

**Understanding Why Farmers Change  
Their Farming Practices:  
The Role of Orienting Principles  
in Technology Transfer**

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## *Preface*

Extension and the uptake of new technology have always been a feature of the history of New Zealand primary production as pastoral production has undergone steady change and development. There are many participants in the extension process, including those who do the original research, those who develop it and those who use it, and in the current milieu there is a need to encourage sustainable technology. While scientists and educationalists usually have clearly defined views about technology transfer, their activities are not always guided by an understanding of farmers' views on technology transfer. This research report provides a detailed account of some New Zealand pastoral farmers' views on technology transfer, explaining why, or why not, particular innovations are adopted, and provides a basis on which to develop extension practices that will better appeal to farmers.

**Tony Zwart  
DIRECTOR**



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## *Summary*

This report presents results from a qualitative study of sheep/beef and dairy farmers in the Temuka/Geraldine area of the South Island, New Zealand. Farmers' accounts of their farming practices, and how they decide to adopt, or not adopt, innovations are analysed to highlight the key orienting principles that guide their decision making. Farmers in each type of production have different orientations to innovation, in large part reflecting the nature of the industry in which they are located. Sheep/beef farmers emphasise profitability and the need to control risk and to farm safely. Dairy farmers emphasise increasing production, increasing efficiency and control by monitoring production. The results are important for alerting researchers and educationalists to the farmers' point of view in the development of effective extension.



# CHAPTER ONE

## OBJECTIVES, SCOPE AND OVERVIEW

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The main objective of this report is to describe and analyse what farmers say about their changes in farming practice as they make decisions to adopt, or not adopt, new technologies. A secondary objective is to raise questions about the nature of extension in New Zealand, both as it has been and as it may be in future. In pursuing these objectives it has been necessary to review the current New Zealand technology transfer scene and discuss models of extension and how they could be improved. However, the main focus is on farmers' accounts of their farming practices and to achieve this objective the research was based on qualitative field work in a sheep/beef area and a nearby dairy farm area. This report presents farmers' accounts of their farming practices and then analyses these to find a number of key orienting principles that farmers use to guide their decision making when adopting an innovation. We argue that it is essential to appreciate those orienting principles in any understanding of technology transfer, and in the development of improved extension systems.

This study focuses on pastoral farmers in the Temuka/Geraldine area of the South Island of New Zealand and the main findings clearly relate to this area, or areas very similar to it. While the sheep/beef farm category appears clearly defined, it does in fact include farms on which there are a surprisingly wide variety of activities, including: cropping, deer farming, forestry and tourism, among others. Thus, the results of this study are relevant to farms that are not confined to sheep and beef production. Further, because the analysis focuses on farmers' experience within a particular context that occurs in other areas we expect that the orienting principles operate for a wide range of farmers in New Zealand, not just those in the study area. That is to say, the problems confronting farmers in the study area will also occur in some other places and farmers' responses there may be quite similar. However, since one of our conclusions is that the industry in which farmers operate has a significant influence on the nature of their orienting principles, we would not expect the results to be applicable to other farmers operating within widely different industries. However, we would expect that other farmers would have orienting principles of some sort. Further, the orientation that results from uncertain markets in the sheep/beef industry may well occur in other industries that also have uncertain markets.

While this research makes a start at improving current extension systems it does not develop the results into a fully-fledged revision. This work remains to be done once the results are more widely discussed and appreciated.

This report provides a critical literature review on extension generally and reviews developments in New Zealand extension in Chapter Two. Chapter Three briefly describes the research process. Chapters Four and Five present the main findings about sheep/beef and dairy farms respectively. Both of these chapters are quite long and detailed, and contain many verbatim quotations from farmers. Some readers may want to examine these in detail. Others, who may not need to scrutinise the basic data, will find a useful summary of the key findings at the end of each of the substantive chapters.

Finally, Chapter Six concludes the report by discussing the results including making some comparisons between sheep/beef farmers and dairy farmers, and suggesting ways improvements in extension can be achieved by responding to farmers' orienting principles.





## **CHAPTER TWO**

### **EXTENSION IN NEW ZEALAND**

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#### **2.1 Introduction**

Technology transfer is one element of the broader process of agricultural extension. Extension can be defined as a linear process by which information and new technology are transferred from scientists to educators, and then to users. The focus of this research is on technology transfer in New Zealand and on the models that best explain it. To date the linear technology transfer model seems to dominate explanations of New Zealand farmer innovation. This report adopts a different viewpoint: one that emphasises the point of view of farmers. The following review will discuss recent changes in perception of extension both overseas and in New Zealand. This chapter will briefly review definitions and early models of adoption and describe modern critiques of the early models in order to highlight changes in understanding of technology transfer. It describes government involvement in extension both before and after deregulation in 1984. It then reviews current modes of extension and concludes with an assessment of the effectiveness of extension arguing for the need to document farmers' views about technology transfer.

#### **2.2. Understanding Technology Transfer**

Technology transfer is part of the extension process and involves farmer innovation. It is important to understand the meanings of these concepts and to examine the competing models of extension. This section provides definitions and an outline of different models of extension to provide some background to understanding technology transfer.

