Bern University
of Applied Sciences

Food Safety Assurance for small and micro dairy businesses in Switzerland: approaches, responsibilities and official control

Webinar, 30th of September 2020

- School of Agricultural, Forest and Food Sciences HAFL

Berne University of Applied Sciences
School of Agricultural, Forest and Food Sciences

Degree programmes

Applied research and development

Consulting services and further education

- School of Agricultural, Forest and Food Sciences HAFL

Bern University of Applied Sciences BFH
School of Agricultural, Forest and Food Sciences

FACTS and FIGURES:

- One of 8 BFH departments in Bern
- Over 800 students
- 310 employees, 85 tenured lecturers and professors
- 50 adjunct lecturers
- Budget for degree programmes 25 million CHF
- Budget for research, consulting and further education 8.5 million CHF

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https://www.hafl.bfh.ch/en/home.html

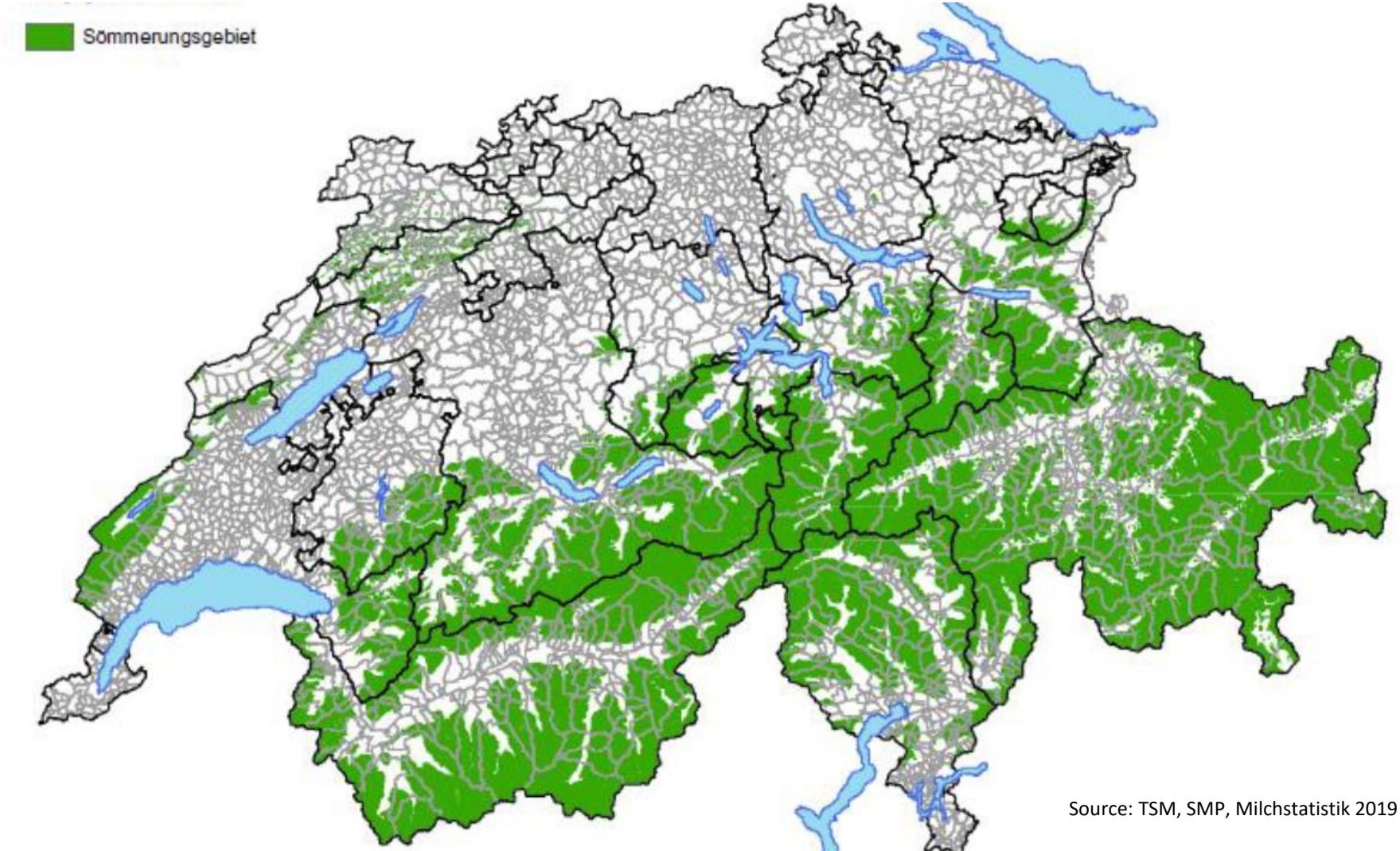
Content

- Overview Swiss dairy sector, role of SMEs
- Food Safety Assurance: national regulations, sector guidelines
  - Swiss Food legislation and ordinances,
  - Sector guidelines: QM Fromarte, SAV Guidelines (SAV: Swiss alpine farming association)
- Flexibility, derogations on national basis
  - Overview sector guidelines Fromarte and SAV
  - Objectives and purpose of the sector guidelines
  - Example: storage conditions for raw milk
- Implementation approach
- Verification of compliance
  - Public law enforcement (visit by official authority)
  - Private basis (implementation of QM Fromarte, audit)

- Q & A

Overview Swiss dairy sector, role of SMEs

Switzerland country area 41'285 km²
600 cheese dairies (throughout the year production)
1340 small and micro-dairies (seasonal production in summer, alpine dairies)



