



FSA Project FS101025

Freezing as an intervention to reduce the numbers of campylobacters isolated from chicken livers



🔥 Background

- Caterers
- Colour
- Texture
- Undercooking



The image is a screenshot of a BBC News article. At the top, the BBC logo is on the left, and navigation links for 'Sign in', 'News', 'Sport', 'Weather', 'iPlayer', 'TV', and 'Radio' are on the right. Below this is a red banner with 'NEWS HEALTH' in white. A secondary navigation bar includes 'Home', 'World', 'UK', 'England', 'N. Ireland', 'Scotland', 'Wales', 'Business', 'Politics', 'Health', 'Education', and 'Sci/Enviro'. The article's date is '2 December 2011' and it was 'Last updated at 01:09'. There are social media share icons for Facebook, Twitter, Email, and Print. The main headline is 'Chicken liver food poisoning link'. The sub-headline reads: 'Over 90% of cases of a common form of food poisoning seen in catering venues this year were due to people eating undercooked chicken liver pate, often at weddings, infection experts have said.' The main text states: 'The Health Protection Agency (HPA) analysed 18 outbreaks of Campylobacter in 2011 across England. In all, 443 people became unwell and one had to be hospitalised. The Food Standards Agency (FSA) has reminded caterers to cook poultry livers to prevent infection.' To the right of the text is a photograph of a wedding table setting with white linens, glassware, and floral arrangements. Below the photo is a caption: 'Chicken liver pate is a popular dish at weddings'. At the bottom right, there is a 'Related Stories' section with a link titled 'Two thirds of chicken'.

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2 December 2011 Last updated at 01:09

Share f t e p

Chicken liver food poisoning link

Over 90% of cases of a common form of food poisoning seen in catering venues this year were due to people eating undercooked chicken liver pate, often at weddings, infection experts have said.

The Health Protection Agency (HPA) analysed 18 outbreaks of Campylobacter in 2011 across England.

In all, 443 people became unwell and one had to be hospitalised.

The Food Standards Agency (FSA) has reminded caterers to cook poultry livers to prevent infection.



Chicken liver pate is a popular dish at weddings

Related Stories

[Two thirds of chicken](#)

Assessment of freezing as an intervention

Two main project strands:

- Small retail survey of fresh and frozen livers
- Freeze some livers and see what happens



Retail survey

- 30 frozen and 33 fresh livers
- Differences in numbers of campylobacters
- Used ISO 10272-2 (with modification on low dilution)

- 51 retail premises
- 14 different processing plants

- 48 supermarkets, 10 butchers, one deli, two commercial catering suppliers, two corner shops

