

EFFECT OF PORK HAM WITH PSE-LIKE QUALITY DEFECTS ON WET-CURED HAM

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Introduction

During the last decades, various quality defects have appeared in pork meat, specifically in ham muscles. The quality defects are typically characterized as low ultimate pH, abnormal color, increased drip-loss, reduced firmness, and disintegrated muscle fibers. Given their similarity to pale, soft and exudative (PSE) meat, they are often referred to as PSE-like quality defects. In 2018, the first cases regarding PSE-like quality defects in Norwegian ham were reported. Similar defects have also been observed in several other European countries [1-3]. The observed quality defects cause significant financial losses for ham producers, particularly for cooked cured ham products [1].

Objective

The aim of this study was to test and establish short-term solutions that make it possible to use raw materials with PSE-like quality defects for wet-cured ham. Different cooking times, drying, and various vacuum (press) were analyzed, and their effect on raw material with normal quality and PSE-like quality defects.



Figure 1: Control ham with red, firm, and normal (RFN) meat quality on the left. Defect ham with PSE-like quality defects on the right – with very pale appearance.

Material and methods

Table 1 illustrates the design of the experiment. Wet-cured ham was produced from ham cuts comprising the semimembranosus and adductor muscles. The control hams were of red, firm, and normal (RFN) meat quality, and the defect hams had PSE-like quality defects (Figure 1). Ham cuts were classified visually based on color, firmness and degree of disintegrated fibers. Both muscle types were injected with a 2.0 % NaCl and nitrite brine solution, giving a 20 % meat weight increase. The ham cuts for each of the cooked cured hams were tumbled in a vacuum drum, and following tumbling, half of the hams were dried for 30 min in an oven at 100°C. Meat cuts were then packed into vacuum bags, with loose or tight vacuum, to form wet-cured hams of approximately 0.5 kg each, where muscle types were mixed. The hams were cooked in water bath at 80°C for 2 h to obtain a core temperature of 73°C. Half of the hams were cooked for additional 45 min after obtaining a core temperature of 73°C. After cooking, the hams were cooled at -1°C for 2 h, then stored at 4°C for 4 days for maturation, prior to slicing. In total, there were 10 treatment groups, each with 3 replicates (Table 1). After cooking and maturation, all hams were cross cut and sliced (Figure 3) and subjectively evaluated for visible cracks, muscle adhesiveness, texture, color and taste. Photos were taken of all cuts and slices.

Group ID	RFN ham (0) / PSE-like ham (1)	Drying after tumbling 0 min (0) / 30 min (1)	Vacuum under cooking Loose (0) / Tight (1)	Cooking time 2 h (0) / 2 h 45 min (1)	Number
A	1	1	0	0	3
B	1	1	0	1	3
C	1	1	1	0	3
D	1	1	1	1	3
CtrlB	0	1	0	1	3
E	1	0	0	0	3
F	1	0	0	1	3
G	1	0	1	0	3
H	1	0	1	1	3
CtrlG	0	0	1	0	3

Table 1: Design with 10 treatment groups to study effect of raw ham quality on wet-cured ham.

Results

After salting, the adductor muscle from PSE-like meat was noticeable paler than the semimembranosus muscle, indicating lower absorption of the brine (Figure 2). There was no indication for treatments to alleviate the PSE-like defect during curing and cooking. However, the small adductor muscle, which is located on the inside of the flat steak, particularly contributed to reduced quality of the cooked ham - it had remarkable looser texture with cracks, was dryer and had reduced taste (Figure 3). This reflects the lower absorption of the brine. The negative effect of the adductor muscle was also confirmed after a second round of producing wet-cured ham, where the two muscles were separated. Even though the semimembranosus muscle also had PSE-like zones, the adductor muscle with PSE-like zones had considerable additional negative effect on the final product – with increased occurrence of loose texture and dryness.



Figure 2: Pale color of the adductor muscle after tumbling indicates lower absorption of the brine.
Figure 3: Slice of cooked ham with a slightly paler color than normal, and a loose structure with cracks.

Conclusions

If the adductor muscle has signs of PSE-like quality defects, it has negative effects on the final quality in wet-cured hams. To reduce financial losses, it is proposed to remove afflicted zones before processing.

References

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