



Nuove potenzialita' di valorizzazione del siero

Convegno DairyTech
2 Dicembre 2014

Erika Silletti, Ph.D.
Erika.Silletti@nizo.com



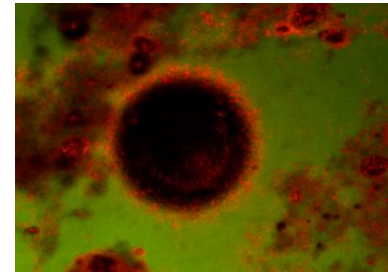
Together to the next level

Protein functionality

alla scoperta delle completa potenzialita' delle proteine

- Introduzione
 - 65 anni di storia, 65 anni di applicazioni
- Aggregazione proteine siero
 - Heat-induced gelation vs cold gelation
- Proteine del siero e percezione sensoriale
 - Gel
 - Fibre di proteine del siero
- Proteine del siero, sazieta' e massa muscolare
- Idrolisati
- Clean label

Innovazione
NIZO



Dairy

NIZO Protein Centre

65 proud years!

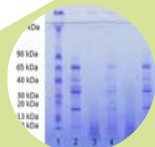
1960

start milk protein research

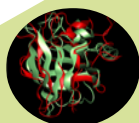


Analytical methods

Milk protein analysis



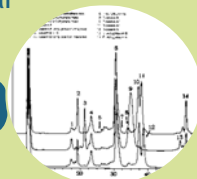
structural studies



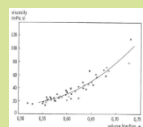
casein sub-micellar structure

1980

genetic variants



Concentration of milk



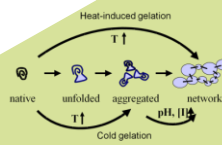
Separation technology

Bioactivity



1990

β -lactoglobulin aggregation model

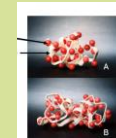


Cold gelling of whey proteins

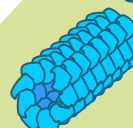


2000

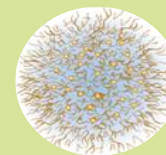
Complex coacervation



α -lactalbumin nanotubes

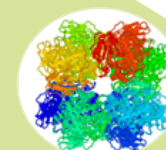


CaP-nanoclusters



2010

Extraction RuBiSco



Non-dairy

Functionality in applications

Physical/enzymatic modification technology

Together to the next level

Dairy



Well-tasting recovery drink



Tailor-made caseinate



Potato sport drink



Soluble keratins



Stable acid soy drink



Less fouling

Non-dairy



Fresher taste



Pardano



Control of viscosity yoghurt

WPI

WPC



Kernhemmer

Whey powder



Analytical methods

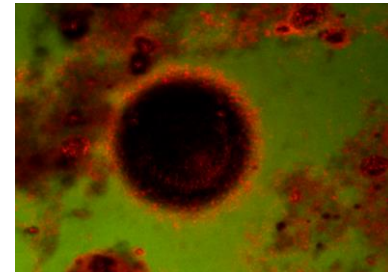
Separation technology

Physical/enzymatic modification technology

Functionality in applications

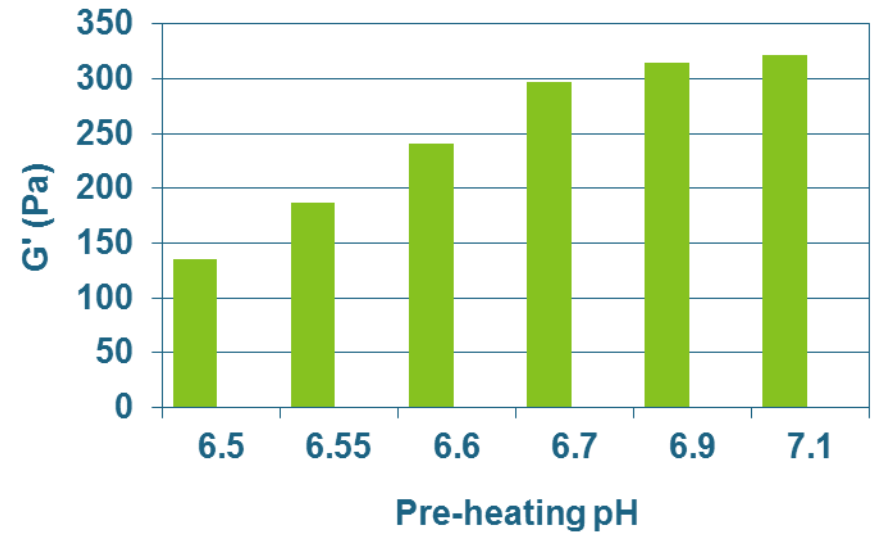
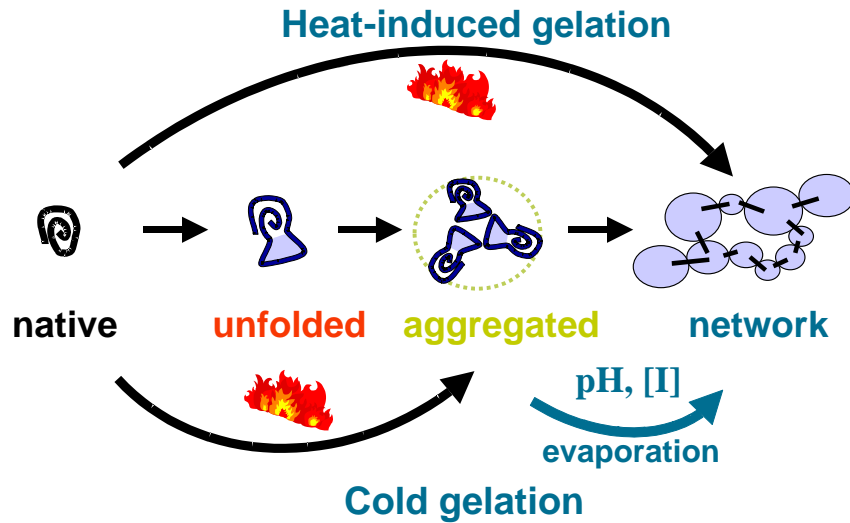
Protein functionality