##### **2.2.1 Definition and Early Models of Extension**

Roling (1988) notes that extension is defined differently across countries and organisations and he discusses the inherent conflicts surrounding the notion. Extension can be seen as providing information to assist the individual to clarify and achieve their own goals, or to achieve structural change through empowering the poor (Roling 1988:37). Both of these strands of extension can use human resource development concepts and activities, and teach people how to learn, manage, communicate, analyse their environment, lead others, organise etc. Despite the variability in the definition, Roling (1988:39) argues that extension includes the following defining elements:

1. Extension is an intervention
2. Extension uses communication as its instrument to induce change
3. Extension can be effective only through voluntary change
4. Extension focuses on a number of different target processes and outcomes which distinguish it from other communication interventions
5. Extension is deployed by an institution.

Implicit in this definition is the idea that extension is the broad, institutional process that includes transfer of technology from researchers to educators to farmers. When farmers adopt a new technology they have undergone a process of innovation or adoption.

Most governments use extension as a policy instrument that has goals that do not necessarily involve farmers, for example, export goals, national food security, cheap food supplies for urban workers and efficient use of national resources are given priority above the welfare of individual farmers (Roling

1988:38). Thus, societal and individual goals may differ. Governments may use price controls and regulation alongside extension. Extension is an expensive process, and is usually carried out by institutions not individuals (Roling 1988:48). In New Zealand it is carried out by government, commercial enterprises (stock and station agents), and cooperatives of farmers but rarely by voluntary agencies.

The linear model of extension, where scientists define which aspects of farming should be studied and provide solutions which are passed on to farmers through a process of extension by specialist educators, is relatively recent, having become prominent while agricultural innovation escalated in the second half of the nineteenth century. This period also saw the birth of the Land Grant College complex in the United States. These universities and associated experimental stations have provided major reinforcement of the respective roles of scientists and farmers. This linear view of technology transfer from scientist to farmer became all-pervasive very rapidly and gained fairly universal acceptance in the social as well as the physical sciences, as has been demonstrated by the development of the "diffusion of innovation" concept (Kloppenborg 1991:532).

Technology transfer from scientists to farmers will vary in its efficiency, depending on the nature of the technology. Some simple cost-effective technologies will be adopted by the majority of farmers with little intervention by educators. Creating awareness leads almost directly to innovation. Other technologies require considerable intervention, including face to face consultations, before adoption will occur. However, adherents to the linear model believe that once some people have adopted an innovation in response to intensive extension efforts, its use will diffuse or "trickle down" through the whole population. Roling suggests that this model assumes that the better the communication process, the more effective the diffusion process will be (1988:53).

In Western nations, diffusion of innovation theory has underpinned a "trickle down" strategy in extension, on the basis of thousands of studies of adoption of innovations. These studies began in the 1920s, and had developed a fairly standardised set of concepts by the 1950s. Rogers' latest summary of the literature breaks the adoption process into five stages: knowledge, persuasion, decision, implementation, and confirmation (Rogers 1983:165). The knowledge stage may occur before a farmer has felt a need to make changes in that area and often involves the mass media. Only once a need is perceived will anyone actively engage with an innovation, finally forming a favourable or unfavourable impression of it (the period of persuasion). A favourable attitude will not necessarily lead to adoption, which depends on a "cue to action". The decision to adopt will be promoted by the characteristics of the innovation. These are its relative advantage, compatibility with existing systems, complexity or ease of use, observability (here equipment has an advantage over systems) or trialability (risk involved in the first implementation) (Rogers 1983:240-1).

Rogers found that adopters could be divided into five categories, innovators, early adopters, early majority, late majority, and laggards (1983:205).

Earlier knowers of an innovation, when compared to later knowers, are characterised by more education, higher social status, greater exposure to mass media channels of communication, greater exposure to interpersonal channels of communication, greater change agent contact, greater social participation, and more cosmopolitaness. (Rogers 1983:206).

The role of the researcher was to identify barriers to adoption. Between 1971 when Rogers and Shoemaker produced the first review of the diffusion literature, and the 1983 update, Rogers has increased his emphasis on the role of economic factors rather than motivation in the decision to adopt. The need to assess the appropriateness of technology and reduce imbalances within target populations is discussed, but the basic assumption about the innate benefits of technology remains unchallenged.

In Third World countries diffusion of innovation theory has been found to be less applicable than in First World countries and the ability of research and development organisations to choose appropriate technologies for local farmers has been less successful than anticipated. Anthropologists have found major flaws in attempts to implement some of the assumptions developed in First World situations. Even in the First World these are now seen as more problematic. A radical critique of technology transfer looks at power relations within agricultural production and processing and suggests that the production of new technology primarily benefits the most productive and therefore richest farmers, i.e., productivity is promoted above equity by state funded research and extension (Hightower 1973, Lawrence 1987). The next step has been development of a model of technology transfer which emphasises the two way exchange of knowledge between farmers and researchers and gives farmers the status of co-researchers.

The export of research expertise from First to Third World nations during the major aid projects of the 1950s and 1960s was followed by increased inequality amongst farmers because of the capital intensive nature of many of the production systems developed and used in extension. Successful technology transfer from experimental stations in the Third World, set up using First World expertise, to poor and sometimes illiterate farmers required the development of new communication systems. Anthropologists studying farmer learning and decision-making realised that local farmers rejected innovations for a variety of practical reasons rather than from any innate conservatism. Farmers were drawing on detailed local knowledge of their environment to run complex farming systems and they interpreted the apparent value of new technology from this local, cultural base - sometimes concluding that the new technology was inappropriate for them. To the outsider, those farmers appeared to be laggards. Frequently, the monocultural, high technology solutions of the experimental stations were too expensive for these farmers to implement comprehensively, and they were unsuitable for partial adoption. Further, they were inflexible, especially for the climatic variation anticipated by the local farmers.

