

DANISH MEAT RESEARCH INSTITUTE

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Recommendations for safe cooking of meat at temperatures below 75°C

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INTRODUCTION

Application of sous vide cooking and cooking at temperatures below 75°C have increased during the last decade in the catering sector.

By cooking at temperatures below 75°C you gain the following benefits:



- Reduced cooking loss
- Increased juiciness
- A red centre

It is assumed that, in the worst case, fresh meat can contain 4 log of *L. monocytogenes.* Therefore a low temperature heat treatment that ensures a 4 log reduction of *L. monocytogenes* must be regarded as safe.

COOKING OF MEAT TO CORE TEMPERATURES <75°C

Chops, steaks and whole roasts

VIDE MASTER

Only the surface is contaminated with bacteria

Bacteria on the surface

Minced meat

Mechanically tenderized meat

Enhanced meat

Bacteria are distributed evenly in the meat

OBJECTIVE

The objective was to convert the measured reductions of *L. monocytogenes* during heating at 58, 60 and 63°C to generic recommendations that ensure a 4 log reduction of *L. monocytogenes.*

MATERIALS AND METHODS

- Different meat cuts and patties were inoculated in the geometric centre with a green coloured 5-strain cocktail of *L. monocytogenes*
- The vacuum-packed samples were heat treated in water bath or industrial sous vide equipment at 58, 60 and 63°C
- Analysis of L. monocytogenes (Oxford, 48 h at 37°C) three to five times during the holding time

are inactivated due to temperatures >75°C on the surface during cooking in oven or on pan

Core temperatures of 58-74°C are acceptable without holding times Holding time is required to obtain a 4 log reduction of *L. monocytogenes* at core temperatures <71°C

 Core temperature
 Holding time*

 70°C
 1 min.

 65°C
 6 min.

 63°C
 12 min.

 60°C
 35 min.

 58°C
 72 min.

Figur 1.

Generic recommendations for safe cooking of meat in sous vide, in oven or on pan at temperatures below 75°C

CONCLUSION

RESULTS FROM EXPERIMENTS

- At 58°C, the D-value was 2.5 times higher than the original mean D-value of the cocktail, indicating a heat adaptation of the *L. monocytogenes* strains
- At 60°C, a 2 log reduction was obtained during heating to 60°C in the core, and more than a 6 log reduction was obtained after 20 minutes of holding time
- At 63°C, more than a 4 log reduction was obtained during heating to 63°C in the core
- The experimental results indicate that the generic results must include a safety margin, corresponding to a holding time at temperatures from 58-70°C

An increase in D-value is measured at 58°C, probably corresponding to heat adaptation of *L. monocytogenes*

Generic recommendation for holding times must include a safety margin to take heat adaptation into account



