

### Annex 3. Behavior of pathogenic agents during production and/or storage (ripening) of dairy products made from raw milk

Food	(Change in) counts	Conditions	References
<b>Raw cow milk or unknown</b>			
Emmentaler (hard)	<ul style="list-style-type: none"> <li>- inoculation in milk: 4-6 log cfu/mL of <i>Campylobacter jejuni</i>, <i>E. coli</i>, <i>Listeria monocytogenes</i>, <i>Salmonella</i> Typhimurium, <i>Staphylococcus aureus</i>, <i>Yersinia enterocolitica</i></li> <li>- 1 day after production: only low numbers of <i>Staphylococcus aureus</i></li> <li>- 1 week after production: no detection of any of inoculated pathogens</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (32 °C), addition of lactic starter culture, coagulation with rennet (35 min), heating curd (53 °C, 45 min), pressing, salting (20 % brine)</li> <li>- storage: 11-13 °C, 90 days</li> <li>- day 1: pH 5.26</li> <li>- day 90: pH 5.59, water 354 g/kg, salt 5.1 g/kg</li> </ul>	Bachmann & Spahr, 1995
Emmentaler (hard)	<ul style="list-style-type: none"> <li>- inoculation of cow milk: 4-5 log cfu/mL <i>Mycobacterium avium</i> subspecies <i>paratuberculosis</i></li> <li>- steady and slow decrease during ripening</li> <li>- D-value of 27.8 days</li> <li>- viable cells detected at day 120</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (60 °C, 20 min), cooling to 31 °C, addition of lactic starter culture and propionic acid bacteria, coagulation with rennet (35 min), cutting curd, ripening (53 °C, 45 min), draining of whey, pressing (22 h), salting (24 h, 20 % brine), vacuum sealing</li> <li>- storage: 12 °C, 10 days; 22 °C, 60 days; 12 °C, 50 days</li> <li>- pH at day 120 5.7-5.8</li> <li>- water content at 24 h 375-385 g/kg</li> <li>- salt content at 120 days 4 g/kg</li> </ul>	Spahr & Schafroth, 2001
Cheddar (hard)	<ul style="list-style-type: none"> <li>- herd of 35 cattle</li> <li>- 1 cow shedding 2.3 log cfu/mL of <i>Salmonella</i> Muenster in milk</li> <li>- 11 of 181 vats of curd positive</li> <li>- 2 of 11 vats of cheese positive</li> <li>- 1 of 2 vats positive after 125 days</li> </ul>	<ul style="list-style-type: none"> <li>- storage: 5 °C</li> <li>- positive vat: pH 5.14, ash 3.50 %, moisture 35.64 %, total solids 64.36 %, salt 1.03 %</li> </ul>	Wood <i>et al.</i> , 1984
Cheddar (hard)	<ul style="list-style-type: none"> <li>- inoculation in milk: 2 log cfu/mL <i>E. coli</i> K12</li> <li>- increase during production</li> <li>- decrease 1.5 to 2 log during storage</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (32 °C, pH 6.67), addition of calcium chloride solution and mesophilic starter culture, ripening (1 h), addition of rennet (25-30 min), cutting and settling of curd (15 min), heating curd (38 °C, 1 h), draining (pH 5.4), salting (2.7 %), pressing, packaging</li> <li>- storage: 4 °C, 120 days</li> <li>- average: moisture 37.26 %, salt 1.49 %; ash 3.55 %</li> <li>- day 14: pH 4.91</li> </ul>	Amornkul & Henning, 2007
Cheddar (hard)	<ul style="list-style-type: none"> <li>- inoculation of milk: 1-5 log cfu/mL of <i>E. coli</i> O157:H7</li> <li>- increase during production</li> <li>- decrease of less than 1 log cfu/g at day 60</li> <li>- decrease of less than 2 log cfu/g at day 120</li> </ul>	<ul style="list-style-type: none"> <li>- production: pressing, vacuum packaging</li> <li>- storage: 7 °C, 1 week</li> <li>- after storage: cutting, vacuum packaging</li> </ul>	Schlesser <i>et al.</i> , 2006

