

Effect of stress on variability in lag-duration of *Campylobacter* spp. during enrichment

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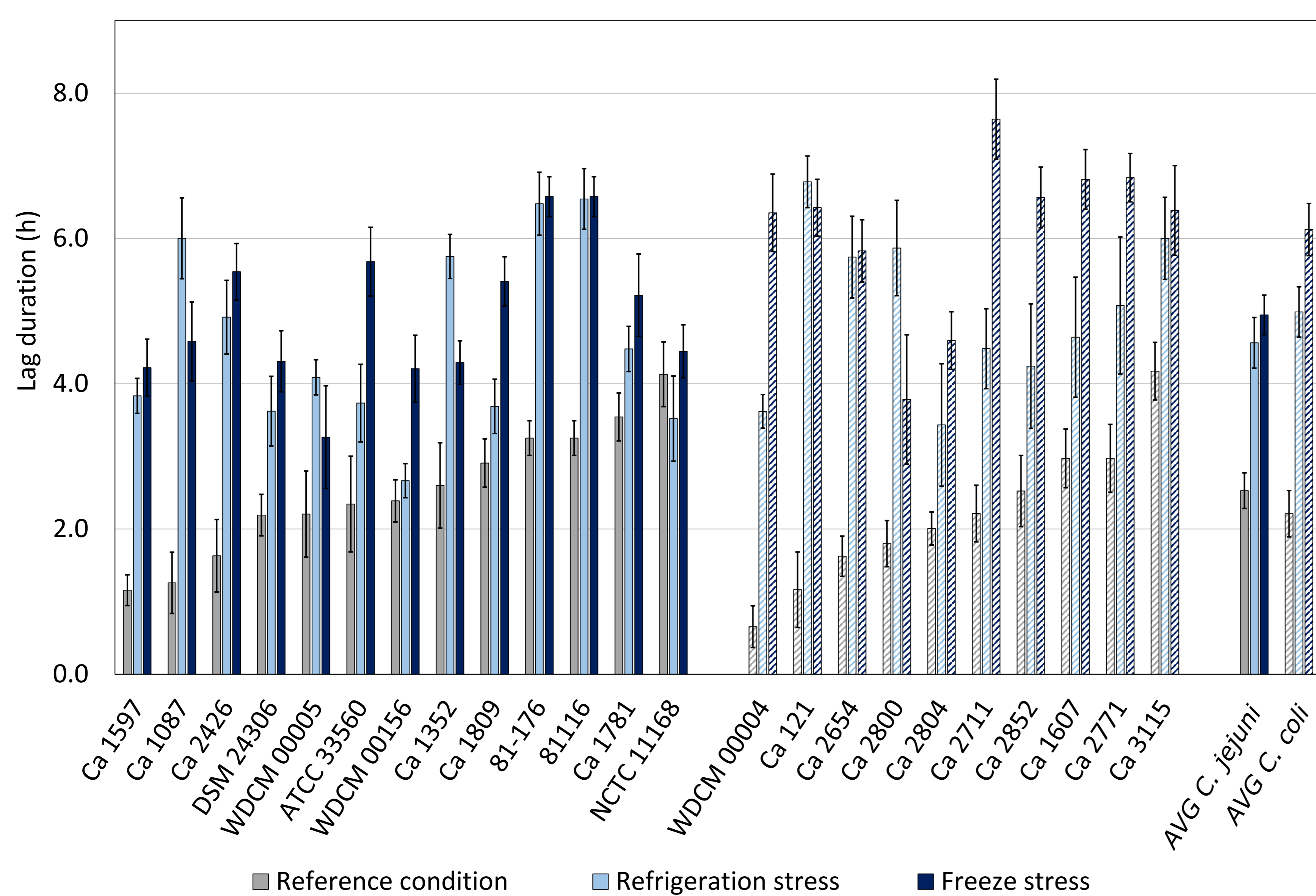
Background and Objective

Campylobacter cells present on food products often encounter unfavourable conditions during food processing and as a consequence can suffer sub-lethal damage. To ensure food safety, also those cells have to be detected following procedure A of ISO 10272-1:2017.