Models of greater complexity were developed in the Third World to meet the wide range of needs within farming and the roles of all those involved in innovation have been adjusted, giving more attention to the abilities of farmers. The best known of these newer approaches is the Farming Systems Research and Extension model, developed in the 1980s. This approach emphasises developing solutions which match local needs closely, using local resources if possible, to solve a wide range of problems. For these solutions to be successful, money needs to be allocated to educate local organisations and provide resources for them to participate in the research process by setting agendas and carrying out trials. Chambers has popularised the term "Farmer First" for such agendas (Chambers, et al. 1989) and suggests that this will encourage independence among rural people, promote a two-way exchange of knowledge, and a genuine partnership over setting research agendas rather than using participation to "sell" external ideas more effectively. With this approach the long run distribution of resources will be very cost-effective as the provision of additional resources to be used locally will allow local skills and resources to be developed more effectively. This will allow ideas to be adapted to a wide range of local conditions, and be of use to small farmers. If the centralised system remains in place, such adaptation will remain too expensive (Biggs and Clay 1981 in McLintock 1993:12).

The understanding of extension gained from the analysis of third world situations has fed back to the First World by a number of routes (Chambers et al. 1989, Roling 1988, Whyte 1991). Rogers used these insights to fine-tune diffusion of innovation theory. Others incorporated it into comprehensive attacks on the organisation of not only technology transfer but agricultural research and development itself. Kloppenburg (1991) drew on feminist critiques of scientific models and methods to outline the way class and other power relationships have distorted research agendas and suggested ways of developing a more equitable science. As with models developed for Third World nations, these new models would focus on local experience, issues and solutions, and incorporate the input of farmers at all levels of the research process. In the First World the most potent support for new models comes from alternative agriculture practitioners. Activities such as the United States Department of Agriculture's (USDA) Low Input/Sustainable Agriculture (LISA) programme and the National

Research Council's (NRC) Board of Agriculture report "Alternative Agriculture" promote on-farm research by farmers, although they require confirmation using standard techniques on experimental stations.

Generally, there is now a growing number of researchers and educationalists who are informed by, and responding to, the new ideas about extension, and there is now a significant body of literature to support the development of new models of extension that emphasise the farmers' point of view rather than assuming that extension is best organised on a linear basis. It is relevant now to review the extension scene in New Zealand.

## **2.3 Extension in New Zealand**

Extension has been provided directly by the government until recently, as a central part of a national productivity drive. Scientists have been heavily involved in setting research agendas, with technology transfer agents or educationalists acting as intermediaries between scientists and farmers. The diffusion of innovation model has been adopted from overseas, with some fine tuning for local conditions. New Zealand extension has shared the weaknesses identified overseas, such as an expectation that technology can provide solutions to all problems, the assumption that increasing the level of technology used is beneficial, and that those who do not adopt lack information.

Many new technologies have been adopted quickly with minimal intervention (e.g., aerial topdressing, farm bikes, animal health remedies). Others, such as rotational grazing, have required considerable extension effort. The inability of low income farmers to afford some technologies and their forced exit from farming has also been recorded (Anderson and Moran 1983). Environmental sustainability is providing a challenge to scientists and farmers which will require their close cooperation. New strategies are being introduced, e.g., research councils with farmer members, Landcare groups, and on farm research is increasing. Attitudes to extension have been strongly shaped by New Zealand's history as a major exporter of agricultural produce and by recent restructuring, so these will be reviewed as an introduction to current extension issues. The remainder of this section covers early government involvement in extension and the impact of deregulation on extension.

### **2.3.1 History of Government Involvement in Extension**

The New Zealand economy developed around the country's suitability for agricultural production. A major proportion of the country's export income has always come from dairy, wool and sheep meat exports. Beginning with early European settlement, when the government controlled sale of land, the state has been involved in farming. From the late nineteenth century the government took on an increasing range of roles to ensure farming continued to be successful. Control of pests and diseases and the import of animals were important early roles. Other roles included provision of credit for individual farmers, instituting research and development, and providing for regulation of industrial relations. During the twentieth century the role of the state continued to expand. Purchase of land for settlement by ex-servicemen, the establishment of producer boards, a widening range of quality controls and regulation of processing and export, and sometimes price support became part of the government's portfolio of interventions.

The Department of Agriculture, established in 1892, implemented many of these services. The government had already allocated some money for farmer education about new crops through the Crown Lands Department (Nightingale 1992:28). In line with a high priority on improving the quantity and quality of agricultural production the Department employed instructors in farming techniques from the first. The number of instructors and the range of farming systems they dealt with expanded rapidly. Mass production of dairy products and refrigeration required an increase in quality of production which was actively supported by the Department's instructors and inspectors (Nightingale, 1992:51-7). By the 1920s the extension service had grown large enough to allow face-to-face consultation with farmers as well as provision of pamphlets and reports. As the Department's scientific work moved into breeding

new grasses in the 1920s, the extension service passed on new techniques or knowledge and fed back farmer responses to scientists (Nightingale 1992:119). In 1973 there were 600 extension workers, 68% provided by government and another 8% provided by a combination of government and levy (Scrimgeour et al. 1991:2-3).

