RAW MILK SAFETY PILOT STUDY IN ESTONIA

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INTRODUCTION. Raw milk has several microbiological and health benefits but due to its nutritional properties, raw milk also creates good growth conditions for a variety of spoilage and potentially pathogenic microorganisms, such as Shiga-toxin producing *Escherichia coli* (STEC), *Listeria monocytogenes*, *Salmonella enterica*, *Campylobacter* spp., *Yersinia* spp. and some others. Raw milk may also contain mastitis-causing agents, such as *Staphylococcus aureus*, *Streptococcus agalactiae* and zoonotic pathogens, such as *Coxiella burnetii*, *Toxoplasma gondii*, *Leptospira hardjo*, tick-borne encephalitis virus and some others which can be excreted with milk and are potentially hazardous to humans. Present study was supported by the Estonian Ministry of Agriculture project 8-2/T13091VLTO with the main aim to estimate the safety and quality indicators of raw milk intended for direct selling to customers.

MATERIALS AND METHODS. During the one month period from June to July 2013 without previous notification to the farmers' in-line milk filters, bulk milk samples and milk samples from selling points were collected from a total of 14 dairy farms in Estonia. These farms were randomly selected out of the 35 farms that sold raw milk in large amounts directly to consumers in Estonia in summer 2013. Of these 14 farms, six (42.8%) produced milk organically. Among the selected herds, tie-stall and free-stall systems were equally used. All samples were taken by official veterinarians. All analyses of the samples collected from the farms began within 24 h after sampling. The samples obtained from the selling points were analysed on the day of expiry date. For mastitis pathogens a commercial real-time PCR test kit (Patho Proof Mastitis PCR Assay, Thermo Fisher Scientific, Espoo, Finland) was used for bulk milk samples, and the analyses were performed in the Estonian Milk Recording Laboratory. All other analyses were performed in the Estonian Veterinary and Food laboratory in accordance with ISO standard methods including STEC genes determination where PCR was used as described in ISO/TS 13136.

RESULTS. The somatic cell counts, total bacterial counts and the presence of *L. monocytogenes*, *Campylobacter* spp., *Salmonella* spp. and STEC were studied in the milk. The total bacterial counts exceeded 100,000 cfu/ml in three (21.4%) bulk milk samples and in 10 samples (71.4%) collected at the retail level. STEC genes were detected in 64.3% of the in-line milk filter samples. More than one STEC serogroup-specific gene was detected in four dairy farms. *L. monocytogenes* was found in 36% of the in-line milk filters. Neither *Salmonella* spp. nor *Campylobacter* spp. were found in any samples.

CONCLUSIONS. The milk quality of one-third of the dairy herds from which raw milk was directly sold to customers was not sufficient. Therefore, raw milk that is intended for direct consumption cannot be considered to be microbiologically safe without heat treatment. The current risk management methods that are applied in Estonia are not sufficient to ensure raw milk safety for customers. We also suggest that the official criteria for raw milk that is intended for direct consumption should be reviewed and improved in Estonia.