Source: TSM, SMP, Milchstatistik 2019 Schweiz

Overview Swiss dairy sector, role of SMEs

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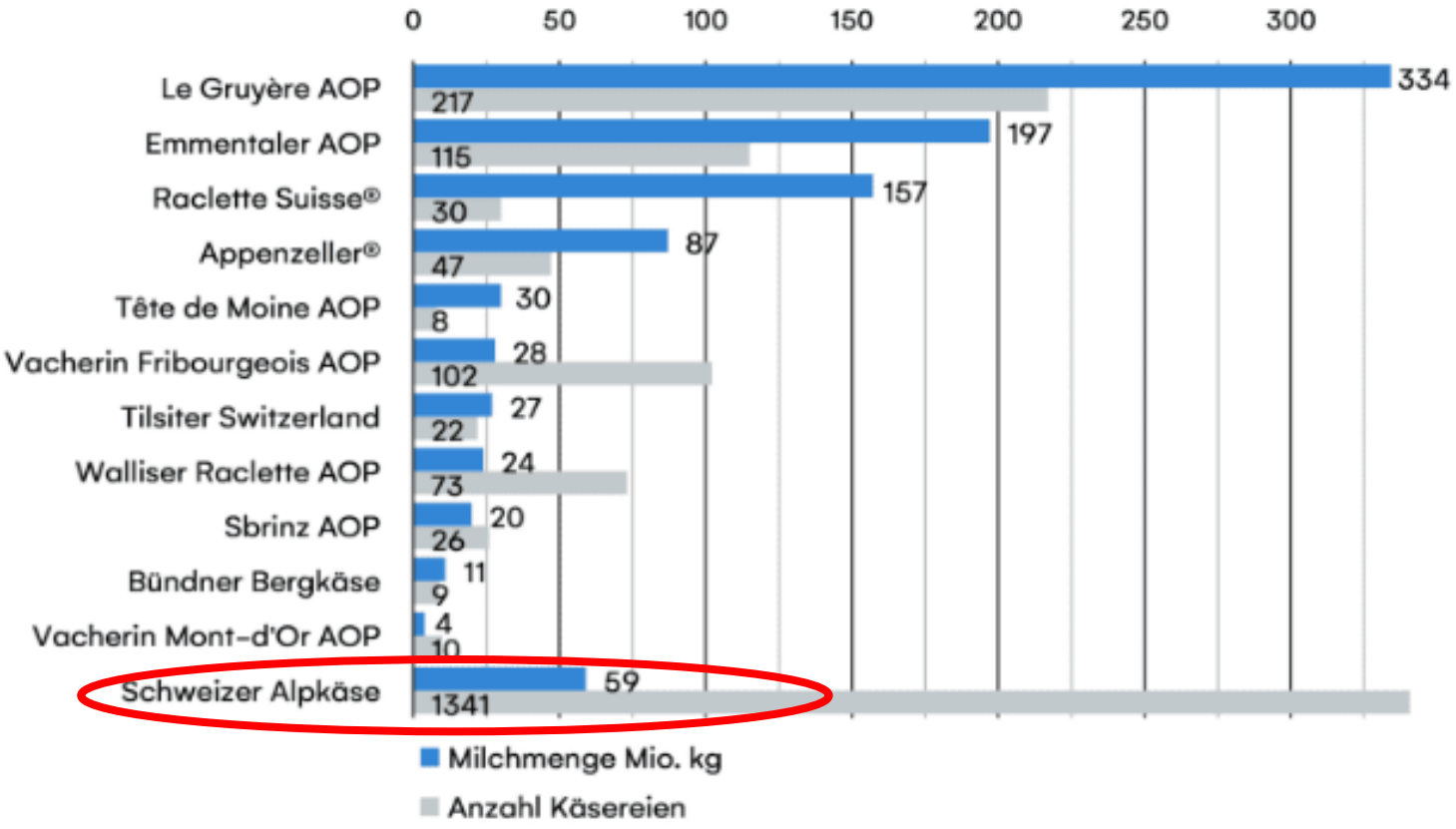
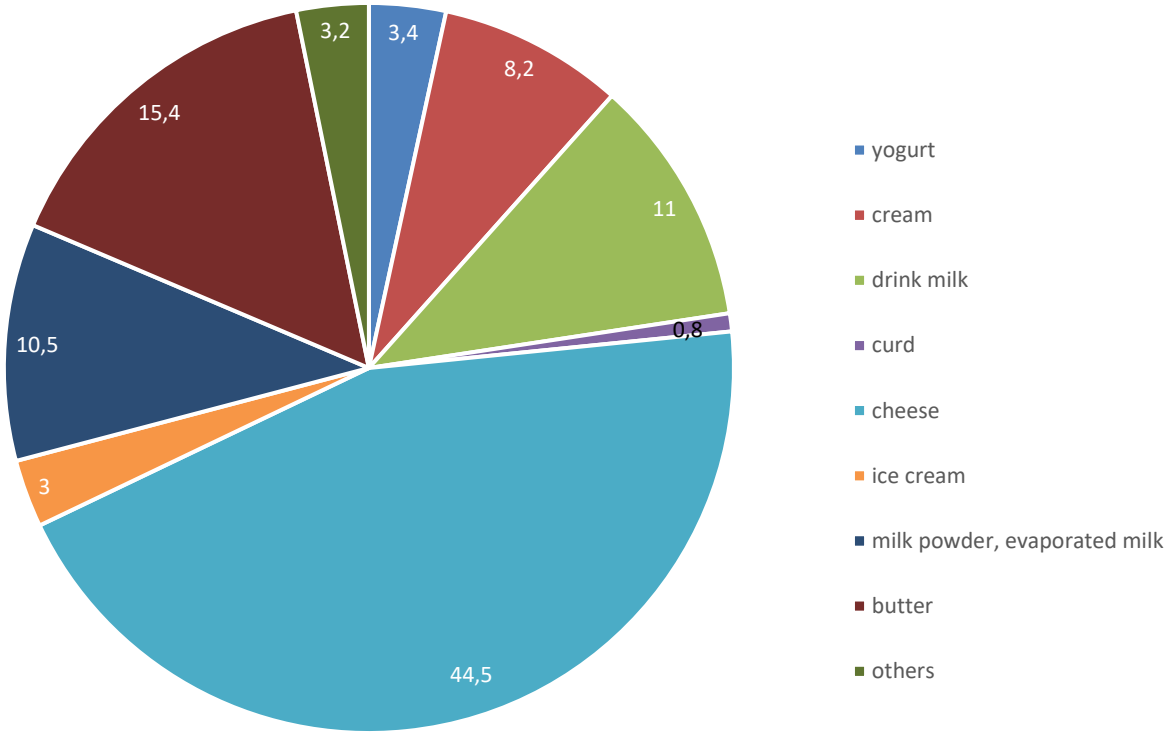


Source: TSM, SMP, Milchstatistik 2019 Schweiz

Overview Swiss dairy sector, role of SMEs

3’399’271 tons of cow’s milk produced in 2019

Valorisation of cow’s milk….



45% of the total cow’s milk production is transformed into cheese (195’114 tons)

23% of the total cow’s milk production is transformed into raw milk cheese (85’298 tons)

→ the micro dairy business is key for high value creation in decentralised regions

Source: TSM, SMP, Milchstatistik 2019 Schweiz

Swiss Food Law: overview

Swiss food and commodities ordinance SR 817.02

- **Art. 76 Good hygiene practice**

Example: Maintenance of the establishment and its facilities and devices

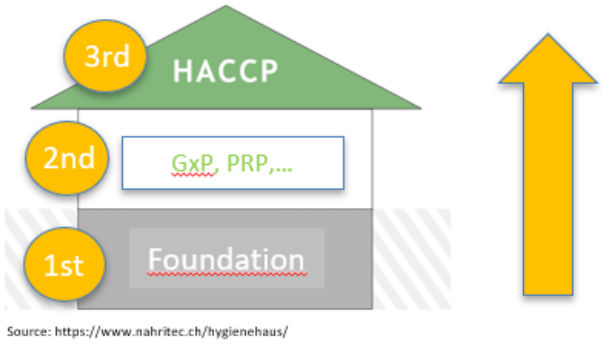
- **Art. 77 Good manufacturing practice**