The Advisory Division was focused on solving production problems for individual farmers, although Brown (1990:43) reminds us that the chief client of the Advisory Division of the Department of Agriculture was the government. (As it was of other agencies such as the Rural Bank and Department of Scientific and Industrial Research (DSIR) which were involved in rural innovation.)

The extension service aimed at deciding which changes should be promoted, explaining their benefits (sometimes change was mandatory) and analysing the knowledge and skills required to implement the changes suggested. Farmers have traditionally been highly responsive to price signals but, in addition, change was promoted by use of mass media, group activities, and individual visits (Walker 1994:61-2). The Department aimed to train extension officers in adult education skills as well as technical and financial ones and encourage farmers to make their own decisions and monitor their own progress. The service used a diffusion model which appeared to be highly successful when agricultural production was rising rapidly.

Advice to farmers was also available from a wide range of other sources:

1. Private farm consultants
2. Dairy board advisers
3. Stock and station agents
4. Veterinarians
5. Accountants
6. Bank managers
7. Contractors
8. Sales representatives
9. Marketing organisations
10. Growers/farmers organisations
11. Scientists.

Dairy and sheep/beef farming had separate extension systems: the New Zealand Dairy Board provided a consultancy service through a levy on farmers and sheep/beef farmers had a variety of sources of information including MAF advisers. The Dairy Board personnel spent about 20% of their time on one to one consultancy (Scrimgeour et al. 1991). Most of their time was spent with discussion groups. Allison (1981) noted that in some areas scientists also provided considerable technology transfer, with the deer programme at Invermay attracting so much attention that 30% of science time was spent on advice. Journeaux (1990:5-8) commented on the differences in extension systems in sheep and dairy farming, attributing this to their different industry structures. He notes that not only do dairy farmers have access to industry consulting officers, but that in dairying areas MAF Technology consultants (now Agriculture NZ) may also spend 70-80% of their time on dairy consultancy. Not only was far more one-to-one contact possible, but the number of scientists involved in The Dairy Research Institute was three times higher than in the meat industry. Sheep farmers may have considerable contact with stock and station agents, but traditionally these people have not had a great deal of liaison with research and extension agencies. Because sheep farming is more diverse and complex a whole farm approach is required in extension rather than provision of "add-on" technology. In spite of these differences Journeaux concluded that while the structure of the two industries "would tend to favour dairy farmers rather than sheep and beef farmers as regards adoption of new technologies, there is no real evidence to support this." (Journeaux 1990:8).

Structural differences in extension have a long history and relate to the history of product marketing. While processing in the dairy industry has been carried out by producer owned cooperatives since the early twentieth century, the move to producer cooperatives in the meat industry is more recent and has

been accelerated by the economic down turn of the 1970s and 1980s. Plant processing capacity reduced by 26% between 1982 and 1991. Currently 75% of the export processing industry is farmer owned (Willis 1992a:10-11). Willis comments "The processing industry is committed to: maximising profits to shareholders, and returns to suppliers of livestock. One is not necessarily consistent with the other." (Willis 1992a:11). Farmers selling wool are also price takers. They sell to private wool merchants and are not involved in processing (Willis 1992b:9). The New Zealand Meat Producers and Wool Boards promote marketing of farmers' product but do not act as a single seller in the way the New Zealand Dairy Board does.

### **2.3.2 The Impact of Deregulation on Extension**

Before the 1960s New Zealand was able to depend on guaranteed access to British markets at good prices. This provided a high standard of living with little or no unemployment, bolstered by the development of an extensive social welfare system, support for farming, and protection of local manufacturing.

When Britain joined the EEC in 1974, access to a guaranteed market was no longer guaranteed and substitute markets provided lower returns to exporters. Government policy continued to support increasing farm production, with subsidisation of farm inputs such as finance, fertiliser, and transport in 1978 in part to compensate for protection of domestic manufacturing. Government support expanded in the face of low prices, until 40% of sheep farmers' incomes were paid by government. In the hopes of a medium-term economic recovery government borrowed overseas to support the economic status quo and develop energy self-sufficiency. However by 1984 current policies had proved unsustainable in the face of high inflation and low growth and major restructuring was undertaken by the Fourth Labour Government shortly after it came to power (Walker 1994:3-5).

The new farming policies were implemented rapidly, with an immediate reduction in most subsidies, a graduated increase in interest rates to market levels, and the imposition of fees for services such as inspection and consultancy over the next two years (Walker 1994:7). Domestic marketing Boards were deregulated. Competition led to the increasing sophistication of product processing during this period, with closure of many plants (Walker 1994:36-8). Subsequent reforms in other sectors such as the deregulation of financial markets, removal of wage and price controls, corporatisation and privatisation of government trading activities, tax reform, and reduction of export incentives and import controls also affected farming.

The short term effects were a major decrease in farming profitability (exacerbated by low overseas prices for farm products), increased unemployment, and reducing activity in the manufacturing and construction industries. Farm spending dropped dramatically, with flow-on effects in rural service industries. Walker notes "... about 20% of the total debt owed by the farm sector was written-off and about 5% of farms were sold" (1994:30). Land values dropped and farmers sold stock, land and equipment or sought off-farm employment (Walker 1994:31). Often farm women were able to work off-farm or income support was available. About 40% of sheep and beef farmers now have off-farm income (Walker 1994:67).

