Latent class analysis of real time PCR and bacteriological culturing for the diagnosis of *Streptococcus agalactiae* using cow composite samples.

Ingrid H. Holmøy[a]*, Nils Toft[b], Hannah J. Jørgensen[c], Tormod Mørk[c], Liv Sølverød[d], Ane Nødtvedt[a].
[a]Department of Production Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, Oslo, Norway
[b]Division of Veterinary Diagnostics and Research, National Veterinary Institute, Technical University of Denmark
[c]Norwegian Veterinary Institute, Oslo, Norway
[d] TINE SA, Molde, Norway

Streptococcus agalactiae (*S. agalactiae*) mainly causes subclinincal mastitis in dairy cows. Recently, the national mastitis laboratory has taken into use a new, commercially available real-time qPCR-test for *S. agalactiae.* The test is mainly used for dry-off milk samples, and for screening of cows in a herd following detection of *S.agalactiae* in a cow-sample or in bulk tank milk. The aim was 1) to estimate sensitivity and specificity of the PCR assay currently in use in Norway for the diagnosis of intra-mammary infection with *S.agalactiae,* in comparison with conventional bacteriological culturing, and 2) to investigate the effect of intra-herd prevalence on the positive and negative predictive values of both tests.

Materials & methods

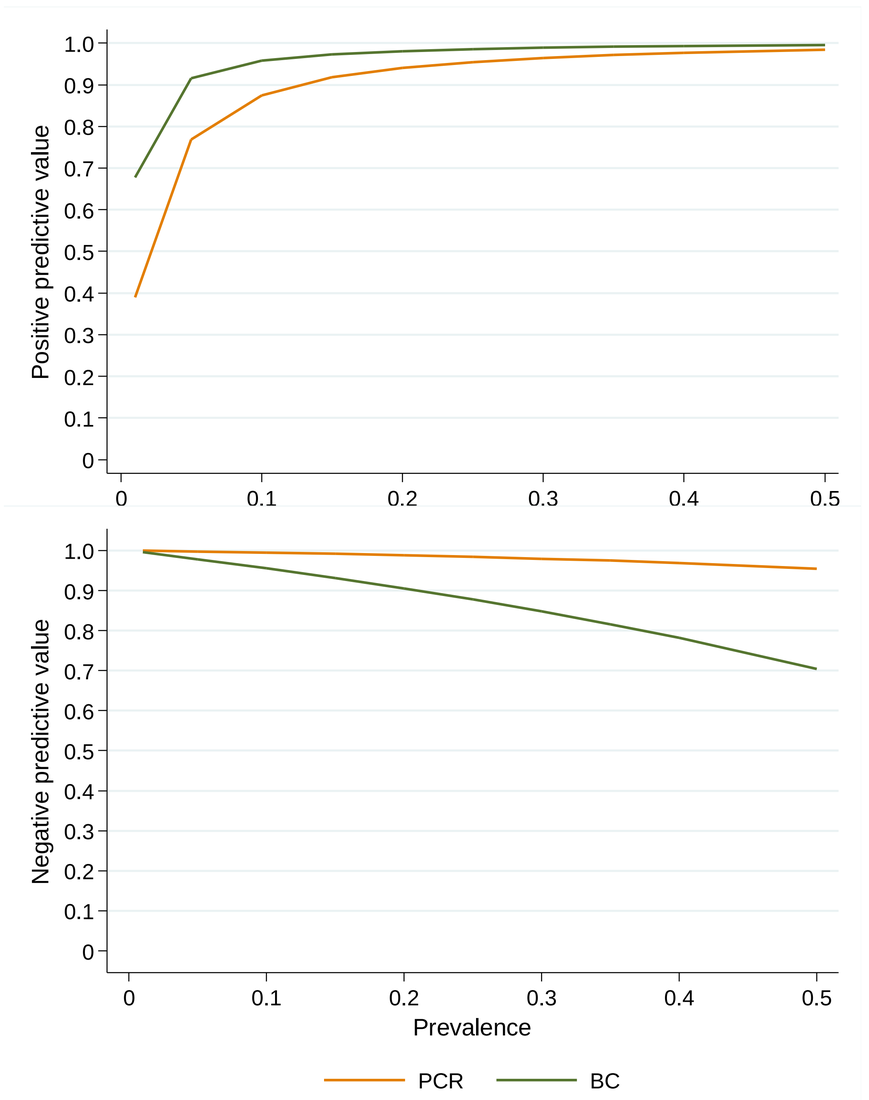
- 6 dairy herds used as populations, assuming different prevalence.
- 578 aseptically taken cow-composite samples.
- Mastitis 4 qPCR, DNA Diagnostics at the recommended cut-off <37, bacteriological culturing (BC).
- Bayesian latent class analysis.
- *Two-test conditional independence model.*
- Non-informative priors, uniform beta (1, 1) distribution for test properties and sub-population prevalences in the analyses.
- The model were fit using the OpenBugs version 3.2.1 rev 781 software.

Results

Test parameters at the manufacturers´ recommended cut-offs:

	Median	95% PCI	
Se_{PCR}	95.3	84.2	99.6
Sp_{PCR}	98.5	94.6	99.9
Se_{BC}	58.2	43.8	74.4
Sp_{BC}	99.7	98.5	100

Positive and negative predictive values of PCR and BC at hypothetical intra-herd prevalences:



Positive predictive values were low for both tests at prevalences ≤0.05, in particular for PCR.

The PCR test gained the highest negative predictive values, regardless of the true prevalence in the population.

In conclusion, Se of PCR was substantially higher than Se of BC. Sp of both PCR and BC was above 98%.
The predictive ability of the tests at different assumed prevalences should be taken into consideration when choosing and applying a test to an entire herd.