

Providencia alcalifaciens and canine gastrointestinal disease – a metagenomic approach

Anja Maria Aardal¹, Simen Foyn Nørstebø¹, Ellen Skancke², Ann-Katrin Llarena¹
¹Department of Paraclinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences, ²Department of Companion Animal Clinical Sciences, Faculty of Veterinary Medicine, Norwegian University of Life Sciences

Background



Photo from Pixabay.

- An outbreak of acute haemorrhagic diarrhoea syndrome (AHDS) occurred in dogs in south-eastern Norway in autumn 2019.
- The bacterium *Providencia alcalifaciens* was isolated from faecal samples from many affected dogs.
- In a previous study, we established a metagenomic threshold for detecting *P. alcalifaciens* in canine faecal samples, and we identified the bacterium in 4/362 (1.1%) healthy dogs¹.
- The purpose of this study was to investigate the occurrence of *P. alcalifaciens* in faecal samples from dogs with gastrointestinal disease using metagenomics.

HUNT & HUNT One Health

- HUNT is a longitudinal human health study of inhabitants in Trøndelag county in Norway.
- HUNT One Health is a subproject of HUNT4, collecting data from animals belonging to HUNT4 participants.

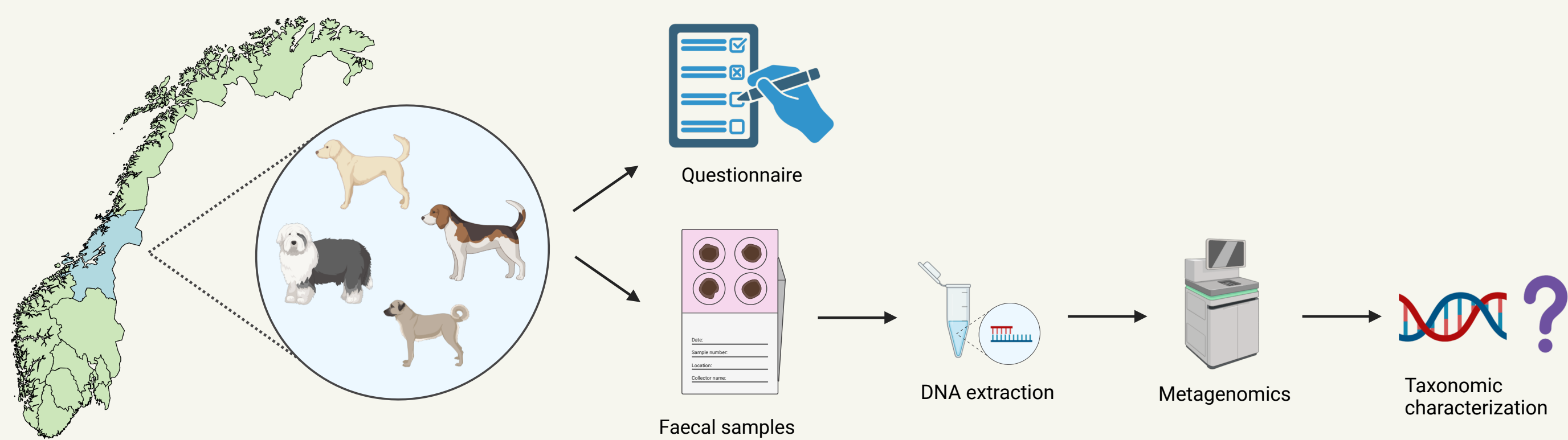


Figure 1: Dog owners from Trøndelag, already participating in HUNT4 themselves, were recruited to submit faecal samples from their dogs and answer a questionnaire.

Materials & Methods

- Dogs were selected based on an owner-filled questionnaire.
- We included dogs with a history of repeated diarrhoea / loose stools, inflammatory bowel disease and dogs with diarrhoea at time of sampling.
- The samples were analysed using the same bioinformatic pipeline as for the study on healthy dogs¹.