Example: Control of operations -> temperature control of raw milk storage

- **Art. 79 HACCP system**

- **Art. 80 Sector guidelines**

The food hygiene building



Source: https://www.nahritec.ch/hygienehaus/

3rd priority: HACCP

- „Hazard Analysis Critical Control Points“
- Codex Alimentarius: *“A system which identifies, evaluates, and controls hazards which are significant for food safety.»*

2nd priority: Good Hygiene Practise (GHP), GxP, PRP,....

- Cleaning and desinfection
- Personal hygiene
- Workplace hygiene
- Temperatures
- Pest monitoring

1st priority: Foundation

- Premises, facilities
- Installations, machines
- Equipment, materials, etc.

A stable foundation is basic and elementary! Without it, the other levels cannot successfully be built up.

Swiss food and commodities ordinance SR 817.02

- Art. 80 Sector guidelines

The food industry may develop and implement sectoral guidelines as an alternative to meeting the requirements of Articles 76-79, provided that the same objectives can be achieved by doing so.

The sector guidelines must be approved by the Federal Office for Food Safety and Veterinary Affairs.

They must be agreed with the parties concerned and:

- take into account the relevant codes of practice of the Codex Alimentarius*;
- ensure the correct implementation of the procedures based on the HACCP system or its principles.

They may lay down simplified self-regulation requirements for micro-enterprises.

→ Sector guideline Fromarte (SMEs)

→ Sector guideline Swiss Alpine Association SAV (micro-enterprises, seasonal dairies in the Alps)

* www.codexalimentarius.org; Recommended international Code of Practice, General Principles of Food Hygiene 1-1969

Objectives and purpose of the sector guidelines

- Approved by the official authority for food safety.
- Guarantee the food safety of the dairy products and comply with the principles of the internationally recognized food standards (Codex Alimentarius).
- Comply with Swiss food law requirements.
- Allow dairy-specific adjustments (e.g. recipes, production protocols).
- Critical limits, process hygiene criteria etc. are compulsory !!
- Accepted by the retail business .
- Accepted as a component of the contractual agreement on food safety and quality between producer and customer.
- Used as a basis for the cheese dairy controls by the official law enforcement.
- **Application oriented, tailor-made, easy to use -> “like a recipe for cooking”**

Guarantee safe, high-quality dairy products, high added value, consumer confidence.

Sector guideline Fromarte (for SMEs) (1)

- 15 chapters:
  - Management system: presentation of the cheese dairy, field of application, document control etc.
  - Management responsibility: management and organization, customer orientation, corporate policy etc.
  - Resource management: personnel, competencies, assessment and training of employees etc.
  - Buildings, facilities and equipment, surroundings: hygiene zones, windows, glass management etc.
  - Production process: HACCP concept, HACCP team, specifications and intended use, flowcharts, control measures, hazard analysis, limit values, monitoring system, corrective measures, validation and improvement, verification planning, documentation etc.
  - Traceability system: emergency prevention and response, redemption actions
  - Development of new food products
  - Supply chain: milk production, supplier management, raw milk storage
  - Production: preparation of starter cultures, production planning, production, recipe, packaging, labelling etc.
  - Cellar: ripening, atmosphere control etc.
  - Sales and logistics: labelling, storage conditions, transportation, batch release
  - Cleaning, disinfection, waste management
  - Service and maintenance: maintenance plan, balance monitoring, test equipment monitoring, pH-measurement monitoring etc.
  - Monitoring, laboratory, analytics: manufacturing protocol, step control etc.
  - Continuous improvement process: audit program, audit report

Sector guideline Fromarte (for SMEs) (2)

- More than 100 documents divided into 15 chapters
- Templates, work instructions, procedures, recipes,….
- Available on the Fromarte website
- Documents have to be adapted to specific conditions in the enterprise such as: facility, customer, product variety, etc.

