Biofilm persistence in a milking system associated with a washed-rind cheese-making facility

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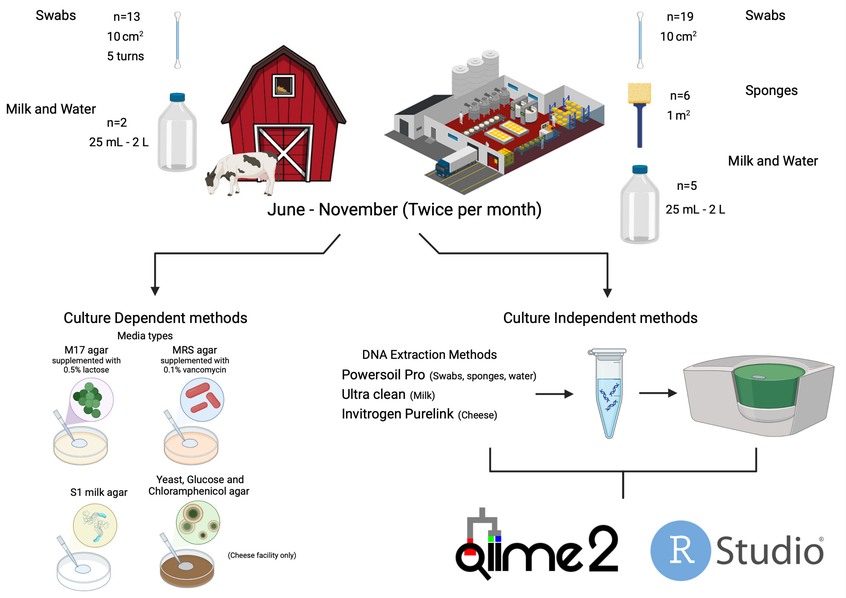
INTRODUCTION

- Biofilms in milking systems not only contain spoilage bacteria but can also contain bacteria that could benefit cheese ripening [1].
- *Actinobacteria* such as *Brevibacterium* contribute to flavour development during the ripening of washed-rind cheeses [2].

OBJECTIVE

To evaluate biofilm persistence in a milking system which may resist sanitation procedures and carry over to an artisan washed-rind cheese facility

MATERIALS AND METHODS



RESULTS

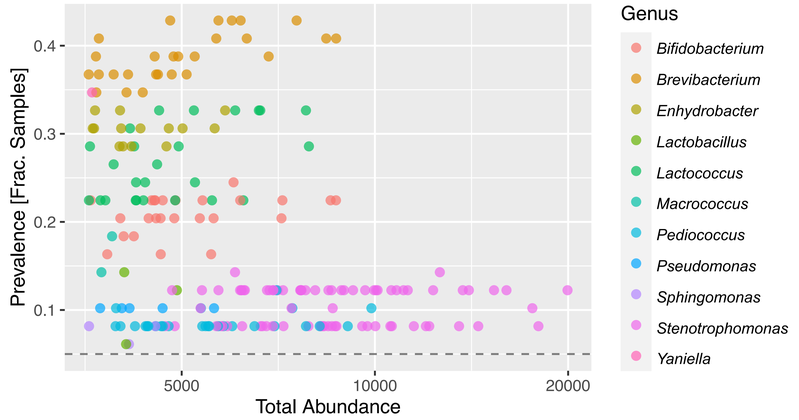
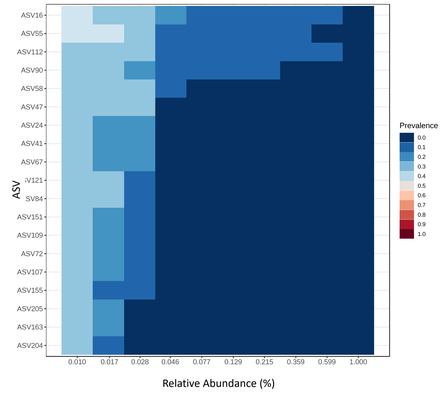


Figure 1. Prevalence plot of amplicon sequence variants of environmental bacteria found in swab samples of milking facilities over six months of sampling. 16S rRNA gene amplicon sequences were analyzed using R studio.



8 ASVs classified as *Lactococcus* (ASV 55 is the most abundant)
11 ASVs classified as *Brevibacterium* (8/11 are most abundant; ASV16,112, 90, 58, 47, 24, 41, 67)

Brevibacterium has a positive influence on rind development and protection against spoilage

Figure 2. Amplicon sequence variants of the bulk tank milk core microbiome over six months of sampling, filtered at ≥ 30% total prevalence and ≥ 0.01% total abundance. 16S rRNA gene amplicon sequences were analyzed using R studio.

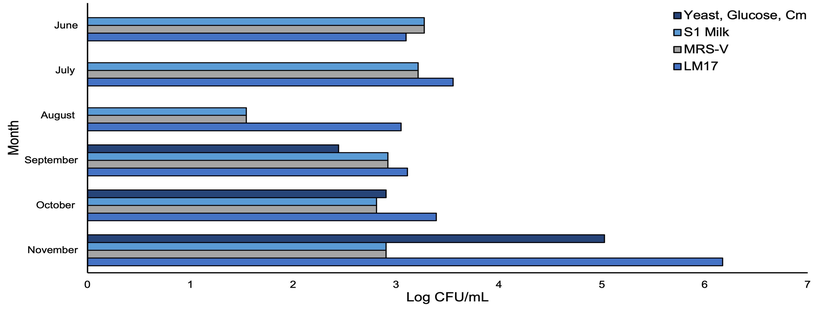


Figure 3. Bar plot of average Log colony forming units (CFU/mL) of raw milk collected from the artisan cheese facility. Plated on Yeast, Glucose Chloramphenicol agar for yeasts and molds, S1 milk agar for proteobacteria, MRS-V agar for ripening bacteria and LM17 for total aerobic bacteria.

CONCLUSIONS

- Equipment swabs showed a high prevalence of *Brevibacterium* and high abundance of *Stenotrophomonas* (Figure 1).
- Raw bulk tank milk core microbiota showed two main bacteria with multiple sequence types: *Brevibacterium* and *Lactococcus* (Figure 2).
- Culturable aerobic and proteobacteria from the artisan cheese facility raw milk show increases during the fall season (Figure 3) indicating a potential accumulation of biofilms in the milking system.

MORE INFORMATION

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ACKNOWLEDGMENTS

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References:
1. Quigley, L., O'Sullivan, O., Beresford, T., Ross, R., Fitzgerald, G., Cotter, P. Molecular approaches to analysing the microbial composition of raw milk and raw milk cheese, International Journal of Food Microbiology, 2011, Volume 150, Issues 2–3, Pages 81-94, https://doi.org/10.1016/j.ijfoodmicro.2011.08.001.
2. Anast, M., Dzieciol, M., Schultz, L., Wagner, M., Mann, E., Schmitz-Esser, S. Brevibacterium from Austrian hard cheese harbor a putative histamine catabolism pathway and a plasmid for adaptation to the cheese environment. Sci Rep. 2019 Apr 16;9(1):6164. doi: 10.1038/s41598-019-42525-y. PMID: 30992535; PMCID: PMC6467879.