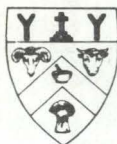


Farmers Conference

Lincoln College

**University College of Agriculture
Canterbury**

1984



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LINCOLN COLLEGE

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Contents

Conference organising committee	iii
---------------------------------------	-----

Introduction	1
--------------------	---

Opportunities for the future

Opportunities for future agriculture in Southland	
<i>A. J. Allison</i>	5

Management of the high fertility sheep flock

Management of prolific sheep flocks	
<i>R. M. Rohloff</i>	19

Objective selection of ewe lambs	
<i>A. J. McCraw</i>	24

The shepherd's viewpoint	
<i>R. Black</i>	27

High fertility by injection

Hormone immunisation for high fertility	
<i>J. F. Smith</i>	35

Experiences with hormone injection	
<i>F. K. Shallard</i>	44

Comments on previous papers	
<i>A. R. Sykes</i>	49

N.Z.A.P.S. Centennial Award — 1984: Mr Bill Walker.	
<i>J. F. Smith</i>	52

Entry into farming

Entering farming in the 1980s	
<i>D. K. Ower</i>	57

Lincoln College Foundation Farmer of the Year Award

Introduction	69
--------------------	----

Finalists	
<i>C. R. Davis</i>	71
<i>A. J. and J. G. Reid</i>	79
<i>B. J. Scott</i>	86
<i>R. F. Seebeck</i>	93
<i>G. L. Smith</i>	99

Lean lambs, new grading, the farmer's pocket

Justification of grading changes <i>R. Marshall</i>	105
Research findings in lean lamb production <i>P.F.Fennessy</i>	111
How the farmer copes with meat grading and lean lambs <i>C. C. Miller</i>	116

Management of high-producing grass pastures

A planned feeding programme for ewes <i>K. F. Thompson</i>	125
Spring management of pasture to increase summer white clover <i>R. J. M. Hay and G. S. Baxter</i>	132
Effect of seedhead control on pasture and animal performance <i>R. C. McDonald</i>	138

Cereal production opportunities for the South

Technology for survival <i>W. R. Scott</i>	149
Market prospects for the export of New Zealand barley <i>G. B. Robertson</i>	159
Milling oat requirements for Southland <i>S. R. Adams</i>	163
Cereal husbandry — cultivation to shipping <i>G. Gardyne</i>	166

Deer farming

Beginners guide to deer farming <i>K. Kelly</i>	177
Venison marketing and its potential <i>G. A. Thompson</i>	185
The economics of entering deer farming <i>G. A. G. Frengley</i>	192

Some social aspects

Marriage — a tax revolution <i>R. Richardson</i>	201
The role of 'Women in Agriculture' <i>J. Simpson</i>	205
Stress — the inevitable companion <i>D. Fergus</i>	209

Introduction

This year, for the first time, the Lincoln College Farmers' Conference was held away from the College.

In arranging this the Conference Organising Committee aimed to make the Conference more relevant to a local region. A programme was arranged to address the issues of the Southland region with the theme 'Opportunities for the Future'.

The Conference was strongly supported by Southland and South Otago producers.

A continuing feature of this years' Conference was the association with the Lincoln College Foundation. Five farmers presented summaries of themselves and their properties while competing for a Foundation Travel Award. Entry was for 'farmers who have owned and operated their own first full time property for five years or less'. These summaries are included in this proceedings.

**Opportunities
for the
future**

Opportunities for future agriculture in Southland

A. J. Allison, Regional Director, Invermay Research Centre, Mosgiel

Southland can be considered the most efficient livestock farming province in New Zealand. However, this is no cause for complacency because substantial production increases are possible following the more widespread application of existing technology. Certainly the province has played its part in the survival of the meat industry to date which has largely been achieved by maximising throughput and the supply of carcass sheep meats to world markets. Economic predictions made as recently as 1980 (Ojala 1980) suggesting a six-fold increase in demand for sheep meats by the year 2 000, no longer appear to be realistic.

Recent major problems in marketing of sheep meats, and low prices to farmers bolstered by contributions from SMPs and Meat Board stabilisation are causing a lack of farmer confidence. Problems with marketing have been compounded by the large increases in volume of lamb and mutton available for export from 1980 to 1983.

SOIL RESOURCE AND POTENTIAL

In considering opportunities for agriculture in Southland it is first appropriate to consider the potential for expansion of production, and then to comment on what proportion of that potential might be realised.

The main soil groups in Southland have recently been categorised according to their pastoral farming, cropping and forestry capability (Bruce, in press). The areas identified in these potential-use categories are as follows:

- * Horticulture and intensive cropping — 78 000 ha — 2.5% of the total land area. These soils have very slight limitations for cropping, and are mostly of high quality. They are very versatile, and need protection from urban encroachment and other non-productive land uses.
- * Cropping and intensive grazing — 313 500 ha — 10% of the total land area. These soils can be used for horticulture but are more suitable for cereals and other food crops.
- * Intensive and semi-intensive grazing — 311 400 ha — about 10% of total land area. These soils have slight limitations for pastoral use, but more severe limitations for cropping result from both the slope and soil structure. They are not as productive for pastoral use as either of the above, but are most suitable for the production of prime or store stock.
- * Intensive/semi-intensive grazing or production forestry — 236 900 ha — about 7.5% of the total area. These soils are not suitable for cropping but have only slight limitations for pastoral and forestry use. They are suitable for prime or store stock production, or commercial exotic forest.
- * Production forestry — 242 600 ha — 8% of the total area. Those soils have only slight limitations for forestry, but have moderate-severe limitations for pasture or crops. The total area is adequate for large-scale forest development and much of it is favourably located.
- * Semi-extensive grazing — 168 700 ha — 5.5% of the land area. In general, these soils could not be developed for uses other than grazing but are suitable for the production of store stock.
- * Extensive grazing and conservation — 170 800 ha. These soils are generally of low fertility and have severe limitations even for pastoral use as a result of erosion and climatic conditions.
- * Conservation — 1 584 500 ha: Soils in this class are mainly in mountainous country with severe or very severe limitations for pastoral use. A large part of the area is forested ie., most of Fiordland and Stewart Island, and is unsuitable for pastoral use. This area (51% of the Southland region) cannot be exploited for increasing

agricultural production because of erosion and additional climatic problems.

POTENTIAL FOR INCREASING STOCK NUMBERS

Stock-carrying potential is computed by estimating the potential herbage production, allowing a potential utilisation figure of that herbage, and then assuming that each stock unit would consume 550 kg of herbage DM per annum. These data are summarised in Table 1 which specifically excludes land assessed as most useful for conservation. It is significant that these levels of DM production on each particular land class and the percentage utilisation figures outlined may be achieved relatively easily.

At the present time, there are about 10 million stock units carried in Southland, and the estimate of potential is almost 16 million (which includes 1 million in the 'Production Forestry' land-use category). The number of stock units being carried in Southland today is only about half a million greater than in 1972 because of the significant decline in sheep numbers from 1973 to 1975. However, since 1975 the livestock numbers carried have risen steadily. Increasing sheep numbers have to some extent been at the expense of cattle which have decreased by 25% since 1976.

The proportion of the potential identified in Southland which is realised depends largely on the economics of that production. This in turn will be determined by available incentives, costs of production and processing, and a smoothly running processing sector upon which slaughter dates for stock might be reliably programmed.

INCREASING LIVESTOCK NUMBERS AND PRODUCTIVITY

Land development and grazing management

Much of the increase in livestock numbers considered possible can be achieved in land development programmes for which technology is already known, or for which quite extensive research programmes are currently being carried out. The use of inoculated and pelleted clover seeds and fertiliser application will allow greater amounts of high quality feed to be grown. A higher proportion of this feed can be utilised by larger numbers of stock if additional fencing provides the necessary control in more efficient grazing systems. In areas where acid soils are not particularly suitable for the introduction of white and red clover, Maku lotus and plants of this type lead the way for exciting land development possibilities in the future.

Per animal productivity

Considerable gains can be made by farming more productive stock and there are a number of ways of achieving this. Sheep numbers in Southland have increased by about 3 million over the past two decades whereas lambing percentages have decreased. From 1961 to 1970, lamb tailing percentages ranged from 110 to 119 (average 114), but since that time the provincial average has only been more than 110% once — in 1980 (average 106). The logical conclusion is that

sheep liveweights have decreased with increased stocking rates. The decrease in the weight of freezer ewes over the same time period from about 26 kg to less than 20 kg tends to confirm this view.

New breeds of sheep

The Ministry of Agriculture and Fisheries plans to bring into New Zealand three new breeds of sheep — the Finnish Landrace, the Oxford Down, and the Texel — which have been identified in countries free from the disease Scrapie and other exotic diseases which New Zealand wishes to exclude. In breed comparison trials with Finnish Landrace animals before the slaughter of the ill-fated exotic sheep imports in 1978, Finn × Romney animals were substantially more productive than were contemporaneous Romneys. The productive advantages of the imported sheep have been estimated to be worth \$7–10/SU net profit — a rise of 40% (Bushnell & Hutton 1982). This rise in profitability is the result of the very large increases in lamb drop.

The other exciting breed is the Texel which has been well researched on the Continent and in the United Kingdom. The Texel's most important attribute is carcass composition, and in comparison with Suffolk cross lambs Texel crosses have up to 1% higher killing-out percentage, 3.5% less fat, 4.2% lean, and 0.7% less bone. This result has very substantial implications for a lamb production industry.

The Oxford Down will provide an alternative heavyweight sire to the Suffolk presently available in New Zealand.

Providing animal health standards can be maintained, importation of these sheep breeds is of the highest priority. There has been much doubt expressed by members of the farming community about the wisdom of attempting to import additional breeds of sheep. However, these doubts have not been logically substantiated.

Farmers will choose to use these new sheep breeds (including the Booroola Merino as a source of high fecundity genes) if they are confident that production advantages can be translated into additional profit.

Breeds of cattle and age of mating

Studies at Tara Hills and at Ruakura over many years have consistently shown Friesian cross beef breed dams to be more productive than Angus cows. This productivity has been measured in terms of fertility, milk production, and therefore weaning weight (30–50 kg advantage) and efficiency (about 20% increase in weight of calf weaned per 100 kg of cow liveweight (Baker & Carter 1976; Parker *et al.* 1977).

These results are clearly not reaching the beef industry which does not appear to be sufficiently motivated to increase efficiency by converting grass to saleable meat on the basis of these findings. It is the very low uptake of the information in industry which caused the author to discontinue cattle work at the Tara Hills High Country Research Station and to almost completely eliminate beef cattle research at the Invermay Centre.

Beef production may also be increased by the mating of yearling cattle. This is not widely practised within industry although substantial data have been presented showing that the practice is both feasible

and possible. Significantly, Carter (1973) has found that between weights of 215–306 kg (a wide range) there was little apparent relationship between joining weight and subsequent reproductive performance.

Selection within breed

Principles of selection within breeds of sheep and cattle are quite well understood by the farming community, and the numbers of flocks and herds on Sheeplan and Beefplan respectively, indicate that these principles are being applied. However, in terms of effectiveness of selection programmes within industry, there are substantial opportunities for much greater co-operation between groups of farmers than exist at the present time. These comments are made with specific reference to the following criteria: *fecundity, wool production and leanness*.

The outstanding example of selection for fecundity comes from the Lands and Survey breeding scheme at Waihora where selections have been made from amongst 300 000 animals being farmed by the Department of Lands and Survey in the Rotorua district. Ram progeny selected from within their elite flock of 5 000 ewes have been compared with industry Romneys and the ewe progeny of the former have consistently had higher lambing percentages (average 15% each year) than the industry Romneys. This difference illustrates the gains which can be made by judicious animal breeding and the application of selection principles to large populations. Commercial groups, where farmers pool their resources between regions, now exist throughout New Zealand but further potential for this avenue of flock improvement exists.

As has clearly been shown in programmes of increasing ewe fecundity, screening of very large numbers of animals for wool weight and leanness (or other economically indicated criteria) will identify the outstanding individuals. These may then be run in central flocks where further selections can take place. Invermay programmes are giving major emphasis to both these traits in studies being carried out in full co-operation with farmers in Southland, and early indications are that progress can quickly be made.

It is important that Sheeplan and Beefplan records are more widely used to ensure that outstandingly productive animals for various traits are quickly recognised. Data within these breeding schemes belong to, and have been paid for by individual breeders, and providing those breeders agree to having their data accessed, it is important that this be possible, quickly and efficiently. In the future, much greater farmer co-operation in objective performance recording of livestock should be possible with MAF advisory and computing inputs being freely available to service this co-operation.

In the future non-castration of males should also play a significant part in ensuring high growth rates and decreasing fatness in both sheep and cattle.

AGROFORESTRY

Over the past decade there has been a substantial increase in interest in forestry production systems associated with the grazing animal based on the excellent work carried out by MAF and the New Zealand Forest Service (NZFS). There has also been considerable opposition where land considered to be suitable for sheep grazing or for cropping has been considered for afforestation. With the exception of the National Water and Soil Conservation Organisation (NWASCO) land capability classes 1-3, the apparent conflict between agriculture and forestry should largely have been defused. Local authorities adhering to criteria adopted in district schemes, and many farmers, may disagree. Current analyses by the MAF and NZFS indicate that forests which are thinned to low ultimate stocking rates ie., 100 stems/ha, provide substantial grazing opportunities for a large part of the tree rotation length. This strategy appears more profitable than either trees or grazing separately (Percival & Knowles 1983). Surely this is a more flexible approach for many areas of New Zealand to produce saleable export products for the future. Improved silvicultural techniques in association with the agroforestry regime suggested, will produce high quality saw logs of maximum value per cubic metre. If land was more readily available more investment than is available at present might be attracted in both Otago and Southland.

DEER FARMING

The deer industry has expanded rapidly since the early 1970s, following material assistance from research inputs — particularly from the Invermay Centre. Presently, there are about 2 200 deer farmers farming about 260 000 deer. Numbers of animals farmed are increasing as rapidly as reproduction rates allow. It is likely that it will be a further eight or nine years before the deer industry could expect to have one million hinds. The immediate outlook for velvet antler in the Korean market is not optimistic, and it is likely that many more tags will be offered to deer slaughter plants in 1984-85. Clearly there is enormous potential for venison production which could be up to 40 000 tonnes by the mid 1990s from a level of 500-700 tonnes in 1983 — an average yearly rate of increase of 30%. Obviously great care and initiative will be needed in market promotion and quality control, but there will be ample opportunity for this as the volume of product gradually increases. Present research assessing the effects of electrical stimulation on meat quality compared with conditioning for various periods, will be vital to product quality assurance in the immediate to medium-term future.

There is substantial interest in importing elk from Canada, and also red deer from the United Kingdom and the Continent. Although it seems that strains of red deer from overseas sources have very high weights of antler velvet which would be attractive in the New Zealand industry, it is likely that similar or increased progress could be made by selection within our existing populations of red deer. Antler velvet weights can also be increased markedly in wapiti or elk crossing programmes. Indeed in the future, herds of purebred elk may well be farmed to

produce heavy weights of high quality antler velvet which will continue to command premium prices.

Pere David deer, which number only about 1 100 in the world, may also find their place in our industry. These animals rut three months earlier than red deer, have a longer gestation period, but still calve five to six weeks earlier. There may be advantages with an earlier calving hybrid animal which could utilise higher quality feed available in the late spring to achieve higher weaning weights of progeny compared with present farming systems.

THE MEAT INDUSTRY

Previous discussion in this paper on increasing total numbers of livestock, particularly sheep, and increasing performance of individual animals by changing breeds or selecting within breeds, assumes that the product can be readily marketed with sufficient prices being paid to the primary producers to keep them in business. If the producers think that increasing the price of their product overseas will solve their problems then they will probably be disappointed. Prices for sheep meats on the overseas markets at present are relatively high; retail prices in the United States and United Kingdom in 1983 were about \$6 and \$5 kg, respectively. There are however, substantial economies to be made in various sectors beyond the farm gate which may result in the potential to pay higher prices to producers.

In order to maintain our existing market share and to be able to market additional amounts of sheep meat products, which we undoubtedly have the ability to produce, capabilities in both meat processing and marketing must improve. Hopefully, in the near future all sheep meats, including those destined for the local market, will have been electrically tenderised ensuring more even quality than is currently produced. Although there was the capability in slaughter plants to use this technique on 40% of the total lamb kill in 1982-83, only 17% met the standard (Frazer 1983). The capability of treating carcasses in this way has increased markedly over the past 12 months and it seems imperative in the future that such treatment is mandatory.

There are many opportunities for further processing of both lamb and ewe carcasses, and there are potential savings of freight of cuts and bulk meat to overseas markets. Simply cutting frozen carcasses into bits is not necessarily a definition of 'further processing', particularly with the shoulder joint. De-boned and rolled shoulders held in an elastic net are a very attractive cut by comparison, and seem a good opportunity for adding value to a product which should be more acceptable to consumers. Alternatively, boned lamb shoulder meat may be sold as a bulk product for further processing in New Zealand or overseas. Some cartons of export lamb shoulders available in Southland last year clearly lacked any form of quality control at the time of cutting and could be predicted not to receive an enthusiastic response from overseas consumers.

Killing charges in the vicinity of \$11-12 for lambs and \$14-16 for ewes, are just as big a problem for the farming community as philosophies of introduction of new technology and reducing manning rates on slaughter chains are for the unions. Currently, wages and

salaries make up about 60% of killing charges (Davey 1981). If the meat industry was to substantially reduce labour on slaughter chains then an opportunity exists to deploy much of that labour to the area of further processing. There has been talk in many areas of New Zealand about the provision of further small slaughter works capable of introducing new technology and which would have associated processing facilities. The provision of further slaughter space neither seems to be necessary nor economic. Presently, all sheep and cattle are killed, albeit sometimes more slowly than farmers would wish, in existing facilities which operate for only one short shift per day and then only for 130-140 days/annum. Killing space presently available should be adequate even if sheep and cattle numbers were to increase markedly. It is extremely costly to build new works, and simple calculations would indicate that interest charges per processed carcass would be in the order of \$6-7 before any other charges are considered. When the meat industry has not accepted utilisation of slaughter plants seven days per week, or working them more than one shift/day at peak periods during the year (although this may necessitate provision of further chilling and freezing space), then there does not seem to be any compelling rationale for the provision of further, very expensive slaughter facilities. Certainly additional processing capacity is urgently needed.

The lamb kill with more than 3.5 times the volume of export mutton is clearly the major economic concern for the industry. However, the value, or lack of value of slaughter ewes is a real crisis. A recent National Business Review (NBR) article (May 7 1984) estimated that if it were not for SMPs and meat industry stabilisation account subsidies, farmers would suffer a net loss of \$3.50/ewe. About 6.5 million ewes are slaughtered each year for export, resulting in 125 000 tonnes of mutton, and this product in carcass form is particularly difficult to sell. The NBR report concluded that the Meat Board would have saved \$18.5 million by paying the producers the \$41.5 million necessary to give the full SMP schedule and asking them to dispose of the animals on farms. Their offer, while not attractive, is economic. In comparison with this dismal picture, some facilities in New Zealand are boning-out ewe carcasses into a variety of products. The return for these products, excluding all charges, is about \$5, compared with an estimated \$3.50 loss when carcass sales of ewe mutton are considered. Surely industry should be attempting to increase the percentage of export mutton treated in this way which will necessitate a much more aggressive and effective marketing push as well as the provision of further processing facilities.

Proposals for alternative uses of the product are currently being considered eg., canning; cold pack mutton products such as 'spam'-type canned meat, mutton-based luncheon meat and sausages; keg mutton salted and packed in barrels; and a variety of other products. It has been reported that one New Zealand company has offered to buy up to 25 000 tonnes of mutton per annum to process into a de-naturised mutton product used in canned products both here and in joint plants in Asia. Such an offer should be treated with great enthusiasm. Obviously a reasonable charge must be made for the meat,

but a break-even cost for carcass mutton would be in the order of 70 cents per kilogram or 115-125 cents boneless. In order to ensure that such proposals receive an economically attractive, rapid, and effective response perhaps the Meat Board should gift the first 3 000-4 000 tonnes of product. It is essential that if a canning operation such as this is established it pays a reasonable price for the product, and having done that would be guaranteed access to product in the future.

In discussions with meat company personnel and with the farming community (Pryde 1984) there is a strong indication that research and development inputs from the Government sector should be shifted beyond the farm gate, particularly into marketing. From a MAF point of view, it is difficult to see where personnel can be really effective and be accepted in a facilitating and assisting role in helping to solve the meat industry's problems. Some Meat Research Institute staff have been working in conjunction with commercial interests to develop new technology for slaughter and processing. In horticulture there is producer co-operation in funding MAF personnel jointly with industry personnel for market research expeditions. This close acceptance and financial commitment is not as readily forthcoming in the meat sector when in fact MAF could provide a number of personnel who could contribute significantly. There is a real challenge for government departments (not only MAF), and meat companies to consider how co-operation could best be fostered to benefit processing and marketing activities which will bring highest value for animal products produced so efficiently in New Zealand.

LONGEVITY OF THE BREEDING EWE

One strategy which would be extremely useful in alleviating the 'ewe mutton mountain' problem would be to run ewes on farms for a longer period than they are presently carried. A Lincoln College survey on the economics and management of 'gummy' ewes (McGregor & Frengley 1976) and unpublished Invermay work suggest that 'gummy' ewes, which would under normal culling practices be sent to the freezing works, can be profitably carried on farms one or two years longer. Most of these ewes will have a moderate reduction in fleece weight but will still be near the peak of their reproductive potential. If ewes were on average carried on farms one to two years longer, even with the concomitant higher death rates particularly in a second year, this would reduce the replacement rate and allow a greater kill of female lambs of higher value to be made each year. Perhaps diminishing the returns of ewes slaughtered in works to the farmer, by either giving them no payout at all or charging the real cost of present Meat Board policies, would precipitate many farmers to take this course of action. The number of ewes killed would thus be reduced.

There are also substantial production gains to be made by slaughtering old ewes earlier than is normally the case. The savings in feed when slaughtering about six million ewes one to two months earlier can be calculated and the provision of the feed to the remainder of the national ewe flock will increase lambing percentages as a result

of increased liveweight. Surprisingly, such a strategy would result in an increased national income of \$20-30 million.

LIVE SHEEP EXPORT FOR SLAUGHTER

Present government policy considers the export of live sheep from New Zealand for slaughter to be unfeasible. Recalcitrant union attitudes precipitated this stand. However, the export of live sheep for slaughter in the Middle East seems logical. There is certainly substantial demand in that region with Australia exporting about 6.5 million whethers per annum. Prices in Western Australia are between \$A20 and 30 to the farmer. There is a substantial opportunity in New Zealand to produce a high quality product, and while we are not attempting to supply Middle Eastern markets, our Australian competitors will continue to be appreciative. Also, provision of some live sheep for slaughter into Middle Eastern markets should facilitate the sale of carcass or cuts of sheep meats.

The export of slaughter sheep to the Middle East cannot be seen as a solution for the problem of excesses of ewe mutton. These markets prefer entire male animals, particularly at times of religious significance. Although it may not be easy to obtain Fat Tail sheep in New Zealand the importation of such animals from a marketing and profitability point of view seems attractive. When Australian whethers were selling at \$A75 in early 1983, Fat Tail sheep of similar weights were selling between \$A125 and 300. New Zealand should therefore be strenuously trying to identify sources of Fat Tail sheep of acceptable health status which could be imported into, and established in this country. The first and most obvious possibility is however, to initiate some trial shipments of young entire sheep into Saudi Arabia and Kuwait.

GRAIN PRODUCTION AND FURTHER DIVERSIFICATION

Wheat production in Southland will be dictated by quality requirement for wheat and access of Australian product for milling. Barley production will probably fluctuate depending on export contracts. Horticultural production, particularly blackcurrants and vegetables, is possible in this environment although again marketing constraints have prevented further expansion. The possibility of leaf protein extraction will probably be dependant, at least in the short term, on progress with the scaling up of technology developed at the Ruakura Research Centre.

Although production either from rapeseed, crops converted to biogas, or from sugar beet is possible now, it will be dictated by import prices and the availability of liquid fuels in the future.

Increased production in the agricultural sector will depend to some extent on research and advisory inputs and on the technical education of the farming community. With increasing pressure on government expenditure it is likely that these sectors will have increasing difficulty maintaining their present level of activity, and some advisory services will be on a user-pay basis. In a recent survey Pryde (1983) noted that the 'average' farmer was 44 years of age, 96% were male, only

18.8% had school certificate and 9% had university entrance in spite of the fact the 39% had travelled overseas to observe farming techniques. Obviously there is a major challenge to tertiary education establishments to expand education opportunities in agriculture.

Within the agricultural industries, the stock and station agents who visit and have close contact with most farmers have a largely unrecognised and certainly critical role to play in disseminating technological information relating to production increases. In the future, there could be a profitable expansion in the number of agents with tertiary agricultural education to ensure that a better technological service might be offered to many more farmers than is presently possible. If through such services clients' total productivity increases then based on commissions on produce revenue of firms can be at least commensurate with their efforts in this area.

CONCLUSION

The foregoing discussion has outlined some of the major opportunities for economic survival of the agricultural industry not only in Southland, but also for the whole of New Zealand. Production on farms will be influenced largely by prices offered to farmers and incentives to them, either through direct pricing or government programmes to promote that production. The primary motivating factor for farmers to increase their production is net profit after tax. This will overcome many variously defined social disincentives. In Southland, as in most areas in New Zealand, the land form and capability is such that pastoral industries and/or forestry are the only major alternatives for efficient land use and profitability. Consequently, export income from these activities will be increased only by greater production of products which have added value in New Zealand, at a lower cost and which are more effectively marketed than at present.

Potential use category	Area (1 000 ha)	Potential herbage production	Potential utilisation (%)	Potential (SU/ha)	Total potential SU (1 000)
A	58.0 ¹	13.0	85	20.1	1 166
B	298.5 ¹	12.0	80	17.5	5 239
C	311.4	10.0	80	14.5	4 515
D	236.9	8.0	75	10.9	2 582
E	242.6	6.0	75	8.2	(1 989) ²
F	168.7	4.5	65	5.3	894
G	170.8	3.0	60	3.3	563
Total					15 959 ²

TABLE 1: An estimate of potential for increasing stock numbers in Southland.

- ¹ 20 000 ha and 15 000 ha excluded from total land areas in A and B respectively, to allow for cereals and horticulture at present.
- ² One million SU included in the total as potential within soils more suitable for forestry.

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Management of the high fertility sheep flock

Management of prolific sheep flocks

R. M. Rohloff, Technical Officer, Invermay Research Centre

Profitability on many of our intensive sheep farms must increase if the farms are to compete with alternative land uses such as deer farming, cropping, and horticulture. Increased productivity is a major component of increased profitability. Therefore, it is logical to maximise the reproductive advantage that twin and triplet-producing ewes provide by achieving high lamb survival and good growth rates to weaning. Farmers must be prepared to adapt their management systems to maximise on sheep which are either genetically prolific, or which can be made prolific following immunisation. Prolific sheep flocks are those that usually tail over 130%.

This paper discusses the main management practices needed to maximise survival and growth rates in lambs of multiple birth rank. These lambs predominate in flocks which tail over 130%.

Lamb survival is governed by a combination of management and environmental factors — the latter being beyond the farmers control.

However, the influence of management may assist in reducing the effect of adverse weather conditions. The management system instigated must match the expected productivity of the flock. If half of the ewe flock produces twins then two thirds of the lambs born will be of multiple birth rank and will therefore be responsible for the bulk of income. Fig. 1 outlines the proportion of birth ranks in four typical flocks with various lambing percentages. More twins than singles are born in flocks which drop more than 140% (LB/EL). Triplets do not occur in significant numbers under 160% lamb drop, but increase rapidly to about 30% of all lambs born at 200% lamb drop.

Lamb birthweight has the greatest effect on lamb survival. Fig. 2 outlines the 'safe' range (those with the best chance of survival) of 3.5–5 kg for traditional breeds and 3.5 to almost 6 kg for easy birth strains and breeds. A heavy birthweight means that the lamb has more fat (energy reserve) to combat the enormous heat loss after birth and more developed birth coat for insulation once it is groomed by the ewe. A heavy lamb is a better competitor for milk in a litter situation. Shelter and labour can compensate for low birthweights.

Farmers whose flocks usually tail over 130% must aim for lamb birthweights that are as high as possible. Mature ewe size is the major factor to consider. Fig. 3 indicates that ewes over 55 kg at joining should produce mainly 'safe' twins. Where twins are heavy singles are also heavy, therefore prolific sheep which produce big twins should be capable of easy single births. Two-tooths produce lambs 15% lighter than older ewes, hence, at birth most of their twins are at risk.

	Flock fecundity	
	High	Low
Mean ewe liveweight at joining (kg)	63	50
Lambs reared per ewe	1.45	0.9
	Required DM (kg) (seasonally available S.I. pasture)	% more DM than low fecundity ewes
Flushing per mating	1.2	35
Early pregnancy	0.9	40
Last 6 weeks	1.5	90
Last 3 weeks	1.9	110
Last week	2.4	120
Early lactation	2.2	45
Post weaning	0.8	35

TABLE 1: Per ewe feed requirements of high and low fecundity flocks.

Feed management becomes more important as flock prolificacy increases (Table 1). The level of feeding during the first three months of pregnancy is very important in prolific flocks. Ewes should not lose

more than 5 kg of liveweight otherwise placental development will be reduced and low twin lamb birthweights result. A ewe which loses over 12% of its mating liveweight up to Day 90 of pregnancy may reduce lamb birthweights by 10%, irrespective of the level of late pregnancy nutrition. This puts the majority of 'safe' twins into a poor weight range.

Allocation of feed supplies must be very precise and efficient to meet the feed requirements of prolific flocks, especially during late winter when saved pasture is of considerable economic value. I place equal importance on mating crayon marks as on portable electric fencing for the efficient organisation of feed and labour. Crayon colours should be changed every eight days.

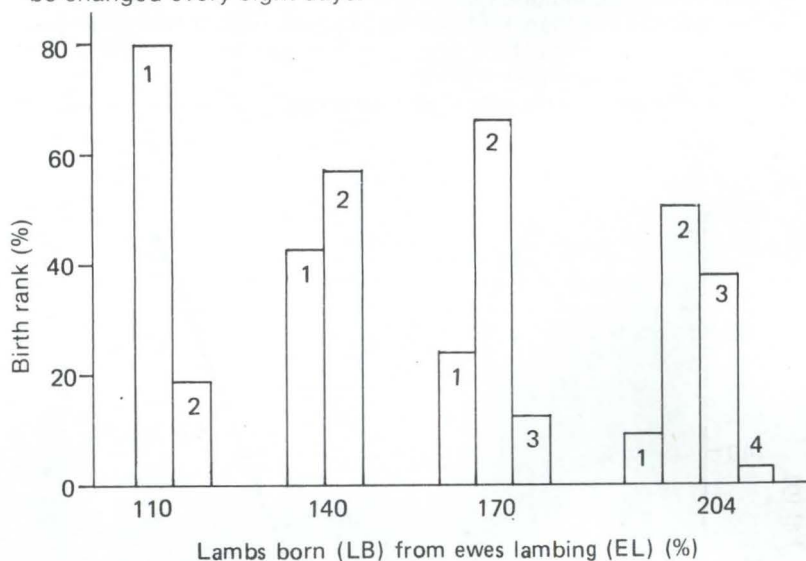


FIGURE 1: Lamb birth rate distribution within flock.

Twinning ewes need a less stressful environment at lambing and more time for the establishment of bonding and suckling than single-producing ewes. Therefore, lambing mobs should be set-stocked to minimise disturbance from other ewes. Mothering ability is a heritable trait. Easy birth and good mothering ability is 'easy care' which is entirely the responsibility of the ram breeder.

Feed management of prolific flocks should not only furnish the demands of the developing conceptus, but also prevent excessive loss in ewe condition during late pregnancy. Ewe condition is a nutritional buffer during late pregnancy and early lactation. Pregnancy in twinning ewes normally removes 20% of stored fat. Ewes which lose almost half of their condition risk a reduction in twin weaning weights of 30%. Most triplet-producing ewes lose about 50% of their condition by parturition. Six weeks of lactation in early lambers normally removes another 20% of ewe condition. Therefore, a 60 kg twinning ewe at joining is likely to lose 15 kg of liveweight by weaning. Two-tooth ewes

are usually 5-8 kg lighter than mature ewes at joining. Two-tooths rearing twins may need priority feeding to recover and gain liveweight by the next joining. Delayed joining is commonly used in prolific flocks to coincide the commencement of lambing with the availability of spring pasture. Split joining can also be used so that thin ewes or two-tooths are joined later. Milk production will not be significantly reduced because spring pasture is usually available. Feeding of concentrates in late pregnancy is a management practice worthy of consideration. A lack of rumen volume resulting from foetal burden may prevent adequate intake of a diet consisting only of pasture — this results in accelerated ewe condition loss.

Flocks with greater than 130% tailing produce more twins and have greater and more critical feed and labour requirements than flocks producing a high proportion of singles.

It pays not to waste a reproductive advantage.

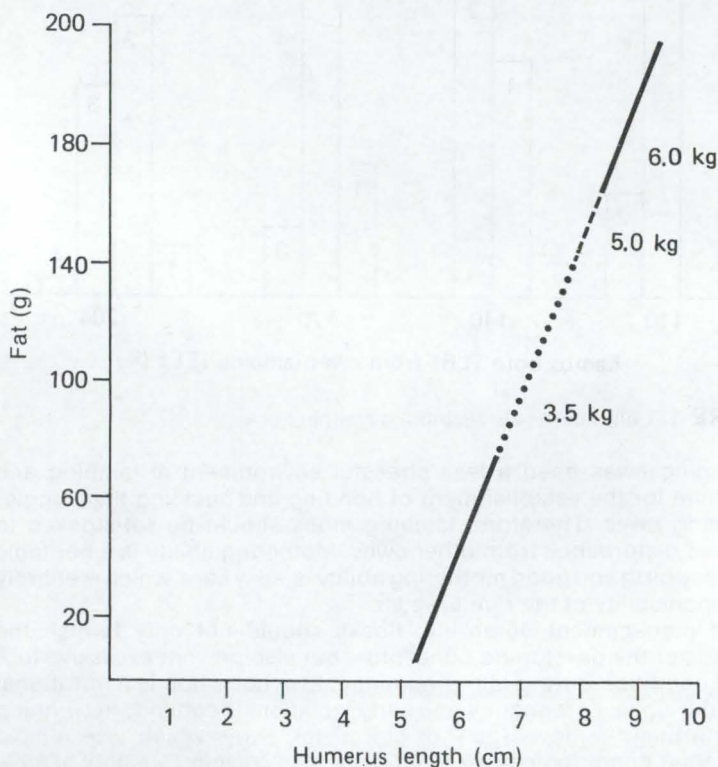


FIGURE 2: Effect of total weight on maturity (144 days), adapted from Robinson (unpublished data).

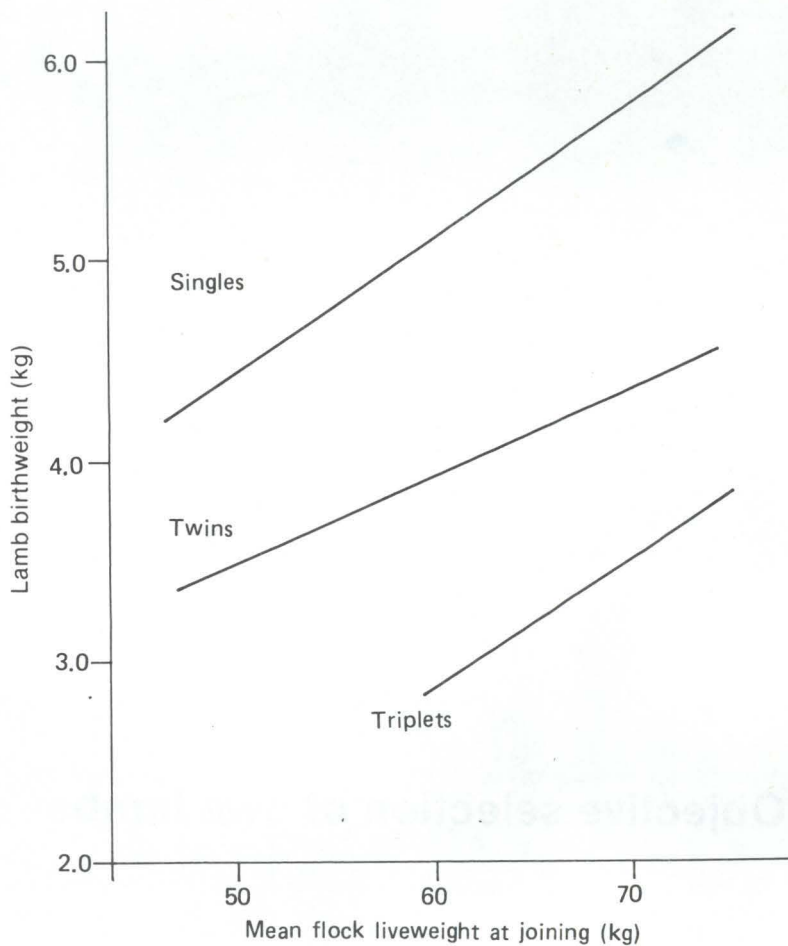


FIGURE 3: Flock liveweight and lamb birthweight relationships.

Objective selection of ewe lambs

A. J. McCraw, Sheep and Beef Officer, MAF, Gore

There are two types of selection — subjective and objective. Subjective selection is selection solely by eye. This is based on how you imagine the ewe lambs or their offspring may perform. Objective selection is based on measured information eg., the liveweight of ewe lambs or fleece weight. Factual information can be used to predict how offspring are likely to perform. Before you start thinking about selection you first must establish your own flock objectives. A clear plan for your flock makes your objectives more attainable.

This paper discusses the genetic gain you can expect to make following objective selection. A genetic gain is a permanent gain over and above any nutritional gains. Of the total expected genetic gain in commercial flocks, only 15% comes from ewe hogget selection whereas a further 5% comes from ewe culling. The most important contribution of 80% comes from the rams you purchase each year.

RAM SELECTION

The ram is very important because he is capable of leaving 100 times more progeny in his lifetime than a ewe. The major consideration in ram selection is the choice of the ram breeder. You must select a ram breeder who has a record of genetic progress in the production traits you are interest in. First, look at his breeding policy. He must have over 200 ewes, have a performance record on Sheeplan, be making progress on selected traits, apply selection pressure using Sheeplan, use sires he has bred himself. There are also management practices to consider. The ram breeder must have the same management practices as you and a similar environment. You must know his flock performance, the production level of his clients, and whether vets inspect his rams. Ram selection is the most important job on the farm as it determines the destiny of your flock's production.

EW E HOGGET SELECTION

It is unprofitable in most instances to winter additional hoggets because of the costs involved in wintering stock and the introduction of the new meat grading system. Selection based on body weight can be carried out before the spring or summer to reduce the number of over-wintering stock.

There are several methods for objectively selecting ewe lambs: hogget oestrus, liveweight, birth rank, fleece weight, birth rank with liveweight.

If your objective is to increase your lambing percentage Table 1 indicates the selection criteria you should use for a given performance level.

Performance levels	Singles (%)	Multiples (%)	Selection criteria
Up to 100%	90	10	Liveweight using scales
100-110%	60	40	Hogget oestrus
110-120%	45	55	Birth rank
Above 120%	30	70	Birth rank with liveweight
Suggested aim 160%	20	80	Birth rank with liveweight

TABLE 1: Ewe hogget selection criteria to increase present lambing performance levels.

If your major objective is fleece weight, it is not worth carrying additional hoggets to cull and sell after weighing their fleeces in the spring unless you can get \$15 more than the prime lamb price. However,

weighing hogget fleeces is worth the effort if you put perhaps 30% of your two-tooths to a meat breed sire. As a result you are only breeding from the top 70% of your two-tooths.

EWE SELECTION

Ewe selection only accounts for 5% of your genetic gain and is quite a simple procedure. All poor producers and sheep that are trouble-makers are culled eg., ewes with udder problems, poor mothers etc.

CONCLUSIONS

In summary, the ram is by far the most important component when you are trying to improve the genetic performance of your flock. If you are in a situation where it is difficult to objectively select ewe hoggets, eg., extensive or semi-extensive farming, ensure that you are buying rams from a breeder who is making good genetic progress in the productive traits you are interested in. The objective selection of ewe hoggets and ewe culling can also contribute to the genetic gain of your flock.

The shepherd's viewpoint

R. Black, farmer, Groopers Bush

In this paper I will be discussing my management methods of previous years using a hypothetical farm of 125 ha, running 1 500 Coopworth ewes producing more than 160% lambing, 400 ewe hogget replacements, and about 16 SU/ha. This is a typical one-man unit, with a little casual assistance, for our area.

A farm management programme blends from one year to the next. I will start by discussing my ewe flock management from early January, having weaned, culled, and shorn in late December.