Objective of this study is to quantify the growth kinetics during enrichment in Bolton broth of 13 *C. jejuni* and 10 *C. coli* isolates after exposure to 64 h of refrigeration stress (+4°C) and freeze stress (-20 °C) and to assess variability in lag-duration. Additionally, a selection of strains was exposed to atmospheric oxygen stress to assess if lag duration during enrichment is dependent on the type of stress encountered.

Results

A Lag-duration without prior stress treatment (reference condition) and after application of refrigeration and freeze stress



Lag-duration after stress:

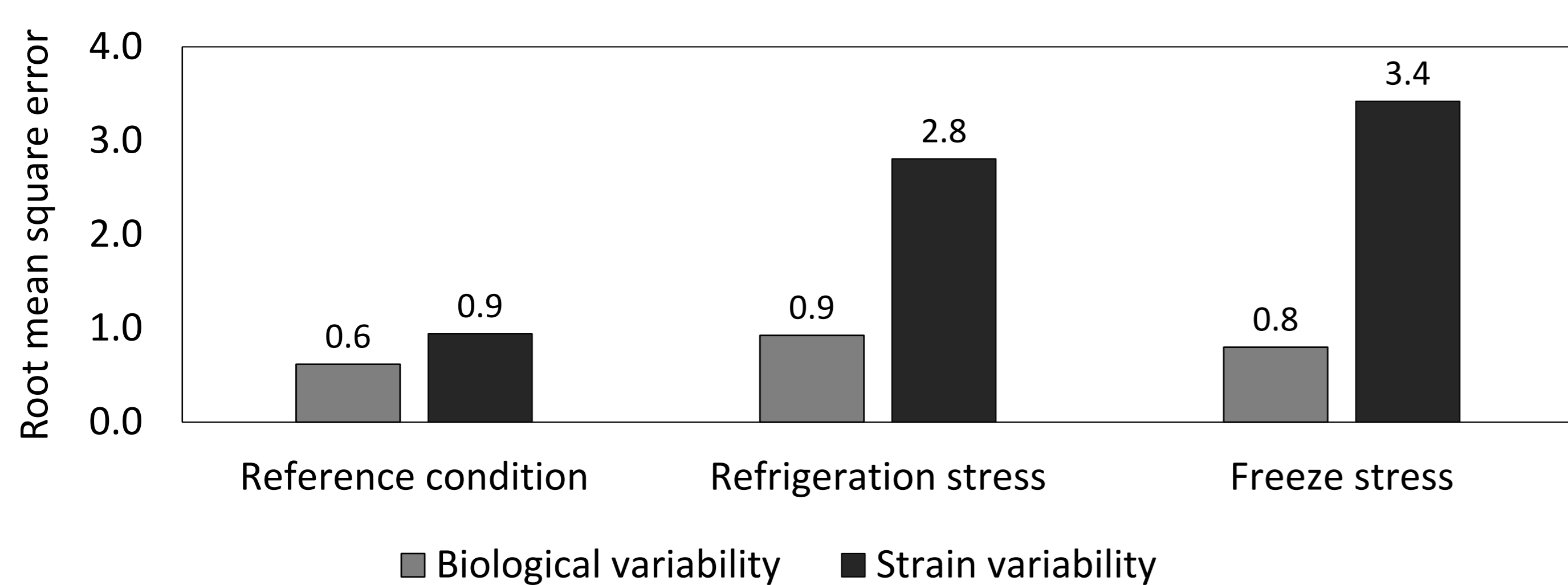
- Growth curves were fitted with the Baranyi-model ($n=2$).
- Refrigeration- and freeze stress increased lag-duration compared to the reference condition by a factor 2 and 2.3, respectively.
- Differences in lag-duration between species were only significant after freeze stress ($p=0.02$).

