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THE INVERDALE PROLIFICACY GENE IN SHEEP

Introduction

As the list of references at the end of this contract shows, publications arising from research into the Inverdale gene are found in numerous journals and conference proceedings. This makes it difficult for farm advisors and practically impossible for farmers to access all of this information. The contract approach has enabled current knowledge on the Inverdale gene across a range of disciplines to be presented at a farmers' day within the annual conference of the NZSAP and subsequently published in the proceedings as a readily accessible reference.

The contract comprises seven papers from scientists covering different aspects of research into the Inverdale gene, and for the first time there are two papers from farmers with first hand experience of managing these prolific sheep. The scope of the papers allows readers unfamiliar with the Inverdale gene the opportunity to be informed on the implications of this gene in a single publication.

It is very appropriate that this collection of papers on the Inverdale gene is published in the proceeding of the NZSAP conference, as the first hint that this Romney family may have a major gene for prolificacy was contained in a paper I presented to the 1987 conference of the Society. The subsequent discovery that the gene is on the X-chromosome, homozygous females are infertile, and tumour-like structures develop on the ovaries of some homozygous ewes are all outlined in this contract together with current knowledge on ovarian characteristics, hormone profiles, genetic markers and the use of the gene in industry.

G.H. Davis

Discovery of the Inverdale gene (FecX)

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ABSTRACT

Selection for ovulation rate in a screened prolific flock identified a prolific family of Romneys in 1984 that descended from one ewe, and progeny tests of her male descendants carried out from 1985 to 1990 indicated the presence of a major gene (Inverdale) on the X-chromosome. One copy of the gene increases ovulation rate by about 1.0 and litter size by about 0.6. However, research in 1991 found that ewes with two copies of the gene have small non-functional 'streak' ovaries and are infertile. Many of these infertile ewes develop tumour-like structures on their ovaries and these are currently the subject of intensive research.

In 1993 a prolific Romney flock in Tokoroa, with no known connection with A281, was also found to have the Inverdale gene. The place of the Inverdale gene in industry will be to increase prolificacy in ewe flocks mated to terminal sires, and a research programme has been established to identify a genetic marker for ram breeders.

Keywords: sheep; prolificacy; Inverdale gene; major gene.

SCREENED PROLIFIC EWE

In 1979 a high prolificacy flock was established at the Invermay Agricultural Centre, Mosgiel, by screening Romney, Coopworth and Perendale ewes from the national flock on the basis of a history of high litter sizes (Kelly et al., 1983). Subsequent selection within breed was on ovulation rate, and in 1984 a prolific family of Romneys was identified that descended from a screened ewe (A281) from the property of Mr Derek Weir at Banks Peninsula (Davis et al., 1987). A281 had 33 lambs in 11 lambings and had been purchased at the Addington saleyards as a two tooth in 1968. Apart from the fact that she came from a property at Albury in South Canterbury, nothing is known of her origin. By 1984, seven of her female descendants in the screened flock had a mean ovulation rate of 2.45 (SE = 0.15), and a flock of 30 descend-ants had an average litter size of 2.4 on the Banks Peninsula farm.

Ram progeny tests

Progeny tests of three grandsons of A281 bred at the Woodlands Research Station in Southland were carried out.