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## Commercial performance of sheep carrying the Inverdale gene (FecX)

A.J. GRAY AND G.H. DAVIS<sup>1</sup>

Orawia, 2RD, Otautau, New Zealand.

### ABSTRACT

The progeny testing of 12 Romney rams from a family in the Woodlands high prolificacy flock provided an opportunity to improve the 88% lambing percentage from the 3200 ewe flock on a Southland farm.

Over four years, ewes with the Inverdale gene averaged an extra 35 lambs weaned per 100 ewes joined. The litter size averaged 2.38 for Inverdale ewes, with 11% having singles, 45% twins, 39% triplets and 5% quadruplets. More than 80% of Inverdale ewes reared >1 lamb, and the second generation Inverdale ewes reared larger and more lively lambs. Weaning weights at 12 weeks of age averaged 22 kg, which, due to the large number of lambs reared as multiples, was lighter than the commercial flock. However, by eight months of age Inverdale and commercial hogget weights were similar.

High feeding levels during lactation have been critical to the success of the Inverdale flock.

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

### History

In 1987 a 240 ha farm on the south coast of Western Southland, which was carrying 3,200 traditional-type Romney ewes, was purchased. In that year, El Nino delivered six weeks of blizzard-like conditions during lambing, which played a major part in turning 135% lambs born per ewe joined into a disappointing 88% lambs tailed per ewe joined. This level of performance was unsatisfactory for a fattening farm.

Following a sheep seminar at Gore, which included discussion of the Woodlands high prolificacy flock, it was decided to run a progeny test in 1988 involving 12 sire groups mated to 100 ewes each. The groups comprised mixed-age ewes, and lambs were tagged according to sire. The number of ewe lambs weaned per sire from 11 sires ranged from 19 to 53. One sire, ram 81-84, which also was the sire or grand-sire of the other 11 rams, failed to leave any progeny. A total of 320 female progeny were retained through to two-tooths in 1990, when they were examined by laparoscopy to measure ovulation rate. At the time of laparoscopy, liveweights of the progeny groups ranged from 54.5 kg to 60.5 kg. Three groups

were identified as carrying what was to become known as the Inverdale gene, and these had an average ovulation rate that was about 1.1 higher than the eight non-carrier groups (Davis *et al.*, 1991).

### Lambing results

The overall commercial lambing (lambs tailed per ewes joined) in 1990 was an improvement of 27% from the 1987 disaster. However, the two-tooth lambing of the progeny test offspring was disappointing, with a high mortality rate due to bad weather and low lamb birth weights. This required a rethink of feed management, which in the following years produced far better results, with the Inverdales averaging 35% higher lambing than the commercial flock to the ram. This was achieved despite lower culling rates in the Inverdale flock.

The reproductive performance from 1990 to 1993 is summarised in Table 1. Although the second generation Inverdales (two-tooths born 1991) were lighter at mating, they had fewer dry ewes than the first generation two-tooths (born 1988). The

**TABLE 1:** Reproductive performance of Inverdale ewes (1990-1993)

	No. ewes to ram	Mating weight (kg)	Barren ewes (%)	Ewe deaths (%)	Lambs born per ewe lambing (%)	Lambs tailed per ewe joined (%)	Increase in lambs tailed per ewe joined (compared with total commercial flock)	Conditions at lambing
2 yr lambing 1990*	85	56.7	9.4	4.7	215	128	+13%	Bad weather, and short of grass throughout pregnancy and lambing.
3 yr lambing 1991*	75	59.3	6.7	1.3	226	167	+49%	Good weather, and good feed into winter.
4 yr lambing 1992*	66	66.1	1.5	6.1	253	159	+39%	Marginal weather, and short of grass from lambing until weaning.
5 yr lambing 1993*	46	64.0	0.0	6.5	272	178	+55%	Good weather, and good feeding throughout lactation.
2 yr lambing 1993#	124	51.0	7.3	0.8	220	163	+40%	Good weather, and good feeding throughout lactation.

