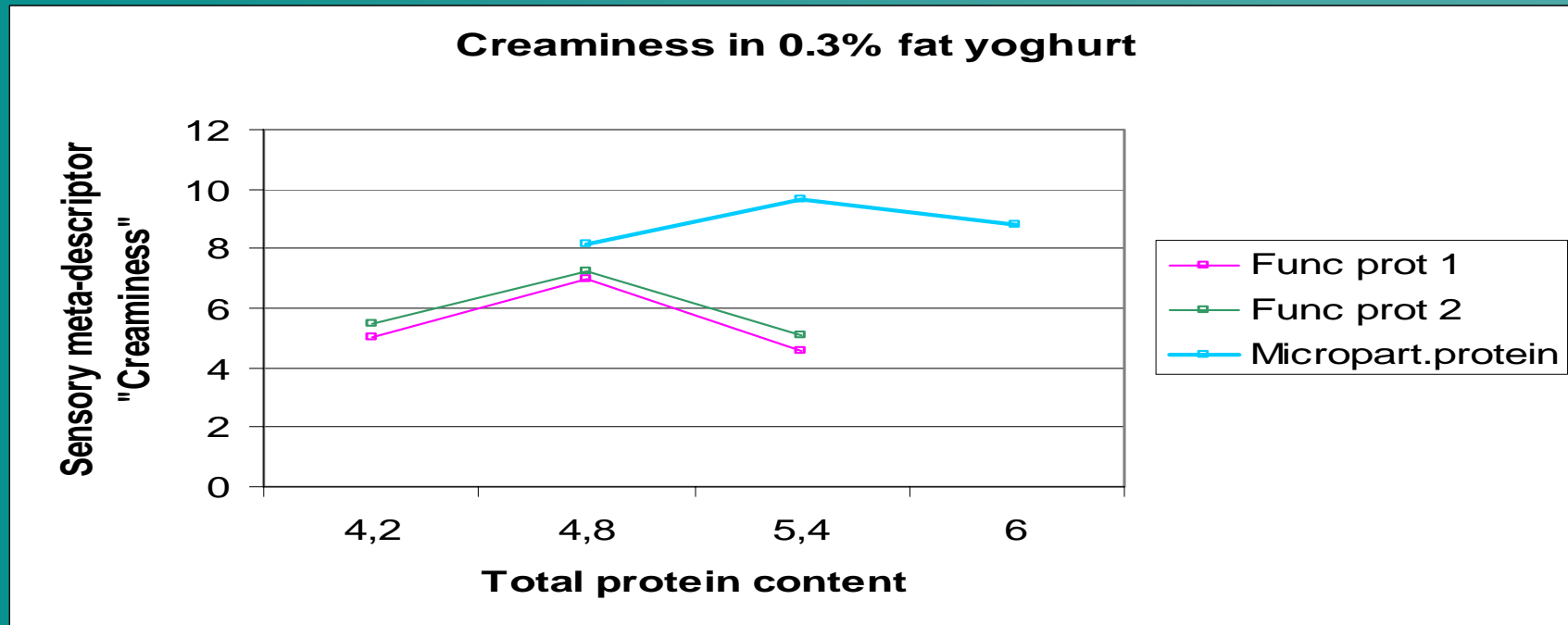
Frøst, M.B.& Janhøj, T. Understanding Creaminess. International Dairy Journal (2007): doi10.1016/j.idairyj.2007.02.007