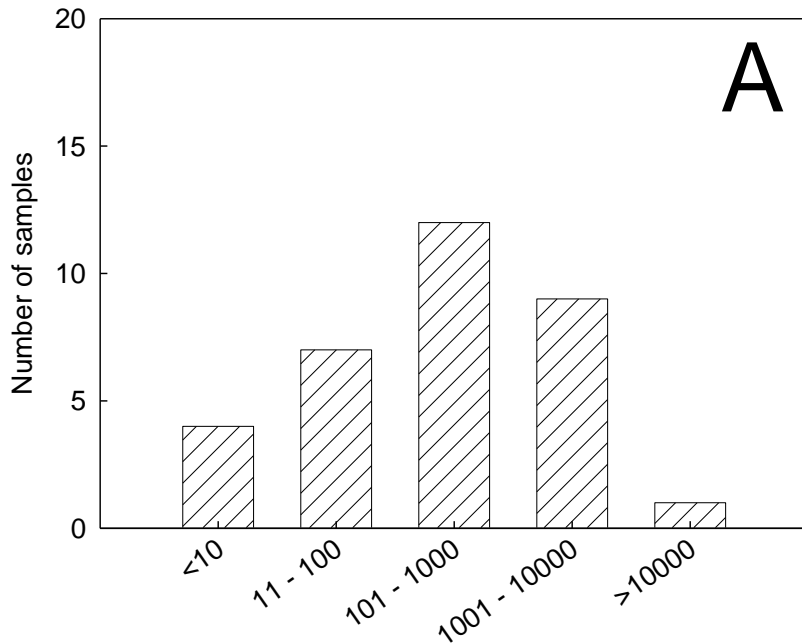


Locations

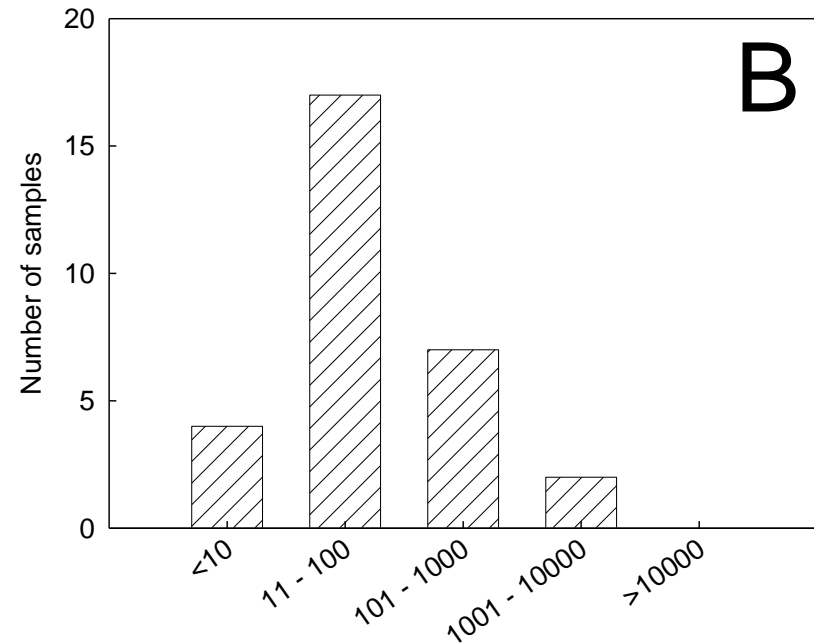
Sample collections
piggy-backed onto
FSA retail survey
of Lm in CSM



Comparison results



Banded counts of *Campylobacter* numbers in unfrozen chicken liver samples purchased at retail (cfu/g)



Banded counts of *Campylobacter* numbers in frozen chicken liver samples purchased at retail (cfu/g)

Fresh mean log 2.25 cfu/g liver

t-test: $P = 0.015$ Frozen livers in retail samples contained less *Campylobacter*

Frozen mean log 1.55 cfu/g liver

Retail survey

Nothing interesting:

- No correlation between purchase temperature and numbers of campylobacters
- No correlation between remaining shelf life and numbers of campylobacters



Strand two

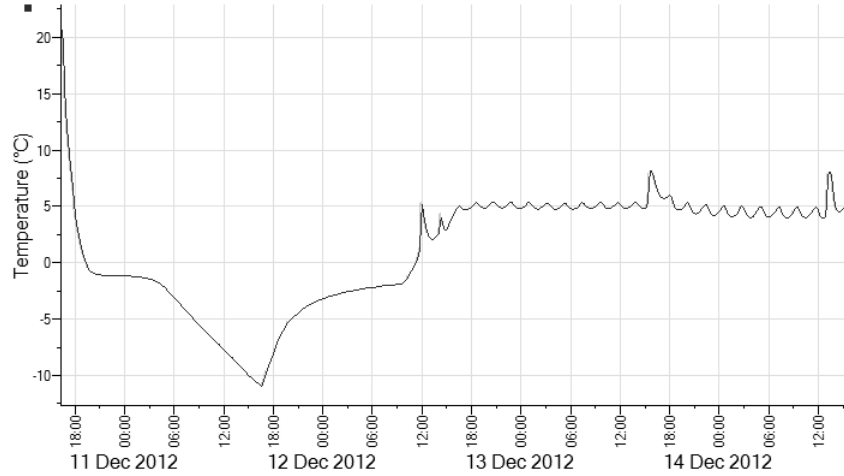
- Effect of freezing fresh livers on natural campylobacters
- Collected livers from slaughterhouses (to be sure) and final clearance flocks (max chance)
- After standard process – trimmed, chilled and cleaned in slush ice
- Broadly comparable numbers to the retail livers with longer shelf life (no sig. dif. whole retail sample set)



