

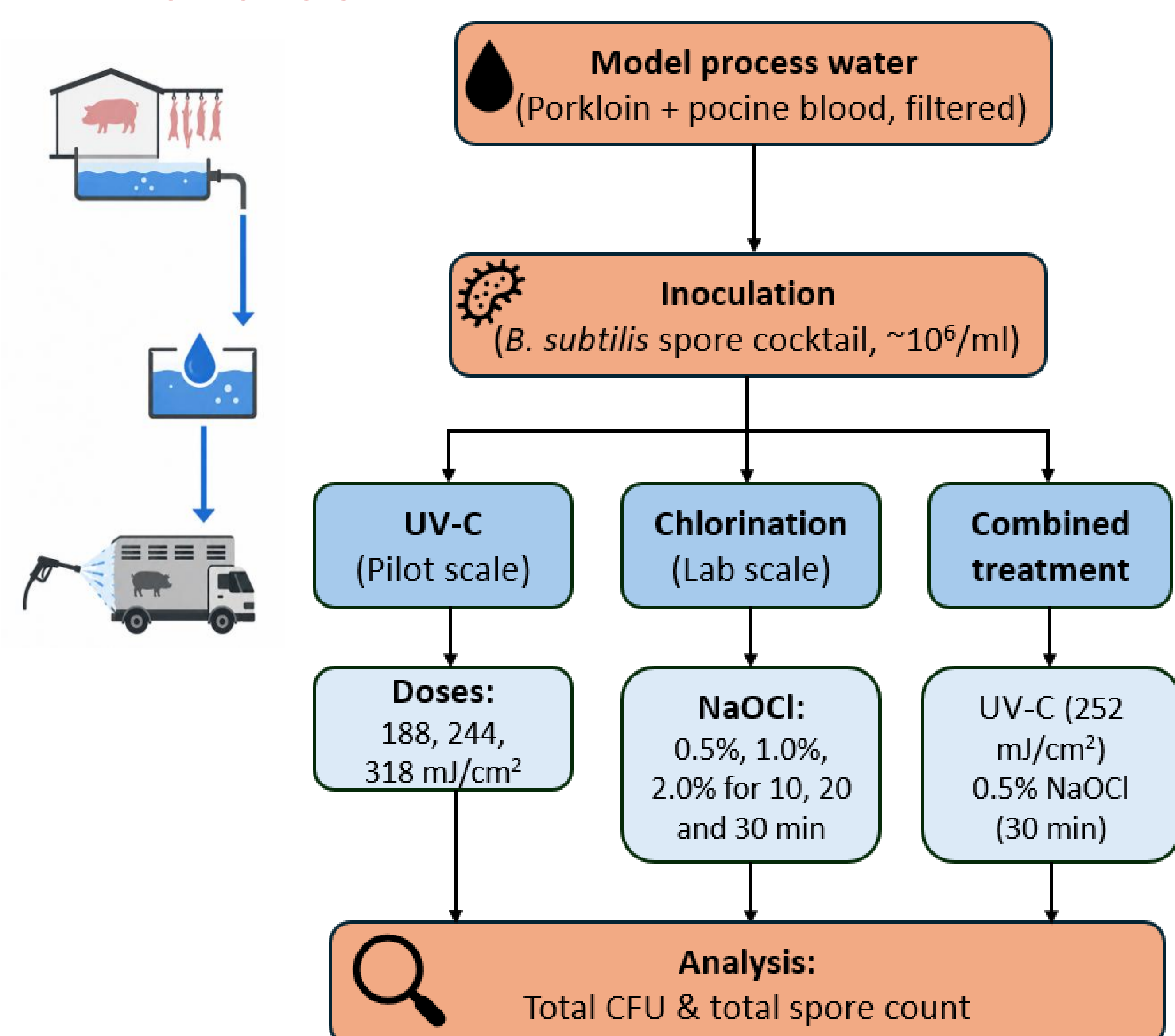
Inactivation of *Bacillus subtilis* spores in slaughterhouse process water by UV-C and sodium hypochlorite highlights the potential for water reuse

Nanna Bygvraa Svenningsen & Anette Granly Koch
Production and Food, Danish Technological Institute, Denmark

INTRODUCTION & AIM

- Water reuse in the meat industry is crucial to reduce water consumption.
- Microbiological safety is a major barrier for reuse of water for instance for cleaning transport vehicles (cross-contamination risk).
- High organic matter in process water is a challenge for pathogen inactivation by chemical or physical techniques.
- Aim:** To evaluate the efficacy of UV-C and sodium hypochlorite against *Bacillus subtilis* spores (surrogate for *B. anthracis*) in model slaughterhouse process water.

