

How to make safe, juicy and rose beef patties

Annemarie Gunvig, Tomas Jacobsen and Mari Ann Tørngren



Introduction

Prolonged cooking of meat at a low temperature (LTLT) is ideal for:

- Reducing toughness and cooking loss
- Improving juiciness
- Obtaining a rose colour in the centre of the meat

Food safety

Combining temperature with the right time, the treatment ensures a 4 log reduction of *L. monocytogenes*, equal to high food safety.

Materials and methods

Safety:

- Inoculated of beef patties in the geometric centre with a green coloured 5-strain cocktail of *L. monocytogenes*.



- Heat treatment of vacuum-packed samples heat treated in a water bath at 53°C, 58°C, 60°C or 63°C.
- Analysis of *L. monocytogenes* (Oxford, 48 h at 37°C) three times during heat treatment.

Sensory analysis:

Beef patties heat treated at 55°C, 60°C and 75°C were evaluated on a 15-point unstructured scale anchored at the extremes (0 = low intensity and 15 = high intensity) by an 8-member trained sensory panel.

Moisture loss:

Patties were weighed before and after sous-vide cooking and before and after frying.

Results

Table 1. Log reduction of *L. monocytogenes* in beef patties at T_c^1 and after the specific holding time at 53°C, 58°C, 60°C and 63°C (n=3)

Temperature °C	Reduction at T_c^1 Log	Holding times ² Minutes	Total process time Minutes	Total reduction Log
53	0.5	300	322	> 6.7
58	1.1	30	53	> 6.7
60	2.7	20	44	> 6.7
63	4.6	3	31	> 6.7

1 T_c = Time until the heat treatment temperature is reached in the core.

2 Holding time = Time at the specific temperature




Temperature	55°C	60°C	75°C
Appearance			
Juiciness***	7.3b	6.9b	3.1a
Doneness***	1.9b	2.1b	10.6a
Moisture loss (%)	8.5	12.9	22.8

Figure 1. Appearance, LSmeans for juiciness and doneness and moisture loss of beef patties heat treated at 55°C, 60°C and 75°C.

Conclusion

LTLT cooking of beef patties at 53°C, 58°C, 60°C or 63°C with holding times of 300, 30, 20 and 3 min, respectively, ensured more than 4-log reduction of strains of *L. monocytogenes* with a mean D-value.

Heat treatment of beef patties at 55°C and 60°C (220 and 27 min, respectively) resulted in juicier and less crumbly beef patties with a rose-coloured centre and 10-14% lower moisture loss compared with 75°C.