Freeze treatments - using two freezers

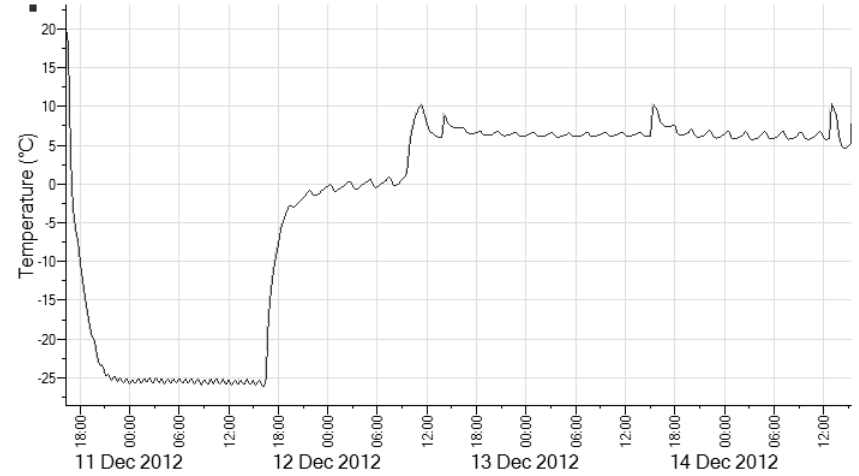
Frozen livers

■ 650943 Temperature Frozen livers



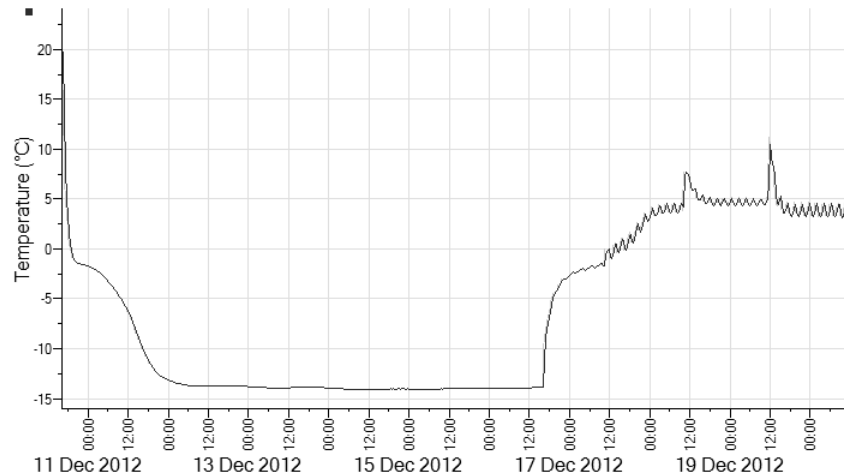
Frozen livers

■ 649197 Temperature Frozen livers