At this stage, I consider it important to take out of the flock rising four-tooth ewes that have reared twins or more along with any lighter condition ewes. These ewes will be run on better feed, probably for about one month. After one month most of this group will be in good condition and will rejoin the main flock who have been used for pasture control. In early March, I would check-weigh about 10% of the ewe flock, and take out any light condition sheep. The objective is to have all sheep within a fairly narrow weight range before mating. One does

not get the best results by having a flock average weight of 60 kg, if the range is from 40–80 kg. By the beginning of April, I aim to have the flock in good forward condition with an average body weight of about 62 kg and range of 55–72 kg. I find I have no difficulty getting the big framed Coopworth two-tooths I have on the property up to a similar body weight at this stage.

MANAGEMENT OF FEED

With tupping scheduled to commence on 20 April, I would have various ram mobs sorted out and would be ready to start intense flushing by 10 April. This would generally involve three mobs. For this purpose, from early March I save about one third of the grassed area of the property that has been well grazed down, and with the use of some nitrogen I can have 20 cm of really good quality feed available for the flushing-mating period.

In Southland and elsewhere, the weather conditions cannot be controlled and good growth guaranteed but with the use of nitrogen in late February or early March I find my grass growth rate almost doubles. This assures me of a good flushing feed. Nitrogen application in late February has a carry-on effect on the growth into winter.

I have found stocking ewes at 150/ha and rotating every day a good system to best utilise this long fresh feed. Each block has three days spell before the next grazing. I have ample feed on these blocks to feed the sheep until after the end of the first cycle, when all breeding stock rams would be replaced with export lamb sires.

Using this method of flushing and mating, I get a 3–4 kg rise in body weight in the first ten days, and a similar gain in the following first cycle. I consider this to be a very important contribution towards obtaining a really high lambing performance.

To assist in the management of feed in spring, and to reduce the work load at lambing I change the colour of ram crayons at seven-day intervals. By the end of the first cycle about 10% of ewes are not mated.

For the first six weeks after the rams are joined with the ewes I take special care to avoid placing any stress on the flock eg., I avoid suddenly limiting feed supply. A reasonable proportion of the farm has been spelled for six weeks by June and this enables me to proceed with my winter rotation using daily shifts. I have found that up to 800 sheep in a mob come through the 100-day winter period much better than one large mob. Although this requires extra electric fencing, the smaller mob shifts more easily, is usually more settled, and contains fewer sheep that are unable to compete for food. I do not deliberately take condition off my ewes — our climatic conditions do this adequately at times. I feed some hay which is spread out before sheep move into an area according to availability — about one bale per head for winter.

I like to retain ewes on this rotation system and I increase the amount of feed as lambing approaches. I set-stock the first two seven-day lambing groups at about 20/ha just before lambing commences. Later lambers are left on break feeding as long as possible to build up a better supply of feed.

LAMBING

At the commencement of lambing ewes are stocked more heavily than normal which enables me to have two or three paddocks available into which twins and triplets are moved. Using a motorbike I move ewes with single lambs, twins, and triplets, to separate paddocks as lambing progresses. This enables me to adjust stocking rates: twins and triplets are set at 12.5–15 ha giving preference to triplets for feed and shelter; single ewes are set at 20 ha. I have noted that triplets run on a clover-dominant pasture start grazing by the time they are two weeks old. When stock are run in three groups feed is better controlled, multiple-lambing ewes are identified for breeding replacements, and the fertility of the flock is improved.

When tailing is finished my priority is to get the lambs ready for the freezing works. My target has been 80% of works lambs away by mid-March in the 14–15 kg range. Careful manipulation of available feed in the October–November period plays a large part in the continuing well-being of lambs. I believe that a lamb not receiving any check in its growth during the early months of life grows a bigger frame and less fat than the lamb that has had a lack of suitable feed. I have found that topping pastures from early November onwards in a good growth season is time well spent.

I usually wean lambs in the second half of December, and have found that unless some very good clover-dominant pasture is available, the freshly weaned lambs settle down to feed more quickly in their original paddock even without the ewes.

DRENCHING

I drench ewes and lambs in early November with a worm drench, cobalt, and selenium. The objective of this drench is to keep pastures as worm-free as possible. Lambs are drenched at about three-week intervals until they go to the works. I also drench flock ewes three weeks before mating with the worm drench and selenium. This is to improve the chances of ewes whose condition falls in the lower range having multiple births.

FLOCK REPLACEMENTS

I consider that the selection and management of ewe lambs coming into the flock is most important for high flock performance. The old saying that you cannot build a good house without a strong foundation also applies to building up a good ewe flock.

I have found that ewe lambs need to have an average body weight of at least 42 kg and a minimum individual weight of 36 kg at the beginning of winter. Any that have not taken advantage of our usually good autumn growth conditions are better sent to the freezing works. My ewe hoggets wintered indoors gain a further 4–6 kg. Therefore, even if feed is scarce in spring for a while it is not too difficult to bring ewe hoggets up to a desirable body weight before mating.

Although shed wintering is more costly than an all grass system in-shed wintering of my hoggets leaves an additional 12% of grazing area available for ewe rotation. This helps to offset the higher costs involved in shed wintering.

Sheep with the ability to grow fast usually respond quickly after experiencing adverse feed conditions and pass this trait on to their offspring. Hence, sires selected for their high growth rate make the very important task of getting one season's crop of lambs into the freezing works on time an easier one. My management system operates satisfactorily for the new season as a result.

LABOUR INPUT AT LAMBING

During lambing I have found less time needs to be taken in attending to the actual lambing ewes in a high fertility flock. For example, in some seasons ewes receiving foster lambs after the loss of their own lambs have been less than 2 per 100 ewes lambing. This leaves more time available for feed control and separating rearing ranks in ewes that have already lambled.

To build up a high producing flock ewes giving trouble at lambing and those without good end results are quickly culled. It does not take too long to build up a flock of easy lambing ewes, that know how to count more than one lamb and are capable of feeding their lambs satisfactorily.

It has been suggested that twinning ewes grow less wool, but I have found that ewes rearing more than one lamb grow about the same weight of wool per year as ewes producing single lambs. It appears that multiple-lambing ewes grow wool faster from weaning onwards which compensates for any check due to rearing more than one lamb.

Percentage	Lambs weaned	Lambs sold	Value lambs	Wool return	Total sheep return	Less operating expenses	Cash surplus
120	1 800	1 400	33 600	34 800	68 400	50 000	\$18 400
140	2 100	1 700	40 800	34 800	75 600	50 000	\$25 600
160	2 400	2 000	48 000	34 800	82 800	50 000	\$32 800
180	2 700	2 300	55 200	34 800	90 000	50 000	\$40 000

TABLE 1: The effect of high fertility on the financial return. 1 500 ewes and 400 hoggets stocked at 16 SU/ha. Calculations are based upon an estimated basic works price of \$24/lamb.

Wool returns

1 500 ewes shearing 6 kg per head at \$2.90 per kg	\$26 000
400 hoggets shearing 7.5 kg (3 shearings) at \$2.90 kg	\$8 700
	<u>\$34 800</u>

Recording

The identification and selection of multiple lambing ewes, and the weighing of ewe hogget fleeces enables one to avoid breeding from the lower wool producers. These are two of the most effective ways of increasing financial returns from a sheep property (Table 1). The cost of these two exercises is negligible.

Shelter

I would also draw attention to the importance of the shelter we have on our farm. I feel sure that the shelter belts have made a great contribution to the high survival rates at lambing achieved over the years.

I have endeavoured to highlight the importance of planning ahead to enable sheep to be fed satisfactorily throughout the year. Unfortunately the reliability of our Southland freezing works prevents a steady flow of stock off our properties at the optimum time, and a year of good planning can be fruitless.

High fertility by injection

Hormone immunisation for high fertility

J. F. Smith, Scientist, Ruakura Animal Research Station, Hamilton

INTRODUCTION

The immunisation of animals against certain of their own hormones is one of the more recent technological advances being used to increase or modify animal production. Increases in lambing following the immunisation of ewes against androstenedione is the most commercially advanced of many schemes of hormone immunisation to modify such things as bull behaviour, antler production in deer, and growth of lambs.

The detailed mechanism of action of androstenedione immunisation is not as yet fully understood. It is believed that treatment results in an increased level of gonadotrophin production from the pituitary gland

as a result of a reduction in the negative feedback effect of the steroid hormones. The increased levels of gonadotrophins stimulates an increase in follicle growth in the ovary and results in more ovulations or eggs shed. This increase in ovulation rate (or more potential lambs) is the first stage in the attainment of an increase in marketable lambs. It also appears to be the point at which the immunisation itself ceases to influence the result and the number of those extra eggs that reach market as lambs is thence dependent on nature and management.

PHYSIOLOGICAL EFFECT OF IMMUNISATION

Ovulation rate

Measurement of the increase in ovulation rate is the most obvious and scientifically meaningful parameter to determine the response to immunisation and to determine what factors influence this response.

The ovulation rate results obtained from the use of an androstenedione-human serum albumin conjugate in DEAE Dextran adjuvant on research flocks is shown in Table 1. This material is similar to the commercial product and the average increase in ovulation rate for trials conducted in 1982 and 1983 was +0.59 or 59 extra eggs shed for each 100 ewes treated.

Year	Location	Breed ¹	Age ²	No. ewes ³	Ovulation rate ⁴		
					Control	Treated	Diff.
1982	Ruakura	C	2th	120	1.26	1.89	0.63
1982	Wairakei	P	M	98	1.59	2.19	0.60
1983	Ruakura	C	4th	113	1.54	2.26	0.72
1983	Ruakura	C	M	140	1.58	2.28	0.70
1983	Wairakei	P	2th	130	1.20	1.98	0.78
1983	Whatawhata	R	M	90	1.51	2.24	0.73
1983	Whatawhata	C	M	90	1.81	2.32	0.51
1983	Whatawhata	P	M	97	1.56	2.12	0.56
1983	Whatawhata	MR	M	203	1.29	1.71	0.42
1983	Whatawhata	R	M	203	1.25	1.69	0.44
TOTAL				1 284	1.42	2.01	0.59

¹ Breed: R=Romney, C=Coopworth, P=Perendale, MR=Marshal Romney.

² Age: M=Mixed Age four-tooth to five year, 2th=two-tooth, 4th=four-tooth.

³ No. ewes=Number of ewes treated. A similar number of untreated controls were run in each trial.

⁴ Ovulation rate=Number of ovulations per ewe ovulating.

TABLE 1: Ovulation response to androstenedione immunisation in research flocks (1982-83).

This response was not markedly influenced by ewe age, breed, or ewe liveweight. Also, the base ovulation rate of the flock did not appear

to exert any effect on the response. Ewes with the Booroola fecundity gene have shown a response some four times greater than the non-carriers of the gene. This increase in ovulation rate suggests that ewes with a copy of the Booroola gene should not be immunised against androstenedione.

Effect of ewe bodyweight

Data from on-farm field trials by Glaxo (Geldard *et al.* 1984) suggested that ewe bodyweight has an effect on the response to immunisation in terms of lambs born per ewe treated — increasing response with increasing liveweight (Table 2). No such effect on ovulation rate or lambs born per ewe joined, either between flocks or within flocks, has been seen in our studies. Although a depression in response was noted at the extremes (ie., <40 or >60 kg) this lack of a major liveweight effect has been substantiated by recent results (Table 3). Large nutritional differences in liveweight were produced but no increase in response was seen once ewes weighed 48 kg.

		Ewe liveweight class					
		<40	40-45	45-50	50-55	55-60	>60
Ovulation rate	Control	1.14	1.23	1.22	1.36	1.51	1.76
	Immunised	1.35	1.81	2.04	2.10	2.13	2.14
	Difference	+0.21	+0.58	+0.82	+0.74	+0.62	+0.38
Lambs born per ewe joined	Control	1.05	1.11	1.19	1.24	1.30	1.53
	Immunised	1.16	1.42	1.48	1.55	1.51	1.52
	Difference	+0.11	+0.31	+0.29	+0.31	+0.21	-0.01

TABLE 2: Effect of ewe liveweight on the response to immunisation, (data from 1982 and 1983 trials).

		Ewe liveweight (prematuring) kg		
		41.6	49.9	58.0
Not flushed	Control	1.18	1.33	1.44
	Immunised	1.72	2.00	2.10
	Difference	0.54	0.67	0.66
Flushed	Control	1.42	1.71	1.79
	Immunised	1.92	2.12	2.40
	Difference	0.50	0.59	0.61
Difference due to flushing	Control	0.24	0.38	0.35
	Immunised	0.20	0.12	0.30

TABLE 3: Effect of nutritionally induced ewe liveweight differences on ovulation response to immunisation (1984 trial).

This recent trial also substantiated the results of earlier trials (Smith *et al.* 1981) which indicated an additive response to flushing from immunised ewes.

Embryonic loss

Results show that substantial and reliable responses to immunisation have been obtained. However, this has not always resulted in similar increases in lambs born or weaned.

The variation in the increase in numbers of lambs born from treated ewes has been attributed to a difference in liveweight and a failure to follow the recommended procedure. Similar, if not greater variation has been obtained in research station trials where the protocol was strictly adhered to. The ovulation responses were measured and hence the variation could be attributed to the effect of embryonic mortality which results in different proportions of the extra ovulations producing extra lambs. Similar wide differences in embryonic loss have been reported when ovulations rates were increased by flushing (Smith *et al.* 1982).

This embryo loss constitutes the greatest source of reproductive wastage in New Zealand sheep flocks but, as yet, the influencing factors and the mechanisms involved have not been determined. The effect of embryonic loss in research trials has resulted in an average increase of 18 lambs born per 100 ewes treated. This increase has ranged from 1 to 37 on trials involving 1 284 treated ewes. A similar number of ewes in the on-farm studies of Glaxo gave an average increase of 26 lambs with a range between flocks of 7-45. This distribution of results is shown in Fig. 1 and has an overall average from both research and farm trials of +22.5 lambs born per 100 ewes treated.

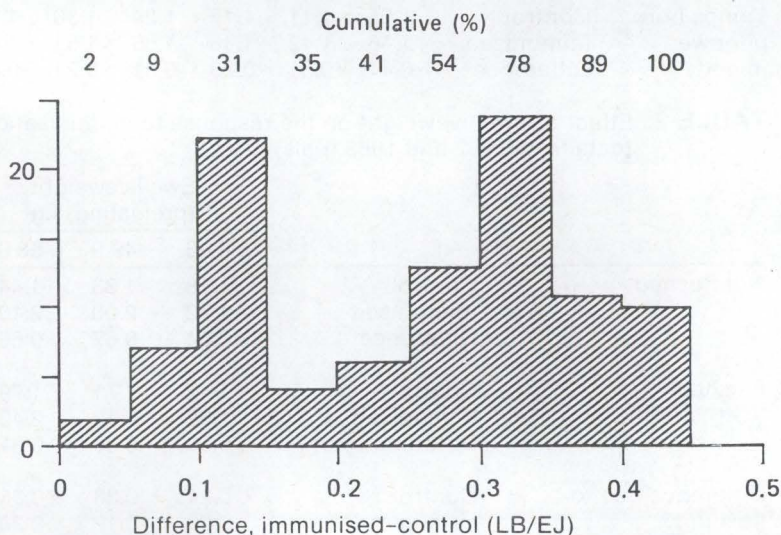


FIGURE 1: Distribution of differences immunised minus control in number of lambs born per ewe joined for research experiments and field trials in New Zealand (calculated on number of ewes). Figures are the cumulative percentage of ewes with a given difference in lambs born (LB) per ewe joined (EJ).

MANAGEMENT IMPLICATIONS OF IMMUNISATION

It is now the farmers' responsibility to turn these extra lambs into marketable products. In management terms, if the farmer has left it until now then it is most probably too late.

Decisions on how to feed the extra multiple-bearing and rearing ewes need to be made well in advance (ie., about the time of mating). What does an extra 20-25 lambs born per 100 ewes treated mean in terms of the proportion of multiple births? The research results have shown that the elevated lamb drop following the immunisation treatment give a similar distribution of birth ranks to that predicted from the data of Davis *et al.* (1983) for an untreated flock with the same lamb drop. The distribution of birth ranks with increasing lamb drop is shown in Fig. 2. This can be used to determine what effect the treatment of a flock with a known lamb drop would be likely to produce.

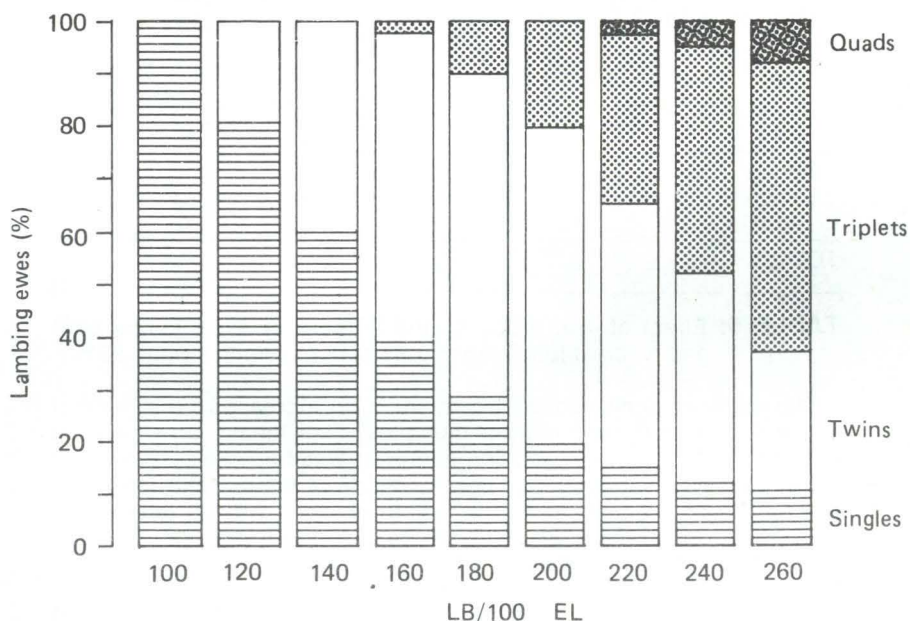


FIGURE 2: Distribution of ewes with various birth ranks for flocks with increasing numbers of lambs born (LB) per ewe lambing (EL) (adopted from Davis *et al.* 1983).

Thus, some extra effort will be required to ensure a high survival rate of these multiple born lambs. The choice of lambing paddock on the basis of slope, shelter, and feed supply is most important. The lamb mortality levels are higher in immunogen-treated flocks, and this is generally associated with a higher mortality level of the multiple-born lambs (Table 4), rather than a difference between treatments within birth ranks.

Treatment	Birth rank			Total
	Single	Twin	Triplet+	
Control	11.7	19.5	31.1	16.3
Immunised	14.6	21.2	33.1	21.3
TOTAL	13.2	20.7	32.9	19.5

TABLE 4: Summary of lamb mortality (%) at Ruakura and Wairakei over three years (1980, 1981, 1982).

However, other factors such as ewe breed (or strain) and age may strongly influence the final number of extra lambs weaned following immunisation treatment (Table 5). The above results were obtained under conditions of identical management for treated and control flocks, and highlight the need for management changes to ensure maximum returns from higher fecund flocks.

Breed	Extra lambs per 100 ewes treated	
	Born	Weaned
Romney	27	4
Coopworth	28	23
Perendale	21	10
TOTAL	26	12

TABLE 5: Effect of ewe breed on the number of extra lambs born and weaned following immunisation (Whatawhata 1984).

The result of immunisation treatment is an increase in the number of ewes producing and rearing multiples. This means an increased demand for feed during lactation and after weaning. Also, it must be remembered that greater numbers of multiple lambs take longer to reach slaughter weight and thus, additional feed will be needed for a longer period. Table 6 presents the data on the time taken to reach slaughter from a trial at Ruakura.

	Days after weaning						Total lamb grazing days after weaning
	0	30	60	80	90	120	
1982-83 ¹ Immunised	27	32	53	-	26	-	6 480
Control	41	34	25	-	8	-	3 240
1983-84 Immunised	-	10	41	43	15	20	9 950
Control	-	16	62	41	5	3	8 290

¹ Target liveweight differed between years being 28 kg in 1982-83 and 32 kg in 1983-84.

TABLE 6: Effect of immunisation on number of days after weaning to slaughter, data refer to the number of lambs slaughtered.

The provision of this feed required by the extra lambs can have some detrimental effects on ewe performance. This is seen as a slight reduction in wool production in the treated ewes and also a lower liveweight at subsequent mating (Table 7). This lower liveweight could result in less extra lambs from the treated ewes in subsequent years. To prevent this liveweight loss from becoming too great some compromise on the level of feed given to the lambs may have to be made. This will depend on the season and the location of the flock.

Year of treatment	Ewe age	Liveweight at mating (kg)		Wool production (kg)	
		Control	Immunised	Control	Immunised
1 (1982)	2th	49.0	48.3	3.56 ¹	3.39 ¹
2 (1983)	4th	57.0	54.4	4.05	3.85
3 (1984)	6th	62.8	59.8	—	—

¹ Wool production for a 10-month period only.

TABLE 7: Ewe liveweight at mating (April) and wool weight (December) after immunisation treatment.

The identification of the multiple-lambing ewe during pregnancy could have considerable advantages in the management of the flock in which immunisation has been used. The use of either X-ray in the last one third of pregnancy (after Day 100), or of real-time ultrasonic scanning in the period from Day 45 to 90+ of pregnancy would enable the farmer to plan his feed allocation and make use of sheltered areas to best advantage. The economics of this new technology will depend on the ratio of cost to the increased value of the lambs born from either lower mortality or higher growth rates. Studies on the application of these techniques are currently underway.

FINANCIAL FACTORS IN IMMUNISATION

The financial consequences are the major determining factors governing the level of commercial application of any new technology. It must be stressed that the simple model used also applies to all other techniques or treatments aimed at increasing the lambing performance of a flock. The economics depends on the number of extra lambs born per 100 ewes treated, the net value of each of those lambs, and the cost of treatment.

The net value of each extra lamb born depends on: (a) the proportion of those that survive from birth to sale; (b) the price for the end-product which in turn depends on the proportion sold as store or slaughtered for export, the carcass weight and grade, and the current schedule

and sale price; and (c) the additional costs involved in the production of these extra lambs including the costs of extra drench and feed, and some allowance for lower wool production from the ewe. Note that this model does not take into effect the change in net value of the multiple born lambs that might have been singles if treatment was not applied.

A range from 5 to 20 cents has been obtained as the net value for each one extra (multiple) lamb born per 100 ewes treated — dependent on the topography and location of the farm.

For the purpose of this exercise the cost of immunogen treatment has been averaged over four years (five doses of vaccine) and includes an interest charge and allowance for return on labour and management. The effect of a change in product price has also been included to produce a range of treatment costs. This enables other treatments (ie., flushing on silage) to be compared. A cost of \$1.50 per dose represents an average treatment cost of \$2.26 over four years; \$1.00 per dose a treatment cost of \$1.57, and 50 cents per dose a treatment cost of 75 cents.

Value of each additional lamb born per 100 ewes treated	Treatment costs per ewe		
	75 cents	\$1.50	\$2.25
20	3.8	7.5	11.3
15	5.0	10.0	15.0
10	7.5	15.0	22.5
5	15.0	30.0	45.0

TABLE 8: The numbers of extra lambs required to break-even for various treatment costs and lamb values.

Table 8 shows the numbers of extra lambs required to break-even for various treatment costs and lamb values. The likelihood of obtaining this result from immunisation can be obtained from Fig. 1. The higher the lamb value and the lower the treatment cost the more likely the chance of making a profit.

The question left once a decision has been made to use the technology is what sheep should be treated. A rapid increase in overall lambing of 20 extra lambs per 100 ewes joined could prove a major managerial challenge to any farmer. Therefore, it would be prudent to treat a quarter or a fifth of the flock to achieve an overall increase of about five extra lambs per 100 ewes joined. Again, if the younger ewes in the flock are treated this enables the extra cost of the two injections in the first year of treatment to be spread over the next four years.

CONCLUSIONS

A farmer may gradually increase the proportion of the flock being treated as he adapts his management to accommodate the steadily increasing number of extra lambs being born.

The recent results on the performance of progeny from immunised ewes (Smith *et al.* 1984) indicate that no detrimental effects have been found and that genetic differences are not masked by treatment.

The use of immunisation to increase lambing percentages could enable farmers to place greater emphasis upon either wool or meat characteristics in their selection programme, and at the same time increase the intensity of selection through the larger numbers of lambs available for selection.

Thus, a farmer should critically evaluate his current management and production levels, assess the value of his existing multiple-born lambs, determine his ability to produce the extra feed that will be required, and if the economics are favourable, introduce the new technology gradually.

ACKNOWLEDGMENTS

The author thanks Dr T. W. Knight and the staff of Whatawhata Hill Country Research Station for collaboration on the studies on that site; Messrs K. S. Maclean, L. T. McGowan, and M. Fraser for technical assistance in the conduct of the trials. The immunogen was kindly provided by Mr D. Jull of Glaxo New Zealand Ltd.

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Experiences with hormone injection

F. K. Shallard, farmer, Riversdale

I consider the theme of the conference: 'opportunities for the future' very appropriate for hormone immunisation.

This paper describes how the application of hormone injections of androstenedione (referred to by the trade name 'Fecundin') fits into a management system and how it affects the running of a commercial enterprise.

We are farming 327 ha on the Waimea Plains, 7 km south of Riversdale in the lea of the Hokonui Hills. The soil type is mostly heavy clay, which needs intensive drainage. We are exposed to southerly storms and often strong Nor'-westers. The present stocking is: 3 000 Coopworth ewes, 200 Dorset Down stud ewes, 800 Coopworth ewe lambs, 150 Dorset Down stud ewe and ram lambs, 50 rams and killers, 30 cattle, 40 acres of grain, and 30 acres of lucerne. Our present lambing percentage is 146% on ewes mated to ram.

On the 3 March 1983 a trial was set up in which we randomly selected 225 ewes as controls and 125 ewes for injection with Fecundin. These ewes were selected from a mob of 1 200 which we mated to a Dorset Down sire. They were mixed age ewes and no two-tooths were included.

All ewes were ear-tagged with a large tag to facilitate identification from a distance at lambing. They were given their first Fecundin injection, weighed, and returned to the original mob. They were wintered as one mob, and were only removed for the second injection, weighing, and scanning.

The bodyweights on 3 March were 57 kg on average (Fig. 1). On 27 March all ewes were weighed and the average bodyweight was 60 kg. They were given a pretup drench with selenium added and vaccinated with Campylovexin (abortion vaccine). This was given as a precaution to guard against any distortion, because we were dealing with relatively small mob numbers. The treated group were also given the second Fecundin injection.

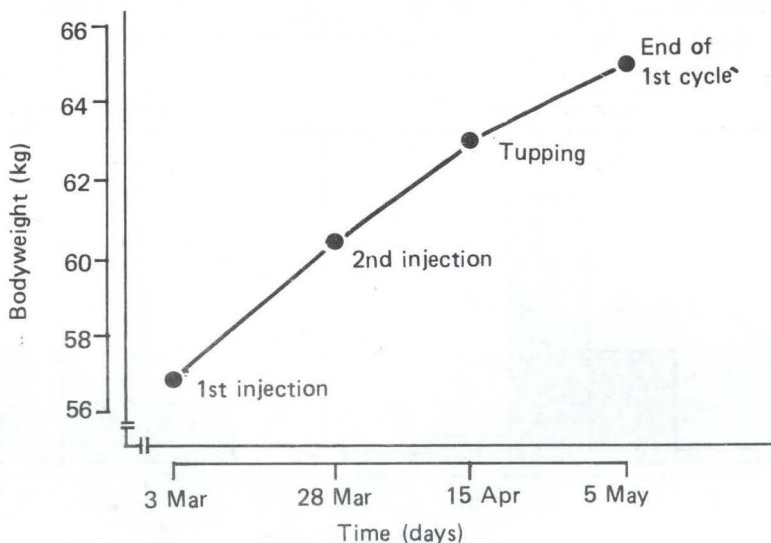


FIGURE 1: Bodyweights of treated and control ewes.

On 15 April the rams were put out at a ratio of 1 to 150. On 6 May, 21 days after putting the rams out, all ewes were weighed and the average bodyweight was 63 kg. The second abortion injection was also given at this time.

WINTER MANAGEMENT

From early May the 1 200 ewes are gradually tightened up and by mid-May they spend about a fortnight tidying up the stubble paddocks and are introduced to poorer quality hay. By early June the ewes go onto a daily shift of grass, supplemented by hay. We work on a 100-day rotation using the electric fence concept which has proved so popular in Southland. Depending on the available grass and weather

conditions, one to two bales of hay per 100 ewes are used until six weeks before lambing when two bales of lucerne per 100 ewes are fed out.

Any ewes showing signs of stress are removed and given better grass and lucerne hay. On 8 July the ewes were crutched, this was six days before they were put under the scanner (14 July). In order to get a good airtight seal between the skin and scanner probe, it is important that the ewes be crutched no more than one week before scanning.

A 'Real Time Ultra Sound' scanner was used. The scanner results showed that we could expect a drop of 176% from the control mob. Two percent were dry, 28% would have one lamb, 65% twins, and 6% triplets (Fig. 2). From the treated ewes we could expect a drop of 221%. There was one dry ewe, 15% would have one lamb, 52% twins, 28% triplets, and 4% quads. This gave us an overall increase of 45%.

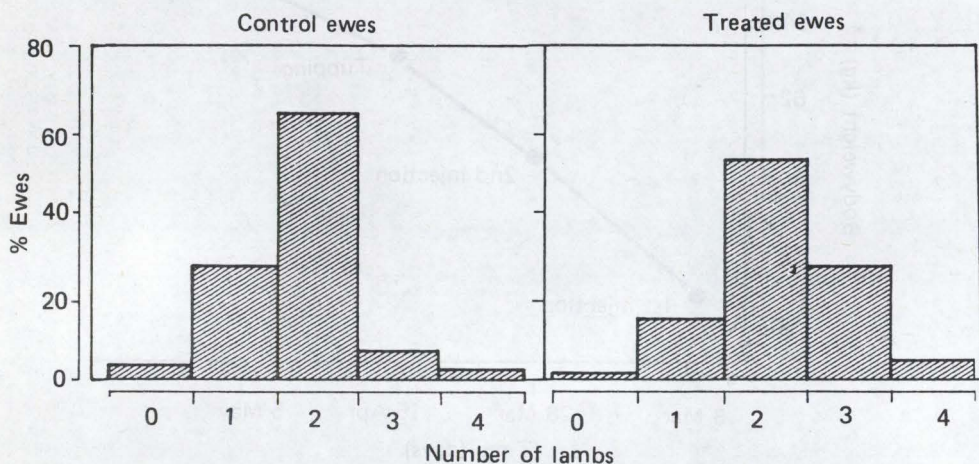


FIGURE 2: Scanner results predicting lamb drop in treated and control ewes.

We were most impressed with the scanner, and felt it could be an exciting technique which could help with lambing management.

All ewes were dotted on the head according to the number of lambs each would produce. Ewes that were dry could be sold giving us an additional paddock for lambing. Ewes having singles could be removed and run on their own — perhaps on a stubble paddock — and fed at lower maintenance levels which would hopefully reduce the numbers of big singles and lambing problems. These ewes could be lambled in more exposed paddocks, and stocked at a heavier intensity per hectare, and would require less shepherding. Ewes having twins could be treated in the usual manner. Those ewes having triplets or quads could be run on their own and be given preferential treatment. Paddocks with more shelter could be made available for them and they could be stocked at lighter rates.

In summary, I believe a fast accurate means of diagnosing birth rank in pregnant ewes would be of immense value in high fertility flocks.

LAMBING

Three to four days before lambing commenced ewes are set-stocked at six per acre. Dries and late lambers were removed. During the first week of lambing, which began on 8 September, the ewes were gone around twice daily. This was increased to three times per day during the peak of lambing. We were told that the treated ewes would probably lamb 3-4 days later than the controls because of the timing of the second Fecundin injection. We had no major problems, apart from some bad weather. There was very little mismothering and the lambs were all of a good size. We considered most lambs to be in the safe range of 3.5-5 kg at birth. There were no more small or runty lambs than normal.

Marking the ewes with a birth rank at the time of scanning was most helpful when doing the field recording. If a ewe had a lamb missing, we could locate it quickly nearby or perhaps assist with a late birth.

We had 12 lambs more than predicted by the scanner.

LAMBING AND DOCKING

The control ewes dropped 170%; 31 lambs were dead at birth, 11 died between birth and docking. We had seven ewe deaths before lambing and five ewes were dry. This gave us a docking percentage of 151% (Table 1). In the treated mob we had a drop of 213%; 19 were dead at birth and nine died between birth and docking. We had five deaths and three ewes slipped lambs before lambing. This gave us a docking percentage of 190% or an increase of 39% over the controls.

	Control (%)	Treated (%)
Lambs born/ewes joined	170	213
Lambs dead/lambs born	11	11
Ewes dead and dry/ewes joined	5	7
Lambs docked/ewes joined	151	190

TABLE 1: Results of Fecundin trial as seen in lambing and docking percentages of treated and control ewes.

Lambs at docking were marked and both mobs were put together two weeks later and were on a rotation until 6 December when they were weaned. Sixty-six lambs from the control mob were killed; there were four over-fat, four trimmers, and the average weight was 14.36 kg. We killed 26 lambs from the treated mob; there was one over-fat, eight trimmers, and the average weight was 14.40 kg.

There is no doubt that from treated ewes you will have more store lambs. This eliminates the need to purchase store lambs. This lambing we are doing further trial work with 200 ewes as control and 200 treated ewes. We propose to weigh all lambs at birth, kill all lambs separately,

and weigh the ewe fleeces at shearing. This should give us a better idea of the effect of hormone injection on mob economics.

OBSERVATIONS

- * A higher lambing percentage obtained using Fecundin allowed ewe numbers, and consequently wintering costs, to be reduced.
- * Lamb later. Lambs born later nearly always weigh as much as the earlier lambs.
- * We could use nitrogen on several smaller paddocks for ewes having triplets or quads.
- * Sheltered paddocks could be used for ewes giving higher lambing percentages.
- * Ewes could be set-stocked for lambing.
- * It is important to identify all treated ewes and discuss your programme and timing with your vet or farm advisory officer.
- * We normally get a drop in excess of 150% from our two-tooths. This puts more lambs at risk in the below 3.5 kg birth range. However, if you identify your multiple births and if your two-tooth percentage is not acceptable then there could be a place for treating two-tooths born as singles.
- * Four-tooths are preferable if Fecundin is being used for the first time. The first year will cost \$3 per ewe and requires two injections. In subsequent years, only one injection is required.
- * Fecundin should not be used unless you are already getting a lamb drop of 125% or better because the economic benefit below this level is very doubtful.
- * You cannot substitute Fecundin for good bodyweights.

CONCLUSIONS

I am concerned that some farmers, without careful planning, will get themselves into difficulties and will blame Fecundin and not their management. For those who can use this material wisely, I would consider it to be one of the exciting 'opportunities for the future'.

Professor Sykes' comments on previous papers

A. R. Sykes, Professor of Animal Sciences Group, Lincoln College.

I think you have heard two very interesting papers outlining the exciting possibilities for increasing reproductive rates using immunisation. The sound technical paper presented describes, as objectively as possible, the existing state of knowledge and technology.

You have heard an excellent paper from Mr Shallard on the practical application of the technology. He gave you some very sound advice in the last paragraph of his paper and I wanted to pick up on these aspects. I will use some material prepared by Dr Smith for his paper which I didn't hear him present.

Ovulation rate responds to liveweight, possibly to flushing, and to Fecundin. Fecundin involves a simple injection method for increasing ovulation rate which costs about \$2.26 per ewe. As Mr Shallard said, however, there is really no excuse or room for the use of Fecundin to get out of a bad management situation eg., using Fecundin in ewes which are light in weight because of bad management. The more difficult approach, which must be tried before we resort to Fecundin, is the use of management techniques to increase bodyweight and hence ovulation rate. Management strategies allowing for flushing are useful, but again are probably less important than consistent maintenance of good bodyweight. Maintenance of good bodyweight brings benefits

in several other forms: additional wool, better lamb growth, and other less quantifiable benefits than are available from Fecundin. For instance, I have calculated the additional profit that would be produced if increased fertility was the result of better liveweight management rather than Fecundin injection. My calculations suggest that if the additional fertility potentially available using Fecundin were achieved by higher bodyweight an additional \$2.00 of wool per ewe would result.

On using Fecundin the likelihood is that we will decide we need pregnancy diagnosis to feed this more fertile sheep in poor body condition to safeguard our investment. Commercial pregnancy diagnosis operations currently operating in Australia cost \$1.25 per ewe. A conservative total cost of increased fertility derived from Fecundin as compared to management will therefore be at least \$4 per ewe. As Dr Smith has shown, at present we can only work on the basis that we will get an extra $\frac{1}{5}$ of a lamb per ewe treated, or an extra 20 lambs weaned per 100 ewes treated. The cost of each lamb induced by Fecundin is therefore five times the cost of Fecundin treatment of each ewe, or \$20 per lamb. Is this your most worthwhile investment at this stage?

I am suggesting, as strongly as I can, the need to make sure that your management is as good as it can be and that your animals are achieving their maximum through management. There are many farms operating with unnecessary liveweight deficits, despite their present stocking rates. Fecundin is not an easy and cheap way to mimic good and consistent management, quite the contrary. Comparisons with neighbours or good farmers in the region and consultation with animal husbandry advisors will soon give answers to these questions. Clearly, some comparisons of stocking rate are important to determine whether you are achieving high bodyweights through good management of pasture rather than understocking. If we can make the decision that the farm is well run, is not understocked, and that there are still summer feed surpluses then **there clearly is a case for the use of Fecundin**. Alternatively, if for some reason bodyweights are unusually low in a particular season but you have adequate conserved feed in storage, the decision to use Fecundin as a short-term boost to production can reasonably be made.

What are the consequences of this decision? Special considerations for flock management have already been mentioned. Mr Black has spoken well about lamb birthweight and survival. His advice to you for handling this problem would be consistently good nutrition throughout pregnancy. How are you going to achieve this? It will require intensification to allow optimum provision of high quality conserved feed and pastures. In my estimation this can only be achieved by a combination of the making of high quality silage from early spring growth and/or the use of winter forage crops.

Another question which I raise, and to which I don't have the answer, would be the importance of milk production in Fecundin-treated ewes. The gradual improvement of prolificacy within a breed under selection pressure, particularly where selection for weight of lambs weaned per ewe is used, is likely to result in some improvement in milk production. The ewe that produces twin lambs and can't rear them usually leaves

the system. Are we by-passing that selection process by using Fecundin? We probably do need to assess the milk production capabilities of the sheep we are dealing with carefully. Milk production is extremely important for at least the first five or six weeks of life. It is most likely that within breeds there are animals which have a high capacity for milk production. As a general rule, Border-Leicester cross-bred sheep tend to have a higher milk production than other breeds in New Zealand and might be better suited for the use of Fecundin. I'm asking, therefore, whether you should consider the need for a breed change first if you are considering using Fecundin.

Another consideration is that individual farmers with low bodyweight problems will only see these problems exaggerated by the use of Fecundin. Mr Shallard clearly has overcome this but let's remember that it has been a good year for pasture growth and it will be those years when it is not as good that ewe bodyweight problems are exaggerated. How are we going to cope in seasons where pasture growth is poor? I believe this requires intensification, silage production, and the movement of surpluses from the spring when they occur into the summer. These surpluses are important for the maintenance of high quality swards. We undoubtedly will have to wean earlier because of problems of maintaining feed quality. It will be more difficult to use the ewe as a clean-up tool. Clearly, we can't use her in that role and expect her to recover bodyweight which is lost as a consequence of increased prolificacy. It will be more difficult therefore to maintain pasture because we will aim to overcome bodyweight deficits at the same time. Further intensification involving silage-making to remove those surpluses and topping to get rid of the poorer quality material will become increasingly important.

Finally, what recommendation can be made about the use of Fecundin in a general sense of this region? There appears to be a good case for the use of Fecundin in well-managed flocks. There will be additional store lambs; however, this is not likely to be a problem. As Mr Shallard said, there is plenty of scope for additional lambs to be reared in this area. This is demonstrated by the fact that Southland is traditionally an importer of store lambs. The use of Fecundin has the potential to increase your ability to generate and maintain income and wealth in the region. But first apply pressure to reduce its costs.

I would like to make one further and final point. You are served by able groups of animal husbandry advisors and veterinarians. I believe you should make good use of them. The use of Fecundin is a highly technical subject. It is not easy for me to indicate every situation in which the use of Fecundin or more rigorous management would be more appropriate. It is your animal husbandry advisors who can help you. This follows along from the comments of our Chairman of Council, Mr Sid Hurst, who stressed the need for the increasing use of educational institutions such as Lincoln College. These institutions are, after all, in the business of producing the experts who can help you. It's up to you to use them; they are well-trained to understand these principles and concepts. They are people who will help you make the decisions as to whether you should use Fecundin, and I believe, whether you will use it successfully.