Example:

08 Beschaffung, Lagerung

4. Produktion

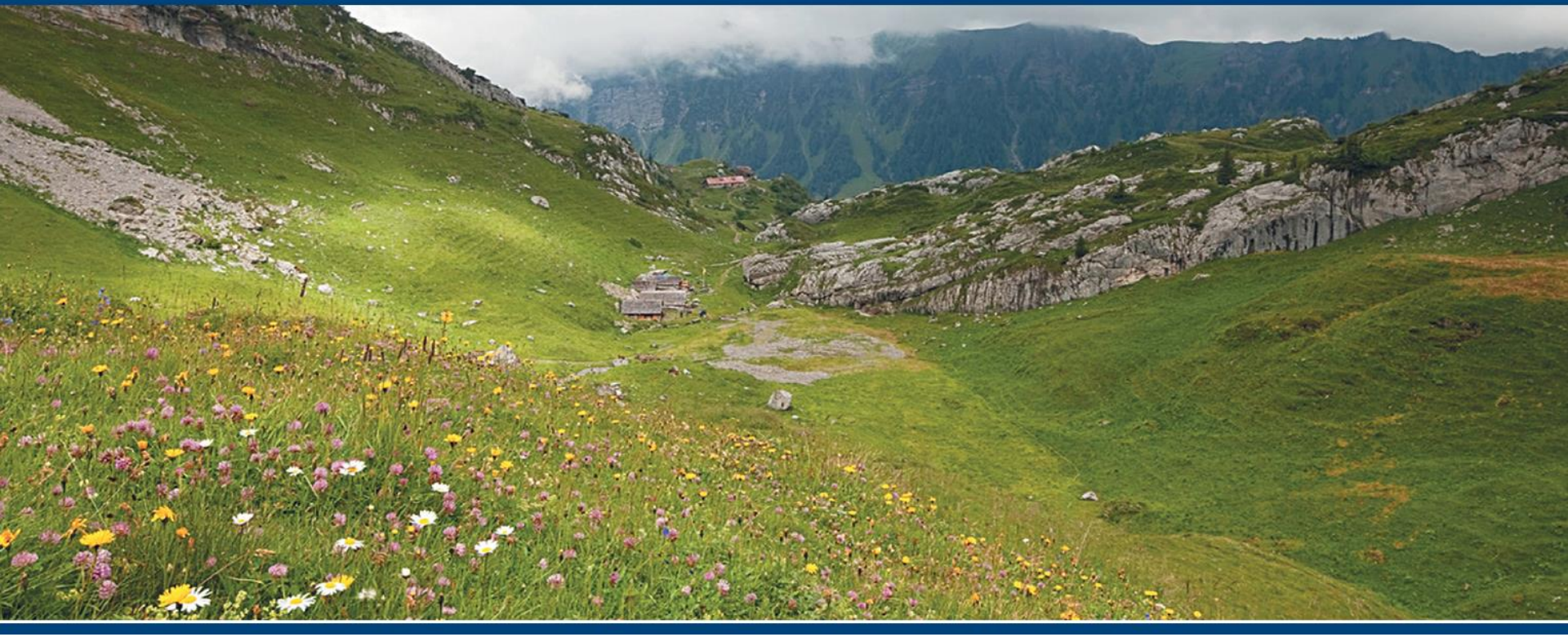
	Rohstoff Milch	AA Arbeitsanweisung	2	08.01			-		
	Rohstoff Milch	AA Arbeitsanweisung	2	08.01					
	Endtermin Silagefütterung	FO Formular	1	08.011			-		
	Endtermin Silagefütterung	FO Formular	2	08.011			-		
	Milchannahme und Milchlagerung	AA Arbeitsanweisung	2	08.02			-		
	Milchannahme und Milchlagerung	AA Arbeitsanweisung	2	08.02					
	Begleitpapier für Milchlieferung	AA Arbeitsanweisung	1	08.021			-		
	Begleitpapier für Milchlieferung	FO Formular	2	08.021			-		
	Lieferantenauswahl	AA Arbeitsanweisung	1	08.03					
	Lieferantenauswahl	AA Arbeitsanweisung	1	08.03			-		
	Rohstoffauswahl	AA Arbeitsanweisung	1	08.04					
	Rohstoffauswahl	FO Formular	1	08.04			-		

Sector guideline Fromarte (for SMEs) (3)

- Example HACCP concepts

- *Staphylococcus aureus* is a control point at the step of filling the moulds (separation of the curd from the whey)
  - m: 10’000 cfu/g
  - M: 100’000 cfu/g
  - Formation of toxins is possible at levels >10’000 cfu/g

Sector guideline of the Swiss Alpine Association SAV (micro-dairies, seasonal dairies in the Alps)



Schweizerischer alpwirtschaftlicher Verband

Structure of the SAV sector guideline

Part A
Working documents: specification documents and monitoring documents for daily use, checklists, basic recipes, HACCP, manufacturing protocols, microbiological sampling plan, cleaning plan…

Part B
Basics and basic knowledge of milk production and milk processing, food labelling regulations, testing protocols…

Part C
Cheese varieties with PDO label, specifications for the PDO are an integral part of the sector guideline.