During the period of agricultural restructuring the role of the Ministry of Agriculture and Fisheries (MAF) changed dramatically. Its research functions were split off, services which could be better provided by private organisations were contracted out, and new policies on quality assurance were developed. Regarding its extension role, MAF and other personnel debated the advantages and disadvantages of obtaining cost recovery from farm consultancy. Some critics emphasised the inefficiencies in the "multi-tiered public servant staffing system" which operated at that time (Brown 1990:43). Others saw research and development as a public good from which it would be difficult to exclude "free riders" and recommended that extension services be continued. They emphasised that information had been freely shared in New Zealand because farmers were not competing directly with each other to sell products on a limited domestic market. Another issue was the need to ensure that scientists did not become cut off from user groups (McArthur 1987). However, the outcome of the

debate was the decision to change extension to user pays. This decision was made in 1984 and the policy was progressively introduced between 1987 and 1990.

The change in policy resulted in a reduction in the number of advisors, and a drop in the number of clients as some were unable to pay for services, or they refused to pay for them. Farmers as commercial clients employed advisors to focus on specific goals and the proportion of large commercial clients, as opposed to individual farmers, increased in numbers. The revamped advisory company, now called Agriculture New Zealand, contracts to provide policy advice, farming information and disaster relief management to MAF. Agriculture New Zealand went through a number of internal changes while it was associated with MAF, and then in 1995 it was sold to Wrightsons. However, MAF may still undertake mass media campaigns which support government objectives, e.g., on sustainable land management (Walker 1994:64). Evaluations of the restructuring of the advisory services have often concluded that although the nature of the services has altered, farmers were still effectively served (Walker 1994, Scrimgeour et al. 1991, Brown 1990).

Farmers' reactions to the changes in extension have been the subject of research. A 1991 survey asking 100 Waikato farmers whether they were satisfied with current extension services showed that 46% felt that a free advisory service was inappropriate, 40% preferred this option, and 14% were unsure (Scrimgeour et al. 1991:12). Support for reinstating the free advisory service dropped to 38% and uncertainty rose to 23% when farmers were told the cost of the service provided before 1984 would be about \$1,000 per farmer per year, paid by a levy on farmers and government. Most (22%) saw no difference between the services offered previously and those offered under user pays, generally because they had not used a MAF consultant during either period. Some were prepared to pay quite large sums of money on consultancy and study groups run by private consultants, accountants etc. - one group cost \$400 a year and had a waiting list. Two thirds used non MAF personnel, with most thinking MAF should be involved in helping respond to "adverse events", research, regulation, and protection (Scrimgeour et al. 1991:12).

In a review of the economic benefits of government involvement in extension, Scrimgeour, et al. (1991) commented that there were still some roles for government in extension, such as encouraging practices which will minimise environmental disaster, whether through dramatic adverse effects such as storms, or on-going environmental degradation. Facilitation of rural community life, to prevent loss of competent farmers to other occupations and the development of rural poor, were also public goods which could be funded by government. Government also had some responsibility to consider the impact of new technology. However Scrimgeour et al. (1991:40) considered that this was best done by funding non-governmental organisations and educational institutions. They recommended that Crown Research Institutes and producer organisations should take on an increased role in extension.

The New Zealand government now plays a minor role in extension. With Agriculture New Zealand no longer connected directly to government, the latter's role is confined to broad issues only. In this new environment there is some scope for extension to develop into new forms, especially for the Crown Research Institute most involved with pastoral agricultural research - AgResearch. The next section examines the contemporary situation.

## **2.4 Current Modes of Extension in New Zealand**

### **2.4.1 AgResearch Involvement in Extension**

The following section is based on interviews with AgResearch personnel and it shows how AgResearch has to some degree, had to take over some of the roles originally played by MAF. However, AgResearch has had to start from scratch in planning its extension policy. They have run a wide reaching consultation process to develop new models of extension, and are now starting to invest in these models.

Prior to restructuring of science provision, it was suggested that science organisations needed to incorporate extension into their budgets to ensure a return on their investments - possibly incorporating it into each project, or contracting a specialist unit to act for each CRI (Scrimgeour et al. 1991:41). AgResearch, the Crown Research Institute providing most of the needs of pastoral farming, demonstrates how this has been managed. Their intention is to include extension training for AgResearch staff in all research divisions, and General Managers of divisions will include extension in their business plans. Because AgResearch has become more output oriented now than prior to restructuring, the divisions are generally more commercially oriented and will ensure farmers are aware of new opportunities. They want to provide input into farm decision-making, although on a cost recovery basis. Given that the Public Good Science Fund does not fund technology transfer projects beyond dissemination of results typical of all research projects they will not become involved in on-farm consultancy as provided by MAF in the past.

AgResearch, like other Crown Research Institutes, does not have a delivery network extending throughout the farming districts and is more interested in expert systems than providing farmers with specific information. One tool is a computer database which will supply diagnostic prescriptions for staff involved in discussion groups with farmers (called Bovision). Once the expertise of scientists is captured in such a system they are freed up to concentrate on science. AgResearch sees farmers as clients of their clients. Release of information to technical commercial representatives might be a means of retaining income from their science investment while facilitating spread of the information. AgResearch's extension activities include public relations, feedback for scientists, and work with innovative farmers. Although it is not expecting to provide consulting services, Grassline is the exception that proves the rule. Grassline is a pasture advisory service, established prior to restructuring, that provides information on new grass varieties and advice and if necessary on-farm visits to assist with their establishment, on a cost-recovery basis. It works with innovative farmers, but once pasture has been established successfully on one farm, others in the locality will be more likely to follow suit. This process provides valuable feedback to scientists.

