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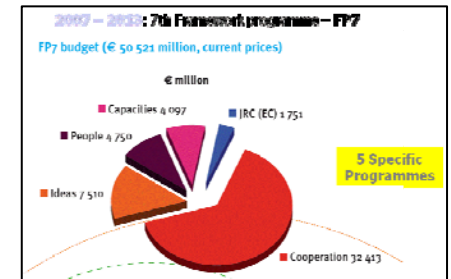
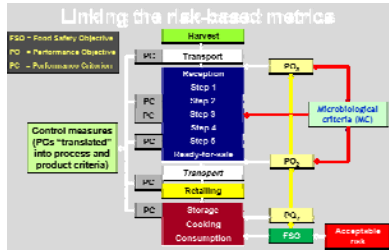
# Safety issues of traditional raw milk cheeses

Thomas Berger

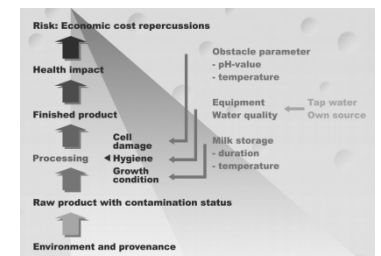
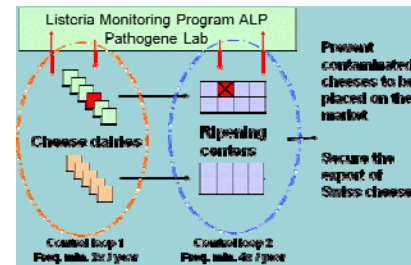
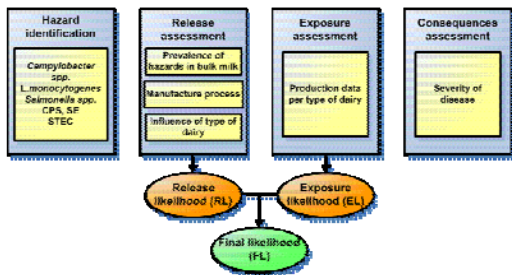
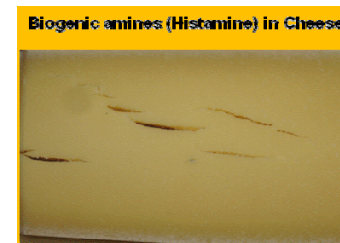
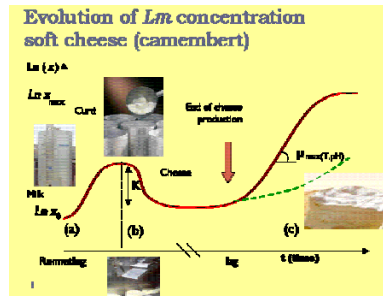
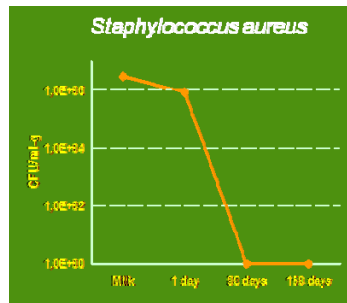
28 April 2009



# Safety issues of traditional raw milk cheeses



## IMPRESSIONS 1





# Safety issues of traditional raw milk cheeses



## IMPRESSIONS 2

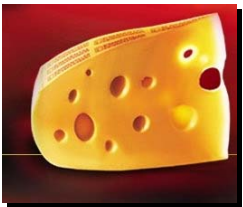


# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Importance of raw milk cheese

- raw milk cheese is of agricultural, economic and cultural importance for many European countries
- there is a consumer demand for traditional raw milk cheese
- there is common interest and motivation for the production of raw milk cheeses
- But:
  - business size is small and pressure to improve standards to market is high
  - a new generation of committed small producers needs a framework to continue tradition
  - new innovate tools have to be developed to hold available knowledge



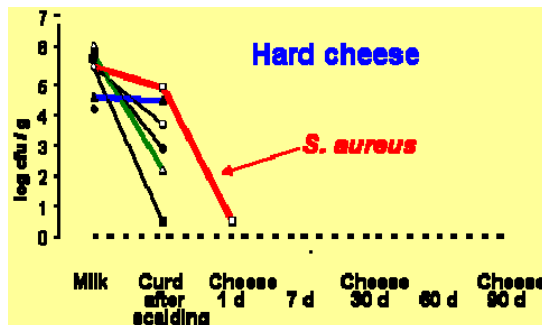


# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Prevalence

- Raw milk hard cheeses are usually free of pathogenic bacteria after a ripening time of 90 days
  - Canarien raw milk cheeses (*Alvarez et. al., Canarien Agronomic Research Institute, ES*)
  - Pecorino Romano cheese (*Pirisi et. al. , AGRIS Sardegna, IT*)
  - Romanian raw milk cheeses (*Nicolaescu, University of Agronomic Sciences and Veterinary Medicine, RO*)
  - Swiss raw milk cheeses (*Jakob, Agroscope Liebefeld-Posieux, CH*)





# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Prevalence – influencing factors

- Essential factors influencing the raw milk cheese hygiene are
  - raw milk quality
  - personal hygiene milker and cheese maker
  - water supply
  - time and temperature of milk storage or thermisation temperature
  - burning temperature of cheese curd
  - protective cultures
  - acidification and salt content
  - ripening time
  - hygiene status of ripening cellar (reinfection of surface)



**[*Sanaa, National Veterinary School, FR; Imhof, Agroscope Liebefeld-Posieux, CH; Jakob*]**



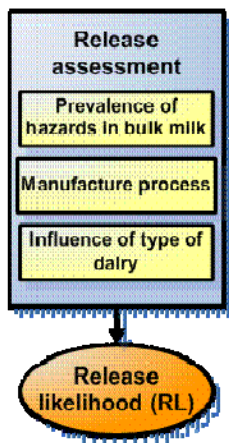
# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Prevalence – likelihood of contamination

- contamination sources cause problems with *E. coli*, *S. aureus*, *L. monocytogenes*, but usually not with *E. coli* O175:H7, *Salmonella spp.*, *Y. enterocolitica*
- lot of knowledge for hard/semi-hard-cheese, and starter cultures
- less knowledge for soft cheese
- as a consequence raw milk soft and semi hard cheeses are critical products
- likelihood of contaminations is higher for small businesses

(*Menendez et. al., Federal Veterinary Office, CH*)



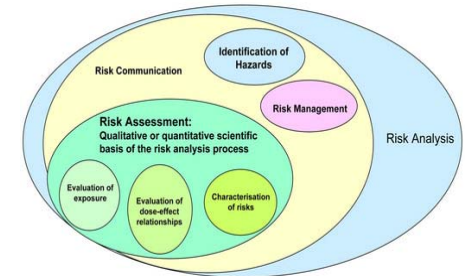


# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Risk assessment

- epidemiological data (e.g. from outbreaks, partly)
- data concerning the presence of pathogens and hygiene bacteria (partly)
- risk based national monitoring programs (*Menendez et. al.*)
- models for risk assessment are now available (*Mühlemann, Agroscope Liebefeld-Posieux, CH; Menendez et. al., Sanaa*)
- evaluation of risk based metrics (FSO, PO, PC), using these tools the dairy sector is able to take advantage of the newest developments in food safety and taking its responsibility for sufficient safety at the time of consumption (*Heggum, Danish Dairy Board, DK; Sanaa*)
- knowledge on critical production steps
- HACCP plans for small and large food businesses





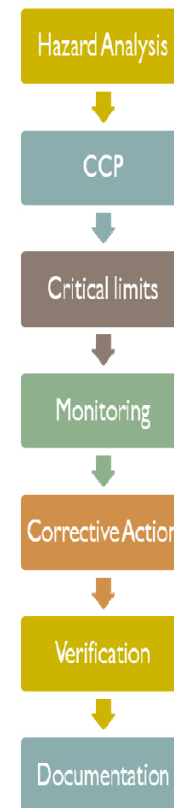


# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### Internal risk management

- work shall be in compliance with the formulated QM-system/GMP
- concept of hygiene
- observance of the principle of compartmentation
- formation and sensitizing of the staff
- HACCP plans for small and large food businesses





# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### EUs DG research programs FP6 & FP7 concerning the issue milk

- OPTIMILK: Quality, safety and value optimisation of the milk supply chain in rapidly evolving central and eastern European markets.
- MYCOPLEX: Development of Innovative Immuno-PCR Assay for the Detection and Quantification of Ochratoxin and Aflatoxin in Complex Matrices (Milk, Coffee)
- PATHOMILK: Providing the Milk Supply Chain with a Rapid, Portable and Cost-Effective Biosensor for Multi-Pathogen Detection in Milk
- SAFECHEESE: A barrier for preventing pathogenic bacterial growth in cheese from non pasteurized milk

**(Moreau, European Commission, DG Research - Unit E.3)**





# Safety issues of traditional raw milk cheeses

## Existing knowledge / strengths

### EUs DG research programs FP6 & FP7 concerning the issue milk

- PathoGenCombat: Control and prevention of emerging and future pathogens at cellular and molecular level throughout the food chain
- Goat BSE: Proposal for improvement of goat TSE discriminative diagnosis and susceptibility based assessment of BSE infectivity in goat milk and meat
- ROBUSTMILK: Innovative and practical breeding tools for improved dairy products from more robust dairy cattle
- NANODETECT: Development of nanosensors for the detection of quality parameters along the food chain





# Safety issues of traditional raw milk cheeses

## Weaknesses / knowledge gaps

### Hazards

- Traditional production environment (not only milk quality)
- Methods of analysis and sampling: lack of simple and affordable methods for checking milk quality (small producers)

### Prevalence

- Microbiological quality of raw milk
  - lack of knowledge
  - Prevalence & variations in raw milk contamination levels (limited knowledge on new emerging risks: viruses, STEC...)
  - behavior of pathogens in relevant milk-based media/conditions (growth rates, lag times, reduction rates, etc.)