alla scoperta delle completa potenzialita'delle proteine



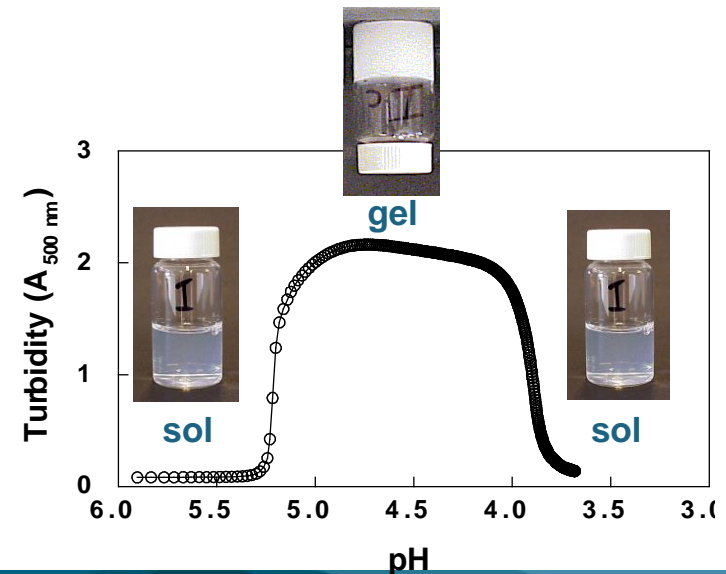
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 - 65 anni di storia, 65 anni di applicazioni
- **Aggregazione proteine siero**
 - **Heat-induced gelation vs cold gelation**
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Formazione del gel



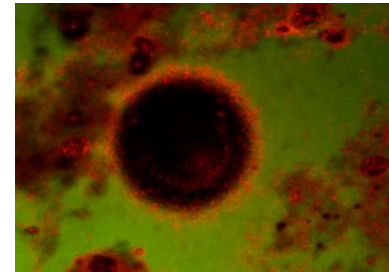
Aumento della "firmness" del gel a parità di % proteine =>

