Farmers adopting technology to improve sheep production – a nine year study

A. COCKS[1], M. WILLIAMS[1], M. CASEY[2], C. BROWN[2], J. WARE[1], N. MORRISON[1], G. MORRISON[1], G. PEARCE[1], W. TAYLOR[1], G. COCHRANE[1], J. COCHRANE[1] and T. HARRIS[1]
[1]*RD2 Clinton*
[2]*Agriculture New Zealand, Private Bag 1966, Dunedin (corresponding authors)*
mariecasey@wrightson.co.nz

Abstract

The Kuriwao Farm Action group has followed a process of continued monitoring and evaluation to improve sheep production. Involvement in this project has given the farmers meaningful information for all members to use as part of their decision making. As a group they have evaluated options such as pasture cultivars and renovation strategies, sheep genetics, chemical topping and hogget mating. The benefit to all members has been faster progress and less costly mistakes. Many new technologies such as scanning, improved pasture species, chemical topping and improved animal genetics and nutrition are now standard practice on these properties. The farmers made bigger gains in the last five years as the impact of new sheep genetics and crossbreeding combined with a greater understanding of the importance of ewe nutrition in both lamb numbers and growth. The original objectives of the project were to improve lambing percentage, pasture performance and lamb growth. On average, lambing percentage improved by 2% per year for the last nine years (and 3% per year since 1996). Average lamb growth rate lifted by 8.6g/d/year (5% per year).

Keywords: genetics, learning, nutrition, pasture improvement, pasture production, sheep production

Introduction

The Kuriwao Farm Action Group is a discussion group in fertile hill country in the South Otago District. These farmers were aware that changes were required to their farming systems to make the gains required for increased profitability to remain sustainable in the future. They identified that they wanted to improve both pasture production and lambing percentage.

In 1993 they applied, after eight years of operation as a discussion group, to the Foundation for Research Science and Technology TBG programme for funding to assist them to lift their production and profitability by adoption of new knowledge and technology. This involved a partnership programme between AgResearch, Agriculture New Zealand Ltd and the discussion group.

The aims of this project were to improve lamb growth and sheep fertility. This included the adoption of new pasture cultivars and improved genetics into some of the farmers' flocks. The farmers were keen to be involved so they could get meaningful information that would enable them to make better decisions.

This paper documents three case studies. The first outlines the pasture production opportunities. The second studies the impact of feed management and supply to the lamb production systems and sheep performance is highlighted in the third study.

Discussion group

The Kuriwao Farm Action Group is made up of 10 farms (12 farmers). Nine are in the Clinton Gorge area, one on the north side of the Clinton hills in South Otago. The average lambing % and lamb weights of these properties were higher than similar farms in the district at the beginning of the programme (Table 1).

The rolling hill country farms average 8-900ha of one third developed pasture and two thirds improved tussock reaching an altitude of 4-500m. Long wet winters, cool late springs and moist summers are typical. The average rainfall is around 1200mm (range: 800-1600mm).

The properties winter approximately 4500 sheep (including hoggets) and 200 cattle (including finishing stock).

The sheep breeds used are:

- Perendale (four properties including two experimenting with Perendale cross)
- Romney and Perendale (three including one using the Inverdale gene)
- and Coopdales (two farms).

Table 1 Average lambing percentage and lamb carcase weight for the Discussion Group compared to the district averages (MAF Farm Monitoring and CF2000).

	1994		1999	
	Lambing %	Ave lamb wt	Lambing %	Ave lamb wt
Kuriwao DG	125 (102-129)	15.7 (13.5-17.8)	132 (114-140)	16.6 (16.4-16.8)
District ave (>3500su)	114	15.1	122	15.5

Case Study I: Pasture Production

Pasture production was a major limitation and the farmers felt that pasture renewal would provide the largest gains in the shortest time. The aim was to provide high quality feed in early spring and summer for lamb growth and good recovery in autumn for ewes.

The resident pastures mainly contained browntop (*Agrostis tenuis*), dogstail (*Cynosurus cristatus*) and sweet vernal (*Anthoxanthum odoratum*) species. Improved pastures were likely to be either Grasslands Ruanui or Grasslands Nui perennial ryegrass (*Lolium perenne)*. These pastures had reasonable growth in spring with quality and growth declining over summer and poor autumn production.

