

EATING QUALITY OF DRY AGED AND WET-THEN-DRY AGED VS WET AGED BEEF AMONGST AUSTRALIAN AND JAPANESE CONSUMERS

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I. INTRODUCTION

Dry aging is a method of ageing in which meat (usually unpackaged) is stored for an extended period under controlled temperature, air flow and humidity. Dry aged beef is usually marketed to have better flavour and tenderness [1]. In this context, conventional ageing in a vacuum bag is referred to as 'wet' ageing. Previous studies have shown conflicting results for the effects of dry ageing of beef on sensory attributes [2-4]. Furthermore, Australian beef products destined to be dry aged in Japan are shipped in 'wet ageing' conditions for 3 weeks and then subjected to dry ageing in Japan. Little is known about the effect of dry ageing of a previously wet aged beef primals. This study aims to examine the effect of dry ageing and dry ageing of pre-wet aged (wet-then-dry) Australian beef loins in comparison with wet ageing.

II. MATERIALS AND METHODS

Beef carcasses (n=24) were selected to have pH \leq 5.7 at 24h post mortem. Bone-in loins (*longissimus thoracic et lumborum*) were removed from both sides and allocated to treatments allowing for randomisation of position within the cuts and sides. Boned-out primals were wet aged at 2-4°C for 56 days. Bone-in primals were dry aged for 56 days in a custom-built dry age chiller at Top Cut Foods (Gold Coast, QLD). For the wet-then-dry treatment, bone-in primals (n=24) were wet aged for 21 days, then, removed from packaging, dried with paper towels and dry aged for a further 35 days. After ageing, all primals were boned and/or trimmed by commercial boners and cut into 25 mm-thick steaks, then blast frozen and stored at -20°C. Duplicates of the wet aged, dry aged and all wet-then-dry aged samples were dispatched to Japan. Consumer testing in Australia and Japan was conducted using the MSA sensory testing protocol [5]. Results were analysed by the method of restricted maximum likelihood (REML) using GENSTAT (18th Edition, VSN International Ltd, UK). Ageing method, and days aged (nested within ageing method) were fitted as fixed effects while taster group, taster source, carcass, side, cut and cut position (all nested within) were fitted as random effects.

III. RESULTS AND DISCUSSION

When comparing wet vs dry aged samples, consumers in both Australia and Japan rated all MSA eating qualities (tenderness, juiciness, flavour, overall liking, satisfaction and the calculated MQ4 score) of the dry aged products significantly higher than those from wet ageing, consistent with observations from previous studies [2, 3]. These results demonstrate superior eating quality of dry age beef loins and the potential to attract premium value. It is noted dry aged *spinalis thoracis* and *biceps femoris* from US Choice and US Select beef attracted a lower overall liking score than their wet aged counterparts [4], suggesting only high value muscles are suitable for dry ageing and further investigation using different muscles of Australian beef is needed. To investigate opportunities for dry ageing of Australian beef in Japan, the wet-then-dry treatment was tested with the Japanese consumers. The wet-then-dry samples received higher scores for flavour, overall liking and MQ4 compared to the wet aged products. Also, when comparing the wet-then-dry with the dry aged samples, there was little difference in tenderness, juiciness, and MQ4, even with reduced time in the dry aged chiller (35 vs 56 days). These results together indicate that the wet-then-dry ageing treatment provides an opportunity to create premium products with Australian beef in Japan without drastically affecting eating quality. To our knowledge, this study is the first to investigate dry ageing of pre-wet aged beef loins under the experimental conditions.

Table 1. MSA consumer sensory results

	Dry aged	Wet aged	Wet-then-dry	SED ¹ SED ²	P-Values	
					Ageing method ¹ Ageing method ²	Ageing method × ageing time ¹ Ageing method × country ²
Tenderness						
Australia	79.88	70.52		2.349 ¹	< 0.001 ¹	0.172 ¹
Japan	70.33	63.53	65.37	2.151 ²	< 0.001 ²	< 0.001 ²
Juiciness						
Australia	75.14	64.26		2.172 ¹	< 0.001 ¹	0.002 ¹
Japan	58.00	49.26	54.28	2.615 ²	< 0.001 ²	< 0.001 ²
Flavour						
Australia	72.18	64.18		2.250 ¹	< 0.001 ¹	0.097 ¹
Japan	60.32	46.84	54.63	2.395 ²	< 0.001 ²	< 0.001 ²
Overall like						
Australia	74.74	66.87		2.066 ¹	< 0.001 ¹	0.490 ¹
Japan	64.87	51.72	57.29	2.399 ²	< 0.001 ²	< 0.001 ²
MQ4						
Australia	74.90	66.40		2.078 ¹	< 0.001 ¹	0.337 ¹
Japan	64.16	53.72	58.25	1.907 ²	< 0.001 ²	< 0.001 ²
Satisfaction						
Australia	3.882	3.572		0.113 ¹	0.002 ¹	0.922 ¹
Japan	2.503	2.201	2.305	0.101 ²	< 0.001 ²	< 0.001 ²

¹For comparison of all product eaten in Australia and between days aged and ageing method.

²For comparison of 56 days aged product between countries and ageing methods
SED = standard errors of difference between the means

IV. CONCLUSION

Dry ageing of Australian beef loins generated products with superior eating quality compared to wet aged meat. Dry ageing of pre-wet aged loins produced meat with comparable eating quality to dry ageing and superior compared to wet ageing. Results in this project demonstrate opportunity to create premium products from Australian beef loins for both domestic and international markets. The differences in eating quality of beef loins from the three treatments and in consumers of the two countries warrant further study to understand flavour chemistry differences in the meat products and thus opportunities for new product development.

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