

Technical University of Denmark



Survival and growth of exponential and stationary phase *Salmonella* during fermentation of sausage

Birk, Tina; Müller, Anna Karoline; Hansen, Tina Beck; Aabo, Søren

Publication date:
2011

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Birk, T., Müller, K., Hansen, T. B., & Aabo, S. (2011). Survival and growth of exponential and stationary phase *Salmonella* during fermentation of sausage. Poster session presented at 9th International Conference on the Epidemiology and Control of Biological Chemical and Physical Hazards in Pigs and Pork, Maastricht, Netherlands.

DTU Library
Technical Information Center of Denmark

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Survival and growth of exponential and stationary phase *Salmonella* during fermentation of sausage

Tina Birk, Karoline Müller, Tina Beck Hansen, and Søren Aabo

Division of Microbiology and Risk Assessment, National Food Institute, Technical University of Denmark, Mørkhøj Bygade 19, 2860 Søborg, Denmark

Background and introduction

Raw meat will occasionally be contaminated with enteropathogens during slaughter. These pathogens will be transported further down the meat processing chain and may constitute a risk for the consumer.

During manufacturing of sausages, the majority of meat are frozen when mixed with ingredients during mincing. Freezing arrest bacterial growth and reduce the number of the pathogens. However, the production process of fermented sausages do not ensure complete elimination of pathogens.

The growth phase of bacteria in raw meat entering the sausage production is unknown. The survival and growth of *Salmonella* during fermentation may depend on its growth phase in the raw meat before freezing. Bacterial survival under food environmental stress are typically performed with stationary phase cells. However, the response to environmental changes differs between exponential and stationary phases cells, with stationary phase cells being generally more resistant.

Objectives

The objectives in this study were to:

- Investigate the survival of exponential and stationary phase cells of *Salmonella* Typhimurium phage definitive Types DT12 and U292 in minced meat during freezing.
- Follow survival/growth of exponential and stationary phase *Salmonella* during sausage fermentation with and without starter culture.

Conclusion

It can be concluded from the experiments that:

- The exponential phase cells are significant more sensitive to freezing than stationary phase cells.
- Growth of the starter culture during sausage fermentation arrest growth of both exponential and stationary phase cells.
- Fermentation failure (mimicked by not adding starter culture) may lead to *Salmonella* growth, most prominent for exponential phase cells.

Results

Effect of freezing on survival of exponential and stationary phase *Salmonella* Typhimurium DT12 and DTU292 in minced meat

