ECONOMICS OF LIVESTOCK IMPROVEMENT

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To illustrate the economics of livestock improvement of sheep run under intensive conditions of 15 sheep per hectare in the southern region of the South Island of New Zealand, I am going to compare the returns from sheep which have had twenty years of selection for improved reproduction, growth rate and greasy fleece weight with the returns from a control flock.

A significant number of ram breeders in New Zealand have been using 'Sheeplan' since 1968. This is a national sheep performance recording scheme which is operated by the Ministry of Agriculture and Fisheries. It is not unreasonable to state that there are many commercial flocks throughout the country which have benefited from twenty years of genetic improvement.

INTRODUCTION

It is appropriate that a paper which assesses the economics of livestock improvement should be introduced by the chief executive of a meat marketing and processing company which handles more than five million sheep and lambs each year.

Mr Murdoch of the Alliance Freezing Company (Southland) Ltd, said in his paper that "In the medium to long term, the preference is for farmers to produce lean, larger lambs which are able to maintain a growth plane so that the 'window of opportunity' to sell is large. This allows the producer to take advantage of more options, whether they are market related and/or determined by the available feed."

Never before has the importance of minimum cost production been as apparent as it is now. The New Zealand sheepfarmer has experienced three years of low returns. The farming of sheep which are efficient converters of grass to saleable meat and wool with a minimum of labour is paramount to financial success.

As I will illustrate later in this paper there are major financial rewards from farming genetically superior sheep.

Meat

To meet the objective to produce animals which can grow faster but also maintain the opportunity to sell to maximum advantage over a wide range of weights a programme is necessary which measures not only weight gain but also the condition of the animals. The following schedule clearly illustrates the financial loss to the producer when lambs fall into the trimmer T grade or the overfat F grade.

Meat schedule; June 1988

The current meat schedule returns to the producer, nett of processing charges, the following prices:

Table 1 Meat schedule returns

Grade	Fat cover millimetres	Carcase weight kilogrammes	Return Meat only dollars
YL	up to six	12.5	3.46
PL	up to twelve	12.5	3.34
YM	up to six	14.0	6.44
PM	up to twelve	14.0	5.60
YX	up to nine	20.0	13.14
PX	up to twelve	20.0	10.14
TH	13 to 15	20.0	6.14
FH	> 15	20.0	2.34 Note discount

Note: to assess the total return to the producer, for a lamb with one kilogram woolpull, approximately $10 should be added to the meat only value.

The producer can aim to provide a heavy lean lamb but the penalty for a lamb which grades overfat or F grade is severe. To minimise this risk it has become common practise to leave ram lambs entire or as cryptorchids. Ewe lambs howevr present a greater problem.

Special contracts for heavy lean lambs are becoming more common in New Zealand especially for out of season production.

Lambs which can grow quickly to heavy weights without putting on fat are not only more profitable but they take advantage of New Zealand's seasonal grass growth pattern. In prolific flocks lambs born and/or reared as triplets can be well grown before the winter.

Wool

The price paid for crossbred wool is determined by yield, length, colour and soundness. Much has been said about improving returns to the grower but the over-riding factor which influences this is weight. Greasy fleece weight is moderately inherited at approximately 0.3 so for a genetic programme aimed at the improvement of wool production, fleece weight is the most important objective.

Objectives

When the economics of livestock improvement is discussed the proportion of the total return from sheep which meat represents should be known.

It can be clearly seen from the following table that meat in carcase form returns less than 50% of gross return to the processor/exporter and less than 40% to the producer.

Currently a 14kg lamb carcase gives the %return for each component.

Table 2 14 kg lamb carcase return

	Value to Processor/Exporter Ex works	Value to Producer Schedule
Meat	47.3 %	38.8 %
Pelt	28.5 %	61.2 %
Wool	11.7	
Casings	7.6 %	Credit against
Offals	3.7 %	processing charge
Rendered	1.2 %	

Lamb meat as a percentage return from a breeding ewe

The % return of lamb meat to the total return from a breeding ewe in a commercial flock situation, at best, is unlikely to be more than 20% to 25% and in the following example it is 17.6%.