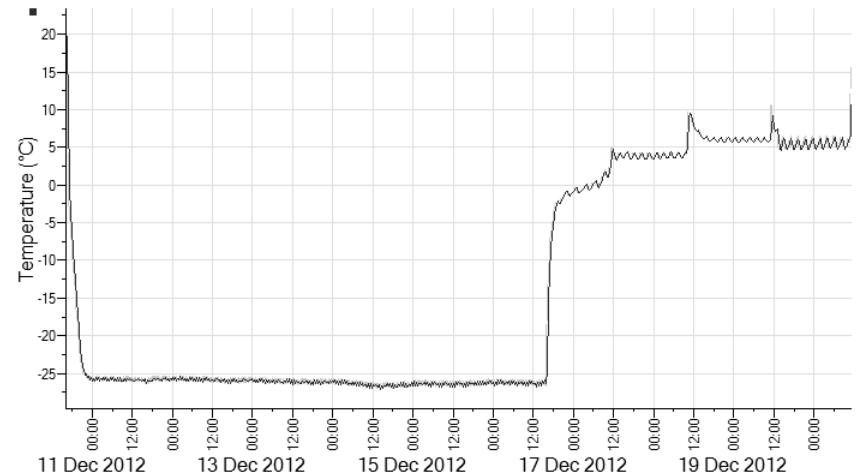
Frozen livers

■ 649224 Temperature Frozen livers

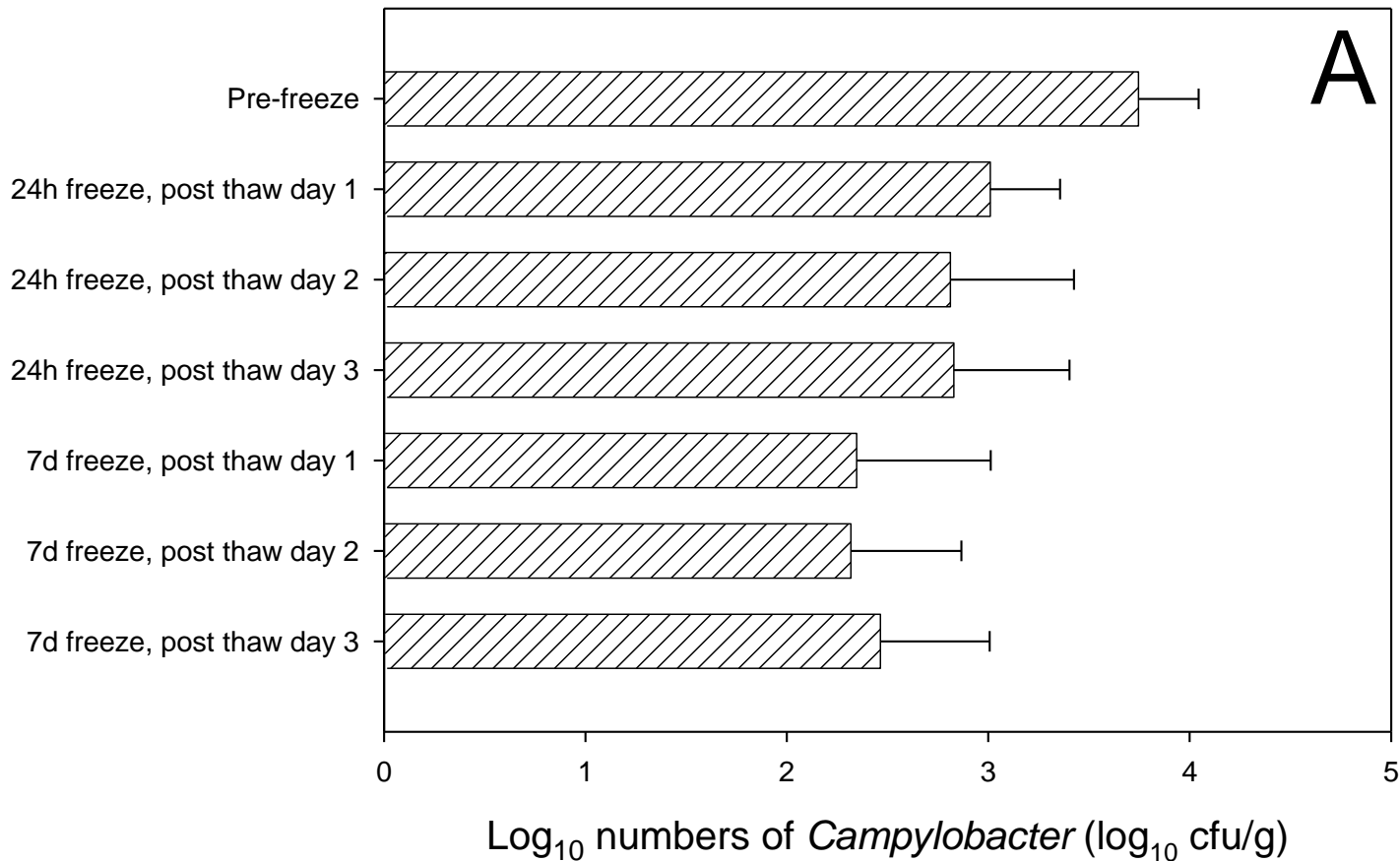


Frozen Livers

■ 630651 Temperature Frozen Livers



🌿 The -15°C freezer (n=30)