A few examples….

Checklist «Cooling and storage of raw milk»

Table 1: Pathogenic or toxin-forming microorganisms: Frequency in raw milk and behaviour in semi-hard cheese [28, 34-39]

Hazard	Prevalence in raw milk	Growth in semi-hard cheese	Inactivation during cheese ripening at 10–15°C	Importance
Listeria monocytogenes	0.1–1.0% (1)	On the surface of red smear cheeses	Decrease in cheese <0.5 log/month	High
Salmonella spp.	<0.10% (1)	No (no lactose fermentation)	Decrease of about 1 log/month	Low
Shiga toxin-producing *Escherichia coli*	0.1–1.0% (1)	Strong reproduction in the first 24 hours (lactose fermentation)	Decrease of about 1 log/month	High
Staphylococcus aureus	23–32% (2)	Strong reproduction in the first 24 hours, at levels >10^5 cfu/g, toxin formation possible	Decrease of about 2–3 log/month, toxins are not inactivated	High
Histamine-forming lactobacilli	14–25% (3)	In the manufacturing process and during maturation	Slow deactivation after 30–60 days with ongoing histamine formation	High

(1) Farm bulk milk samples (N = 601) delivered to cheese factories producing raw-milk cheese. Proportion of samples with positive result in 25 g milk [38]
(2) Percentage of samples (N = 403) with more than 100 cfu/mL [34]
(3) Percentage of samples (N = 199) with more than 1 cfu/mL [39]

Source: Eugster & Jakob, *Milk Science International (72) 2019 P. 45-52*

Food safety of raw milk cheese: storage conditions for raw milk

Raw milk cooling and storage: Swiss food law regulations (SR 916.351.021.1)

7 .. Milk processors can specify different cooling temperatures for the production of cheese. However, the storage temperature may not exceed 18 ° C. If the storage temperature is higher than 8 ° C, processing must take place within 24 hours after the oldest milk has been obtained. Food safety must be guaranteed at all times.

→ Storage of raw milk at temperatures >8° C for 20 hours is possible….
…but food safety must be guaranteed at all times!

Source: Eugster & Jakob, *Milk Science International (72) 2019 P. 45-52*

Food safety of raw milk cheese: growth limits for pathogenic bacteria at storage conditions

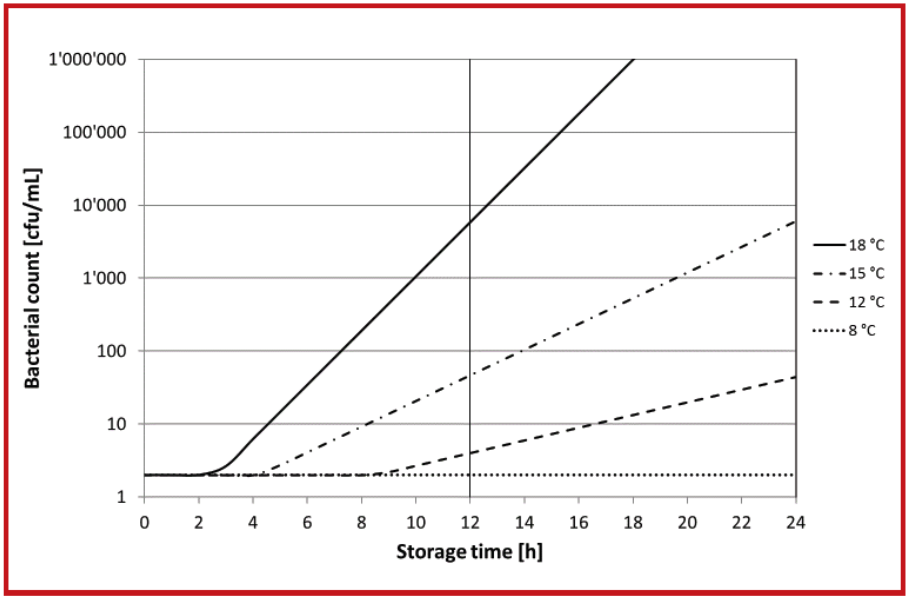


Figure 1: Propagation of *Escherichia coli* in milk at different temperatures (Simulation with Sym'previus®, [41])