Take the current return from a ewe in a flock producing 130% of lambs survival to sale:

Table 3 Lamb meat as % return

Wool	35 microns	5 kg/ewe @ 400cpk	$20.00
Wool	lambs	1.3 @ 1.5kg @ 400cpk	$ 7.80
Wool pull lambs mid March .85 kg		1.3 @ $8.77	$11.40
		Total wool	$39.20 = 82.4%
Lambs 14 kg YM @ $6.44 meat only @ 1.3			$8.37 = 17.6%
		Total return	$53.13

It can be easily seen that New Zealand's sheepmeat industry will continue to rely on the production from dual purpose animals. There will be only limited scope for special meat breeds to be more profitable.

"The Gree" breeding programme. 1964 - 1988

This year 686 coopworth and 607 romney ewes are recorded on animalplan. Sire refrencing with the use of artificial insemination and BLUP analysis is in its second year for both breeds. The Apex Coopworth Sire Reference Group and the New Zealand Romney Development Group are made up with breeders who have similar objectives and who are prepared to co-operate for their mutual benefit. "The Gree" flock is a participant in both schemes.

The breeding programme at "The Gree" was initiated in 1964 when 2th ewes which reared a good set of twins to weaning were identified. In 1968 Sheeplan was available. By using the sheeplan index the main emphasis was for number of lambs born. By 1978 due to the improved lambing performance the emphasis was given to selection for heavy greasy hogget fleece weight. This is demonstrated by the fact that the average breeding value for hogget fleece weight for all the sires used since then have averaged +0.21.

By 1980 growth rate was considered to be important. Subsequently an autumn weight or 100 days post weaning growth rate has been recorded.

Lean growth rate

Condition scoring to produce a lean growth rate index began in 1983 when a C measurement was taken on top index ram hoggets using an electronic scanner. Now all ram hoggets are given a physical GR assessment by a competent lamb drafter when they are weighed in the autumn.

The economics of livestock improvement

It is from this background that the following comparison of the financial returns to a competent commercial farmer is made between running a genetically improved flock with twenty years selection, and an unimproved or control flock.

Assumptions:

Based on the Rotomahana Strain Trial which was conducted from 1979 to 1983 by Drs J.N. Clarke, R.L. Baker et al of Ruakura Animal Research Centre, in which both the coopworth and romney strains used at "The Gree" were compared with other strains of romneys. Both these strains when compared with the control flock aftr adjustment for adult ewe liveweight were 14% superior for lamb production. This was due to the ram influence only so we can conclude that the real diffrence was 28% if ewes from each strain had been used in the comparison.

The wool weight differences were insignificant between the romney strains but the coopworth strain was 8% to 10% superior.

It must be remembered that this result was from rams bred more than ten years ago. Up to 1978 the emphasis with the romneys was for improved lambing and easy care whereas the coopworth was a more prolific breed but subject to criticism for having less wool. The response from 1970 by coopworth breeders was to select for heavy fleece weights which gave the coopworth eight years advantage.

Given that there has been ten years further selection since 1978 and that the sires at "The Gree" have averaged +0.21 breeding value a ten percent genetic gain for fleece weight and 25% increase for lambs sold from 120% to 150% is used in this comparison.

Growth rate

In the following example the return for lamb at $17.00 is the same. To achieve this the lambs from the improved flock have to grow at a 5% fastr rate to offset the highr percentage of lambs which are born as multiples. This increases from 63% at 120% lambing to 88% born as twins or triplets at 150% lambing when a 12% lamb death rate is recorded.

The cost of growing an extra 300 lambs pr 1000 ewes depends on the grass growth pattern. In the Southland/Otago region of New Zealand raising the lambing percentage from 120% to 150% enables the grass to be utilised more efficiently because the stock requirements are better met by the seasonal growth pattern.

Table 4 The economics of livestock improvement

Take	1000 breeding ewes				4 % deaths
	255 ewe hoggest @ 75 = 191 stock units				2 % deaths
	Total 1191 stock units				
Item	**Control**				**20 years genetic Improvement**
					+25% lambing +10% wool weight + 5% growth rate
		Dollars			Dollars
Wool 400cpk nett					
Ewes 12 months	720@ 4.5 kg	12960	720@	4.95 kg	14256
4th ewes 10 months	240@ 3.8 kg	3648	240@	4.18 kg	4012
lambs wool	1200@ 1.3 kg	6240	1500@	1.43 kg	8580
ewe hoggets	250@ 3.5 kg	3500	250@	3.85 kg	3850
2th 2nd shear	250@ 2.5 kg	2500	250@	2.75 kg	2750
Lambs to works	945@ $17.00	16065	1245@	$17.00	21165
Ewes to works	210@ $11.00	2310	210@	$11.00	2310
Total gross return		47223			56923
Less expenses for 300 additional lambs					555
Gross return/stock unit (1191 su)		$39.65			$47.33
Advantage/stock unit to improved flock			$7.68		
For a sheep farm of 2500 stock units the advantage is					$19,200.00

