A survey was made of 26 influential studs in the Queensland Merino sheep industry to determine flock structure and breeding strategies. Lamb-marking performance of studs in each of the three Statistical Divisions was on average 20 to 25% higher than the Division long-term average. Sixty-five percent of studs joined rams first at 18 months but the others did not join until 24 or 30 months. All studs joined ewes at 18 months. Rams were joined for three to seven years with 42% of studs joining rams for seven years. Twenty-seven percent of studs had more than six ewe age groups. Death rates in rams and ewes were generally low. All rams and ewes were classed between 10 and 18 months with culling rates between 20 and 50% for rams and 20 and 60% for ewes. The estimated generation interval in these studs was 4.37 years. Forty-six percent of studs measured reserve rams and 31% reserve and sale rams. Six studs were not using objective measurement but four of these intended to commence measurement programmes. Only one stud graded sale rams on production records. The consequences of flock structure and selection practices in these studs on the Merino industry in Queensland are discussed.

(Keywords: Merino studs, flock structure, selection practices, objective measurement)

INTRODUCTION

Genetic progress in the commercial flocks within the Merino sheep industry is largely dependent on the selection decisions made by studs which supply a large proportion of flock rams. Rose (1984) showed that within the Queensland industry a few influential studs played a very important role in supplying the state's annual commercial ram requirements. To study the consequences of breeding strategies in studs it was necessary to determine their flock structure, performance levels and selection practices.

MATERIALS AND METHODS

A survey was made in 1983, chiefly by personal interview, of the 24 extant studs which Rose (1984) defined as influential in the Queensland Merino sheep industry between 1960 and 1980. Also included were the two newly registered studs which were gaining importance because of large annual ram sales. These 26 studs were still a very important influence in the Queensland industry in 1980 when they represented less than 40% of studs but bred almost 80% of stud rams sold.

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The details sought by the survey included lambing performance, management of the ram and ewe flocks, classing and selection of rams and ewes and the use of measurement to select sires and to provide production records for sale rams. The 26 studs were run on 18 properties of which nine were in Central-west Statistical Division of Queensland, six in South-west and three in Darling Downs.

RESULTS

Lambing performance

Lamb-marking percentages for stud properties in each Division were 73 (range 60-85) in Central-west, 84 (range 70-95) in South-west and 86 (range 75-94) in Darling Downs. Average lamb-marking percentages in the Statistical Divisions of Central-west, South-west and Darling Downs for the period 1966-83 were respectively 48.1, 59.3 and 66.0.

Joining practices

Sixty-five percent of all studs joined rams first at 18 months, 8% at 24 months and 27% at 30 months. The number of years rams were joined in studs ranged from three to seven. Forty-two percent of studs joined rams for seven years; this was most common in North-west Division where the percentage was 54. Only two studs joined rams for only three years.

Ram joining percentages ranged from one to three. Eighty-one percent of studs joined either 2.5 or 3%. Death rates in rams were low in all areas and ranged from less than 1 to 6% per year.

All studs in the survey joined ewes first at 18 months. Seventy-three percent of studs had four to six age groups of ewes. The remainder had seven to ten groups. Death rates in stud ewe flocks were generally low; almost a quarter of the studs had 2 to 3% deaths and 46% had 5 to 6%. However, of the studs in Central-west more than half reported 10% losses in breeding ewes.

Flock size and structure

The average flock size of these studs, defined as the number of ewes mated annually, for the period 1960-80 was 3444 (range 870-7805). Three studs mated, on average, less than 1000 ewes annually, 15 mated between 1000 and 5000 ewes and seven mated more than 5000. In the period 1965-1980 the average number of sires used annually was 96 (range 12-202). Seven studs used, on average, fewer than 50 sires per year, eight used between 50 and 100, nine between 100 and 200 and two more than 200.

Generation interval

The average age of ewes at lambing in these stud flocks was estimated to be 4.65 years and of rams 4.08 years resulting in a generation interval of 4.37 years. If all sires were culled after joining at 2.5 years the generation interval would be reduced to 3.60 years. If, in addition, all studs joined their rams first at 1.5 years the interval would be reduced to 3.56 years.
All rams and ewes were classed between 10 and 18 months. From 20 to 50% (mean 34%) of rams were culled and from 20 to 60% (mean 36%) of ewes. All but one stud, which had 40% reserves, classed from 5 to 20% rams as reserves. **Fifteen** studs had 10% reserves. All studs had special ewes and these represented between 5 and 40% of the stud ewes. In 11 studs special ewes comprised 10% of the stud ewes and in seven studs 30%.

**Objective measurement**

Between 1970 and 1983 only two studs, under the same ownership, had never measured any rams. They were starting a programme to measure all rams in the following year. Another two studs on one property which had just come under new ownership planned to measure all reserve rams. These studs had previously measured reserves from 1974 to 1978. In 1983 only two studs did not measure or intend to measure any rams. One had measured all rams in 1978 and reserve rams in 1981 and the other had measured reserves from 1970 until 1973.

Of the remainder, seven studs measured reserve and sale rams and 13 measured all reserve rams and had done so for eight years or more. Fifteen of these studs began measurement programmes in the 1950s. Only one stud graded sale rams on measurement; this has been described in detail (McGuirk et al. 1982; Rose 1980). Two studs, run by one studmaster, did not formally class rams into sale grades but offered them for sale on the basis of measurements. All other studs had from two to four sale grades classed visually.

**DISCUSSION**

The higher lamb-marking percentages reported by studs, by comparison with Division statistics, may be attributed to the higher levels of husbandry and deferential treatment afforded to stud sheep. This was also reflected in the high culling rates attained in most studs.

The age at first joining and the number of years sheep are bred both contribute to the generation interval. A long generation interval will slow the rate of genetic progress. **More** than one third of studs did not join rams until they were 24 or 30 months old. This did not seem to be related to slow maturity in rams as 77% of studs in Central-west joined 18 month rams. Studbreeders who did not join at 18 months believed that some rams selected at that age changed undesirably by 30 months. These studbreeders either did not measure or were not convinced that measurements on young rams were reliable predictors of either the rams' future performance or their genetic worth. However, all studs joined ewes at 18 months.

The greatest obstacle to rapid genetic progress was the length of time rams and ewes remained in the flock. In years when reproduction levels were low or when droughts recurred managers tended to retain ewes beyond the desired culling age **provided** their teeth were sound. This meant that one quarter of the studs had aged ewes, seven years and older. This was considered a necessary means of maintaining flock numbers.

A far more significant problem was the widespread practice of retaining sires until they were culled for infertility, broken mouth or some other sign
of physical deterioration. Since only four studs made any significant ram purchases from other studs, there would have been no economic constraints on studs to replace sires more rapidly. Studbreeders were not generally convinced that effective selection should be producing better rams in each new generation.

Ram classing in all studs was similar to reported practices (McGuirk et al. 1982). Although a large number of studs measured reserves it was difficult to assess how well these measurements were used. If classing were of a similar standard to that reported by McGuirk et al. (1982), and measurement were used as effectively in sire selection, a relatively high selection pressure for clean fleece weight could be expected in those studs using measurement. However, the rate of flow of genetic improvement to the industry would be slowed by the large number of age groups of rams and ewes.

Only one stud graded rams on production records although others provided records for clients’ inspection. There is a need to promote measurement of reserve rams in those studs not using it. Grading of sale rams by measurement would ensure that the price paid for a ram was related to its performance.

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