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Pathogen records as a tool to manage udder health

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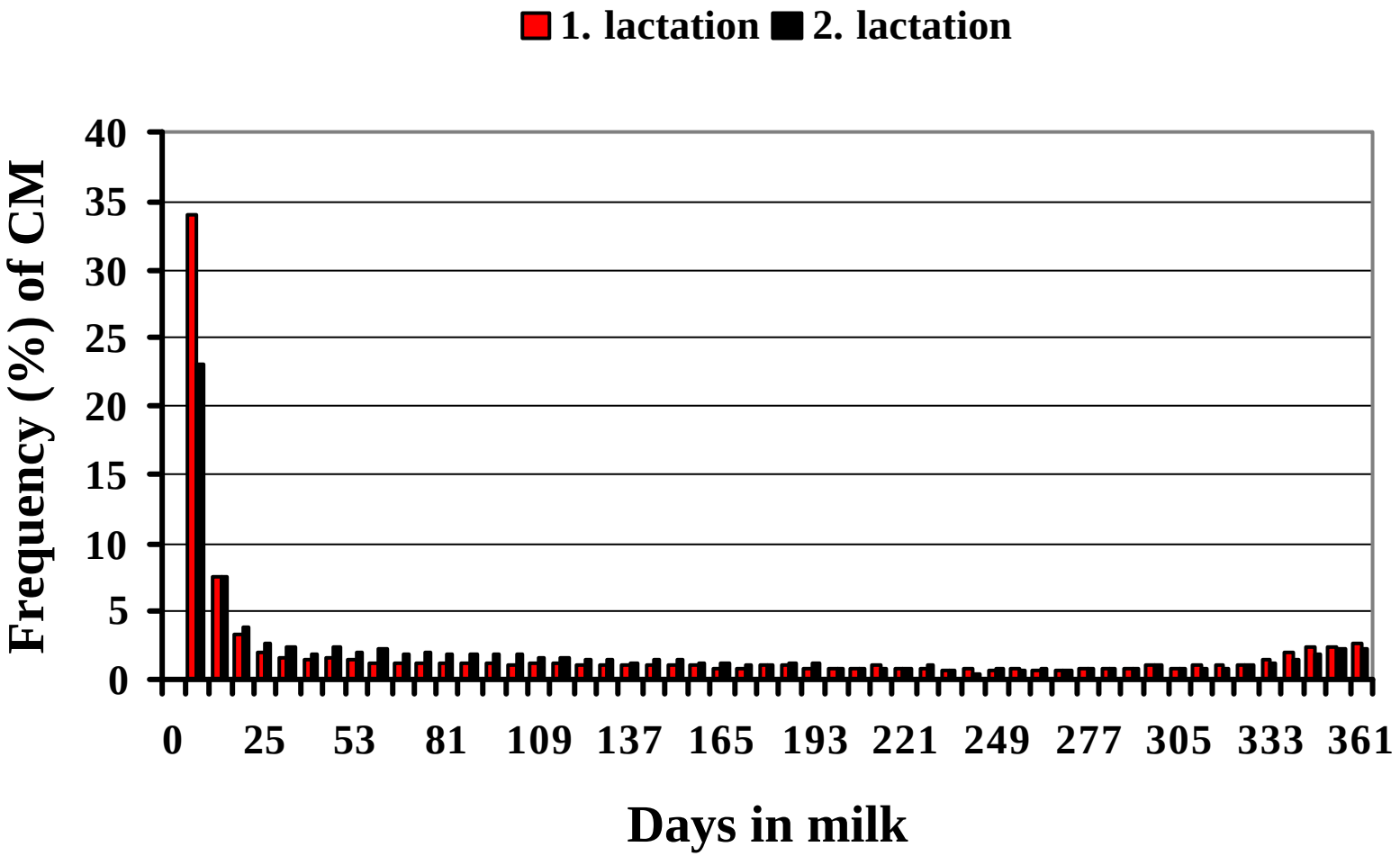
Objectives