N.Z.A.P.S. Centennial Award 1984: Mr Bill Walker

*J. F. Smith, Scientist, Ruakura Animal Research Station, Hamilton,
and Past President N.Z.A.P.S.*

Bill Walker has frequently been a genial host to parties of Lincoln College staff and students since the early 1970's. He has willingly discussed with student and staff visitors features of the management of his property. His discussions described adjustments to the management system as development proceeded; detailed financial information, problems associated with large scale development, and scale economies in the design of the new management system. The excellence of his management organisation and stock performance has been especially important. He has taken a more than passing interest in soil science research in his administrative role with the Southland Co-operation Phosphate Company. His interests in fertiliser use and in associated research stems from his long experience with hill country improvement.

Shortly after the war, Bill took over his parents' 2 280 ha farm at the top of the Kurawao Gorge behind Clinton. At that time, the property carried 1 500 ewes, 500 hoggets, and a few cattle, in all about 1 900 stock units excluding rabbits. Bill did his own shearing and crutching and it was hard to make ends meet. In 1953 he was one of the first people in South Otago to begin aerial topdressing when, with the able support of his wife, he began the development programme which reached its peak in the 1960s.

By 1974 the property was carrying 14 000 stock units — 8 000 as sheep and 6 000 as cattle. The changeover to Perendales was completed by the early 1970s and since that time stock carried and stock performance have continued to rise although more slowly. Today, Bill farms in partnership with his son-in-law, Jeff Ware. The property now carries about 16 000 stock units — the sheep have been increased to 10 000. Where 0.8 stock units per ha were carried formerly, there are now 7. Stock performance exceeding 130% lambing, 4.3 kg wool, and 95% calving sets an example for many to follow. Put into perspective, at 5 300 stock units farmed per man, this performance is outstanding.

Much is attributed to the low labour requirement of the Perendales as three more men would have been needed if the Romneys had not been replaced. However, everything about the property has been geared to low labour inputs from fencing and race placement through to the occasional use of aeroplanes for spotting stock. There are now 530 ha of grassed paddocks and all lambs and cattle are fattened. As a three-man operation everything is well managed.

The property is very attractive and with a performance to match its appearance it is seen by visiting Lincoln College staff and students to reflect the perception and hard work necessary for success and leadership in agriculture. Bill's own personal achievements are considerable, but equally important in this award is his willingness to communicate his ideas about farming to students at a formative stage in their careers. Without such individuals the task of teaching and infecting students with enthusiasm for sound progressive agriculture would be infinitely more difficult. For these reasons Bill Walker is a worthy recipient of this award.

EARLIER RECIPIENTS

The N.Z.A.P.S. Centennial Award was initiated at the time of the Lincoln College Centennial in 1978. It is awarded to the farmer who has made a substantial contribution to the College by either hosting student field trips with a strong stock emphasis or supervising students' practical work.

Earlier awards were made to:

- 1978 W. A. C. and D. B. Abbiss, 'Halcombe', Feilding.
- 1979 J. T. B. Guise, 'Aparima', Otautau.
- 1980 W. G. Logan, 'Waverley', Hororata.
- 1981 M. V. Prouting, 'Mesopotamia', Rangitata.
- 1982 J. D. McDougall, 'Sunnyside', Martinborough.
- 1983 G. E. Fieldhouse, 'Fieldview Farms', Rongotea.

Entry into farming

Entering farming in the 1980s

D. K. Ower, Deputy Director, Property Management Service, Lincoln College

INTRODUCTION

If the farming industry is to remain viable and continue to grow we must encourage a situation where workers can, if they wish, aspire to eventual ownership of a farm or small holding, or at the very least ownership of an asset to enable them to purchase a home for retirement.

AN OVERVIEW OF LAND SETTLEMENT

Much has been done towards achieving the above objective in recent years. The following summaries of land settlement through the Department of Lands and Survey and the Rural Banking and Finance Corporation, illustrates the considerable achievements in land settlement made by these agencies (Tables 1-4).

Year	Number		
	Sheep	Dairy	Total
1974-75	20	6	26
1975-76	32	19	51
1976-77	12	2	14
1977-78	40	15	55
1978-79	28	16	44
1979-80	36	21	57
1980-81	41	24	65
1981-82	60	15	75
1982-83	56	18	74
1983-84	35	23	60
			521

TABLE 1: Lands and Survey settlement, 1974-84.
Source: Department of Lands and Survey.

The objective of the Department of Lands and Survey is to settle 70 units per annum, although there is some doubt if this can be achieved. Nevertheless, it is likely that the average of recent years will be maintained, throughout the 1980s.

Year	Standard settlement		Special settlement ¹		Farm worker holding ²		Total	
	No.	Av.Amt (\$)	No.	Av.Amt (\$)	No.	Av.Amt (\$)	No.	Av.Amt (\$)
1973-74	633	34 265	—	—	—	—	633	34 265
1974-75	832	40 973	—	—	—	—	832	40 973
1975-76	936	46 794	—	—	—	—	936	46 794
1976-77	948	48 597	85	104 588	—	—	1 033	53 204
1977-78	975	51 774	105	115 619	74	26 486	1 154	55 961
1978-79	974	64 876	100	127 800	130	32 076	1 204	66 561
1979-80	834	77 086	96	160 416	188	34 148	1 118	77 021
1980-81	880	84 886	104	192 788	252	41 111	1 236	85 040
1981-82	836	104 354	100	241 300	333	49 909	1 269	100 858
1982-83	822	122 238	73	250 958	272	54 779	1 167	114 567
	8 670		663		1 249		10 582	

¹New policy introduced in 1976-77.

²New policy introduced in 1977-78.

TABLE 2: Rural bank land settlement civilian lending, 1973-83.
Source: Rural Bank and Finance Corporation.

Figures are not available to indicate how new farmers obtain the substantial capital inputs required for the standard settlement transactions. It can only be assumed that many of them received considerable family help.

Year	Number	Av.Amt (\$)
1973-74	723	7 966
1974-75	776	8 492
1975-76	1 051	8 772
1976-77	1 049	9 418
1977-78	1 131	10 671
1978-79	1 127	12 307
1979-80	1 028	16 391
1980-81	1 231	21 673
1981-82	1 298	24 229
1982-83	1 214	27 784
	10 628	

TABLE 3: Rural Bank stock and plant lending.

Source: Rural Bank and Finance Corporation.

The loans shown in Table 3 are mainly loans to sharemilkers. Loans to other sharefarmers average only 6% over the last seven years for which the records have been available.

Source of finance	1978-79	1979-80	1980-81	1981-82	1982-83
Lands and Survey civilian settlements	44	57	65	75	74
Rural Bank settlement lending	1 204	1 118	1 236	1 269	1 167
Rural Bank stock and plant loans	1 127	1 028	1 231	1 298	1 214
Total settlements	2 375	2 203	2 532	2 642	2 455

TABLE 4: Summary of land settlement, 1978-83.

CHANGES IN CAPITAL STRUCTURE OF SHEEP AND BEEF FARMS

A reminder of the financial changes that took place on sheep and beef farms during the 1970s and early 1980s is provided by the figure from a recent address given by Mr N. W. Taylor, Director of the New Zealand Meat and Wool Board's Economic Service. He comments on the relationship between farm incomes and land values. 'Through most of the 1970s rural land values kept in line with net farm incomes. But in recent years, land values have moved well ahead of farm incomes expressed on an index basis. Recent figures suggest that the 1983 farm land index will show a decline from the peak in 1982, though it will still remain significantly ahead of farm incomes' (Fig. 1).

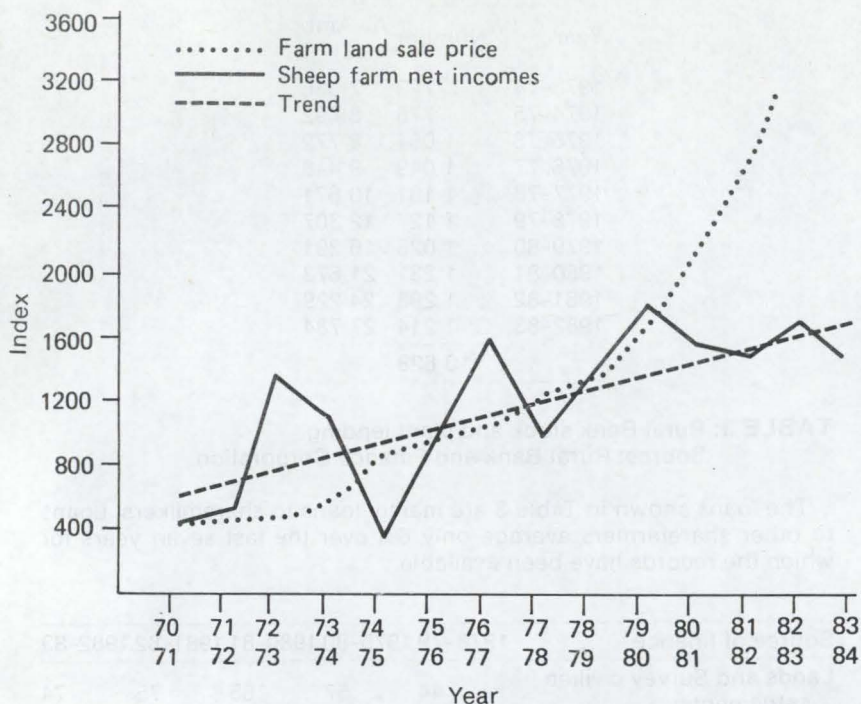


FIGURE 1: Sheep farm incomes and farm land sales prices, (Money terms 1975-76 = 1 000).

Source: New Zealand Meat and Wool Boards' Economic Service, Sheep and Beef Farm Survey and Valuation Department (grazing and fattening farmland sale index).

	1973-74	1981-82	Increase
Total area (ha)	360	295	
Total stock units	2 274	2 341	
Total assets (\$)	201 607	630 774	313%
Total liabilities	42 959	101 849	237%
Net worth/total assets (%)	79	84	
Interest/SU (\$)	0.95	3.60	379%
Net income/SU (\$)	4.33	5.97	138%

TABLE 5: Financial data from 'Single owner farms'.

Source: New Zealand Meat and Wool Board's Economic Service.

A further illustration of changes in capital structure that have occurred is contained in Table 5. The common characteristic of 'single-owner farms' is that they are held by individual owners. The figures may therefore be expressed as 'per farmer'.

Year	Average deposits (\$)	
	Leasehold	Freehold
1980-81	27 615	50 945
1981-82	35 525	82 920
1982-83	44 130	96 700
1983-84	46 585	112 450

TABLE 6: Lands and Survey settlement scheme deposits, 1980-84.
Source: Department of Lands and Survey.

Total charges for rent and interest, on leasehold units settled in 1982-83 averaged \$11/SU.

The limiting factor

The data presented emphasise all too well the problems facing new farmers. These problems are compounded by rising land prices, consequent increases in debt servicing, and low farm profits.

The Kneebone report, a report of a working party set up by the Minister of Lands in 1978 to consider land aggregation and other terms of reference, stated 'There is no evidence to suggest that a landless person with the necessary finance, adequate for prices ruling at any time, had been unable to purchase farm land. The problem very clearly is a financial limitation rather than non-availability of farm land.' If the trends outlined earlier, relating to farm incomes and farm land sale prices, continue, then this financial limitation will get worse.

THE ACHIEVEMENT OF SAVINGS

How can the potential new entrants into farming in the 1980s achieve savings. The dairy industry offers opportunities to such people to make savings and purchase their own farm through the various sharemilking agreements commonly in operation.

The following are some observations on methods of achieving savings for other types of farming based on our contacts with young farmers in the Lincoln College Property Management Service, during a period of over five years:

- * Very few people have been able to make worthwhile savings from farm wages alone.
- * Double income earners — some people work at two jobs. This involves long hours of work and considerable sacrifices by both the worker and family.
- * Two income earners — when both husband and wife work. Considerable savings can be made, with fewer sacrifices.
- * Farm workers holdings — over 1 300 Rural Bank loans have been made for this purpose since the scheme's inception in 1976. A worker must have employment in the district before a loan is granted to purchase a property.

- * Ownership of stock — stock may be grazed on leased land or land made available free-of-charge by the employer.
- * Contract work — shearing, fencing, and agricultural contracting of all types often allow good savings to be made by the contractor.
- * House renovations — the purchase, renovation, and sale of houses, particularly in the early 1970s, provided some people with a good opportunity for saving.

In many instances, combinations of these saving methods have been used. In all instances hard work, frugal living, and a desire to make savings so that farm ownership can be achieved have been essential ingredients.

FARMING AGREEMENTS

Despite the outstanding settlement achievements over the years of both the Rural Bank and the Department of Lands and Survey, there remains a host of young farmers who must not be ignored if the farming industry is to continue to remain viable. They have only limited amounts of capital but many have the managerial experience and, most important of all, the enthusiasm of youth.

Farming agreements offer another opportunity for these people in addition to the land settlements already discussed. There are two main types of farming agreements: sharefarming and partnerships.

50-50 Sharefarming

The 50-50 sharefarming agreement seems to be the type best suited to the requirements of stock and cropping properties. In this type of agreement the owner provides the land and buildings and the sharefarmer provides the stock and plant.

The gross income is shared 50-50. The expenditure is split broadly on the basis of the owner meeting the costs of materials and standing charges, and the sharefarmer providing the labour and meeting the costs related to his stock and plant.

The sharefarmer is entirely responsible for the day-to-day management of the farm, but the parties mutually agree upon the farming policy and annual programme. The owner retains full ownership of the land and buildings. He continues to have an interest in the farming operations and a share in the fluctuating fortunes, which always seem to be part of farming.

The owner normally sells the stock and plant to the sharefarmer and the agreement may make provision for the owner to repurchase it at the termination of the agreement. Some stock may be bailed and the purchase spread over several years to assist the owner with taxation and the sharefarmer with financing, if necessary.

The following sharefarming agreement commenced in 1979 and was terminated at the end of a five-year period.

Stock:	1979	2 600 SU		
	1982	3 500 SU		
	1984	2 650 SU		
Ownership:	Land and buildings provided by owner			
	Stock and plant provided by sharefarmer			
Finance:	Total	Stock	Plant	
Ingoing 1979:				
Sharefarmer's capital	20 000	18 000	2 000	
Rural Bank loan on stock	37 000	37 000	-	
Term loan on plant	13 000	-	13 000	
Total stock and plant	\$70 000	55 000	15 000	
Outgoing 1984:				
Sharefarmer's capital	84 000	61 000	23 000	
Balance owing to R.B.	14 800	14 800	-	
Total stock and plant	\$98 800	75 800	23 000	
Capital increases:	35 200			
Loan repayments				
Inc. value stock	20 800			
Inc. value plant	8 000			
Total increases	\$64 000			

Partnerships

In a partnership agreement the management partner is given the opportunity to purchase a share in the land and buildings, as well as the stock and plant.

The management partner receives a salary and also shares in the profits and losses. The partners mutually agree upon the farming policy and annual programme but the management partner is entirely responsible for the day-to-day management of the farm.

A partnership is often more attractive than sharefarming to young farmers because their capital is likely to be better protected in land and buildings than stock and plant. Generally, more money is required for a partnership. Present legislation, however, discourages such agreements.

Sharefarming variations

Sharefarming agreements may operate in a number of ways, including:

- * Sharefarming on an adequate sized unit which provides sufficient income to meet the requirements of both parties.
- * Sharefarming on a one-man or uneconomic unit which does not generate sufficient income to support both parties. The sharefarmer

is allowed to do some off-farm work, such as shearing or contracting, to augment his income.

- * Sharefarming on a small block, which is part of a larger farming unit. The sharefarmer undertakes duties of manager or farm staff on the main unit and in addition sharefarms on a small block to supplement his normal salary. The work on the sharefarming block is carried out in the sharefarmer's own time or by his family.

Limitations to farming agreements

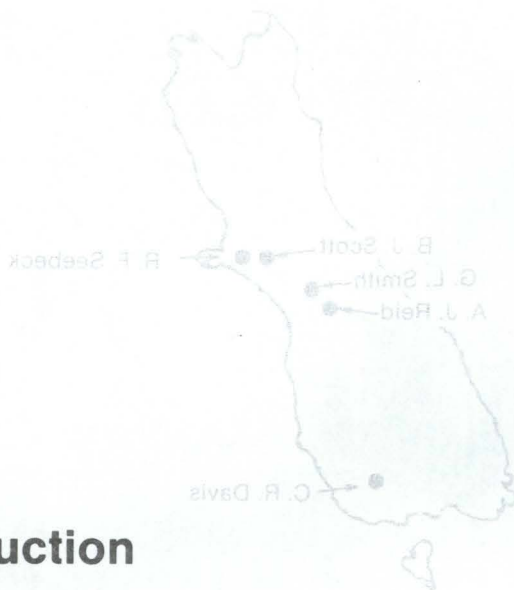
- * A number of measures introduced in the Income Tax Amendment Bill No. 2 have had an adverse effect on farm partnerships. They have effectively discouraged further farm development in existing partnerships and also the formation of new partnerships. In particular, the limitation of \$10 000 per individual taxpayer for losses that may be offset against other income in any one year is very restrictive.
- * The taxation faced by a farmer on the sale of his livestock to a sharefarmer, where a low standard value or nil value has been adopted, is proving to be a real deterrent.
- * A major impediment to faster progress to sharefarming agreements outside the dairy industry is a lack of understanding by land owners and farmers of the benefits and advantages that can accrue from such an agreement.
- * There are many land owners and farmers, throughout New Zealand who would benefit from a sharefarming agreement. Farmers considering retirement or merely wishing to change the emphasis of their activities, are particularly suited to sharefarming. They can relinquish the physical work load whilst still retaining an interest in the farm and full ownership of the land and buildings.

CONCLUSION

- * New Zealand can be proud of its achievements in land settlement of civilians over the past two decades. These achievements are likely to continue during the 1980s with little variation in the number of settlements anticipated.
- * There have been major changes in the capital structure of farming since the beginning of the 1970s. Increases in both deposits for farm purchase and debt servicing are particularly noteworthy.
- * It is still possible for young people to make substantial savings towards a financial involvement in farming. Some young people will continue to purchase their own farms, especially those who are able to obtain some family help.
- * Financial limitations, have been important, rather than the non-availability of farm land, for Government Settlement schemes.
- * Unlike other forms of land settlement, finance is not a limiting factor in sharefarming whereas availability of land is.

- * The dairy industry through sharemilking has created a very successful ladder to farm ownership.
- * Further opportunities are necessary for sheep and beef farmers with limited capital and management expertise. Farming agreements and in particular sharefarming, offer young farmers another opportunity. Such agreements need to be assisted by legislation which will encourage land owners and farmers to become involved.
- * The Lincoln College Property Management Service acts as an independent organisation to promote farming agreements. It welcomes enquiries from interested parties.
- * Outside the dairy industry, sharefarming offers the best opportunity to increase the settlement of new farmers. However, the interest and co-operation of farmers and land owners is needed if worthwhile progress in this area is to be achieved.

**Lincoln College
Foundation
Annual
Farmer Award
1984**



Introduction

The Lincoln College Foundation was established in 1978 and since then it has encouraged farmers to apply for grants funded by the Federation's trust.

One of these grants is the annual Farmer Award — a joint venture with the Lincoln College Farmers' Conference. The Award consists of a travel grant because the Foundation sees travel as an important means of extending contacts in New Zealand agriculture.

Each year a particular class of farming is nominated and farmers working a property in this class are invited to apply for the award. Applicants submit their performance and property for scrutiny. Farms are visited and assessed according to the following criteria:

- * technical performance
- * innovativeness
- * financial performance
- * farm appearance

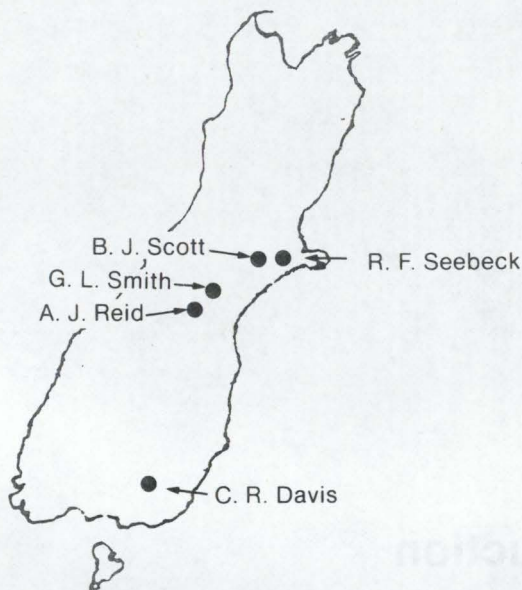
Finalists present a review of their property and farming experience to the annual Lincoln College Farmers' Conference and the award is made at that time. The finalists' presentations are published annually.

The annual Farmer Award is intended to encourage interest among farmers and to make them aware of the support of the Foundation Trustees. The award is made in recognition of farmers who show leadership in their class of farming and who would benefit from further study overseas.

Award Recipients

1983 C. Logan Freeman, 'Montrose,' Kirwee

1984 B. J. Scott, Killinchy, Leeston



Lincoln College Foundation Farmer Award finalists 1984 farm locations.

C. R. Davis, Arthurton, No. 1 R. D., Gore.

A. J. and J. G. Reid, Scott Road, R. D. 26, Temuka.

B. J. Scott, Killinchy, R. D. Leeston, Canterbury.

R. F. Seebeck, 'Taihoa', R. D., Dunsandel.

G. L. Smith, Highbank, R. D. 2, Rakaia.

C. R. Davis

Arthurton, No. 1 R. D., Gore

This time five years ago, having been employed by the Rural Bank for the previous four and a half years, my then fiancée and I had just signed up to purchase our present property. This followed a frustrating period of three 'near-misses' on other sheep and cattle properties in the Otago-Southland region.

Our approach had been to either look for a well-developed, high-producing small property with a versatile soil type (which nearly always evolve to be the cheapest in the long term), or a property that was capable of a rapid increase in stock numbers at a low cost of development. Having been brought-up in a development situation I had a natural inclination towards the latter.

The property consisted of 348 ha of rolling to steep hill country, obviously under utilised, situated 21 km east of Gore. We have subsequently purchased 19 ha of land so that the property now fronts onto the main highway. It is bordered to the east by the Waipahi River and to the west by a county road.

Two major broadtopped ridges, running east-west and comprising about 40% of the total area, dominated the geography. These are free-draining Kaihiku soils sprayed with an amount of volcanic rock. The lower areas between the ridges are Arthurton soils, slightly less fertile but similar in profile to the well-known Waikoikoi soils. The wetter areas require mole and tile drainage. Twenty hectares of alluvial Taieri soils bordering the river complete the three complementary soil types. Altitude ranges from 120 to almost 300 m. We have recorded an average annual rainfall of 0.9 m.

On takeover, the property was carrying 2 590 SU, all Perendales, and was stocked at 7.4 SU/ha or three per acre. This was a level appropriate to the subdivision, the little amount of grass produced, and the phosphate applied.

Purchase price was \$450 000 as a going concern, apportioned at \$361 000 for land or \$139 per existing SU. A vendor and standard Rural Bank settlement, family and Livestock Incentive Scheme (LIS) loans to help swell our modest equity of \$25 000 financed the property. With the extra 767 Perendale ewes ingoing capital was reduced to an acceptable \$6-20/SU.

It was anticipated that we would be overstocked initially in an attempt to get the operation going. The reality of this was at times a little unnerving. The overall development philosophy was quite straightforward. The Perendales were to be used as a development tool to assist in establishing a low cost, high performance stock system as rapidly as was possible. A plan was drawn up with a projected aim of at least 4 000 SU within three years. It was intended that stock performance should be maintained and debt servicing per stock unit reduced.

Development is now largely complete. The cost was a total of \$134 000 with a total of 4 360 SU, less the 250 SU apportioned to the additional land which are being wintered this year.

Soon after our arrival on the property a soil test confirmed the low phosphate levels. These averaged 7.5 on the Olsen tests over all paddocks, clearly illustrating the previous five-year average of 12.7 t of super over the total property. We immediately applied 250 kg/ha of molybdc and 375 kg/ha of 0.9.0 superphosphate.

Six months elapsed before decisions on fence layout and design were made. The first priority was to completely sheep-proof all the existing fencing that was to be preserved. This was done mainly by the use of electric outriggers. Temporary electric fencing was used extensively in the first 18 months. This performed the dual role of confirming where new subdivision was to go and provided the incentive to get it constructed. The basic layout was to link as many paddocks as possible with two lanes. Each lane was to be serviced by a new set of circular sheep yards constructed from timber milled on the property. The yards designed by John Galligher have proved to be a tremendous asset.

In total, 21 km of fencing has been constructed which subdivides the property into 62 main paddocks with a further two hogget blocks divided into six strips. The overall average is 5 ha per paddock. The layout, particularly the lanes, has been of tremendous assistance in

planning grazing management and utilising pasture at the most opportune time. Mobs that are difficult to control, such as newly weaned lambs, are especially easier to handle. We now believe layout and subdivision to be more important than any labour-saving advantage one breed may have over another.

The stocking trends and production are illustrated in Table 1.

Stock	Vendor	July 1979	June 1984
Perendale ewes	2 254	3 024	2 620
Coopworth ewes	-	-	580
TOTAL	2 254	3 024	3 200
Perendale hoggets	515	500	364
Coopworth hoggets	-	-	450
Rams	25	30	55
TOTAL	2 794	3 554	4 069
Cows	-	46	-
Two-year heifers	-	-	51
One-year heifers	-	-	74
TOTAL SU	2 632	3 911	4 359
SU/Eff./ha	8.3	12.4	13.7
L%, S-S	110%	116%	116% P, 134% C
Total wool (kg)	9 100	15 495	
Meat/Eff./ha(kg)	99	198	
Wool/Eff./ha (kg)	41	71	
Av. lamb weight (kg)	-	12.24	15.2

TABLE 1 Stocking trends and production from date of takeover in 1979.

Fence type has varied from 9-wire on narrow lanes and when bordering woodlots, to 4 and 5-wire insul timber, to 3-wire fibreglass for the hogget strips. The majority of the posts required have been driven by a neighbour. The threat of smothers has prompted the use of electric fences in suspect areas.

PASTURE RENEWAL

It was immediately apparent that some of the worst browntop areas could not be improved by fertiliser application and grazing management. Therefore, a system of direct-drilling the free-draining rocky areas and ploughing the heavier soils for winter hogget feed has been followed.

Twenty-six hectares have been direct drilled. A major side benefit of this is the flush of clover following paraquat or spraygrow applications which has provided excellent clean lamb pasture. All pastures have been diamond drilled apart from the first year.

Forty-five hectares have been cultivated with swedes or rape through to ryecorn. Barley was once undersown with new grass.

Thirty-five hectares of tussock have been oversown and topdressed. This was financed by the Land Development Encouragement Loan. Heavy initial rates of phosphate of 1.1 t/ha of half-strength molybdcic super and 2.5 t/ha lime, spread where possible by tractor, have proved a good investment.

Hoof and tooth development has proved adequate on the remaining areas. The benefits compound quickly on the heavier soils, where the poorer grasses could not persist under the treading imposed by daily shifts over winter. The wetter seasons have assisted pasture improvement.

FERTILISER

Soil or foliage tests have been completed annually. Following an average application of super of 560 kg/ha the MAF phosphate model has finally shown a maintenance requirmeent of 200 kg/ha. All areas accessible by truck have been limed at 2.5 t/ha. In future, 20% of the property each year will be limed at rates dictated by test results. DAP will now be used on hogget and cattle blocks in the spring. White muscle was diagnosed in our first spring so selenium super was spread over half the property last year, and over the total area at a reduced rate of one third of a kilogram per hectare this year. It is hoped to monitor selenium blood levels next summer.

STOCK

To assist our overstocking problem in the first year and still comply with LIS requirements, our hoggets were exchanged for cows. These were used for grazing to open up some of the heavier tussock areas.

It certainly was not easy accepting the lamb growth rates, particularly in the first two years. Five hundred in the first year and 1 100 in the third year were sold as stores to ease pressure on other stock and to assist liquidity. In the first two years all ewes were mated to Perendale rams to give a wide selection margin. The South Suffolk was then introduced and mated to ewes which were selected on lower wool weight and inferior body type.

Lamb deaths have risen from 13 to 22%. The latter figure was recorded last year with the swing to the South Suffolk and the heavier stocking rate. However, the higher lamb weights and more importantly, the greater growth rates allowing earlier slaughter, have more than compensated. Lamb weights have risen to an average of 15.2 kg this year with 155 or 4.8% graded as trimmers and 1.5% over-fat. The net cost of these figures on next year's pricing are \$1 400 - 1 600.

As pasture quantity and quality improves, Coopworth ewe lambs have been purchased from two reputable breeders producing at top meat and wool levels per hectare. As two-tooths these have been mated to hired Coopworth ram lambs which were selected on high growth rates and low GR measurement.

This system will obviously continue and will compound because we

can keep our own replacements. The total flock transition to Coopworths should be completed by about 1987.

It is the total conversion efficiency of the Coopworths under an intensively controlled grazing system at high stocking rates which has appealed to us.

Briefly, the main points of stock management are:

- * Ewes are rotated in two mobs on a 105–110 day winter, starting most importantly in early to mid-May, mainly on daily breaks. One hundred and twenty days were required for the first three years because of insufficient regrowth for a quick regrazed before lambing.
- * Harnesses split lambing into nine-day intervals.
- * The bulk of 1 500 bales of hay is fed in late May and June on the less productive, free-draining soils. This leaves the better areas of high quality feed to benefit from winter growth. Fattening cattle are very lightly stocked on these areas and are sold as the ewes bear down on them.
- * It has taken four years to wind the lambing date back to 15 September.
- * Hoggets are on daily breaks from early May. They then feed on swedes to mid-August, then they are grazed in rotation on areas less suitable for lambing.
- * To extend the safe area for weaning and provide extra grass controllers in summer, 74 heifer calves have been purchased. It is hoped to extend this number to about 150 when gross margins permit. Heifers up until now have been purchased in late spring.
- * Ninety-five percent of ram lambs have been left entire or possibly as cryptorchids next year. Ewes and lambs are set-stocked until weaning in early December.
- * Works lambs are divided into groups of 500–600 and are slowly grazed in rotation on the best available clover. Spraygrow at 750 ml/ha over 8–10 ha has fostered clean clover production.
- * A 4 m topper has also greatly assisted summer feed quality.
- * Lambs are drenched at three three-weekly and two four-weekly intervals.
- * Ewe lambs are shorn in mid-January and ewes in February. The later date has advantages in a developing farm situation. However, a possible deterioration in wool quality may dictate an earlier date in future.

PLANT

The approach to all plant and machinery is simple: the less the better, and it's the use of and not the ownership of, which is important. As a result, contractors have been employed widely. A four wheel drive utility is in its third year of lease. Overall, the relativity between machinery costs and farming terms of trade is well known.

LABOUR

Our labour force consists of myself and, fortunately for me, a very capable wife. A single man was employed for one summer while our daughter was expected. A student is to be employed over the summer, and with further intensification, silviculture requirements, and extensions to our family, possibly fulltime.

The labour-saving advantages of intensive subdivision are greatly underestimated. The routine now becomes one of light, enjoyable, but regular, work.

FORESTRY

Any area not capable of carrying 7 SU/ha once fully developed ie., mainly cold back faces or areas awkward for stock movement, is, or will be, planted in trees. The exception to this is 6 ha of wide-spaced *Pinus radiata* being grazed this year and 2 ha of *Delicatensis* planted near the woolshed for stock shelter.

The total area proposed for forestry is 49 ha or 15% of the property of which 27 ha of various species are now established. Plantings have been staggered to spread silviculture requirements and costs.

A joint venture has been carefully considered, however, because our average land preparation costs are low, we have proceeded independently. Should costs provide an untimely strain in the future, an agreement may well be made then. The Forestry Encouragement Grant scheme has been utilised.

To provide a quicker return, some areas may be clear-felled at 15 years of age for round-wood or sold as a standing investment. Establishment of further shelter belts is steadily proceeding.

FINANCIAL FACTORS

Nil standard values were utilised in Year one. Subsequent increases have been written down to a \$6 standard value. As a result, development expenditure has been deferred leaving \$53 000 to be offset against future assessable income.

A summary of the development can be seen in Table 2.

Total cost (\$)	134 000
Cost per SU	76
Source of finance	\$
LIS	16 930
Landel	11 600
Development loan	20 000
Stock loan	22 000
Income	63 470
TOTAL	134 000
Debt servicing	\$/SU
Year 1	6.20
1984	5.44
1984 with additional land	6.78

TABLE 2: Summary of development.

The return from this development is apparent in the actual cash flow (Table 3).

Source	\$	\$/SU
Cash farm income	172 170	41 21
Cash farm expenses ¹	105 720	25.31
Cash surplus	66 450	15.90
Charges	29 570	6.78
Surplus	36 880	9.12

¹ Includes stock purchases.

TABLE 3: Actual cash flow.

THE FUTURE

In brief, our future plans include:

- * A stabilisation of existing stock numbers. However, if performance is corrected, carrying capacity will continue to increase.
- * All hay is to be made on a neighbour's property in return for the use of a dry tussock block to winter his ewes.
- * About 400–500 t of silage is to be made to slow the winter rotation down, provide greater flexibility, and to feed heavier cattle on a concrete pad.

- * The ratio of cattle to sheep is to increase, to take full advantage of the free-draining soil, and to enhance the complimentary summer grazing. The present feed budgeting system is to be refined further.
- * All thoughts of diversification up until now have been thwarted by the reality of knowing that we would obtain a better return in the short term by improving our existing system. However, a small but expandable deer unit is now under construction and will be stocked at an appropriate time, most likely with stags. The emphasis will be on meat production per hectare.
- * In view of the present position of the sheep meat industries I feel our challenge to produce high outputs of required products per hectare at minimal costs is just beginning.

Finally I would like to thank the Lincoln College Foundation and all those involved in the organisation, for providing what has been a very stimulating challenge.

TABLE 2: Summary of development

The return from the development is expected to be as follows (Table 3)

£	£	£
15.11	175.170	15.11
12.35	102.120	12.35
10.01	65.450	10.01
10.01	24.570	10.01
9.10	38.880	9.10

Includes stock purchase

TABLE 3: Actual cash flow

THE FUTURE

In order to plan this future

it is necessary to consider the following factors:

1. The future of the sheep meat industry

2. The future of the deer meat industry

3. The future of the beef industry

4. The future of the pig industry

5. The future of the poultry industry

6. The future of the fish industry

A. J. and J. G. Reid

Scott Road, R. D. 26, Temuka

In presenting this paper I would like to introduce you to our farming career. I would like to discuss how we came to purchase our first farm, how we financed that farm, and what we have achieved on that property since our settlement. I would also like to present some of our aims and ambitions as we continue to farm that property.

THE ROAD TO FARM OWNERSHIP

How did we reach farm ownership?

I was born and educated in Mosgiel. After leaving school I worked on a Taieri Dairy Farm for 30 months before entering Massey University in 1974. Twelve months later I was awarded a Diploma in Agriculture. During this year I met Judith who is now my wife.

On my return to Mosgiel I worked in my parents' joinery factory for 18 months. The aim was that I would eventually manage the business.

During this time I found that my thoughts and interests were still deeply involved in agriculture, particularly in dairy farming. Judith and I then set out with the aim of buying our own farm — we were keen and full of enthusiasm.

We spent the first year share-milking a herd of 80 cows on the Taieri — a great job but not one where we could rapidly increase our capital. It was time to move on. We accepted a 50-50 share-milking contract on a nearby property. This property was milking 100 cows but had scope for building-up numbers to provide the necessary capital for farm ownership.

Everything went well for the first two seasons. However, in our third season the 1980 Taieri floods hit the plains. It left the area covered with up to 2 m of water over June and July and the area was left like a swamp over August and September.

We knew we had to retain ownership of the stock if we were to keep our capital growing. We sent 100 cows to Ashburton where they were milked for that season. Other stock were very generously grazed by Southland farmers for varying periods of up to six months.

We foresaw a large loss of income that year — we had only 80 cows instead of 180. We were still determined to aim for our farm. It would have to be a real team effort. Judith did an exceptional amount of work. We were living four miles from the farm from June until Christmas, but every day she bundled our two children (who were then aged two and four months) into the car and headed for the farm. She attended to the farm jobs and milked the cows in the evening. I worked at the joinery factory again to help maintain a reasonable income.

In November we looked at a 54 ha dairy farm at Winchester in South Canterbury. It did not take long to do budgets and sheets of figures which resulted in an application to the Rural Bank for a special settlement loan.

June 1978	Cash and plant	9 000
	R.B.F.C. Stock loan (140 cows)	20 000
		<u>\$29 000</u>
June 1978– April 1981	Capital ¹	5 300
	Injected ²	1 500
		<u>\$6 800</u>
April 1981	Stock (233 cows, 88 replacements)	107 800
	Less debts	17 500
		<u>90 300</u>
	Plus plant	14 000
		<u>\$104 300</u>

¹ From the Livestock Incentive scheme.

² A family loan.

TABLE 1: Growth of capital during three share-milking years, June 1978–April 1981.

We waited anxiously for the Rural Bank's reply to our farm settlement application. We were both thrilled when we heard we had been successful. At last our own farm — what a great feeling! For four years we had watched land prices soaring. Our only hope was that our stock asset was increasing at a faster rate — in the end it had. In May 1981 Judith and I, with Desiree and Bradley, moved to our first farm at Winchester.

The farm covers 54 ha and is located 2 km east of Winchester. It is flat and the soil is a heavy, high fertility, Wakonui, silt loam. The farm was well sub-divided into 30 paddocks with reasonable stock water supply and good access races. There was a good range of normal dairy farm buildings, including two houses. For a number of years the farm had operated as a town milk supply unit. Today it still carries a small quota of 432 litres per day. Previous production had averaged about 14 000 kg from 90 cows.

Ingoings	(\$)
Lands and buildings	230 000
Stock	52 000
Plant	14 200
Legal, hay, sundries	8 900
TOTAL	\$305 100

Financed by	
R. B. F. C. settlement loans	161 800
L. & S. D.P.L. ¹	33 500
Family loan	1 500
Own contribution	104 300
Ingoing deficit ²	4 000
TOTAL	\$305 100

Equity on settlement 104 300
 305 100 × 100 = 34%

¹ Lands & Survey Deferred Payment License.

² Covered from the first year's farm revenue.

TABLE 2: Budgeting to meet farm settlement costs incurred at time of purchase, April 1981.

FARM PRODUCTION AND DEVELOPMENT

The farm finance was finalised: we were on the farm and keen to get going.

The first season got underway with 115 cows — production peaked at a reasonable level. It looked like we were going to be well ahead of budget, but then it all happened. The rain stopped, and by late January we were feeding straw and hay. However, in spite of the

drought, we managed to finish the season slightly ahead of budget with 15 400 kg of butterfat and a herd of thin cows.

An irrigation scheme and renewed stock water supply were our priorities for the next season. We had stock available to increase the herd size, but they had to be fed. That winter, we spent many hours in trenches laying pipes for the irrigation scheme — we were determined to beat those Canterbury droughts.

The second season started with a dry spring. The irrigation plant was turned on in September. Cow numbers reached 153. We were feeling happy with peak production which was 40% up on the previous year. The water was working, we had green grass and plenty of it. Our children found a new use for the irrigation water — a 300 gallon per minute cold shower — a great feeling on a hot day. We ended the season with 44% more butterfat than the previous year. The irrigation had been a great success. More cows were now needed to test the farm's potential, but the cowshed facilities would have to be expanded.

I drew plans and worked out prices for rebuilding. Last winter we spent many long days and nights on the end of a concrete hammer or an electric welder — the building job had to be finished before the spring. It was a rush, but we managed and we now have a new 21-a-side Herringbone cowshed which could easily handle up to 250 cows.

During these two years the farm had been run on budget control with the Rural Bank. This had been a condition of our special settlement loan. But now we were told, 'It's time to look after yourselves'. Losing the 9% current account overdraft was a big shock to the system: the bank wanted 13%.

We started this season with our new cowshed, an extra labour unit, and a further increase in cow numbers. We peaked at 183 cows, and daily production in late October was up 15% on the previous year. By the end of this month we will have produced 29 750 kg butterfat. We have improved on our original target — which was 27 000 kg fat or 500 kg/ha in Year 3. The local discussion group's opinion was that 'It can't be done in Canterbury.' However, the recipe was simple: more feed, more and better cows.

Increased stock pressure meant farm races had to be upgraded this Autumn. We are at present building a silage pit and concrete feed pad to facilitate our winter milking herd of 30-40 cows.

The following summarises farm production over the past three years.