Potenziale riduzione dei costi



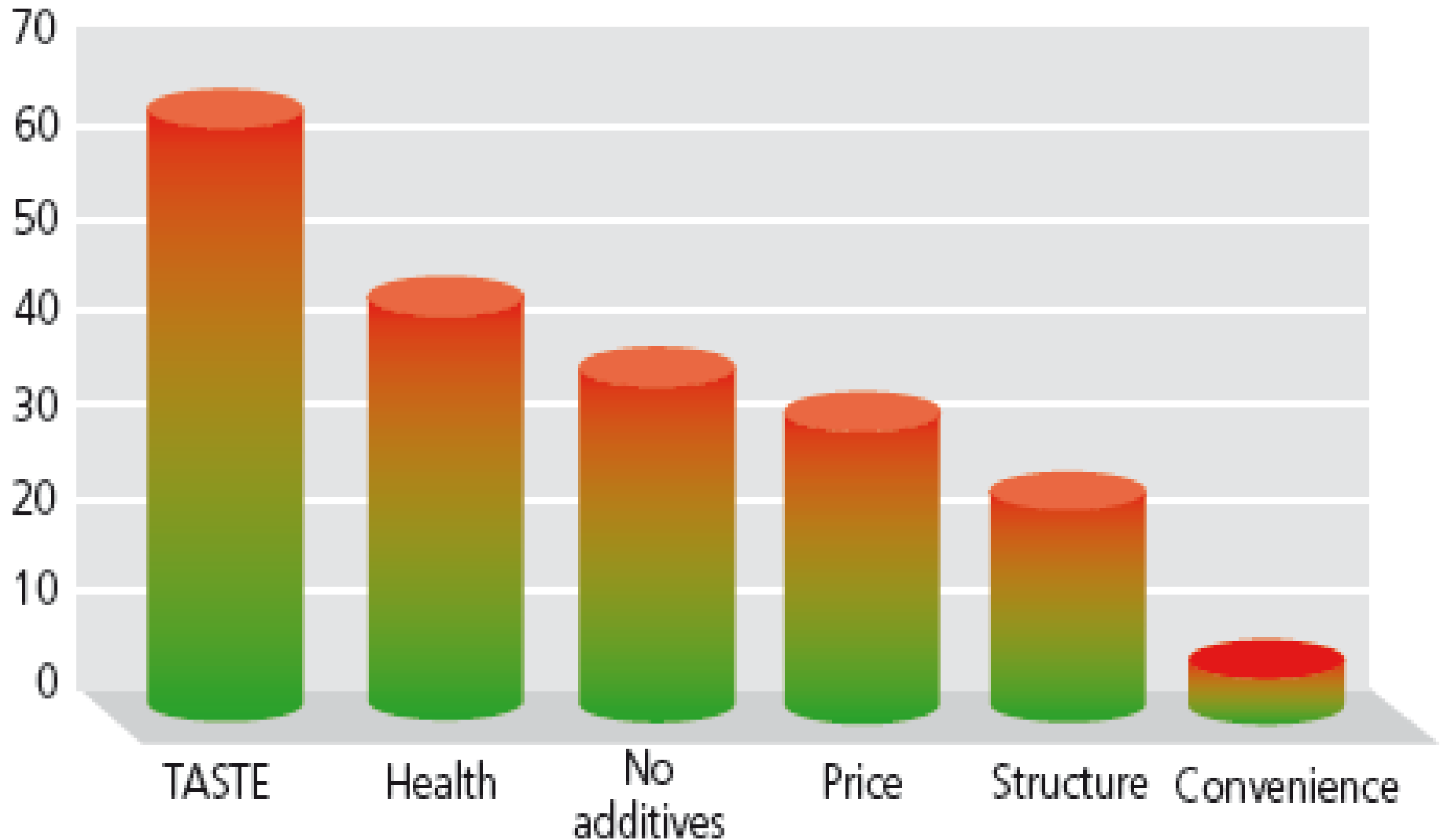
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Reason to buy