Creaminess in low fat yoghurt

- We have used the knowledge of and ability to measure creaminess

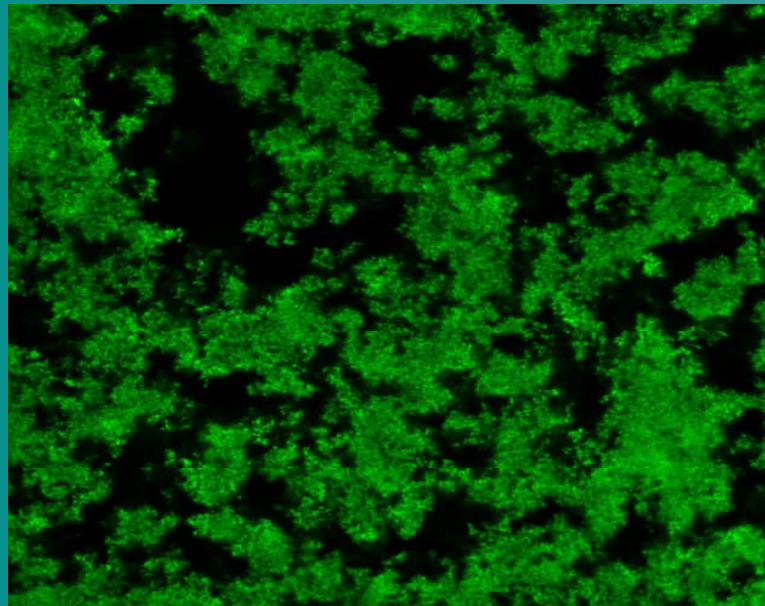
Creaminess in low fat yoghurt



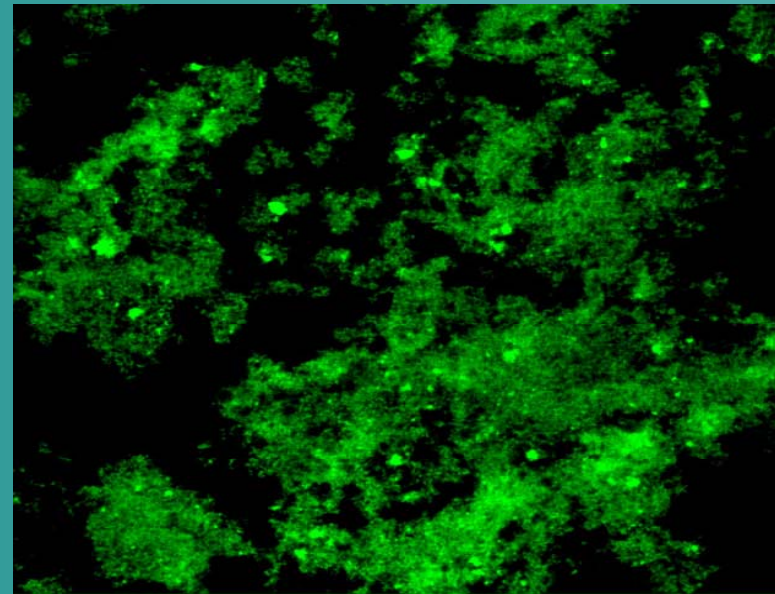
Extract of results created by Susanne Bølling Johansen, under supervision of Michael Bom Frøst and Richard Ipsen. Master of Science Project report, The Royal Veterinary and Agricultural University (Now Copenhagen University, Faculty of Life Sciences), March 2004.

Creaminess in low fat yoghurt

Arla Foods Ingredients, Business Area Functional Milk Proteins
Applications - Creaminess in Stirred Yoghurt



