

P-01-13

Eating quality differences between new season and old season lambs are minimal (#290)

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Introduction

Consumer beliefs and retail marketing of “young spring lamb” has shaped an industry wide perception that new season (NS) lamb (approx. 6-8 months old) has better eating quality than old season (OS) lamb (approx. 10-12 months old). This perception is also based on the knowledge that increased animal age decreases eating quality, mostly as a result of increased collagen crosslinks [1]. Despite this, there is little evidence to support an age-related difference between NS and OS lambs. Pannier showed little to no difference in consumer eating quality scores between lambs and yearlings in the loin, a high quality cut [2]. In contrast, yearlings had lower scores than lambs in the topside, a low quality cut. Therefore, we hypothesised that consumer eating quality scores between NS and OS lamb would not differ for high quality cuts, although OS lamb will receive lower scores than NS lambs in low quality cuts.

Methods

NS (n=88) and OS (n=88) lambs were sourced from 4 farms. At each farm, the two age classes were grouped together under extensive pasture grazing conditions for 4 weeks prior to slaughter, ensuring the same pre-slaughter nutrition and management. Animals were sent to slaughter on the same day and abattoir, with each carcass electrically stimulated for 30 mins post-stunning. Eight cuts (topside, rump, outside, knuckle, loin, leg, shoulder and rack) were collected and tested from each carcass using a grill or roast cooking method (Table 1). After 5 days ageing all cuts were frozen and later thawed before evaluation by untrained consumers. In total 1,341 cuts were eaten by 2,235 consumers following Meat Standards Australia sensory protocols. Each cut received 10 individual consumer scores. Each consumer scored 6 meat samples for tenderness, juiciness, liking of flavour and overall liking on a scale of 0 to 100. Consumer scores were analysed using linear mixed effects models (SAS) with age class, cut and farm within killgroup included as fixed effects, with relevant interactions. Animal identification and consumer within session were used as random terms.

Results

NS lambs (hot carcass weight 23.9kg, GR fat depth 15.4mm, intramuscular fat 4.3%) were lighter and leaner than OS lambs (hot carcass weight 25.6kg, GR fat depth 17.0mm, intramuscular fat 4.8%). There was no difference in sensory scores between NS and OS lambs in the loin, rack, leg and shoulder cuts for any of the sensory traits (Table 1). There was also no difference in the outside for tenderness, juiciness and overall liking, and no difference in the

topside for tenderness, liking of flavour and overall liking. In contrast, NS lambs received higher sensory scores ($P < 0.05$) in the knuckle for all traits, and in the rump for juiciness, liking of flavour and overall liking. For all sensory traits NS lambs were given an average of 2.9 scores higher in the knuckle and 3.1 scores higher in the rump compared to OS lambs. Across all lambs, sensory scores were highest for the rump, knuckle, rack and loin cuts, with overall liking scores of 67.8, 67.8, 67.5 and 64.8. The shoulder, outside, leg and topside cuts received lower overall liking scores of 62, 59, 55 and 51.

Conclusion

Consumers could not differentiate between NS and OS lamb for most cuts, potentially due to the small age differences. This agrees with results from Pethick [3] who also found no difference in eating quality when comparing 8.5 and 20 month old lambs. The results support our hypotheses that NS lamb would score no different to OS lambs for high quality cuts. The exception to this was the knuckle and rump, which were classified as high quality cuts based on sensory scores. In this case consumers generally preferred NS lamb. Differences in consumer scores between NS and OS lambs in the knuckle and rump could be attributed to decreases in collagen solubility. Collagen solubility decreases with increased age and results in tougher meat [1]. When comparing lambs of 6 and 9 months old collagen solubility decreased in the knuckle by 2.5%, which was 5 times higher than other cuts [4]. It seems that with increased age collagen solubility decreases more rapidly in these particular cuts, causing tougher meat and potentially lower sensory scores. This study has highlighted the potential to develop high quality OS or “autumn lamb” products, and therefore should receive the same premium price as NS lambs at retail.

1. Young, O. and Braggins, T., *Tenderness of ovine semimembranosus: is collagen concentration or solubility the critical factor?* Meat science, 1993. **35**(2): p. 213-222.
2. Pannier, L., G. Gardner, and D. Pethick, *Effect of Merino sheep age on consumer sensory scores, carcass and instrumental meat quality measurements*. Animal Production Science, 2018.
3. Pethick, D., *Effects of animal age on the eating quality of sheep meat*. Australian Journal of Experimental Agriculture, 2005. **45**(5): p. 491-498.
4. Cross, H., Smith, G., and Carpenter, Z., *Palatability of individual muscles from ovine leg steaks as related to chemical and histological traits*. Journal of Food Science, 1972. **37**(2): p. 282-285.

Notes

Cook	Cut	Tenderness		Juiciness		Liking of Flavour		Overall Liking	
		NS	OS	NS	OS	NS	OS	NS	OS
Grill	Knuckle	69.5 ± 1.0 ^a	66.1 ± 1.0 ^b	67.0 ± 0.9 ^a	64.5 ± 0.9 ^b	68.1 ± 0.9 ^a	65.5 ± 0.9 ^b	69.2 ± 0.9 ^a	66.4 ± 0.9 ^b
	Rump	69.4 ± 1.0	66.9 ± 1.0	69.0 ± 0.9 ^a	64.1 ± 0.9 ^b	68.0 ± 0.9 ^a	65.6 ± 0.9 ^b	69.2 ± 0.9 ^a	66.5 ± 0.9 ^b
	Loin	64.1 ± 1.0	65.8 ± 1.0	61.0 ± 0.9	61.2 ± 0.9	64.5 ± 0.9	64.5 ± 0.9	64.8 ± 0.9	64.9 ± 0.9
	Outside	55.7 ± 1.0	54.4 ± 1.0	61.0 ± 0.9	59.3 ± 0.9	61.1 ± 0.9 ^a	58.7 ± 0.9 ^b	60.3 ± 0.9	58.1 ± 0.9
	Topside	46.3 ± 1.0	45.2 ± 1.0	52.7 ± 0.9 ^a	50.0 ± 0.9 ^b	53.6 ± 0.9	53.5 ± 0.9	51.5 ± 0.9	51.2 ± 0.9
Roast									
	Shoulder	63.8 ± 1.0	64.4 ± 1.0	60.2 ± 0.9	61.9 ± 0.9	61.0 ± 0.9	61.4 ± 0.9	61.7 ± 0.9	62.4 ± 0.9
	Leg	53.9 ± 1.0	54.9 ± 1.0	50.0 ± 0.9	50.2 ± 0.9	56.6 ± 0.9	56.7 ± 0.9	56.0 ± 0.9	55.6 ± 0.9
	Rack	69.4 ± 1.0	70.5 ± 1.0	63.5 ± 0.9	65.5 ± 0.9	65.9 ± 0.9	67.4 ± 0.9	67.0 ± 0.9	68.1 ± 0.9

Least Square Means (+se) of NS and OS lamb eating quality scores within individual cuts Values within each cut (row) for individual traits followed by a different letter are significantly different at $P > 0.05$

Notes