METHODOLOGY



CONCLUSION & OUTLOOK

- Substantial spore inactivation was achieved in a highly challenging slaughterhouse water matrix (high protein/blood).
- UV-C showed dose-dependent inactivation.
- Sodium hypochlorite inactivation was concentration- and time-dependent.
- Combined treatment (UV-C followed by NaOCl) reduced surviving *B. subtilis* to below detection limit.
- Physical and/or chemical treatments support the potential for safe process water reuse.
- Further validation is needed against a broader range of relevant animal pathogens.

RESULTS

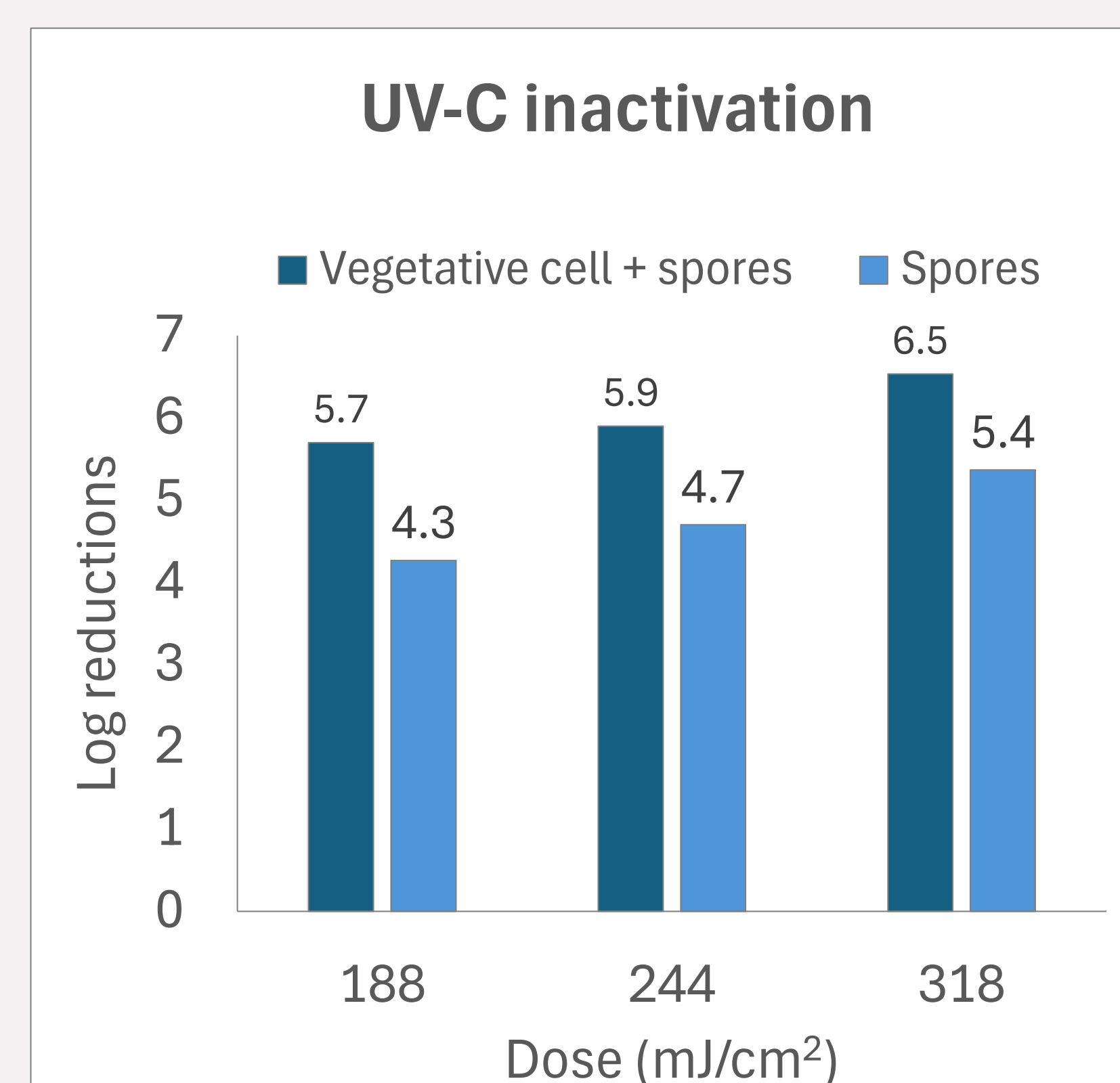


Figure 1: Reduction of total *B. subtilis* (vegetative cells + spores), and spores alone in model process water treated with UV-C at 188, 244 or 318 mJ/cm². The depicted values are mean log reductions for each treatment (n=3). Both spore and total reduction of *B. subtilis* were dose-dependent.

