ANNEX 3. RAW MILK AND RAW MILK CHEESES

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SPECIFIC CONTROL MEASURES FOR RAW MILK AND RAW MILK CHEESES

1. INTRODUCTION

1. Although most milk for drinking is either pasteurized or sterilized by ultra-high temperature (UHT) processing, raw milk products are consumed in many countries. Raw milk cheeses are fermented products made from raw milk that are consumed in a variety of countries around the world. Cheeses are produced by both large manufacturers and small factories such as farm cheese producers, artisanal cheese producers or large-scale industry. Specific combinations of ingredients and technologies are used by manufacturers to obtain a wide variety of cheeses with desired characteristics and meet consumer expectations.

2. Raw milk and raw milk cheeses have been associated with foodborne infections caused by Shiga toxin-producing *Escherichia coli* (STEC) in humans from different countries (FAO/WHO, 2019; Baylis, 2009; Perrin et al., 2015; Honish et al., 2005; Espie et al., 2006; Mungai et al. 2015, Currie et al., 2018; Treacy et al., 2019). A comprehensive approach, considering all the aspects of raw milk and raw milk cheeses from production to consumption, is necessary to reduce the presence of STEC in these products.

3. Cattle are the main reservoir of STEC (Karmali et al., 2010; Salaheen et al., 2019; Rhodes et al., 2019). Infected cattle can carry the bacteria in their gastrointestinal tract without any symptoms of disease and shed them in their faeces (Chapman et al., 2001; Sarimehmetoglu et al., 2009; Brown et al., 1997). STEC have also been isolated from the faeces of other species of animals, including buffaloes, goats, camel and sheep, that are commonly milked for human consumption (Vu-Khac et al., 2008; McCarthy et al., 2019; Álvarez-Suárez et al., 2019; Allal et al., 2012; Njage et al., 2012). Detailed investigations have shown that without observance of appropriate cleaning steps and udder hygiene practices, faecal matter can contaminate the cow’s teats and udders, which in turn can contaminate the milk during the milking process (Ruegg 2003). For this reason, STEC can potentially be found in raw milk. When STEC-contaminated milk is used to produce raw milk cheeses, STEC may survive and be isolated from some resulting raw milk cheeses.

4. It is recognized that some of the provisions in this Annex may be difficult to implement in areas where primary production (milk production) and processing (sometimes traditional) are conducted in small establishments. It is also important to emphasize that this document is intended for use by a variety of operators using diverse milk production systems and cheese technologies. This Annex is therefore intentionally flexible, to allow for different systems of control and prevention of contamination considering cultural matters and different processing practices and conditions.

5. This guidance describes the surveillance and the good practices that can contribute to control of STEC in raw milk and raw milk cheeses at different steps in the production chain and, when implemented correctly, can help reduce the risk of contamination and resulting illness. Effectiveness of interventions of different production practices to control STEC based on published data is variable. This is due to the significant differences in experimental design and manufacturing practice among studies. In particular, the efficacy of control measures at multiple steps in the food chain on the overall reduction of STEC in raw milk and raw milk cheeses has not been quantified. Consequently, it will be up to competent authorities and to each operator (farmer, dairy, or cheesemaking operators) to define appropriate risk-based monitoring and control measures, considering relevant scientific and technical information.
2. OBJECTIVE

6. The objective of this annex is to provide science-based guidance for the control of STEC related to raw drinking milk and raw milk cheeses. This guidance focuses on control of STEC during raw milk production (cows, buffaloes, goats, camels and sheep), raw milk cheese making, storage, distribution to consumer.

3. SCOPE AND DEFINITIONS

3.1. Scope

7. This annex presents specific guidance for control of STEC related to raw milk intended for human consumption and raw milk cheeses.

Raw milk is a milk which has not been heated beyond 40ºC or undergone any treatment that has an equivalent effect. This excludes processing techniques used for microbiological control (e.g. heat treatment above 40 ºC, microfiltration and bactofugation).

3.2. Definitions

- 8. Refer to the General Standard for the Use of Dairy Terms (CXS 206-1999), and the Code of Hygienic Practice for Milk and Milk Products (CXC 57-2004) Annex I (Guidelines for the Primary Production of Milk) and Annex II (Guidelines for the Management of Control Measures During and After Processing). Also refer to the General Principles of Food Hygiene (CXC 1-1969) and the General Standard for Cheese (CXS 283-1978) Milk: milk is the normal mammary secretion of milking animals obtained from one or more milking without either addition to it or extraction from it, intended for consumption as liquid milk or for further processing.