Sensory response is multimodal

Sensi

Vista

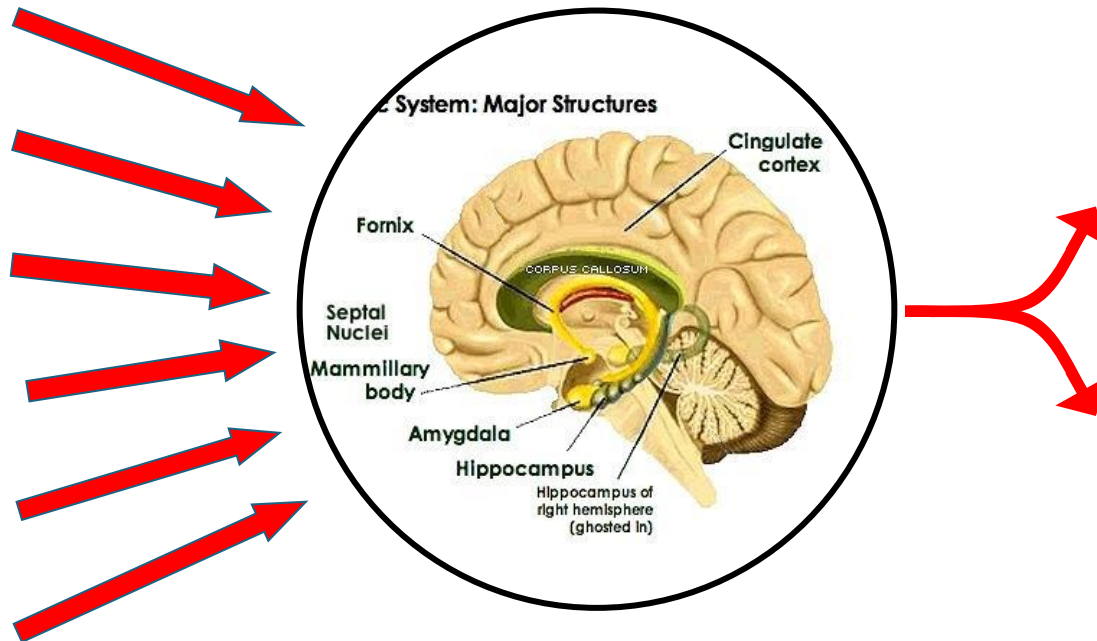
Tatto

Udito

Mouthfeel

Gusto

Olfatto

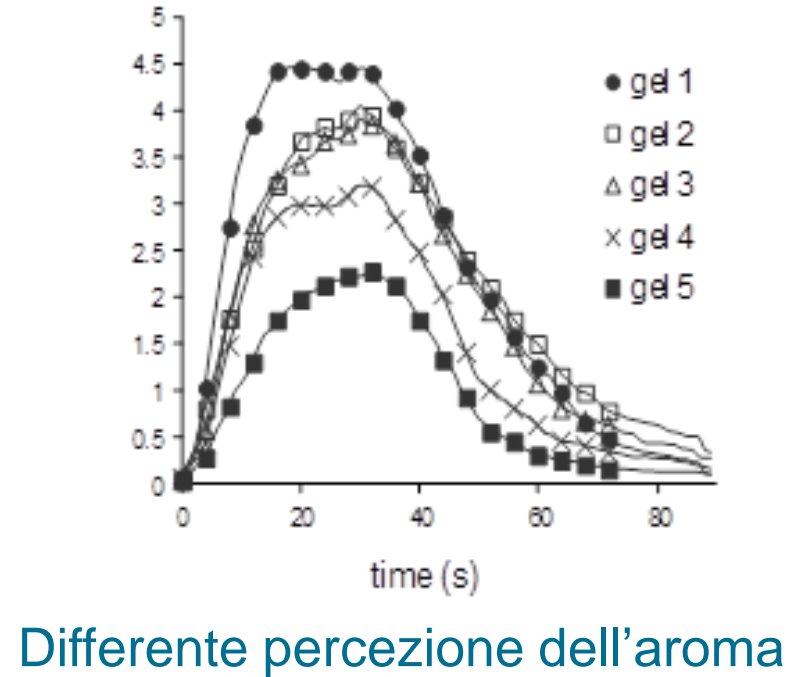
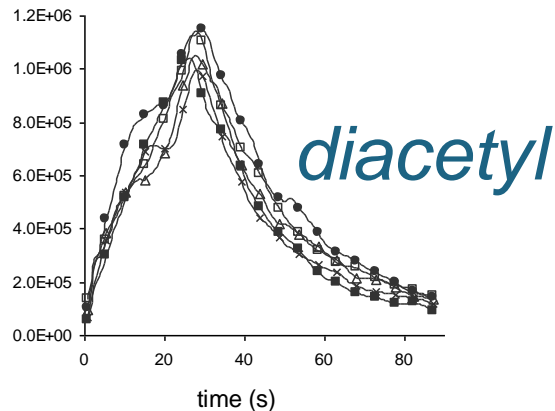
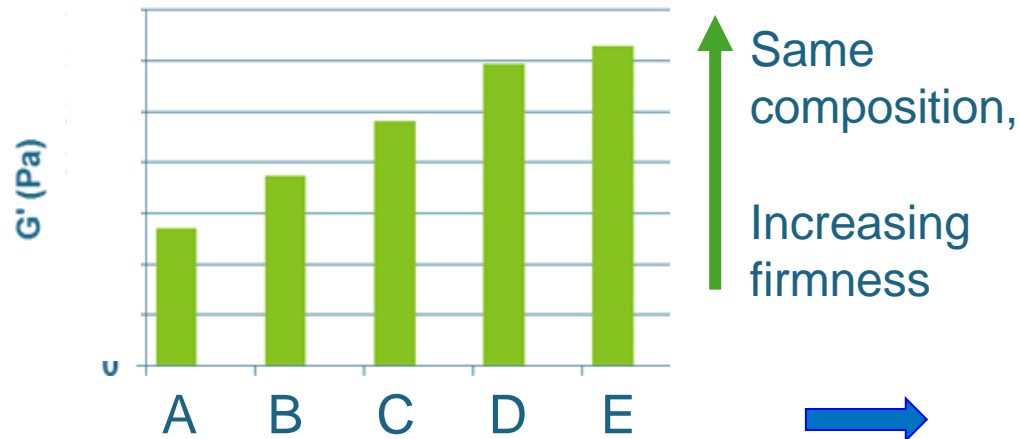


