BRIEF COMMUNICATION: Grand-dam age has no effect on ram lamb live weight and carcass characteristics

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Introduction

Breeding ewe lambs at 7 to 9 months of age can increase their lifetime productivity and profitability (Young et al. 2010; Kenyon et al. 2011, 2014). Further, in theory, increased genetic gain can be made from selecting progeny born to ewe lambs as replacement ewes. However, little is actually known about the long-term phenotypic impacts of such a management option. Loureiro et al. (2012) examined the reproductive and lactational performance of 18-month-old ewes born to either ewe lambs or mature ewes and reported little difference. They did, however, report that in one of two years, lambs born to dams who themselves were born from ewe lambs (i.e., the grand-offspring) were slightly heavier at weaning than grand-offspring from mature ewes. If this apparent effect was found to be consistent after weaning, and also to affect carcass characteristics, it might indicate a potential advantage of selecting replacement ewes born to ewe lambs. To date, these relationships have not been examined. Therefore, the present study examined the live weight and carcass characteristics of two cohorts of male lambs born to ewes that themselves were born to either mature ewes or ewe lambs.

Materials and methods

The present study is part of a larger research programme examining the long-term effects of breeding ewe lambs (Kenyon et al. 2011; Loureiro et al. 2012). This specific study aimed to answer the question: if farmers were to keep ewe lambs (G1) themselves born to ewe lambs (G0) as replacement ewes, would there be consequences in terms of growth and carcass composition in their ram lambs (i.e. the grand-offspring of ewe lambs, G2).

This study utilised G2 male lambs born over two successive years (2011 and 2012) from either single- or twin-born-and-reared Romney G1 ewes which, in turn, were born to either G0 ewes that were either mature ewes (MEwe) or 8-9-month-old ewe lambs (EweL). A total of 65 and 77 G2 rams lambs were born and survived through to slaughter in 2011 and 2012, respectively, and were included in the current analysis.

Lambs were tagged within 12 hours of birth and identified to their dam and their birth rank determined. The lambs were left entire at tailing (docking) at an average age of 33 and 27 days in 2011 and 2012. Lambs were weaned at an average age of 109 and 107 days in 2011 and 2012 respectively and managed post-weaning under commercial conditions in one group until slaughtered at a commercial abattoir at average ages of 207 and 194 respectively. At slaughter, carcass weights and GR depth (soft tissue depth at the 12^{th} rib) were collected and a dressing-out percentage (DO%) calculated. All data were analysed using General Linear Model (SAS, 2011) with fixed effects of year, rearing rank (single born and reared (11), twin born but singleton reared (21), twin born and reared (22)), dam (G1) birth rank (singleton vs. twin) and grand-dam (G0) age (MEwe vs. EweL) and the interaction between dam birth rank and grand-dam age. The interaction was not found ($P>0.05$) to be significant in any model and was removed from the model.

Results and discussion

Birth rank is negatively correlated with lamb live weight from birth to weaning and this relationship often holds throughout the lamb's first year of life (Afolayan et al., 2007; Hopkins et al., 2007; Safari et al., 2007; Kenyon and Blair 2014). In the support of this, in the present study, singletons were heavier ($P<0.05$) at birth than twin-born lambs, and those reared as singletons to weaning were also heavier ($P<0.05$) through to slaughter at approximately six months of age than those reared as a twin (Table 1).

Lambs reared as twins had lighter ($P<0.05$) carcass weights than those born and reared as a singleton (Table 2). This is likely explained by a lighter live weight at slaughter, as DO% did not differ ($P>0.05$). This is consistent with the findings of Bray et al. (1990) who reported lower carcass weights in twins compared to singletons, driven primarily by lighter live weights to six months of age as there were no differences in DO%. In the present study GR depth was not affected ($P>0.05$) by lambing rearing rank. McCoard et al. (2010) reported that male twin lambs adjusted to the same carcass weight did not differ in carcass fatness compared to singletons. Combined, these studies indicate with the current increase in fecundity occurring in the national flock little impact in carcass adiposity is likely to occur.