	1981-82	1982-83	1983-84
Cows	115	153	183
Butterfat (kg)	15 411	22 242	29 750
Fat/ha (kg)	285	412	551
Fat/cow (kg)	134	145	162

Cow numbers have risen by 68 cows — this represents 59% increase. Total kilograms and kilograms per hectare have increased by 93%. When we settled the farm, our original production target was 500 kg fat/ha — now we have reached this we are setting our sights much higher. Production has increased by 28 kg per cow in spite of the increased herd size. We hope to continue this trend.

Next season we aim to be milking at least 210 cows and the production target is a minimum of 33 000 kg fat. What are our long term production aims? Well, I think there's a lot of butterfat increases left in the farm yet. I have a friend at Morrinsville who is producing at levels of around 700 kg fat/ha. I'm looking forward to the day when I can say to him 'Shift south, the South Island can produce 800 kg of fat/ha.

DEVELOPMENT AND STOCK INCREASE COSTS

Development	(\$)
Irrigation and water supply	67 700
Cowshed	50 500
Silage pit and races	14 000
	<hr/>
	\$132 000
Financed by	
(1) R.B.F.C. Development loans	89 000
Farm Revenue	43 200
	<hr/>
	\$132 200
Stock Increases	
(2) Opportunity cost (94 cows, \$340/cow)	31 800
Less LIS. ¹	8 500
	<hr/>
	\$23 300
Reinvested capital (1) and (2)	43 200
	<hr/>
	23 000
¹ Livestock Incentive Schemes.	<hr/>
	\$66 500

TABLE 3: Farm development and stock increase costs.

The reinvestment of farm income is important to our aim of increasing our equity. Our equity today has risen from our settlement equity of 34% to a level of 48%.

DEBT SERVICING

We entered farm ownership in 1981 with total borrowings of \$197 000. During the past three years this has increased to a total of \$310 000. With capital repayments of \$17 000 we have a total of \$293 000 still owing.

	1981-82	1982-83	1983-84	1984-85
Debt servicing cost	15 700	23 000	29 800	33 400
\$/kg butterfat	1.02	1.03	0.97	1.01

This shows that the total cost of servicing our debt (which includes interest on our current account has more than doubled from \$15 700 in 1981-82 to a budgeted figure of \$33 400 for 1984-85.

Perhaps the most important feature here is that our ability to service

this debt has remained virtually unchanged at nearly \$1.00 per kg butterfat each year.

FEATURES OF OUR FARM TODAY

Cowshed

We aimed to build a shed which gave us features such as good stock control, good cow flow, easy and efficient milking, and a place that is a pleasure to work in.

Irrigation

We have a travelling irrigator capable of covering 3.2 ha with up to 50 mm of water every 24 hours. Labour input is about 1 hour every day to shift this machine — a not excessive input when we consider the benefits it has given us.

Feed supplements

About 90% of our supplementary feed is bought in as silage, hay, straw, meal, and grazing. This is a major cost to the farm and accounts for about 30% of farm operating costs. We consider that the feed available in our district is a resource which could be utilised to a greater extent to increase dairy farm production.

Grass

We aim to convert a high percentage of the grass grown directly into milk. We achieve this with a high stocking rate of milking cows — around 4 cows per ha or 28 SU/ha will be milked next season. We monitor grass growth and feed demand fairly carefully from autumn to late spring — our decisions on feed management and rotation lengths etc. are based on such information.

Cow breeding

Our aim in herd management is to breed cows with a superior genetic ability to produce milk. We mate cows to sires with high breeding indices owned by the New Zealand Dairy Board — these bulls are our guarantee to genetic improvement. We herd-test to identify cows with high butterfat production upon which we base our breeding programme.

Labour

We extended our labour force this year to include a permanent land girl. We have found real benefits from employing labour — one major benefit is that Judith can spend much more time with our family, which has now increased with the birth of our third child, Raewyn, who is three months old.

FARM PROFITABILITY

Our future aims must take into consideration farm profitability. We have spent a lot of time and money on development activities since

settling on the farm. What has been happening to farm profitability during this time?

Farm profitability	Budget		
	1981-82	1983-84	1984-85
Gross farm income	74 000	132 000	151 000
Operating expenses	43 000	86 000	87 000
Net surplus ¹	31 000	46 000	64 000
Net surplus per ha	579	854	1 185
Farm operating costs			
Gross farm income	58%	65%	58%

¹ Net surplus (available for debt servicing, personal, tax, development).

TABLE 4 Farm profitability.

Gross farm income from milk and stock sales has increased by 78%. Farm operating costs have increased by 100%. Net surplus or farm profitability has increased by 48%. We have achieved our increase in net surplus per hectare of 48% by rapidly increasing our gross income. Our aim for the future is to keep farm costs at a lower percentage of farm income. Farm costs have risen to 65% of farm income this season. I believe we must attempt to keep them at a lower level without restricting further economic production increases. This presents us with a great challenge for the future.

Waikato I.C.I. Dairy Farm Awards are going to farms with net surpluses per ha of at least \$1 200. On next year's budget we should come close to this by holding farm costs at around 58% of income.

I believe that these Waikato returns per hectare are achievable on South Island dairy farms. As a result of the big difference in land price between Waikato dairy farms and our dairy farm, the lower levels of capital invested by us must give a better return on our investment.

CONCLUSION

What an exciting future and challenge agriculture presents us with! I believe the goal of farm ownership in the 1980s is still obtainable by young farmers who show determination, and have their sights set on achieving this ambition.

The challenge doesn't end at farm ownership — it has only begun. We are finding real reward in utilising all the resources we can to farm our property as an efficient productive unit. When we aren't challenged by our farm I think it will be time to give someone else a try — someone who can find a challenge in what we have left. Perhaps these will be the farmers entering the 1990s.

I would like to take this opportunity to thank the Lincoln College Foundation for their invitation to address the Conference. I would also like to thank Don Crabb and his staff at Lincoln for preparing my visual material. Our thanks also go to others who have given us help and encouragement during this project.

B. J. Scott

Killinchy, R. D. Leeston, Canterbury

My career started when I left Ashburton Technical College and worked on the then family farm at Eifflerton in the Ashburton County. I worked at home for two years and worked a tractor for most of the time — something which I enjoyed at the time and still enjoy today.

January 1968 I moved to 'Longbeach Estate' and worked on the cropping side of their farming operation. 'Longbeach' was a dairy, sheep, and cropping farm. From there I moved to North Canterbury, working a crawler tractor on Lands and Survey Hill Development work and also driving a windrower for a local contractor.

In January 1971 I moved to Temuka, and worked for Mr Alan Pye — a farmer and contractor. This farm involved beef cattle, sheep, potatoes, cereals, peas, ryegrasses, and clovers, and also contracting with hay balers, headers and agricultural equipment. Once again I worked on the cropping side of this operation.

From April 1971 to March 1972, at my own expense, I went on a world tour with the I.A.E.A. During this time I worked in Canada and

Britain. Both of the farms I worked on were beef cattle and cropping farms. I also visited several interesting farm operations in the western states of America.

On returning to New Zealand I went back to Temuka to work for Alan Pye and married my wife Betty — a Christchurch girl — 18 months later. In 1973 I leased 4 acres of land which sounds much more than 1.6 ha. On this land I grew peas in the first year and wheat in the second, both were successful crops.

At this point in my farming career I visited the Rural Bank for the first time regarding farm settlement. I found them to be most helpful, but they believed my limiting factor was that I was not a farm manager. I could make a decision on when to turn the tractor at the end of a paddock but had had no experience in making management decisions.

I applied for, and failed to get, two farm manager positions, both were for sheep farms with a small amount of crop. The third farm manager position I applied for was a specialist cropping farm. I was successful in getting this position. I became the farm manager of the Lincoln College Cropping Farm and commenced duties there in December 1975. I was then 26 years of age.

In early 1977 I found 20 ha of cropping land for lease 7 km from Lincoln. On leasing this land I started a 50-50 farming partnership with my wife Betty. On this land in the first year we grew Tama ryegrass, then white clover, and then wheat. Our second visit to the Rural Bank came during this time, again for a farm settlement, and I was this time asked, 'Do you have a property for sale in mind?'. My answer was 'No'. They replied 'Then find one'.

Ingoing expenses	
Land and buildings	132 000
Irrigation plant	5 000
Stock	15 000
Hay	2 000
Plant	6 000
TOTAL	160 000

Finance	
Rural Bank	100 000
Private loan	30 000
Own cash input (19% equity)	30 000
TOTAL	160 000

Ingoing assets	
Tractor	3 500
Grubber	150
Spray Unit	900
Plough	30
Car	6 500
Mower	150
TOTAL	11 230

TABLE 1: Costs involved in purchasing the property.

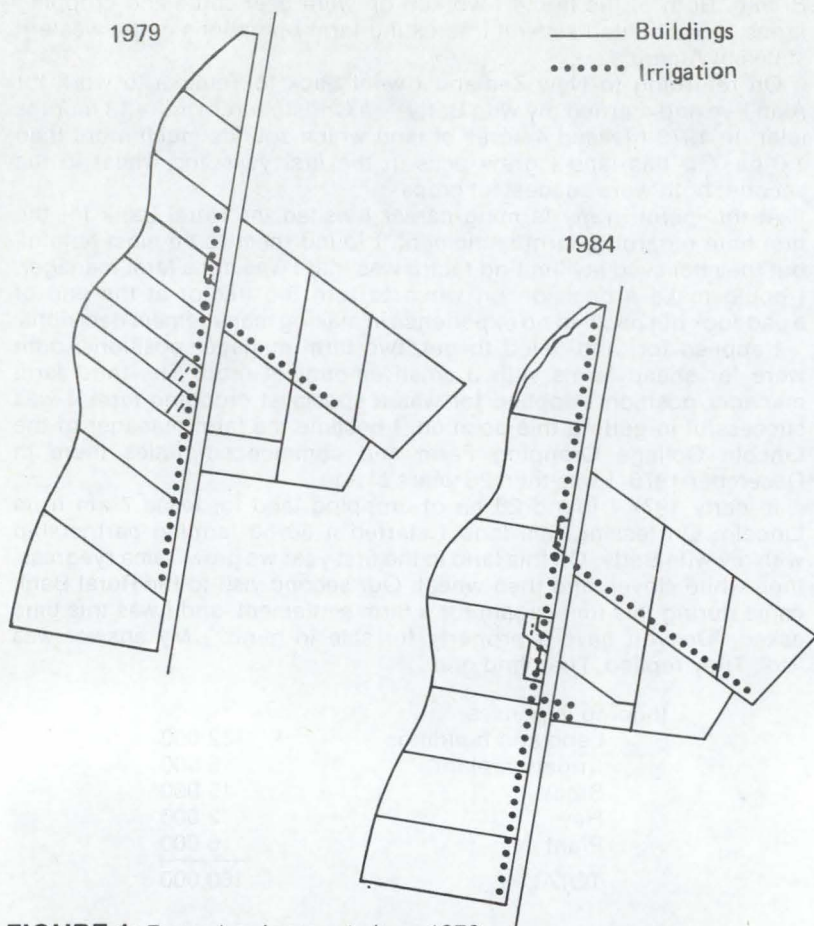


FIGURE 1: Farm development since 1979.

In 1978 our farm was advertised for sale in the Christchurch Press. It comprised of 82 ha of Paparua Silt Loam. The property is situated 56 km south of Christchurch, 12 km west of Leeston. It featured an irrigation bore with submersible pump and underground mainline, a sound four bedroom house, a six bay implement shed, and several other buildings in poor repair.

After our second visit to the property I submitted an offer to the owner for the purchase of the farm. My offer was \$132 000 for land and buildings (which was the Government Valuation at the time) plus \$5 000 for the irrigation equipment (which consisted of 300 m of end-tow and and 300 m of hand-shift). Eventually the offer was accepted. We moved and settled on the farm in September 1979. I was 30 years of age. My first ambition to be settled on our own farm by the time I was 30 had been achieved. The costs involved in farm settlement are shown in Table 1.

DEVELOPMENT

Development

Since purchasing the farm, we have completely refenced half of the property. I have constructed a fence with five plain wires and two electrified wires with posts every 7.5 m. This has been financed from the farm cash surplus and from the sale of netting from the old fences (at an average price of \$40 for a coil). We now have a swing iron gate into these paddocks and a wooden panel that can be lifted out to make the gateways 7 m wide. This gives access to wide machinery. We are presently up-dating the fences on the other half of the farm.

Fertiliser

The total farm has had 5 t/ha of lime applied which has lifted the pH from as low as 5.3 to 6.0 or higher.

Irrigation

In the summer of 1980 I decided that shifting irrigation pipes from 6 am in the morning until 9 pm in the evening was no longer fun. I applied to the Rural Bank for a development loan to update the system. We purchased a travelling irrigator at a cost of:

Travelling irrigator	25 460
Booster pump and motor	4 000
Additional underground mainline	2 900
New pump shed	800
Electric switch gear	1 700
TOTAL	\$34 860

The Rural Bank granted a loan of \$27 000 to update the system, the balance — \$7 860 — came from the farm surplus. The system now allows water to be irrigated by travelling irrigator and/or hand-shift pipes. The whole property can now be irrigated in 18 days applying 50 mm of water.

Silos

There was no grain storage at all when we purchased the farm. For two years we put the grain into temporary grain silos in one of the old buildings. We now have four permanent self-emptying silos with a capacity of 125 t that are a pleasure to use. Once again this was financed by the farm cash surplus at a cost of \$8 700.

Assets	\$
Land and buildings ¹	400 000
Plant and implements	75 000
Stock	15 000
TOTAL	490 000

Liabilities	\$
Rural Bank	121 000
Private loan	30 000
General finance (tractor)	18 000
TOTAL	169 000

¹ Government valuation Oct. 1983.

TABLE 2: Assets as of 31 July 1983.

Table 2 shows that from a 19% equity at settlement we have increased our equity to 66% in four years.

TECHNICAL PERFORMANCE

The farm has 13 main paddocks each about 6 ha and three small paddocks. It is run as a cropping farm which also runs 550 Border Corridale ewes. Each year 77 ha of crops are grown. The cropping programme last year was:

Wheat	20 ha
Peas	20 ha
Beans (processing)	8 ha
Clover	12 ha
Barley	12 ha
Ryegrass	4.5 ha
Pumpkins	0.5 ha
Lucerne (grazing)	5 ha
TOTAL	82 ha

This programme can, and has, varied from year to year. Our main income is derived from 100 t of wheat, and 100 t of peas. Processing beans are grown as a high cost, high risk, high paying crop. The return has ranged from \$1 000 to \$3 000/ha gross. Clover, barley and ryegrass are also grown. I consider them high risk crops but they have the potential to return a reasonably high level of income. Although the income from these crops is not as high as processing beans, the costs are also not as high.

A small area of pumpkins has been grown every year. We have enjoyed growing them because they too have the potential to give a high net return. However, this year we may have to feed them to the sheep because prices are very low.

We do not have a cropping rotation as such but in a 10-year cycle we will grow four crops of wheat or barley, three crops of peas, two crops of white clover, one crop of ryegrass or beans.

I am a cultivator at heart. I have tried direct drilling of winter green feeds with very mixed results. I have had more failures than successes. However, I have found a minimum tillage programme very successful. We put our maxi-tiller cultivator over the ground once or twice before sowing with our conventional drill.

Stock

Sheep are used as a tool of management (just as a plough or grubber is used). They clean up stubble residue and hold back the coming seasons' ryegrass and clover crops. They are also useful for eating yarrow, twitch, etc.

The ewes go off the farm to graze every year for 10-12 weeks from November to January. They are grazed on my neighbour's property which he uses for the wintering of beef cattle. In return for the grazing I supply and cart 200, 5'x4' round bales of ryegrass, pea, and barley straw, but we do not pay for the baling of these straws.

Lambs are sold as soon as possible and are off the farm by January. Half are sold as Beta grade and the rest as prime. They graze lucerne while they are on the farm. Our replacement policy is to buy in large frame two-tooth ewes.

I also sow a paddock of rape and oats for winter feed and one paddock of Italian ryegrass and oats for spring ewe and lamb feed. We feed pea and ryegrass straws to them while break-feeding the rape and oats. In the past rape has been direct-drilled into pea stubble which is undersown with white clover. Once the sheep have grazed out the feed the paddock is saved for clover the next season. Thus, the sheep are a management tool but have the added advantage of returning a gross income of \$16 000-18 000 per year.

Machinery

At the clearing sale for the previous owner of our farm, a combine harvester came under the hammer. I had no intention of buying at the start of the sale, however it seemed too cheap to miss. We paid \$2 500 for it. I drove it into a shed and three weeks later sold it for \$5 200. I went to town and came home with a \$10 000 combine harvester capable of completing our harvest.

After harvest we again sold the combine harvester. It was traded-in on a tip truck, a smaller combine harvester, a grain auger, a new rotary mower, and a new maxi-tiller cultivator. We had to pay \$2 500 to complete the deal. Five items we needed were purchased for one item traded.

Since then we have again updated the truck, the grain auger, the maxi-tiller cultivator, and purchased another identical combine harvester.

The 62 hp tractor that we purchased in 1977 for \$3 500 was sold in 1981 for \$7 000, and we bought a new 66 hp tractor. We have updated this again with a new 90 hp tractor. We have a small 40 hp tractor for doing the spraying, mowing, hay raking, etc.

A three wheeler motorbike has been one of our wiser purchases, used every day, it has never failed us.

FINANCIAL PERFORMANCE

Although I haven't dwelled on financial performance I feel this data will be of interest (Table 3).

	1980	1981	1982	1983	1984 (est)
Total gross profit	42 061	62 730	81 584	84 748	96 000
Total farm working expenses	23 559	27 842	33 261	42 235	48 000
Net farm profit	4 465	14 397	25 019	13 340	28 000
Per hectare					
Total gross profit	513	765	995	1 034	1 170
Total farm working expense	287	340	406	515	585
Net profit	54	176	305	163	341
True cash surplus (deficit)	(2 307)	299	329	21	150

TABLE 3: Financial performance from 1980-84.

I offer no excuses for the \$163/ha net profit in 1983, but when one's crops are only a week away from harvest and hail falls on them for 20 minutes it is the most devastating thing that can happen to a year's work. I can only be thankful that we had two thirds of our harvest completed before the hail struck. This enabled us to keep our cash supply in tact as shown in the true cash column.

We keep a farm cash flow book, recording every financial transaction that is made, and we spend a considerable amount of time keeping our cash flow within our budget.

A paddock book is kept to record every operation carried out, and the revenue and expenses that each paddock has incurred since we commenced farming. I believe that it is most important to identify any enterprise that is not returning a satisfactory level of income.

Betty has been an enormous help. She works from daylight until after dark as I do. She is capable of not only keeping the books up-to-date and in order, but can drive the truck, tractors, and motorbike. She can cultivate, shift grain, weed pumpkins, help set the drill for correct seeding rate, mow clover, shift irrigation pipes, tail lambs, man the sheep scales, work a broom in the shearing shed, and is bringing up our three children. It makes one wonder who should be trying to win an award like this.

THE FUTURE

My ambition is to enlarge the scale of our present operation, to increase on present production levels, and to further improve our financial performance. This will also utilise our present machinery resources and enable us to justify the expense of a newer and larger combine harvester.

I also want to hand the land onto the next generation in a better condition than it was when I received it.

R. F. Seebeck

'Taihoa', R. D., Dunsandel

I was born and educated in Christchurch and upon leaving school in 1970 with School Certificate I wanted to go farming. I therefore joined the North Canterbury Farm Cadet Scheme. I was placed on a pig and dairy unit 25 miles south of Christchurch in Dunsandel, where I remained for the full four-year term. I managed the 80 sow pig unit in the final year. I then worked on a sheep and cattle property for ten months, but preferring pig farming, returned to my former employer. I went into a one third partnership in the pig enterprise and ran 120 sows and sold weaners. I remained there for three years before purchasing our present property.

Unlike myself, my wife Sally was raised on a farm in Marlborough, educated in Christchurch, and has worked as a landgirl and Karitane Nurse. We married in 1976, and we now have two children — Rebecca, 7, and Daniel, 4.

We spent two years looking in various parts of the province for a small stepping-stone unit. One application got as far as the Rural Bank

filing system, but was rejected because of a lack of finance on our behalf. Our present property was advertised for auction. We went along hoping it wouldn't be sold because we could not bid because of a lack of finance. The property was fortunately passed in. We put in an offer subject to finance from my wife's family and Rural Bank finance. Again our application was refused, this time because of a shortage of money on the Rural Bank's behalf.

We took the 'pig by the tail' so to speak: we arranged vendor finance on a short term, took possession in 1979, re-applied to the Rural Bank and were at last successful.

PROPERTY DESCRIPTION

Our property was advertised as a good house surrounded by two acres of young trees. On inspection we found that the vendor had planted pine branches in the lawn which, by possession date, looked like a new breed of deciduous pine. The purchase price of our 36 ha Dunsandel property was \$90 000. We also purchased a 1 000 bird poultry settlement for \$7 000 which we farmed for two years. We then sold this back to the Poultry Board because we could not purchase any more entitlements. The farm also had three run-down laying sheds. The rest of the property was very poorly fenced and was covered in browntop and yarrow — we later eradicated this by cultivation and grazing.

We took 36 sows with us from the partnership. We also purchased 250 ewes. Our income came from selling weaners because there was a lack of fattening accommodation. While my wife looked after the poultry and eggs, I did a lot of casual work. We decided that the obvious future of our stepping-stone unit lay in the development of an economic pig unit. With a greater profit to be made by fattening pigs, as opposed to selling weaners, our first priority became weaner accommodation.

FARM DEVELOPMENT 1979-80

We constructed a weaner room capable of accommodating 200 weaners from the roofing structure of the existing sheds. We also built ten kennel-type pens that would house 180 pigs to pork. Ideas were gleaned from visits to other modern piggeries, teamed with many of my own ideas.

Problems arose that year when we started to lamb-down our ewes. Some fences were poor and a number of sows got in with the lambing mob. On two occasions they cleaned up about a dozen lambs. Consequently, we sold the ewes and what lambs we had left immediately. Later that year, when time and money allowed, I built a set of stock yards and started a much needed fencing programme.

During that year we gradually increased sow numbers and by the end of 1979-80 we had 75 sows, 3 boars, and 360 fatteners (Table 1).

	1979	1980	1981	1982	1983	1984(Est.)
Sows	55	75	90	130	165	175
Weaners	80	80	160	250	200	300
Fattening	-	280	430	780	940	1 200
Boars	3	3	4	5	7	10
TOTAL	138	438	684	1 165	1 312	1 685
Est. C.M.V. of fattening stock			\$ 94 500			
Est. C.M.V. of sows and boars			\$ 45 750			
			\$140 250			

TABLE 1: Stock numbers at 30 June 1984.

FARM DEVELOPMENT 1980-81

This year brought an increase in pig prices which helped considerably with further development. With the aid of a \$8 500 Rural Bank loan I built another ten kennel pens with additional labour from an off-season freezing worker. Before this we erected a 90 t grain silo. Until this stage we had been milling all the barley with a tractor-driven hammermill. We managed to update this by converting it to electric.

During 1980-81 we established 20 acres of lucerne on which we grazed the dry sows. We also started our shelter planting programme. We planted a two-row shelter belt across the north-west end of the property using a subsidy from the Catchment Board. The shelter belt consisted of pines and arizonicas.

As in the previous year, refencing continued when possible. Throughout the year sow numbers continued to increase and by the end of 1980-81 we had 90 sows, 4 boars, and 590 fatteners (Table 1).

FARM DEVELOPMENT 1981-82

Finances were boosted in 1981 with the sale of the poultry entitlement for \$5 000. This enabled us, with the help of a \$14 000 Rural Bank loan, to convert the existing poultry shed into a finishing shed. When totally completed the shed would be capable of housing 700 pigs, fattening through to bacon.

We had builders' assistance to construct and complete the outer shell, concrete floors, and drains. I then continued to build half of the interior only, because we didn't have enough sows to produce sufficient pigs to fill the whole shed. The rest of the interior was left for future expansion. The interior of the shed is galvanised pipe divisions and gates, which I welded myself. In keeping with the previous buildings, the shed has a deep drain with Australian iron bark slatting on top. I used iron bark for its hardness and price compared with steel mesh. The total cost of this exercise was \$23,000. We also purchased a second-hand 90 t silo for \$800, and a 40 foot grain elevator for \$350, complete with motor. Both these items proved to be good purchases.

We purchased a 50-sow herd during that year and so finished 1981-82 with 130 sows, 5 boars, and 1 030 fatteners (Table 1). Up until this time the work force had been Sally and myself, but because of an increase in stock numbers we needed the help of a local single man.

FARM DEVELOPMENT 1982-83

In 1982 farm fencing and shelter planting continued and a new farrowing shed was constructed. We designed this to hold 48 sows, with six separate rooms each holding eight sows. This gave us enough farrowing outside in huts. Weaning numbers reflected a reasonable amount of success, but a fair share of weaner mortalities were caused by the cold and sows squashing the young piglets.

This farrowing shed has now increased our weaning average from 8.5 to 9.5 pigs per litter. We obtained another Rural Bank loan of \$50 000 to help finance the operation. However, the total cost came to \$57 000. We again got builders' assistance to help pour the floor (which was 3 500 sq.ft), and erect the outer shell, and interior walls. We built all the farrowing crates of galvanised pipe, as well as the pens and divisions which separate each litter. These are made of hippilon — a hard plastic material designed for easy cleaning. A heat lamp in each pen provides the warmth for the piglets. We wean one room in the shed per week (weaning at five weeks old). This gives time to clean out the rooms for a new batch of sows that are due to farrow. Later that year with enough finance available, and after a health problem I have flared up, we decided to update and simplify feeding methods in the 20 fattening kennel pens. Up until this time all fattening pigs, except the weaners that are fed in stainless steel hoppers, were fed on the floor by bucket once or twice daily. We changed the feeding techniques of these kennel pens by constructing a wire rope circuit with nylon discs bonded to it inside a steel tube. These discs convey the meal to stainless steel feeders. This has proved extremely successful and allows more time in other more important areas of the farm. The cost of this, including the troughs, was \$5 000.

After breeding our own 25 replacement gilts, we brought the sow numbers up to 185 by the end of 1982-83 with seven boars and 1 140 fatteners (Table 1).

Our local single man left during the year and we later employed a young man who, needing accommodation, now lives in.

FARM DEVELOPMENT 1983-84

We completed the farrowing shed ourselves in 1983. This gradually led to a marked increase in production numbers which meant more weaner accommodation was needed. We therefore dug into our resources and put together another ten weaner pens to accommodate 200 more weaners. This project cost us \$4 000.

From there, we completed the finishing shed that we had started in 1981. This meant welding and putting in the remaining pipe pens, slatting, and gates etc. By January 1984 we had enough accommodation in the finishing shed to fatten 550 pigs through to bacon. This now gives us total accommodation, from weaner through to bacon, of 1 250.

We needed to update our old silos that were now too small, so we purchased four new fed silos — three 5 t and one 20 t — at a cost of \$3 500. We also traded in our old tractor for a later model with a front-end loader at a cost of \$9 000. With new silos installed that

could now handle more automation, we automated the finishing shed and both weaner rooms to give us more time to work with the breeding herd. We have just completed these operations at a total cost of \$9 000 and, aside from a few teething problems, have got the system working successfully.

As the original drop system was to be too expensive, I designed my own hoppers for the finishing shed at about half the cost. These involve a drop system where meal is dropped from the hoppers on to the floor three times a day, by means of a winch. The weaner room system is similar to that in the kennel pens with the meal falling into feeders by means of PVC tubes. The finishing shed is now environmentally controlled. Curtains on each side operate on a winch that is thermostatically controlled by a sensor. As the temperatures alter, the curtain moves accordingly.

This summarises our development and major expenditure, and we are still adding the final touches to the finished shed. The only other major expenses, apart from the pig enterprise, was an alteration to the house, the purchase of a utility and a farm bike, and the upgrading of the family car.

We are currently running 175 crossbred sows, five Duroc boars, two Hampshires and three large white boars, 1 500 fatteners and 140 ewes (Table 1). We hope to be able to lamb the ewes down successfully this time because of improved fencing.

DEVELOPMENT COSTS

Year	Cost	Loan	Finance
1979	Weaner room etc.	15 500	
1980	Kennel pens etc.	12 000	R.B.F.C. 8 500
	Plant	1 000	Family 2 000
1981	Finishing shed etc.	28 900	R.B.F.C. 14 000
	Plant	12 100	H.P. 7 500
1982	Farrowing shed etc.	61 500	R.B.F.C. 54 000
	Plant	2 500	
	House	8 000	
1983	Finishing shed etc.	25 500	Bank loan 15 000
	Plant	9 000	
	TOTAL	\$175 000	\$101 000
		Farm cash input	74 000

Cost per fattening pig place \$115

TABLE 2: Pig unit development costs.

FEED COSTS

We are currently using 600 t of barley — about 50 t of which we grow at a cost of \$165/t. We purchase the barley from local farmers at the contract price set by the firms. This year the price is \$165/t, delivered in our silo. Barley is the main source of our feed. Protein sources made of meatmeal, bloodmeal, fishmeal, and milk powder, are put in various percentages depending on the age of the pig. We also add vitamins and minerals, salt and some synthetic lysine (Table 3).

	Weight (t)	Cost
Sow	87	17 351
Sow pellets	90	19 800
Creep feed	89	24 920
Weaner/grower	189	41 722
Fattening	311	68 420
Additives	-	7 000
TOTAL	766	\$179 213

TABLE 3: Feed cost 1983-84.

The sows receive a daily ration of 2 kg while in gestation and 6-8 kg while lactating, depending on the size of the litter. All fattening pigs are fed on demand, as previously explained, until reaching the finishing shed where they are put onto a restricted diet with a maximum of 2.4 kg daily.

SALES

Our pig sales over the past five years has changed from selling weaners and pork to selling pork and bacon and finally to only selling bacon as we are now doing. There is more profit from bacon sales. Our current output is around 60 pigs per week, averaging 62 kg dead weight. The price at present is \$2.18 per kilogram for a prime baconer (Table 4). With the aid of controlled feeding, we have a very high standard of grading, getting 91.5% prime, 6.5% choice, and 2% over-fat. By the end of this year, we hope to have increased the sow numbers to reach the optimum of 190-195, and to be turning out 70-75 baconers per week.

		Cost	
P.M.A.	Baconers (61.3 kg)	1 076	126 016
	Est. final payment/kg	20¢	13 194
A.M.B.	Baconers	536	69 904
	Porkers	504	51 544
	Weaners	158	8 000
	TOTAL	2 274	268 500
	Baconers by 30 June	300	37 500
	Weaners (private sales)	250	12 500
	Choppers	35	3 500
	TOTAL	2 859	322 000
	TOTAL PURCHASES	195	

TABLE 4: Actual 1983-84 sales.

FUTURE OBJECTIVES

Our objectives for the future are:

- * To double bacon production to 150 per week, markets permitting.
- * To purchase more land for grain growing.
- * To intensify our present holding by either deer or fitch farming.

G. L. Smith

Highbank, R.D.2, Rakaia

I was born and raised in the Lincoln District. I attended Broadfields Primary School and did three years at Lincoln District High School. I worked for a local farmer for one year after I left school, drove trucks for a year or two for a local company, and helped my father who still farms a small block near Lincoln. During this time I began leasing 8 ha for potato growing (my family has a history of growing potatoes which dates back to my grandfather's time).

The following year I worked for another firm carting concrete building blocks, and I continued to grow potatoes in my spare time — usually before and after work and during weekends. I began building up some plant and equipment for potato growing and handling, and started a contract potato planting, digging, and grading business. After a year with this firm I was faced with an ultimatum — if I planned to continue my potato growing activities then my job as a truck driver would be terminated: I chose potato farming.

During the next six years I continued with my potato contracting run, increasing the area I leased for growing potatoes up to 20 ha. I managed to lease 32 ha of cropping land in the Prebbleton district.

In Autumn 1972 I purchased my first farm property — 79 ha of shallow Lyndhurst soil at Racecourse Hill in Central Canterbury. I had an 85% debt on the unit so I continued to lease some 12–16 ha of better quality soils at Kimberley annually for potato growing. I was now able to grow certified seed potatoes in this favourable locality.

In 1979 I bought a further 28 ha of slightly better quality soil (borrowing 100% of the purchase price) at Sheffield, some 3 km away from the original block. Here I endeavoured to broaden the base of my business slightly. I always grew one or two paddocks of potatoes on the land I owned.

While working at Sheffield, I looked to the Methven/Highbank area for an economic unit. However, I was always short of funds to compete with other purchasers. I looked forward keenly to the day when I would have a farm large enough to avoid the need for leasing additional potato ground. On two occasions I was the under-bidder for farms in the area; a further time I came third. I always had my farm at Sheffield sold subject to purchasing a full-time economic unit. Interestingly enough, I went over my present farm just before it was sold in 1972 (at \$780/ha), but a property of that size with funds available to me then was just out of the question.

Later in 1981 my opportunity came. I had the chance to purchase Hesslewood — 144 ha at Highbank — for just under \$5 000/ha, with crops included. I managed to sell my existing blocks at equal or slightly lower prices per hectare for post-harvest delivery, because of their location and smaller size.

For the period of February–March 1982 I was the proud owner of 251 ha of cropping land, and 18 ha of leased land growing potatoes separated only by 70 km. With some bridging finance, hard work, and long hours, and a bit of high speed travelling, we managed. I harvested my 107 ha at Sheffield, moved over to Highbank to complete the harvest there, then returned on a daily basis in April and May to dig my 18 ha of potatoes.

Since then, life has been a little less hectic working only 144 ha, of which all has been harvested in the last two seasons and, at this stage we're doing no off-farm potato growing.

FARM PROGRAMME

I keep the crop rotation and sequence very flexible, and I am prepared to make changes, if and where necessary, throughout the season. Rather than having a rigid rotation of crops, I try to balance soil fertility over the farm as a whole.

I have a small ewe flock from which I try to achieve high per head production. I balance surplus feed by fattening additional lambs and/or hoggets, selling grazing ewes, and occasionally grazing the ewe flock off the farm.

To achieve maximum profitability sheep must always be secondary to cash cropping. Thus crop paddocks are cultivated and small seed

paddocks are closed at the appropriate time to allow sheep to graze. Seed potatoes remain a very significant part of my farming programme and income, with some 15 ha being grown annually. However, the percentage of my total income from potatoes is now somewhat lower than it used to be.

Since purchasing Hesselwood pre-harvest 1982, I have built a 230 m² potato-handling shed and erected 200 t of permanent grain storage plus a drying floor and fan with the help of the Rural Bank. This last investment allows me to harvest both good yield and quality Moata ryegrass seed during the difficult 1983-84 harvest period.

I have also upgraded my tractor and header harvester. I operate the 144 ha intensive cropping unit with the help of some casual labour at times, particularly at potato harvesting. For those unaccustomed to potatoes, there is more work in 16 ha of potatoes than in the remaining 128 ha of conventional cropping land.

Weed, pest, and disease control are extremely important if top yields of good quality crops and small seeds are to be achieved. There are some wild oats on the farm but I believe I have made some progress in their control over the past 30 months.

I have achieved my main objective — a nice-sized piece of good quality land in the right area, allowing me to grow premium quality seed potatoes.

My farming philosophy is based on the following points:

- * A simple farm programme and rotation, carried out thoroughly.
- * I concentrate on what I know and do it as well as I can.
- * Good timing of operations and attention to detail are important.
- * I aim to produce a top quality product (and that's been difficult this year with peas, grain, and white clover seed), and to sell at a good price.
- * To have an adequate range of farm equipment and plant, well-maintained.
- * To make decisions and act quickly on those decisions.
- * To apply all the necessary inputs to achieve good results, including adequate fertiliser and lime, weed, pest, and disease control.
- * Perhaps the most important ingredient, is hard work and good management.

My wife and family are very important in the scheme of things. Mary helps with lambing, and potato harvesting and grading. The three children can be of great assistance when they are being co-operative.

I realise that my debt servicing is high but I am confident that with seed potatoes, I can handle the financial aspects — maybe not comfortably. Hopefully, when I have set-backs in some areas, these will be balanced by gains in other areas. For example, this year, as a consequence of excessive rain during the harvest period, my clover yielded \$20 000 less than anticipated. Fortunately, the same rain lifted my potato yield to the extent that this difference will be fully recovered.

At the present time I have plenty to keep me busy and once our debt has been reduced a little I will look around for new goals to pursue.

**Lean lambs,
new grading,
the farmer's
pocket**

Justification of grading changes

R. Marshall, Member of New Zealand Meat Producers' Board

The principal justification for grading changes — or in fact for grading — is that it achieves the highest net return to farmers on a continuing basis. It is axiomatic that a change which achieves this must result from improved customer satisfaction.

I would like to quote from a paper given by Dr. Tony Kempster who was brought to New Zealand two years ago by the Meat Board. Many of you no doubt heard him speak then.

The marketing of lamb, like the marketing of any commodity, can be thought of as a contest for consumer spending power. Lamb has to compete not only with different sorts of meat but also with other food products and non-food products. Like any contest, there will be winners and losers. Winners will be those who are able to anticipate changes in consumer requirements and exploit them.

The major grading changes introduced this season have been:

- * The introduction of an additional fatness grade by splitting the former P grades.
- * The establishment of a lower level of fatness for meat to be exportable in carcass form.

- * A marked improvement in the consistency within each fatness grade.
- * Reduced emphasis on conformation as a basis for segregation.
- * An increase in the minimum weight within the L weight range.

Before these changes were introduced, the Board held a number of meetings with scientists working in this field; submissions were invited and received from breed societies and individuals; Dr Kempster was brought to New Zealand because he is an eminent scientist in the field of the composition of meat animals, and his work in establishing the United Kingdom meat classification system; our chief production supervisor, Mr Chris Newton, spent a six month study tour overseas looking at the relevance of grading, and quality standards to the marketing of our meat, and as part of the grading research, the Board did a sample survey on 18 000 export lamb carcasses in the 1980-81 season.

The changes are therefore the result of extensive studies into consumer requirements — but we have also assured ourselves that there is scope for producers to respond and increase production of the preferred grades.

Almost all research into consumer attitudes highlights excessive fatness as a major factor affecting consumption. This is particularly so for sheepmeat because its fat is less palatable than that of other red and white meats. Upper limits of acceptance for lamb, even in the tolerant United Kingdom market, equate to about 12 mm GR on an average 13 kg lamb.

While it is easy to believe that the standards of grading, product presentation, and marketing methods that have served us for 100 years in the United Kingdom can't be too bad, facts tell a different story. After the war the British consumer was eating an average of 12 kg of sheep meat annually. This constituted 24% of total meat consumption; by 1982 this had fallen to 7 kg, or 10% of meat consumption, and the predictions are that, without significant efforts to respond to consumer demand, this decline in meat consumption may continue. At the same time, domestic production in the United Kingdom has risen, and the standard and presentation of their produce has improved.

In spite of evidence suggesting that consumers are increasingly seeking leaner meat, producers may have become confused by a recent statement by Mr. Mike Richardson of the British National Federation of Meat Traders about the eating quality of our lamb now that it is becoming leaner. However, these concerns are reflecting traditional views that flavour and tenderness can only be obtained from fat meat. Today there is ample evidence, both from scientific studies and consumer taste panels, that this is not so, particularly if processing avoids inducing toughness through cold shortening.

It is not just health concerns that are responsible for the reduced intake of animal fats. People moving from active to more sedentary jobs reduce the need for carbohydrates, of which fat used to be a significant source. Consumers have also learnt from eating chicken that meat does not need to be fatty for it to be tender and juicy. Fewer customers are being advised by butchers. They make their own choice

in self-service outlets and are concentrating more and more on buying protein rather than fat. This trend is particularly evident among young people.

For the most sophisticated markets — Japan, North America, the United Kingdom, and Europe, as well as sectors of other markets — we must continue to improve our product, — its quality, packaging, presentation and, promotion. We must move it 'up market', to use the current jargon, because we do not believe that we should compete on price alone. In the United Kingdom we have lost the parity we used to have with scotch beef, and in many markets our meat is in danger of being dragged down to the price level of chicken and pork. In Canada our product brings a premium price, and we have 80% of the lamb market. We believe that we can achieve this same position in other markets, and we must do so to maintain a viable farming industry.

Less than 20 years ago nearly all our lamb went to the United Kingdom, now the story is quite different with over 70% going to some hundred other markets — nearly all of which demand lower fat content. Had we not moved this season to change the grading standards, we would have faced pressure from Iran to send only Y grade lambs, and we could not have filled the order from these grades. We would have been in a weak bargaining position. All Middle Eastern peoples prefer lean meat, and we have to compete in the region with chicken and lean EEC intervention beef, as well as very lean South American lambs.

However, in the frozen lamb trade, our lamb is regarded as being more meaty and more tender than that of our competitors. The grading changes are understood and have been welcomed by our customers in the Middle East as well as in many of our other markets.

Europe has always been a market for lean meat — and both their own sheep breeds and cattle are noted for lean meat production.