- To descripe:
  - new data recording system to be used in udder health management
  - the preliminary results from the collected data

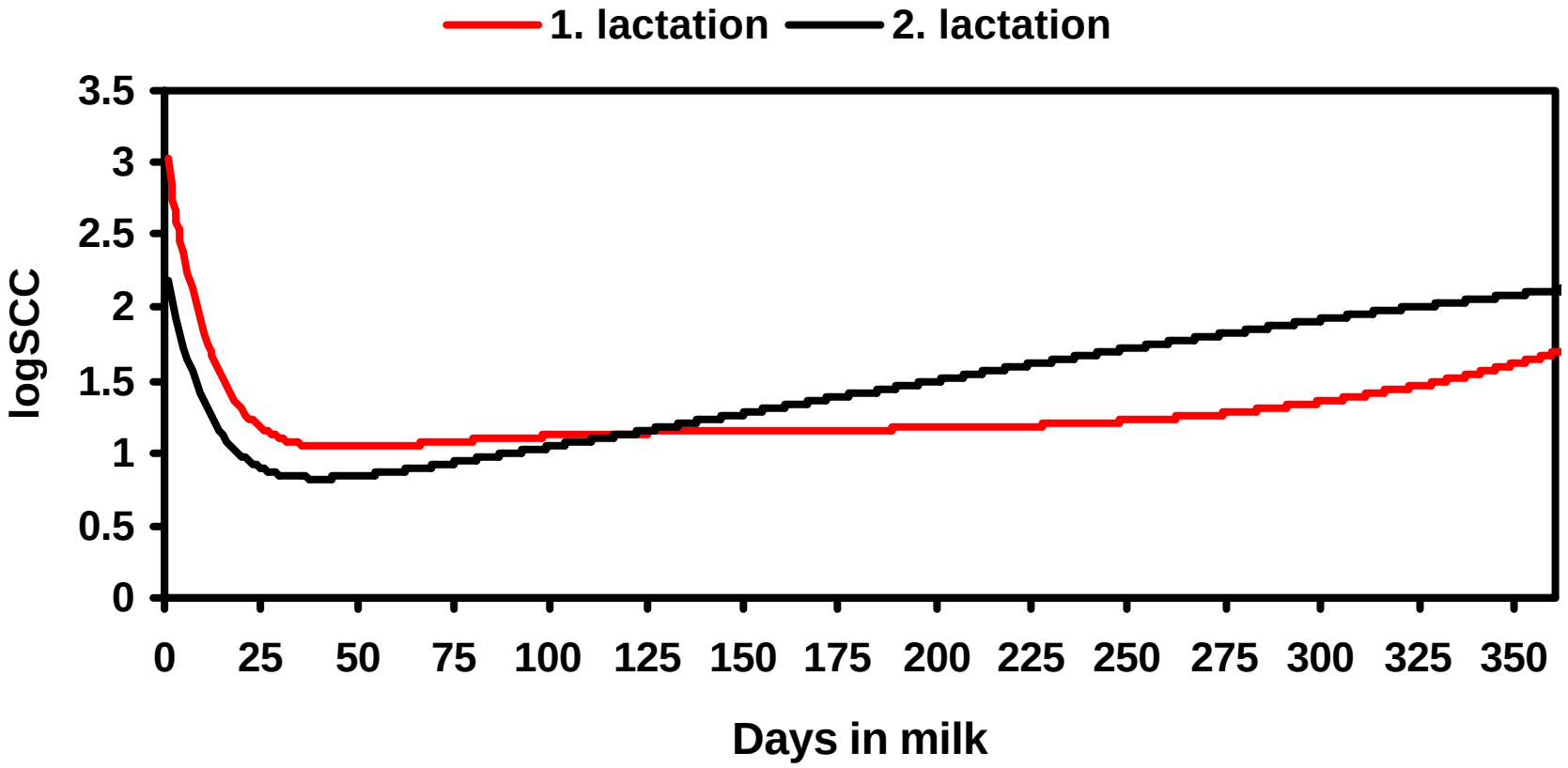
- Clinical mastitis (CM) is an inflammation of one or more quarters of the udder, usually caused by bacteria
  - over 100 different micro-organism can cause mastitis
  - most important species are staphylococci, streptococci and coliform bacteria