Percezione



Proteine del siero e percezione sensoriale

5 whey protein gels, same concentration

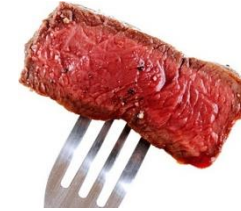


A parita' di aroma, la diversa texture influenza percezione sensoriale

Stessa composizione dell'aroma

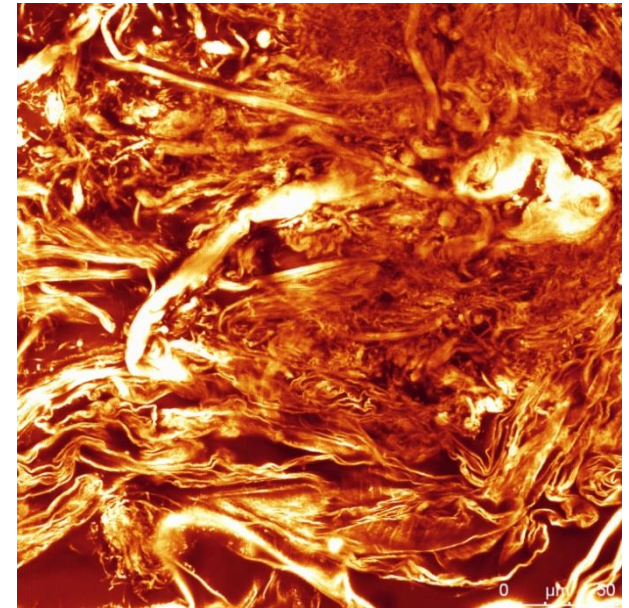
Protein fibers for juicy meat alternatives

- Consumers demand for sustainable food production
- Consumers demand for meat alternatives with the “bite of meat”



Meat alternative with protein fibers have juiciness and the “bite of meat”

- Protein fibers produced with the NIZO technology have a meat-like texture and mouthfeel
 - Juiciness
 - “Bite of meat”
- Technology developed for **dairy** and vegetable proteins



NIZO protein fibres

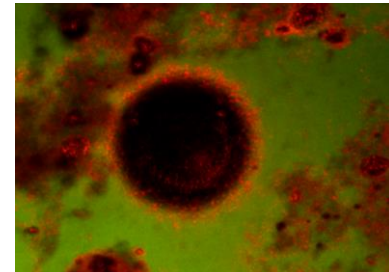
the starting point for meat alternatives

- The NIZO process is a liquid process
 - Starting from protein solution → no drying required
 - Low investment costs
- Flexible with respect to protein source
 - Fibres prepared from **whey**
- Proof of concept at pilot scale
- Range of final products prepared from the fibres
 - Burger *without added egg white powder*
 - Quiche, pastry, snack, stir fried product



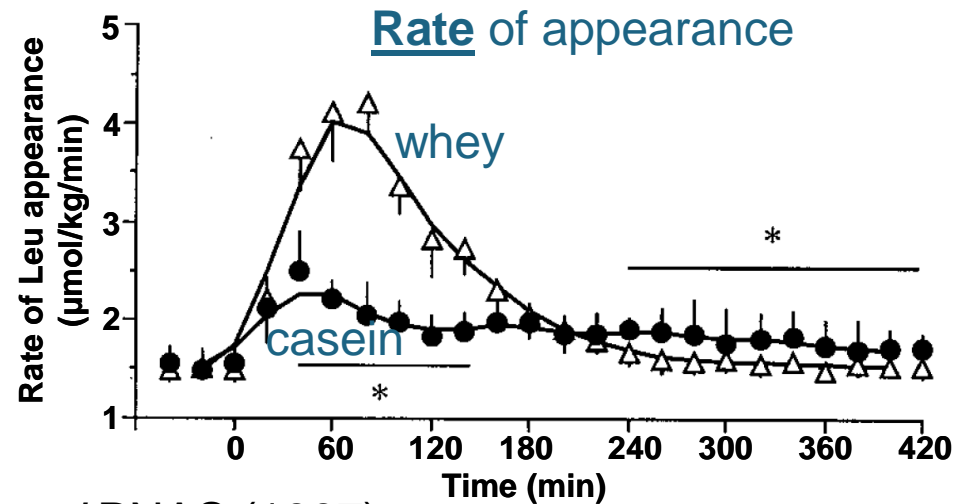
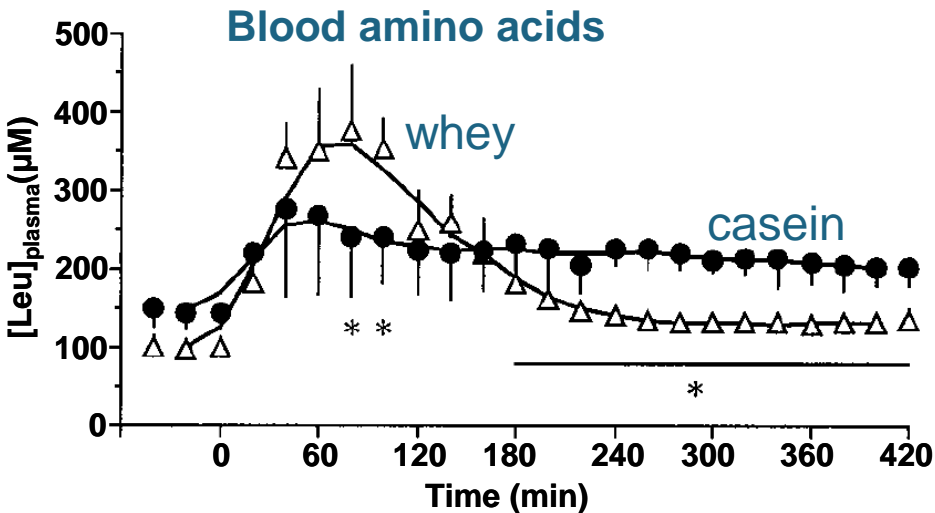
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Proteine del siero e sazieta'



