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THE INCORPORATION OF THE 'BOOROOLA GENE' INTO THE TEXEL BREED OF SHEEP

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INTRODUCTION

It is now well established that the 'Booroola gene' confers an increased fecundity upon carrier ewes and that this is largely mediated through an increase in ovulation rate (Piper and Bindon, 1982). In this study the gene has been introduced into the Texel breed of sheep. At present work is just establishing the 'gene' in the breed but the objectives are three-fold. Firstly, at a practical level the aim is to marry the excellent carcass characteristics of the breed with an improvement in prolificacy and to examine the value of using carrier rams to breed highly prolific Texel crossbred ewes and also produce wether lambs with good carcass characteristics. Secondly, at a more basic research level, the intention is to gain a further understanding of the mode of action and expression of the 'gene'. Thirdly, and following on from this, in the longer term, it is hoped to study the 'gene' at a molecular level.

MATERIAL AND METHODS

A small flock of 25 purebred Texel ewes of various ages was established at the West of Scotland College in 1985. This was mated over 2 years with two imported Merino cross rams believed to be heterozygous for the 'Booroola gene'. All surviving female lambs were retained and their status as either 'carrier' or 'normal' was diagnosed the following autumn by the counting of corpora lutea 8 to 11 days following synchronization with progestagen sponges.

The basic laparoscopic technique has been described elsewhere (Boyd and Ducker, 1973). An ovulation rate of three or more was diagnostic of 'carrier' status. Animals not giving this result were generally re-examined once more at the second or third synchronized oestrus and in some cases, for example after two ovulation scores of two (or of zero) they were introduced to the ram, mated and lambed if possible depending on the lambing result were re-examined the following year. A few 'normal' ewes were retained as controls but generally only 'carrier' ewes were kept for further breeding. Subsequently, in 1987 the foundation ewes and rams were removed from the flock and only purebred Texel sires have been used since then.

TABLE 1
Ovulation rate and litter size of crossbred Texel ewe lambs

	Ovulation rate		Litter size	
Diagnosis	Mean	s.e.	Mean	s.e.
Carrier	3·10	0·11	2·25	0·19
Normal	1·48	0·06	1·30	0·11

TABLE 2
Ovulation rate and litter size of crossbred Texel ewes

	Ovulation rate		Litter size	
Original diagnosis	Mean	s.e.	Mean	s.e.
Carrier	3·78	0·30	2·38	0·29
Normal	2·19	0·28	1·80	0·28

RESULTS AND DISCUSSION

The method of diagnosis of 'carrier' ewes must by inference bias any comparisons of ovulation rates and litter sizes. However, data are now available from some 37 'carriers' and 47 'normal' ewes and it is quite apparent that there are large differences between the 'carrier' and 'normal' populations (see Table 1) and furthermore that these differences are maintained in older ewes despite the fact that some of the 'normal' data included in Table 2 contain ewes which are now recognized as being 'carriers'. Comparisons between ewe lambs and older ewes are complicated by the fact that the latter were examined and mated earlier in the breeding season and this we believe reduced the ovulation rate to a more manageable figure.

The present estimate of the accuracy of diagnosis based on at least one ovulation of three or more in the 1st year is 0·90 while the sensitivity of the technique is 0·88. This latter figure is an under-estimate because a considerable proportion (0·44) of the normal ewe lambs which showed two ovulations had only a single lamb. These were culled but some of these may possibly have been 'carriers'.

Nevertheless the fact that the mean litter size of the foundation purebred ewes (1·65, s.e. 0·08) is so closely comparable with that of the 'normal' ewes in Table 2 (1·80, s.e. 0·28) indicates that the laparoscopy technique has much to commend it as a further means of diagnosis in addition to litter size.

In 1988 some laparoscopy was undertaken after mating to avoid late lambing and to shorten the lambing period. Although the numbers were very small (12 ewes) the embryonic/foetal loss was smaller than expected (0·14) and smaller than might be deduced from Table 1. The intention is to re-examine this finding over the next few years.

The high perinatal losses (0·48 lambs/ewe) that have been sustained with these young sheep are disappointing and the objective is to marry the demands of an early diagnosis with a subsequent tight lambing period, and greater lambing care.

In summary these preliminary data show that the introduction of the 'Booroola gene' into the Texel ewe causes a considerable increase in prolificacy. At the practical level it remains to be seen if this can be managed effectively.

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