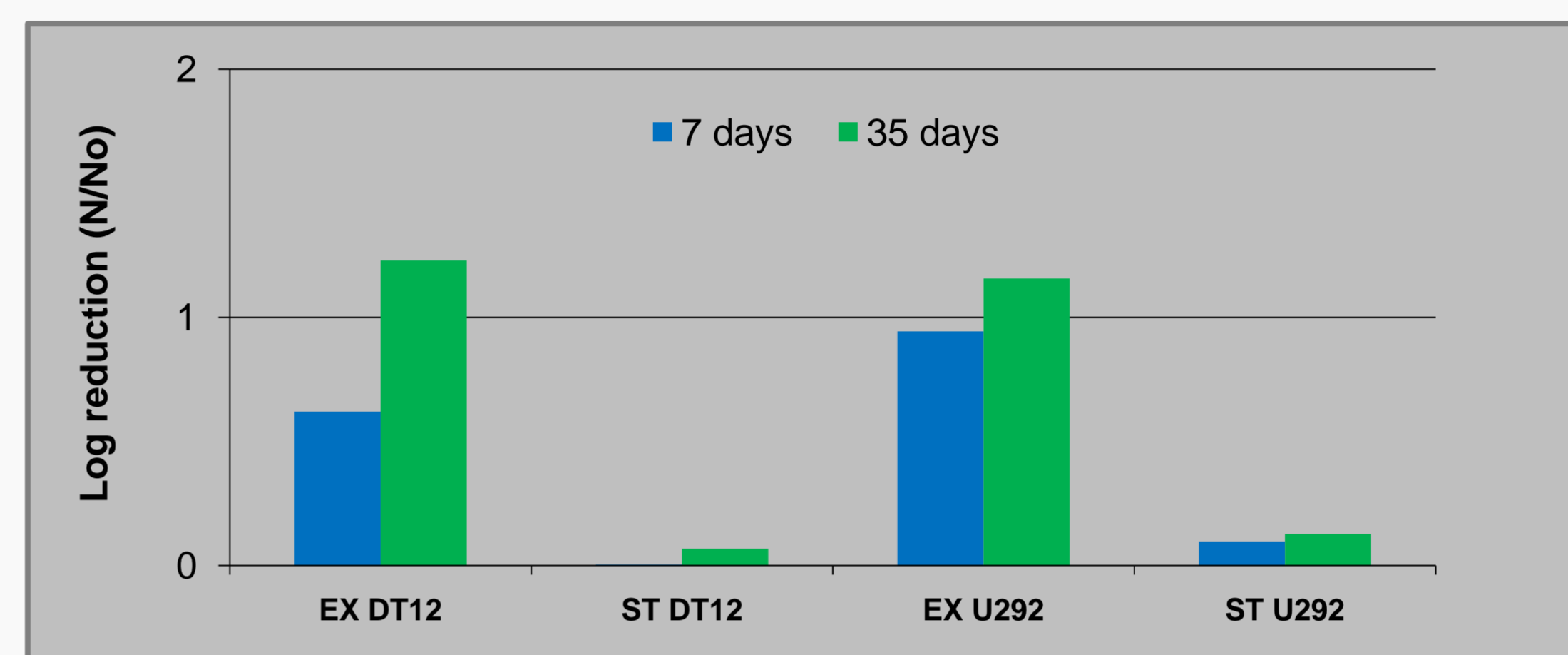


Fig 1. Significant differences in survival of exponential (EX) and stationary (ST) cells was observed during freezing in minced meat. No reduction was observed for the stationary cells after freezing for 35 days whereas exponential cells were reduced more than 1 log₁₀.

Growth of exponential and stationary phase *Salmonella* Typhimurium DT12 during sausage fermentation