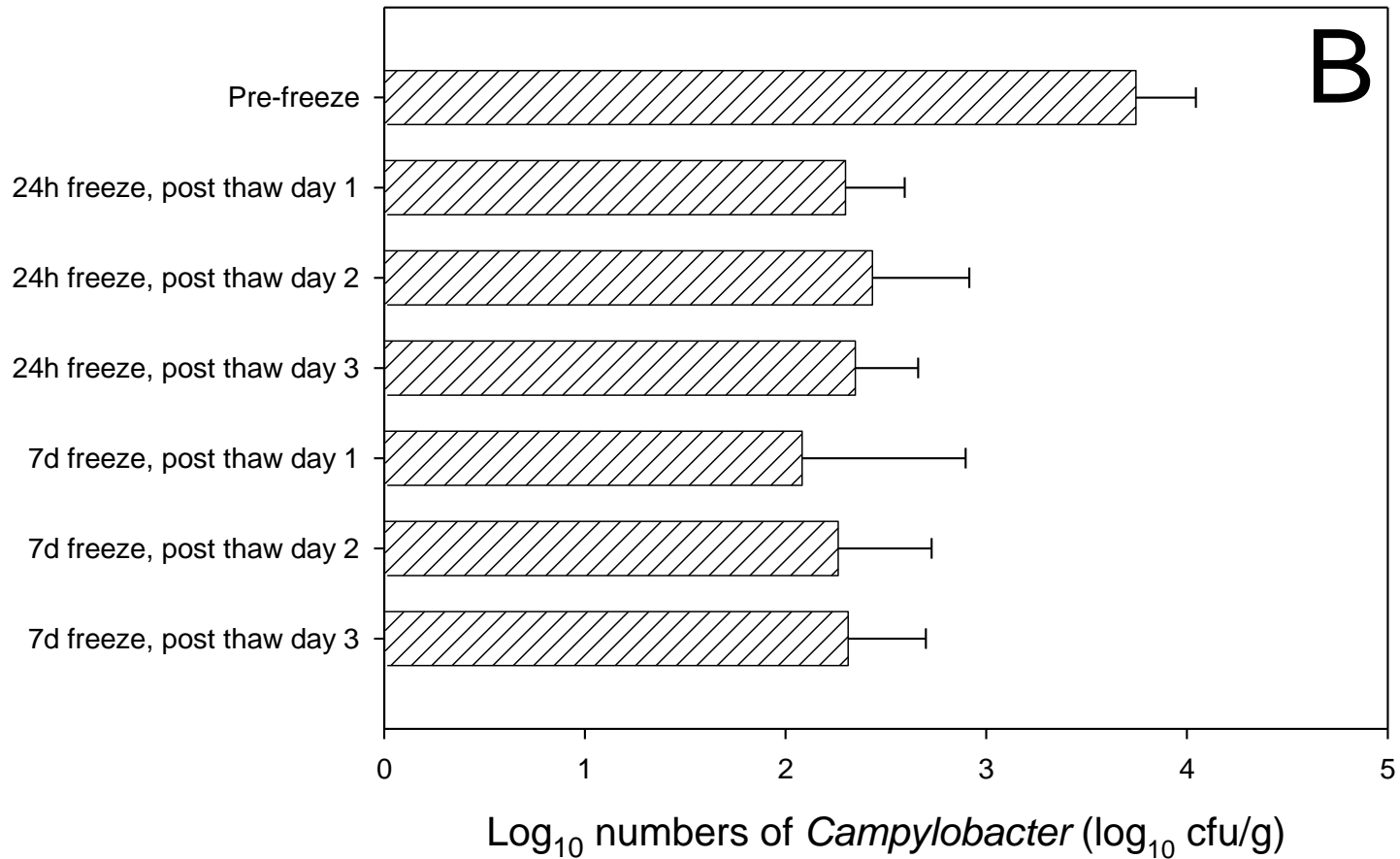


The -15°C freezer

- Freeze for 24h significantly lower numbers of campylobacters compared with unfrozen livers (t-test $P < 0.01$)
- Freeze for 1 wk significantly lower numbers of campylobacters compared with 24h frozen livers (t-test $P < 0.01$)
- No evidence of recovery from sub-lethal injury (ANOVA)



🌿 The -25°C freezer (n=30)