Farmers were visited individually by AgResearch staff to provide recommendations for pasture mixes that suited their objectives. The recommended seed mixes were for short, medium and long term swards based on ryegrass and white clover and included:

- Grasslands Moata or Concord (*Lolium multiflorum)* was recommended for a two to three year pasture
- Grasslands Greenstone for three to five year pasture
- Grasslands Mardsen or Grasslands Nui for a permanent pasture.
- Grasslands Demand and Grasslands Tahora white clover (*Trifolium repens)*,
- Grasslands Pawera and Grasslands Colenso red clover *(Trifolium pratense)*
- timothy (Grasslands Kahu *(Phleum pratense)*)
- plantain (*Plantago lanceolata)*
- chicory (*Cichorium intybus)*.

The farmers continued to develop their knowledge of the cultivars available through use of consultants, seed company representatives and experience within the group. It is important to note that throughout this period (1993-2001) a large number of new cultivars were released onto the market resulting in increased choices (and confusion) for farmers.

The farmers continued with the renewal programmes but also began to realise the importance of other areas of pasture management that impacted on their animal performance. By the end of the project the following strategies were in place.

- Continued pasture renewal
- Emphasis on clover establishment
- Cultivar selection including importance of endophyte status (low or nil) and increasing use of hybrid ryegrasses for quality
- Adequate fertiliser both pre and post sowing
- Strategic use of nitrogen on young pastures
- Ongoing monitoring for pests (porina and grass grub) to avoid or remediate pasture losses
- Use of a double spray technique before establishment to reduce competition of aggressive species.
- Chemical topping (refer to Casey *et al.* 2000)

Case Study II: Feeding Systems

The objectives were not to measure grass growth but to concentrate on animal performance therefore a lamb growth trial was done on the new pastures in 1994. Lamb growth on unimproved pasture ranged from 68-91g/hd/d (Table 2) and 83-294 g/hd/d on improved new pastures.

Monitoring of lamb growth continued through the seasonal analysis of killing sheet data. The overall lamb growth from birth to slaughter (Figure 1) increased by

Figure 1 Lamb growth rate trends.

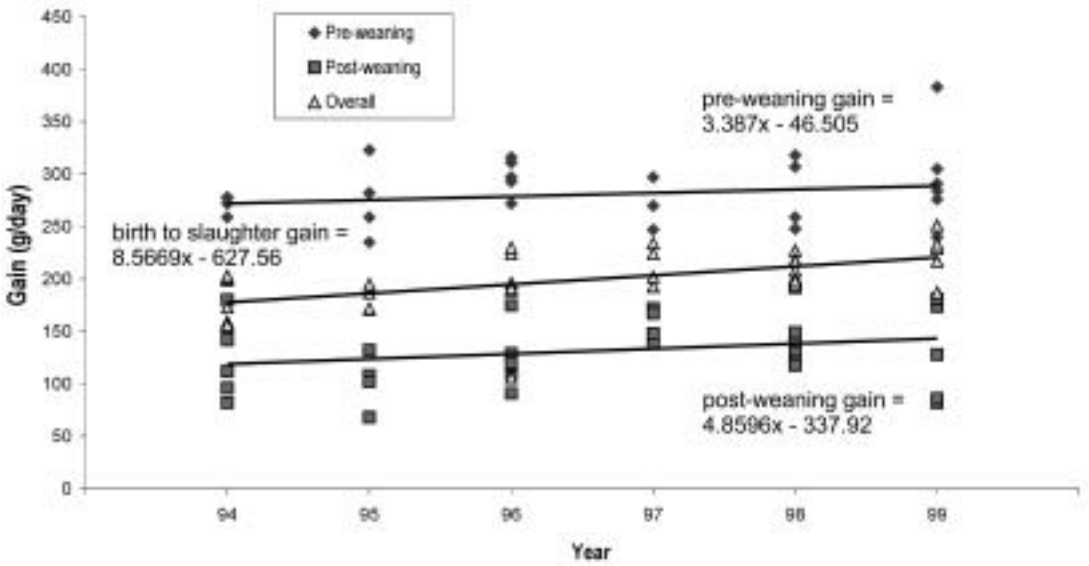

Table 2 Post weaning lamb growth rate in the lamb growth trial 1994 (g/hd/d).

	Overall farm ave	Lamb growth trial			
	1994	Jan	Feb	March	April
Farmer A	82	135	83	120	193
Farmer B	68	237	196	200	143
Farmer C	91		294	152	

8.6 g/d/yr or from 175g/d in 1993 to 225g/d in 1999.

Lamb growth analysis highlighted the differences between properties and could often be related to specific managements on each farm. The farmers were able to see who was getting the best lamb growth rates both pre- and post-weaning and use that information to change their own management practices.