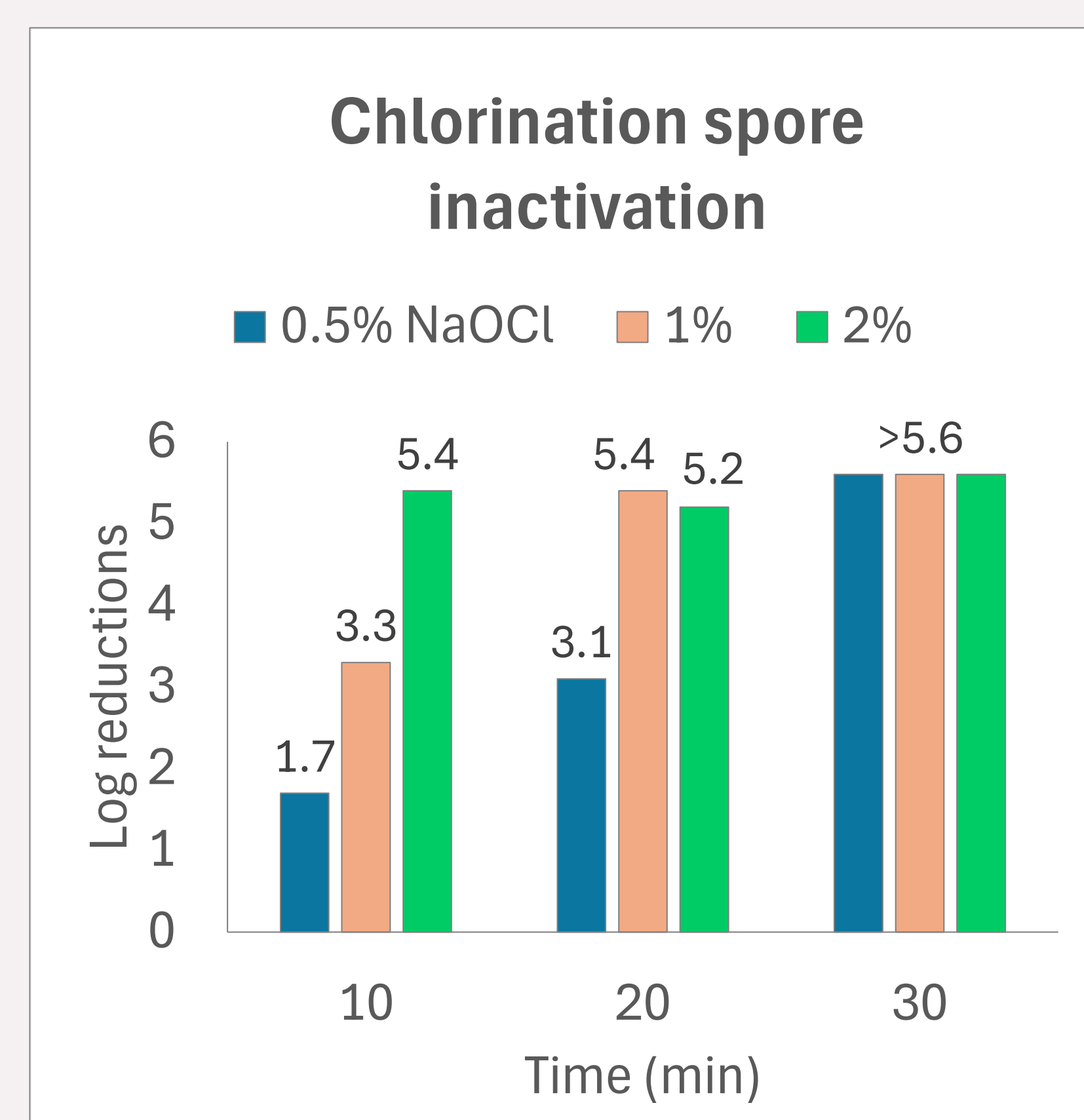


Figure 2: Inactivation of *B. subtilis* spores after 10, 20 or 30 min treatment with 0.5%, 1% or 2% NaOCl. The depicted values are mean log reductions for each treatment (n= 3).

