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GROWTH, CARCASS COMPOSITION AND MEAT QUALITY OF CROSSBRED LAMBS AT DIFFERENT SLAUGHTER WEIGHTS

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INTRODUCTION

There is very little published work on the potential of the crossbred lamb generated from prolific and meat-type sheep. Crossbreds of meat-type sheep with prolific sheep could produce lambs with improved carcass composition and meat quality compared with the prolific breed (Lirette *et al.*, 1984; Aziz *et al.*, 1992a) or better reproductive efficiency than the meat-type breed (Vessely and Swierstra, 1987). On the other hand, crossbreeding between meat-type breeds might produce crossbreds with superiority over purebreds in growth rate and carcass yield (Geenty *et al.*, 1979; Wolf *et al.*, 1980). The relationships between breeds or crossbreds in carcass composition and meat quality may differ when comparisons are made at more than one weight because of variation in growth pattern and maturity (Geenty *et al.*, 1979; Aziz *et al.*, 1992a). Thompson (1982) found that animals selected for heavy weights at weaning have similar body composition when compared at the same weight as animals selected for light weaning weight but at maturity, they were heavier and had a greater percentage of fat. The present study aimed to compare growth, carcass composition and meat quality of crossbred lambs at 25 and 45kg live weight.

MATERIALS AND METHOD

Sixty male lambs were used: 20 lambs of DorsetxSuffolk (DS), 19 lambs of DorsetxRomanov (DR) and 21 lambs of RomanovxSuffolk (RS). The lambs had free choice access to creep feed and forage from two weeks of age. Following weaning at seven weeks of age, lambs were fed in groups ad libitum on barley-based grain mix (18%CP and 3.73MCal/kg DE) and chopped legume haylage (16%CP and 2.71MCal/kg DE) according to crossbred and slaughter weight. Ten animals of each crossbred were slaughtered at 25 and 45kg live weight following a 24 hour fast.

Lambs were weighed, shorn and re-weighed. The animals were slaughtered and dressed according to normal commercial practice (Aziz *et al.*, 1992b). Hot carcass weight (HCW) included kidney as well as kidney and channel fat.

Cold carcass weight (CCW) was taken after 24 hours chilling at 4 to 5°C. Kidney and channel fat were removed and weighed individually. The left side was separated into four wholesale cuts, which were then dissected separately into subcutaneous fat, intermuscular fat, muscle and bone. The shoulder, with neck and shanks, was cut off between the 5th and 6th ribs. The rib roast was separated between the 12th and 13th ribs. The loin was 9.5 vertebrae in length and the leg was the remaining part of the carcass.

The colour measurements (L*, a* and b*) of the fat and loin muscle between the 12th and 13th ribs were made using

a Minolta Chroma Meter (CR-200b). Two chop samples of 40 to 60g were cut from the anterior portion of the loin muscle, weighed, hanged for 48 hours at 4 to 5°C and re-weighed to determine the amount of water loss (drip loss). The remaining portion of the loin was cooked to an internal temperature of 72°C. After chilling the cooked meat for five hours at 4 to 5°C, seven cores were removed and sheared on a Nene Instruments Ltd. (M 3000) equipped with a Warner-Bratzler cell. Peak shear values for the seven cores were averaged.

Analyses of variance was applied to body and carcass traits using General Linear Model (GLM) procedures of the Statistical Analyses System (1985). A factorial design, involving the crossbred (DS, DR, RS) and two slaughter weights (25 and 45kg live weight) were used and the least squares means tested for significance using linear contrast.

RESULTS AND DISCUSSION

Genotype had a highly significant effect on growth rate (Table 1). Because DS lambs grew fast, they were younger by 21 days than DR at 25kg and by 63 and 22 days than DR and RS respectively at 45kg. These results indicated that Suffolk sheep had maintained their growth advantage even when crossed either with Dorset or Romanov (Wolf *et al.*, 1980; Lirette *et al.*, 1984). Wool growth was affected significantly by genotype and slaughter weight and their interaction, indicating that less wool production in DS lambs was concomitant with lighter skin weight (Table 1).

Slaughter weight had a highly significant effect on the proportion of carcass weight to fleece-free body weight (Table 1). The DS produced lambs whose carcass weight and dressing percentage were greater than lambs from DR and RS at 25kg but these traits were similar among crosses at 45kg. The positive relationships between carcass weight and dressing percentage has been reported by Fahmy (1979) who found that dressing percentage increased by 3% as slaughter weight increased from 22.7 to 40.7kg live weight. More recently, Aziz *et al.* (1992b) found that regression coefficient (SE) of carcass weight relating to fleece-free body weight was significantly higher than one (b=1.389±0.082) during normal growth in Merino wethers.

The proportion of the shoulder and leg in the left side was reduced significantly as slaughter weight increased and that of the rib and loin was increased significantly (Table 1). Fahmy (1979) found that as slaughter weight increased, there was a slight decrease in the percentage of the shoulder and leg and an increase in the proportion of the loin-rack cuts of the carcass. However, genotype did not influence the relative proportion of each primal in the carcass except DR lambs had a higher proportion of loin than RS and a lower proportion of leg than DS at 25kg. Our results confirmed those of Lirette *et al.* (1984) who found that there was no difference between breeds in retail cuts expressed as percentage of carcass weights.

The proportion of the lean in the side was decreased by 4.3, 3.3 and 6% and that was accompanied with fat increase of 9.2. 10.1 and 13.7% in DS, DR and Rs respectively as slaughter weight increased (Table 1). These results are similar to those of Aziz et al. (1992b) who found that the regression coefficients (SE) relating the weight of muscle, bone and fat to dissected side weight were 0.731 (0.49), 0.393 (0.67) and 2.484 (0.161) respectively as live weight increased from 23 to 33kg in Merino wethers. Carcasses of RS lambs contained the highest percentage of lean and bone and the lowest percentage of fat at 25kg. The lower proportion of fat in Rs lambs at 25kg was due to the less deposition of subcutaneous fat compared with DS and DR, and intermuscular fat and kidney and channel fat compared with DR lambs. More deposition of fat in the carcass of RS lambs reduced the proportion of lean to higher extent compared with DS and DR to become similar among all genotypes. Slow growing DR lambs (Table 1) were older at 45kg than DS and RS lambs; the proportion of fat was higher by 2.8 and 1.5% and that of bone was lower by 2.9 and 2.0% respectively. These results confirm the concept that genotypes which are heavier at maturity generally grow faster, contain less fat and more protein and water in their whole bodies and carcasses than do animals of smaller mature size (Wood *et al.*, 1980).

There was a significant effect of genotype x slaughter weight interaction for lightness (L*) of the fat colour (Table 2), with increase of L* value of fat in DS lambs as slaughter weight increased whereas that of DR and Rs was not affected. There was an interaction effect for both a* and b* values of the loin muscle colour. The colour of loin muscle in DS

muscle was more red than DR lambs at 25kg, but more red in DR lambs than RS lambs. Drip loss was a function of slaughter weight but not genotype (Table 2) being reduced significantly as DR and RS lambs increased in live weight.

CONCLUSION

The prolific breeds can be used in crossbreeding with meat-type breeds for market lambs, because no major negative influence was found on carcass composition and meat quality. The observed differences in carcass composition and meat quality were related to rate of maturity and carcass weight and have implications for crossbreeding programs to produce meat from more prolific sheep. RS lambs were found to be the best of the crossbreds for marketing at 25kg as they contained more lean and less fat. However, DS lambs were the best crossbred for marketing at 45kg because they grew fast than other crossbreds between 25 and 45kg live weight.

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