- Mastitis pathogens can be divided:
  - **environmental** pathogens survive and multiply outside the cow's body eg. in soil and beddings (coliform bacteria)
  - **contagious** pathogens live in the udder and skin and the infection is normally spread from cow to cow during milking (e.g. *S. aureus*)

Distribution of mastitis during lactation



Lactation curve for somatic cell count (SCC)



- Mastitis has remained one of the major diseases in dairy herds causing profound economic losses to whole milk production chain
  - strategies to reduce mastitis are important
    - management practices and genetic selection

- Only Nordic countries have national health recording system
  - only countries including CM directly into selection objectives of dairy cattle
  - in most countries SCC is used as an indirect selection tool

- SCC indicates both resistance and susceptibility of cow to CM

- CM indicates clinical cases and SCC both clinical and sub-clinical cases

➢ indicators of different aspects of udder health

- Genetic resistance to different mastitis types may be based on different mechanisms and the resistance to different pathogens may differ between cow families
  - selection for SCC may not affect all pathogens equally

➢ Important to estimate the true relationship between mastitis and SCC
  ➢ We need information on pathogen specific mastitis and SCC

- Database containing pathogen information on an individual cow basis
  - information can be used on more targeted treatment and breeding programs
  - unique data

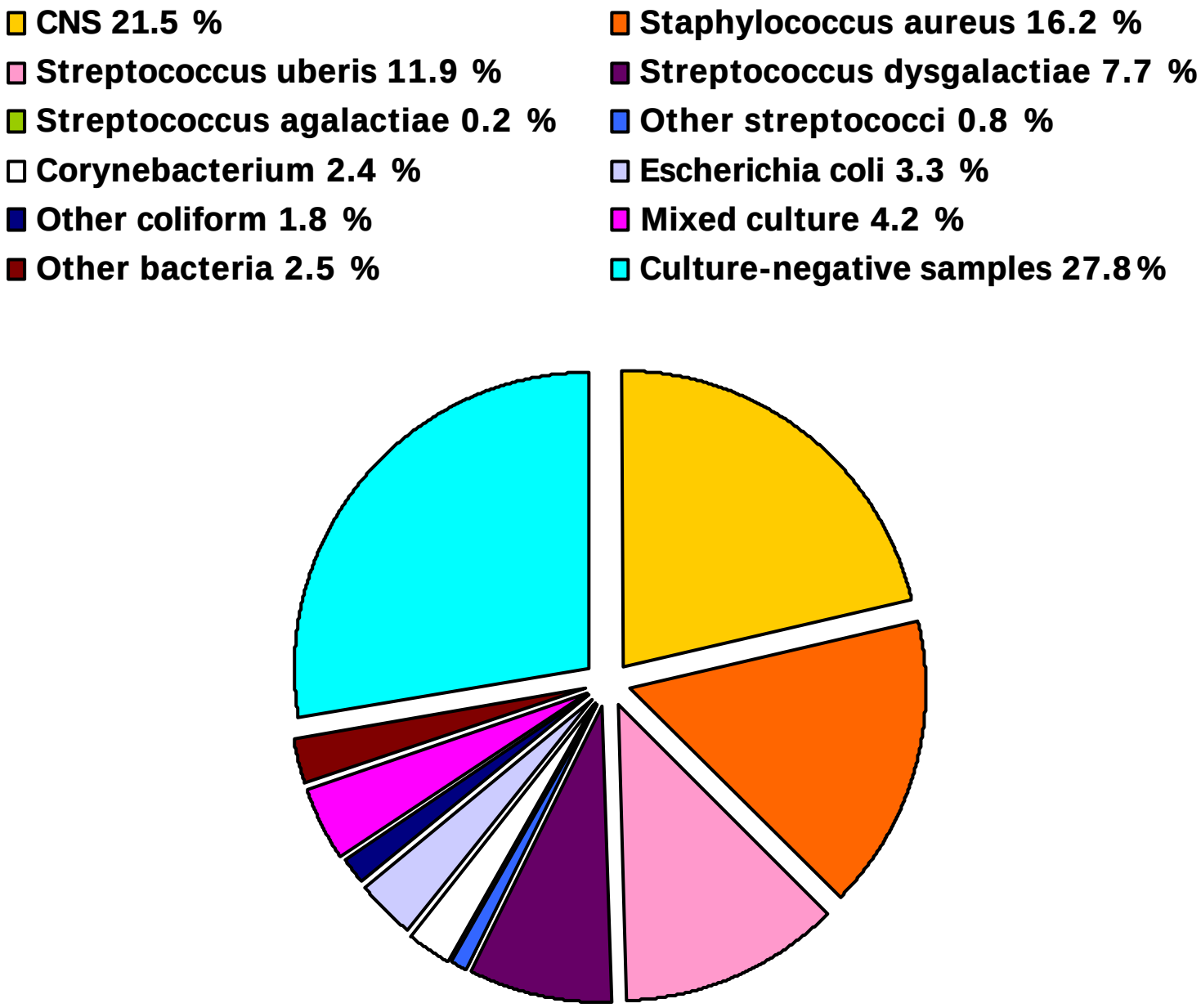
- Reliable pathogen information requires
  - standard bacteriological methods
  - use of animal and herd identifications
  - sampling date