AgResearch is also interested in working in with educational institutions to provide up-to-date information in innovative formats, e.g., computer assisted learning. Although no plans have been made yet, there is potential for a polytechnic to run a specialist course for farmers with AgResearch providing information. Studying at home is a more practical option for established farm managers and owners than attendance at polytechnic courses, and AgResearch could also work with the Farming Education and Training Association (FETA) on course development. Course content would need to be carefully assessed to ensure that innovations and new information would meet farmers' needs. Like Massey and Lincoln Universities, AgResearch tests its ideas on its own experimental farms and could provide input at a suitable level.

AgResearch is also involved in focus farm development. These farms are privately owned, with the owner agreeing to become involved in a research project for a set period of time. The farms are periodically changed. Funding for these projects is available from the Meat Research and Development Council (MRDC) and other agencies. The focus farm provides a concrete learning situation, community input and ownership of the process, technical input, and effective networks to assist self-help. AgResearch also runs research farms where it tries out new pasture species and holds large-scale field days. These are attended by both farmers and those involved in extension. These research farms will not be established in all districts, but are useful as they foster two way feedback between farmers and scientists.

Because AgResearch sees diversification and meeting consumer demands as essential to profitable farming, it expects total quality management (TQM) to provide guidelines for farmers in the future. Quality management systems will evolve in the farming community as technology and management packages. New grass varieties and other innovations are expected to be sold with a "surrounding" production system. Like many stakeholders in farming, they say the technical and business input into farming is increasing. Highly specialised products such as hyper-immune milk will become more



common, with different markets for each of dozens of possibilities. The marketing aspects of farming will become much more complex.

Staff of AgResearch's unit for research into improving technology transfer methods have recommended that close contact between scientists and farmers be maintained and that "target groups of farmers should be involved in the design and development of innovations, and any extension efforts are targeted at these specific groups." (Whatawhata Research Centre 1992:63). They recommend experiential learning for farmers and the application of technology to local systems to maximise farmer learning.

AgResearch is not developing a single policy to be applied to all regions and sectors. They have a range of solutions to differing needs as outlined above. The demands of innovations based on biotechnology and environmentally friendly production could be comparable to the changes heralded by aerial top-dressing, and AgResearch states that it wishes to play the role of honest broker during this period, meeting the needs of both farmers and researchers.

However, it is the view of some commentators (McRae et al. 1994) that agricultural research and extension is organised within a transfer of technology paradigm with few researchers sympathetic to farmer oriented approaches. In this view, farmers are poorly represented within current extension. At the same time there is emphasis from the Foundation for Research, Science and Technology that Crown funded research is relevant and taken up by farmers.

#### **2.4.2 Existing Extension Systems**

There is a variety of technology transfer methods in use in New Zealand. Some of these methods are designed to focus on one farmer's specific problem, others are intended to provide general information on new techniques and equipment as these become available. Briefly, these methods consist of: formal courses from educational institutions, individual consultations with experts, discussion groups and mass media field days.

##### ***Education***

For some new entrants to farming, their first contact with technology transfer comes from the education system and because training organisations generally use the most up to date information, this information can flow from new entrants into the general farm population. However, the drop in student numbers and entrants to farming during the 1980s may have contributed to the reduction in introduction of new ideas over that period as well.

Farming education includes short specialist courses run by polytechnics, cadet training schemes (a mixture of on-farm experience and trade certificate papers), trade certificates, diplomas and degrees. Trade certificate qualifications, organised as three year courses, require the ability to carry out a range of practical tasks as well as more theoretical information. In university courses the amount of theoretical content increases, but even degree courses have practical pre-requisites. However there is little offered in distance education by the universities at present. Correspondence courses are offered at the Open Polytechnic of New Zealand, with practical skills provided by local polytechnics. Most of those attending polytechnic and university courses are beginning their career in farming. Few mature farmers complete additional training at this level, although they may attend sessions on specific skills. The full range of courses from all institutions cover financial management, communications skills (for those entering service industries), and technical skills.

The number of students in agricultural courses peaked in 1984/5, and has dropped since then (Wyllie 1989:91-8). Wyllie noted that in the 1970s, 80% of school leavers had some contact with farming, but that this figure had dropped to 10% in 1989. This has led to polytechnics offering introductory courses which allow students to decide whether they like farming. Farming experience and training is also available from government funded courses for young people without employment.

### *Individual consultations*

These are intended to help farmers plan for specific goals and monitor the progress of innovations. Farm advisors might provide specific services, (such as soil testing), advise on new techniques, help clarify goals (social as well as economic since these often overlap) and discuss major decisions such as sale or purchase of a farm. Consultations also provide essential feedback to advisors as to how innovations work in a range of practical situations.

### *Discussion groups*

Discussion groups provide practical strategies for adoption of new practices as well as providing information. Most are oriented around farm visits but include study tours, indoor and outdoor discussions, and guest speakers.

Landcare groups have also been set up in some parts of New Zealand to date in areas where there is community-wide concern about farming issues such as land degradation. Demonstration farms have been set up by organisations concerned with innovation. Some are owned and run by these organisations; in other cases projects are set up on the farms of private individuals. Public meetings are held at these to demonstrate progress with new techniques (Walker 1994: 63).