For example one farmer had reasonably old pastures but is a very good pasture manager who emphasised maintaining both the quality and the quantity of feed on offer. Other farmers developed specialist areas of the farm for lamb finishing where they concentrated on high performing new pastures.

In 1994 it took 206 days to produce a 17kg lamb, now it takes 160 days. This creates the opportunity to use 46 days of grass growth for other stock on the farm. This equates to about 12-1400 kgDM/ha in autumn (46 days @30kgDM/ha/d) on the lamb finishing area, which is now available for other enterprises such as cattle finishing or improving ewe body condition.

This flexibility allowed the farmers to adopt different strategies as a result of the improved lamb growth. This has resulted in getting lambs away earlier; in most cases up to 3 weeks earlier (Table 3) and increased lamb carcase weight (Table 4).

These improvements in feed management and supply also assisted a lift in lambing percentage as well (Figure 2) of a steady 2% increase per year. Improvement has been more rapid in the last five years at 3% per year.

Many management techniques were implemented to assist in improving sheep performance. The improved feed supply gave farmers the confidence to include the following techniques:

- Weaning by weight, when 80% of the lambs are 25kg or more
- Setting lamb growth and ewe live weight targets and monitoring against targets
- Improved pasture quality
- Separate lambing of single, twin and triplet mobs
- Targeted use of tussock blocks for singles or twins at lambing
- Scanning for triplets
- Hogget lambing
- Body condition scoring.

Case Study III: Sheep performance

Sheep performance included the identification of the importance of genetics in lamb growth, the evaluation of new genetics, and improved flock nutrition.

In 1995 the farmers conducted an on-farm evaluation of their sheep's potential for growth. They each provided 20 lambs, 10 grazing on one farm and 10 on another. The farmers saw that although the average lamb growth differed between the properties some lines of sheep showed higher potential for growth (Table 5). This evaluation helped minimise the effects that feed

Table 3 Date when 90% of lambs were quit.

Farmer	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000
A			30-Mar	8-Apr	16-Apr	6-Apr
B		30-Apr	10-Apr	23-Apr	7-Apr	6-Apr
C	23-Mar	20-May	30-Apr	4-Apr	28-Apr	16-Mar
D	3-May	18-Apr	10-Apr	7-Apr	9-Apr	15-Apr
E	18-Apr	30-Apr	30-Apr	20-Apr	30-Apr	2-May
F		5-May	14-Apr	6-Apr	14-Apr	27-Mar
Mean (B-F)		2 May	18 Apr	11 Apr	18 Apr	7 Apr

Table 4 Average lamb weights for the Kuriwao Properties (kg carcass weight).

	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000
A			17.4	18		
B		14.8	15.3	16.5	16.5	
C	16.5	16.9	17.3	16.6	16.4	17.5
D	16.7	16.7	17.0	17.9	16.7	17.6
E	14.4	15.1	17.3	17.0	16.8	
F		14.9	15.9	16.7	16.5	
G		14.3	14	15.8		
Mean (B-G)		15.7	16.6	16.7	16.6	
Mean (C-D)	16.6	16.8	17.2	17.3	16.6	17.5

Figure 2 Trends in lambing % for the group – 1991-1999.

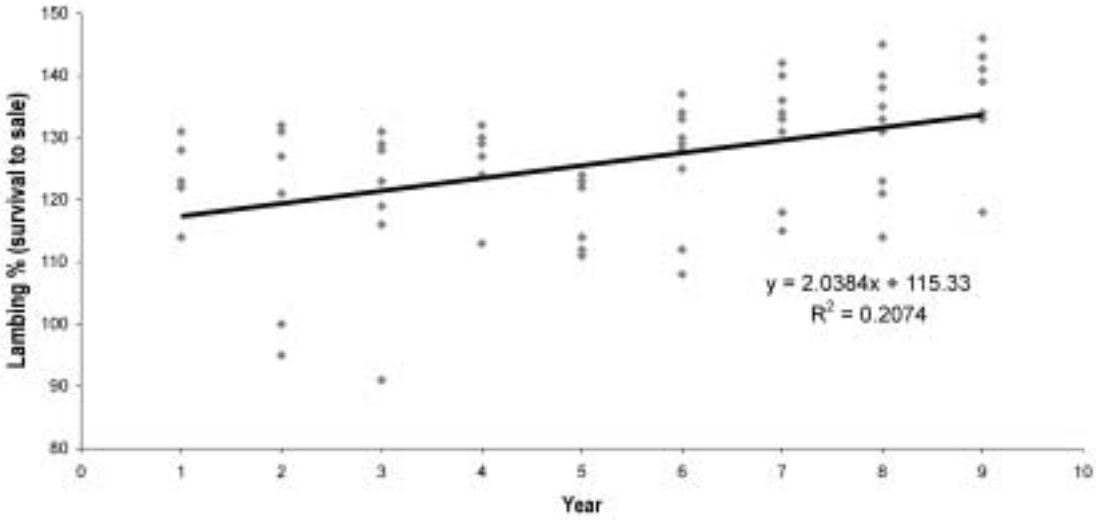

Table 5 Lamb weight gain over three months showing the differences between the lambs from different farms, evaluated at two sites (means are adjusted for initial liveweight).