Boirie *et al* PNAS (1997)



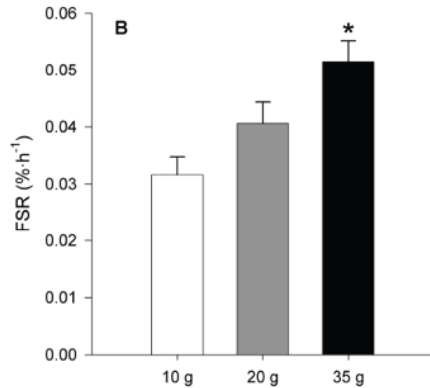
In the short term

- Satiety hormones ↑
- Perceived satiety ↑
- Energy intake ↓

Hall, W.L. *et al* Br. J. Nutr. (2003)



Quantità

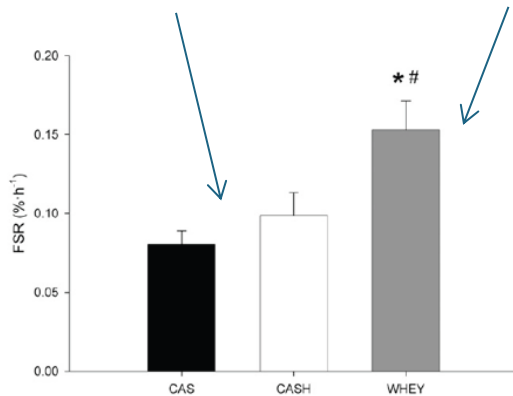


Penning's et al., Am J Physiol., in review

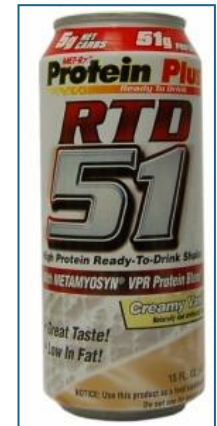
Positivo effetto delle proteine del siero su mantenimento e aumento massa muscolare.

Utilizzo in applicazioni ad alto contenuto proteico, quali sport drinks.

Confronto caseine/ siero

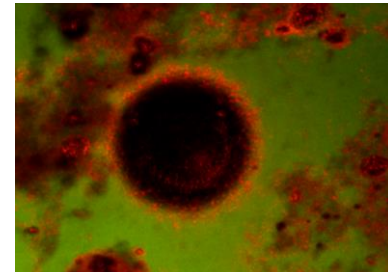


Penning's et al., Am J Clin Nutr, 2011



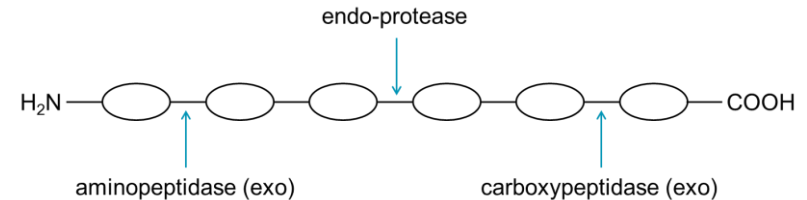
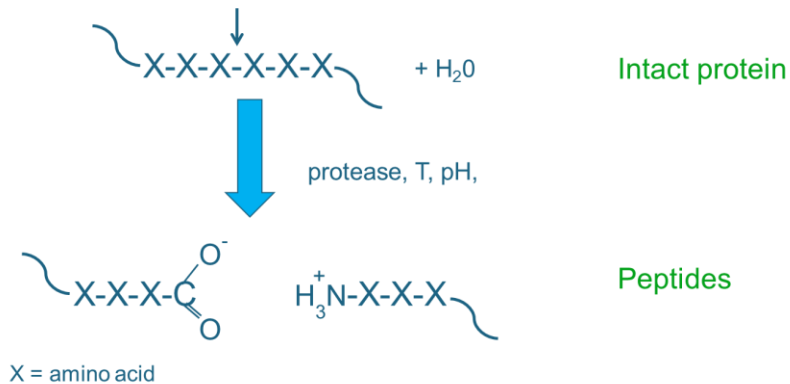
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Idrolisati e loro benefici