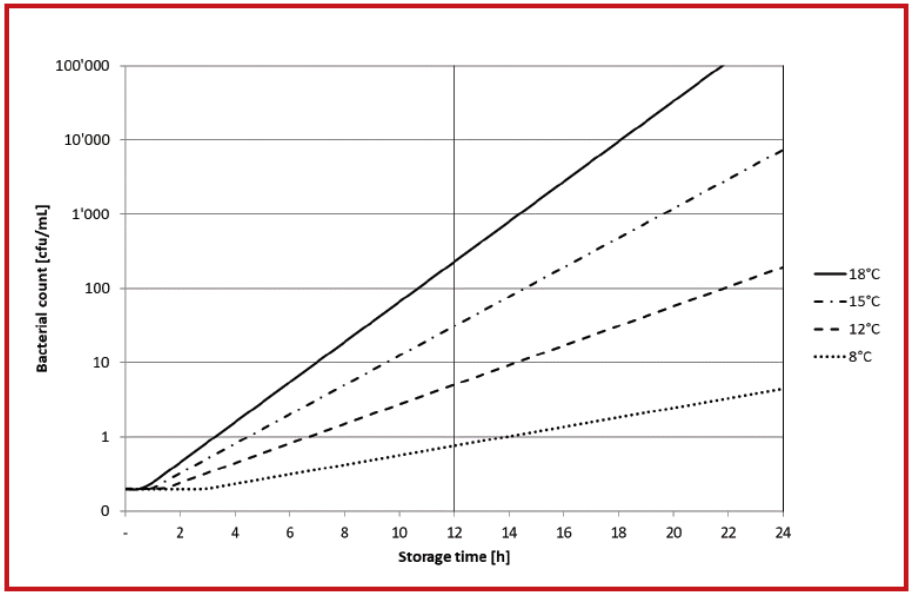


Figure 2: Propagation of *Listeria monocytogenes* in milk at different temperatures (Simulation with Sym'previus®, [41])

Depending on the storage temperature -> growth of *E. coli* and *L. monocytogens* to unacceptable levels.

Source: Eugster & Jakob, *Milk Science International (72) 2019 P. 45-52*

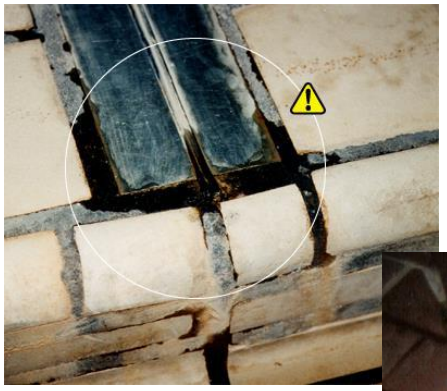
Checklist «Cooling and storage of raw milk»

Milk storage conditions for different dairy product groups to ensure food safety and high product quality (based on scientific evidence)

Flexibility in the storage conditions of raw milk: the production of different varieties of cheese is possible depending on the T/t combination which is applied for the cooling of the raw milk.

Fundamental research translated into very comprehensible T/t combination for cooling and storage of raw milk

Checklist «Production hygiene»



Working documents: Recipes

Basic recipe for semi-hard cheese made from raw milk: For each cheese variety, which can be produced in frame of safety assurance system of SAV and Fromarte there is a detailed recipe for production. It includes the flow chart and defines parameters which must be respected at every step of the process.
A very important parameter which has to be controlled in every production is the measurement of pH. It is the result of a proper lactic acid fermentation. If the pH value of 5.2 after 20 hours cannot be reached, it is possible that unwanted MOs have multiplied and a quality or safety problem may occur. The process has not been properly managed. Corrective measures are therefore required.