- Raw milk – Milk (as defined in Codex General Standard for the Use of Dairy Terms (CXS 206-1999)) that is intended for direct consumption or a primary input for dairy products and which has not been heated beyond 40ºC or undergone any treatment that has an equivalent effect.

- Raw milk cheeses: cheeses made from raw milk.

4. PRIMARY PRODUCTION-TO-CONSUMPTION APPROACH TO CONTROL MEASURES

9. Figures 1 and 2 provide flow diagrams describing key steps of raw milk and raw milk cheeses production. Not all steps occur in all operations, there may be other steps, and steps may occur in a different order than shown in the Figures.

10. Raw milk should come from healthy animals, be obtained by hygienic milking and be free of colostrum. Raw milk can be a potential source of microbial pathogens, including STEC. It is of major importance to ensure the sanitary quality of the raw milk, which does not undergo a microbial reduction treatment prior to bottling for drinking milk or before the cheese making.

11. The application of combined control measures throughout the food chain is necessary for the control of STEC in the end-products. However, these measures and flow diagrams can vary according to different dairy farming practices and cheese-making processes.

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1 Codex General Standard for the Use of Dairy Terms (CXS 206-1999)
2 For technical purposes, cheese curd might be “cooked” (i.e., by application of heat at temperatures below 40ºC to expel water from the curds). The heat stresses microorganisms, making them more susceptible to other microbiological control measures. Code of Hygienic Practice for Milk and Milk Products (CXC 57-2004), annex II, appendix B, p. 43
5. PRIMARY PRODUCTION – MILK PRODUCTION AT DAIRY FARM

5.1. STEC at the dairy farm.

5.1.1. Scientific Knowledge

12. STEC contamination on the farm: healthy cattle and other ruminants commonly host and shed STEC. (Karmali et al., 2010, Salaheen et al., 2019; Rhades et al., 2019) (see additional data in the Raw Beef Annex). Most of the available data concern cattle. However, there are a number of scientific articles on the presence of STEC in goat, sheep, camel and buffalo, as well as the environment on these farms (Jacob et al., 2013; Otero et al., 2017; Vu-Khac et al., 2008; Alall et al., 2012; Njage et al., 2012). Animal-to-animal transmission via faecal-oral transmission is a likely contamination route of STEC within the herd (Chase-Topping et al., 2008). In addition, the introduction of new animals to a herd may introduce STEC (Sanderson et al. 2006; Ellis-Iversen et al. 2008). Environmental transmission has also been demonstrated due to poor housing conditions or to the survival period of STEC (potentially more than a year) in effluent and the environment (soil, plants, crops, grain and water) (Jang et al., 2017; Nyberg et al., 2019; Haymaker et al., 2019). Pastures can also maintain bacterial circulation by faeces deposited onto the ground and/or spreading of effluent (Fremaux et al., 2008; Jang et al., 2017; Nyberg et al., 2019). Factors affecting STEC contamination on farm are varied and include animal health status, animal age, stage of lactation, geography, climate, exposure to wildlife and farm practices. Other factors (such as major cleansing in the barn and culling) were associated with a lower stx (gene) detection in milk. Other wildlife or livestock, pests, and birds can also carry STEC and thus contribute to their circulation in milking herds (Berry et al., 2010; Puri-Giri et al., 2017). These environmental factors and the features of STEC ecology indicate that control strategies based on denying STEC access to hosts or habitat will be highly challenging to implement in a manner which reliably prevents exposure of ruminants to STEC.

13. Feed and drinking water: feed and water (surface water, roofing water, contaminated drinking water) can contribute to introduction or circulation of STEC, following direct or indirect contamination (Schets et al., 2005; Lascowski et al., 2013; Saxena et al., 2015).

14. STEC excretion by dairy ruminants: Ruminants are the main reservoir of STEC. A review (Hussein and Sakuma, 2005) has indicated a wide range of estimates for the prevalence of STEC carriage in healthy dairy cattle. Different studies reported prevalence in faeces varying greatly depending on animal factors, geographic location and production type (Karmali et al., 2010, Salaheen et al., 2019; Rhades et al., 2019). Studies have reported that sheep and goats are also asymptomatic carriers of STEC (Schilling et al., 2012; Pinaka et al., 2013; Bosilevac et al., 2015; Vu-Khac et al.; 2008; Zaheri et al., 2020).

