The Effects of Terminal Sire Breed on Carcass Quality and Sensory Traits of Lamb

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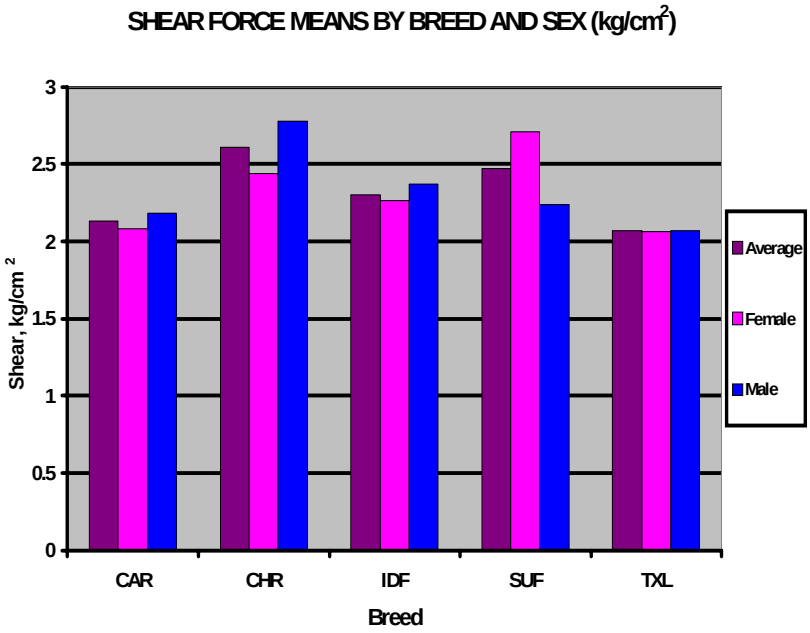
Results

Progeny of the Texel (TXL) and Canadian Arcott (CAR) had the lowest shear values ($P < 0.05$) and the highest trained sensory panel ratings for initial and overall tenderness although the panel ratings were not significantly different ($P > 0.05$) from the other breeds (Table 2).

The progeny of the Charollais (CHR) and Suffolk (SUF) rams had the highest shear values ($P < 0.05$) and the lowest numerical sensory panel ratings for initial and overall tenderness ratings. All of the loin samples had shear force values less than 5 kg (Graph 2), which is regarded as tender by consumers (Shorthose et al. 1986).

The taste panel evaluated six lambs out of the 142 (4.23%) as Slightly Tough in Overall Tenderness (Graph 3). All six of these lambs had shear values of less than 3.75 kg.

Graph 2.



The relationship between shear values and the taste panellist scores for both initial and overall tenderness was moderate ($r = -0.63$; $P = 0.0001$).

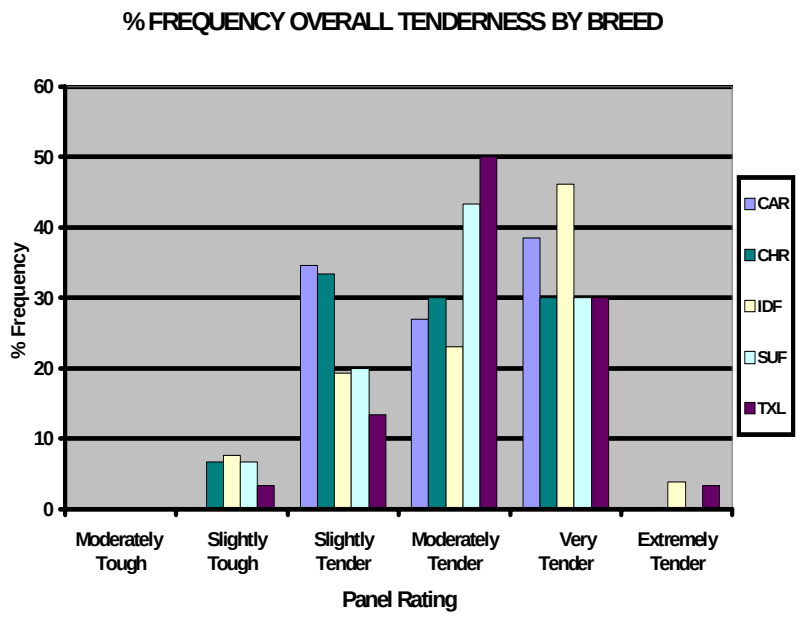
The overall cooking time for the Texel progeny were marginally longer ($P < 0.05$) than the progeny of the other sires (Graph 4), which was not