Cheddar (hard)	<p><i>E. coli</i> O157:H7 counts in log cfu/mL or g:</p> <ul style="list-style-type: none"> <li>- 1.3 (milk)</li> <li>- 1.3 (milk before coagulation)</li> <li>- 1.6 (curd after cutting)</li> <li>- 1.3 (whey at draining)</li> <li>- 2.4 (curd before salting)</li> <li>- 2.2 (cheese on day 1)</li> <li>- decrease to 1.4 log cfu/g on day 60</li> <li>- below 0.7 log cfu/g after 108 days</li> <li>- detection after more than 270 days</li> </ul>	<ul style="list-style-type: none"> <li>- production: addition of lactic acid starter, heating milk (32 °C, 30 min), coagulation with rennet, stirring (30-60 s), cutting, settling (2 min) and stirring (+1 °C/4 min to 39 °C) of curd, pH 5.8, draining of whey, stirring (pH 5.5), dry salting, mixing (5-10 min), pressing (overnight), pH 5.2, vacuum sealing</li> <li>- storage: 9 °C</li> <li>- average composition: moisture 30.82 %, salt in moisture phase: 5.52 %</li> </ul>	D'Amico <i>et al.</i> , 2010
Cheddar (hard)	<ul style="list-style-type: none"> <li>- natural contamination of <i>Listeria monocytogenes</i></li> <li>- never &gt; 1.3 log cfu/g</li> <li>- no detection after 5 months</li> </ul>	<ul style="list-style-type: none"> <li>- storage: 5 months</li> </ul>	Dalmasso & Jordan, 2014
Gouda (hard)	<p><i>E. coli</i> O157:H7 counts in log cfu/mL or g:</p> <ul style="list-style-type: none"> <li>- 1.4 (milk)</li> <li>- 1.4 (milk before coagulation)</li> <li>- 1.8 (curd after cutting)</li> <li>- 0.5 (whey removed)</li> <li>- 0.7 (whey plus wash water)</li> <li>- 2.6 (curd before pressing)</li> <li>- 3.0 (cheese before brining)</li> <li>- 2.2 (cheese on day 1)</li> <li>- decrease to 0.7 log cfu/g on day 60</li> <li>- below 0.7 log cfu/g after 94 days</li> <li>- detection after more than 270 days</li> </ul>	<ul style="list-style-type: none"> <li>- production: addition of starter cultures, heating milk (30 °C, 40 min), coagulation with rennet, settling (1 min) and stirring (30 min) of curd, removing of whey, stirring (38 °C, 30 min), prepressing (10 min), draining, pH 5.16, salting (pH 5.2), brining, drying, vacuum sealing</li> <li>- storage: 14 °C, 5 weeks; 9 °C</li> <li>- average composition: moisture 47.41 %, salt in moisture phase: 4.79 %</li> </ul>	D'Amico <i>et al.</i> , 2010
Tilsiter (semi-hard)	<ul style="list-style-type: none"> <li>- inoculation in milk: 4-6 log cfu/mL of <i>Campylobacter jejuni</i>, <i>E. coli</i>, <i>Listeria monocytogenes</i>, <i>Salmonella</i> Typhimurium, <i>Staphylococcus aureus</i>, <i>Yersinia enterocolitica</i></li> <li>- 90 days after production: only <i>Listeria monocytogenes</i> detected</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (32 °C), addition of lactic starter culture, coagulation with rennet (35 min), heating curd (42 °C, 15 min), pressing, salting (20 % brine)</li> <li>- storage: 11-13 °C, 90 days</li> <li>- day 1: pH 5.21</li> <li>- day 90: pH 5.78, water 393 g/kg, salt 12.3 g/kg</li> </ul>	Bachmann & Spahr, 1995