- Improved bioactivity
- Improved rate of amino acid absorption
- Improved digestion
- Lowering allergenicity
 - Advantage in infant food
- Improved functionality
 - Clear solution at low pH
 - Improved heat stability

Bioactive peptides: APPLICATIONS

Antimicrobial peptides

- Lactoferricin-B (Morinaga milk Industry Co)
- Infant formula
- Dental therapeutics: mouth rinse solutions



ACE-inhibiting peptides

- Calpis sour milk (Calpis Food Industry)
- Evolus milk drink (Valio Ltd)
- BioZate™ (Davisco Foods International Inc.)
- C-12 peptide (DMV)
- TensGuard (DSM)  tens guard™



Mood & stress

- Vivinal Alpha (Borculo Domo Ingredients)
- Lactium (Ingredia)



Anti-oxidant stimulating

- Cysteine Pepton (DMV)



Mineral binding peptides

- Anti-carries agents: toothpaste chewing gum



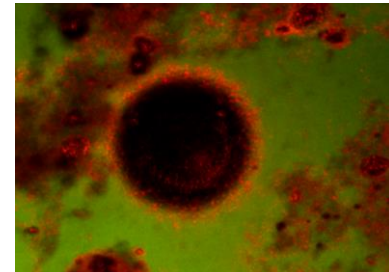
Insulin stimulating peptides

- Recovery : PeptoPro® (DSM)
- Type II-diabetes: Insuvital



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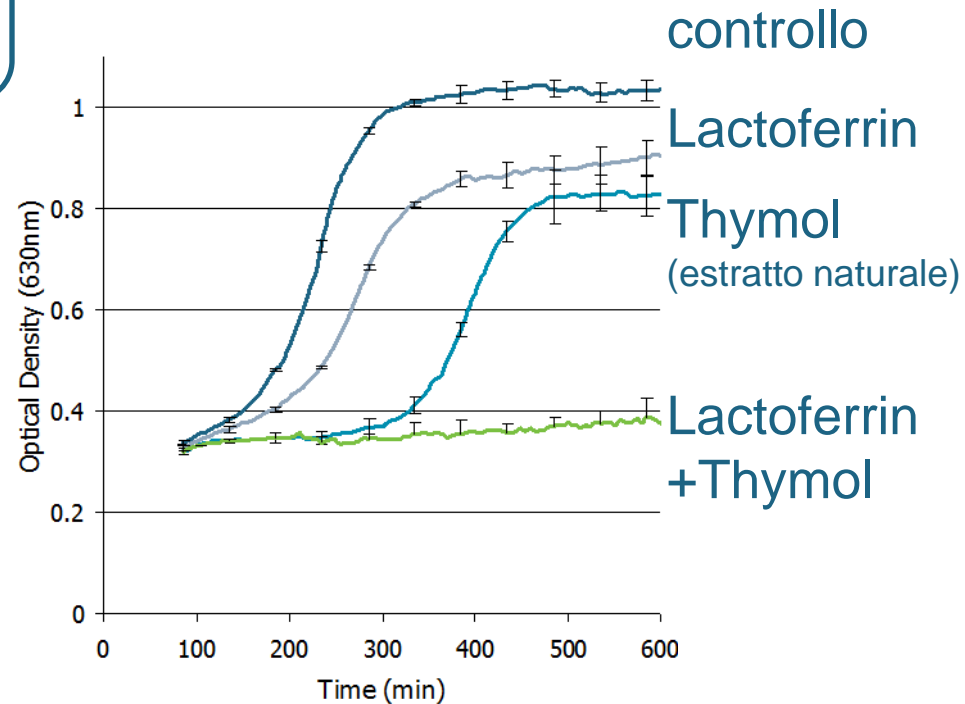
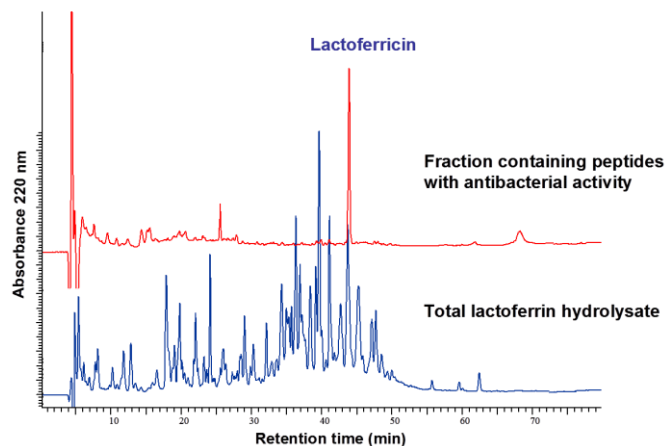
Clean label antimicrobials

