# Investigations on pathogenic microorganisms sources in cows milk production chain

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## OBJECTIVES

The objective of the current study was to investigate sources of *Listeria monocytogenes, Salmonella spp., Staphylococcus aureus, Bacillus cereus, Clostridium spp.* and moulds in cowshed environment.

## INTRODUCTION

The origin of food borne pathogens in milk may be contamination on the farm during milking process from cows' environment or itself, and from milking equipment. For obtaining safe and qualitative cows' milk and further milk products, it is essential to find out critical microbial hazards in milk production environment.

## MATERIALS AND METHODS

In total, 130 feed, 21 water, 5 manure, 4 air samples from four dairy farms in Latvia were bacteriologically and mycologically examined at the Scientific Laboratory of Biochemistry and Microbiology of the Research Institute "Sigra". Complex and selective culture media were used for the isolation of bacteria. In species level bacteria were identified using gram-positive and gram-negative kits of BBL CRYSTAL Identification System.

## RESULTS

Acquired results showed that bacteria from the genus *Listeria* (int.al. *L.seeligeri*, *L.grayi* and *L.innocua*) are present in feed – grass, silage, fodder, and corn (Fig.1). 12,5 % of feed samples were contaminated with *L.monocytogenes* (Fig.2). Silage, haylage, corn, fodder, and hay samples were contaminated with spore forming bacteria *Clostridium* and *Bacillus* vegetative cells and spores (Fig. 3).

Source of members of the family *Enterobacteriaceae*, genus *Staphylococcus, Bacillus cereus* and different species of microscopic fungi are water, air and manure (Table 1.).

**Table 1. Microorganisms isolated from cowshed environment**

| SAMPLE | ISOLATED MICROORGANISMS |
|---|---|
| WATER | *Escherichia coli, Enterococcus faecalis, Enterococcus faecium, Corynebacterium aquaticum, Aeromonas hydrophila, Clostridium spp., Bacillus cereus,* fungi |
| AIR | *Aerococcus spp., Micrococcus spp., Proteus spp., Pantoea spp., Pseudomonas stutzeri, E.coli, Acinetobacter baumannii, Staphylococcus spp.,* fungi |
| MANURE | *Escherichia coli* (thermophilic and mesophilic), *Enterococcus spp., Salmonella spp., Listeria monocytogenes, Bacillus cereus,* fungi |

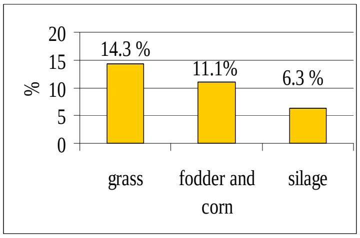

Fig.1. Spectrum of feed samples contaminated with *Listeria spp.*

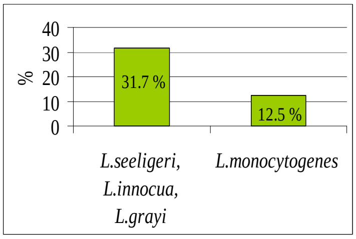

Fig.2. Percentage of feed contaminated with *Listeria spp.* and *L.monocytogenes*

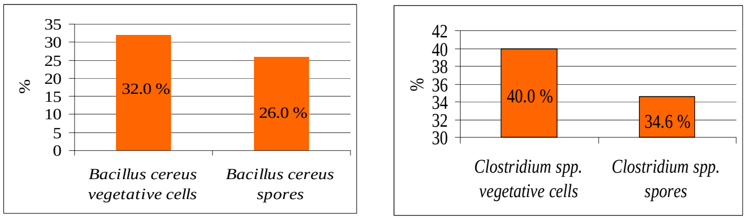

Fig.3. Incidence of *Bacillus* and *Clostridium* vegetative cells and spores in feed samples (n=130)

## CONCLUSIONS

- **Dairy cows' feed is the source of raw milk contamination with pathogenic *Listeria monocytogenes* and spore forming bacteria from the genus *Bacillus* and *Clostridium.***
- **Water used in dairy farms contains *Escherichia coli,* coliform bacteria, *Bacillus cereus* and fungi.**
- **Air in dairy farms is the source for milk contamination with bacteria of genus *Staphylococcus,* mainly coagulase negative staphylococci.**
- **Manure is the source for milk contamination with *Listeria monocytogenes, Salmonella spp., Bacillus cereus* and fungi.**