Table 2. Least-square means for loin composition traits

	Sire Breed					Sex	
	CAR	CHR	IDF	SUF	TXL	Female	Male
No. of Lambs	26	30	26	30	30	78	64
Fat	0.45 abc	0.51 a	0.40 bc	0.38 c	0.47 ab	0.45	0.44
Depth	2.45	2.43	2.57	2.34	2.39	2.45	2.48
Width	6.36	6.55	6.55	6.38	6.48	6.42	6.52
Length	21.00 a	21.14 a	20.78 a	21.45 a	19.70 b	20.62	21.01
Color	3.71	3.67	3.67	3.63	3.60	3.77 a	3.54 b
Marbling	3.84	3.83	4.40	3.91	3.99	3.96	4.09
Cook Loss	16.46	17.88	17.42	17.79	18.27	17.12	18.00
Seconds per gram	4.87 b	4.88 b	4.80 b	4.86 b	5.36 a	4.96	4.95
Shear Force (cm^2)	2.09 b	2.62 a	2.33 ab	2.47 a	2.08 b	2.30	2.34

a,b,c Means in the same row, within trait, with different letters differ ($P < 0.05$).

Graph 3



attributable to gross differences in shape dimensions. This slight increase in cooking time may be related to muscle fibre type or moisture content, analysis which were not measured in the present study.

The length of the short loins of the Texel progeny were slightly shorter ($P < 0.05$) than that of the other lamb breeds. Measurements for loin thickness and depth were related to hot carcass weight and not to breed or gender effects (Table 2).

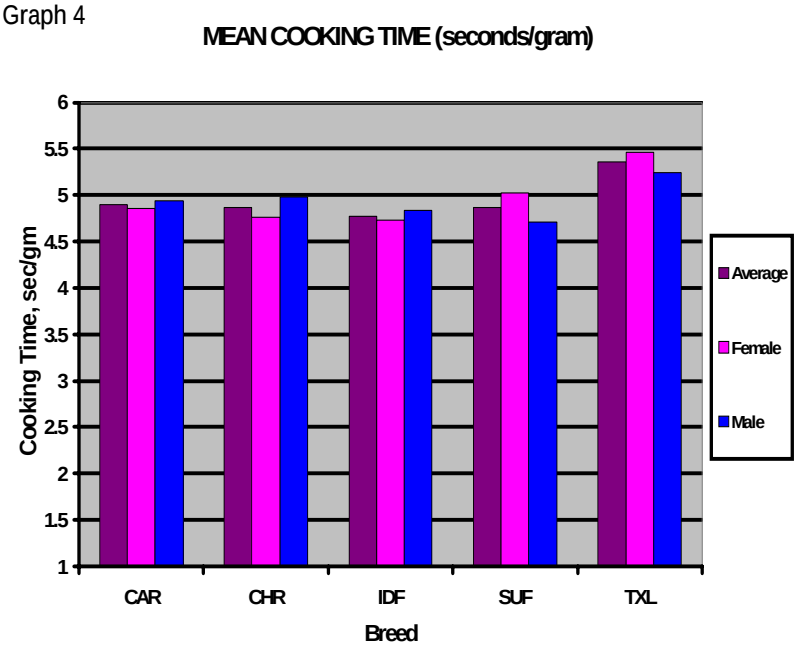
The fat thickness measurement on the loins from the Suffolk lambs were significantly less ($P < 0.05$) than the other sired lambs and the Charollais lambs the greatest, although on several of the loins fat the surface was cut or partially removed making the accuracy of this measurement questionable (Table 2). The GR measurement and the fat thickness measurement had a positive correlation ($r = 0.22$; $P = 0.007$).

There were no significant differences between breeds or genders for lamb flavour intensity, off flavour, juiciness or overall palatability ratings (Table 3).

This is in agreement with other authors (Crouse et al. 1983; Dransfield et al. 1979; Ellis et al. 1997) that differences in lamb flavour or eating quality due to breed of sire were not observed.

Also differences in flavour intensity due to gender were not observed ($P > 0.05$) which supports reports by Jeremiah et al. 1998; and Ellis et al. 1997. Although numerically small, the only significant difference ($P = 0.04$) by gender was on the subjective colour attribute of the loin muscle prior to roasting, with means of 3.77 for the ewe lambs and 3.54 for the wether (Table 2). This small difference would likely not be noticeable to consumers as it is less than one full unit in difference. A slightly higher (P

Graph 4



= 0.18) proportion of the loins from the ewe lambs were rated as Slightly Dark Red compared to the wether lambs (62 vs 53% respectively; Graph 5).