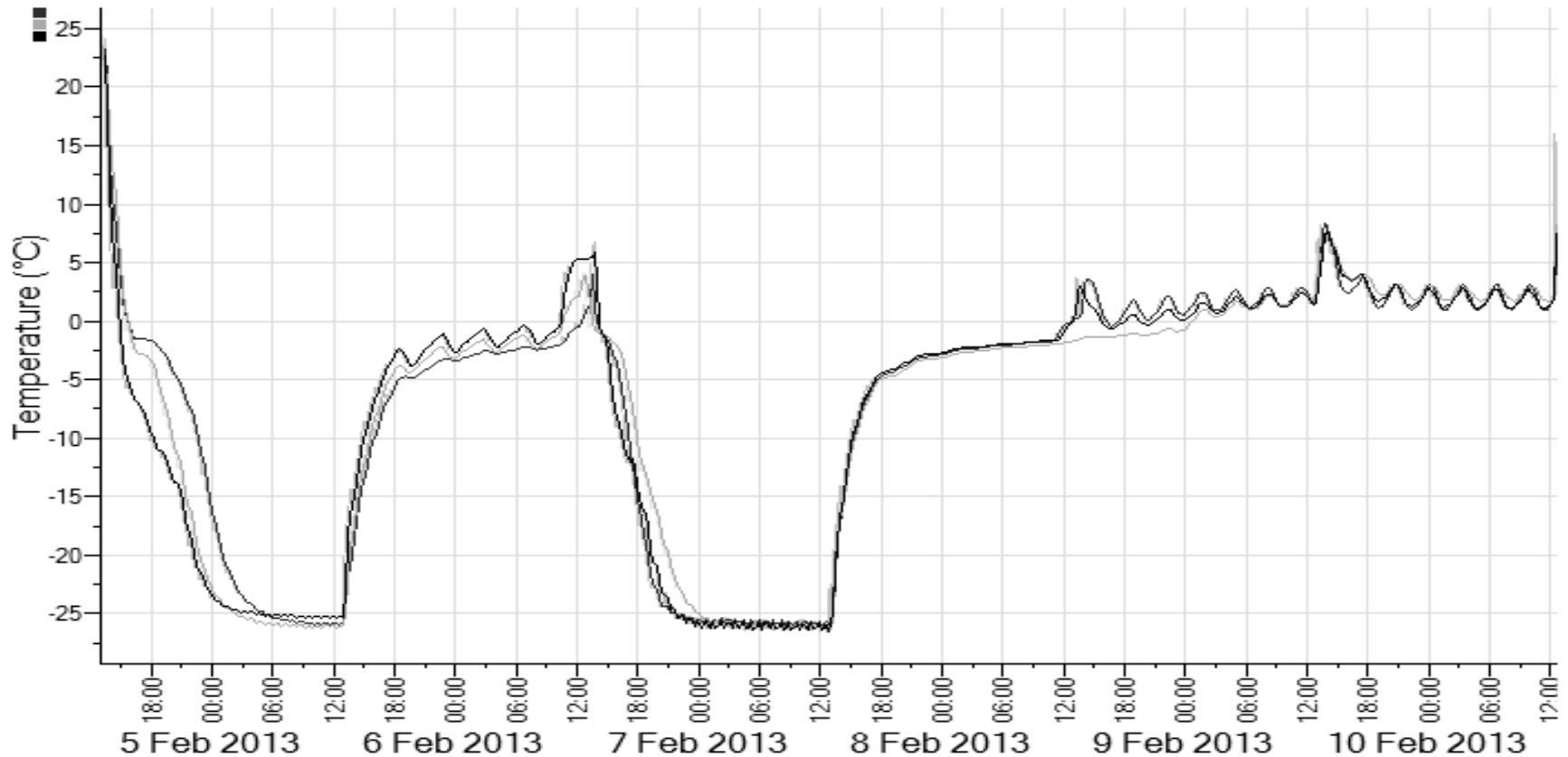
The -25°C freezer

- Freeze for 24h significantly lower numbers of campylobacters compared with unfrozen livers (t-test $P < 0.01$)
- No difference when freeze for 24h compared with 1 wk frozen livers (t-test $P = 0.18$)
- No evidence of recovery from sub-lethal injury (ANOVA)