Tisliter (semi-hard)	<ul style="list-style-type: none"> <li>- inoculation of cow milk: 4-5 log cfu/mL <i>Mycobacterium avium</i> subspecies <i>paratuberculosis</i></li> <li>- steady and slow decrease during ripening</li> <li>- D-value of 45.5 days</li> <li>- viable cells detected at day 120</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (60 °C, 20 min), cooling to 31 °C, addition of lactic starter culture, coagulation with rennet (35 min), cutting curd, ripening (44 °C, 10 min), draining of whey, pressing (22 h), salting (24 h, 20 % brine), vacuum sealing</li> <li>- storage: 14-15 °C, 120 days</li> <li>- pH at day 120 5.7-5.8</li> <li>- water content at 24 h 400-410 g/kg</li> </ul>	Spahr & Schafroth, 2001

		- salt content at 120 days 16 g/kg	
Semi-hard cheese	<ul style="list-style-type: none"> <li>- inoculation in milk: 1 and 3 log cfu/mL <i>E. coli</i> (5 strains, including 3 VTEC)</li> <li>- increase of 3.5 log cfu/g at day 1 (concentration effect and growth)</li> <li>- slow and continuous decrease during ripening</li> <li>- generic <i>E. coli</i> survived at higher counts</li> <li>- 1 of 3 VTEC showed weaker survival</li> <li>- 6 cheeses with low inoculum: &gt; 1 log cfu/g at end of ripening</li> <li>- after enrichment, VTEC detection in almost all cheeses</li> </ul>	<ul style="list-style-type: none"> <li>- cooking temperature: 40 °C or 46 °C</li> <li>- storage: 16 weeks</li> </ul>	Peng <i>et al.</i> , 2012
Semi-hard cheese	<p><i>Staphylococcus aureus</i> counts in log cfu/mL or g:</p> <ul style="list-style-type: none"> <li>- 2.4 (milk)</li> <li>- 1.3 (mesophilic starter culture)</li> <li>- 1.3 (thermophilic starter culture)</li> <li>- 0.0 (cfu) (rennet)</li> <li>- 3.3 (gel of early coagulation)</li> <li>- 2.3 (whey)</li> <li>- 4.2 (curd at pressing)</li> <li>- 3.8 (cheese at day 7)</li> <li>- 0.0 (cfu) (cheese at week 10)</li> <li>- 2.0 (soured cream)</li> </ul>	- cheese after 24 h: pH 4.9-5.2	Jørgensen <i>et al.</i> , 2005b
Feta (soft)	<ul style="list-style-type: none"> <li>- inoculation in milk: 4 log cfu/mL <i>E. coli</i> O157:H7, <i>Listeria monocytogenes</i></li> <li>- <i>E. coli</i> O157:H7: growth during production, highest count at 10 days, decrease after 10 days, count at 75 days higher than inoculum</li> <li>- <i>Listeria monocytogenes</i>: growth during production, survival during storage, count after 75 days higher than inoculum</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (30 °C), addition of starter culture, addition of lipase (1 h) and rennet (1 h), cutting and stirring curd (20 min), draining (2 h), drying (18 °C, 24 h, 85 % RH), addition of salt (3 %), after 1 week addition of brine (7 %)</li> <li>- storage: 2 °C, 75 days</li> </ul>	Ramsaran <i>et al.</i> , 1998
Camembert (soft)	<ul style="list-style-type: none"> <li>- inoculation in milk: 4 log cfu/mL <i>E. coli</i> O157:H7, <i>Listeria monocytogenes</i></li> <li>- <i>E. coli</i> O157:H7: growth during production, highest count after 24 h, decrease after 24 h, count at 65 days higher than inoculum</li> <li>- <i>Listeria monocytogenes</i>: growth during production, survival during storage, count at 65 days higher than inoculum</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (33 °C), addition of starter culture (1 h), addition of rennet (45 min), cutting and settling of curd (1 h), draining (24 h), salting, drying (18 °C, 2 days, 85 % RH), ripening (12 °C, 10 days, 90 % RH), packaging</li> <li>- storage: 2 °C, 65 days</li> </ul>	Ramsaran <i>et al.</i> , 1998