15. The excretion of STEC by ruminants seems to be sporadic but may also be persistent over several months (Rahn et al., 1997; Widiashi et al., 2004). Studies have shown that excretion varies according to the season, peaking in warmer months (Berry and Wells, 2010; Jaakkonen et al., 2019). Excretion also varies among individual cows, with some individuals considered to be “high shedders” (a high-level excretion of STEC) (Chase-Topping et al., 2008), and excretion levels may even differ between cow droppings of the same animal (Berry and Wells, 2010). Other factors proposed to contribute to changes in STEC excretion include age, diet, housing, stress, herd size, animal health, geographical area, and previous contamination with STEC strains. Faecal contamination of sheep and goat milks exist but is less likely than for cows, because of anatomical differences and as their faeces tend to be more solid and thus are less likely to easily cross-contaminate (Otero et al., 2017).

5.1.2. Control measures for STEC at the dairy farm

16. There are no interventions shown to be consistently efficacious in significantly reducing or eliminating STEC in ruminant intestines. In addition, no interventions specific for small ruminants are suggested. Control measures should be implemented to minimize spread between animals and their environments. The following are examples of measures that may be useful:

- maintain animal health and, where possible, minimize animal stress,
- keep litter and bedding as dry as possible,
- apply pest control practices,
• if possible, limit faecal contact with newborn or young animals,
• keep young cattle in the same groups throughout rearing without introducing new animals,
• apply hygienic practices for manure and slurry management, with the maintenance of necessary intervals between spreading on pasture and the reintroduction of animals for grazing (Fremaux et al., 2008),

16 bis. Other control measures at primary production, such as diet ingredients, vaccination and additional good management practices (as described in the Raw Beef Annex) may be helpful in minimizing the shedding of STEC and, thus, contamination of raw milk, but more research on efficacy is needed.

17. The presence of STEC in feed can be minimized by application of good manufacturing practices and appropriate manure and slurry management when the feed is produced on the farm (Code of Practice on Good Animal Feeding (CXC 54-2004)). Secure storage of feed is important to prevent STEC contamination from runoff water, pests and birds. In addition, it is important to limit water contamination for watering animals by adequate maintenance of water troughs (LeJeune et al., 2001).

5.2. STEC during preparation of animals for milking, milking, and then transfer of milk to bulk containers/tanks.

5.2.1. Scientific Knowledge

18. STEC are commonly present in the microbiota of milk-producing animals, and it is not possible to eradicate them. There are no established methods to prevent STEC carriage or ensure reduced shedding by ruminants. The major route of raw milk contamination is from faecal sources (directly or indirectly). This in turn soils the teats, and consequently the milk can be subsequently contaminated during the milking process. Therefore, limiting faecal contamination during milking is of key importance to manage STEC on the farm (Farrokh et al., 2013).

5.2.2. Specific control measures during the preparation of animals for milking, milking, and then transfer of milk to bulk containers/tanks

19. The implementation of control measures aims primarily at avoiding contamination of the raw milk with STEC during milking and storage on the farm. For this it is important to apply good hygiene practices during milking, to keep animals clean, and most importantly to prevent contamination with faeces.

20. Reducing faecal contamination before and during milking:
• Manage a clean and hygienic environment for the milking animals to reduce faecal contamination. For example, the area where milking will be performed should be cleaned.
• Clean and disinfect all milking materials, utensils and equipment.
• Udders and teats should be properly cleaned before the milking process to minimize the risk of contamination of milk with STEC.
• In the case of manual milking, in addition to udder and teats, the operator's hands need to be properly cleaned.