- Consumer suspicion for additives
- Replace additives while maintaining texture, stability and processability

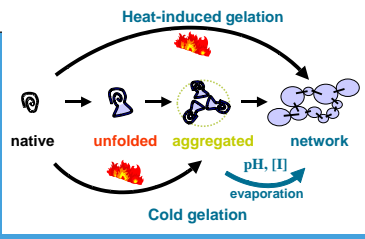


Bioattività di proteine e idrolisati:
una soluzione naturale per
preservare il prodotto

- Antimicrobial proteins, hydrolysates, peptides
 - Obtained by hydrolysis of food proteins
 - Lab-scale and pilot scale production



Whey proteins and hydrolysates: rich source of functionalities broad applicability



Clean label

Cold-gelling

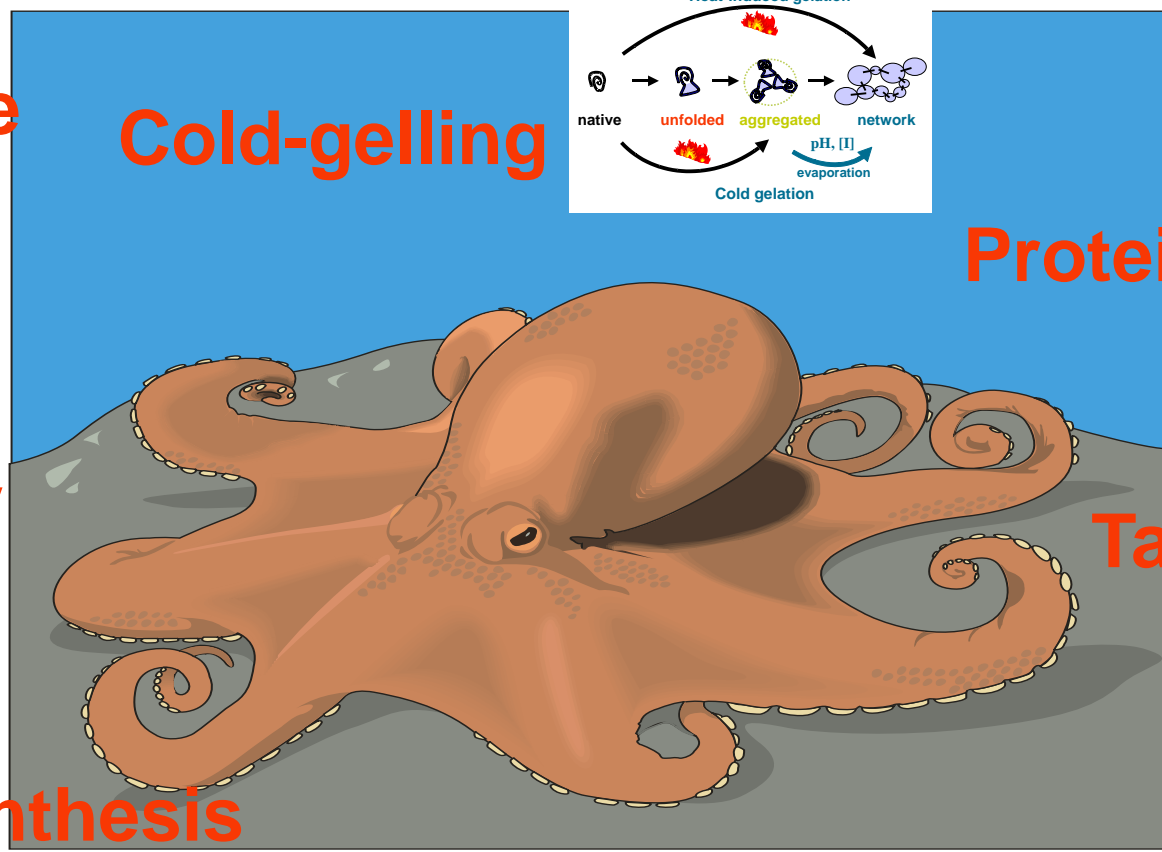
Protein fibers



Bioactivity



Taste



Muscle synthesis



Health

High protein foods



The protein group at NIZO



Grazie per l'attenzione

Erika.Silletti@nizo.com