

Inactivation of *Salmonella* through thermal treatment of cattle-manure

Josefine Elving^{1,2}, Björn Vinnerås^{1,3}, Ann Albihn¹, Jakob R. Ottoson^{1,2}

¹ Department of Chemistry, Environment and Feed Hygiene, National Veterinary Institute, Uppsala, Sweden

² Department of Biomedical Sciences and Veterinary Public Health, Swedish University of Agricultural Sciences, Uppsala, Sweden

³ Department of Energy and Technology, Swedish University of Agricultural Sciences, Uppsala, Sweden

Introduction

The spread of not sanitised manure on arable land used to produce food and feed poses a health risk to both humans and animals due to the potential presence of pathogens (1,2). Sanitation of manure can be achieved through *e.g.* composting or thermophilic anaerobic digestion as a result of thermal inactivation of pathogens.

Aim

The aim of the present study has been to determine the time to establish a 1 log₁₀ reduction, the D-value, for thermal inactivation of *Salmonella* Senftenberg 775W in varying moisture contents (MC) and temperatures and to calculate the time needed to achieve a 5 log₁₀ reduction, in accordance with the ABP-regulation.



Photo: B. Ekberg and J. Elving, SVA

Methods

NaCl, 99% MC, fresh cattle manure (FCM), 87% MC, and dried cattle manure (DCM), 75% MC, was inoculated with *S. Senftenberg* 775W (NCTC 9959). Thereafter thermal treatment was performed at 49, 52 and 55°C in preheated block heaters and samples were taken continuously during 8 hours.

Analysis of *S. Senftenberg* was performed by plating on XLD (Xylose-Lysin-Deoxycholate) agar containing novobiocin and counts were confirmed using a MUCAP-test. Statistical analysis, GLM and regression analysis, was performed using Minitab.

References

- Boqvist, S., *et al.*, *Salmonella* isolated from animals and feed production in Sweden between 1993 and 1997. *Acta Veterinaria Scandinavica*, 2003. **44**(3-4): p. 181-97.
- Hutchison, M.L., *et al.*, *Levels of zoonotic agents in British livestock manures*. *Letters in Applied Microbiology*, 2004. **39**(2): p. 207-14.

Conclusions

- **Sufficient reduction (5 log₁₀) of *S. Senftenberg* 775W based on the upper limit of the 95% CI can be achieved within 32h at 52°C and within 4h at 55°C in fresh cattle manure and in NaCl.**
- **The inactivation rate is not only influenced by the treatment temperature but also by the moisture content with D-values generally decreasing with increasing moisture content.**
- **In general a treatment temperature as low as 49°C resulted in a more irregular inactivation which is reflected in larger confidence intervals. Therefore, such low temperatures cannot be recommended for sanitation treatment of manure.**

Results

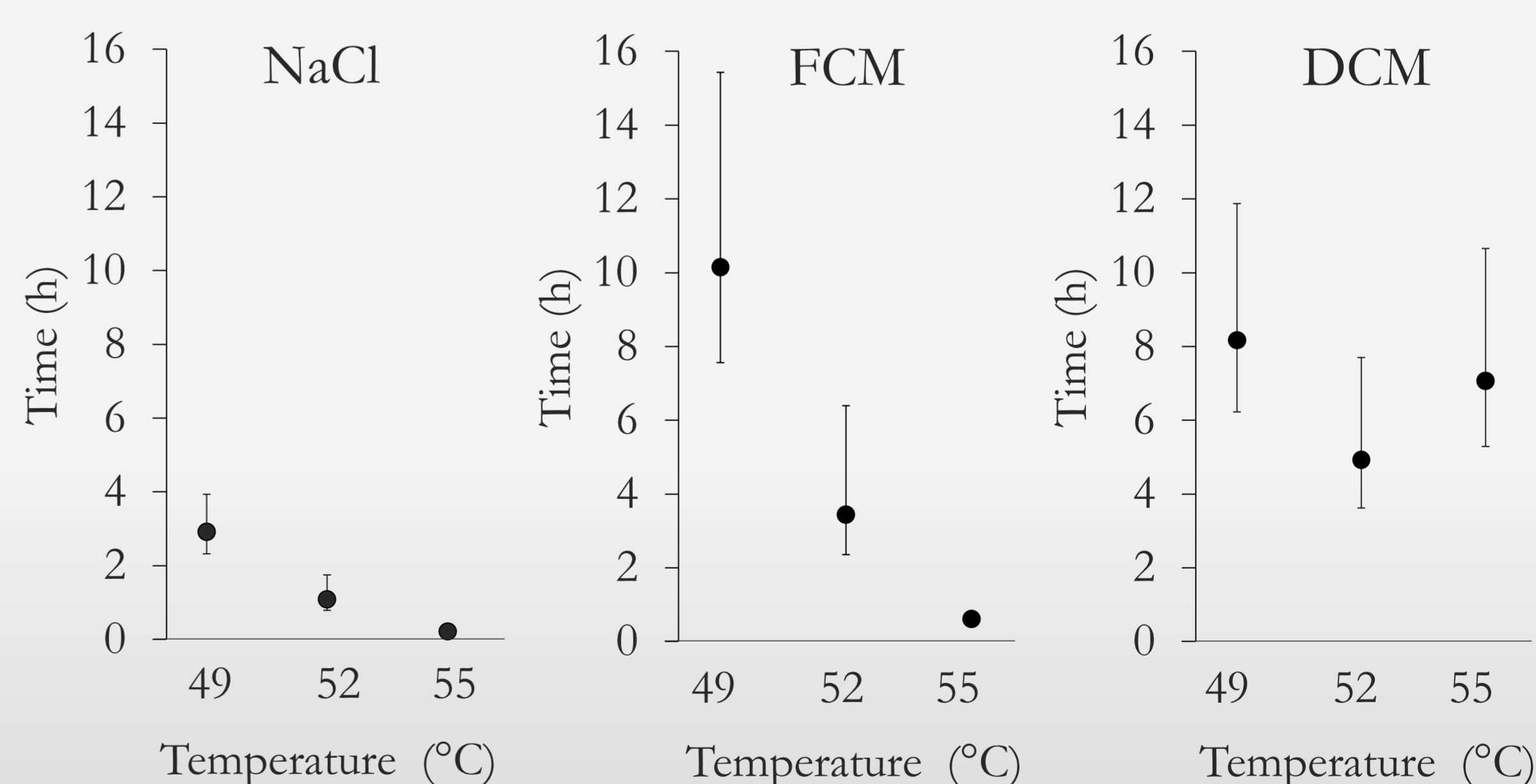


Figure. D-values ± 95% confidence interval for *S. Senftenberg* 775W at different temperatures and moisture contents.



Josefine Elving

Department of Chemistry, Environment and Feed Hygiene
Section of Environment and Biosecurity

NATIONAL VETERINARY INSTITUTE
post. SE-751 89 Uppsala, Sweden
phone. +46 18 67 40 00 fax. +46 18 30 91 62
e-mail. josefine.elving@sva.se web. www.sva.se