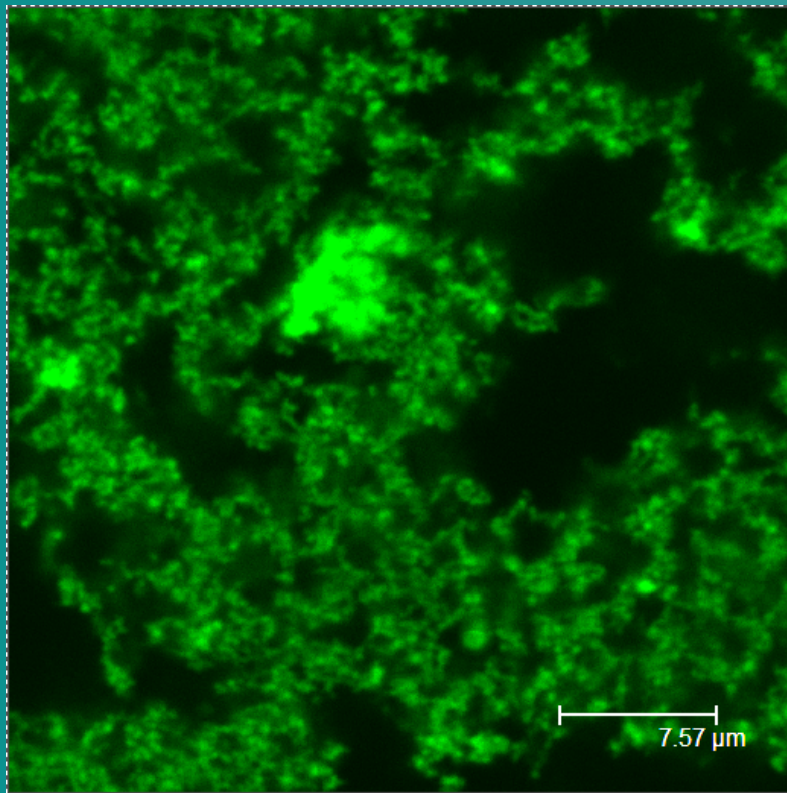
Native WPC



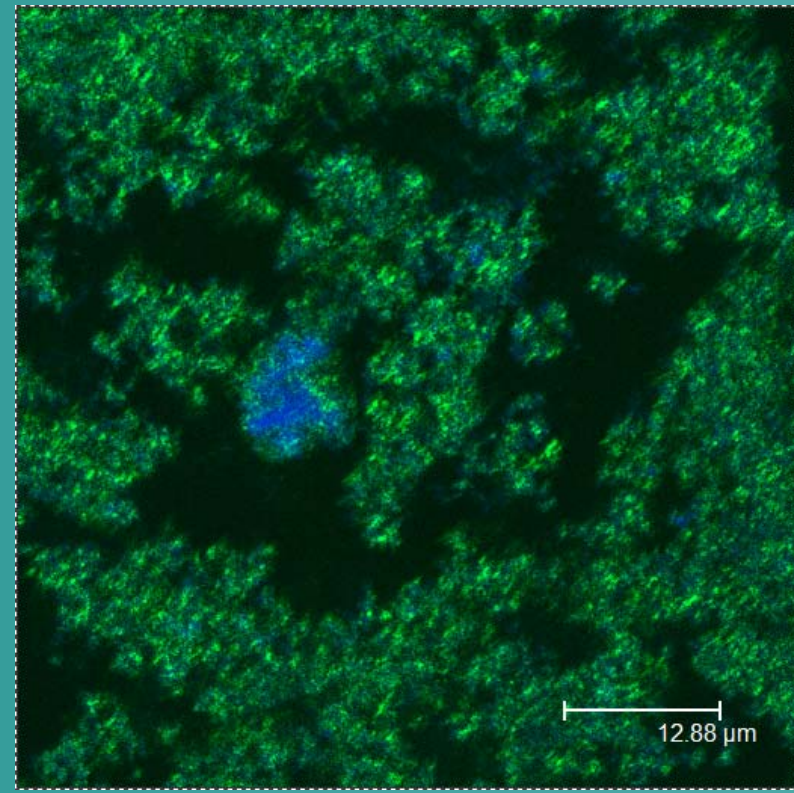
Microparticulated WPC

Creaminess in low fat yoghurt

Arla Foods Ingredients, Business Area Functional Milk Proteins
Applications - Creaminess in Stirred Yoghurt



Protein dye, FITC



WPC specific dye (in blue), DMNERF
+ reflection (green)

Conclusion

- There is something more important to the consumers than viscosity: Visual impression and creaminess
- Graininess can now be measured instrumentally - and will supplement measures of microstructure in *describing consumer perception of consistency*
- By understanding and exploiting the possibilities for creation of a creamy microstructure, we can make excellent low fat fermented milk products!

Thank you for your attention!

Contact addresses



Lisbet Bjerre Knudsen, Arla Foods Corporate R&D, Skanderborgvej 277,
Århus, Denmark

lbk@arlafoods.com

www.Arlafoodsingredients.com



Michael Bom Frøst, University of Copenhagen, Faculty of Life Sciences,
Rolighedsvej 30, Frederiksberg, Denmark

mbf@life.ku.dk