Most discussion groups have less than 20 members (Rwenyagira 1985). These days they are often convened by farmers but still make use of the services of farm consultants. Previously they were primarily organised by the Department of Agriculture's Advisory Division, who serviced 2084 discussion group meetings in 1983/4 (Rwenyagira 1985:10). Discussion groups are organised around informal networks, generally involving farmers from medium-sized farms of similar interests and socio-economic status. They generally meet the needs of progressive farmers but are assumed to provide indirect benefits to others who observe the improved farming techniques of participants. Discussion groups may fulfil social and other needs, such as providing reassurance and confidence, as well as providing farming information, and generally have variable life cycles, with groups disbanding and reforming as the needs and abilities of participants change. Members of discussion groups do not see them as a substitute for individual consultation by members. Nevertheless most found that they provided information that was not available elsewhere and that they were very practical and tested ideas through discussion (Rwenyagira 1985: 119-24).

A survey of Canterbury farmers found that 16% gave discussion groups as their preferred learning option, 16% favoured talking with other farmers, but 49% preferred an option which makes use of both of these plus some additional features "seminars with demonstrations, and an opportunity to question and discuss in groups of 8-10 farmers" (Moore 1990:51). A local meeting on how to improve fine wool production staged in a local woolshed, which involved presentations by a Wool Board consultant, MAFTech, a veterinary and a private consultant had been cheap to run and was very well attended.

### *Media*

Information from mass media reaches a wide audience, but is most loosely linked to change in practices. Information provided in the mass media provides awareness of new opportunities and reasons for change. This information varies in depth, from radio/television broadcasts "advising farmers of improved farming practices, success stories, prices, government policies and general knowledge information" (Walker 1994:62) to technical publications written by scientists and advisers. Field days with practical demonstrations and the opportunity to talk to off-farm experts and other farmers and articles in newspapers and magazines fall between these extremes. A wide range of organisations provide information for the mass media. There are nearly 100 farming periodicals available, and many of the approximately 150 newspapers distributed have farming sections (Agriculture Horticulture Forestry: A Directory of Contacts 1994: 268-274).

## 2.5 Assessing the Effectiveness of Extension

Restructuring was intended to provide a more cost effective and targeted service, with farmers encouraged by market forces to maintain a close watch on appropriate innovations including business management techniques. However, the international extension literature clearly highlights the methodological critiques of linear models of extension, emphasising the need to value the two-way aspects of the process more highly, to take individual goals into account, to do whole farm analyses, to treat farmers as active learners with good reasons for not adopting certain innovations, and to improve techniques to facilitate learning (Philips 1985). These critiques raise doubts about the effectiveness of the original extension system and the efficacy of restructuring extension, and also raise the question of whether a market orientation aids technology transfer.

To begin to examine the impact of restructuring on these issues requires a review of New Zealand research into extension, which dates from the 1960s, as a means of assessing the original system. An early study outlined by Greer (McMillion 1960) noted factors which suggested that "many of the findings of American research on practice adoption were probably applicable in New Zealand" (Greer 1982:5). The profile of early adopters in diffusion theory suggests that diffusion will take place whether government subsidises extension or not, although the critiques of past methods suggest the rate may slow down.

Technology transfer research in New Zealand has suggested that few farmers resisted change, and that understanding their attitudes to the costs and benefits of new practices on their own farm was necessary before adoption or rejection could be understood. Other factors which were believed to influence adoption of particular innovations were age, education/management skills and communication patterns among farmers. In addition Stewart (1979) found that higher income and farm size was associated with adoption of innovations.

Suggestions for fine-tuning extension methods have included presentation of data in a form which is readily understood by farmers or its placement in the most suitable media, or concentration of information in fewer sources (improved "marketing" of information) (Greer, 1982, Fairgray 1979). Information overload has been of some concern, and face-to-face methods, not necessarily on an individual basis, have been favoured by extension agents. Suggested solutions in the past have often included an increase in the number of farm advisers. Increases in efficiency gained through decreased staff turnover, encouraging people to stay longer in each district, or education of agricultural service people who already have contact with farmers, have also been suggested. Allison (1981:16) noted that "Between 1968 and 1978, 41% of advisory officers left MAF within 3 years of appointment and 52% of field officers have had less than 5 years' experience". This claim for more staff is entirely in line with the linear extension model in which educators play a key role and the provision of an increased number of educators is expected to facilitate extension.

Greer (1982) constructed and tested a model of farmers' orientation to work and found increasing income, intrinsic factors, and the need for both less work and more leisure were the most common motivations. Other goals, such as establishing sons in farming, achievement of targets, independence and lack of motivation towards change were each noted in a smaller number of farmers. Greer (1982: 103) noted that "very few of the goals mentioned conflict directly with the adoption of new practices". Greer's results supported an active technology transfer programme, as did other extension research. The problems he identified seemed to require improvements in the linear model of extension rather than radical change:

Many non-adopters of the practices studied had accepted inaccurate information about them and believed, on the basis of this inaccurate and inadequate information, that the advantages of adopting a practice were outweighed by the disadvantages. (Greer, 1982:161).

Greer concluded that management ability influences farm performance and may over time influence orientation to work as farmers experience limitations to their aspirations, become more negative about risk, and become more fatalistic. He suggested that advisory officers could (among other things) focus more time in persuasion on later adopters and those with lesser ability by helping them to learn how to learn (including screening of information for items which are most relevant to their situation) (Greer 1982:163-77). The provision of skills as well as information requires additional training in adult education by extension agents, but falls short of the type of critique offered to the lineal model by Farmer First programmes.

