Volatile profile of dry- and wet-aged Australian beef loin and its relationship with consumer flavour liking

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Introduction: Dry ageing and wet ageing are both commonly used technologies in the processing of beef to improve eating quality. Dry-aged beef is known to have better flavour compared to wet-aged beef, but the underlying mechanisms are not well-understood. Volatile compounds in cooked meat play important roles in the perception of flavour. Therefore, the objective of this study was to analyse the volatile profiles of dry- and wet-aged Australian beef and establish a relationship between the volatile profile and the flavour liking of aged beef obtained in a sensory assessment.

Materials and methods: The Longissimus thoracis et lumborum were excised from 24 carcasses at 24-hours post mortem from a commercial beef processing plant and then vacuum-packed and transported in a refrigerated lorry to Top Cut Foods (Gold Coast, QLD) for ageing treatments. The dry- and wet- ageing conditions were described in the study of Ha et al. (2019). The bone-in primals were dry-aged for 35 or 56 days, and the boneless primals were wet-aged for 21, 35, or 56 days. The treatments were randomised within each carcass. The samples for volatile analysis were randomly selected from 12 carcasses and the volatile profiles of cooked beef were measured using headspace solid phase microextraction and gas chromatography–mass spectrometry (HS-SPME/GC–MS). The volatile profiles of aged beef were analysed using the Restricted Maximum Likelihood procedure in GenStat (16th Edition, VSN International, Hemel Hempstead, UK). A partial least-square (PLS) regression analysis was performed on the volatile profiles and flavour liking scores of aged beef using GenStat. The flavour liking of aged beef was obtained in the study of Ha et al. (2019).

Results: The ageing type (dry or wet) and ageing time showed significant effects on most volatiles in the headspace of cooked beef. Dry-aged beef had significantly higher concentrations of aldehydes, ketones, and pyrazines such as hexanal, 3-hydroxy-2-butanone, and 2,6-dimethylpyrazine. The concentrations of most aldehydes, ketones, and pyrazines decreased with ageing time in dry-aged beef except for lipid oxidation products such as octanal and hexanal. In contrast, significantly higher ethanol and acetic acid were detected in wet-aged beef, and their concentrations increased with ageing time in wet-ageing. The PLS model indicated that the flavour liking of aged beef was positively correlated to some volatiles such as pyrazines, 2-acetyl-2-thiazoline, and hexanal but negatively correlated to the concentrations of ethanol, acetic acid, Heptanal, and Octanal.

Conclusion: The dry- and wet-aged beef exhibited disparate volatile profiles measured by HS-SPME/GC-MS, and the dry-aged beef generally contained higher concentrations of desirable volatiles. The long-term ageing caused the accumulation of lipid oxidation products and microbial fermentation products in dry- and wet-aged beef respectively and thus negatively influence the flavour liking of beef. The PLS model showed that the difference in volatile profiles could explain why dry-aged beef is preferred in the sensory assessment and why long-term (56 days) aged beef had relatively lower flavour liking.

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Literature:

Ha, M., McGilchrist, P., Polkinghorne, R., Huynh, L., Galletly, J., Kobayashi, K., . . . Warner, R. D. (2019). Effects of different ageing methods on colour, yield, oxidation and sensory qualities of Australian beef loins consumed in Australia and Japan. Food Research International, 125, 108528.