

Effect of clover in the diet of grazing lambs on the organoleptic qualities of roasted leg joints and grilled chops

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Introduction

Sustainable clover-rich swards, capable of producing similar lamb output to grass-only swards given 160 kg fertilizer nitrogen have been developed on an upland site at the Bush Estate by the Scottish Agricultural College Edinburgh (Vipond and Swift, 1992). There is little information from the United Kingdom to indicate whether the clover content, at around 20% of sward dry matter, would affect the eating quality of lambs produced from these pastures.

Work in New Zealand has shown that in many cases trained sensory panellists have detected more intense/strong, lamb-meaty flavour in lambs grazed on pure swards of legumes compared with grass-only swards (Cramer, Barton, Shorland and Czochanska, 1967; Shorland, Czochanska, Moy, Barton and Rae, 1970; Czochanska, Shorland, Barton and Rae, 1970; Purchas, Johnson, Birch, Winger, Hagyard and Keogh, 1986). Grazing on legumes has

also been accompanied by increased detection of off-flavours (Park, Corbett and Furnival, 1972; Purchas *et al.* 1986) however Nixon (1981) detected more 'off flavours' on ryegrass pasture. Acceptability of a stronger lamb taste may be influenced by previous exposure to the meat as indicated by national consumption figures (Wood and Fisher, 1990). Untrained consumers have generally not been found able to discriminate between grass and clover-fed lambs (Nicol and Jagusch, 1971; Purchas *et al.*, 1986).

Material and methods

Lambs were grazed from turn-out to weaning and for 8 to 9 weeks post weaning on pastures of nitrogen-fertilized tetraploid perennial ryegrass (T) or unfertilized tetraploid perennial ryegrass plus S184 white clover (TC). Clover content of TC averaged 17.6% of sward herbage dry matter. Twenty-four lambs were slaughtered at fat class 3L

Table 1 Sensory panel evaluation of gigot and chop samples on a eight point scale: 1 low, 8 high

	Lean texture		Lean flavour		Fat flavour		Fat odour		Acceptability
	Juiciness	Tenderness	Lamb flavour	Abnormal flavour	Lamb flavour	Abnormal flavour	Lamb odour	Abnormal odour	
Joint									
Leg	4.9	4.8	4.7	1.7	4.6	2.1	3.6	2.5	4.8
Chop	5.7***	5.8***	5.0***	1.7	4.7	1.8*	4.1***	2.5	5.3**
s.e.d.	0.12	0.14	0.09	0.08	0.14	0.13	0.10	0.14	0.15
Treatment†									
T	5.2	5.2	4.8	1.8	4.6	1.9	3.8	2.6	5.0
TC	5.5	5.6	5.0	1.7	4.6	1.9	3.9	2.6	5.2
s.e.d.	0.16	0.24	0.13	0.15	0.19	0.15	0.14	0.15	0.21
Source									
Off milk/pasture	5.3	5.2	4.8	1.8	4.6	1.9	3.8	2.6	5.3
Off pasture	5.3	4.9***	4.8	1.7	4.6	1.9	3.9	2.5	4.8*
s.e.d.	0.28	0.20	0.10	0.12	0.15	0.13	0.11	0.12	0.18

† T = tetraploid perennial ryegrass diet, TC = tetraploid perennial ryegrass/clover diet.

at weaning (off mother) and a further 24, 8 to 9 weeks later (off pasture). Thick end of gigot and single loin chops were respectively roasted or grilled and samples assessed for texture of the lean, and for normal and abnormal flavour of the lean and fat by an experienced sensory panel. Flavour profile studies were also undertaken by 10 experienced panellists who rated lean and fat flavour and fat odour using their own vocabulary, established prior to tasting. The lean was assessed for the following flavours: lamb, muttoniness, sweet, fatty, sour, bitter, pungent, irony, musty and aftertaste. The fat was assessed for the following flavours and odours: lamb, musty, sickly, sour and sweet (flavours) and lamb, fatty, musty, sweet and rancid/sour (odours).

Results and discussion

There were no significant effects of pasture type on lean texture and flavour or fat odour and flavour using an eight-point scale (1 low, 8 high) but there was a tendency for lambs from clover pastures to be slightly juicier and more tender and have a slightly higher score for lamb flavour of the lean (see Table 1). Differences however were less than 0.5 of a point. Large differences between gigot and chops were detected but could be expected owing to the different cooking techniques used in preparation of these samples (roasting *v.* grilling). Chops appeared significantly more juicy (5.7 *v.* 4.9; s.e.d. 0.12; $P < 0.001$) and more tender (5.8 *v.* 4.8; s.e.d. 0.14; $P < 0.001$). Chops had a stronger lamb flavour of lean (5.0 *v.* 4.7; s.e.d. 0.09; $P < 0.001$) and the odour of the fat had a greater intensity of lamb odour (4.1 *v.* 3.6; s.e.d. 0.1; $P < 0.001$). These factors may have been associated with a significantly higher acceptability (5.3 *v.* 4.8; s.e.d. 0.15; $P < 0.01$) for chops. Lambs slaughtered at weaning off a diet of pasture and milk were significantly more tender than lambs slaughtered 8 to 9 weeks later off a diet of pasture only, tenderness ratings being 5.2 *v.* 4.9 (s.e.d. 0.19; $P < 0.001$). Acceptability was significantly higher for lambs slaughtered off the mother (5.3 *v.* 4.8; s.e.d. 0.18; $P < 0.05$).

Results for flavour profiles of lean samples indicated there were no significant effects of pasture or source of lambs, although there was a trend for lambs fed clover to be of stronger lamb but weaker mutton flavour and a similar trend for lambs weaned off the dam compared with lambs weaned later.

There were no significant pasture treatment effects on fat flavour or fat odour. However lambs slaughtered off the dam had a less sickly flavour than those slaughtered later off pasture with ratings of 2.2 *v.* 2.5 (s.e.d. 0.13; $P < 0.05$) and had a weaker lamb odour in the fat 3.4 *v.* 3.6 (s.e.d. 0.13; $P < 0.05$)

and a weaker fatty odour at 2.3 *v.* 2.6 (s.e.d. 0.1; $P < 0.05$).

Conclusions

Results indicate a tendency for effects due to clover in the diet to be associated with a slightly stronger lamb flavour. Slaughtering lambs off the dam rather than 8 weeks later was associated with significantly more tender and acceptable lamb with an improved flavour. Overall differences in lamb eating quality owing to pasture treatments were small and it is unlikely that consumers would be able to detect them, thus a change in production methods of lamb to using clover-based pastures is not constrained by adverse effects on eating quality.

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