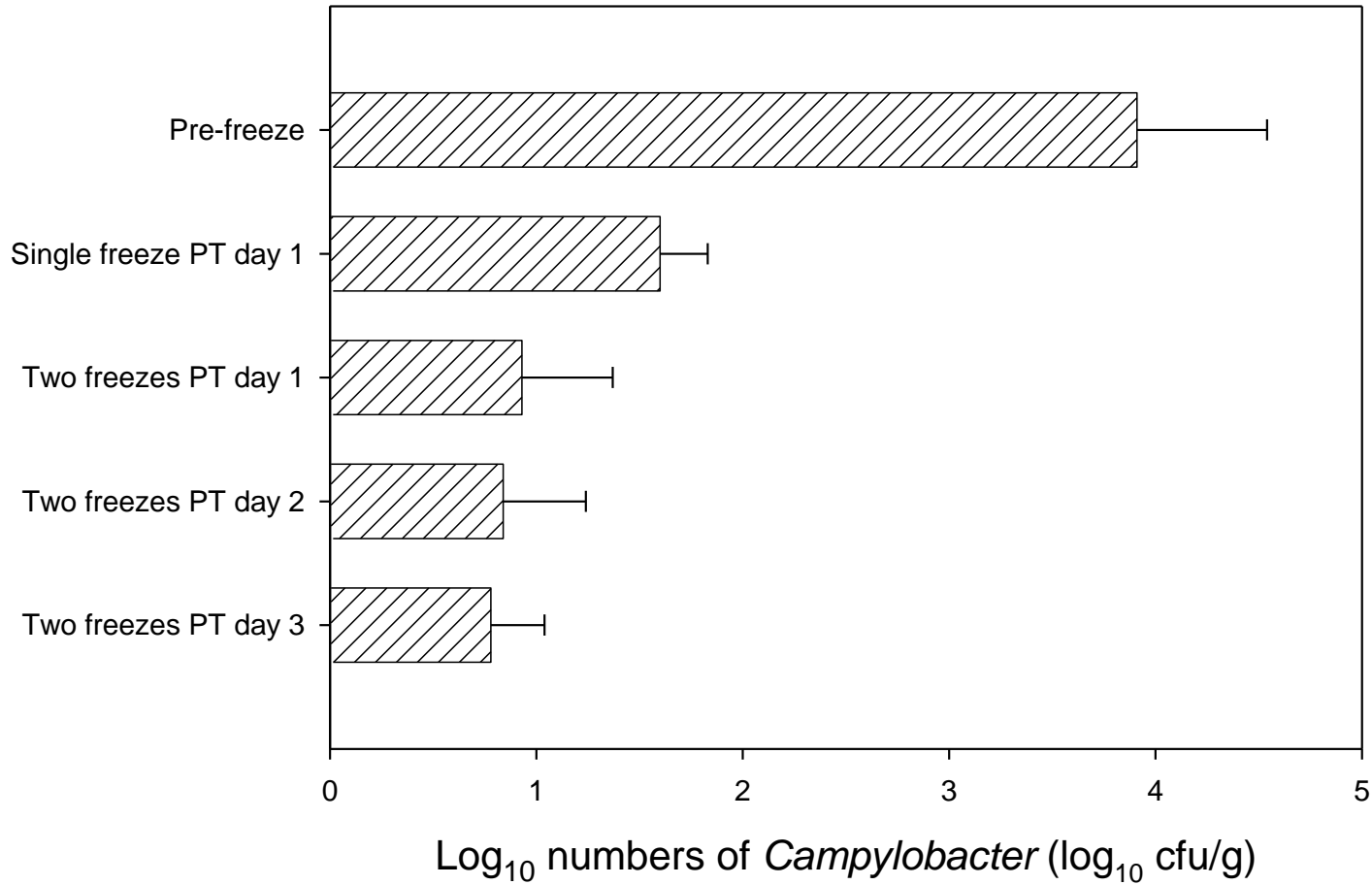


🔥 The effect of two freezes to -25°C

Temperature of twice-frozen livers



🔥 The effect of two freezes to -25°C ($n=30$)



🔥 The effect of two freezes to -25°C

- First freeze significant reduction compared with unfrozen livers ($P= 2 \times 10^{-26}$)
- Second freeze significant reduction compared with unfrozen livers ($P= 9 \times 10^{-10}$)
- Significant benefit of freezing twice
- 3 logs reduction to *Campylobacter* numbers



Project team

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