Camembert (soft)	<ul style="list-style-type: none"> <li>- inoculation in microfiltered milk: 3 log cfu/mL of VTEC</li> <li>- increase by 1-2 log cfu/g during production</li> <li>- stabilization during salting/drying</li> <li>- decrease during early stages of ripening</li> </ul>	<ul style="list-style-type: none"> <li>- production: addition of mesophilic starters and ripening flora, heating milk (32 °C, 2 h), coagulation with rennet (8 min, pH 6.30), pH 6.15, cutting and settling (30 min) of curd, draining (20 °C, 20-22 h), storage (20-22 °C, 20 h),</li> </ul>	Montet <i>et al.</i> , 2009

		<p>brining (10 °C, 25 min), during (13 °C, 5 h), ripening (11 °C, RH 95 %, 20 days), packaging</p> <ul style="list-style-type: none"> <li>- storage: 4 °C</li> <li>- milk (before maturation): pH 6.45</li> <li>- curd (during draining): pH 6.03</li> <li>- cheese (end of moulding): pH 4.65</li> <li>- cheese (after salting): pH 4.64</li> <li>- cheese (after drying): pH 4.66</li> <li>- cheese (at day 1): pH 4.66, dry matter 38.37 %, moisture 76.53 %</li> <li>- cheese (at day 10): pH 4.75</li> <li>- cheese (at day 20): pH 5.11, dry matter 42.02 %, moisture 73.65 %, salt 2.58 %</li> </ul>	
Camembert (soft)	<p><i>Brucella abortus</i> counts in log cfu/mL or g:</p> <ul style="list-style-type: none"> <li>- 3.6 (milk – pH 6.5)</li> <li>- 4.2 (fresh curd – pH 6.1)</li> <li>- 4.3 (curd out of mould – pH 4.6)</li> <li>- 3.0 (cheese at day 5 – pH 4.8)</li> <li>- 1.5 (cheese at day 8 – pH 4.7)</li> <li>- 1.3 (cheese at day 12 – pH 5.0)</li> <li>- 1.1 (cheese at day 15 – pH 4.9)</li> <li>- 0.4 (cheese at day 18 – pH 4.9)</li> <li>- 0.0 (cheese at day 22 – pH 5.8)</li> <li>- 0.0 (cheese at day 25 – pH 5.8)</li> <li>- 0.0 (cheese at day 29 – pH 5.5)</li> <li>- 0.0 (cheese at day 32 – pH 6.2)</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (32 °C, 1 h), addition of lactic starter, pH 6.5, coagulation with rennet (20 min), cutting curd, moulding, whey draining, inoculation of surface, ripening (25 °C, 10 h; 18 °C), salting (12 °C, 50 min, 20 % salt solution)</li> <li>- storage: 12 °C, 35-40 days</li> </ul>	Plommet <i>et al.</i> , 1988
Surface mold cheese (soft)	<ul style="list-style-type: none"> <li>- inoculation of surface of cheese: -0.7 and 0.3 log cfu/cm<sup>2</sup> of <i>Listeria monocytogenes</i></li> <li>- increase after day 28</li> <li>- increase to 2.96 log cfu/g at day 60 (low inoculum)</li> <li>- increase to 4.55 log cfu/g at day 60 (high inoculum)</li> </ul>	<ul style="list-style-type: none"> <li>- cheese: ripening, wrapping</li> <li>- storage: 4 °C, 60 days</li> </ul>	D'Amico <i>et al.</i> , 2008
Uncooked pressed cheese	<p><i>E. coli</i> O157:H7, O26:H11, O103:H2 and O145:H28</p> <ul style="list-style-type: none"> <li>- increase during first 24 hours of production</li> <li>- constant during ripening and storage until day 40</li> <li>- no significant difference in rind and core</li> <li>- no significant difference for industrial or traditional production</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating cow milk (34 °C, 1 h), addition of mesophilic and thermophilic lactic acid bacteria, addition of rennet, coagulation (34 °C, 30 min), pressing, brining (1 h 30 min), ripening (12 °C, industrial 12 days or traditional 20 days), wrapping</li> <li>- storage: 4 °C, industrial 12 days or traditional 20 days; 8 °C, 8 days</li> <li>- pH: decrease from 6.6 to 5.3 during day 1, slow increase</li> </ul>	Miszczycha <i>et al.</i> , 2013

