O-02-03

Pasteurization effects and achievement of target values for inactivation of Hepatitis E Virus in semi-dry pork sausages following cooking instructions (#17)

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Introduction

Saucisson is a traditional Swiss semi-dry fermented pork sausage, which has to be heated up before consumption. Due to a high water activity (>0.96 on average) many pathogens such as *Listeriamonocytogenes*, *Salmonella spp.* and *E. coli* can survive in this type of products (Kabisch 2014). A sufficient thermal treatment before consumption ensures food safety. Some of these sausages contain also raw liver, which is a potential source of Hepatitis E Virus (HEV). As described by Barnaud et al. (2012) only a heat treatment of 20 min at 71°C inactivates HEV. Thus, the aim of this project was to investigate, if cooking instructions given by the manufacturers ensure the inactivation of HEV and a sufficient pasteurization of the products.

Methods

Saucisson Vaudois, Saucisse aux choux, Saucisse au foie and Saucisson du Vully with varying diameters were heated in a water bath at 73°C, 75°C or 80°C according to the cooking instructions. The water bath was either preheated or heated up directly with the sausage. The core temperature was measured by a PT-100 sensor and recorded. In total 18 runs per sausage (3 temperatures and 2 heating methods, 3 repetitions) were performed. The total thermal load at 70°C was calculated using a z-value of 10. Based on previous studies (Ministry for Primary Industries 2015; Kabisch 2014; Doyle & Mazzetta 2005) a time-temperature requirement of 1 min at 70°C was chosen for pasteurization. For HEV inactivation, a target value of 20 min at 71°C was set. Temperature differences were estimated with the Fisher's Least-Significant-Difference Test.

Results

The temperature curves of sausages heated up in cold water were lower than those starting in preheated water (Figure 1). Saucisson Vaudoise, Saucisse aux choux and Saucisson du Vully showed significant differences ($p=0.05$) of the core temperature after the recommended cooking times. In Saucisse au foie the temperature was equalized for both cooking methods after 40 min (73°C / 75°C) or 30 min (80°C). Table 1 shows the pasteurization effects and the achievement of HEV inactivation targets at 80°C. Only Saucisse au foie reached the required targets at all tested water-bath temperatures.

Conclusion

If the heat treatment of sausages started in cold water, the required pasteurization effects were only partly reached. Furthermore, pasteurization targets were only safely achieved at a water bath temperature of 80°C.

Not all sausages reached the inactivation targets for HEV (71°C, 20 min). The liver-containing Saucisse au foie achieved the values in all trials as a safety margin was applied, recommending a longer heating time of 40-50 min compared to 20-30 min for sausages with the same diameter. As Szabo et al. (2015) detected HEV also in raw sausages without liver, longer cooking times for all products and / or adaptation of the diameter should be discussed.

The influence of different hurdles on thermal inactivation effectiveness in this specific product is not clear yet. Furthermore, the influence of the storage conditions at sales shops and at home have to be considered. There is a need of challenge tests using different pathogens and analyzing them along the whole value chain.

Literature

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Notes

Product name (diameter)	Recommended cooking times at 80°C [min]	Pasteurization effect at 70°C (z=10) cold water bath [min]	Pasteurization effect at 70°C (z=10) preheated water bath [min]	Thermal inactivation of HEV (71°C / 20 min)
Saucisson Vaudois (55 mm)	40	0.02 ± 0.02	2.90 ± 1.91 2 ok / 3	no liver
	50	1.04 ± 0.83 2 ok / 3	10.78 ± 4.90	no liver
Saucisse aux choux (35 mm)	20	0.00 ± 0.00	2.61 ± 1.80	no liver
	30	0.77 ± 0.34	29.18 ± 11.14	no liver
Saucisse au foie (35 mm)	45	94.61±12.50	84.40 ± 31.89	
	50	137.69 ±14.08	121.29 ± 35.43	
Saucisson du Vully (35 mm)	20	0.00 ± 0.00	4.82 ± 2.24	no liver
	30	1.08 ± 0.12 2 ok / 3	34.56 ± 9.31	no liver 2 ok / 3

Table 1 Pasteurization effects and evaluation of target values for HEV inactivation for different semi-dry sausages after recommended cooking times at 80°C
(green = reached; orange = partially reached; red = not reached)

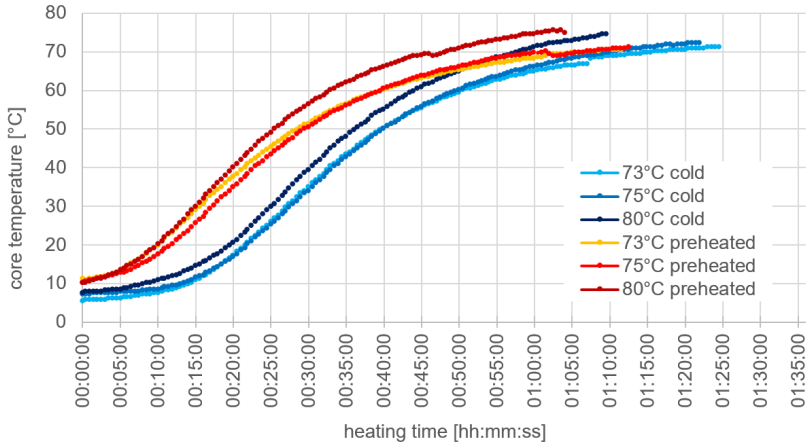

Figure 1 Average core temperature curves (n=3) of Saucisson Vaudois at different water bath temperatures starting in cold or preheated water bath

Notes