- Pathogen records collected from laboratories analysing mastitis milk samples

  – recording practice starts when veterinarians send milk samples from infected cows to laboratories
  – after the analyses, bacteriological results are automatically sent to the database
  – permission for data from milk producers
  – currently data collected only from the largest mastitis laboratories

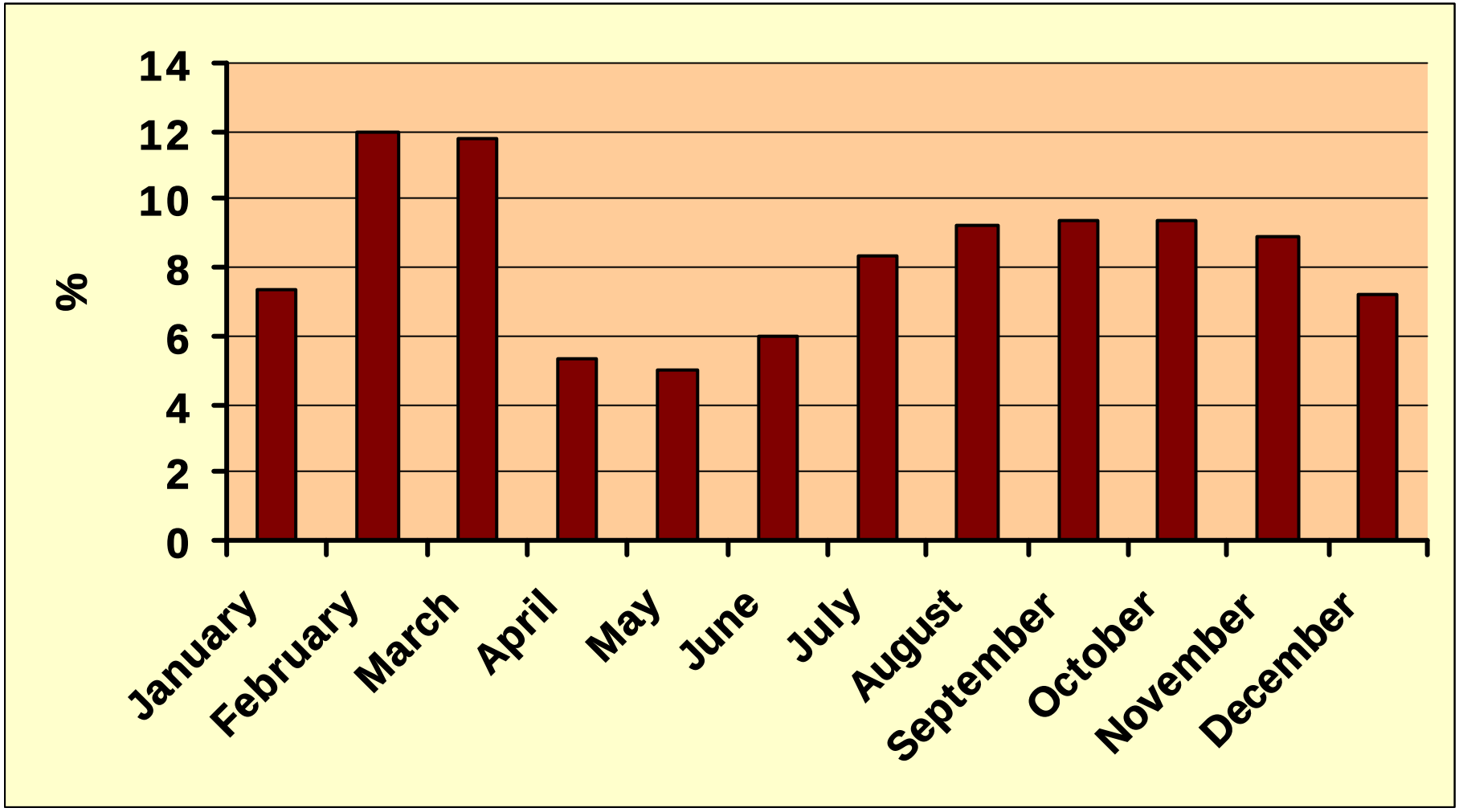
- After the first year of full operation information from about 58 900 milk samples was entered to the database

  – bacteriological information of 27 945 cows from 4867 herds (ca. 1/3 of dairy herds in Finland)
  – according to sampling dates, 81.6 % of cows sampled for bacteriology once, 14.1 % twice, and rest of the animals three or more times
  – 68.8 % of the cows only one quarter was sampled at a time. All four quarters were sampled in 11.0 % of the cases


CNS 21.5 %
Staphylococcus aureus 16.2 %
Streptococcus uberis 11.9 %
Streptococcus dysgalactiae 7.7 %
Streptococcus agalactiae 0.2 %
Other streptococci 0.8 %
Corynebacterium 2.4 %
Escherichia coli 3.3 %
Other coliform 1.8 %
Mixed culture 4.2 %
Other bacteria 2.5 %
Culture-negative samples 27.8 %

- The percentage of culture-negative samples was 27.8 %
  - low concentration of pathogens in the milk sample because:
    - the pathogen is either eliminated from the mammary gland (e.g. *E. coli*)
    - the pathogen has invaded into mammary epithelial (*S. aureus*)
  - infection caused by virus or other non-bacteria
  - some samples taken also from the non-infected quarters