		<p>after day 5 to 5.80 at day 40</p> <ul style="list-style-type: none"> <li>- <math>a_w</math>: remained constant, in core 0.974 at day 40, in rind 0.980 at day 40</li> </ul>	
Uncooked pressed cheese	<p><i>E. coli</i> O26:H11 and O157:H7</p> <ul style="list-style-type: none"> <li>- increase during first 24 hours of production</li> <li>- constant between day 1 and 60</li> <li>- decrease during ripening</li> <li>- at day 210 under detection limit except for <i>E. coli</i> O26:H11 (3 log cfu/g at day 240)</li> </ul>	<ul style="list-style-type: none"> <li>- production: cow milk, addition of mesophilic lactic acid bacteria, addition of rennet, coagulation (32 °C, 45 min), pressing, dry salting of curd (2 h), pressing</li> <li>- storage: 9-10 °C, 7 months</li> <li>- pH: decrease from 6.79 to 5.19 during first day, in core slow increase to 5.52 at day 240 and from 7.34 at day 60 to 7.64 at day 240</li> <li>- <math>a_w</math>: in core slow decrease to 0.943 at day 240, in rind from 0.941 at day 60 to 0.922 at day 240</li> </ul>	Miszczucha <i>et al.</i> , 2013
Uncooked pressed cheese	<p><i>E. coli</i> O26:H11 and O157:H7</p> <ul style="list-style-type: none"> <li>- increase during first day of production</li> <li>- constant during ripening until day 20</li> </ul>	<ul style="list-style-type: none"> <li>- production: cow milk, addition of mesophilic and thermophilic lactic acid bacteria and yeasts, heating milk (34 °C, 1 h), coagulation with rennet (34 °C, 30 min), pressing, brining (13 °C, 1 h 30), ripening at 12 °C for 20 days, wrapping</li> <li>- storage: 4 °C, 12 days; 8 °C</li> <li>- pH: in core decrease from 6.7 to 5.2 during first day and 5.1 at day 7, slow increase to 5.25 at day 28</li> <li>- <math>a_w</math>: in core 0.96 at day 35</li> </ul>	Miszczucha <i>et al.</i> , 2014
Smear cheese	<ul style="list-style-type: none"> <li>- inoculation of milk: 1.52 log cfu/mL of <i>E. coli</i> O157:H7</li> <li>- increase to 3.4 log cfu/g at day 1</li> <li>- decrease during ripening to &lt; 0 cfu/g in rind at day 21</li> <li>- decrease during ripening to &lt; 1 log cfu/g in core at day 21</li> <li>- detection of viable cells at day 90</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (32 °C, 50-55 min), addition of starter culture (at 25 °C), pH 6.55, coagulation with rennet (75 min), cutting, settling (5 min) and stirring (5 min) of curd, heating of curd (+1 °C/5 min to 37 °C), pH 6.4, moulding (pH 5.1), brining (75 min, 23 % NaCl), storage (15 °C, RH &gt; 95 %, overnight; smearing; 18 days), wrapping</li> <li>- storage: 6 °C</li> <li>- pH: in rind 5.27 at day 1, decrease and dramatic increase after development of smear microflora to 6.32 after 10 weeks, in core 4.89 at day 1, decrease to 4.72 after 1 week, slow increase to 5.16 after 10 weeks</li> <li>- moisture: in core 45 g/100 g after 6 weeks</li> <li>- salt: in core 2.46 g/100 g after 6 weeks</li> </ul>	Maher <i>et al.</i> , 2001