In the United States, and to varying degrees in many other countries, there have been researchers claiming that high cholesterol consumption causes heart disease. I know that researchers are far from unanimous, but what is of immediate concern to us is the effect on public attitudes. Over the past 20 years the United States national consumption of butter has dropped by 30%, egg consumption has declined 14%, while the average estimated intake of animal fat has plummeted by 60%. An eminent American doctor has made the comment 'Instead of making excuses, food producers ought to be adopting the long range goal of making their products better.'

Key components in our new marketing strategy for Japan are: the development of new market forms after research in the market, and an emphasis on a lean, consistent product.

The grading changes we have introduced are a step in the direction that Dr. Kempster indicated — to become better than our competitors at anticipating changes in consumer demand, and exploiting them.

It is likely that some farmers will not understand the move to place less emphasis on conformation as readily as others. It is true that there are still a number of retailers who bemoan the passing of what has been known as the traditional 'blocky' New Zealand lamb. However, consumer research shows that in nearly all situations consumers are far more concerned with the fat to lean ratio than they are with shape.

Admittedly, there have been complaints about lack of muscling and small eye muscle in chops. Most of these complaints relate to the very light lambs, which is why we have raised the minimum allowable carcass weights. In general, these very light lambs, particularly the YLs, are immature and seen in the supermarket clearly have a low meat to bone ratio.

Traditional conformation has been — and I suggest still is — closely allied to fatness. However, for markets where lamb is sold as joints, and shanky legs are less preferable, we ensure that those lambs that used to fall into the more extreme end of the former omega grade are segregated. Even so, research indicated that, at equal weights, there is no difference in total lean meat content between carcasses of apparently good conformation and those of apparently poor conformation.

The increase in supermarket selling and the relative decline of the traditional family butcher; the increase in further processing of lamb within New Zealand; and the dramatic change in markets for our product, are all major factors in the shift away from traditional ideas of carcass conformation ideals. It is of course not true to say that conformation is no longer important; what is true is that we must re-define what we understand by 'conformation' to encompass all productive and economic factors.

So what should we, as farmers, be doing to meet the challenge?

Overall, it appears that we will continue to develop larger, later maturing strains of our existing breeds in an endeavour to reduce fat problems and also gradually increase average weights by perhaps a kilogram. This extra weight would improve the meat to bone ratio, and would, on a per kilogram basis, help to hold or reduce processing charges, particularly on such items as boneless product.

What we must not do is reduce weights to reduce fatness of carcasses because unit costs per kilogram of product will rise. I quote from a paper presented by Dr Alan Kirton: 'However, drafting at lighter weights to avoid the overfatness problem is an admission of failure and is not recommended. This reduces the volume of saleable meat per farm. It will also increase the killing charges per carcass kilogram.' The paper 'How to produce leaner lambs' has been widely published.

It has been shown that the faster growing animals, particularly to the hogget stage, are leaner at a given weight. It is logical that the trend to larger and leaner animals will continue by following the present Sheepplan Index, because of the importance placed on growth rate and fertility, which is related to body size. It is significant that the type of sheep which is evolving as a result of applying these breeding objectives tends to be the larger, more rangey animal. It is of interest that Dr Butterfield commented that breeding for increasing length and size in pigs has led to a smaller cross section area of eye muscle. He suggested that the solution to increasing eye muscle area in later maturing sheep is to carry the lambs to a heavier weight.

Farmers who have to starve lambs before slaughter to reduce their over-fatness should think very carefully about the rams they are using. It doesn't make sense to grow grass to produce fat which then has to be starved off. What is required is a lamb which will make optimum

use of available feed, producing the maximum amount of saleable product per hectare. As farmers, we have to think carefully about our farming policy — do we want our lambs off the place before pastures dry off in December, or do we want to shear our lambs and grow them on until they average 17 or 18 kg in the autumn?

There is obviously a great difference in the choice of breeds, and particularly of strains within breeds. Per head performance will play a crucial part in the success or failure of our farming enterprise. In a paper delivered in 1980, Neil Taylor of the Meat and Wool Boards' Economic Service demonstrated differences in net per hectare profitability of low and high per head stock performance on North Island hill country farms. The low group averaged \$52.10 net per hectare, while the high group averaged \$96.10. (The importance of stock performance in the New Zealand sheep industry. Paper No. 1828.)

The statistics for this season, particularly on lamb grading, both nationally and for the Otago and Southland regions are interesting. So far this season rather fewer lambs than expected have entered the excessively fat grades of T and F. The percentage of excessively fat grades in the national kill up to 17 March 1984 was 4.42% Ts and 1.73% Es although the percentages vary regionally from as low as 1.93% Is and 0.42% Es to 6.7% Ts and 2.28% Ts and 2% Fs. In the Otago region the figures are 4.32% Ts and 1.66% Fs, and in Southland — 6% Ts and 2.4% Fs (Table 1).

	Week ending 14 Jan		Week ending 24 Mar		Week ending 12 May	
	1982-83	1983-84	1982-83	1983-84	1982-83	1983-84
Meat grades	(%)	(%)	(%)	(%)	(%)	(%)
Southland/Otago						
P	69.03	56.30	73.43	61.81	—	60.42
Y	25.61	34.84	20.99	25.19	—	21.66
T	—	2.88	—	5.64	—	6.20
F	0.76	1.02	1.20	2.01	—	3.69
Av.wt. (kg)	13.77	13.50	14.50	14.27	—	13.78
Canterbury/South Canterbury/North Otago						
P	62.14	53.96	58.91	60.05	—	56.48
Y	33.54	39.06	34.59	27.78	—	26.39
T	—	3.40	—	6.62	—	8.22
F	0.74	1.16	1.15	1.91	—	3.77
Av.wt. (kg)	12.95	13.55	12.89	13.98	—	13.66

TABLE 1: Percentages of the regional Southland/Otago and Canterbury/South Canterbury/North Otago kill in meat grade class P, Y, T, and F; and carcass average kill between 1982-84.

The percentage of excessively fat lambs produced so far this season is less than expected; however, there is no room for complacency. Lambs that have had to be trimmed before export represented 7.1% and these

result in a loss not only to the producer, but also to the nation through reduced yields and lower prices for the resultant cuts. Further, some of the specifications for sophisticated, further processed products, even for the more fat tolerant United Kingdom market, mean that many P grade carcasses require considerable trimming.

It is clear that a failure to respond to today's price 'signals' could result in some producers being greatly disadvantaged in the future if the trend for leaner meat continues — and this is highly likely.

The expected differential between P and T grades in the 1984-85 season was assessed in February as likely to be about 20c per kg. We have just revised this estimate, and based on the most up to date information on costings, yield, and market returns, it is likely that the differential could be around 35c per kg. Even this level of discount could increase over time if market conditions dictate. We are not at this time quoting an absolute figure because we want to see more trimmed cuts marketed so that a fair market return can be gauged.

Our animal scientists and practical farmers have shown that in many instances low-cost changes in farming practice can achieve leaner lambs. Ram breeders will be given further impetus to make use of current technology in the pursuit of leaner sires.

Results this season, which has been one of good pasture conditions in most areas, have been quite encouraging; next year I believe we must do even better.

In conclusion, the Meat Board is very pleased with the high standard of performance that has been achieved under the new grading scheme for lamb and mutton, and with the cooperation we have received from all sectors of the industry — freezing companies, the graders themselves, stock and station companies, MAF advisory officers, scientists and the research establishments, Federated Farmers, and producers. This cooperation is responsible for the success of our efforts to reposition lamb as a quality, branded product of which we can be proud — selling at a rewarding price in the markets of the world.

Research findings in lean lamb production

P. F. Fennessy, scientist, Invermay Agricultural Research Centre, Mosgiel

The objective of our research on lean lamb production is to identify the factors which influence carcass composition in lamb, and so to devise strategies which, when applied by farmers, will produce the type of carcass required by the market. That carcass is heavier and leaner than the average type of carcass produced in recent years. This is especially true where carcasses are to be processed into fabricated cuts in New Zealand.

FACTORS INFLUENCING CARCASS COMPOSITION

It is important to understand which factors influence carcass composition in the growing lamb. Two of the most important factors are carcass weight and sex of the lamb.

Carcass weight

As the animal grows and carcass weight increases, the most notable change in composition is in the total amount and relative distribution

of carcass fat. These changes are shown for the typical average ram lamb slaughtered at Invermay in Table 1. C refers to the fat depth over the eye muscle on the twelfth rib and GR is the depth of tissue to the bone at a point 11 cm around from the midline on the twelfth rib.

	Carcass weight (kg)	
	12	20
Fat (%)	18	26
C (mm)	1	4
GR (mm)	3	11

TABLE 1: Carcass chemical fat content, C, and GR measurements in typical 12 and 20 kg ram lamb carcasses.

The fat percentage increased from 18 to 26% (a 45% increase), whereas the subcutaneous fat, as indicated by the C and GR measurements, increased about four-fold ie., the subcutaneous fat increased at a relatively greater rate than the total carcass fat. In terms of the actual tissue components, every kilogram of carcass weight gain over this weight range was made up of 0.50 kg of lean, 0.38 kg of fat, and 0.12 kg of bone.

Sex of lamb

Ram lambs are leaner, and grow faster than ewe lambs; wether lambs are intermediate. At the same age, ram lamb carcasses are about 8–10% heavier than ewe lambs, with wethers being intermediate. Similarly, the rates of increase in the subcutaneous fat are ranked in the same order. Typical values derived from Invermay studies are shown in Table 2.

	Same fat % and GR (kg carcass)	Rate of increase in GR (mm/kg carcass)
Ewe	13	1.6
Wether	15	1.3
Ram	17	1.0

TABLE 2: Effect of sex of lamb on relative fatness of carcasses.

These sex differences are best understood in terms of a maturity comparison. Ewe lambs are early maturing compared with ram lambs. Essentially, early maturing animals get fat at lighter weights ie., early maturing lambs have a smaller mature body size, have a slower growth rate, and are fatter at the same carcass weight when compared with the later maturing lambs.

Breed

Where meat sire breeds are used, the example of maturity comparison is also useful. Early maturing sire breeds produce lambs which are

fatter than those sired by later maturing breeds when compared at the same carcass weight.

VARIATION IN CARCASS FATNESS

The factors outlined above are all general trends. Within any line of lambs of the same sex, breed, and weight from the same farm, there will be tremendous variation. For example, the following distribution would be expected in a line of 100 Coopworth ram lambs from Invermay if all were killed at a carcass weight of 16 kg (the average GR measurement would be 7 mm):

2 carcasses with GR > 3 mm

15	3-5
33	5-7
33	7-9
15	9-11
2	>11 mm

If the source of this variation could be understood and the results used, then the production of leaner carcasses would be a much simpler matter. Unfortunately, the reasons for the major part of the variation are not understood, although it now appears that 30-40% is genetic variation and therefore can be influenced by the breeding programme. Devising appropriate breeding strategies is the aim of a long term research programme at Invermay.

Breeding

Currently there are two possible breeding approaches to reduce fatness. These involve either direct selection against fatness or indirect selection using a character correlated with fatness.

The real objective in reducing fat is to increase the lean meat content of the carcass. The Invermay work suggests that if we can breed lean lambs with 1 kg less fat than average, they will have 0.85 kg more lean and 0.15 kg more bone than average carcasses at the same carcass weight. The effect of such a change on the composition of carcasses is shown in Table 3.

	Average	Lean
Lean tissue (%)	58	63
Bone (%)	18	19
Fat (%)	24	18
GR (mm)	7	3

TABLE 3: Composition of the average ram lamb carcass and a lean carcass with 1 kg less fat at a carcass weight of 16 kg.

Direct selection involves the use of ultrasonic instruments which measure the depth of fat in certain parts of the carcass.

In the Invermay project, backfat depth over the eye muscle is

measured. The fact that fatness responds to selection is revealed in the progeny test of rams from these Invermay fat and lean lines. The results of one such test are shown in Table 4.

	GR (mm)	C (mm)	EMA (cm ²)
Lean	6.6	2.5	11.7
Fat	9.0	4.1	10.8

TABLE 4: Average measurements of GR, C, and eye muscle area (EMA) for progeny of lean and fat line rams when slaughtered at the same carcass weight.

It is clear that the progeny of lean line rams had considerably less subcutaneous fat and a greater eye of meat in the chop than the progeny of fat line rams. However, the actual rate of progress achieved by selection is dependent on numerous factors, especially the actual selection pressure applied by the breeder. In the future it is possible that more sophisticated devices to measure the actual lean meat content of the live animal will become available. If this eventuates it will be up to us to devise ways of making effective use of such instruments.

The possible contribution of indirect selection methods must also be considered. Here the news is encouraging because it appears that selection based on an index very similar to that used by Sheeplan has produced a genetically leaner sheep in trials at the Woodlands Research Station. The five selection lines were set up by Dr Neil Clarke in 1973 and were based on a wide sample of New Zealand Romneys. Since last year, the hoggets in the various selection lines have been measured for backfat thickness. The results for the 1983 ewe hoggets are shown in Table 5.

Selection line	Backfat (mm)
Control	6.3
100-day weight	6.1
Hogget fleece weight	6.2
Number lambs born	5.0
Production index	4.8

TABLE 5: Backfat thickness (adjusted to 36 kg liveweight) of ewe hoggets in the Woodlands romney selection lines.

CONCLUSIONS AND IMPLICATIONS FOR THE FARMER

While the longer term prospects for breeding are vital for the future, the real question is what can the farmer do now. Two important factors that influence carcass composition are carcass weight and sex of the lamb. Therefore, ewe lambs must be drafted at lighter weights and earlier in the season than wether lambs; this means identifying and separating out ewe lambs from males. When ewe lambs are drafted at lighter weights there may be some loss in total farm production

unless other lambs are drafted at higher weights. The ideal way to compensate for this is to leave a proportion of ram lambs entire. However, to minimise the 'nuisance potential', works ram lambs should be off the farm by mid-March. Frequent drafting of lambs is also vitally important to avoid having too many lambs in the T and F grades.

How the farmer copes with meat grading and lean lambs

C. C. Miller, farmer, Hedgehope

The farmers' job is basically a managerial one. The Meat Board has set the grades and fat limits to meet the change in attitudes of our markets. Research has provided us with knowledge on growth rates and leanness, differences in leanness between sexes, variation within breeds, and variation between different breeds. The past season has given us some experience and knowledge of the weight potential various types of lamb in our own flocks can attain.

In some ways this approach is like a crash course because we want to know the answer in one season. All the variables associated with farming mean that this is not possible. However, we can gather what is known with the experience to date and formulate a farming plan, building on it as we gain experience and knowledge to produce a leaner lamb produce, now demanded by our markets.

I am farming a 209 ha property, 202 ha of which are effective. It is situated at Glencoe, 32 km south-west of Gore. The land contour is gently rolling to flat, with a clay subsoil which requires extensive tile and mole drainage. It is subdivided into 44 paddocks, most of which have electric available for further subdivision for winter rotation. At

present, 60 ha are used for cereal crops, leaving 142 ha in pasture for the 2 150 breeding Coopworth ewes, 360 of which are registered stud ewes. There are 500 ewe hoggets, 120 ram hoggets, and 13 rams; giving a SU total of 2 600 — just over 18 SU/ha.

The average stock performance over the last seven years, with stocking rates between 18 and 19 per ha, has been:

Lambing (%)	studs 165% and overall 140%
Lamb carcass weight	14 kg
Wool weight sheep wintered	5.4 kg

As the stud flock increases the cereal crop area is being decreased to allow more room for improved sheep performance. The stocking rate on the farm does help to eliminate fat but leaves little room for bad years like last year. I am now adjusting stocking rates to obtain higher growth rates and better per animal performance.

COPING WITH LEAN LAMBS

The following are suggestions on how to cope with lean lambs based on my past experience and some theory, which may be experience by next year.

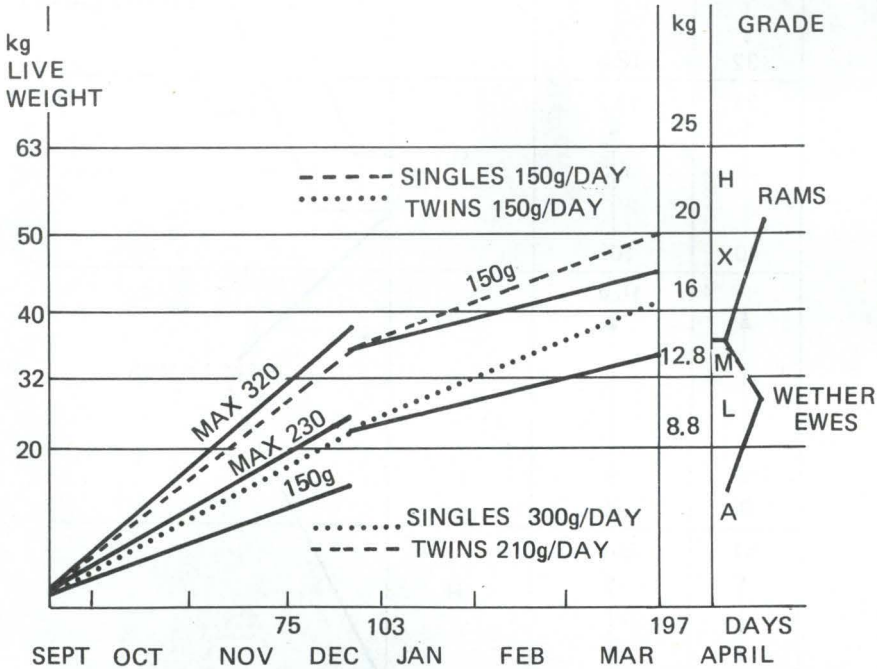


FIGURE 1: Growth rate, liveweight, and carcass grading of single and twin lambs in relation to the number of days from birth.

Monitor lamb growth rates and forecast drafting dates

Research has shown that single lambs can grow at a rate of up to 320 g per day and twins at 230 g per day. This growth rate is dependent on feeding levels and quality of feed, which will vary from farm to farm, and season to season. It is important to note that twin-rearing ewes require more feed than singles to maintain good growth rates. Under intensive systems, it is a good idea to separate twins and singles

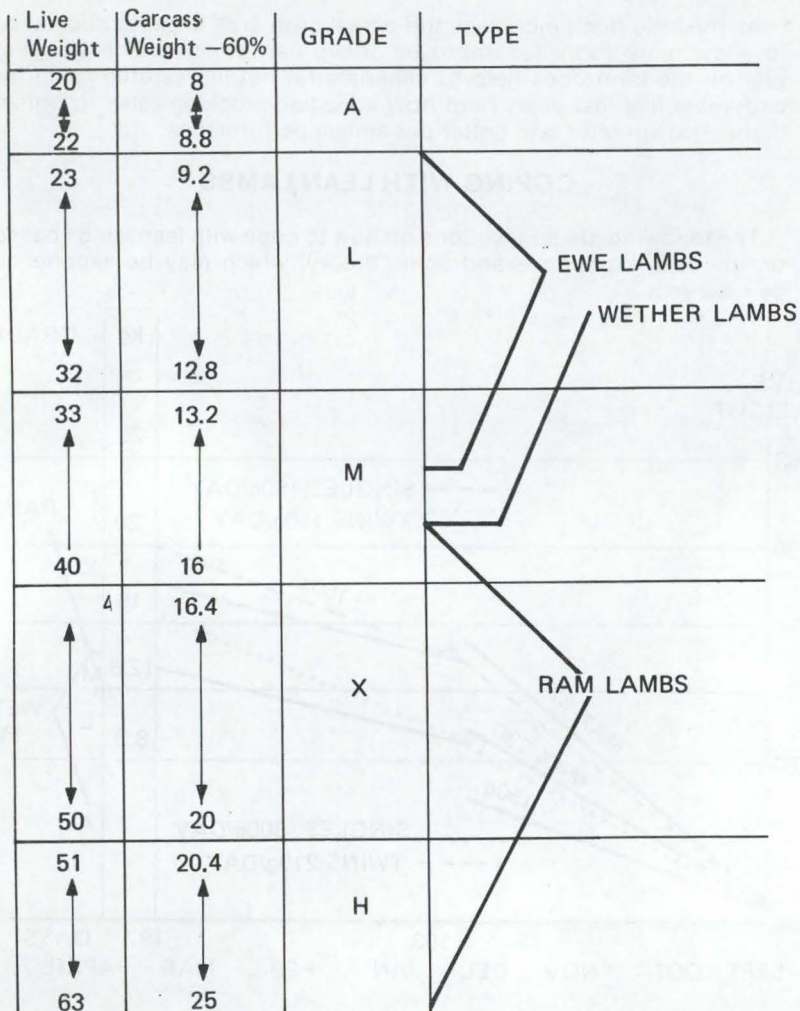


FIGURE 2: Relationship between liveweight, carcass weight, sex range, and fit grade.

if possible. This allows a better allocation of feed, more suited to each mob's requirement, and helps to keep growth rates of twins high.

Fig. 1 shows growth rates for single and twin lambs. Liveweights correspond to carcass grading weights and are shown in relation to the days from birth.

One of our problem management areas is over-fats at weaning drafts, especially single-ewe lambs. If we draft at around Day 100, the top single lambs, with a growth rate of 320 g, will weigh around 37 kg or better. This gives a carcass weight of around 15 kg allowing for a dress-out of 40%. This means that many ewe lambs fall in the over-fat grade. Clearly it is too late by the time the killing sheet is in to alter the situation, and to starve the fat off the ewe lambs is a wasteful use of grass. However, if we monitor their growth by sample weighing mobs at around 60–65 days, we can tell when we are likely to reach a target weight we think will suit the type of lamb. It would be possible to take an early draft of single lambs before weaning, depending on the growth rate.

This can be used to advantage with terminal sires to make room at an early stage for other lambs to be taken to higher weights eg., ram lambs. Where wool breed ewe lambs are bred for replacements this is not possible, but a knowledge of the growth rate is valuable to determine the best time for weaning. Some culling could be done before too many lambs reach 35 kg which would eliminate some obvious culls that are becoming over-fat.

Fig. 2 shows the relationship between liveweight, carcass weight, sex ranges, and grades. These are calculated on a 40% dressing-out, but lambs will vary depending on feed and time of weighing eg., full-gut will lower the percentage as will the type of lambs: milk lambs will be 1–2% lower, rams 1.5% lower, ewe lambs 1% higher, Down X 1–2% higher, shorn lambs 2% higher. Obviously, different breeds and types of lambs within breeds will become fat at different weights. The individual farmer's own experience and knowledge of his own sheep is needed to decide what weight the lambs can be expected to reach.

Leave early ram lambs entire

We know that at a given weight wethers are leaner than ewe lambs and that rams are leaner than wethers. Therefore, early ram lambs should be left entire.

Grade	Ewe lambs (13 kg) (%)	Ram lambs (14.5 kg) (%)
YL	18	8
PL	27	0
YM	41	76
PM	14	15
PX	–	1
Average price	\$23.20	\$26.00

TABLE 1: Distribution of weight grades in ewe and ram lambs killed at the same age and run under the same conditions.

Table 1 shows a line of ewe and ram lambs killed at the same age and run under the same conditions. The rams showed 1.5 kg weight advantage, with a bigger percentage going into the YM grade. The YL grade percentage could have been removed with better use of scales.

Ram lambs therefore offer an opportunity for heavier lambs. If this potential is exploited ram and ewe lambs should be identified, target weights for each group decided, they should be run separately after weaning, and growth rates should be monitored by scales. Frequency of drafting can be decided if growth rates are known. A decision should be made early in the season as to when the last lambs should be off the property. This allows priorities for feed to be worked out, and prevents large numbers of lambs, especially ram lambs, from eating valuable flushing feed.

Use of top and bottom mob systems and regular drafting

After weaning, a top mob of rams, wethers, and ewes should be selected out on weights using scales.

Using Table 1 and a knowledge of growth rate of your stock gained from random monitoring, cut-off points three weeks before drafting can be calculated to give a desired carcass weight. This secures a weight range that will fit into a grade suitable to the type of lamb. For example, if a carcass weight of 15 kg is required (corresponding to a liveweight of 37 kg) and the lamb growth rate is 150 g/day then after 21 days the lambs should have a weight increase of 3.15 kg. At this cut-off point lambs whose bodyweights are between 33.5 and 35.5 kg should be selected. However, if lambs were found to be growing at 200 g/day, drafting dates would have to be at 15-day intervals. Drafting dates have to be set according to the target weights for different types of lambs eg., ewe lambs 13 kg, wether lambs 15 kg, ram lambs 18 kg.

The effectiveness of this selection improves with experience and a knowledge of your own sheep. If drafters are given information on weight ranges and they work on sex lines rather than mixed lines, better grading should result. After each draft, other lines can be selected from the bottom mob to a weight designed to fit into the frequency of drafting. The end-of-season deadline should be kept in mind.

Clean stock

Stock that requires washing can cost weight. I experienced this this season when a line of lambs, despite being yarded for some hours, needed to be washed and killing was delayed. As farmers I think we need to know how long it takes for sheep to empty out before trucking. It generally takes 6-8 hours to empty but this can be up to 24 hours. The loss in actual bodyweight may be only 0.1 kg. Southland's climate makes it difficult to present clean stock with lambs fed on soft pasture. We do need to hold stock long enough to empty them before transport. Eight to ten hours in yards before killing next day is still better than trucking within a few hours of slaughter. When washing is required, killing may have to be delayed until the following day which can cost 1 kg in weight.

Breeding

Variation can spoil the best of plans. In any management plan there will be individual animals, fatter or leaner than the average. It is the average we are trying to manage in a commercial lamb enterprise. The job of exploiting variation belongs to breeding. Within all breeds there is variation, if this wasn't the situation we would be unable to make any progress in breeding better sheep, for leaner, heavier carcasses. Ram breeders must identify high growth rate sires that leave heavier leaner progeny. They must test for fat cover, select leaner animals, and cull fatter types.

Farmers breeding ewe replacements have to select rams that have been subjected to this sort of breeding pressure. They must select their breeding ewes for size and leanness, culling low-shouldered, dumpy, heavy-ribbed sheep.

At the final selection, ewe lambs should be drafted into three weight lines eg., 38 kg and above, 35-37 kg, 34 and below. With the help of a works drafter, if needed, the fattest should be taken out. The weight lines will help accuracy. Any lambs that are fat in the bottom line will be culled immediately, because these are sheep that are undesirable in any breed. It is better to kill these and accept a few over-fats than to breed further problem lambs from them. During selection you may want to give more consideration to the heavier lines, particularly to the fatness to weight ratio.

SUMMARY

- * Monitor growth rates and forecast weights.
- * Become experienced with scales.
- * Know your stock — be aware of the weight grades they fit into before fat occurs.
- * Leave early rams entire.
- * Use top and bottom mobs and draft regularly.
- * Empty out well and present clean stock.
- * Use rams selected for growth rate and leanness.
- * Cull small and dumpy ewes.
- * Weigh and cull fat ewe lambs.

Management of high-producing grass pastures

A planned feeding programme for ewes

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INTRODUCTION

Most farmers have a feeding plan for their ewe flock. They realise the importance and recognise the need for careful management at high stocking rates and production levels. In many situations the liveweight and feeding targets produced by the MAF are appropriate, particularly in flocks of low to moderate fecundity. Feed plans based on these targets stress the importance of flushing ewes before mating, reducing ewe liveweight after mating, and feeding to achieve ewe liveweight recovery during lactation.

Feed plans need to be sufficiently flexible to accomodate seasonal and annual changes. While farmers are skilled at making changes in response to the normal vagaries of climate and pasture growth, they have less experience in developing feed plans for major production changes, such as an increase in ewe fecundity with the use of immunisation or the high fertility Booroola gene. Farmers often find

such sudden changes and the consequential feed management difficult to cope with.

This paper discusses recent research results that may help farmers to modify feed programmes where increases in lambing performances are expected. The papers that follow discuss aspects of pasture management, complementary to the feeding of a high fecundity flock.

NUTRITION, BIRTHWEIGHTS, AND MILK PRODUCTION

If the benefit of a high ovulation rate is to be realised high lamb survival and growth rates must accompany increases in ewe fecundity. Feeding during pregnancy and lactation can affect both lamb survival and growth.

Lamb survival is greatly influenced by birthweight, with optimum weights being between 3.7 and 4.5 kg (Dalton *et al.* 1980). As fecundity increases, the lower birthweights of twin and triplet lambs is associated with higher mortalities in these groups compared with heavier single-born lambs.

Pregnancy nutrition can influence the birthweight of single and twin lambs. Recent research (Davis *et al.* 1981) indicates that birthweights are influenced by the size of the placenta. In particular, the number and size of cotyledons on the placenta is important because nutrients for the foetus are absorbed from the ewe's blood supply by the cotyledons. If the placenta is well-developed with many large cotyledons, it is better able to supply nutrients to the foetus. Foetal growth and lamb birthweight are hence improved, especially in late pregnancy. Placental development is normally complete by Day 100 of pregnancy. Restricted nutrition in early pregnancy can reduce the number and size of the cotyledons, thereby affecting birthweights, particularly of multiple-born lambs.

The interactions between the level of feeding at different stages of pregnancy and lamb birthweight are complex and not fully understood. However, sufficient is known to suggest that in high fecundity flocks, restricted feeding in early pregnancy may result in reduced placental development and subsequently reduced birthweights of twin lambs. In ewes with a poorly developed placenta, there may also be little response in lamb birthweight to good feeding in late pregnancy.

Ewe milk production is related to the level of feeding after lambing, and level of feeding during pregnancy has little effect. This was demonstrated in an experiment at Lincoln College (Geenty & Sykes 1983) where a 15 kg difference in ewe liveweight after lambing was generated by differential feeding during pregnancy. During lactation, groups of these heavy and light ewes were offered three levels of feed. At each feeding level heavy and light ewes had similar levels of milk production (Fig. 1).

To ensure good milk production Bircham (1984) has suggested that a herbage mass of 1 000 kg DM/ha is required when ewes are set-stocked at lambing. If there is less cover than this, feed intakes and milk production are restricted and lower lamb growth rates result.

WINTER AND SPRING FEEDING

There are three factors to consider when planning winter and spring feeding. Firstly, severe feed restrictions should be avoided in early pregnancy. Secondly, if feed is short in late pregnancy, ewes in reasonable condition can be restricted to conserve feed for early lactation. Thirdly, ewes should be fed as well as possible during lactation to ensure high lamb growth rates.

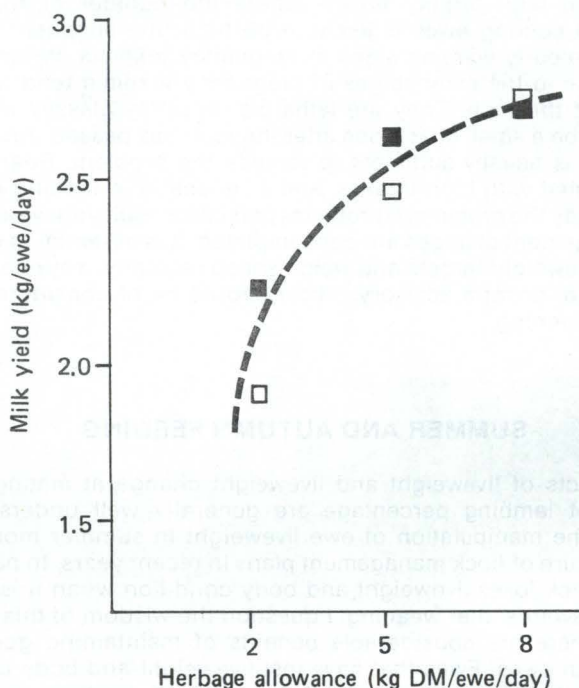


FIGURE 1: Relationship between milk production and herbage allowance for twin-suckled ewes. ■ Ewes maintaining bodyweight during pregnancy; □ ewes losing 15 kg maternal bodyweight during pregnancy.
Source: Geenty & Sykes (1983).

Normally a farmer has little control over the level of feeding in spring and is reliant on favourable climatic conditions to give adequate pasture growth to meet lactational demand of the ewe. In contrast, level of winter feeding can be rigidly controlled with rationing of pasture and supplementary feeds. When the ewe flock is tightened up after mating it should be fed to maintain liveweight or have a small (10-30 g/day)

liveweight loss. At constant liveweight a ewe will be losing bodyweight. Liveweight measurements include 5–8 g/day of wool growth and 10–20 g/day of foetal growth during the first three months of pregnancy. At constant liveweight the ewe is losing 15–25 g/day bodyweight.

If the ewes are in good body condition and feed is in short supply, there may be advantages in some restriction to conserve feed for early lambing. In late pregnancy, foetal growth is 250–300 g/day and hence liveweight should increase at this rate to maintain bodyweight.

In practice, the margin between under and over-feeding the ewes may be indicated by the incidence of pregnancy toxemia and bearing troubles. In high fertility flocks, where the number of triplet and quadruplet-bearing ewes is likely to be high, the shepherd must be sensitive to early warning signs of pregnancy toxemia. When shifting ewes, those in the early stages of pregnancy toxemia tend to drift to the rear of the mob. They are lethargic, possibly glassy eyed, and there may be a smell of acetone after the mob has passed. An increase in feeding is usually sufficient to remedy the problem. Bearings can be associated with high intakes, and a reduction in feeding level can often remedy the problem. If problems persist, consult your veterinarian.

If management changes are contemplated, it is essential to establish feasible liveweight targets and weigh sheep regularly. Your consultant, veterinarian, or farm advisory officer should be of considerable help with this planning.

SUMMER AND AUTUMN FEEDING

The effects of liveweight and liveweight change at mating on the subsequent lambing percentage are generally well understood by farmers. The manipulation of ewe liveweight in summer months has been a feature of flock management plans in recent years. In particular, the ewe flock loses liveweight and body condition when it is used to 'clean up' swards after weaning. I question the wisdom of this practice because there are considerable benefits of maintaining good body condition in ewes. Ewes that have lost liveweight and body condition with restricted feeding require 4–6 weeks of feeding well above maintenance to regain the weight lost. Building a feed supply to achieve a flushing liveweight gain of 4–5 kg over three weeks at mating is difficult. I believe that high summer liveweight is a better target than a lower liveweight associated with a high flushing gain.

Wool production considerations influence my opinion. Summer nutrition has a major influence on wool production. With good feeding in summer, annual fleece weights can be increased by up to 0.5 kg.

On most farms, pastures need to be 'cleaned up' after weaning. In my view it is preferable to use the mower for 'bottoming' of pastures rather than pushing ewes to clean up swards which reduces liveweight and body condition. Dr McDonald will discuss this further in a subsequent paper.

In high fecundity flocks, the objective should be to keep ewes in good body condition throughout the year by careful feed management.

GRAZING SYSTEMS

Rotational grazing and set-stocking have a place in any feeding programme. Generally, rotational grazing is preferable where:

- * Intakes need to be controlled;

OR

- * Feed banks need to be built up;

OR

- * Pasture control necessitates hard grazing.

Set-stocking is appropriate where:

- * High intakes are desired;

AND

- * Less rigid control of pasture is required.

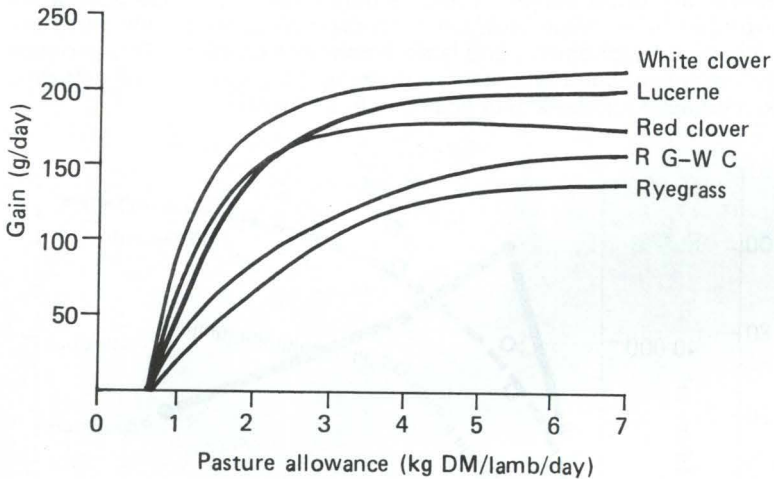


FIGURE 2: The influence of daily pasture allowance (kg DM/lamb) on rate of liveweight gain (g/day) for lambs grazing different swards.

Source: K. T. Jagusch (1979) Proc. Ruakura Farmers Conf. pp. 46-51.

Sward structure changes in response to the grazing system. Fig. 2 shows changes in tiller numbers, tiller growth, and sward productivity in swards maintained at different heights by set-stocked grazing over summer. At herbage masses greater than 900 kg DM/ha, tiller numbers declined but growth per tiller increased giving similar productivity from all swards. Under rotational grazing, herbage masses of 2 500-3 000 kg DM/ha are commonly used and this leads to open swards with a low number of high-producing tillers. Farmers are often concerned

about the way rotationally grazed swards become very open but, providing the herbage masses do not get much above 3 000 kg DM/ha, productivity is unlikely to be detrimentally affected.

After a period of rotational grazing, set-stocking for as little as 4–6 weeks is likely to lead to an increase in tiller numbers and sward density.

Set-stocking during lactation and rotational grazing for the remaining months coincide with the objective of maintaining high-producing swards and controlling animal intakes by planned feeding.

LAMB GROWTH AND SWARD COMPOSITION

Weaned lambs need a considerable proportion of legume in the diet to achieve high growth rates. White clover is exceptionally good at promoting lamb growth (Fig. 3). For growth rates over 170 g/day swards require a clover content of over 50%. High-producing, permanent pastures are grass-dominant and seldom have more than 35% white clover and often much less. On such swards, lamb growth rates are likely to be disappointing and lamb-finishing a problem. This problem may be accentuated where high lambing percentages are achieved and increased numbers of lambs need to be finished.

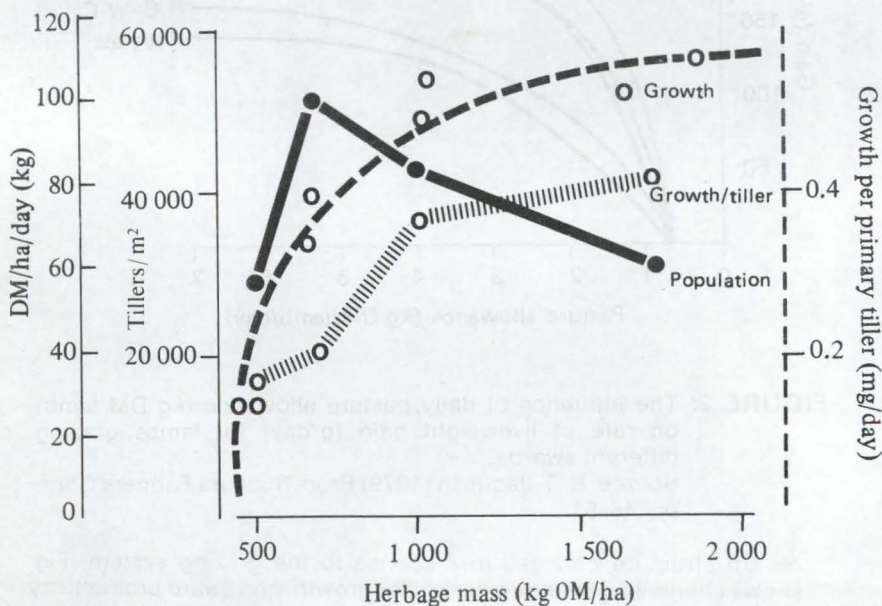


FIGURE 3: The influence of variations of herbage mass (kg OM/ha on rates of herbage growth (kg DM/ha/day), tiller population (tillers/m²), and tiller growth (mg/day). Source: Adapted from Hill Farm Research Organisation Biennial report, 1979–81.

Clover-dominant swards can be produced using chemicals such as Paraquat applied in October or November. New pastures usually have a high clover content and can provide good lamb feed. On permanent pastures the spring grazing management can alter the summer clover level from 10 to 30%. Mr Hay will discuss this further in a subsequent paper.

FEEDING FOR HIGH PRODUCTION

Detailed grazing plans should be prepared for any high-producing flock. These plans set targets and expectations and allow early predictions of deficits and surpluses. The MAF feed budgeting computer program has a lot to offer farmers who are planning feeding within a season. It is important, however, that these plans are regularly reviewed because pasture growth often differs from expectations and early predictions of surpluses or deficits allow appropriate steps to be taken.

In summary, the principles that I consider important when designing a feeding programme are:

- * Aim to maintain or increase liveweight after weaning, and look to other methods for controlling pastures rather than hard grazing with the ewe mob.
- * Flush the ewes if possible.
- * If ewes are in good condition liveweight may be reduced during winter but avoid sudden restrictions in early pregnancy.
- * Manipulate the winter grazing plan to ensure adequate pasture cover at lambing (1 000 kg DM/ha herbage mass).
- * Set-stock during lactation.
- * Lambs require high legume content in the diet for high liveweight gains.

The detailed liveweight targets and grazing system differ between farms depending on farmer objectives and expected production levels. Hence, no recipes have been given. In all situations feed planning is worthwhile.

