

Ongoing Research & Development Projects

PROJECT TITLE: The role of sire referencing schemes in terminal sire sheep to improve the carcass quality of crossbred lambs.

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INTRODUCTION: Sire referencing schemes (SRS) are co-operative breeding programmes through which genetic links are created among member flocks by the mutual use of some rams (reference sires). These links allow for across-flock genetic evaluations creating a much larger pool of candidates for selection and thereby the opportunity for substantially quicker rates of genetic progress. Sire referencing schemes were introduced in terminal sire breeds in the UK in the early 1990s. Their goal has been to improve carcass quality by basing selection decisions on an index to improve lean growth rate. In the three largest schemes (Charollais, Suffolk and Texel), after just a decade of sire referencing, Lean Growth index score has increased by approximately 2% per annum.

Selection programmes in terminal sire breeds ultimately must focus on improving carcass quality in crossbred lambs under commercial finishing regimes. Given the progress achieved in index score within SRS, it is both timely and necessary to test the consequence of that progress on the composition of the carcasses of crossbred lambs, and their retail value.

In 1997 Defra and the Meat and Livestock Commission (MLC), in collaboration with the Institute of Rural Sciences (IRS), SAC and ADAS, agreed to fund a long-term experiment – the Longwool Project – to develop breeding programmes relevant to crossing sire (Longwool) breeds. Its objective was to produce a selection index to improve carcass quality without compromising the reproductive performance or maternal ability of these breeds or their crossbred daughters.

The Longwool Project involved approximately 4,800 matings of Scottish and Welsh Mule ewes to terminal sire rams over four years (1999 through 2002) at research farms in England (ADAS Rosemaund), Scotland (SAC Edinburgh) and Wales (IRS Aberystwyth). This large resource of recorded Mule ewes provided a unique opportunity to conduct an extensive progeny test of high and low Lean Growth index rams chosen from within SRS in the most numerous meat sheep breeds (Charollais, Suffolk and Texel) in the UK. There were two aims of this progeny test: (i) to compare growth rate, carcass weight and carcass quality (as measured by fat and conformation score, carcass dissection and retail cutting) in commercially finished lambs sired by high *versus* low index rams; and, (ii) to evaluate the consequences of selection on this index on the finishing and marketing of crossbred lambs given current industry specifications.

The performance of approximately 6,500 terminal sire cross lambs was assessed in the research. These lambs were progeny of 90 Charollais, Suffolk and Texel rams, half high index and half low index, purchased from the respective SRS in these breeds between 1999 and 2002. The lambs were born in March/April each year with live weights recorded at birth, at 5 weeks, 10 weeks, and 16 weeks (weaning) of age, and once they achieved a target finish condition of 3L. At finish, the lambs were ultrasound scanned for muscle and fat depths and visually assessed for conformation. They were then slaughtered at one of two commercial abattoirs [Hamer International Ltd for lambs from ADAS and IRS, and ABP Ltd (Scotland) for lambs from SAC] where carcass weight, conformation and fat score, and estimated subcutaneous fat percentage were recorded. About 1,000 of the carcasses were transported to the University of Bristol for further carcass evaluation. The right side of each carcass was processed into retail cuts (including leg steaks, cutlets and chops) while the left side of each carcass was dissected into lean, fat and bone.

FINDINGS: By 10 weeks of age, offspring of high index sires were 0.44 kg heavier than offspring of low index sires. High index lambs were 1.1 kg heavier in live weight at target finish (3L), which they achieved at a similar age (169 days) as low index lambs.

High index lambs had thicker muscle depths as measured by ultrasound than low index lambs.

Carcasses from lambs with high, in contrast to low, index sires had more favourable MLC fat scores, with fewer of the high index carcasses being assessed as over-fat (above a 3L).

Assessments on conformation based on the EUROP score suggested carcasses from high index lambs were slightly less well conformed although a more detailed 15-point conformation score assigned in the abattoir suggested otherwise.

Cold carcass weights were 0.56 kg more in lambs from high as compared to low index rams.

On average, high index lambs yielded 0.47 kg more saleable meat which translated into increased weights of leg steaks, cutlets and chops.

In 2004, an extra kg of carcass weight was worth £2.62. Since the offspring of high index rams produced an extra 0.56 kg of carcass weight, this corresponds with an increased sale value of £1.47 each. If a ram is used for 3 years, and mated to 50 ewes each year, it would sire approximately 240 reared lambs over its lifetime. Thus a single high index ram would earn an extra £353 for a commercial sheep farmer. On an industry basis, where approximately 10.1 million terminal sire cross lambs are marketed annually, use of high index rams could generate nearly £15 million in additional income to UK sheep producers. Given the higher value of retail meat, the potential return from the increase in saleable meat yield is nearly twice that amount.

These results clearly indicate that selection on Lean Growth index produces crossbred lambs with heavier carcasses that yield more saleable lean meat that could generate substantially higher market returns. The wider uptake and use of such breeding technologies would allow the UK sheep industry to increase its competitive edge in meeting domestic and European-wide market demands for quality lean lamb.

Yet, for these benefits to be fully realized, the current system for lamb marketing in the UK needs to be re-assessed. Lamb is marketed based on weight and visual assessments of conformation and fatness. Carcasses outside target specifications, including a prescribed weight range, are penalised. This research documented that crossbred lambs sired by high index terminal sire rams can produce carcasses at weights exceeding target without becoming overly fat. A consistent mechanism by which sheep producers and meat processors can benefit from that opportunity is thus needed. This likely involves developing: (i) additional lamb products that generate added-value from the cutting of heavier yet lean carcasses for the wholesale (e.g. catering; restaurant) and retail (e.g. supermarket) trade; and, (ii) crossbreeding systems by which terminal sire and Mule ewe enterprises co-operate to consistently produce heavier lamb weights (e.g. greater than 28 kg carcasses) to service this trade with an assured market premium. Research in product development and the design of co-operative crossbreeding programmes is therefore needed. In addition, a major knowledge transfer programme focused on improving dialogue and commitments among sheep farmers, abattoirs and processors is a requisite for such opportunities to result in mutual benefits throughout the industry.