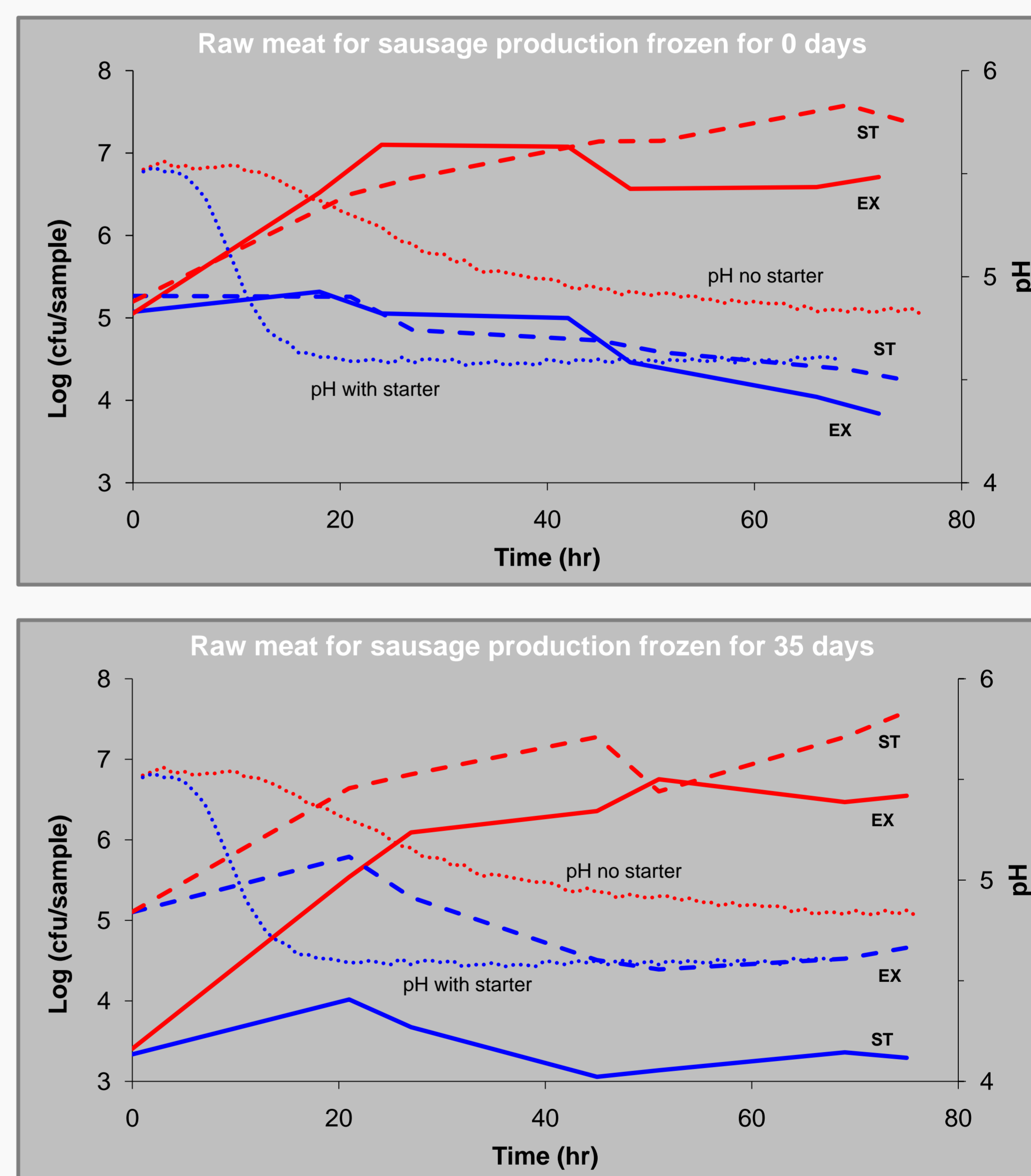
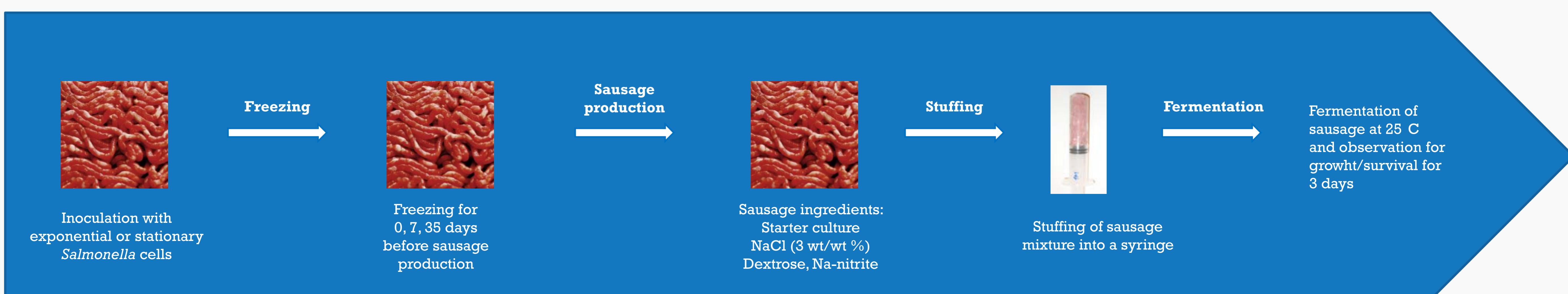


Fig 2. In the sausage without starter culture the stationary and exponential cells starts to grow where the exponential grows faster. Adding starter culture results in a drop in pH and a blocking of the growth of *Salmonella* in both growth phases.

Red curves: without starter culture Blue curves: with starter culture

Fermented sausage model

Reduction of *Salmonella* during freezing – growth/survival during fermentation



The sausage model was modified after Axelson, Nofima Mat, Norway