

Investigation of the variation in lamb meat quality on three winter finishing systems

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Introduction Consumer purchasing decisions are, to a large part, governed by the level and consistency of meat quality and there is a need to identify systems of production that deliver consistent lamb eating quality through the winter months that will restore retailer confidence in British lamb outside the main grazing season.. The Vipond *et al.* (2005) report on lamb eating quality highlighted the deterioration in lamb flavour post-Christmas and recommended that dietary effects be investigated with a specifically designed experiment.

Materials and methods 180 Texel cross Mule lambs from one Shropshire farm were allocated to a three feed treatment x two finishing period study to investigate variation in meat quality by diet and date of slaughter. Lambs were finished in groups of 30 after a 6 to 7-week finishing period in either November (N) 2007 or March (M) 2008. The feed treatments were grass or grass silage (with compound supplementation where necessary) (G), stubble turnips (T) or *ad-libitum* compound feed (C). Lambs were weighed fortnightly until sale aiming to finish at 18 to 21 kg carcass weight and fat class 2/3L. Loins of 16 wether lambs from each treatment were compared with lambs from two control groups: grass-only fed British lamb (from the same Shropshire farm) (UK) slaughtered in November and New Zealand (NZ) lamb delivered, vacuum-packed and chilled, in May. Fresh samples were assessed for pH and colour (using standard CEILAB methodology) with the remainder being vacuum packed and frozen until required. Sensory analysis was carried out by trained assessors who ranked samples on 8-point category scales for tenderness, juiciness, lamb and abnormal flavour intensity, flavour liking and overall liking. Animal performance data were analysed using ANOVA with diet and finishing date as factors; carcass fatness and conformation data were analysed using the chi-squared test. Meat quality and taste panel results were analysed using ANOVA using type as a factor.

Results C lambs grew significantly faster, resulting in both heavier lambs at sale (44.8 kg cv. 41.7 and 41.1 kg for C, T and G lambs respectively, $p < 0.001$) and a reduced average days to sale (50.5, 56.2 and 57.0, $p = 0.004$) for C, T and G lambs respectively). Dressing proportion was highest for T and lowest for G lambs (0.457 cv 0.416, $p < 0.001$). Slaughter date did not affect carcass conformation or fatness significantly but G lambs were leaner with poorer conformation. Overall growth rates, dressing proportion and days to sale were unaffected by slaughter date. Mean loin muscle pH varied between 5.5 (G in March) to 6.1 (NZ), an atypically high value usually caused by glycogen depletion pre-slaughter (Table 1). The meat from the two control groups was significantly darker than the other groups and the NZ lamb had a significantly lower hue value (redder) than all other groups and a significantly lower chroma (duller) than UK. NZ lamb was the most tender. For G and C lambs, there was deterioration in some quality attributes between November and March, most notably in abnormal flavour (which increased) and flavour liking and overall liking (which decreased). Compared with the UK controls, both groups of G and C lambs had weaker lamb flavour and, apart from the November-slaughtered G lambs, a significantly more pronounced abnormal flavour. The UK controls were preferred overall to any of these groups. On the other hand, both T groups had quality ratings on a par with the UK controls and, moreover, there were no significant effects of season of slaughter on this diet. In terms of overall liking, the most preferred were the two T groups and the UK controls; the least preferred groups were G and C slaughtered in March. The flavour changes were more important in determining overall liking than the changes in tenderness and juiciness between the two slaughter times, some of which favoured the March-slaughtered groups. But it is noteworthy that all lamb groups produced meat that was tender.

Table 1 Ultimate pH and some of the sensory ratings for the different treatments.

Variable	GN	GM	CN	CM	TN	TM	NZ control	UK control	LSD	P
Ultimate pH	5.77 ^b	5.51 ^c	5.75 ^b	5.59 ^{de}	5.71 ^{bc}	5.62 ^{cd}	6.13 ^a	5.63 ^{cd}	0.07	<0.001
Tenderness	5.22 ^b	4.94 ^c	4.48 ^d	5.26 ^b	5.40 ^b	5.17 ^{bc}	6.18 ^a	5.33 ^b	0.25	<0.0001
Lamb flavour	4.10 ^c	3.92 ^c	4.05 ^c	4.08 ^c	4.21 ^{bc}	4.49 ^{ab}	4.54 ^a	4.48 ^{ab}	0.31	<0.0001
Abnormal flavour	2.66 ^c	3.47 ^a	2.99 ^b	3.47 ^a	2.47 ^c	2.51 ^c	3.15 ^{ab}	2.37 ^c	0.33	<0.0001
Flavour liking	4.59 ^b	3.94 ^c	4.36 ^b	3.82 ^c	4.98 ^a	5.00 ^a	4.30 ^b	5.25 ^a	0.30	<0.0001
Overall liking	4.54 ^b	3.90 ^d	4.13 ^{cd}	3.85 ^d	4.90 ^a	4.85 ^a	4.27 ^{bc}	5.06 ^a	0.29	<0.0001

^{a,b,c,d} means within a row having different letters differ significantly ($p < 0.05$) Sensory scores are on 8-point category scales (1=extremely tough/extremely disliked to 8=extremely tender/extremely liked)

Conclusions Stubble turnips provided a consistent diet that delivered a high level and consistency in lamb eating quality through the winter months. Later slaughter tended to reduce the assessors overall liking for grass silage and concentrate fed lambs. UK lamb compared favourably with this sample of NZ lamb but the latter had atypically high pH.

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References Vipond, J., Richardson, R.I., Hunter A., Nute G.R., Edwards, S.A. and Simm, G. (2005) Proceedings of the British Society of Animal Science, 57