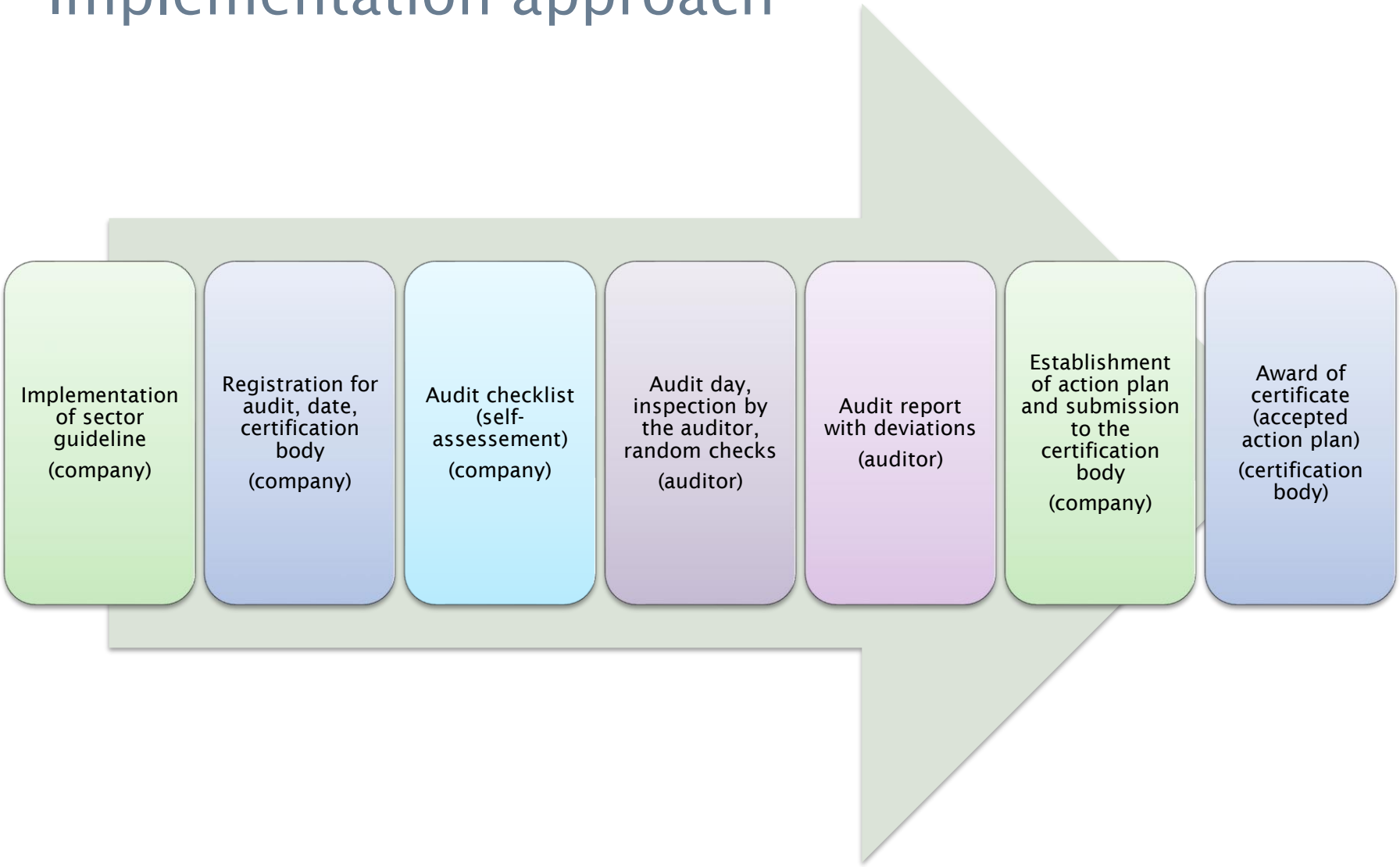
Control point CP: pH-control after 20h: 5.2

Monitoring plan

Monitoring plan for the production of semi-hard cheese made from raw milk

Microbiological hazards and their management (based on HACCP concept)

Implementation approach



Verification of compliance (1)

Documents which must be prepared and submitted before the audit takes place:

- Monitoring of production
- Hygienic zoning
- Test plan
- HACCP concepts for all dairy products not covered by the sector guideline
- Hygiene training documents

Evaluation grid:
80% of the maximum number of points must be achieved

«After the audit is before the audit»: the certificate of the associations (Fromarte, SAV) is valid for 2 years

Conclusions

- There is a strong need for application-oriented food safety guidelines for SMEs and micro businesses.
- The guidelines must comply with the national and international food safety standards and food hygiene principles.
- The guidelines are based on fundamental research know-how which is translated into comprehensible, easy to use instructions.
- The guidelines are a result of a long and close collaboration between the private sector, the professional organizations, food safety authorities and research institutes.
- The guidelines allow dairy-specific adjustments (e.g. recipes, production protocols).
- The guidelines represent the basis for a trust-based supply chain and are accepted by all stakeholders.
- **The guidelines are application-oriented, tailor-made, easy-to-use -> “like a recipe for cooking”.**
- **The guidelines ensure safe, high-quality dairy products, high added value and consumer confidence.**

Thank you for your attention!