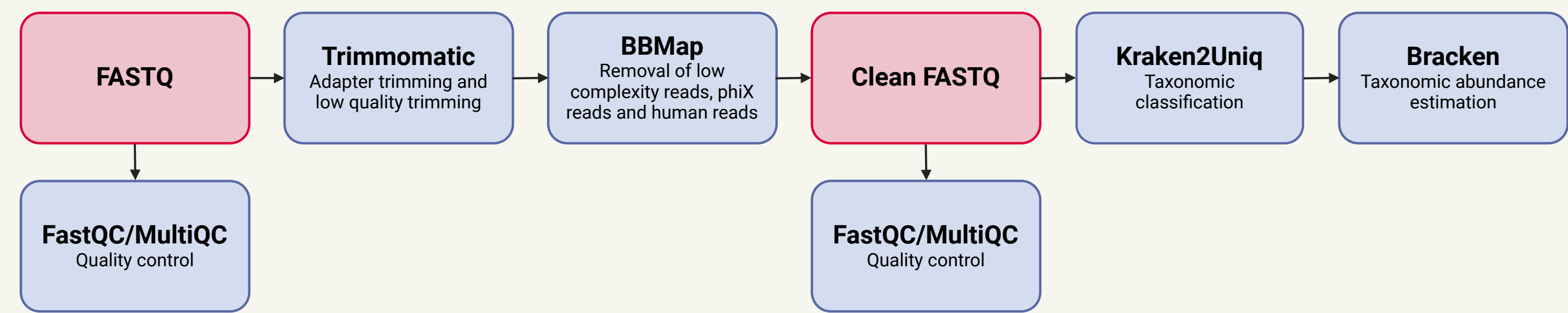


Figure 2: Bioinformatic pipeline used in the study, based on the Talos pipeline².

Results

- There were 26 samples from dogs with gastrointestinal conditions.
- None of the dogs had *P. alcalifaciens* above our threshold of both 569 unique *k*-mers and a ratio of unique *k*-mers to reads of 5.2.