# Safety issues of traditional raw milk cheeses

## Weaknesses / knowledge gaps

### Role of protective cultures

- natural ecosystems
- lack of knowledge about bacterial competition, microbial ecosystem (changes which reduce natural micro-flora in raw milk)

### Historic production records

- no safe history with raw milk semi-hard/soft cheeses
- no safe history at all in countries without historical raw milk cheese production

### Thermisation

- needs to be defined for cheese types

### Predictive models and validation thereof

- $a_w$ , pH, salt content, temperature, ripening time, technology type



# Safety issues of traditional raw milk cheeses

## Weaknesses / knowledge gaps

### Risk Assessment

- Linking outbreaks to products
  - incubation periods
  - questions to sick people, case study
  - lack of epidemiological data (reporting, outbreak investigation, product involved, laboratory testing)
  - dose-effect information on the exposure with pathogens
- Lack of data for quantitative risk assessment
  - scientific data not comparable
  - “good quality“ data, miniaturized cheese making test system
  - raw milk cheese consumption, specific handling and habits of food in population (sub)groups
  - financial, time and network limitations



# Safety issues of traditional raw milk cheeses

## Weaknesses / knowledge gaps

### (Risk) Communication

- consumer expects safe products
  - Safe products for healthy people, for all people?  
(→communication to consumers), risk management shows low awareness concerning the identification of new hazards / risks
- Differences between and within countries
  - limited communication/collaboration on knowledge about raw milk cheese among countries
- Authorities to producers
  - interpretation of law / enforcement
    - flexibility vs demonstration of safety
    - relative burdens / competition
    - no uniform GHP guidelines for small raw milk producer



# Safety issues of traditional raw milk cheeses

## Weaknesses / knowledge gaps

### (Risk) Communication

- Co-operation / interaction with scientists
  - lack of awareness of small producers on food safety issues --> need of simple and understandable communication on hot spots
  - knowledge transfer from science to practice (HACCP)
- Lack of organization of small raw milk cheese producers and of coordinated action
  - need of differentiation between industrial - artisanal raw milk cheese production --> focus on small producers
  - need of differentiation between artisanal - traditional raw milk cheese production --> tradition may be artisanal, but artisanal should be open to innovation
  - education and training programs for small producers





# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### Prevalence

- Prevalence & variations in raw milk contamination levels
  - identify (new) microbiological, chemical and physical agents
  - valid data on behavior of pathogens (incl. toxin production) in relevant milk-based media and conditions (growth rates, lag times, reduction rates, etc.)
- Process:
  - behavior of organisms in cheese
    - over time
    - throughout the process
    - for technological parameters as pH, temperature,  $a_w$ , salt, organic acids etc.
  - interactions



# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### Prevalence

- Analytical methods
  - quick
  - cheap
  - accurate
  - validated



# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### Risk Assessment

- Fully accessible information in order to understand for whom and why an assessment was made and in which manner, by what means, for what purposes, under what limitations and in which environment it was done
- Chances and limitations of the qualitative and quantitative methods
- Quantitative risk assessment by a distributed computing approach
- Standardized approach
  - for gathering and presenting information / scientific data
- Collaboration / co-operation
  - data collection (outbreak, epidemiology)
  - surveillance (government, transparency, providing a focus for intervention)



# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### (Risk) communication

- collaboration/co-ordination among producers - researchers
- promote transfer of knowledge on food safety issues, GHP
- promote coordinated action producers – researchers - authorities
- promote communication with consumers (awareness on raw milk cheeses)



# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### Knowledge transfer

- distinction between artisanal and industrial produced cheeses
  - majority of countries produce raw milk cheese at artisanal level
  - artisanal producers need more support
  - establishing adapted GMP measures (including HACCP) - guidelines
  - development of uniform GHP guidelines for small raw milk producers



# Safety issues of traditional raw milk cheeses

## Steps forward / proposals

### Knowledge transfer

- producer associations should take more responsibility
  - "inter-professional", centers of excellence
  - need of a European organization of small cheese producers (→ what about “European Alliance for Artisan and Traditional Raw Milk Products”, EAT?)
  - guides, data collection, facilitate knowledge sharing / development, on-line reporting of monitoring results + feedback, review of testing / monitoring programs for raw milk
- label of quality for raw milk cheese



# Safety issues of traditional raw milk cheeses

Steps forward / proposals

**Need for more research  
and  
knowledge transfer!**