Smear cheese	<ul style="list-style-type: none"> <li>- inoculation of cow milk: 3.56 log cfu/g dry weight <i>Listeria monocytogenes</i></li> <li>- no growth during production</li> <li>- increase of 2 log cfu/g dry weight during first 4 days of</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (30 °C, 3 h, RH 88 %, pH 7-6.8), addition starter, coagulation with rennet (45 min, RH 71 %, pH 6.55), cutting (15 min, RH 67 %, pH 6.45), heating curd (30 °C to 36 °C, 40 min, RH 65 %), moulding (RH 62 %,</li> </ul>	Schwartzman <i>et al.</i> , 2011

	<p>ripening</p> <ul style="list-style-type: none"> <li>- survival/decrease until end of ripening</li> </ul>	<p>pH 6.3), turning (36 °C to 22 °C, RH 62-60 %, pH 6.3-5.2), brining (23 % NaCl), draining, smearing</p> <ul style="list-style-type: none"> <li>- storage :13 °C, 14 days, RH 43 %, pH 5.2-5.0; 8 °C, 14 days, RH 18-85 %, pH 6.7-5.0</li> <li>- a<sub>w</sub>: during production 0.998-0.999, minimum in rind 0.75, in rind at end of ripening 0.892 (lower than core)</li> </ul>	
Danish cheese	<ul style="list-style-type: none"> <li>- inoculation in milk: 6 log cfu/mL <i>E. coli</i>, <i>Listeria innocua</i>, <i>Staphylococcus aureus</i></li> <li>- <i>E. coli</i>: increase during production, highest count after 7 days, decrease after 7 days</li> <li>- <i>Listeria innocua</i>, <i>Staphylococcus aureus</i>: survival during production, no growth during ripening</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (30 °C), addition of starter cultures (9 log cfu/g), coagulation with rennet (30 min), heating curd (39 °C (8 h to reduce pH from 6.70 to 5.40) or 50 °C (4 h to reduce pH from 6.70 to 5.40), 2 min), pressing</li> <li>- storage: 8 °C, 56 days</li> </ul>	Masoud <i>et al.</i> , 2012
Cheese	<p><i>Staphylococcus aureus</i> counts in log cfu/mL or g:</p> <ul style="list-style-type: none"> <li>- 0.80</li> <li>- 2.34</li> <li>- 2.86</li> <li>- 2.51</li> <li>- 0.82</li> </ul>	<p>from cow milk (average of 8 farms, 73 batches)</p> <ul style="list-style-type: none"> <li>- milk: pH 6.58</li> <li>- curd (2-3 hours): pH 6.19</li> <li>- cheese (5-6 hours): pH 5.37</li> <li>- cheese (24 hours): pH 5.11</li> <li>- cheese (30 days): pH 5.17</li> </ul>	Jakobsen <i>et al.</i> , 2011
Cooked cheese	<p><i>E. coli</i> O26:H11 and O157:H7</p> <ul style="list-style-type: none"> <li>- no growth during first hours of production</li> <li>- during ripening only detection after enrichment</li> <li>- at day 120 not all strains detected after enrichment</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating cow milk (32 °C, 15 min), addition of thermophilic lactic acid bacteria, addition of rennet, coagulation (32 °C, 32 min), heating of curd (54 °C, 35 min), brining (24 h), pressing</li> <li>- storage: 9-10 °C, 4 months</li> <li>- pH: decrease from 6.6 to 5.38 during first hours, stable for 1 month, slow increase to 5.82 at day 120</li> <li>- a<sub>w</sub>: in core stable between day 5 and 15 and decrease to 0.975 at day 120, in rind increase from 0.974 to 0.980 between day 15 and 45 and decrease to 0.964 at day 120</li> </ul>	Miszczycha <i>et al.</i> , 2013