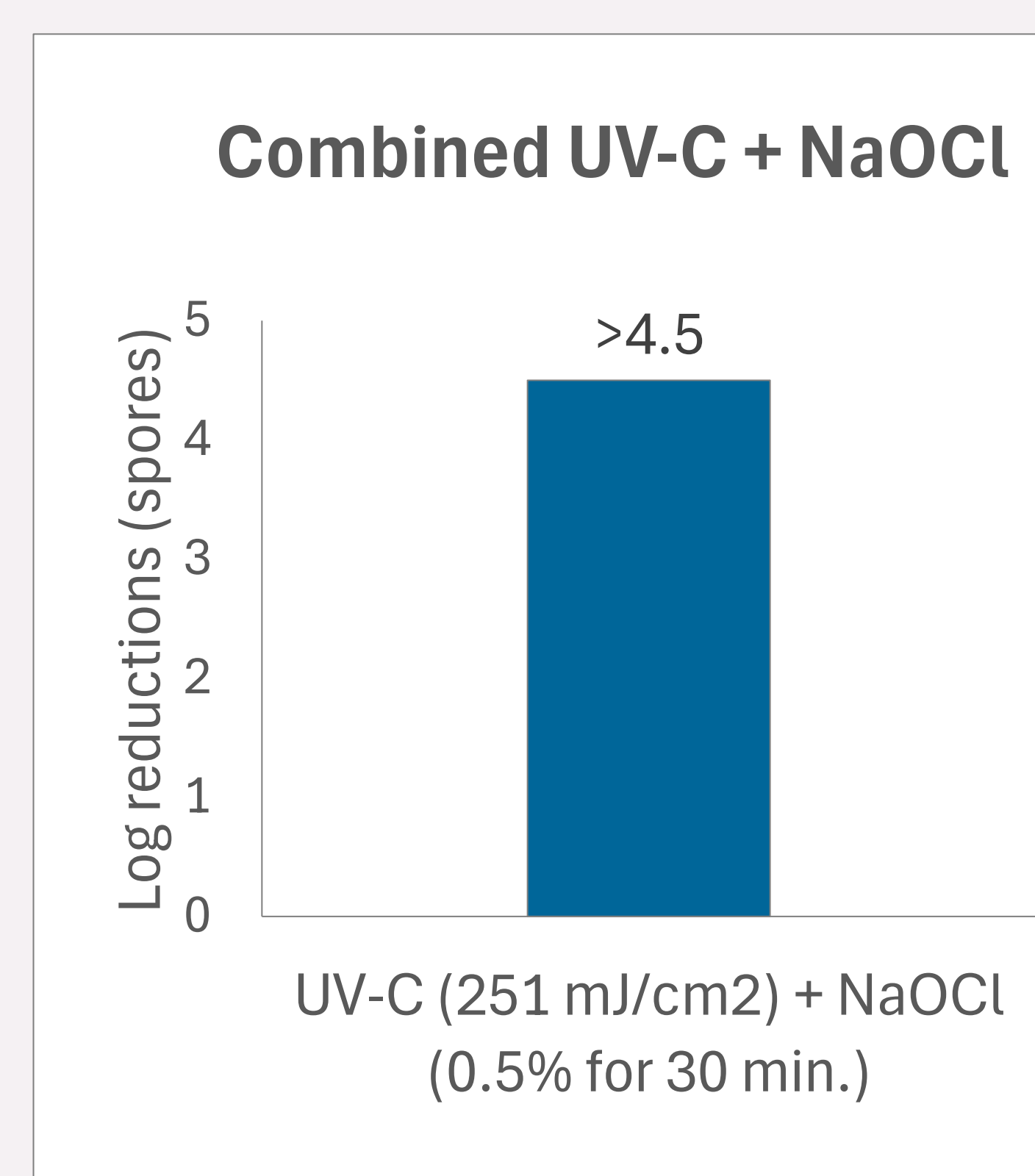


Figure 3: Combined treatment of model process water with UV-C (252 mJ/cm²) and 0.5% NaOCl for 30 min reduced the number of spores and vegetative cells of *B. subtilis* to below the detection limit (>4.5 log; LOD = 1 log CFU/ml; n=3).

ACKNOWLEDGEMENTS

The study was supported by the Danish Pig Levy Fund



Nanna B. Svenningsen
Senior consultant
M nbs@teknologisk.dk
T +45 72 20 11 66

Gregersensvej 9
DK-2630 Taastrup
Tel. +45 72 20 20 00
www.DMRI.COM