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Spring management of pasture to increase summer white clover growth

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INTRODUCTION

Southland agriculture is dominated by intensive sheep production systems where a wide range of grazing managements, from continuous set-stocking to complete rotational grazing, are adopted. Over a number of years the farming community has expressed concern over the apparent drop in contribution of white clover to total sward production under all grass farming on high soil-N-status intergrade YBE's; particularly where all-year-round rotational grazing is practised (Hook 1978; Miller 1984). An experiment is in progress to provide information on how the white clover component of the sward is affected by a range of grazing treatments in spring. This trial is sited on ryegrass/white clover pasture known to be greater than 20 years old, on the DSIR

Regional Station at Gore. The soil type is a Waimumu silt loam, an intergrade YBE, and average annual rainfall is 920 mm.

Because of the limited space of this paper the authors have made some generalisations concerning growth responses to the management regimes imposed in the trial described. For a full explanation of the probable mechanisms surrounding treatment effects, with citation of relevant literature, see Hay & Baxter (1984).

TREATMENTS AND EXPERIMENTAL METHODS

The treatments imposed on 0.6 ha of uniform pasture are presented in Table 1.

4WK	Grazed every four weeks in spring
3WK	Grazed every three weeks in spring
2WK	Grazed every two weeks in spring
SS	Set-stocked for a 12-week spring period
CSS	Continuous set-stocking spring and summer (September-March)

TABLE 1: Grazing treatments.

It is important to understand that (other than CSS) these treatments are applied only in spring for 12 weeks during a normal lactation period — early September to early December. After early December all treatments receive the same rotational grazing management — monthly grazing in summer and autumn and one grazing in winter. The CSS treatment remains set-stocked until the end of February, then changes to the same rotational grazing as the rest of the trial for autumn and winter.

The grazing intensity in the 2WK, 3WK, and 4WK treatments was to a residual height of 1–2 cm, and to ensure that this grazing height was achieved in 48 hours, sheep numbers were allocated depending on the amount of herbage on each plot. Sheep numbers on SS and CSS treatments were adjusted periodically in order to maintain 500 kg/ha of DM above 1 cm. Throughout the spring and summer, numbers fluctuated between 20 and 35 ewes/ha.

DM production measurements are made from eight randomly-placed 0.25 m² quadrats per plot sampled before grazing in rotationally grazed plots, and from pretrimmed (1 cm) sites on to which enclosure cages are shifted weekly in the set-stocked treatments. Botanical separations are determined in the laboratory from additional samples taken at each DM measurement. White clover growing point numbers, and stolen length and dry weight data, are obtained by taking 20 plugs per treatment from each of the three replications, and dissecting them in the laboratory.

DRY MATTER PRODUCTION

DM data are presented as a percentage of the annual production of the 4WK treatment. All results given here are the means of two years, the 1981-82 and 1982-83 seasons. Relative total annual and seasonal herbage yields are given in Table 2.

Treatment	Annual	Spring ¹	Summer	Autumn	Winter
4WK	100	31	37	21	11
3WK	93	26	37	20	10
2WK	91	24	36	20	11
SS	91	21	39	21	12
CSS	89	21	34	21	13

¹ Spring=Sep-Nov (inclusive); summer=Dec-Feb; autumn=Mar-May; winter=Jun-Aug.

TABLE 2: Relative annual and proportional seasonal yield of total herbage (4WK annual=17 080 kg DM/ha=100).

Table 2 shows that the 4WK treatment is the only one that differs from the others in total annual production. All the advantage of this treatment occurred during spring.

Treatment	Annual	Spring	Summer	Autumn	Winter
4WK	100	33	48	12	7
3WK	99	25	52	13	9
2WK	135	28	73	23	10
SS	163	23	105	24	11
CSS	113	24	61	18	10

TABLE 3: Relative annual and proportional seasonal yield of the white clover component (4WK annual=1 795 kg DM/ha=100).

Table 3 shows the large difference in white clover DM production which have resulted from the various spring grazing treatments. There was 63% more white clover produced annually on the SS treatment compared with 3WK and 4WK plots, and over twice as much in the same comparison during summer. The 2WK and the CSS lay between these two treatment groups.

What causes these big differences in white clover production?

Reasons for what is happening to white clover herbage above grazing height are to be found by studying the parts of the white clover plant below this level, including underground tissue. Intensive sampling at Gore over the last two years on this trial has demonstrated that December is the critical month for sampling because it defines the potential for summer white clover production.

Treatment	Stolon dry wt (g/m ²)	Stolon length (m/m ²)	Nos growing points (per m ²)
4WK	10	2.7	1 120
3WK	20	4.8	2 425
2WK	24	6.2	3 910
SS	34	7.8	7 245

TABLE 4: Dry weight of stolons stolon length, and numbers of growing points sampled from pasture in December under various spring grazing regimes.

Table 4 demonstrates the big difference between grazing treatments in the three stolon characters measured. (CSS was not measured because the set-stocking management was still imposed in December.) The more frequent the grazing in spring, the higher the growing point number, stolon weight and length by early summer.

We believe that the amount of white clover produced in summer depends on the 'condition' of the white clover plant at the end of spring (in terms of stolon length and dry weight and numbers of growing points), provided it is subsequently rotationally grazed. Our argument was strengthened by the very strong positive relationship we found between the amount of white clover produced in summer and numbers of live growing points in December. These many white clover growing points confer a competitive advantage over associated pasture species; rotational grazing then allows expression of this advantage when temperatures are higher in summer and therefore more favourable for white clover, and when ryegrass is competitively at its weakest (Langer 1973).

How are these effects brought about?

Repeated defoliation (as typified by set-stocking) makes the clover plants partition their growth into stolon material rather than into leaves and petioles (this results in leaves becoming smaller and closer to the ground) (Hay & Baxter 1984).

Repeated defoliation also allows much more light to reach the stolon tip which encourages branching of stolons. This in turn produces longer stolons and more growing points (Table 4).

The lower stolon mass at the end of the spring period in the rotationally grazed swards (Table 4) would have been attributable to the intense shading by grass and clover leaves of the stolon tips which reduced branching. The infrequent grazing would not have encouraged the clovers to change the partitioning of growth into stolons rather than leaf and petiole material.

What are the implications of these research to farmers?

Firstly, they must stimulate stolon production (by continuous defoliation) rather than leaf and petiole material during spring. This will give rise to a massive build-up in growing points which can be capitalised on during summer. Rotational grazing then, will give highest white clover DM production.

- * Weaning early in December fits in well with this management pattern, and we find that rotating lambs ahead of ewes is the best method of utilising feed. Ryegrass is at its weakest in summer, so that is the time to give the clover component of pasture opportunity to express itself. Summer is the only season where temperature permits this expression.
- * The consequences of leaving organisation of rotational grazing until late in summer can be seen from the CSS treatment. The white clover DM in summer was about half that produced in the SS treatment. This is, however, the most common form of summer management of pasture in Southland.
- * Obviously the whole farm cannot be treated in this 'ideal' manner because during November, paddocks have to be closed to enable a rotation to start following weaning. However, as growth rate increases during the late October–November period, the increase in stock density (as paddocks are closed) means that grazing pressure is maintained on a considerable proportion of the pasture area of the farm. These will be the paddocks which will produce the highest amount of clover during summer.
- * There is an increasing awareness of the importance of the below-grazing-height pasture in nutrient cycling (Field & Ball 1982) of which white clover stolons are an important component. With a greater amount of stolon material present at all times of the year in the SS and 2WK treatments (Hay & Baxter 1984), higher levels of total N may build up under these management systems. For this reason it would be advisable to change the area of the farm on which stock are concentrated at the end of spring to ensure that any beneficial nutritional effects are equally dispersed over the whole farm.

SUMMARY

In the farming community of Southland concern has been expressed for some time over the apparent drop in contribution of white clover to total sward production under all grass farming; particularly where rotational grazing is all-year-round.

On a site containing old (20 years) pasture, four grazing management systems were applied in the 12-week lambing to weaning period from September to December: set-stocking, and grazing at 2, 3, and 4 weekly intervals. From December all managements changed to monthly rotational grazing until the end of autumn followed by one grazing during the three months of winter, apart from a subdivision of the set-stocked treatment which was continued under this management until the end of February when it, too, changed to the same spelling interval as the rest of the trial. Information on stolon length and dry weight, as well as numbers of live growing points, was obtained at regular intervals. The trial is in the third of its planned five-year term.

Two years' results have demonstrated that DM production over the 12-week spring period is greater in the 3WK and 4WK plots, the main

difference being higher ryegrass production compared with the other two treatments. At each of the monthly summer grazings there has been twice as much white clover DM produced in the SS and 2WK plots than in 3WK and 4WK. In these treatments there has been a massive build-up of white clover growing points and stolon material during the 12-week spring period, which gives rise to four to six times more potential sites for white clover leaf growth than is present in the 3WK and 4WK treatments.

The research provides a basis for the design of grazing systems which aim to increase livestock performance.

ACKNOWLEDGMENTS

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Effect of seedhead control on pasture and animal performance

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INTRODUCTION

This paper looks predominantly at the place of machinery in improving summer pasture quality. The main emphasis is on the use of mowers or silage harvesters to control seedheads, although the importance of stock grazing management during spring is also discussed.

Most Southland farmers top at least some of their pastures during summer for a variety of reasons including thistle control; encouragement of more leafy, vegetative pastures; reducing competitive suppression of clover growth; or just for aesthetic reasons. Over the last two seasons we have been conducting trials at the Woodlands Agricultural Research Station to examine the effects that topping has on pasture production, pasture quality, and lamb growth.

TIME OF TOPPING

In 1982-83, the effects of different times of topping were examined on a 12-year old pasture, which contained significant amounts of dogstail, *Poa* spp., and browntop. The pasture was laxly grazed during spring and contained a high density of seedheads when the trial began in late November.

The trial consisted of five topping treatments, each replicated four times. The treatments were one topping at either the end of November, end of December, end of January, three toppings at each of the previous dates, and non-topped pasture. Topped pastures were cut to about 5 cm above ground level using a tractor and mower. All treatments were rotationally grazed at four weekly intervals (eight weekly during winter) through to the following November. Before and after each grazing, sample areas within plots were cut to ground level to calculate DM growth. The pastures were dissected into components and *in vitro* digestibility measurements were made.

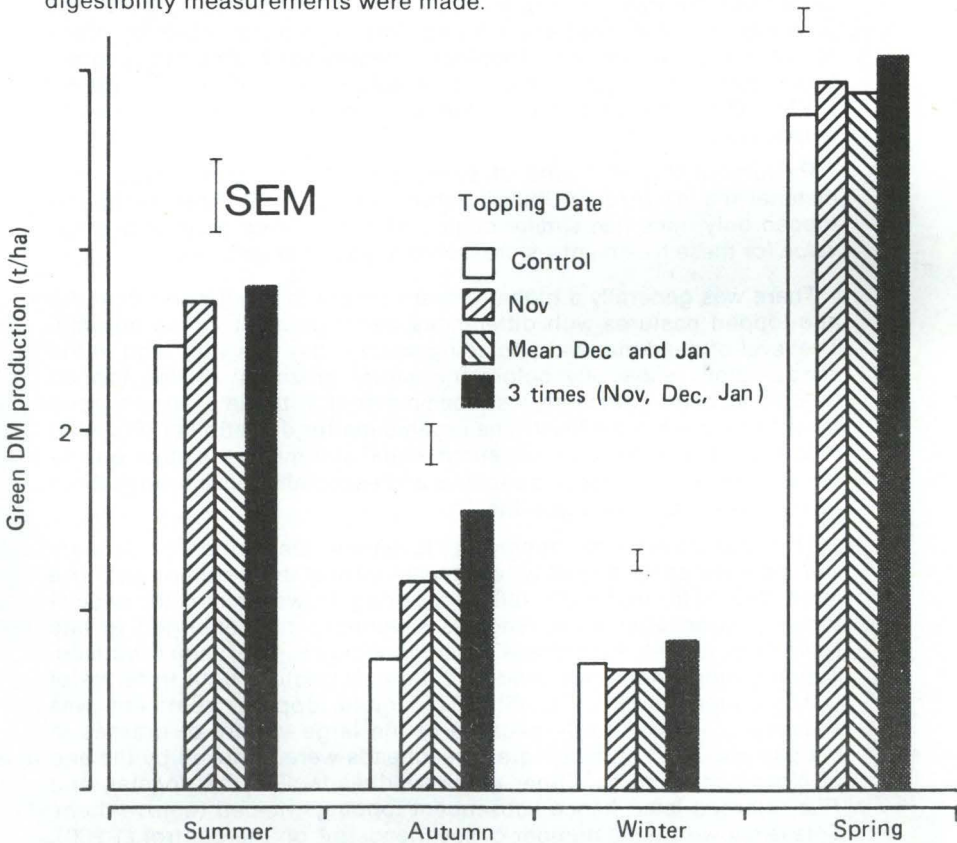


FIGURE 1: Effect of time of topping on green pasture production (t/ha).

Fig. 1 shows the green DM grown on the treatments each season. The treatments topped in December and January were similar yielding throughout, hence a mean figure for their growth is shown.

Though treatments were similar yielding during winter and spring, there were some differences during summer and autumn. In summer there was a tendency for pastures topped in December and January to produce less green DM than the pasture topped in November. This may have been the result of stimulation of new tillers and slower or no regrowth of vegetative tillers following the later toppings. At other seasons, DM production on all the treatments topped once was similar. Compared with non-topped pasture, DM yields of pasture topped in November appeared to be about 20% higher during summer and autumn. The treatments topped later were similar yielding to the control overall.

The pasture topped three times produced 35% more DM during summer and autumn than the control, and also tended to produce more than the pastures topped only once. This greater growth was probably because ryegrass tillering was increased more by three toppings than by one or no toppings. The average number of ryegrass tillers (per 5 cm core) at the end of autumn was 12.0, 9.8, and 6.6 (SEM=1.03) in the control, once topped, and three times topped plots, respectively.

Pasture quality in terms of percentage clover, percentage dead material and *in vitro* digestibility, is shown in Fig. 2. The three treatments topped only once had similar quality pasture, hence only an average value for these treatments is presented at each harvest.

There was generally a higher clover content in the topped than the non-topped pastures with differences being greatest in the autumn. The level of dead material (including seedheads) was very high in the control plots, especially before the winter grazings. All the topped treatments had significantly less dead material, with the pasture topped three times having the least. The organic matter digestibility (% OMD) followed a similar trend during summer and autumn to the other quality parameters, with the topped pastures and especially those topped three times, being the most digestible.

This trial shows that topping in November, December, or January will increase pasture quality, especially during the autumn, and to a lesser degree through to the following spring. However, only the earliest topping, soon after most ryegrass seedheads had emerged in late November, is likely to increase the amount of green herbage produced. Topping more than once produces the best pasture both in terms of DM produced and its quality. This multi-topping treatment was successful at least partly because of the large variety of grasses in the pasture. Most of the ryegrass seedheads were removed by the end of November topping. Other grass seedheads such as dogstail and *Poa* emerged later, hence subsequent toppings helped remove them. This is shown by the number of seedheads/m² on the control (1 900), November topped (800), and three times topped (300) plots at the end of January.

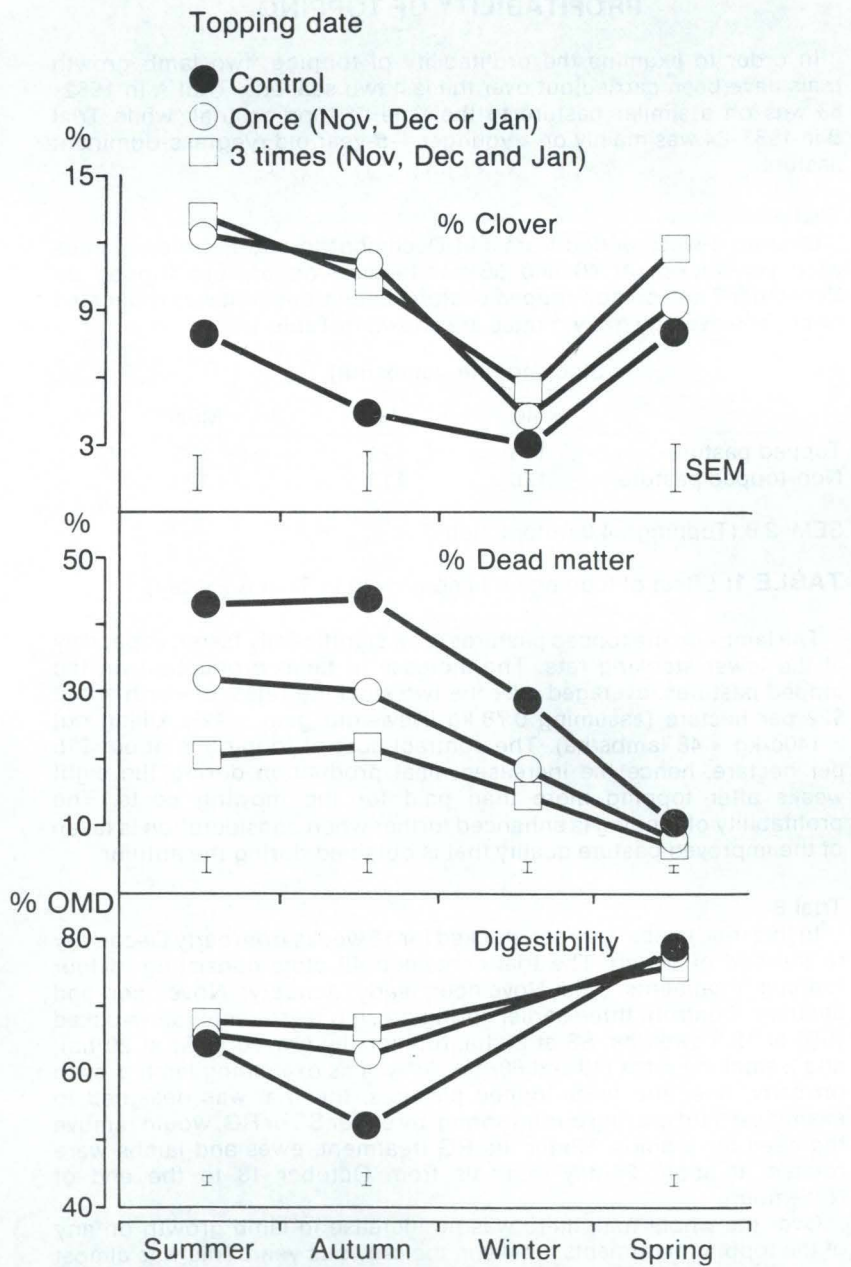


FIGURE 2: Effect of topping on pasture quality.

PROFITABILITY OF TOPPING

In order to examine the profitability of topping, two lamb growth trials have been carried out over the last two seasons. Trial A in 1982-83 was on a similar pasture to the time of topping trial, while Trial B in 1983-84 was mainly on a younger 4-5-year old ryegrass-dominant pasture.

Trial A

Over an 8-week period from mid-December to mid-February, lambs were set-stocked at 40 and 56 per hectare on pasture topped on December 7 and on non-topped pasture. Each treatment was replicated twice. The average growth rates are shown in Table 1.

	Stocking rate (lambs/ha)		Mean
	40	56	
Topped pasture	148	121	135
Non-topped pasture	128	113	121

SEM=2.8 (Topping), 4.0 (Interaction).

TABLE 1: Effect of topping on lamb growth in Trial A (g/day).

The lambs on the topped pastures grew significantly faster, especially at the lower stocking rate. The increase in lamb production on the topped pastures, averaged over the two stocking rates, is worth about \$22 per hectare (assuming 0.78 kg liveweight gain \times 42% killing out \times 140c/kg \times 48 lambs/ha). The contract cost of topping is about \$15 per hectare, hence the increased meat production during the eight weeks after topping more than paid for the mowing costs. The profitability of topping is enhanced further when consideration is taken of the improved pasture quality that is obtained during the autumn.

Trial B

In this trial, lambs were set-stocked for 16 weeks from early December to the end of March. The trial contained 48 plots consisting of four topping treatments (end November; early January; November and January; Control), three earlier spring grazing treatments (set-stocked (SS) at 12.5 ewes/ha, SS at 20/ha, rotationally grazed (RG) at 20/ha), and 2 stocking rates (40 and 60/ha). As well as examining lamb growth on early, late, and twice-topped pastures, the trial was designed to examine if hard grazing during spring, by either SS or RG, would remove the need for topping. Under the RG treatment, ewes and lambs were rotated at about 24-day intervals from October 13 to the end of November.

Over the whole trial, there was no increase in lamb growth on any of the topping treatments, unlike in the previous year. This was almost certainly because of the low number of seedheads on these pastures. The average number of seedheads (per m²) on the non-topped plots in December was 500, 100, and 300, on the SS at 12.5, SS at 20, and

RG at 20 plots, respectively. This is in comparison with about 2 000 seedheads/m² in the previous year when a lamb growth response to topping was obtained. The low number of seedheads on all treatments was due either to all the spring management treatments, including SS at 12.5, controlling seedheads, or more likely, the result of a reasonably heavy grazing which removed seedhead tillers on all plots before October 13 when the spring treatments began. All the pastures at this time were grazed to a height of about 4 cm and contained 800–1 000 kg DM/ha. Hence, it may be that reasonable summer seedhead control can be achieved by grazing to this level in early October.

Although lamb gains were not affected by topping in this year, they were affected by the spring grazing treatment. Table 2 shows the effect of spring treatment on lamb growth, available DM when the trial began, and summer pasture quality.

	Spring treatment			SEM
	Set-stocked at 12.5 ewes/ha	Set-stocked at 20.0 ewes/ha	Rotational grazed at 20.0 ewes/ha	
Lamb growth (g/day)	129	135	112	8.1
Available DM (kg/ha) (end of Spring)	2 240	1 400	1 850	49.4
Clover (%)	17.5	20.0	16.6	2.50
Dead matter (%)	16.4	11.5	16.4	1.97

TABLE 2: Effect of spring grazing on lamb growth and pasture quality during summer in Trial B.

The trial suggests that lamb growth over the summer was poorer on pastures which were rotationally grazed during spring rather than set-stocked. Considering that when the trial began there was less DM available for the lambs on the high SS plots than on the RG plots, the better gains on the SS plots are mainly the result of improved pasture quality. This is partly confirmed by the average clover and dead material contents measured in the pastures over the summer (Table 2). Total DM growth over the 16 weeks was similar on each spring treatment. The difference in summer clover content between SS and RG pastures during spring is smaller than has been published elsewhere. This is probably because in summer the pastures were set-stocked rather than rotationally grazed.

METHODS OF SEEDHEAD CONTROL

Topping

Topping pastures with a mower is the main mechanical means of removing grass seedheads and of improving pasture quality in summer and autumn. Its effects and profitability have been discussed above.

Silage

An excellent method of seedhead control is to make excess pasture into silage during late spring. Cutting silage early produces both a higher quality feed than if it is made after Christmas and allows better pasture regrowth.

Producing high yielding, good quality summer pasture by early seedhead control is another advantage for making silage instead of hay for sheep. This complements the other advantages of silage: it is a quicker, less climatic-dependent means of conservation, and is a cheaper, higher quality feed than hay.

Grazing management

There is a conflict between hard grazing in spring for improving pasture quality and lax grazing for maximum ewe and lamb performance. Often, part of a farm is hard grazed in late spring to build up pasture reserves for weaning. However, seedhead control is seldomly achieved on the whole farm by grazing management, even when some paddocks are shut up for silage. As these and other trials have shown, set-stocking in spring is more likely to remove seedheads than rotational grazing at the same stocking rate. Set-stocking in spring also has the other important advantage of improving summer clover levels.

During summer, stock have often been used to control seedheads. However, very hard grazing of breeding ewes at this time is not recommended, as it is detrimental to their liveweights and especially to their wool growth.

THISTLE CONTROL

Although most of this paper has looked at the place machinery has in seedhead control, topping can also be an effective means of thistle control. Work done in Taranaki by M. J. Hartley showed that when there was a high density of Californian thistles (30% ground cover), both repeat topping and repeat spraying with MCPB whenever grazing was impeded (thistles about 30 cm high), gave an economic increase in sheep production. The repeat treatments used were three topplings in the first year and one in the second, or two sprayings in the first year and one in the second. After two years, there was only a trace of thistles on the sprayed plots and about an 80% reduction on the topped plots. The increased stock production was the result of increased pasture utilisation rather than an increase in total DM produced.

No trials have been done in Southland to examine whether topping will economically control the province's main weed — the Californian thistle. However, if topping is concurrently used as a seedhead control method this method of thistle control is probably very economic.

SUMMARY

This paper has concentrated on seedhead control methods and

especially on the use of topping machines to achieve good quality summer pasture.

Lamb growth trials have shown that topping with a mower is economic when there are about 2 000 seedheads/m², but not when the level is about 500/m².

On pastures with dense seedheads, the best time to top is early, preferably in late November soon after ryegrass seedheads emerge. Topping in November, December, or January will all increase pasture quality during the summer and autumn. Only the November topping, however, is likely to increase pasture production. On pastures topped in November, a second topping in January will probably increase DM production and quality even further, especially if the pasture contains a high proportion of late emerging grasses.

Apart from topping with a mower, seedhead control can also be achieved by silage-making or hard grazing during spring. There always needs to be a compromise, however, between the hard grazing of ewes and lambs for improving pasture quality and the need for maximum stock performance. Seedhead control on a farm can probably be achieved partly by grazing, partly by silage conservation and if seedheads are dense on the remainder, it should be topped.

Set-stocking is preferable to rotational grazing during spring for seedhead control and the production of high quality summer pasture. Very hard grazing of breeding ewes during summer is not recommended as a seedhead control method.

An additional reason for topping is the control of Californian thistles. Repeat topping of dense thistles whenever they reach about 30 cm is economic.

Cereal production opportunities for the South

Technology for survival

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Two difficult harvest seasons and the threat of CER looming on the horizon must have caused many cropping farmers, not only in Southland, to wonder how long they will continue to grow cereals. Obviously there is no instant answer to the problem.

In this paper I will try to review some of the strengths and weaknesses that I see in the Southland cereal industry. Most of my first-hand experience of experimentation on cereals has been gained in the Lincoln environment and it would be rather arrogant for me to suggest that the Lincoln technology should be transplanted into the Southland environment. However, it is my belief that some of our recent experimental work and technology, which I will describe, may have a place in Southland.

WHEAT

The importance of yield

The present system of payment for wheat in New Zealand gives growers little incentive to produce high quality wheat. Provided a minimum standard is achieved (MDD of 15), yield is the most important factor influencing the profitability of the crop. It is not surprising that

the first two place-getters in the ICI Tasman Wheat '83 competition (which is based on profit per hectare) both grew the highest yielding crops. In round figures, the gross margin of a crop yielding 8 t/ha is about double that of one yielding 5 t/ha.

There is no question that Southland is a high yielding environment and consistently produces the highest district yields in the country. In the 1983 season, yields for the Christchurch district averaged 4.0–4.3 t/ha, whereas for Invercargill the average was just under 5 t/ha.

Let us now analyse the factors that contribute to these high yields. A common belief expounded by experts from further north is that Southland's cool, wet summers produce large, plump grains which result in high yields. Both assumptions are incorrect. The mean temperature during the period of assumed grain filling in Southland (January–February) is just under 15°C. Grain filling in winter wheat crops in Canterbury occurs during December when the temperature is very similar at 15.2°C. Temperature during grain filling has a major influence on final kernel weight for any one cultivar (Wardlaw *et al.* 1980). It is therefore not surprising that the grains produced by Southland crops are no bigger than those grown further north (Table 1).

Year	Christchurch	Dunedin	Invercargill
1982	40.6	42.6	42.1
1983	42.7	41.5	39.1
1984	46.6	41.6	NA ¹

¹NA=not available.

TABLE 1: The effect of district on mean kernel weight (mg) of wheat.

A high-yielding crop of winter wheat in the Lincoln environment produces ears containing about 18 spikelets (Scott *et al.* 1977). Spring-sown wheat generally produces fewer spikelets per ear. In the crops which I inspected in Southland in March of this year, the number of spikelets per ear was about 15. The decline in the number of spikelets per ear caused by spring sowing is mainly the result of the longer daylength that these crops experience during ear development (Rawson 1971).

A wheat ear that produces 15 spikelets per ear with each spikelet containing 1.5 grains per spikelet has about 23 grains per ear. If we assume that each grain weights 40 mg (Table 1) a crop yielding 8 t/ha would require a population of 870 ears per m², a figure which is high by Lincoln standards (Scott *et al.* 1977). Thus, the yield component, which is most likely responsible for the high yields in Southland, is the ear population. From a management point-of-view, ear population can be influenced by cultivar, sowing rate, and N status. The climatic factor which has a big influence on ear population is the water status of the crop during stem elongation. In relation to this Southland is usually more favourably endowed than Lincoln where water stress can cause considerable tiller mortality in dry years (Scott *et al.* 1973).

Wheat quality

Once the conditions of CER become fully implemented it will be even more important for the New Zealand wheat grower to produce wheat of a consistently high quality if he is to survive. The quality of wheat produced in Southland can perhaps be described by one word — variable (Table 2).

Year	Christchurch	Dunedin	Invercargill
1979	35.2	37.1	38.1
1980	36.5	38.2	38.6
1981	20.5	16.7	19.4
1982	19.9	17.7	16.8
1983	17.6	11.4	11.0
1984	13.0	11.9	10.3

¹ The Bulk Fermentation Test was replaced by the Mechanical Dough Development Test in 1981.

TABLE 2: The effect of district on average baking score¹ of wheat (not counting damaged lines).

In 1979 and 1980, Southland produced the highest quality wheat in New Zealand (Table 2). However, in 1983 the baking score of Southland wheat was disastrously low. The past season (1984) is likely to be even worse but, if it is any consolation, Canterbury wheat also had a low baking score.

Within one cultivar, grain protein level is often correlated with baking score making it important for the grower to ensure that the crop has an adequate supply of N, particularly during grain filling (Scott 1981). On soils containing low levels of organic N, the application of N at early growth stages, whilst giving large increases in grain yield (Scott 1978), may cause drastic reductions in grain N content (Table 3).

	Rate of N applied kg/ha			
	0	25	50	100
Kopara	2.02	2.01	1.92	1.94
Karamu	2.01	1.95	1.87	1.87

S.E. \bar{X} for vertical and horizontal comparisons : 0.02.

TABLE 3: Effect of N fertiliser on grain N% of Kopara and Karamu wheat grown at Lincoln 1975-76.

Growers should be aware that there is more to producing wheat with a high baking score than just ensuring that the growing crop has a high level of N available. It is interesting to compare the protein content of Southland and Christchurch wheat during some of the seasons previously mentioned (Table 4).

	Christchurch	Dunedin	Invercargill
1982	10.9	10.5	11.0
1983	9.9	9.4	9.7

TABLE 4: The effect of district on % protein of wheat grain, not counting damaged lines.

In 1982, the baking score of Southland wheat was slightly lower than that grown in the Christchurch district (Table 2) and, as expected, there was little difference in percentage protein. However, in 1983 when the bake score of Southland wheat was very low (Table 2), the percentage protein was little different from the higher scoring wheat grown further north (Table 4).

One of the most powerful tools that the farmer has to control quality is the choice of the cultivar grown. It is interesting to compare the proportion of Category A wheat among cultivars with the total tonnage produced (Table 5).

	Distribution for all cultivars	Distribution for Category A cultivars
Rongotea	3	4
Oroua	25	52
Kopara	12	0
Takahe	45	31
Tiritea	14	12

TABLE 5: A comparison of the distribution of Category A wheat among cultivars with the total tonnage grown in the 1984 season (%) for the Southland district.

In the 1984 season, only one quarter of all the wheat grown in Southland was Oroua yet this cultivar produced more than half of all the Category A wheat (Table 5) indicating that the choice of cultivar can have a marked effect on quality. These data should not be taken as a blanket recommendation for Oroua which does have the advantage of being very early maturing (Risk & Wright 1979) but may also be very prone to sprouting under certain conditions (D. S. C. Wright pers. com.).

The date on quality referred to in Tables 2, 4, and 5 do not include any lines damaged by bugs, heat, or sprouting — the latter being a major problem in Southland in some years (Table 6).

Although the data for the 1984 season were not quite complete at the time of publication, they do indicate that during the 1984 season less than one half of the Southland wheat crop was free from sprout damage. Just under 20% of the crop showed a considerable (S3) degree of sprout damage.

Sprouting is the natural phenomenon of mature grains germinating in the ear before harvest. It is brought about by damp or humid conditions. In general, red-grained wheats are more resistant to sprouting than white wheats and the red-grained derivative of Aotea — Takahe — was bred with Southland in mind (McEwan 1975). Despite

the success of plant breeders in breeding sprout-resistant wheats, sprouting continues to be a major problem in Southland in some years (Table 6).

Sprout index	1983	1984
S0	83	43
S1	92	63
S3	97	81
S6	99	92
S12	100	98
S12+	100	100

TABLE 6: Distribution of Sprout index 1983 and 1984 for the Invercargill district (% of tonnes up to and including various sprout indices).

Southland wheat crops are traditionally spring-sown from mid-August to late October (Risk & Wright 1979). This sowing time conveniently follows either pasture, which is left down as long as possible for lambing feed, or swedes, which are fed off over winter (Rankin 1961). Despite spring sowing giving high yields of quality wheat in some years, it is my opinion that spring sowing is one of the major contributing factors to the sprouting problem. By Lincoln and most of Canterbury standards, harvest time in Southland is late, occurring in March–April compared with late January at Lincoln. Examination of the weather records for Gore shows that the mean temperatures for February, March, and April are 14.9, 13.4, and 10.5°C, respectively. Along with this temperature decline goes a corresponding drop in the rate of evaporation and daylength — all factors which drive heading contractors around the bend.

While grain driers can bring the time of harvest forward by a few days it is suggested that the most logical way to achieve this is by sowing the crop in autumn, particularly on free-draining soils. This suggestion is a radical departure from traditional practice; however, there are some very good physiological reasons why autumn sowing might give very high yields. For example, autumn-sown crops should produce at least five more spikelets per ear because of the daylength effect discussed previously. What is more certain is that autumn sowing will advance the harvest date by at least one month.

All wheat growers have to control plant diseases, some of which require chemicals. Some results of the ICI Tasman Wheat '83 competition are relevant to this discussion of 'technology for survival'. To control stripe rust in winter-sown Rongotea in Canterbury the recommendation is to apply 2–3 sprays each of 500 ml of fungicide — a total of 1 000–1 500 ml. The winner of the competition, Mr Ivan Maw, applied three sprays of 250 ml — a total of 750 ml of fungicide.

During the 1983 season nearly 90 000 t of wheat was grown in the Invercargill district. This year the total is unlikely to exceed 30 000 t. For various reasons, some of which have been discussed, the average Southland farmer has moved away from growing wheat, its place being taken mainly by barley, the next crop to be discussed.

BARLEY

Southland is capable of growing high yielding crops of quality barley grain for both feed and malting and the early maturity of barley makes it an attractive alternative to wheat (D. S. C. Wright pers. comm.). There is no doubt that the export market for barley has also been partly responsible for the swing to this crop this year.

In New Zealand, the agronomy and physiology of barley growth have not been researched to the same extent as wheat. In 1983, an extensive programme on barley research was started at Lincoln College — the results from some of this research are presented here as I believe they may have promising implications for Southland.

Firstly, it is necessary to define some terms. Winter barley is any cultivar of barley that is insensitive to frost and cold (ie., winter hardy) and requires some exposure to cold early in its life cycle if it is to flower and develop normally — the vernalisation requirement (Gallagher 1983). Spring barley, on the other hand, does not have a cold requirement for flowering and may have a variable degree of winter hardiness.

The advantages and disadvantages of winter barley have been exhaustively reviewed by Gallagher (1983) and the development of barley in general by Gallagher *et al.* (1983). These reviews indicated that in the New Zealand situation, early sown barley (ie., autumn-sown) may be available for grazing in early spring. The effects of grazing on grain yield were unknown.

With this background of information we sowed a number of barley cultivars on 7 April 1983. Winter and spring barleys with two-row and six-row ears were chosen where available. Ryecorn cv. Dominant and oats cv. Omihi were included as standard greenfeed species (Table 7).

Cultivar	W — Winter	Ear-type
	S — Spring	
Illia	W	6-r
Priver	W	2-r
Gwylan	S	2-r
Hassan	S	2-r
Kakapo	S	6-r
Koru	S	2-r
Magnum	S	2-r
Mata	S	2-r
Triumph	S	2-r
Oats	-	-
Ryecorn	-	-

TABLE 7: List of cultivars sown in grazing experiment.

All cultivars listed in Table 7 were grown with and without grazing. A split plot design with four replications was used ie., for each cultivar four plots were grazed and four were left ungrazed. Each plot measured 12×1.5 m and was sown using a Duncan seedliner drill at 200 viable seeds per m². Superphosphate at 150 kg/ha was drilled with the seed

together with Thimet granules at 12 kg/ha for the control of aphids — the vectors of BYDV. On 15 August and 4 October all plots were sprayed with 300 ml of Tilt and 420 ml of Metasystox per hectare for the control of fungus diseases and aphids, respectively. On 8 August 1983 two 0.1 m² quadrats per plot were cut to ground level and the herbage was dried and weighed to determine the herbage yield before grazing. At the same time five plants per plot were removed and dissected for apical development.

Where appropriate, plots were grazed with sheep between 8 August and 11 August at a stocking rate of about 600 ewes per hectare. All plots were allowed to flower and mature grain after growing. Grain yields were determined by cutting 2 m² samples out of each plot, excluding the two outside rows. All plots had matured by early January 1984.

Herbage yields before grazing, the residual left by the sheep and, by difference, the apparent intake by the sheep are presented in Table 8.

Cultivar	Pregraze yield	Residual yield (kg DM/ha)	Apparent intake
Illia	1 640	650	990
Priver	2 350	960	1 390
Gwylan	1 860	1 310	550
Hassan	2 080	1 910	170
Kakapo	1 500	770	730
Koru	2 870	1 610	1 260
Magnum	2 370	1 860	510
Mata	2 910	2 170	740
Triumph	2 090	1 780	310
Zephyr	3 020	2 570	450
Oats	1 860	650	1 210
Ryecorn	2 600	1 480	1 120
S. E. mean	185	138	233
CV%	16.3	18.6	59.3

TABLE 8: Herbage yields (kg DM/ha) before and after grazing for the cereal cultivars.

With regard to the barleys, lowest herbage yields were produced by Illia and Kakapo (Table 8), possibly because these six-rowed barleys tiller less than two-row barleys (Barling 1981). Highest barley herbage yields were produced by the two-row cultivars — Gwylan was slightly lower than the rest but was similar to oats. Ryecorn produced a yield similar to the two-row barleys.

When sheep were introduced to the plots it was very apparent that they grazed the Illia, Kakapo, and oat plots, and to a lesser extent Priver, in preference to all other cultivars. This preference was shown in the yields of herbage remaining after grazing. One of the limitations of the experiment was that the plots of Illia, Kakapo, and oats were visually 'thumped' to force the animals to eat the spring two-row cultivars.

On the basis of the interaction between herbage yield and acceptability, it was apparent that the highest intake of herbage occurred in the barleys Illia, Priver, and Koru. It is probably no coincidence that oats and ryecorn, the crops traditionally grown as greenfeeds (Scott 1976), also produced comparable intakes. Apart from Koru, the apparent intake of all other spring cultivars was at a lower level despite the high levels (2 000–3 000 kg DM) of herbage on offer.

The reason why vegetative grass plants (and cereals are grasses) are tolerant to grazing is that the apex or growing point is very small (less than 1 mm long) and is held on a very short stem only a few millimetres above the roots and below soil level. Once the plant enters the reproductive phase the apex elongates. The grass stem also elongates, raising the apex above soil level until eventually it emerges as the grass flowerhead. Table 9 provides a quantitative description of how far this process had proceeded when the various cereal cultivars were grazed in August. By definition, apex height is the distance from the uppermost root to the base of the apex. Apex length is defined as the distance from the base to the top of the apex.

At the time of sampling in August, the apex of all barleys showed some degree of reproductive development. Oats was the only cultivar in the experiment that was still vegetative. Both the winter barleys, Illia and Priver, had very short apices with little stem elongation, so that these apices were still below soil level. At the other extreme the spring cultivars Koru, Mata, and Zephyr showed considerable reproductive development with apices at least 4 mm long and elevated at least 11 cm, making them very prone to grazing damage.

Although Kakapo is described as a spring barley (Wright 1975) its apical development was very similar to that of the winter barleys Illia and Priver (Table 9). The six-row characteristic of Kakapo may be related to this slower rate of development.