21. STEC can also potentially persist on milking equipment and pipelines if these are not adequately cleaned and disinfected (Annex I Guidelines for the primary production of milk from CXC 57-2004). Cleaning and disinfecting is more challenging if equipment is not well designed for cleaning, and/or not well maintained. STEC can form biofilms in milking machines if they are improperly designed, poorly maintained and/or poorly cleaned. Studies have shown biofilm formation by O157:H7 STEC and non-O157 STEC with increased tolerance to sanitizers commonly used in the food processing environment (Wang et al., 2012) particularly if cleaning is not done effectively prior to the application of a sanitizer or if a sanitizer is used at sub-lethal concentrations. All equipment that may come in contact with milking animal teats and milk as it is collected, such as milk collecting buckets, should be thoroughly cleaned and disinfected before every use. The hygienic quality of the water used for the last rinse is very important to prevent contamination of the milking machine
6. CONTROLS DURING MILK COLLECTION, STORAGE AND TRANSPORTATION

23. If milk is processed immediately after milking, cooling is not necessary.

24. All equipment that may come in contact with milk, such as tubes and pipes used for transferring milk to larger containers, pumps, valves, storage containers and tanks, etc., should be thoroughly cleaned and disinfected before every use. Although not a standard practice, a full cleaning, once per 24 h, tanker cleaning approach, with the use of a between-load water rinse with or without a disinfecting treatment has been shown to reduce the presence of surface bacteria in the tanker, and thus may provide some risk reduction.

25. STEC can rapidly multiply in raw milk if the milk is at the temperature of STEC growth (Wang et al, 1997), so temperature control of the milk post-harvest is crucial including during its storage in the farm and throughout the collection route (Wang et al. 1997, Kim et al. 2014) to prevent microbial growth. Temperatures ≥ 6°C, extended storage of raw milk, and high initial bacterial counts in raw milk during collection, storage and transportation have been associated with increased counts of *E. coli* in raw milk. In contrast, deep cooling to 2°C significantly extends the storage life. Milk temperature should be monitored during storage and checked before it is unloaded, when possible.

26. The stage of transport has not been identified as a step likely to contaminate the milk with STEC, if good hygiene practices are followed. Transport is also identified as a stage where growth of STEC may occur if the milk is not properly cooled.

7. CONTROL DURING PROCESSING

7.1. Scientific Knowledge

27. Raw milk cheeses are made from raw milk coagulating through the action of rennet or other suitable coagulating agents, and by partially draining the whey resulting from the coagulation, while adhering to the principle that cheese-making results in a concentration of milk protein. Following this step, different processing techniques are applied to produce the end-products. Different microbiota and very diverse enzymatic reactions play a complex role during processing and maturation. This results in very different cheese types, including ripened or unripened soft, semi-hard, hard, or extra-hard product, which may be coated, uncooked or cooked pressed cheeses (with short or long ripening), blue-type cheeses, lactic cheeses, and white mould cheeses. The different processing steps applied, and the raw milks used from different species (e.g. cow, buffalo, goat, sheep) can influence the behaviour and survival of STEC strains (Miszczycya et al., 2013). The behaviour of STEC (survival, growth or inactivation) can also be influenced by temperature, by the intrinsic physico-chemical properties (pH, a\textsubscript{w}, % lactic acid) and by other microflora present specific to different cheeses during their manufacture.

28. At the initial stages of cheese-making, the temperature (around 30 °C) and a\textsubscript{w} value of milk provide favourable conditions for the growth of STEC. During the first hours of cheese-making (transition from milk to curd), an increase in STEC level by 1-3 log can be observed for some cheese technologies. This increase in number is due to the multiplication of the cells in the liquid milk and then in the curd where cells are entrapped (Miszczycya et al., 2013; Peláez et al., 2019).

29. “Cooking” of cheese curd, as well as rapid acidification (when pH decreases to under 4.3) coupled to the increase of non-dissociated lactic acid, were associated with a range in STEC or *E. coli* log reductions (from 1 to 4 log CFU/g) (Miszczycya et al., 2013; Donnelly and al., 2018). However, the magnitude of reduction varied by STEC serotype and type of cheeses, depending on their intrinsic physico-chemical characteristics (Miszczycya et al., 2013).

30. During the ripening step, the microbial stability of cheeses is determined by the combined application of different hurdle factors (low pH, a\textsubscript{w} values, NaCl, non-dissociated lactic acid, starter cultures (such as...
lactic acid bacteria, *Penicillium* mould). These hurdles create an increasingly challenging environment for STEC during the manufacturing process and ripening (Montel et al., 2014). Various studies have shown that when the ripening is long and therefore the $a_w$ low, the STEC numbers will decrease (Miszczyna et al., 2013). However, if the ripening is not long enough, the $a_w$ remains high and a significant reduction of STEC does not occur in the products (Miszczyna et al., 2013 and 2015). Nevertheless, these procedures reduce the number of STEC, but they cannot ensure the safety of the product if the raw milk is contaminated with STEC (Gill and Oudit, 2015). Consequently, the microbiological quality of raw milk used in cheese making is crucial for reduction of the risk associated with the end products.

