Optimizing quality and shelf-life of retail pork cuts by using muscle specific three-gas MA-packaging

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INTRODUCTION

Packaging of fresh pork in high oxygen MAP can have negative effects on meat quality. This results in less tender and less juicy meat with a rancid off-flavor compare to wrapped or vacuum packed meat. The objective of this study was to investigate the effect of low oxygen three-gas MAP on shelf-life and eating quality.

MATERIALS AND METHOD

Retail cuts from M. longissimus dorsi (LD), M. semimembranosus (SM), and pork belly were packed in five different gas compositions, stored at 5°C and analyzed during storage until day 13.

For each cut, the experimental work was divided into two sub-trials – part 1: meat quality and part 2: shelf-life. For both sub-trials, all pigs were slaughtered on the same date, but for Part 1 pigs were selected according to gender (female) and weight (79-83 kg), whereas random pigs were used for Part 2.

The same slaughter process was used for all three cuts: slaughtering on Monday, and cutting, deboning, shell freezing on Tuesday. For part 1 the meat was sliced at DMRI on Wednesday just before packaging, whereas meat for Part 2 was sliced on Tuesday at the slaughterhouse. All meat samples were packed in modified atmosphere at DMRI on Wednesday in the following five gas compositions.

GAS	O_2	CO_2	N_2
0/20	0%	20%	80%
40/20	40%	20%	40%
50/20	50%	20%	30%
50/40	50%	40%	10%
80/20	80%	20%	0%

RESULTS

Only results for chops and belly are shown.

Table 1. *Sensory attributes of pan-cooked pork chops (LD) in MAP with different gas mixtures (day 9, O_2/CO_2).*

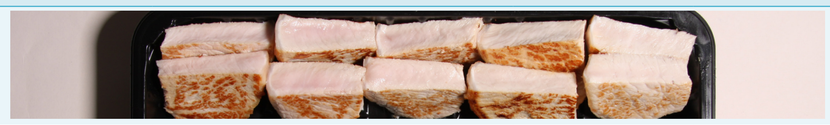
	0/20	40/20	50/20	50/40	80/20
APPEARANCE (day 9)					
SHELF-LIFE - COLOUR	>13 days	>13 days	>13 days	9-12 days	9-12 days
SHELF-LIFE - ODOUR	9-12 days	9-12 days	9-12 days	9-12 days	13 days
PMB (day 2)					
DONENESS	6.2 c	7.9 b	7.8 b	8.6 a	8.7 a
TENDERNESS	6.1 a	5.6 ab	5.3 bc	4.7 c	5.6 ab
JUICINESS	6.1 a	5.9 a	6.1 a	4.9 b	5.6 a
WOF	1.3 c	2.0 bc	1.4 c	2.4 ab	2.8 a

Table 2. *Sensory attributes of pan-cooked pork belly in MAP with different gas mixtures (day 7, O_2/CO_2).*

	0/20	40/20	50/20	50/40	80/20
APPEARANCE (Day 7)					
SHELF-LIFE - COLOUR	> 9 days	> 9 days	> 9 days	> 9 days	> 9 days
SHELF-LIFE - ODOUR	5-6 days	3-4 days	5-6 days	5 days	5-6 days
CRISPNESS	4.9 b	6.5 a	6.4 a	7.1 a	3.2 c
RANCID	1.0	1.3	0.9	1.2	1.6
STALE FLAVOUR	4.0 a	4.0 a	3.2 b	2.7 b	4.6 a
BITTER TASTE	5.0 a	4.8 ab	4.4 b	4.7 ab	4.6 ab

CONCLUSION

Gas compositions in modified atmosphere packaging of retail packed pork cuts must be muscle-specific in order to optimise shelf-life, colour stability and eating quality.

Packaging of pork chops and schnitzels in 40% O_2 + 20% CO_2 + 40% N_2 maintained the same shelf-life as traditional MAP 80% O_2 + 20% CO_2 and resulted in more tender and juicy meat with less PMB and rancid flavour. Packaging of sliced pork belly in 50% O_2 + 40% CO_2 + 10% N_2 resulted in a more crispy texture and less stale and bitter taste. Three-gas MAP could therefore be a suitable alternative to traditional MAP, maintaining shelf-life and enhancing eating quality.

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