Cultivar	Apex height (cm)	Apex length (mm)
Illia	0.9	2.2
Priver	0.9	2.0
Gwylan	2.3	3.1
Hassan	6.6	4.5
Kakapo	1.0	2.5
Koru	12.2	4.6
Magnum	5.2	3.3
Mata	11.2	4.0
Triumph	4.4	2.9
Zephyr	11.2	4.2
Oats	0.7	1.0
Ryecorn	5.7	5.7
S. E. mean	0.7	0.1
CV%	25.2	7.1

TABLE 9: Apex height and length of the cereal cultivars just before grazing on 8 August 1983.

The data in Table 9 also indicate that any cultivar showing extensive reproductive development, either by stem or apex elongation, was rejected by the sheep.

A major problem in conducting this experiment was bird damage which started in the ungrazed plots shortly after anthesis in October. It was hence impossible to get an accurate measure of grain yield or the effect of grazing, except in the case of Illia which, for some reason came through untouched. The grain yield in this cultivar was 11.9 t/ha in the ungrazed plots and 11.5 t/ha in the grazed plots. The standard error of 0.8 t/ha suggested that grazing did not significantly reduce grain yield for this cultivar. In our experience, hand-harvested yields on small plots generally overestimate actual yields by about 15% (Scott *et al.* 1973) which brings the actual yield of Illia in the present experiment back to a mere 10 t/ha.

Gallagher (1983) listed the possible advantages of winter barley as better yield, more even workload, early harvest, and early sales. Possible problems discussed were the increased autumn workload, weeds, volunteers, higher costs due to diseases, and problems with seed supplies. The experiment described above has suggested some other problems with autumn-sown barley, whether these are true winter or spring barleys. These problems are:

- * Where spring barleys are autumn-sown they anthesise very early in spring (October in Canterbury). In some years this could lead to frost damage.
- * On moisture retentive soils of high fertility, lodging can be a problem. While grazing can reduce lodging it is likely that growth regulators to shorten the straw may also be required.
- * At present there is no winter barley which is also a malting barley. This restricts the market for grain, although it is likely that plant breeders will solve this problem in the future.

Despite these problems I believe that winter barley sown in autumn (say March), grazed in August as a lambing greenfeed, and then harvested for grain by February offers exciting potential for Southland cereal growers on free-draining soils. In Southland, the main advantage is probably the early harvest which not only eases harvesting problems but enables other crops or new grass to be sown before winter. Autumn-sown winter barley also offers the opportunity for grazing in early spring because of its growing tolerance which obviates the justification for spring sowing in the past.

As a final twist we should not that the recently released overseas wheats — Bounty, Abele, and Crossbow — are all true winter wheats, unlike anything we grow at present. Perhaps one day we shall see these winter wheats being autumn-sown, grazed, and harvested early, just like winter barley.

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Market prospects for the export of New Zealand barley

G. B. Robertson, Chairman, South Island Export Barley Society

There has recently been a great deal of interest in barley as an export crop. This interest has resulted in a major expansion of the area harvested this year so that exports will rise from our usual export tonnage of 60 000–70 000 t to around 250 000 t from this current harvest. Farmers are now quite rightly asking 'Is this new optimism justified and can we sell all the grain?' I believe the answer is 'Yes'.

THE INTERNATIONAL MARKET

The international grain trade is vast and is as vital to the world as the oil business. At present, about 200 million tonnes of grain are traded internationally and this is divided almost equally between wheat and feed grains. Although a great many countries export grain it is important to note that over 50% of the grain in world trade — 40 million tonnes of wheat and 70 million tonnes of feed grains — originate from the United States. Consequently, this country is the major influence on world grain trade.

The world feed grain trade totals 105 million tonnes. Maize is the

most important grain comprising about 75 million tonnes. Barley is less important with about 10 million tonnes being traded across international borders.

Against these enormous tonnages, our exports this year of around 250 000 tonnes are indeed small.

The barley trade can be further subdivided into feed and malting

The two chief markets for feed barley are Russia, where a continued inability of the Communist Regime to produce satisfactory results in agriculture means a substantial shortfall in grain production; and Saudi Arabia, where some of her wealth from oil is converted to the grain that her deserts cannot grow. In addition to these markets, many other smaller buyers purchase feed barley each year.

The malting market is smaller and more specialised, particularly in terms of variety. Maltsters and brewers have definite preferences for barleys of proven malting ability and high percentage malt extract, but they also look for low nitrogen levels, good plump grain, and of course an ability to germinate. Malting barley prices are related to feed prices with varying premiums over feed depending on variety. Hence, although many varieties may be malted, the best prices are reserved for varieties of proven merit. For a top malting variety we would expect the market to pay a premium of up to 15% over feed prices.

Markets for malting barley need careful development to ensure that the right type of barley is offered and a reputation is developed for quality — particularly where maltsters are trying barley of a new origin such as New Zealand barley. The main markets for our malting barley will be South East Asia, South America, and occasionally Europe, when the European harvest is unable to supply enough quality barley. The market for malting barley is not unlimited. We should only be selling the very best barley for malting and selling the remainder as feed.

NEW ZEALAND'S EXPORT BARLEY TRADE

There is a school of thought that looks on barley as something of an exotic new crop which has provided opportunities for the New Zealand farmer after a lift in world market prices. This is understandable given the movement in grower prices from \$100 per tonne in 1980 to the prospects for \$180 per tonne for feed this year and \$200 plus for malting. Yet in reality, the change has not been in the world scene but has occurred here in New Zealand marketing methods. Before 1980 we simply exported surpluses. The production of feed grains was seen as a business of producing for the local feed industry. This attitude was reinforced by an export licensing system where licenses were only issued for export when local buyers agreed that they had sufficient grain for their own purposes. We, as farmers, were discouraged from growing for export by a short-sighted contracting system offering fixed price contracts which prevented growers from participating in true world prices. Very little effort was being made to present New Zealand barley in a favourable light and quality standards were minimal.

Since 1980 we have seen the introduction of pools that enable growers

to participate in the full market price. We are exporting high quality specifications and are now producing a premium variety of malting barley for overseas buyers. What I am suggesting is not that the international market has changed over the last four years but that our marketing has improved to produce better grower prices. This is best demonstrated by the fact that values in terms of US dollars are presently as low as they have been any time during the last few years. The peak price for malting barley last year was no higher (in US dollars) than the price for which we sold feed barley from the first year of the Barley Society in 1980-81. The better prices received by the New Zealand producer are also a result of the devaluation of the New Zealand dollar against the US dollar over the last four years.

FUTURE PROSPECTS FOR NEW ZEALAND

Barley is a commodity and like all commodities it is subject to price reaction, and changes in supply and demand. From time to time record harvests in the major grain growing countries will lead to over supply and consequent low prices. At other times we will see grain crops affected by droughts and other seasonal factors leading to shortfalls and higher prices.

Barley is an expanding market as a larger world population turns more to grain for food. It is expected that the world grain trade will expand at a faster rate than the population growth rate as an increasing proportion of the world's food becomes grain-based.

Our future viability as a barley-exporting nation depends on an understanding of the international market, but of even greater importance is our ability to produce barley efficiently.

Factors in our favour as barley exporters are firstly that we can grow barley well. Our particular combination of soils and climate appears to favour barley production, particularly spring barley. In Europe at present, winter crops — particularly wheat but also barley — are the favoured crops. In North America quality bread wheats and corn can be grown extremely well. However, in the South Island of New Zealand our barley yields are extremely good and are rising in response to better management. The sort of yields we obtain with spring barley are admired by the most sophisticated British grain grower who can grow 10 t/ha on winter cereals but cannot reach our spring barley production.

Secondly, the quality of our barley is also very good. Barley now grown under irrigation in dryer areas in Otago and Canterbury, or under the more reliable rainfall of southern regions, is of a high standard in terms of grain size and weight.

A third factor promoting the growth of barley in New Zealand as an export crop is that barley integrates into farming systems — both with livestock or all cropping systems. The livestock farmer can integrate the barley crop with pasture renewal and winter feed crops. Crop farmers can undersow herbage seed with barley. Barley provides easier management of foliar and soil-borne diseases than does wheat.

Our fourth advantage as a barley exporter is the direct route from farm to export. The meat industry, once the healthy giant of New Zealand agriculture, is currently suffering from unrealistic freezing

charges. Barley can be exported directly avoiding any inefficient processing costs within New Zealand.

Our grain is grown close to port and moves from on-farm storage to the ship's side. The costly extra handling incurred from intermediate consolidation and storage facilities, and the long journeys to port experienced by continental grain producers of North America or Australia are thus eliminated.

A fifth consideration in the export of barley is the relatively low cost of international freight for grain compared with the expense of transporting our refrigerated products or even the costs of general cargo. In a very competitive bulk shipping market we can look forward to freight rates that ensure our grain can be sold competitively anywhere in the world.

Finally, the grain trade has none of the political restraints we see from time to time in the international meat or dairy markets. Grain is a basic commodity. Even the EEC has no quota on the import of grain to that market.

Looking at the future, we can expect fluctuations in prices as the market reacts to variations in crop production from season to season. If we do our job well as producers, if we maintain and continue to increase our already very good yields, we will continue to export barley competitively to the expanding grain markets of the world.

The best proof we have of our overall competitiveness as a barley exporter is probably the fact that we are one of the very few groups of exporters who can actually make a living from exporting without the need for massive subsidies, be they export incentives or supplementary minimum prices. We can rightly claim that as an export industry we are lean and efficient and that barley growing is a viable use for our limited amount of good arable land.

Milling oat requirements for Southland

S. R. Adams, Manager, Fleming and Company Limited, Gore

Southland's geographical location and rainfall makes it ideally suited for oat growing. Standard requirements for milling oats are: bushel weight 41/42, screenings 10%, and moisture below 15%. The current variety of oats supplied is Makura.

About 60% of our current requirements of oats comes from Central Southland and this is mainly from the Oreti plain area (6 500 t). Many of our growers have been supplying oats for a number of years and one recently recorded 25 years of selling to our mill.

All oats entering the mill are cleaned three times before being stored and once more before being processed. This results in a loss of 4% in the form of straw, weed seeds etc., and in the current year represents a write-off of \$75 000. The cleaner the grain supplied by the farmer the better our milling extraction will be. CER trade with Australia will also be more competitive.

All oats are taken into the mill by July and all clients are paid on the completion of contracts. The storage capacity of the mill is 6 800 t. Oats entering the mill for processing, after passing over granostar cleaner and stonator, are graded on width and length. Oats are shelled

by impact hullers and the recognised loss is 25%. The husk is used to fire the boilers and using a steam engine we generate 25% of our own power.

Future oat requirements are an oat of good weight and colour, containing low screenings.

The quantities of oats that have been purchased since 1971 are shown in Table 1.

Year	Tonnage	Average cost per tonne
1971	4 137	\$ 49.00
1976	5 406	\$ 95.00
1981	6 900	\$119.00
1983	11 000	\$171.00

TABLE 1: Oats purchased since 1971 and average cost.

Sales of finished products between January and December in the same years were:

Year	Tonnage
1971	2 816
1976	4 800
1981	5 600
1983	6 100

An increase of 117% occurred over this period with a consequent increase in revenue to Southland grain growers.

Oats need moisture, and drought conditions in some years resulted in oats being imported from Australia. In 1955 1 800 t were imported, 1 800 t in 1964, and 3 000 in 1973. The cost of the 1973 oats importation took five years to write back into prices. In a drought situation it is imperative that growers meet their contracts and not feed the oats to farm stock. Although finding other feed for stock may be a costly alternative it is vital to ensure a continuity of mill production and price to our customer. The advent of CER and competition from Australia makes this even more important. Lost sales may never be recovered.

Use	Tonnage
Human nutrition	
Breakfast foods	12 000
Animal nutrition	
Compounded feeds	850
Forage	40 850

TABLE 2: New Zealand domestic production of oats.

CER AND ITS COMPLICATIONS

This mill could not compete on the Australian market, but given the right prices for raw materials Australia could break into the New Zealand

market. Australia produces 1.6 million tonnes of oats, 19 000 t of which are sold as breakfast foods. The export of unmilled oats totals 195 000 t and the total export of milled oats is 9 500 t.

Australian oat growers graze their oat crops several times and the final oat harvest is regarded as a bonus. Three years ago the farmer received NZ\$97 per tonne. In 1982 it was \$148 per tonne. The current price FIS Sydney is NZ\$149 per tonne and the grower receives NZ\$113. During the drought last year, oats were freighted from Western Australia to Sydney at between A\$40 and 50 per tonne. Western Australia was shipping oats to Japan at NZ\$32 tonne whereas our freight rate to the same area in Japan is NZ\$174.

Australian millers' standards are: bushel weight 43/44, screenings 4%, and extraction rate 62% (compared with New Zealand's 59%). All waste, including husk, is ground and sold back to farmers as stock food; thus, further milling costs are reduced.

Today the retail grocery trade is in the hands of four companies: Foodlands, Woolworths, Coles, and Safeway. Ten years ago 21 companies had 75% of the grocery trade, today there are eight. To enter the Australian market it could cost up to \$100 000 on promotional expenses. Current freight for a container from Sydney to Auckland is \$2 700, Gore to Auckland costs \$2 000. If your product wasn't selling, the bid to compete overseas could be over in a matter of weeks.

In conclusion, we have a trading advantage because of currency adjustments but we must always be aware of competition under free trade with special reference to costs of raw materials.

Cereal husbandry — cultivation to shipping

G. Gardyne, farmer, Gore

I farm in partnership with my father and brother on a 470 ha mixed-cropping farm ten miles north of Gore in the Chatton district. The farm is in three blocks; two of which are suitable for mixed cropping (350 ha). The third block is used solely for stock because it is too steep for cropping. Soil types on the cropping areas are Waikoikoi silt loam and clay loam soils. We have an average rainfall of around 825 mm, although in 1982 it was 974 mm, and in 1983 it was 1 020 mm. The first four months of this year have produced 425 mm.

In 1983 we grew 113 ha of crop. Seventy-five hectares were in wheat giving an average yield of 5.9 t/ha, 18 ha were in milling oats yielding 5.2 t/ha, 11 ha were in oilseed rape yielding 3 t/ha, and 9 ha were in barely which was under-sown with permanent pasture yielding 4.5 t/ha. We also have a further 8 ha in swedes for winter feed for hoggets.

We run 3 200 Romney Coopworth cross ewes, 900 Perendale ewes, and 1 100 hoggets. One hundred and twenty rising one-year and two-year mixed sex cattle and 30 breeding cows give a stocking rate on grass of 16 per hectare.

Mixed cropping has been practised on our farm for several generations; however, this season and the last would certainly be some of the most trying seasons that we have ever experienced. Wheat quality was especially affected.

The main object of cereal husbandry is to achieve the highest yield of the best quality at the most economic cost. This is not always easily done. We are always very reliant upon our 'Maker' for suitable weather to make this possible; the best efforts of man can seem to be rather futile sometimes.

The decision has to be made that throughout the season attention will be paid to detail at every stage of crop growth, and that action will be taken whenever necessary to make sure that the crop is grown to its fullest economic potential; one factor only needs to be left out to severely limit crop yield. It is vitally important therefore, to monitor regularly all stages of crop development. If you don't do this, it will be too late to take preventative action when problems start.

Cereal yields are affected by limiting factors eg., drainage, nitrogen levels, weather conditions. These can be controlled by the farmer to varying degrees.

MACHINERY MANAGEMENT

A winter checkover for the header is always money well spent. It not only helps to prevent breakdowns during harvesting but also enables many problems to be fixed before they become more major. Another point worth considering is that it enables your servicing firm to keep their staff employed during the off-season period because it is essential that they maintain well-trained staff. Other maintenance jobs such as the painting of mould-boards on the plough with a rust preventative substance can prevent many hours of frustration and stress at the start of a ploughing season. Grain drills should also be thoroughly cleaned out, not only at the end of the season but also at regular intervals during sowing to prevent buildup under the fertiliser stars. The greater use of nitrogen fertilisers means this is now more important.

All gear should be kept in good order and be well maintained; the importance of proper machinery care and operation cannot be stressed enough. The Southland climate limits the time when conditions are right for both sowing and harvest. It is therefore important that as much care as possible is taken to prevent breakdowns and accidents.

PADDOCK PREPARATION

Drainage

Good drainage is invaluable. It enables the ground to warm up more quickly in spring and cultivation to be carried out at the right time. Plant health is enhanced and spraying and harvesting can also be done more easily.

The last two years have been abnormally wet and have certainly highlighted the need for adequate drainage. In our own situation the mole and tile drain has proved to be the most satisfactory answer as we have a clay subsoil which holds moles well. Without drainage on

our own property, cropping would not be possible and neither would intensive stocking.

Money spent on proper drainage always gives a good return, especially with cropping. If you are contemplating putting drainage in; it is well worth consulting the MAF or a private drainage advisor to ensure that you have the right system of laying out your drains and mole contours. Drainage cost money so it is important that drainage systems are properly installed so that you can get the return on your investment. Incorrect moling can also damage your subsoil and prove very difficult to rectify.

Paddock nutrient status

A soil test at regular intervals can prove to be a good guide on pH status and other nutrient levels. This helps you to take preventative action before deficiencies affect crop health, and also enables you to plan your fertiliser requirements with cereal sowing.

We have not needed to use potassium in our crop fertiliser because we chop the straw as it passes out of the header, allowing it to rot back into the soil. However, if burning was practised potassium may be needed and a soil test would give you an indication of this.

Another development in soil testing in the South is that of testing for soil N levels. I believe that this incubation test could prove an invaluable aid in estimating the N requirements of your cereal crops. In the past, N has often been added after the symptoms appear and some potential yield damage is already done.

Paddock topography and fencing

There is no point in proving your ability at handling your tractor if the header is not going to be able to harvest the crop. Steep areas are best left uncultivated. We have found that on one part of our property, where the south faces are particularly steep. We have simply run an insul timber fence along the brow of the hill and left that area in grass. Of course if a paddock needs refencing then these areas can be put into a paddock of their own with an adjoining piece.

Adequate fencing and gates are important because stock can soon spoil all the best efforts and intentions. Cattle are usually the best testers of gate latches and extra measures to secure gates may be needed.

CROP ROTATION

It is important to grow crops in a rotation to help prevent the buildup of disease problems. Remember prevention is always better than cure, and of course with takeall, for example, there is no cure. Takeall on a lot of cropping farms is becoming a serious problem.

We have the following rotation: pasture, swedes or wheat, wheat, wheat (we have three wheat crops running if the second crop is still disease free), oats (to help prevent takeall buildup, we may have oilseed rape at this stage if there were no swedes grown), wheat, wheat, oilseed rape (the best break crop for takeall and eyespot though they must be at least five years away from swedes otherwise they will have club root problems), wheat, wheat, barley (undersown with permanent

pasture). This is very flexible depending on different paddocks, disease levels, etc. We are not troubled much by aphids.

Up until this year we have worked on the principle that wheat gives the best return. Therefore we have worked out our rotation to give maximum wheat tonnage using oilseed rape and oats as break crops. The value of these break crops can never be looked at in isolation but rather as part of the whole rotation; doing a gross margin on them alone is a pointless exercise.

It should be remembered that barley too suffers from takeall, although not to the same extent as wheat. Barley could be substituted for the wheat crops and the break crops would remain where they are. Crops such as dogstail for seed are also grown from time to time and can give us a chance to get drainage laid and moles pulled which would not be possible while in other crops.

Our area has been fairly reliable for wheat production; the weather pattern over the last two years has altered that fact. It could mean that we will need to shift the emphasis away from wheat production in the future, although with farming, one usually finds that weather patterns have a habit of righting themselves and often going to the other extreme.

When rotating crops it is important that you do not attempt to take short cuts and grow an extra wheat or barley crop without using a break crop such as oilseed rape to prevent disease buildup. We once grew oilseed rape only three years after a brassica crop, instead of at least five years after, and had a crop failure because of club root.

Each crop has its place in the rotation and disaster can be the result if this principle is not adhered to. Good advice can be invaluable in this area.

CULTIVATION

I am not keen on conservation tillage techniques for this area. Results have been far too variable to make this a reliable means of cultivation. We winter plough in July providing ground conditions are suitable. This is after the ewes have spent five to six weeks on the stubble paddocks.

Ploughing ground that is too wet creates problems, especially if there are not many frosts after ploughing. Early ploughing spreads the work load, taking pressure off the September–October period. It also enables frost action to reduce the subsequent cultivation needed, and allows the ground to aerate and warm up more quickly in spring.

This year we will be using the disc coulters on our plough for the first time. These seem to eliminate any ribbon of straw protruding, especially where stock have not tramped a stubble properly, and they should therefore achieve better disease control.

From a strictly cropping point-of-view, burning is the cleanest way of disposing of straw, providing you have a good clean burn. This is not always very easy in this area. Burning also provides quicker nutrient release, though the benefits of that could be debatable in this area too. However, we do not burn our stubble because our stock numbers are high and we chop our straw. We always try to have

complementary stock and cropping policies. Running ewes on the stubble in early winter is a great help in reducing winter feed requirements. The stubble paddocks are divided by an electric fence and the ewes are moved around with two or three-day shifts with hay being fed.

After ploughing, we do not touch our paddocks until we are ready to sow. The paddock is then worked down to a seed-bed by one pass with a Lelly Roterra. This operation is done either earlier in the day of drilling, or the previous day if the weather is settled. It takes as much time as paddock drilling so the extra operation does not hold up the drilling operation.

We do not like to work down a lot of ground before drilling because if it does rain, worked ground takes longer to dry again than ploughed ground. It might mean that another cultivation is necessary which means more expense and more soil compaction and structure break-down. If ploughing has been late, or there has been little frost action on the ploughing, it might need to be rolled before working. This season we sprayed pasture to burn it off before ploughing and this certainly reduced subsequent cultivation and weed problems.

The exception to ploughing is the oilseed rape stubble which is grubbed or surface-worked in July and then again in August. This is to prevent the burying of ungerminated seed which would remain dormant and prove to be a problem in the future. It is important that the stubble is grubbed fairly early, especially if stock have been on it, to allow aeration, further seed germination, and frost action. If the ground is left until spring and then grubbed in a drying wind clods will form.

Poa annua can also be a problem after oilseed rape, and if the subsequent crop is sown while the ground is still reasonably damp, severe competition will result. In this situation it would be advisable to spray the *Poa annua* with Paraquat before the crop emerges. Of course ploughing also removes *Poa* if you do not mind burying some seed. In some situations that might not be a problem.

Other cultivation techniques are used by farmers very successfully. We believe that this system is meeting our particular requirements. Crops can be put in rapidly when the ground conditions are right in spring, with a minimum number of tractor hours, and a good seed-bed is prepared. It is important that a good seed-bed is prepared to promote even germination and healthy plant development.

Ensure that your drill is sowing at the correct rate and that you can correctly calibrate it to sow the right amount of seed and fertiliser, this job is best done during the winter and not the day you decide to start drilling. Also keep your drilling speed down to below 9 km per hour, or less if ground conditions are too rough. There is no point in bouncing your coulters from one clod to the next and having large gaps in your rows. A walk over the paddock after emergence with a quadrat doing plant counts will soon give you a reasonable idea of how successful drilling was.

It is important that you sow enough seed to achieve an adequate plant population. Seed weight and germination will have an effect on the sowing rate needed. Always sow clean seed, do not sow seed that

has wild oats in it, you can never be too careful. Also, all seed should be treated with a recognised seed treatment.

Generally, with fertiliser and seed we sow about 25 kg P and 25–50 kg N depending on the crop's place in the rotation. If there is an adequate plant population (with wheat 300–350 plants per m²) and it is healthy, the next application is at the end of tillering (Growth stage 5) to help tiller survival and head development.

Last year most crops, except first crops, received about 57 kg N/ha in the form of urea. If any crops were thin, or part of the paddock was not healthy, about half of this application was made earlier during tillering.

What we will be trying in the coming season is a further application of N (about 25 kg/ha) at flag leaf emergence or later (Growth stage 9–10.5). This is intended to crop quality — we will not be expecting a yield increase from this application, but overseas research suggests that grain quality can be improved with this application. It will be interesting to see if we can achieve this result. I would like to see more research in this area because quality is proving to be the crucial factor in wheat production now.

In the past Southland has produced some of the best quality wheat in New Zealand. We are not the only district having problems with quality this year. The future of wheat production in Southland in particular is going to depend on us being able to again produce a quality product. Our basic wheat variety is Takahe with which we are quite happy. We use Tiritea in very high-fertility paddocks. It does give a better yield when well looked after, although it is more vulnerable to sprout damage. We have not yet grown Oroua, mainly because of its poorer yield and susceptibility to sprout damage.

Oats usually receive further N along with Cycocel to prevent lodging. This is applied between the second and third node stage of growth. We tend to apply N lightly to barley because we do not want any lodging with undersowing. Barley is usually sown with 40 kg P and 60 kg N with no further application given. We generally harvest a 5 t/ha crop and have a good sward of ryegrass/white clover established.

Oilseed rape receives 250 kg/ha of serpentine super through the drill to prevent germination injury. This year we broadcasted 87 kg/ha of N before drilling. The rape seemed to respond to that amount of N because we harvested 3 t/ha of dried seed. In the future, we might split this application as there was heavy rain after drilling and some of this N could have been leached. I have also been told that when drilling rape, the Blackmore tips on the coulters give a more even seed depth and thus a more even germination. This is something else we will be trying next year. The rape seed is given a seed treatment but also should be sown with an insecticide, such as Dysistron, to prevent springtail damage and, in warmer areas, aphid attack.

SPRAYING

All our spraying is done with our own 12 m CDA boom mounted on the frontend loader and fitted with ten heads at 1.2 m spacings. The twin spinner broadcaster we use for N application also spreads

to 12 m so the same wheel marks are used. We apply 60 litres/ha of mixture at the 250 μ droplet size. All our cereals, except undersown barley, were sprayed at the two true leaf stage last season and we were very pleased with the results. The crops did not have any weed competition at all. The fertiliser sown with the crop or applied later went solely to the crop. The disadvantage of this system is that paddocks with California thistles need to be sprayed at a later stage with MCPA.

One wheat paddock was sprayed for wild oats and results were limited. The CDA was not putting on sufficient water, and it was subsequently rogued three times to ensure that all the oats were removed. Doing ones own rust spraying can be a tremendous help in spotting that first wild oat plant and keeping on top of the problem.

The next spraying that the wheat crops receive is at Growth stage 5-6 when 100 g/ha of Penlate is applied to second and third wheat crops for eyespot, and 0.5-1 litre/ha of Cycocel is applied to all wheat crops. The rate depends on the crop. A 20%-application of a rust spray was applied as a precaution.

Three to four weeks later 100 g or millilitres of rust spray and 100 g of Benlate are applied. Tiritea is sprayed every three weeks, and Takahe every three and a half to four weeks; the last spraying last season was about the end of January. If the first rust spray with the Cycocel is not included because it is only really a bonus, last season the Takahe crops received two rust sprays and the Tiritea crops three.

If the weather next year is damp around flowering we will also spray Captafol at a light rate to control any glume blotch in the spraying at the first node stage and the one that goes on before flowering. We will drop any later application of Benlate because it has no effect on glume blotch.

When spraying with fungicides we are working on the principle of using reduced rates and a preventative spraying programme. This has resulted in very good control of yellow stripe rust at a very reasonable cost.

One does need to be careful that the spray boom is correctly calibrated and that ground speed is not too fast to avoid any boom flap. We apply 30 litres/ha of spray mixture with the 150 μ droplet size. Also if there is rain within three to four hours after spraying, the paddock will need to be sprayed again at the first opportunity.

HARVESTING

Most header drivers are aware of the different settings for different crops and conditions, and the need to keep the machine well-maintained and lubricated. If a paddock has not been sprayed for thistles for example, one cannot expect the header to make a perfect job because the concave and riddles soon become blocked. Hence, cereal husbandry also has a bearing on harvesting.

I believe that it is important that any one with a large amount of grain should have at least some type of storage because grain driers can soon become congested when the rush of harvest is underway. We have two sheds with bays in them which can have L-shaped shutters fitted in the front. This is a very economical type of grain storage

because the shed can also be used for fertiliser storage and other implements. A facility where one can store fertiliser and lime allows back-loading, and if a farmer is prepared to work in with his carrier, something in the order of a 25% saving can be made in cartage rates. For example, grain may be going to Invercargill or Bluff and fertiliser can be brought back.

As well as storage facilities, we have a lignite-fired Alvan Blanch grain drier set up which also dries a considerable amount of grain for other people.

SELLING OUR WHEAT

In the future it is hoped that a more effective system than the present Wheat Board can be developed to market our wheat. Obviously a producer board would act in growers' interests more effectively than the present board is able to do. The marketing of barley has come a long way in the last few years and it is hoped that with the challenges that face the wheat industry it too can adapt to the changes that will need to take place. The present loading facilities at Bluff will enhance the place of cereal growing in this region.

I have outlined the various stages of crop husbandry, illustrating the points with some of our own experience. Cereal growing in the last few years has been one of the main causes of stress to quite a few farmers and of course the symptoms are often manifest in irrational decisions and actions. Good planning and organising can help to achieve the right balance of work and rest, which is not always very easy with cereal growing. I believe it is always important to make one day a week a day of rest as it helps you to keep things in their proper perspective. If we can then follow the guidelines laid down here, be well prepared, and keep up with the work load, it goes a long way to relieving this stress problem and better decisions will result.

CONCLUSION

Cereal husbandry is as much an attitude or habit as any other farming practice. You need to be well prepared. Machinery must be kept in good order and operated in a good manner. Paddocks put in crops should be well drained, of a suitable contour, and well fenced. The farmer should have a crop rotation and stick to the principles that make up that rotation, although he should be prepared to be flexible within those principles. Poorer returning crops often enable you to grow a larger amount of higher returning crops. Gross margins should be looked at on a rotation basis, not on an individual crop basis.

Timeliness of operations is important. You need to learn to drop less important jobs when something more important needs doing eg., lamb tailing can wait while crops are sown and not the other way around.

Money spent on fertiliser and correct spraying is well worthwhile. Your crops will only yield as well as the limiting factor will let them, so don't miss anything out. Have the right machinery for your size of operation. Do not over capitalise and add to financial stress. Contractors are often a better proposition, especially if they also help the timeliness of operations.

Deer farming

Beginners guide to deer farming

K. Kelly, farmer, Gore

INTRODUCTION

New deer farmers should realise that the farming of deer is not new. The Chinese were farming deer well before the birth of Christ, and the Europeans, including the English, were certainly practising deer herd control and breeding management as far back as the Middle Ages. Interestingly enough, English literature records the medical properties of various parts of deer as early as 1576. In contrast with China and Europe, deer farming started in New Zealand in the late 1960's. By 1979, when I started, deer farming management techniques were already well established. Today, I recommend the following guidelines to all new deer farmers.

ESTABLISHMENT

Carefully assess the value of deer based on sheep and cattle industry criteria; then, assess what you will pay for deer at current market prices.

and develop the marketing strategies needed to establish, maintain, and protect your investment and cashflow. Remember that the final decision to become a deer farmer rests with you and if you are in doubt — don't!

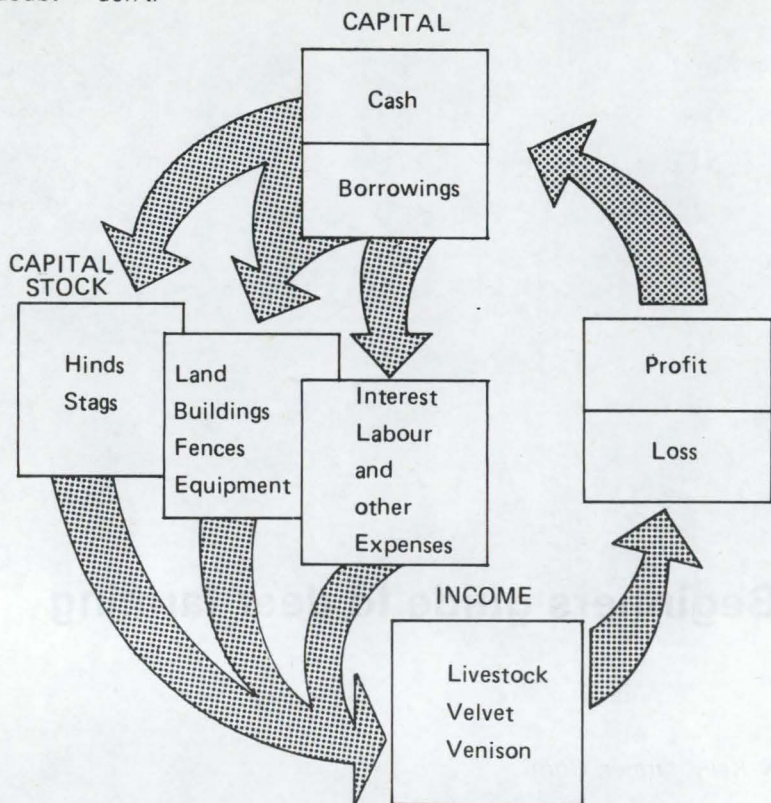


FIGURE 1: Factors to consider when entering deer farming.

Find a sympathetic stock firm manager and/or bank manager. Large sums of money are needed to purchase capital stock. It is questionable whether current prices for female stock can be justified on the traditional criteria used to value livestock. There is a speculative factor built into current market prices, but in the final analysis these prices reflect what people are prepared to pay for stock. If prices fall, as they might, farmers must have a good relationship with their financiers.

Register your deer unit with the Director-General of Forests by notifying your nearest Forest Service officer of your intention to run deer on your property. A new deer farmer will be asked to provide a legal description of the land to be farmed, its general location, its tenure, and if leasehold, the name or names of the owner of the land. You will also be asked to provide a description of the stages of development planned for the farm, the estimated maximum area, and

the number and species of deer to be held when the farm is developed to full capacity. No inspections or permit fee are required under the notification system.

Build yards based on proven design. Endeavour to build yards where neither humans nor animals are put at risk. Especially do not leave gaps when hinging doors. A three inch gap which allows legs to be caught in hinges can cost a new deer farmer more than the shed itself. Take my advice and the advice of your veterinarian and deer farming friends — do not leave these gaps.

Buy only TB-tested quality stock through reputable agents. When buying, remember the basic rules for selecting any livestock. Examine all deer carefully; check legs for old breaks, check mouths to see that the animals are as quoted and are neither undershot nor overshot, check general conformation and temperament. Dry hinds will sometimes be put in front of new deer farmers. Look for the telltale signs — better still, have an experienced deer farmer help you select your first herd. Avoid any animal which obviously does not like human company. They won't alter in a shed situation, and will be a continual threat to other deer and to the people who handle them.

Handle captured stock, preferably adult hinds only, after seeking advice from your veterinarian and experienced deer farmers. The risks involved when handling captured stock will outweigh any supposed advantages unless sound post-capture techniques are applied by the helicopter operator and the farmer concerned. On arrival on a farm, all newly captured deer should be treated with a long-acting antibiotic, and placed in a darkened shed for 24 hours. The initial mortality rate with captured stock can be high. Losses can be excessive with some captured animals and at some times of the year unless great care is taken.

Vaccinate all deer with 5/1 multi-purpose vaccine. Twice the rate of sheep vaccine is the recommended rate.

Do not buy hand-reared stags at any price. There are only two places for these animals — either the nearest game packing house or your home freezer. With age, these animals grow vicious and cannot be trusted, especially during the roar.

MANAGEMENT

Drench all hinds with a recommended drench in mid-March, mid-July, and mid-November. If a few animals do not appear to respond to treatment and appear to lose condition, draft these animals off and inject with IVOMEK rather than using an oral drench again.

Keep excess condition off hinds before fawning. Any departure from this recommendation will cause trouble at fawning, with a resultant increase in the death rate of hinds and fawns, and also the need to perform a higher percentage of caesarians than would normally be necessary.

Cull all rogue hinds and do likewise with dry/dry hinds. Both categories of animals have no place on a commercial deer farm, whether new or well established. Unfortunately their presence is still tolerated because deer fitting these descriptions do not appear in the stag-

dominated game packing houses. There have been no hinds killed at the Mossburn game packing house this year (7 Jun 1984).

Observe hinds carefully during fawning — at least every second day if possible. Watch for the same problems that occur with cows and ewes, and if you want to get the vet, then do so. I realise that this careful scrutiny can only apply in a farm situation.

If necessary, instruct your veterinarian to perform a caesarian.

Keep accurate calving records. This is best done at tagging time in early March by simply feeling the udder one can determine whether an animal is feeding a fawn or not. A word of caution — don't stand directly behind an animal when testing, but rather just a little behind and to the side. This is the only time a red deer hind will lash out with her hind legs. Wet dries can generally be recorded in a paddock situation a day or two after losing their fawns.

Stags

Only use superior animals for herd sires. Until now, some deer farmers have bought herd sires on questionable criteria. Velvet weights, body weights, and general herd performance details are now available from top breeders. Don't be in a hurry to buy but endeavour to make your initial selection whilst animals under offer are still growing their velvet in November. If you can't afford to buy a stag at \$3 000 plus sell a hind to help pay for it, or lease a top animal for the breeding season. Don't buy inferior animals to do the job.

After the first four to six weeks of mating, replace the mob sires with two or three fresh stags. Feed your stags extremely well in the post-rut period. Remember, all stags three years and above have lost between 15-25% of their pre-rut bodyweight during the March-April and early May period. Unless adequate feed is given to these animals, an unacceptably high death rate will occur.

Drench during mid-winter. All stags should be drenched at this time, or as soon after the rut as possible. However, do not drench for the sake of drenching. Put your personal safety before an immediate post-rut drench.

Be aware of the feed cycle of stags. Unlike most animals, including females of the same species, stags have a unique feed cycle (Fig. 2).

Use a veterinarian for velvetting. Unless distance precludes the availability of a vet, it is not a saving to do the job yourself. As a new deer farmer, it is impossible to match the skills of a veterinarian performing this task, and treating all serious stock health problems. Unless a new deer farmer has some experience with velvetting, an experienced deer farmer should be called in for a second opinion before a stag, or stags, are velvetted. New deer farmers tend to cut up to three weeks early, at the trez tine stage rather than at the royal stage. Study the various growth stages of velvet carefully. Keep accurate velvetting records. Providing a double ear tagging system is used, and the tag number of individual animals is placed with their velvet before weighing and recording, this job presents few problems.

Cull low-producing animals. Culling today on most established deer units is done immediately after the first crop of commercial velvet, at the two-year-old stage. A poor producer at this age will never change.

In our situation the first opportunity to cull was in 1981. At that stage, our best stag had produced over 3 kg of A grade velvet as a three-year-old, and our worst 0.6 kg of D grade at the same age.

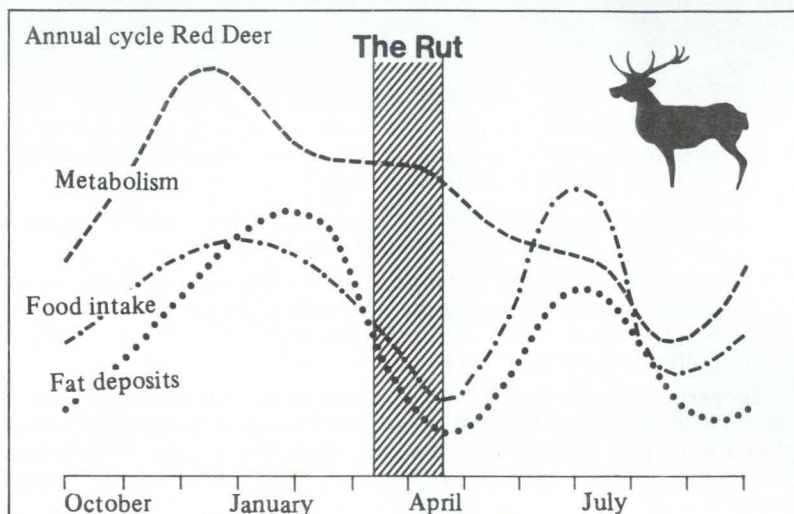


FIGURE 2: Annual cycle of the red deer stag from October to September in New Zealand.
(Source: New Zealand Farmer, March 8, 1984.)

Remove any injured stags from stag-only herds, especially during the rut. These velvetting stags are not batchelors by choice. Unless these injured animals are quickly removed the herd instinct, which is basically homosexual because of lack of option during the rut, will see the injured animal totally dominated and finally bullied to an early death. Much of the initial damage to animals is caused by second growth antler which, although short, is generally as sharp as a needle and is used with lethal effect in the shoulder and rib areas.

Fawns

— Don't touch or tag new fawns. Rejection can be a problem with hinds. If fawns and hinds are to be recorded, there will be other opportunities rather than immediately post-birth.

Don't leave large gaps under gates — newly born fawns will sometimes wander off like lambs.

Hand rear fawns only if necessary — fawns are not easy to rear, nor is it easy to tell if a fawn is mis-mothered. Never be in a hurry to take a fawn home for the children to rear, particularly a stag fawn. Fawns should be weaned between mid-March and August. There is still considerable debate on optimum weaning dates in all deer farming circles for a number of reasons. However, the consensus would argue

a weaning date about 20 March each year. Young fawns should be left on their mothers if management permits.