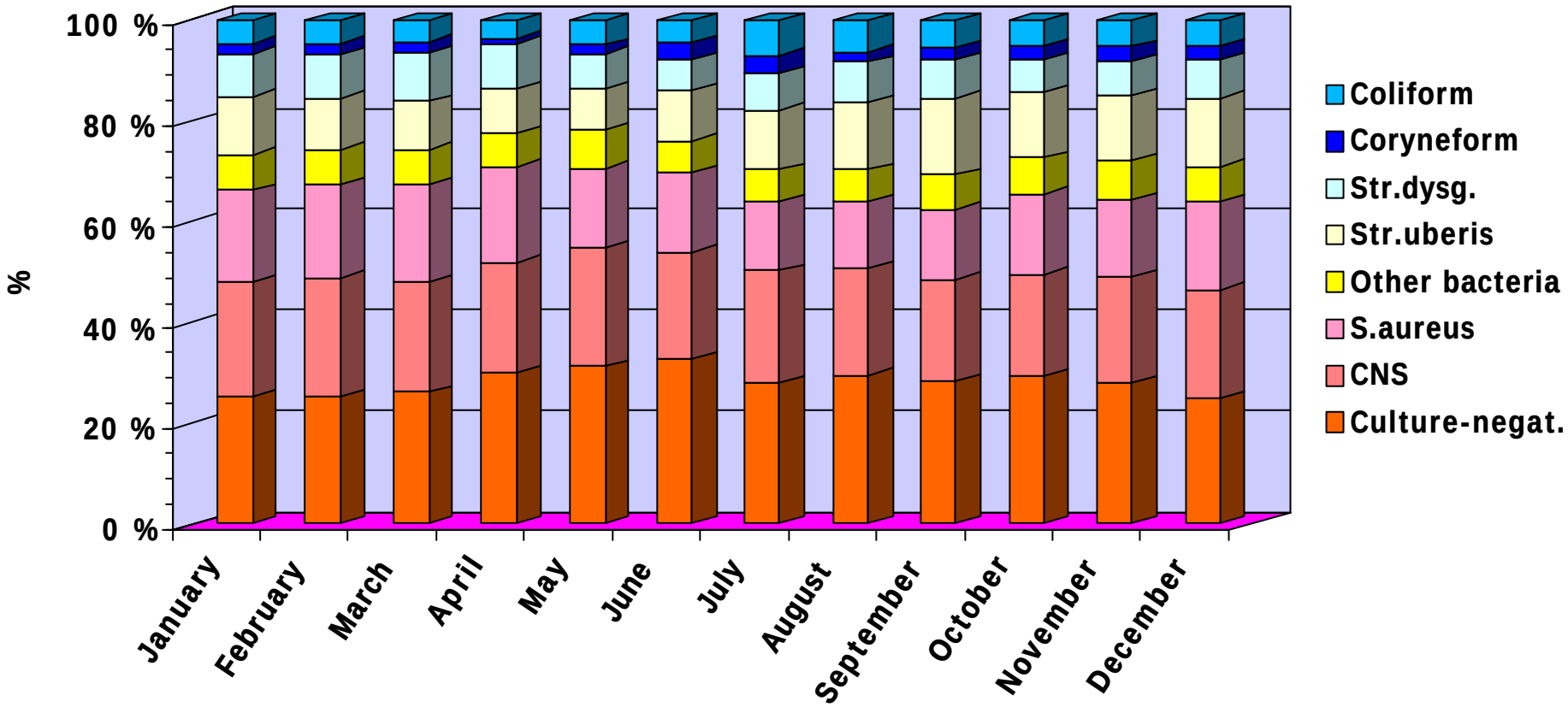
Percentage of mastitis samples analysed in different months