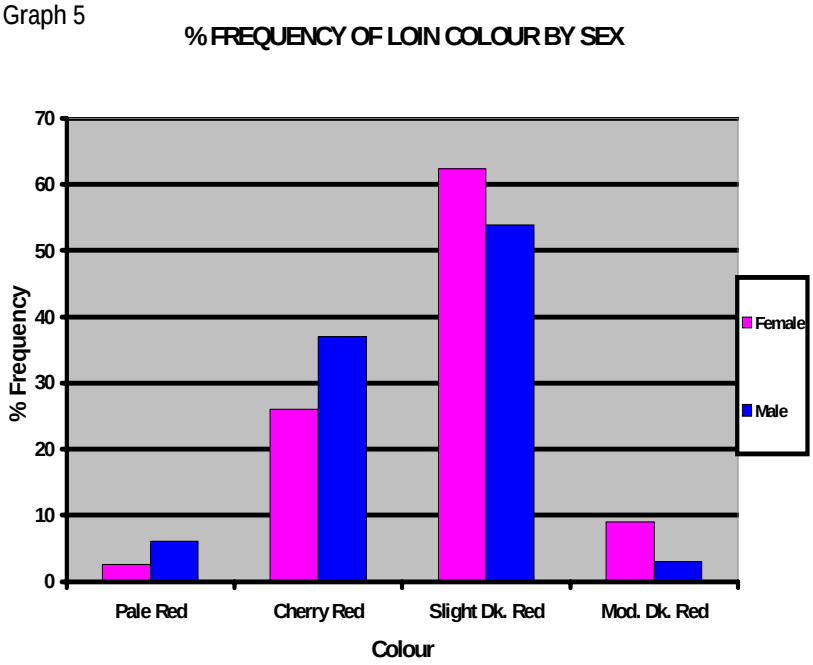
Results

Based on the results of this study there are no differences in eating quality by gender or amongst progeny from these five terminal sires within the hot carcass weight range of 22–27 kg (50–60 lb).

Certain terminal sire breeds may be suited to different production systems for such traits as rate of gain, carcass weight, and level of fat cover without detriment to sensory traits.

However, the trend towards even larger leaner carcasses continues, more research will be required to determine its effect on lamb eating quality.

Graph 5



References

Agriculture, Food and Rural Development web site. April 28, 2005. Marketing lambs to Sunterra Meats. Agric.gov.ab.ca.

American Lamb Council, Lamb Committee, National Livestock & Meat Board. A guide to lamb color.

AMSA. 1995. Research guidelines for cookery, sensory evaluation and Instrumental Tenderness Measurements of Fresh Meat. American Meat Science Association, Chicago, IL.

Cameron, N.D. and Drury, D.J. 1985. Comparison of terminal sire breeds for growth and carcass traits in crossbred lambs. Animal Production. 40: 315-322.

Crouse, J.D., Ferrell C.L. and Cross, H.R. 1983.The effects of dietary ingredient, sex and slaughter weight on cooked meat flavor profile of market lamb. Journal of Animal Science, 57: 1146-1153.

Dransfield, E., Nute, G.R., MacDougall, D.B., and Rhodes, D.N. 1979. Effect of sire breed on eating quality of cross-bred lambs. Journal of Science Food Agriculture, 30: 805-808.

Ellis, M., Webster, G.M., Merrell, B.G., and Brown, I. 1997. The influence of terminal sire breed on carcass composition and eating quality. Animal Science, 64: 77-86.

Jeremiah, L.E., Tong, A.K.W., and Gibson, L.L. 1998. The influence of lamb age, slaughter weight and gender on cooking properties and palatability. Sheep & Goat Research Journal, 14: 206-213.

Maddock, T.D., McKenna, D.R., and Savell, J.W. 2004. Consumer evaluations of lamb in-home consumer evaluations of four lamb retail cuts. Journal of Muscle Foods, 15: 286-288.

Safari, E., Fogarty, N.M., Ferrier, G. R., Hopkins, L.D., and Gilmour, A. 2001. Diverse lamb genotypes. 3. Eating quality and the relationship between its objective measurement and sensory assessment. Meat Science, 57: 153-159.

SAS Institute Inc. 2001. SAS User's Guide: Statistics. SAS for Windows, Version 8.2. SAS Institute, Inc., Cary, NC.

Shackelford, S.D., Leymaster, K.A., Wheeler, T.L., and Koohmaraie, M. 2004. Lamb meat quality progress report number 2. Preliminary results of an evaluation of effects of breed of sire on carcass composition and sensory traits of lamb. Meat Animal Research Center, Clay Center, Nebraska. 1-9.

Shorthose, W.R., Powell, V.H., & Harris, P.V. 1986. Influence of electric stimulation, cooling rates and aging on shear force values of chilled lamb. Journal of Food Science, 51: 889-892.