Drench your deer regularly between March and December, and vaccinate all fawn with multi-purpose 5/1 at tagging or weaning time.

STOCK HEALTH

Become familiar with the signs of Malignant Catarrhal Fever (MCF) and Yersiniosis. MCF comes in two forms:

- * A lingering death over several days, with some outward symptoms similar to Bovine Catarrhal Fever.
- * A sudden death with red mucus around the nostrils, and a scour from the anus showing quite a volume of blood. A much higher percentage of stags are lost with MCF than hinds. There is nothing you or your vet can do.

Generally, animals with Yersiniosis lose condition and then start to scour. This scour will be dark green and have a very pungent odour. If any animal is noticed with a scour, yard and isolate it, and treat immediately with LA Terramycin. These animals can be saved if treated early.

Buy and sell only TB-tested stock. Always check the origin of your stock. All deer farmers must take their responsibilities as regards TB control seriously. Isolate captured stock as a group until one month after capture, before TB testing. Before this time lag, it is impossible to get an accurate and valid TB test.

Isolate and treat any stock with pink eye. Use recommended drenches only for deer. Generally speaking, Panacur, Systamex, Synanthic, and Ivomec are the drenches to use. Make sure your veterinarian knows deer and deer diseases. Like all animals, deer react to people in various ways eg., they know when people are scared of them; equally, they do not like to be bullied. Most veterinarians today are well versed and skilled with deer handling techniques, and all diseases related to these animals. If your local veterinarian does not fit into this category, find another who does.

Never hesitate to call in a veterinarian. Until a new deer farmer is able to differentiate between the various diseases such as MCF and Yersiniosis, it is uneconomic to pretend an obvious problem does not exist. The problem does not go away with deer.

Damaged velvet will occur but if it is excessive you should check your management practices. If management is responsible, change the techniques being used. If the problem is animal related, cull the animal responsible.

Use a hard hat for all shed work. Many deer farmers today are still reluctant to wear a hard hat. It is compulsory for all staff working in my deer shed to wear these hats, and we have all been saved from injury or bruising at some time. Remember, red deer don't generally lash out with their back legs — they rear up and lash downwards with their front feet.

GENERAL ADVICE

Get as much general information on deer and deer farming as possible. The sources I would suggest are your veterinarian, experienced deer farmers, your MAF advisers, MAF Aglinks, the Deer Farmers' Association monthly bulletin 'Stagline' and quarterly magazine 'The Deer farmer'. For all matters regarding stock health, I would suggest a copy of 'Proceedings of a Deer Seminar for Veterinarians', Queenstown, February 1981, 'The farming of deer' and 'Deer farming in New Zealand' by David Yerex, and 'Gold on four feet' by Ronald Anderson, are three excellent general reference books.

Don't take personal risks when handling stock. Never take risks with stags at rutting time, or hand reared mature stags at any time. Don't rush your stock, but use dogs if necessary. Any undue haste, with young stock particularly, will see venison in the deep freeze and a financial loss to the farmer. Be firm with your stock, however, because if they have their way today, they'll try again tomorrow. Dogs adjust quickly to working deer and enjoy mustering the animals.

Don't starve your animals. Perhaps this statement is a little too obvious but when deer farms were being established, it was accepted that deer, particularly stags, needed little supplementary feeding over the winter months. This has proven to be a fallacy. Exercise care when introducing grain and nuts to stock. Deer are like kids with sweets — they will feed to excess given the choice and opportunity. When changing diets during the winter, watch for problems.

Aim to lose 1% of stock — expect to lose 3–4%. However, loss rates of up to 10% can take place in captured animals, depending on the type of stock and the month of capture.

Plant adequate shelter. Remember, there is little shelter derived from 12-gauge wire. If you are prepared to pay \$2 500 for an adult hind, then you should spend a modest amount each year on providing good shelter.

Expect a 90% fawning, it's lower, check your management. Fawning rates vary from farm to farm, and from season to season. Smaller deer units seem to be able to produce about 90%, while the larger units tend towards 85%. Sterile stags can be a problem, and for that reason I would suggest that fresh stags be introduced after the best sires have been used for a month. Just as fawning percentages can vary, so too can the sex rate within the overall percentage. Do not budget on having a 50–50 split each year. We had a 60% stag 40% hind ratio this year. A first year deer farmer in West Otago had 17 stag fawns from a total of 18 live fawns — 94% stag fawns.

Develop and protect your reputation as both purchaser and vendor. Be scrupulously honest at all times. At a time of high prices, new deer farmers should be alert to being ripped off. They should deal only with reputable agents, and be aware that boom prices bring changes in personality and business ethics.

CONCLUSION

I have not touched on the forward contracts which are part of the deer farming scene, nor have I touched on the importance of the

syndicate system of deer ownership. I have centred my remarks today on the red deer herd rather than hybrids or elk type animals, as I feel that most new deer farmers should purchase red deer initially, rather than hybrids or wapiti.

I feel that new and prospective deer farmers should remember that over the last five years, deer farming has undergone abrupt and sometimes traumatic changes. Values for velvet, for example, dropped in early 1980 and \$120 per pound to \$120 per kilogram for super A grade. These price changes were echoed by a drop in livestock values between September and October 1979 and March 1981, from \$3 500 to \$800 for MA hinds.

I recognise that venison prices now seem to be holding at about \$5/kg, and that values for female stock are back to near the 1979 levels. I also know that velvet prices again have a question mark over them.

I have endeavoured to discuss the sound establishment and management techniques necessary to survive in this new, dynamic, exciting, but sometimes volatile, industry. I have stressed the need to assess carefully the value of deer based on sheep and cattle industry criteria, and then to assess what you will pay for deer at current market prices. Having done that, new deer farmers must develop the marketing strategies needed to maintain and protect their investment and cashflow.

I have also stressed the need to find a sympathetic stock firm manager and/or bank manager. Current deer prices reflect a very substantial speculative input, and when these current prices for female stock recede, as they must, new and old deer farmers alike will have to be on good terms with their financiers.

New deer farmers must understand that the New Zealand deer farming fraternity is unique. As individuals, they are born optimists or this industry would not be where it is today. Being optimists, they know and accept that there are no Supplementary Minimum Payments available to those involved in the New Zealand deer industry.

Venison marketing and its potential

G. A. Thompson, General Manager, Fort Export Ltd, Christchurch

I have to admit to being optimistic about the future of venison marketing. In spite of this optimism, the somewhat euphoric state currently pervading the industry — particularly as manifested by the demand for live animals — is quite awe-inspiring. Certainly, deer farming ranks alongside its horticultural counterpart — kiwifruit — as a diversification option in agriculture. In areas such as the Bay of Plenty, the mix of both activities can be viewed side-by-side. However, in areas like Southland, where diversification options are more limited, deer farming provides an exciting and viable alternative to traditional livestock farming.

Interest in deer farming has undoubtedly been influenced by a failing confidence in sheep farming in particular. The prospect of farming an animal which is free of support prices is attractive to the independent-thinking New Zealand farmer.

WORLD DEER TRADE

In order to background what I perceive to be the main opportunities open to a growing New Zealand industry of venison exporting, it is necessary to first look at the patterns of world venison production and consumption.

Venison is produced, to a greater or lesser extent, in many countries. It is very difficult to put accurate figures on production and consumption in most of them for a number of reasons, not the least being the private hunting and home consumption factor.

West Germany is the main market for game meats. It is the only country in which production and consumption have been quantified. It has an annual consumption, according to official statistics, of around 60 000 t. To put that figure in perspective, it is slightly more than the total of lamb, mutton, and goat meat consumed in that country, but only 2% of the total amount of pork consumed, and about 4% of beef consumed. The 60 000 t of game consumption does not count the substantial quantity of game which is hunted and consumed privately, a figure which has never to my knowledge been accurately established.

Of the 60 000 t, only about 18 000 t are venison. Half of the 18 000 t are imported from Eastern Europe, Spain, and New Zealand. Other game animals consumed include buffalo, springbok, antelope, and hare. This illustrates that West Germans love game meat, and they prefer venison from red deer. Thus, the on-going potential for supplying venison to West Germany is very good.

In other countries, privately hunted venison represents by far the most significant component of venison production. One could conclude from this that there is a vast untapped potential for venison market in countries where there is a 'top end' of the market that is prepared to spend more on premium quality food items.

THE ADVENT OF DEER FARMING IN NEW ZEALAND

Deer farming really started in New Zealand in the mid-seventies after a few initial pilot deer farming projects suggested the potential of such ventures. Cattle Services Ltd., which I am also involved in, started its deer farming operation on Coringa Park at Ashburton in 1976 and we were issued with license number 35. As late as 1976, we were only the thirty-fifth operation to seek a license.

Current prices bear little relationship to venison or velvet productivity levels because of the pressure on the live market. There are now about 300 000 deer behind fences in New Zealand, and an increasing number of these are stags. The reason for this is that so few stags have been slaughtered to date.

During the 1982-83 season, about 10 000 deer were slaughtered in deer slaughter plants nationally. In the current season, only 9 000 have been slaughtered, including 1 000 fallow deer. This must concern all involved in the deer industry. The latest developments in the velvet market suggest that there is suddenly a world surplus of velvet and it is likely that we can expect the demand for velvet to return to previous levels for the next two or three years.

Our experience has shown that only 10-15% of all stags born are good velvet producers. Therefore, the danger of this continual build-up of stags is that once the full effect of the nose-dive in the velvet market is realised, the venison market will be saturated. To some extent, the industry is sitting on a time-bomb.

MARKETING ACHIEVEMENTS TO DATE

There are a number of game exporters who are doing an excellent job in the marketplace, developing high-priced restaurant, supermarket, and institutional outlets in countries such as Australia, Japan, south-east Asian countries, the United States, Europe, and even the United Kingdom. In these countries some fresh airfreighting into supermarkets takes place. These results are extremely encouraging and there has been little evidence so far of the problems we have seen in the marketing of other products out of New Zealand, namely exporters competing with one another on price in offshore markets.

Generally, exporters are taking a responsible attitude towards market development and pricing. This has been achieved partly by a high level of communication between the exporters at home. Our company is confident that this situation will continue into the future. However, in-depth market development has been extremely difficult because of a shortage of product. The kill figures I referred to earlier — about 600 or 700 t — spread thinly between a dozen or more exporters. Market development must be approached with great care to prevent exporters from finding themselves unable to supply a particular market. An exporter can work exhaustively for many months to get his foot in the office door of a purchasing executive for a supermarket chain. One small order not supplied is sufficient to ensure that that exporter will have to spend years, not months, to get back into that executive's office a second time.

There has also been some good work done on the local market. In the Christchurch area we have been involved in the development of markets through the supermarket and restaurant trades. In supermarkets, we have staged in-store cooking demonstrations, supported by posters etc., offered samples to consumers, and provided them with recipe pamphlets. This approach is essential for the development of any venison market because venison must be prepared and cooked properly. The one effective way of ensuring that a consumer does *not* come back for more venison is to allow the product to be prepared incorrectly. These comments apply to markets everywhere, both international and local.

Venison is a word unknown in many countries. Where it is known merely as 'deer meat', it will be treated and cooked as just another meat and markets will be lost forever.

QUALITY

A significant part of my optimism regarding the future of New Zealand venison on the international market relates to qualities inherent in the product itself — qualities which make it a unique article with equally

unique advantages. Furthermore, they are qualities which can be usefully exploited in existing markets, like West Germany, and new markets where the product is almost totally unknown.

Firstly, venison meets the modern trend of the market which demands fatless meat. Venison is a healthy meat, high in protein and ideal for weight-watchers. Low fat content is the prime promotional advantage of venison in all markets.

Secondly, because it is cooked differently from other meats, and because it is a game meat, it is a distinct taste alternative. The affluent sectors of markets worldwide are prepared to pay a premium for such alternatives. Yet, because venison is low in fat it represents better value for money — the purchaser gets more red meat for his or her money.

Thirdly, it is game. The importance placed on that description by West German culture is widely appreciated. We believe there is scope to capitalise on the mystical connotations of the word 'game' in other markets also.

Some criticism is aimed at the potential problems of offering a farmed animal as a game meat. While farming deer results in a slight reduction in tanginess of the product, there is the distinct benefit of the farmed animal being able to offer better qualities of tenderness and hence acceptability.

Nevertheless tenderness is something that cannot be taken for granted. The area of tenderising farmed venison requires substantial research. Most DSPs now AC venison carcasses. The traditional and arguably more effective method — ageing — is expensive because of the investment in extra chiller capacity required. However, we suspect that venison responds to ageing far more than other meats. Invermay Research Station is doing some work in collaboration with MIRINZ at Ruakura in two specific areas:

- * The shelf life of chilled venison, and
- * The effects of the use of AC on venison.

This will provide valuable information which we expect to be released in the next two months or so.

Yet another positive advantage enjoyed by venison in the international market is that being game, it encounters low tariff barriers or in many instances, no tariff barriers. It is essential that we make every effort to ensure that the game classification is maintained.

THE QUESTION OF FAT

The importance of keeping fat out of venison carcasses cannot be over-emphasised. In the last season, many lines of farmed deer were grading up to 50% over-fat. I am aware that there has been some debate over what is an over-fat deer but irrespective of that, over-fatness by any definition in deer is anathema. It is difficult for an exporter to explain to an overseas client on a visit to a DSP that the fatty farmed deer he is watching being cut and packed is the exception.

The following has been the ruling venison schedule since March of this year:

Prime grades	\$4.60/kg
70.5 kg and above	
50.5-70 kg	\$4.90/kg
Up to and including 50 kg	\$4.60/kg
Overfat	\$3.60/kg
Manufacturing	\$2.00/kg

The problem of fatness in deer has been well discussed over the last couple of years and I believe farmers are attempting to tackle it in their management practices. There is an ultimate solution to the problem but it is, unfortunately, fraught with difficulties for producers. The slaughter of farmed deer must be restricted to the winter months when fat deposited before the roar has been worked off. The main drawback from the farmer's point-of-view is that during this period, carcass weights are down and it is physiologically difficult to recoup lost weight in mature stags in the winter months.

However, there is another advantage of a winter kill policy for the marketing sector. The kill would more effectively tie in with the demand curve for game meats. The traditional hunting period in the Northern Hemisphere is the autumn — our spring. The big demand months in the traditional game consumption areas are October-December. Our current killing patterns result in product being available for the market between March and August when demand in those traditional markets is at the low point of its cycle. Venison consumption declines dramatically in the Northern summer. When volumes start to increase, exporters face the problem of having to store product for up to six months. This is not a problem yet because low volumes are being killed, but it could be a real issue in the near future.

A winter kill would solve two very serious problems. I mention it here in the hope that farmers will give the matter some consideration.

MARKET PROSPECTS

I believe that the market prospects for venison are good provided that market development is handled by competent, professional, marketing people. Marketing opportunities exist in almost any country where there is a sector of consumers with strong buying power. Such work would always have to be accompanied by the type of marketplace promotional activities mentioned earlier. Market development personnel will also have to ensure that venison retains its image as a premium product.

There are very good prospects for the air-freighting of fresh chilled product to Pacific rim countries. Fort Export has recently participated in the Food and Hotel Asia Trade Fair in Singapore where strong interest was expressed. We consider those markets as having primarily fresh air-freight potential because of the high quality connotations which always accompany the presentation of a product in the fresh state.

We also feel it will be necessary for the industry to make provision for Halal kill in at least some DSPs because the Moslem world now

is becoming more demanding in this respect. Indeed, Malaysia and Indonesia have just recently announced that they will not accept any meat which is not Halal slaughtered. We must have Halal facilities before we can sell any venison into either of those two countries — and there is good demand for venison in both.

CAUTIONS

The industry is marketing a product which is, when all is said and done, a red meat. Therefore, it will inevitably find itself in competition with other red meats, and white meats. We would be foolish to proceed on the assumption that venison will be immune to the market pressures which have given red meat such a rocky ride in the past decade. The formulation of an industry marketing plan is, therefore, of great importance. This involved, in the short term, ensuring that venison retains its high value slot in the marketplace during the current low volume period and that it does not slip into the realm of the commodity trader.

One could say that while volumes are low, this should not be too difficult. The situation is more complicated though because the nature of many markets is such that large volumes of product are required to implement a comprehensive market development programme. We can only handle this problem if the volume growth is steady, predictable, and without violent fluctuation. This explains my grave concern about the current build-up of live stag numbers.

The Game Industry Board is now in operation and has made an encouraging start. It has started to put together the beginnings of a marketing plan and will generally keep a watching brief on developments. The industry must be prepared to learn from the problems being encountered by the more traditional meat exporting industry and I am confident that the board is moving positively in that direction.

CONCLUSION

To sum up, venison farmed in New Zealand is well-placed for success on local and international markets. Its low fat content, high ratio of red meat per kilogram, mystical connotations of 'game', tenderness, capacity to delight sophisticated palates, and partial immunity to trade barriers give it an inventory of marketing and promotional attributes enjoyed by few other New Zealand products. In contrast to the rest of the meat industry, the venison production also has, in West Germany, a fall-back market that has considerable potential for expansion.

I believe these factors add up to an opportunity without parallel for pastoral farmers in New Zealand. However, producers must accept that success does not come without effort. The days when New Zealand could invite buyers from around the world to come and collect its product are over. Farmers, for their part, must take every possible step to ensure they are turning out a product of maximum quality. That means eliminating fat from the carcass.

Marketing people have a vast amount of market development work to do. That work must involve both planning at home and a significant

amount overseas. It is essential that these tasks be carried out by skilled, experienced personnel who must have the backing of the entire industry.

We have the necessary people. We have the product. All we require for success of New Zealand venison on local and international markets is the will to work together — I believe there is every indication that we have that too.

The economics of entering deer farming

G. A. G. Frengley, Reader, Lincoln College

When sheep farm profits fall, farmers are forced to review means of maintaining their incomes apart from intensifying their traditional management practices. One possibility is deer farming, which has clearly had its suitability as a pastoral option demonstrated. Recently, deer farm profits have been very high but the high prices for stock which have given rise to these profits have discouraged many investors. Current problems with investment finance, and the possibility that prices could fall with a resultant capital loss, are also worrying. Furthermore, a fall in livestock or deer product prices will reduce returns to any capital invested before the price fall.

Thus, farmers who are contemplating an investment in deer farming are faced with three specific financial problems:

- * Obtaining sufficient finance to get started.
- * Risk of capital loss.
- * Risk of a fall in the return on capital.

The current high prices for stock result from the continuing demand for stock which exceeds the limited supply and forces up the price.

We have little knowledge of the volatility of this relationship. However, the present high demand for stock results more from investors expectations than from future export price reality. The opportunity to write-off a portion of the original capital investment under current taxation law is also appealing. Clearly the industry will be very sensitive to good or bad news in the export market.

These matters create conditions similar to those affecting high flyers in the share market where prices are governed by taxation offset and optimistic future price expectations. It is risky.

The high prices also create a financing crunch for would-be investors. In the case study which follows, a proposal was made to run deer on a 192 ha Mid-Canterbury irrigated farm. The farm carried stud sheep and the deer were to be integrated into the present management. The fixtures cost, for ring-fencing the boundary, sufficient internal deer proofing, and the yards, amounts to \$108 000. Stocking the property with 400 hinds and eight stags adds \$1.04 million. The initial capital input required was nearly \$1.15 million. Certainly the investment could have been scaled down and the diseconomics reducing the return on the capital invested would not have been great, however the point is the cost of establishing a moderately sized deer farm is more than \$1 million and few investors have that sort of money available.

	Total	Farmer cost	Syndicate cost
Fencing and yards	108,000	108 000	
Hinds, 400×\$2 500	1 000 000		1 000 000
Stags, 8×\$5 000	40 000		40 000
Capital Required	\$1 148 000	\$108 000	\$1 040 000

TABLE 1: Capital cost of a moderately sized deer farm.

Clearly, off-farm capital is needed to commence deer farming. There are two sources: either borrow against your equity in your farm, or attract outside investors by syndicating the ownership of the deer. Owning your deer will give the highest profits, but if you can't get sufficient finance you will make more money by syndicating the stock you need. Syndicating the ownership of the stock is the most realistic way of overcoming the initial financing problem. Outside investors own the stock and the income is shared about 50-50 between the farmer and the syndicate. There are no standard arrangements but generally the farmer bears most of the farm costs including grazing, management, and the displaced sheep income.

Having established a way to overcome the financing problem we must now look at the risk. The principal risk relates to the potential loss of initial capital. Current taxation provisions make it possible to reduce the risk of the investment in deer. If the hinds are written down from the \$2 500 purchase price to \$500 book value, the book loss of \$2 000 may be offset by taxation recovery. At a 60% marginal tax rate the tax refund on this book loss is \$1 200. The real cost of the hind

to this investor is therefore \$1 300, not \$2 500. At lower marginal tax rates the refund falls, and if there is no tax recovery the real cost is the price paid — \$2 500. The taxation offset thus works efficiently as a risk buffer for the initial investment.

For a farmer to be able to take full advantage of the taxation write-down in one year, in our example his taxable income for that year must exceed \$840 000. Even if the write-down is spread over five years, his taxable income must exceed \$160 000 per year and some of the risk mitigation will be lost. Happily, by syndicating the deer the farmer can almost completely remove the risk of losing initial investment capital. The risk is taken by the syndicate members who may write off up to \$10 000 per year against other income.

At the present limit of 20 members per syndicate and in the absence of special partnership provisions, you would need two syndicates with a two year taxation offset on our example farm, or four syndicates if the stock were to be written down in one year. There are several possibilities.

Thus, to get started in deer farming farmers have the option to go alone and probably quite slowly, or to use outside finance by syndicating the ownership of the stock. This case study example enables us to examine closely the profitability of some of these options, and establish some general principles. Table 2 describes the assumptions relating to prices and production used in the analysis which follows.

	Year 1	Year 2	Year 3	Year 4	Settled state
Prices					
W. hinds — sale	1 000	800	700	700	700
Hinds — purch.	2 500				
— sale		1 200	1 000	1 000	1 000
W. Stags	150	150	150	150	150
Stags — purch.	5 000				
— sale	300	300	300	300	300
Velvet (\$/kg)	86	86	86	86	86
Fencing	Boundary \$6/metre erected Internal \$3 million erected				
Production					
Calving	0.8	0.85	0.85	0.85	0.9
Velvet	1 kg at Year 2, thereafter 0.4 kg increase per year Average 2.6 kg				
Deaths	4% all stock, stag life 12 years				

TABLE 2: Deer development assumptions.

The assumptions used may be arguable but our present knowledge suggests that they are reasonable.

Table 3 shows the income generated by the investment in 400 hinds, and the division between the farmer and the syndicate. In the example, health costs are split 50–50 and from Year four stag replacements are

	Year 1		Year 2	Year 3	Year 4
	No.	SU	\$		
Hinds	400	(800)	(2 500) 1 million (5 000)		
Stags	8	(24)	40 000		
	408	824			
Calving		0.8			
Income	No.	Price	\$		
Weaner hinds	100×	1 000	100 000		
Weaner stags	160×	150	24 000		
Hinds			-		
Costs			124 000		
Health and vet					
\$18/head					
Feed					
General			7 350		
Net profit			116 650	139 750	139 150
Syndicate share			58 320	69 875	69 575
Farmer share			58 320	69 875	69 750
				73 825	

TABLE 3: Profits generated by syndicated hinds.

bought by the syndicate. Sixty replacement hinds are kept each year and culling commences in Year 2. The income to the syndicate and the farmer becomes stable at about \$70 000 each from Year 4.

If the farmer chooses to retain weaner stags to develop a 200 stag herd of his own, his annual income pattern after allowing for all development costs for both hinds and stags is shown in Table 4.

	Year 1	Year 2	Year 3	Year 4	Settled
Costs					
Stags	-	24 000	6 750	6 750	2 700
Development	52 140	31 680	25 080	-	-
Management	12 000	15 360	18 370	18 370	18 370
Income displaced	8 000	15 000	25 000	25 000	25 000
Total Costs	72 140	86 040	75 200	50 120	46 030
Income					
Stags	-	-	-	11 100	3 300
Velvet	-	-	10 850	19 390	38 080
Syndicate (50:50 share)	58 320	69 875	69 575	73 825	68 825
Total Income	58 320	69 875	80 425	104 315	110 205
Annual net profit	-13 820	-16 155	5 225	54 195	64 175

TABLE 4: Farmer's annual cash profit loss (own stags, syndicated hinds).

It is not possible to give all the details relating to Table 4; however, the main features are clear. The annual trading result shows that small losses are incurred in the first and second years and that profits are generated from the third year and eventually settle around \$64 000. This is not a cash flow. Peak debt of \$86 000 is reached in the autumn of Year two and in the following year it peaks at \$85 000. The point is that the entire investment, which approaches \$1.25 million can be financed by farmers with a two year loan of \$30 000 and seasonal finance of \$56 000 for three years when the hinds are syndicated. Without syndication most farmers would not be able to find about \$1.4 million.

So far we have proven that the proposal can be financed and that the financial risks can be offset by taxation recovery. We must now assess the profitability of the investment. Firstly, how profitable is the arrangement for the syndicate members? This is shown in Table 5.

Tax rate (%)	Cost (\$ million)	Return on investment (%)
0	1.04	6.5
35	0.71	9.5
45	0.6	11.5
55	0.5	13.7
65	0.38	17.6

TABLE 5: Profitability of investing in syndicated hinds.

At the higher tax rates the return is just sufficient to offset the degree of risk in the investment. At the lower tax rates, it would certainly not interest me.

The farmer is somewhat better off than the syndicate members in our example. (Table 6).

	Zero Tax	65% Tax
Fixed investment	108 900	
Stags (cost)	30 750	
Peak debt	86 000	
Return on investment		
Syndicated hinds	65%	23%
Stags alone	21%	7%
Stags and hinds	40%	14%

TABLE 6: Profitability of deer development to the farmer.

At high tax rates the farmer's return falls substantially. The syndicated hinds are extremely profitable but because of the delay before velvet production rises, the stags are less so. In particular, the profitability

of the venture is dependent on the accuracy of the assumptions given in Table 2, especially the assumptions about future prices.

There is no doubt that the venture is risky. Even if the prices fall below the projections used here, the investment will still generate profits because the operating costs are very low. In view of the returns and the share of risks, perhaps the usual 50-50 agreement could be 40-60 to improve the syndicate members lot.

Overall however, the analysis shows that at current prices farmers can move into deer farming with a relatively small investment, and that by careful financing of the investment, the risk can be significantly reduced. It is up to you to judge whether or not you could accept that risk if you wish to start deer farming.

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Some social aspects

Marriage — a tax revolution

R. Richardson, M. P. Selwyn

The 1983 Budget devised the best material incentive yet to get and stay married. With that Budget came at last the recognition that marriage is a partnership of equals, and that any arrangement to achieve an equal stake in the assets of the spouses should not attract estate, gift, or stamp duty. The impact of this tax revolution has yet to be widely appreciated by the public. As the new duty rates are now operative it is important that married people understand and capitalise on the new tax regime.

1983 was truly a taxpayer's year (as opposed to a taxman's year) for those who have assets of a human (ie., a legal spouse) and material kind. The offer made by the taxman to forego revenue is an offer that married couples should not refuse.

ORIGINS OF REFORM

The origin of this tax revolution lies in the philosophy of the Matrimonial Property Act 1976, that marriage is a partnership of equals. As each spouse is regarded as making an equal contribution to the

marriage partnership, it follows that each spouse has an *entitlement* to the assets of the marriage. Under the Act that entitlement is merely a potential one — a potential that is generally only realised on the breakdown of a marriage. This lopsided state of affairs led many people, including myself, to campaign against the anomaly of legislation that allowed spouses at war to achieve an equal stake in their matrimonial assets free from duty, yet spouses at peace were required to pay a high price in estate and stamp duty to achieve the same objective. I railed against this anomaly in my Maiden Speech to the House in 1982 and argued the compelling case for reform in the following terms — 'Farming is generally a family effort and those of us responsible for policy formation should be sensitive to the part that the family plays in the agricultural scene. It is my assessment that our revenue laws and practices have for too long given scant recognition to family involvement not just in farming but in all enterprises. In particular, it is quite scandalous that we should allow the partners on the breakdown of a marriage to share in the assets free of duty, yet clobber a happily married couple with gift and stamp duty if they seek to achieve the same result. I will work for the recognition by our revenue law that all transactions between family partners should be free from such duties.' I had only to wait until the presentation of the Budget the following year for the merits of that case to be accepted, and for the substantial tax revolution to occur.

FEATURES OF REFORM

- * Spouses have the opportunity to split their assets evenly without duty being levied.
- * A splitting of assets will also create the opportunity to split income and so reduce the level of income tax payable.
- * Splitting of assets may occur in two ways:
 - (a) Court Orders
 - a Court Order when a marriage breaks down;
 - a Court Order transferring property between partners in a continuing marriage (known as a Section 25 Order);
 - a Court Order transferring property after the death of one partner (under the Matrimonial Property Act 1963).
 - (b) Matrimonial Property Agreements (known as a Section 21 Agreement)

Marriage partners are free to deal with all, or any, of their assets, class them as matrimonial property, and make an agreement splitting ownership evenly and free from any duties.

The key requirements of a Section 21 agreement are:

 - the agreement must be in writing;
 - each party must have independent legal advice before signing;
 - signatures of the parties must be witnessed by a solicitor who must certify that the parties understand the implications of their agreement.

WORTH OF THE REFORM

The worth of the reform can best be illustrated by taking a typical farming example — typical in the sense that the couple are paper rich and income poor!

Husband		Wife	
Farm	\$600 000	Bank A/c	\$15 000
Shares	\$ 20 000		
Bank A/c	\$ 10 000		

The Section 21 agreement between the spouses declares the farm and shares to be matrimonial property to be held in equal proportions, and the respective bank accounts to remain separate property — that is property not liable to be shared. The result is:

Husband			Wife		
Bank A/c	\$10 000	Separate property	Bank A/c	\$15 000	Separate property
½ Farm	\$300 000	Matrimonial property	½ Farm	\$300 000	Matrimonial property
½ Shares	\$10 000		½ Shares	\$10 000	

Gift duty position

Pre-budget, a gift to the wife of \$310 000 would have incurred on the new 1 April 1984 scales duty to the tune of \$42 850. Post-budget, no gift duty is payable.

Estate duty position

Pre-budget, if a couple had left things as they were, \$450 000 of the estate would be free from estate duty; that would have left \$180 000 of assets subject to duty at 40% which totals \$72 000 of estate duty payable. Post-budget, the couple will each be able to transmit \$450 000 to the next generation, free from duty. In other words, spouses will now be able to gain access to a combined estate duty exemption of \$900 000. Put another way the legislation gives spouses an escape route from the \$180 000 of estate duty that would have been imposed on that second amount of \$450 000 of assets.

Effective abolition of estate duty

For most couples with assets, a \$900 000 estate duty exemption means a virtual abolition of estate duty. I have always contended that estate duty is a thoroughly disreputable tax, as unmanageable as death duty. The 1983 Budget removes that scourge for most couples. I cannot think of a more worthwhile reform, particularly for the farming community.

AGENDA FOR ACTION

It now falls on the shoulders of married partners and their professional advisers to ensure that steps are taken to reap the benefit of this reform. Beware those who do nothing: no matrimonial property agreement — no relief. I advise every marriage partnership interested in avoiding the scourge of estate duties to have drawn up, without delay, a matrimonial property agreement.

Marriage partners may experience some resistance from their professional advisers whether they be lawyers or accountants. That resistance will largely be the result of ignorance (I hope not prejudice). From my electorate work I have detected a failure in some professional quarters to appreciate that a tax revolution has occurred, and that the social policy behind the reform means that the Revenue will now willingly (and indeed legally) forego tax and duty.

The accountants are to be congratulated for the active steps they have taken to overcome the information gap to which I refer. Last week, the New Zealand Society of Accountants concluded a Continuing Education Series entitled 'A review of the Matrimonial Property Act and estate and planning implications'. That seminar series was conducted in 17 centres throughout New Zealand over a six-week period. The two seminar contributors wondered out loud why no proper publicity had been given to the reforms which explains this article.

UNFINISHED BUSINESS

We must extend the matrimonial property regime and its tax advantages to those marriages that have stood the test of time and terminate only on the death of one partner. It is a travesty that those who die without making a matrimonial property agreement generally incur estate duty when, by their Will, they simply seek to achieve the same result as could have occurred had they made a matrimonial property agreement while they were both alive. Surviving spouses in these 'do nothing' circumstances — and I lament the fact that there will be many of them — are left either to try to bring themselves under the Matrimonial Property Act 1963 or to face the devastation of estate duties. That is not justice. The next crusade is launched to extend the principles of the Matrimonial Property Act to the death situation.

This article has concentrated on a reform of obvious benefit to couples with assets. Many couples however, do not earn their living from assets but from their earnings as an employee. For those families on wages or salary, an obvious logical extension of the Budget's reforms involves looking at the opportunity for income-splitting. The worth of income-splitting was explored by the McCaw Committee on Tax Reform and I am sure we have not heard the last of this issue.

The role of 'Women in Agriculture'

J. Simpson, Advisory Committee on Women's Affairs

Jenny Simpson projected herself 50 years into the future and from the year 2034 she reviews the aims of the recently established 'Women in Agriculture' Organisation. We get a glimpse of the status of rural women in the future and their attitudes to the women of 1984.

As I came through the countryside today I was impressed with its beauty, the hundreds of hectares of flowers being cultivated resembling a patchwork quilt. I have had a stimulating stay in Wellington, attending the conference on 'Women in Agriculture'. After two weeks of an intense round of meetings, it's good to be 'home'. I want to share with you some of my experiences.

As we shot across Cook Strait I chatted to a young woman who told me that she too had been to the 'Women in Agriculture' Conference and how proud she was to hear tributes being paid to her grandmother. Her grandmother's concern for rural women and her untiring efforts to make them aware of their part in the family were mentioned. We wished that we'd had more time to talk about our older folk but it

was over all too soon — the monorail and Gore for me, and west to Greymouth in her auto-jiro for my companion.

Because we were celebrating 50 years of the Organisation of 'Women in Agriculture' we looked back, although we could have been forgiven for thinking that in some areas time had stood still. One person remarked that she would have liked to have been young when 'those two old ladies in the front row were treading the boards'! There they were — old Mrs Glendining and Mrs Simpson — demanding to know our achievements and input. 'Input' threw us a bit — we explained 'It's not a word we use these days, it's a bit old-fashioned'.

The results of this fortnight's analysis left us with very mixed feelings. The rewarding moments were in the recognition that the basic concepts of education in practical and political skills continued to be the motivating force of the Organisation. We smiled when we read the reports of 50 years ago when the 1984 programmes were geared to teaching women the safety aspects of using a chainsaw, driving a tractor, or riding a farm bike. These skills were seen as important then because they were an attempt to keep abreast with modern technology. This exposure to practical situations, we agreed, had played a major part in our ability to master the advantages in technology which we enjoy today in the year 2034. The need for political awareness at national and local levels and the skills women in these areas require were recognised as a major part of the Organisation's function 50 years ago.

In 1984 when they first wrote of these aims, the Advisory Committee on Women's Affairs was aware that over 50% of the population were women, and that with education and application it would be feasible to expect a steady rise in women participating in decision-making.

The concern for the status of women in 1984 covered a wide area. The Advisory Committee on Women's Affairs provided the umbrella from which the aims of 'Women in Agriculture' were launched. These aims were:

- * To increase public awareness of the existence of women in agriculture and agriculture-related industries. This involves:
 - making the women who are already working in agriculture more visible. This was done through the then limited media of television and radio.
 - preparing newspaper and magazine articles.
 - illustrations of women as well as men in school text books, and avoiding the use of language which excludes women, eg., 'Farmer and his family' where 'Farmers and their families' or 'Farming Families' would be more suitable and accurate. Displays of informative material used to promote and illustrate agricultural or working people should also use language that does not exclude women.
 - the use of women speakers and instructors at schools and training institutions to encourage girls and women to make informed decisions about future job options.
- * To influence attitudes and policies in order to ensure that women have equality and access to employment and general participation in the agricultural sector. This involves:

- giving women an opportunity to define their own needs.
- encouraging training opportunities for women who need to acquire new skills.
- drawing attention to areas where women are discriminated against, not only in the work force but in areas of law and finance.
- encouraging women to participate in agricultural decision-making, on and off the farm.
- working towards having our aims acknowledged in the policy of all educational agricultural and decision-making bodies.

Voices from across the Tasman joined in with other women. Lynne Chatterlow from Lyndock in South Australia was a professional agriculturist with a background in state government and media. She was an agricultural advisor to governments both Australian and overseas. Her writings were published in international journals. In one of her papers she quotes a landowner in that colony advising his brother in the year 1851 'A wife, if a good one, is a cheap stock, and may be a great saving where a man has to manage all'.

One hundred and twenty-nine years later, in 1980, she had heard a farm management consultant tell a group of male and female farmers that of the ten assets most needed by a farmer, Number nine was a wife!!

Lynne wrote of the resentment women felt regarding their place in agriculture. She spoke of that much valued unit — the 'Family Farm'. Without women there would be *no* family farm. It is women who have provided the vital component that makes the family farm possible. Women do *all* the work of nurturing, feeding, and servicing that family, on top of which they are involved in the physical procedures of farm management. Lynne was concerned that women were not involved in decision-making; were excluded from effective levels of their local farmer organisations, and the right to positions at the very top of the political tree. However, there were no legal restrictions preventing women from reaching these positions.

Women were heavily constrained by community pressure. They were not even 'allowed' to ask questions at public meetings about matters that vitally affected their lives and function.

Thank goodness we are no longer intimidated. Our voices are heard, our contributions recognised, we are able to exercise financial control. No more for us the indignity that some women suffered by never having access to their own money or having their value to a partnership commensurate with the amount of tax that could be avoided.

We discussed at the Conference the availability of childcare facilities. It was felt that all areas were adequately covered, but we should look towards providing more mobile units to quickly reach stress areas. It was recognised that this amenity played a major part in our social progress. The parenting role is enhanced, we were told, when people voluntarily availed themselves of this support facility.

In the education workshops decentralisation was once again a major topic. It was felt that we had gone as steadily as was possible in this area. The 'education units' which were once called 'Country School' extend a close network of learning. The 20 air bases throughout the

South Island were sufficient to enable students to reach specialised education.

The Political Studies workshop never lacked motivation. Feelings ran high as the discussion ranged over local to international concerns.

The growing numbers of women in decision-making areas was recognised, but criticism was directed at the lack of motivation in initiating change. It was just not enough to have women there, they must be a special breed. Women who are prepared to *lead* and tackle the controversial issues and are strong enough to withstand the backlash are required. Rural women have values and concerns regarding the environment that must not be ignored.

Fifty years ago, in 1984, women fought to keep the nuclear threat at bay. Today, equally dedicated women must ensure that our water supply is safe-guarded.

As we summarised our deliberations there was a feeling that we had not done justice to what was put in place for us 50 years ago.

'Women in Agriculture' today has attained much that was recognised then as a consequence of the Organisation's growth.

The Matrimonial Properties Act was a valuable legacy. The Rape Law Reform was a concern for every one of us.

The quality of life for rural women was a motivating factor in their work. This is where we felt we had let them down somewhat. We decided we were becoming complacent. We must avoid the folly of falling into this trap. We closed the Conference voicing our resolve to uphold the ideas made 50 years ago by 'Women in Agriculture' — the role of women is a valuable and necessary part in the future.

Stress — the inevitable companion

D. Fergus, Family Counsellor, Christchurch, formerly of Gore

With so much written today about stress and its management, it is difficult to know which framework to use when considering this subject. While everyone knows well what it is like to be stressed, it is not quite as easy to talk about it simply. A definition helps, stress has been described as 'any change that an organism is subjected to and consequently has to adjust to'. Stress levels are present all the time. The level of stress at which any person functions most effectively is known as the 'optimum stress level'. Above this point, performance across a whole range of functioning is likely to become inefficient and haphazard; below it we are likely to become bored and, in the same way, more remote and less efficient in our tasks.

Stress occurs when our expectations and practised behaviours no longer meet the needs of the expectations of the people we are interacting with (family or larger community); or when our growth exceeds that of those who are expecting us to remain the same and thus predictable. It is also a factor of great significance in the 1980s when we consider events such as thermonuclear war over which we feel we can have no control.

Stressful events can be clearly identified in several areas. The rural

community has its own specific stressors, as has the cosmopolitan urban community. Stressors that are recognisable in the family community are of course common in all families, whether urban or rural. Quite specific stressors are recognisable amongst women as a result of changing social and economic conditions. Stress is also a very personal affair in that stress levels vary from person to person for reasons that are exceedingly complex.

The workshop considered the nature of stress and some of the physical signals of stress were itemised. Patterns of living and life events that provoke stress were set within the context of social and family development. Participants had the opportunity to identify some of the major stress points in rural living today, and some practical suggestions for the management of stress were reviewed. The important idea that the overload of stress is the personal responsibility of each individual was also considered along with a discussion of the contribution therapists can make in helping individuals cope with stress.