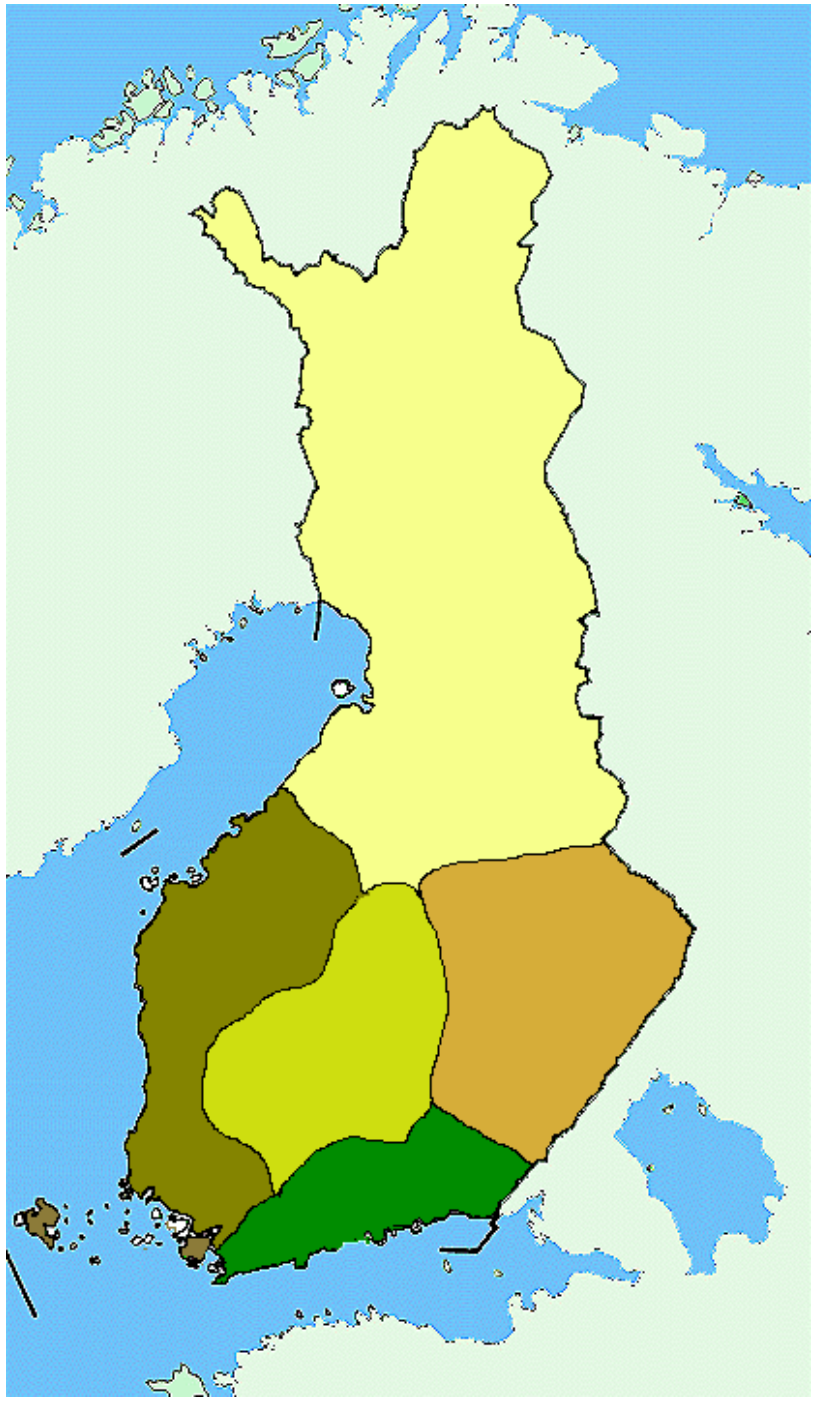


- Most calvings in winter and early autumn

- Season may have influence on the mastitis
  - prevalence of mastitis pathogens varies at different time of year (Chisq=929.02, df=121, p< 0.001)

