

MICROBIOLOGICAL QUALITY OF MILK AND ITS ASSOCIATIONS TO UDDER HEALTH, SKIN MICROBIOTA, AND ENVIRONMENT

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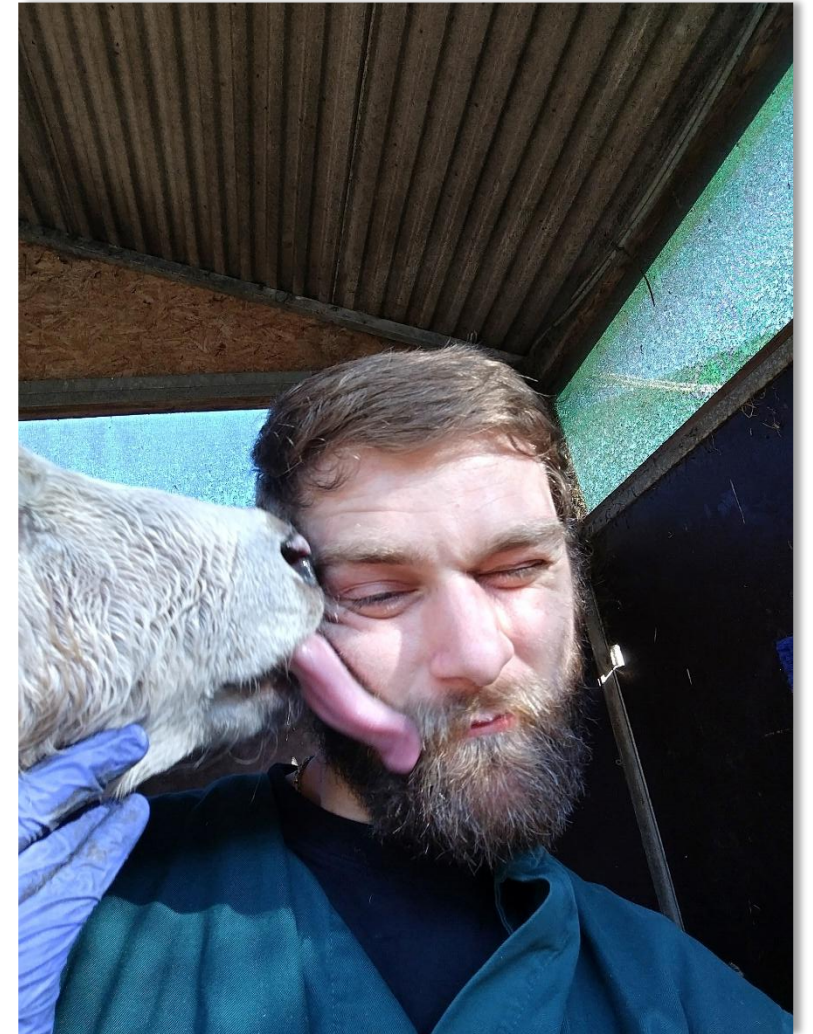
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AGENDA

- Background about TBC
- Ideology behind this project
- Study setup
- Expected outcome



WHY TOTAL BACTERIAL COUNT (TBC) MATTERS

- Key indicator of milk quality and hygiene.*
- Elevated TBC reduces milk quality and potential causes reduction in farm gate price.**
- EU legal limit: <100,000 CFU/mL (Regulation (EC) No 853/2004).***
- Danish payment schemes reward low TBC.****

*Hayes, M. C., Ralyea, R. D., Murphy, S. C., Carey, N. R., Scarlett, J. M., & Boor, K. J. (2001). Identification and characterization of elevated microbial counts in bulk tank raw milk. *Journal of Dairy Science*, 84(1), 292–298. [https://doi.org/10.3168/jds.S0022-0302\(01\)74479-7](https://doi.org/10.3168/jds.S0022-0302(01)74479-7)

**Jayarao, B. M., Pillai, S. R., Sawant, A. A., Wolfgang, D. R., & Hegde, N. V. (2004). Guidelines for monitoring bulk tank milk somatic cell and bacterial counts. *Journal of Dairy Science*, 87(10), 3561–3573. [https://doi.org/10.3168/jds.S0022-0302\(04\)73493-1](https://doi.org/10.3168/jds.S0022-0302(04)73493-1)

***Regulation (EC) No 853/2004 of the European Parliament and of the Council (2004) laying down specific hygiene rules for food of animal origin. (2004). <https://eur-lex.europa.eu/legal-content/DA/TXT/PDF/?uri=CELEX:02004R0853-20230215>

****Støve, J. (2017, June 26). *Værd at vide om kim i mælken og hvad du gør ved forhøjet kimtal*.

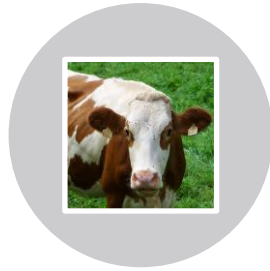
https://www.landbrugsinfo.dk/public/7/a/4/malkning_malkekvalitet_vard_at_vide_om_kim_i_malken_og_hvad_du_gor_ved_forhojet_kimtal



CURRENT KNOWLEDGE GAPS



MOST TBC
STUDIES ARE AT
NATIONAL OR
REGIONAL SCALE.



HERD-LEVEL
STUDIES RELY ON
SPARSE OR
INFREQUENT
SAMPLING.



UNCLEAR
WHETHER
ELEVATED TBC IS
COW- OR
ENVIRONMENT-
RELATED.



NO EXISTING
STUDIES HAVE
TRACKED
BACTERIA FROM
CUBICLE TO
TANK.

STUDY OBJECTIVES

- Investigate origin and composition of bacteria causing elevated TBC.
- Support evidence-based milk quality management.



THOUGHTS REGARDING SAMPLE SIZE

- Does SCC and TBC correlate?
- How many percent of the herd have elevated TBC?
- How fast does the TBC Change?



Unit Type	Definition	Level in This Study
Study Unit	The main entity selected for inclusion in the study based on defined eligibility criteria.	Dairy herd
Observational Unit	The entity from which measurements or observations are directly collected.	Individual milk, teat swabs, bulk tank milk sample or environmental sample
Analytical Unit	The entity used as the independent data point for statistical or comparative analysis.	Varies by analysis: • Herd – for herd-level comparisons • Cow – for cow-level TBC/SCC relations • Sample/Isolate – for bacteriological or sequencing data

SAMPLING STRATEGY

- Only herds with verified functional milking, washing, and cooling systems.
- All lactating cows are screened three times at two-day intervals.
- Cows with high TBC will undergo further sampling.
- Samples collected: quarter milk, teat swabs, bulk tank milk, bedding/environment.



LABORATORY ANALYSIS

- Culture-based methods following NMC Laboratory Handbook (2017)*.
- MALDI-TOF MS used for precise bacterial identification.
- WGS / NGS to identify identical bacteria and trace their presence through the herd.

* *NMC Laboratory Handbook on Bovine Mastitis* (Third edition). (2017). National Mastitis Council.



SCIENTIFIC AND PRACTICAL IMPLICATIONS

- To our knowledge, the first comprehensive herd-level screening of all lactating cows and the environment.
- Highlights subclinical bacterial shedding as a hidden contributor.
- Supports improved TBC management protocols beyond equipment control.



THANK YOU FOR LISTENING.

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