Mozzarella	<p><i>E. coli</i> O157:H7 counts in log cfu/mL or g (80 °C):</p> <ul style="list-style-type: none"> <li>- 5.150 (milk)</li> <li>- 5.200 (curd)</li> <li>- 5.225 (curd after ripening)</li> <li>- no detection (curd after stretching)</li> <li>- no detection (curd after brining)</li> <li>- no detection (after 7 days)</li> </ul> <p><i>E. coli</i> O157:H7 counts in log cfu/mL or g (70 °C):</p> <ul style="list-style-type: none"> <li>- 5.125 (milk)</li> <li>- 5.175 (curd)</li> <li>- 5.225 (curd after ripening)</li> </ul>	<ul style="list-style-type: none"> <li>- production: addition of rennet, heating milk (35-36 °C), coagulation (30 min), cutting curd after 40 min, draining (room temperature, pH 5.2), heating curd (70 °C or 80 °C), stretching, moulding, salting (23 % solution, 12h)</li> <li>- storage: 4 °C, 7 days</li> </ul>	Spano <i>et al.</i> , 2003

	<ul style="list-style-type: none"> <li>- 3.975 (curd after stretching)</li> <li>- 2.075 (curd after brining)</li> <li>- no detection (after 7 days)</li> </ul>		
Mozzarella	<ul style="list-style-type: none"> <li>- inoculation of curd: 7.1-8.7 log cfu/g of VTEC O157 and O26</li> <li>- 4D reduction of VTEC O26 when heating curd at 68 °C for 2.6 to 6.3 min or at 80 °C for 2.1 to 2.3 min</li> <li>- VTEC O157 greater resistance than VTEC O26 at 68 °C</li> </ul>	- production: heating curd at 68 °C or 80 °C	Trevisani <i>et al.</i> , 2014
Butter	<ul style="list-style-type: none"> <li>- inoculation of <i>Listeria monocytogenes</i> (6.10 (A), 3.02 (B), 1.95 (C) and 1.04 (D) log cfu/g) and <i>Listeria innocua</i> (E) in cream</li> <li>- no significant growth during storage</li> <li>- B, C and D: increase with 0.2 log cfu/g during 3 days followed by decrease</li> <li>- C: after 27 days 0.65 (4 °C), 0.65 (10 °C), 3.5 (20 °C) log reduction</li> <li>- decrease at 20 °C was significantly higher than at 10 °C or 4 °C</li> </ul>	- storage: 4 °C, 10 °C or 20 °C, 4 weeks	De Reu & Herman, 2004
Butter	<ul style="list-style-type: none"> <li>- natural contamination of <i>Listeria monocytogenes</i> -0.6-1.2 log cfu/g</li> <li>- decrease of 1 log (4 °C) and 1.8 log (10 °C)</li> </ul>	- storage: 4 °C or 10 °C, 4 to 5 weeks	De Reu & Herman, 2004
<b>Raw goat milk</b>			
Cheese	<ul style="list-style-type: none"> <li><i>Staphylococcus aureus</i> counts in log cfu/mL or g:</li> <li>- 2.01</li> <li>- 3.34</li> <li>- 4.29</li> <li>- 3.90</li> <li>- 1.33</li> </ul>	<ul style="list-style-type: none"> <li>from goat milk (average of 9 farms, 49 batches)</li> <li>- milk: pH 6.59</li> <li>- curd (2-3 hours): pH 6.24</li> <li>- cheese (5-6 hours): pH 5.56</li> <li>- cheese (24 hours): pH 5.24</li> <li>- cheese (30 days): pH 5.14</li> </ul>	Jakobsen <i>et al.</i> , 2011
Ripened cheese	<ul style="list-style-type: none"> <li>- inoculation of goat milk: 9.7 log cfu/g of <i>Brucella melitensis</i></li> <li>- decrease during production</li> <li>- 6.3 log cfu/mL in whey at curd cutting</li> <li>- 6 log cfu/mL at draining</li> <li>- 3 log cfu/mL during days 16-30 (4 °C)</li> <li>- 4 log cfu/mL during days 6-15, no detection during days 16-30 (24 °C)</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating milk (24 °C, 30 min), addition of starter cultures, 24 h at room temperature, at 4 °C or 24 °C: curd cutting (30 min), whey draining (18 h), immersion in brine (30 min)</li> <li>- storage: 4 °C or 24 °C, 30 days</li> <li>- a<sub>w</sub>: 0.98 (milk), decrease, 0.96-0.91 (brining), 0.91-0.90 (ripening at 4 °C), 0.91-0.87 (ripening at 24 °C)</li> <li>- pH: 7.0 (milk), 4.0 (addition of starter cultures), 4.0-5.0 (ripening at 4 °C), 4.0 (ripening at 24 °C)</li> </ul>	Méndez-González <i>et al.</i> , 2011