Lambs born to ewe lambs are generally lighter to at least one year of age, than those born to mature ewes (Loureiro et al. 2011; Kenyon et al. 2014). Further, they display lighter carcass weights, primarily

Table 1 Effects of rearing rank (R Rank), grand-dam (G0) age (GD age) and dam (G1) birth rank (Dam BR) on male lamb (G2) live weight (kg) from birth to slaughter. Data presented as least square mean ± standard error of mean.

		Live weight (kg)			
	n	Birth	Docking	Weaning	Pre-slaughter
R Rank					
11	29	6.2±0.1[b]	16.7±0.5[b]	39.4±0.9[b]	55.7±1.2[b]
21	15	4.9±0.2[a]	15.1±0.8[b]	37.3±1.2[b]	53.9±1.7[b]
22	98	4.9±0.1[a]	12.4±0.3[a]	31.4±0.5[a]	49.1±0.7[a]
GD age					
MEwe	78	5.2±0.1[a]	14.9±0.4	36.4±0.7	53.6±1.0
EweL	64	5.5±0.1[b]	14.5±0.4	35.6±0.7	52.2±0.9
Dam BR					
Single	62	5.4±0.1	14.7±0.4	35.8±0.7	53.0±1.0
Twin	80	5.3±0.1	14.8±0.4	36.2±0.7	52.9±0.9

[ab] Different superscripts within main effects and columns indicate means differ significantly (P <0.05).

Table 2 Effects of rearing rank (R Rank), grand-dam (G0) age (GD age) and dam (G1) birth rank (Dam BR) on carcass weight (kg), dressing-out percentage and GR depth (mm) of male lambs (G2). Data presented as least square mean ± standard error of mean.

	n	Carcass weight (kg)	Dressing out (%)	GR depth (mm)
R Rank				
11	29	23.2±0.8[b]	41.9±1.4	9.3±0.6
21	15	22.8±1.1[ab]	42.4±2.0	9.7±0.8
22	98	21.1±0.5[a]	43.0±0.8	9.2±0.3
GD age				
MEwe	78	22.6±0.6	42.3±1.2	9.6±0.5
EweL	64	22.2±0.6	42.6±1.1	9.2±0.4
Dam BR				
Single	62	22.3±0.6	42.3±1.2	9.0±0.5
Twin	80	22.4±0.6	42.6±1.1	9.7±0.4

[ab] Different superscripts within main effects and columns indicate means differ significantly (P <0.05).

driven by lighter live weights, compared to those born to older ewes (Afolayan et al. 2007). In addition, these progeny can display greater levels of adiposity (Afolayan et al. 2007; Kenyon et al. 2009). What has not been examined, especially post-weaning, prior to the present study, is the implications in the next generation (G2) if replacement ewes are selected from those born to ewe lambs. Loureiro et al. (2012) in one of the few studies examining G2 offspring, noted in one of two years, that lambs whose grand-dam was a ewe lamb, were heavier at weaning. In the present study, which focused on male born lambs only, there was no effect of grand-dam (G0) age (P>0.05) on any of the live weight or carcass parameters measured in the G2 lambs. These results suggest that farmers who select progeny born to ewe lambs as replacements ewes (G1), need not be concerned about potential negative consequences for the performance of later generations of male (G2) offspring from a liveweight and carcass perspective. However, further studies with larger numbers of grand-offspring, including female grand-offspring are needed to verify this finding.

Conclusion

In conclusion, these results support previous findings that have indicated twin born and reared lambs display lighter live weights at a given age resulting in lower carcass weights. In addition, the results indicate that if farmers choose to select

replacement ewes born to ewe lambs, their male offspring will display similar liveweight and carcass characteristics to those whose grand-dam was a mature ewe.

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