Reduction in cell concentration after stress:

(data not shown)

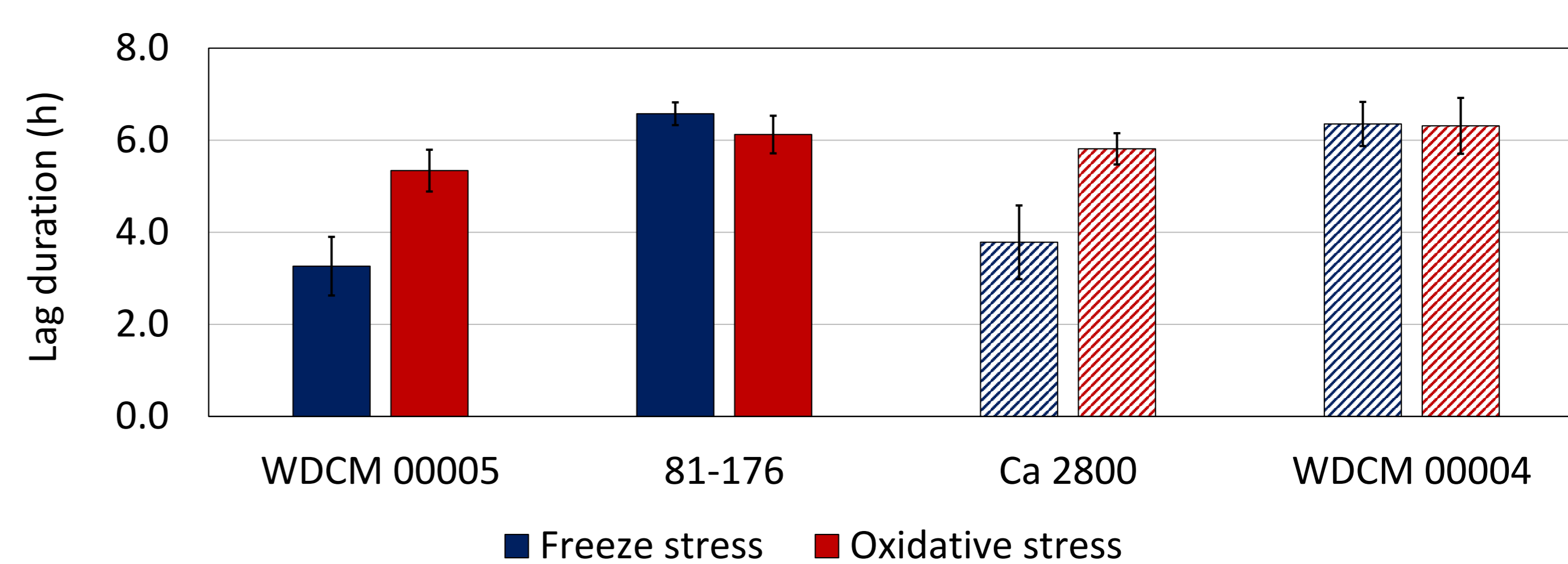
- Close to no reduction after refrigeration, while freeze stress reduced cell concentrations by $1.6 \pm 0.3 \log_{10}$ cfu/ml.
- There was no significant difference in reduction between species after refrigeration ($p=0.61$) while reduction after freeze stress was higher for *C. coli* than *C. jejuni* ($p=0.04$).

B Comparison of biological and strain variability



- Biological variability in lag-duration remained stable for all conditions while strain variability in lag-duration significantly increased by application of stress.

C Lag-duration after freeze stress and oxidative stress



- Both types of stress resulted in similar reduction (data not shown). However, there was no comparable trend in recovery duration after different stresses ($n=2$). Lag duration during enrichment is therefore also dependent on the stress encountered.

Conclusion

- There is no significant difference between species concerning the reduction after refrigeration- and freeze stress.
- Differences in lag-duration are due to strain variability, not biological variability.
- Lag-duration during enrichment is not only strain-dependent, but also depends on the type of stress applied.



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