\* First generation Inverdale ewes.

# Second generation Inverdale ewes.

<sup>1</sup>AgResearch, Invermay Agricultural Centre, Private Bag, Mosgiel, New Zealand.

incidence of wet-dries was markedly lower in the second generation two-tooths (2.7% v 21.9%) and there were fewer low birthweight lambs, which in part reflects the better feeding levels during pregnancy. There was also a lower ewe death rate in second generation two-tooths (0.8% v 4.7%).

### Growth rates

The Inverdale rams used in the original progeny test were small and short, so recent emphasis has been on out-crossing to larger, easy-care sires with above average fleece weights. The Inverdale ewes have been mated with rams from four different blood lines.

The second generation Inverdale ewes are rearing larger and more lively lambs, with over 80% rearing two or more lambs. The larger number of lambs reared as multiples has led to lower weaning weights compared with the commercial flock. In 1993, the Inverdales were weaned at 12 weeks of age and averaged 22 kg, with a range from 12 kg to 36 kg.

Subsequent to weaning, the Inverdale lambs have shown good compensatory growth, with average liveweight gains through to eight months of age of about 140 g/day. About 65% of lambs weighed more than 40 kg at eight months of age, which is very similar to the weight of the commercial lambs. The two-tooth Inverdale ewes average 55 kg at tupping, which is about 4 kg lighter than the commercial two-tooths. This weight difference probably reflects the lower culling pressure on the Inverdales. Two-tooth Inverdale rams have averaged about 80 kg liveweight in January.

### Management implications

Feeding levels are critical. Flushing of ewes prior to mating is not essential, because of the inherently high ovulation rates of Inverdale ewes. This can allow a saving of autumn feed to be carried through into winter to ensure adequate feeding during pregnancy. Preferential feeding over winter is achieved by running the Inverdale ewes of all ages together with the commercial two-tooths in one mob. The demands of lactation for ewes rearing multiples require that higher feeding levels are available from lambing through to weaning. Good liveweight gains have been achieved where feed levels have been adequate from the two-tooth to the four-tooth stage.

The number of dry ewes has been low (5%). Few ewes have needed assistance at lambing (4%), and these have mostly been ewes with quadruplets. The incidence of vaginal prolapse (bearings) has been 2%, which is low considering the size of the ewes and the number of multiple births. The litter size (lambs born per ewes lambing) has averaged 2.38, with only 11% of ewes having singles. The incidence of twins, triplets and quadruplets has averaged 45%, 39% and 5% respectively.

The use of sires with above average fleece weights has resulted in the Inverdales producing heavier fleeces than the commercial Romney flock. The wool has averaged 37-38 microns fibre diameter and the fleece weight of hoggets at nine months of age averaged 3.5 kg.

The emphasis on selecting replacement breeding stock has been on the dam's ability to rear multiple births to good weaning weights. Ewe hoggets which fail to meet the target liveweight of 40 kg at eight months of age are culled. Ram hoggets are selected on their post-weaning growth rates and soundness, plus the absence of wool faults. Cull ewes known to carry the Inverdale gene are used to progeny test Inverdale rams. Only five daughters from these matings are required to identify 97% of carrier rams using the streak ovary condition. By testing ram lambs, this has allowed carrier Inverdale rams to be identified before they are used as two-tooths.

A disadvantage of the Inverdale gene is the need to use progeny testing to detect carrier rams. Pedigree records from the flock are currently being used by the AgResearch Molecular Biology Unit in the Biochemistry Department at the University of Otago to identify a reliable DNA marker.

Care is required to avoid joining carrier ewes with carrier rams. This can be achieved by a three-tier breeding programme. There is a ram breeding flock to provide rams known to carry the Inverdale gene. A second flock is used to generate ewes known to carry the Inverdale gene by mating carrier rams with non-Inverdale ewes. The third flock is the prolific Inverdale carrier ewes, which are mated to a terminal sire. In a structured industry these three flocks could be on three different farms.