Lactic cheese	<ul style="list-style-type: none"> <li><i>E. coli</i> O157:H7, O26:H11, O103:H2 and O145:H28</li> <li>- constant (same as in milk) during first hours of production</li> <li>- increase of <i>E. coli</i> O26:H11 of 1 log cfu/g and decrease until</li> </ul>	- production: heating goat milk (24 °C, 1 h), addition of mesophilic lactic acid bacteria, coagulation with rennet (24 °C, 24 h), dry salting on surface (1 h), ripening (4 °C, 10	Miszczycha <i>et al.</i> , 2013

	<p>end of coagulation</p> <ul style="list-style-type: none"> <li>- at end of demolding (60 days), only detection after enrichment</li> <li>- detection during ripening and storage</li> <li>- at day 60 not all strains detected after enrichment</li> </ul>	<p>days), dripping, packaging</p> <ul style="list-style-type: none"> <li>- storage: 4 °C, 10 days; 20 °C, 2 h; 8 °C, 35 days</li> <li>- pH: dramatic decrease to 4.21 at day 2, increase to 5.26 at day 25</li> <li>- a<sub>w</sub>: in core decrease from 0.994 at day 2 to 0.967 at day 45</li> </ul>	
<b>Raw sheep milk</b>			
Cheese (semi-hard)	<ul style="list-style-type: none"> <li>- inoculation of raw sheep milk cured cheese: 4 log cfu/g of <i>Listeria monocytogenes</i></li> <li>- decrease after 6 weeks</li> <li>- non-linear survival</li> <li>- log reduction at 4 °C: 2.10 at day 91, 3.19 at day 101, presence at day 111, eradication at day 114</li> <li>- log reduction at 12 °C: 1.74 at day 77, 2.90 at day 91, presence at day 98, eradication at day 104</li> <li>- log reduction at 22 °C: 1.76 at day 54, 2.45 at day 67, 4.02 at day 70, presence at day 74, eradication at day 77</li> </ul>	<ul style="list-style-type: none"> <li>- vacuum packaging</li> <li>- storage: 4 °C, 12 °C or 22 °C, 3-6 months</li> <li>- lactic acid bacteria: increase 1 log cfu/g during first 2 weeks, increase at 12 °C and 22 °C</li> <li>- pH: 5.46</li> <li>- a<sub>w</sub>: 0.9450</li> </ul>	Valero <i>et al.</i> , 2014
Feta (soft)	<ul style="list-style-type: none"> <li>- flock of 130 sheep, 66 sheep lactating</li> <li>- bulk tank milk: 3.8 log cfu/mL of <i>Listeria monocytogenes</i></li> <li>- 2.3-2.8 log cfu/g 7 days after production of cheese</li> </ul>	<ul style="list-style-type: none"> <li>- production: filtered milk, coagulation with commercial buttermilk</li> <li>- storage: 4 °C, 7 days</li> <li>- pH (cheese): 4.3-4.4</li> </ul>	Schoder <i>et al.</i> , 2003
Blue type cheese	<ul style="list-style-type: none"> <li>- <i>E. coli</i> O26:H11, O103:H2 and O157:H7</li> <li>- increase in core of 1-3 log cfu/g during first 24 hours of production</li> <li>- rapid decrease 7 days after curding</li> <li>- at day 240 only detection of <i>E. coli</i> O26:H11 after enrichment</li> </ul>	<ul style="list-style-type: none"> <li>- production: heating sheep milk (34 °C, 1 h), addition of mesophilic and thermophilic lactic acid bacteria, coagulation with rennet (32.5 °C, 1 h), dry salting of surface (day 3&amp;5, 5 min), ripening (11 °C, 16 days; -2 °C, 125 days), wrapping (at day 150)</li> <li>- storage: 4 °C, 30 days; 12 °C, 60 days</li> <li>- pH: decrease from 6.6 to 4.91 during first 3 days, increase until day 90, decrease after day 90</li> <li>- a<sub>w</sub>: gradual decrease to 0.898 at day 240</li> </ul>	Miszczucha <i>et al.</i> , 2013