Summary of the benefit to the commercial sheepfarmer

The above exercise shows clearly the financial benefit to the commercial sheepfarmer who has consistantly used rams from flocks which have implemented a breeding programme to improve the production of meat and wool. Nearly $20,000 on an economic unit each year has to justify such a programme.

The future

Response to the selection for improved productivity is dynamic. As progress is made priorities change. For the first 20 years of 'Sheeplan' a single index approach was adopted by most ram breeders. Now, with a better understanding of what computrs have to offer 'Animalplan' which replaces 'Sheeplan' is much more flexible.

We are seeing a switch to single trait selection and in some cases this is a search for major genes which can give a quantum leap in productivity. Sire referencing which makes artificial insemination a viable option is going to enable breeders to make faster progress. We have bred sheep for easy care characteristics. Now innovation in areas of disease resistance such as facial ecezma, footrot, and resistance to worms is being undertaken. It is interesting to note that in spite of all the drugs which have been available to boost production and reproduction, and genetic engineering concepts which we know about, over the last 20 years the selection for more efficient sheep to have built in genetic improvement has been profitable to the industry.

Table 5 The costs of implementing the breeding programme at 'The Gree' (Costs in excess of those which apply to a commercial flock)

Per 1000 ewes			Dollars
Lambs tagged 170%	brass tags	1700 @ 19c each	323.00
Lambs weaned		1615	
Ram lambs shorn rate 1.25		807 @+20c	161.40
Lambs autumn weighed		1535	
Ewe hoggets wintered	plastic tags	500 @+51c	255.00
Ram hoggets wintered	plastic tags	500 @+51c	255.00
Ram hoggets shorn rate 1.5		500 @+40c	200.00
2th rams palpated [vet tested]		300 @ 40c	120.00
Animalplan fees 1987 tag year		$60 per flock	60.00
		$1.30 per ewe	1300.00
Sire referencing 120 ewes artificially inseminated			1600.00
Lean growth analysis			800.00

Table 6 Extra labour

Lambing:	one person four weeks or 28 days @ $100	$2800.00
Weighing:	weaning three people 300/hour=17hrs @ $8.00	136.00
Assessing:	weaning 12 hours @ two people @ $8.00	192.00
Weighing:	autumn three people 300/hour=15 hrs @ $8.00	120.00
Assessing:	autumn 12 hours @ two people @ $8.00	192.00
Ram hogget shearing:	two people @ 5 hours @ $12.00	120.00
Ewe hogget shearing:	two people @ 6 hours @ $12.00	144.00
Preparation of records; lambing books, field lists, output sheets, check listing, analysing information		
Three hours/week @ $10/hour		1560.00
	Total	$10338.40

Ram selling and marketing costs are excluded.

Cost of breeding programme per ewe recorded = $10.34

Cost of breeding programme per ram sold = $34.46

(35 rams sold/100 ram lambs tagged)

Extra Feed

The cost of bringing rams out as well grown saleable animals is as much a function of marketing as it is of breeding. Winter contracts to supply well grown lean ram hoggets has in recent years become a reality. This also suits a breeding programme of population genetics which requires the disposal of inferior ram hoggets after hogget shearing. Therefore the extra cost of feed required to implement a breeding programme is a doubtful debit. In other words the cost of extra feeding is usually well justified by the increased value of ram sales.

REFERENCES

BAKER, R.L., CLARKE, J.N.; et al "Genetic variation among six strains of Romneys and Border Leicester and Coopworth crosses." Proceedings of the New Zealand Society of Animal Production 1987, Vol.47: 101-105.

ACKNOWLEDGEMENTS

J. Oliver, G. Hall, Ministry of Agriculture and Fisheries, Invercargill. P.D. Black, R.J.W. Campbell, R.M. Rohloff, fellow breeders, for assistance with the editing and the logic of this paper.