Proportion of pathogens in different months

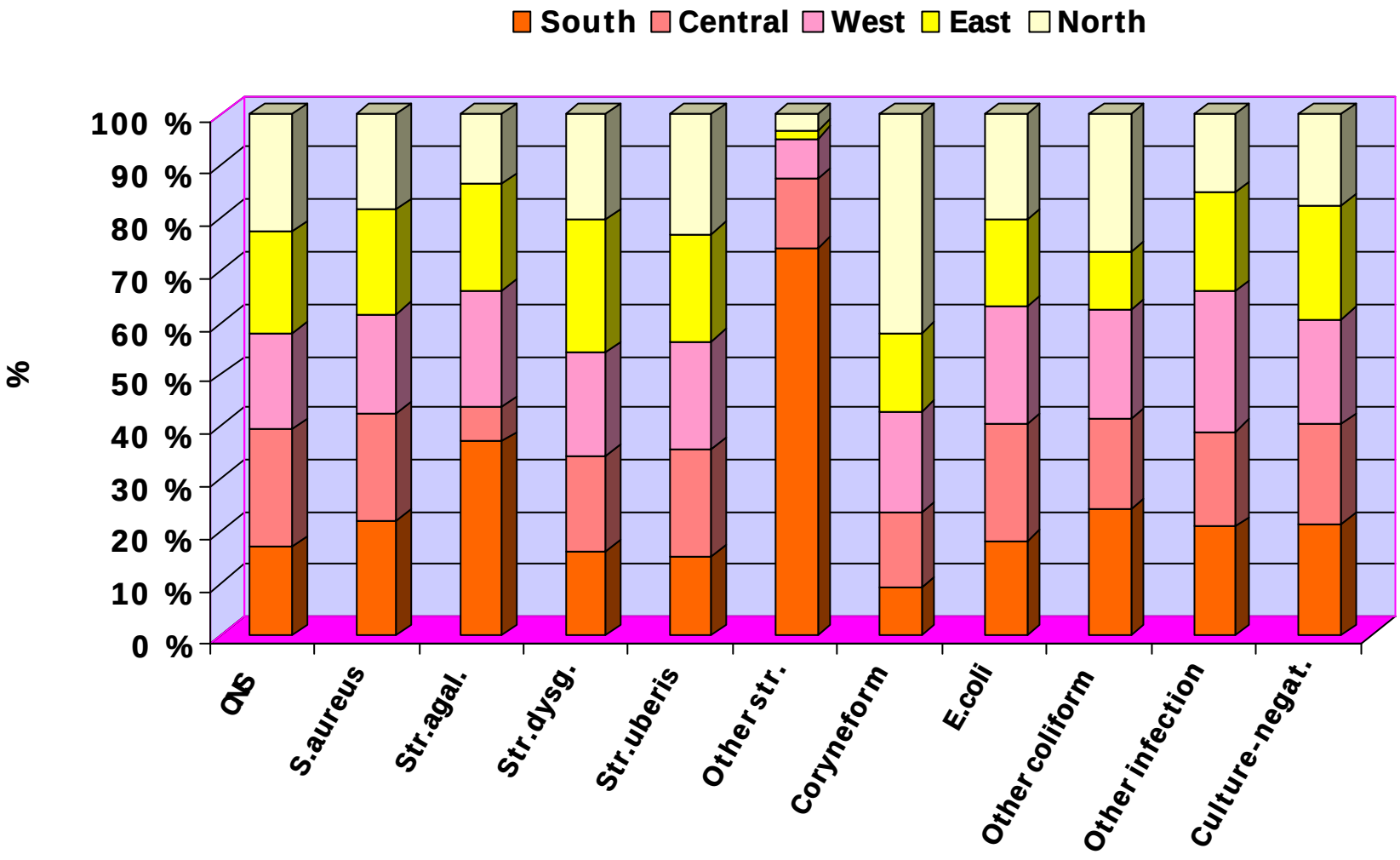




- Prevalence of pathogens was studied in different parts of Finland by dividing Finland into five regions: west, south, central, east and north

- The prevalence of pathogens differs within and among areas (Chisq=2506.19, df=44, p< 0.001)

Proportion of pathogens in different parts of Finland



Future plans

- Pathogen data will be joined together with other recording data
  - genetic parameters for pathogen specific CM and SCC
- Combining health records, SCC and bacteriological information gives
  - a more effective tool for the udder health program and for the selection of more resistant animals
  - enables the epidemiological study of mastitis