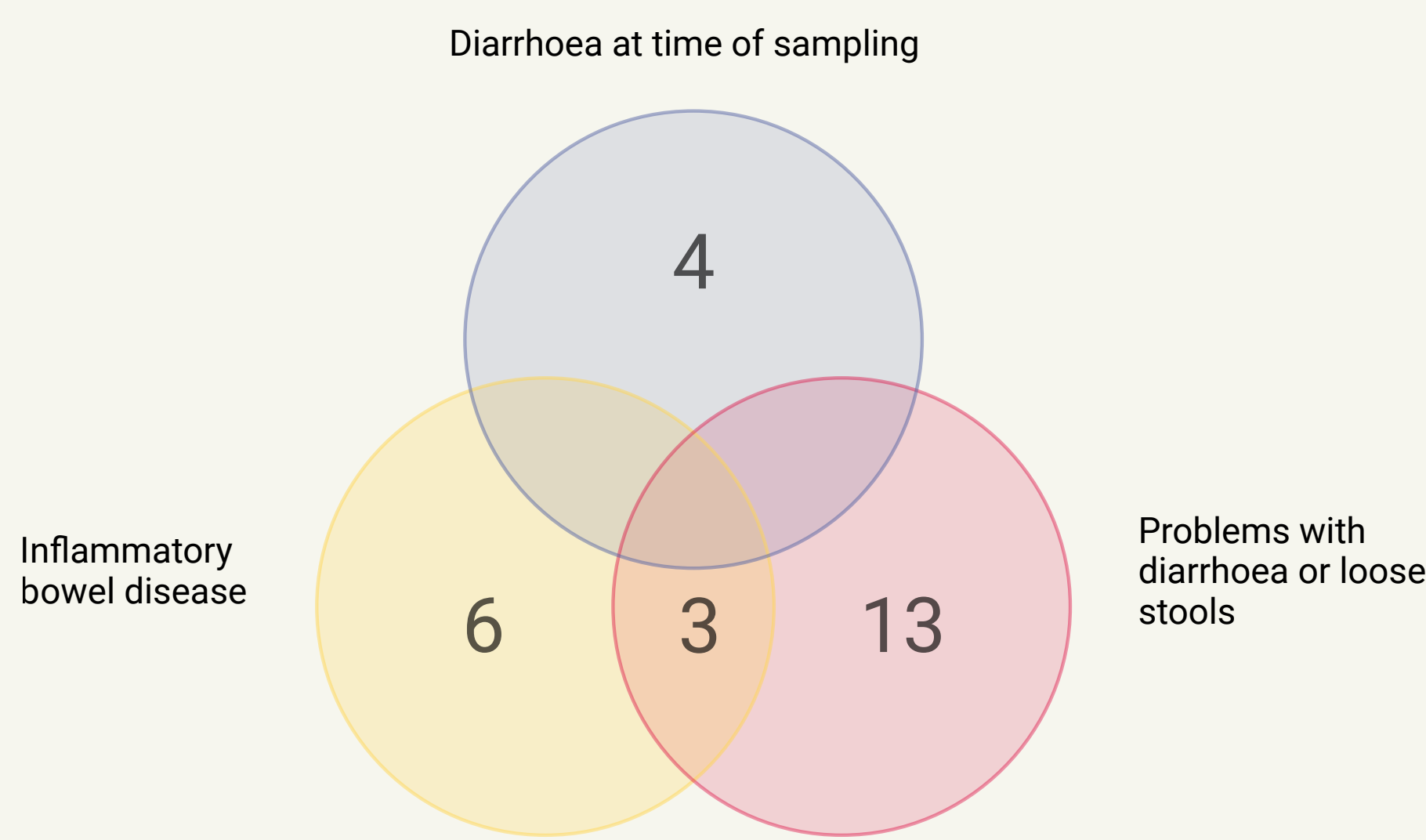
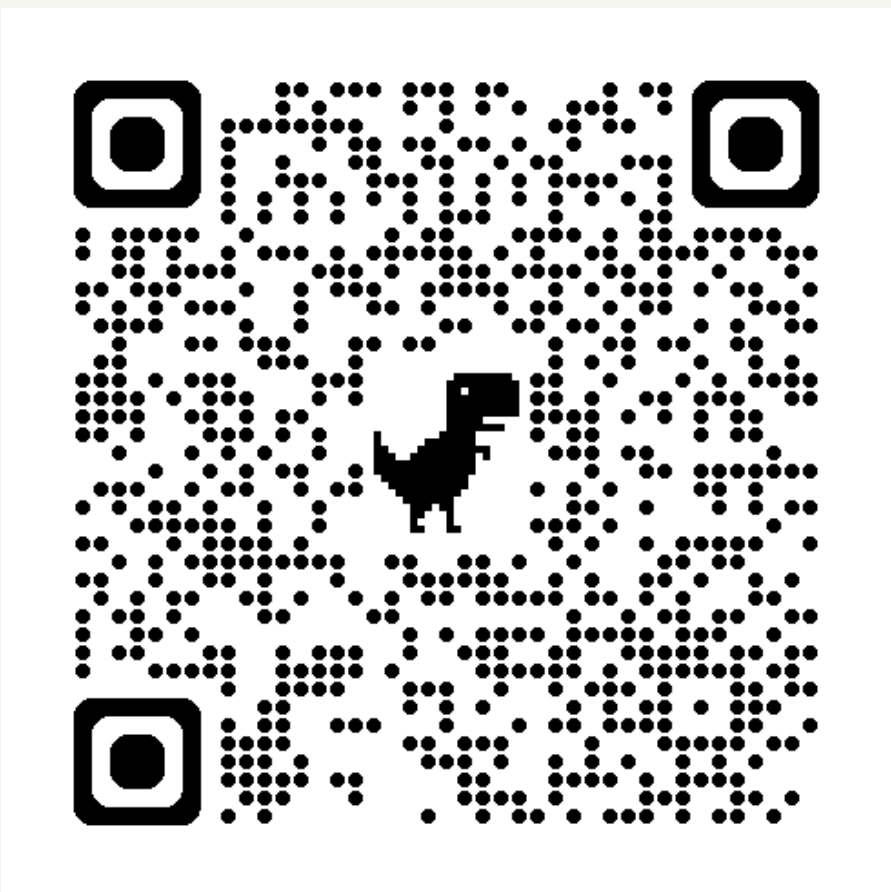


Figure 3: There were 26 dogs with gastrointestinal disease. Three dogs were reported as having had both inflammatory bowel disease and problems with diarrhoea or loose stools.

Conclusion

- None of the 26 dogs with gastrointestinal disease had *P. alcalifaciens* above our previously defined threshold.
- It is however difficult to draw conclusions about the occurrence of *P. alcalifaciens* in dogs with gastrointestinal disease from this material, because of the low number of dogs and the heterogeneity of conditions.
- More research is needed to describe the role of *P. alcalifaciens* in gastrointestinal conditions in dogs.

Want to learn more?



References

¹Aardal, A.M., Soltvedt, E.M., Nørstebø, S.F., Haverkamp, T.H.A., Rodriguez-Campos, S., Skancke, E. & Llarena, A.-K. (2024). Defining a metagenomic threshold for detecting low abundances of *Providencia alcalifaciens* in canine faecal samples. *Frontiers in Cellular and Infection Microbiology*, 14. doi: 10.3389/fcimb.2024.1305742.
²Haverkamp, T.H.A. (2020). Talos. Available at: <https://github.com/NorwegianVeterinaryInstitute/Talos>.