### 7.2. Measures for preventing contamination of milk and milk products

31. The contamination of dairy products with STEC during processing in the manufacturing plants is rare if appropriate hygiene practices are followed (Kousta et al., 2010). It is recommended that the products should be prepared and handled in accordance with the appropriate sections of the *General Principles of Food Hygiene* (CXC 1-1969), the *Code of Hygienic Practice for Milk and Milk Products* (CXC 57-2004) and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

32. The food business operator (FBO) should analyze the risks associated with its manufacturing process regarding the potential growth or decline of STEC. Based on this assessment, the FBO should adapt the process and/or implement controls to reduce any identified risks for STEC contamination and growth.

33. "Cooking" of cheese curd, rapid acidification or long ripening may not be compatible with some traditional production practices, as they may impact the sensory characteristics of the cheese. In such cases other control measures should be identified and applied. For example, testing raw milk for the presence of STEC can be established, as well as an audit programme of milk suppliers to assess their hygienic practices.

### 8. PRODUCT INFORMATION FOR CONSUMERS

34. In line with the *Code of Hygienic Practice for Milk and Milk Products* (CXC 57-2004, section 9.1), raw milk products should be labelled to indicate they are made from raw milk according to national requirements in the country of retail sale.

### 9. VALIDATION, MONITORING AND VERIFICATION OF CONTROL MEASURES

#### 9.1 E. coli enumeration and STEC testing

35. Although STEC can be isolated from raw milk and raw milk cheeses, STEC testing is uncommon and most sampling and testing protocols target indicator microorganisms such as *E. coli*, whose level can be used as an indicator of raw milk quality prior to raw milk cheeses production. Microbiological criteria (refer to the *Principles and Guidelines for the Establishment and Application of Microbiological Criteria Relating to Food* (CXG 21-1997)) based on process and hygiene indicator microorganisms (*E. coli* / Enterobacteriaceae) may also prove a useful tool for validation, monitoring and verification of control measures.

36. Even if they are useful hygienic markers of the quality of raw milk, the presence or concentration of generic *E. coli* or other indicator microorganisms in raw milk does not indicate the presence of STEC. More specific analyses are needed to detect and confirm by strain isolation the presence of STEC. Periodic testing for ["high risk"](a country’s highest priority) STEC may also be conducted for verification of hygienic practices (FAO/WHO, 2018).

36 bis. Testing raw milk for the presence of ["high risk"](a country’s highest priority) STEC can be established, but testing may not be effective on its own: because of low prevalence of STEC, samples

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4 “High risk” STEC are generally isolates that present pathogenic virulence factors that are responsible for significant numbers of illness and/or that cause the most severe illnesses, and this may vary by country.
tested may not contain STEC despite their presence in the food. Thus, such testing should be used in combination with other control measures, including an audit programme of milk suppliers to assess hygienic practices on the farm.

9.2. Validation and monitoring of control measures

37. Control measures should be validated before being implemented. To limit the cost of this important step, it can be shared by several FBOs and a professional organization which may gather, analyse and interpret data in order to establish alternative or improved measures, for example by writing GHP guidelines adapted to the local context or to the traditional steps of processing.

38. The description of control measures may also include the procedures for monitoring their implementation to ensure the control measures are carried out as intended.

9.3. Verification of control measures

39. At the dairy farm: Indicator microorganisms testing for faecal contamination can be implemented periodically using indicators of hygiene in milk. For example, routine analysis of milk at the point of production for microbial quality indicator microorganisms (E. coli, coliform levels or total aerobic plate counts) can provide information on the hygiene of the operation. Nevertheless, low levels of indicator microorganisms do not confirm the absence of STEC nor other pathogens.

40. Enhanced monitoring should be implemented when STEC strains have been detected in milk or in cheeses and production and sale of the products should be ceased until the contamination issue has been resolved. In such situations an input from technical experts or professional association guidance, as well as guidance from competent authorities, can help to identify the risk factors for milk contamination. Finally, a criterion should be defined for when to return to routine monitoring. This criterion should be based on experience and statistical evaluation of the history of microbiological analyses results.

41. General hygiene audits can be useful to check periodically that the GHPs are effectively implemented at each farm where the milk is collected. They might be conducted by the dairy establishment or by a local professional association.