	Farm								
	A	B	C	D	E	F	G	H	SD (0.05)
Lamb weight gain (kg)	14.8 a[1]	11.3 b	10.3 bc	6.2 d	10 b	7.4 cd	9.6 bc	8.8 bcd	2.97

[1] means with the same letter are not significantly different.

management, feed supply or variations in animal health between properties can have on comparing animal performance. Others made the decision to improve the genetics of the rams they were using based on this evaluation.

The Inverdale gene was identified at the beginning of the project as an option to rapidly increase lambing percentage. One farmer chose to use Inverdale genetics as an option. Analysis of the scanning information highlights the impact of the Inverdale genetics (Table 6). A recent tongue in cheek comment by him has been that he may have "too many lambs" – a problem more farmers would like to share.

The group has also considered developments in other high fertility genetics and undertaken a three-year programme to compare rams from 10 sources. Offspring from these rams have been evaluated until 2th's. The increased awareness of the importance of genetics has led to a re-evaluation of the individual performance targets within the group. Genetic decisions are now based on the ability of rams to deliver those performance targets, including lambing percentage, lamb growth and carcase conformation.

A major impact on all the farms was the increased awareness of the importance of ewe nutrition on ewe fertility. Increased concentration on feeding the ewes properly all year has had a significant impact on lambing percentage and lamb performance.

Conclusion

The result of the project has been very successful with all of the farmers lifting their farm performance and profitability, both compared with the original objectives and by being able to rapidly incorporate new research and information as it presented itself.

Involvement in this programme has given the farmers meaningful information and learning opportunities that they then use as a guide for their own decision making. This has allowed faster uptake of

Table 6 Scanning comparison for the Inverdale genetics.

	1996-97	1997-98	1998-99	1999-00	2000-01
2T Perendale	135	140	151	159	166
2T Inverdale		179		215	219
4T Perendale			171		190
4T Inverdale			202		224
6T Inverdale				202	197

new technology and more rapid progress on these properties even though the type and timing of technology adoption has been different on each farm.

Involvement in this project has also led to a reduction in the variability of on farm performance from one year to the next for all the members. This can partly be attributed to the efforts they take individually to implement new research and technology and also partly because of the dynamics or peer pressures that result from being part of an exacting discussion group.

After nearly a decade of monitoring, evaluation and implementation we have concluded that there is no magic mix. As a result of this project the farmers all agree that there are some outcomes that were common to all properties. These are:

- **BENCHMARKING** and **MONITORING** are important for every farm
- **ANY** new pasture is generally better than old resident pastures.
- **BUT** management more important than cultivar.
- **PASTURE QUALITY** is critical. Keep the grass short, green and growing (using cattle or dry ewes, mechanical or chemical topping).
- **BUY** a set of sheep scales and use them.
- Attention to detail is important – **DON'T** miss critical activities and timings whether it is Porina management, Iodine supplementation of ewes, or weed control in the swede crop.
- Identification of the trace elements needed and their effects on animal health eg. Cobalt and Iodine.
- Over time ewe nutrition became more critical as farmers understood its impact on ewe fertility, lambing percentage, lactation and lamb survival and pasture management.
- The impact of accurately understanding the capability of the sheep genetics and identifying the best ram sources.
- Incremental small gains over time achieve dramatic productivity gains.

Table 7 Efficiency indicators for the properties– 1999 season.

Farm	Lambing %	Lamb weaning weight	Ewe mating weight	kg lamb weaned/ewe mated	kg/lamb/kg ewe mated
A	139	33	68	45.9	0.675
B	143	32.5	62.5	46.5	0.744
C	118	26.5	60	31.2	0.520
D	146	34	69	49.6	0.719
E	139	29.5	70	41	0.586
F	134	28	*	37.5	*
G	141	28.5	73.2	40.2	0.549
H	133	31.5	68.7	41.9	0.610
Mean	136.6	30.4	67.3	41.7	

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