42. Milk collection to the dairy establishment: Routine surveillance of the quality of the raw milk received by the dairy establishment (indicator microorganisms or/and STEC) conducted by the dairy establishment can be based on samples collected periodically or even for each load. Sampling milk filters may be a more suitable monitoring point for STEC than raw milk from the bulk tank, considering dilution due to pooling and sporadic contamination issues. Milk filter samples can also be useful in investigating the source of contaminated cheese.

43. Enhanced surveillance of all the suppliers can be set up when STEC strains have been detected in mixed milk unloaded at the processing plant. In such a situation, another measure could be to increase the frequency of sampling and STEC analysis in order to assess the milk origin of the strain, the magnitude of contamination and the persistence of the strains in the processing plant. Then, criteria to return to routine monitoring should be defined.

44. During processing: A milk quality check based on STEC detection is an option that some FBOs may consider for raw milk (STEC negative milks). This approach can nevertheless be difficult because of the complexity, the time taken and the cost to analyse for STECs in milk. Alternatively, milk quality checks can be performed based on E. coli, to verify the application of good hygienic practices.

45. Sampling and testing of raw milk cheeses are an important part of verification plans, to confirm that practices and procedures described in the food safety programme are successful. Accurate safety and quality test results are crucial and depend on appropriate sampling and sample handling, the type of representative samples and proper methods. For routine surveillance, FBOs should consider analysing cheese during the early stages of manufacturing, when the peak of STEC growth is likely to take place. Testing at this time would have a greater sensitivity than end product testing and would save producers the expense of aging and storing contaminated product. Analysis could also be done during ripening and/or before placing the cheese on the market.
When STEC are accidentally present in raw milk, it has been found at very low levels in cheeses (Strachan et al., 2001; Buvens et al., 2011; Miszczyna et al., 2013; Gill and Oudit, 2015). This contamination is characterized by heterogeneous distribution (Autry et al.; 2005), making STEC difficult to detect. Sampling plans should therefore be designed according to the *General Guidelines on Sampling* (CXG 50-2004). In addition, sampling plans should be adapted over the entire production chain (number of samples, nature of the samples (for example: milk, cheese at the start of coagulation, during ripening, etc.), quantity analyzed, frequency of analysis, etc.).

The FBO or industry association defines its sampling plan in line with its own acceptable sanitary quality level.

Enhanced surveillance can be put in place when STEC are detected in curds or in cheeses or in the case of a public health risk. For example, STEC can be screened in greater detail in other batches of cheeses to assess the magnitude of contamination. In addition, it is important to identify the remaining contaminated milk, if any, and stop using it.

**Quantitative risk assessment:** Several sampling plans may be applied at different steps (milk harvested at the farm, milk delivered at the dairy establishment, curds, final products). Their combination in a quantitative risk assessment (QRA) model can help assess the efficacy of this sampling plan, using simulation, in terms of risk reduction of illness and percentage of batches rejected. Specific QRA models for STEC in several raw milk cheeses matrices have been developed (Perrin 2015; see also the opinion of ANSES 2018 STEC (saisine n°2018-SA-0164)). QRA models can also be built based on databases obtained when combining results of microbiological analyses performed regularly on the milk at different levels (farm and tank) and on cheeses (during the process and on the final product), values on technological process parameters and physico-chemical values (e.g., pH, a<sub>w</sub>, acid resistance) on the capacity for growth or survival of the microorganisms considered.

QRA models can help compare sampling plans to determine which one provides better protection.

**Application of prerequisite programmes, including good hygiene practices, and HACCP principles:** Given the low frequency and low level of contamination by STEC strains and the limits of the sampling plans, it is the combination of control measures (including GHPs and HACCP, when applicable) throughout the dairy chain that will reduce the risk of STEC contamination of the products put on the market.
Figure 1. Process Flow Diagram for Raw milk Production, Distribution and Sale
Figure 2: Making Cheese from Raw Milk

1. Receive raw milk
2. Receive other ingredients
3. Cold Storage
4. Room temperature storage
5. Addition of ingredients (e.g. culture/rennet)
6. Set raw milk
7. Cut/Stirring
8. Draining
9. Form/Press/Drain
10. Aging (optional and more or less long)
11. Packaging/Labelling
12. Refrigerated Storage
13. Refrigerated Shipping
14. Retail
15. Consumer

Cook / Wash
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