Obviously, targeting late adopters rather than innovators is less likely to be cost effective in a user pays regime, and because there was so little spending on innovation during the 1980s it is not clear yet whether the new extension services available fulfil the needs of farmers in all situations. Other recommendations move closer towards Farmer First issues.

After reviewing the New Zealand literature Greer concluded that little of the research on the motivation of farmers can be directly linked to their adoption behaviour because of methodological problems, but that communication among farmers was crucial to adoption patterns. Different people were acknowledged as having expertise in specific areas, and so become opinion leaders, but their sphere of influence may be quite local (Greer 1982:9). In support of Greer's emphasis on opinion leaders is Fairgray's (1979:113) study of adoption of rotational grazing which showed that farmers saw the most effective source of information about this practice as discussion with other farmers or observation of rotational grazing (for both adopters and non-adopters).

In contrast Fairgray (1979:77) found that MAF advisers emphasised the effectiveness of their own contact with individual farmers in adoption, through on-farm visits, discussion groups and field days, spending most of their time on these activities. Their perception was more accurate for adopters, for whom contact with MAF Advisory Officers was the next most important source of information, after other farmers, but contact with Advisory Officers ranked fifth for the sample as a whole. Field days provided the most widespread introduction to rotational grazing. Journal articles, often written by Advisory Officers, were more important than expected from the amount of weight placed on this method of communication by Advisory Officers and were even more widely used by farmers for other sorts of farming information. Contacts with other farmers and journal articles also rated highly for accuracy and amount of information (Fairgray 1979:116). Advisory Officers were rated highly by those who used their services, but these were a minority of farmers (Fairgray 1979:119). Only half the sample had ever been visited by an Advisory Officer, most less than once a year (Fairgray 1979:142).

Farmer assessments of the example studied, rotational grazing, were less favourable than those contained in the MAF message, and farmers without direct MAF contact were likely to adopt only part of the innovation. Outside areas where full adoption had occurred farmers might take three to five years longer to adopt the innovation, so the diffusion effect was slow (Fairgray 1979:186). Fairgray concluded that consultants should make more use of the informal farmer networks valued by farmers themselves. This could be followed up with providing specialised booklets with detailed and accurate assessments of innovations to improve the accuracy of information circulating in farmer networks (Fairgray 1979:198). Operation of farmer networks would seem likely to be the same after restructuring.

The general point about the New Zealand research is that New Zealand extension adhered closely to the linear adoption model. This means that farmers were seen either as innovators or as slow or reluctant to innovate. Research focused on particular innovations has shown that there are always laggards or cases where technology transfer fails to occur. Further, it shows that the agents of change, the educators (MAF consultants before 1984) play only a partial role in extension. The other important component is communication among farmers (the diffusion phase). Finally, the research shows that the linear model of extension leads educators to focus on a relatively small number of innovators and leave the process of diffusion and farmer communication to spur innovation among other farmers. It is assumed that all farmers are able to, and interested, in adopting an innovation. This assessment of the

situation in New Zealand is echoed in Australia, but structural constraints to diffusion of innovation are given more emphasis.

Research carried out in Australia by Anderson found farmers saw rising costs and market fluctuations as being their permanent problems. The unpredictability of income discouraged innovation. Farming was often seen as controlled by outside influences: government (31%), big buyers (27%), unions (23%), and Statutory Boards (8%) (Anderson 1981:67). Many farmers were operating at the maximum level for their income, labour, and farm size and only half were trying something new at the time of the survey. The Australian Department of Agriculture's ideology of equality obscured the fact that the different needs of farmers led to service being directed at early innovators (Anderson 1982:57). Anderson suggested some farmers will not pass on information received from farm advisers. He associated keeping information with particular farming systems where control over marketing exists and major profits could be made from improved production. Anderson noted that some farmers asked for information, without necessarily revealing what they intended to do with it, reducing flow-on to other farmers and feedback to scientists. This area has not been followed up in New Zealand with comparative research. However, this research highlights the important role of particular beliefs of farmers about the extension process and structural constraints and challenges the assumption that farmers share a common approach to farming that means that they will adopt an innovation sooner or later.

Returning to the New Zealand situation, we can see that the two guiding principles behind the advisory service's work were diffusion and the importance of increased production. In the present era of restructured agriculture we can consider the likely impacts of introduction of user pays on extension given what we know already. Fairgray challenged the effectiveness of diffusion through face-to-face contact with advisers in a way which suggests restructuring would be relatively neutral. Early adopters will still seek information. Others used consultants very little anyway. Greer, Philips and others suggested that extension could be improved by increasing the human development component of advisory work. Restructuring may have a negative effect on extension in this view because early adopters are likely to be more comfortable with the more technocratic approach which may result from introduction of user pays but those who require more encouragement may miss out. However, interest in facilitation of learning continues (Whatawhata Research Centre 1992, Paine 1993). Whether user pays encourages private consultants to provide skills rather than information has not been tested fully yet. Walker's comment that farmers are more likely to focus on specific projects when they talk to consultants since user pays was introduced suggests not (Walker 1994). Discussion groups are now more important and may fulfil this function. Innovations such as the regional sheep councils have farmer representatives but these may be more targeted to the needs of scientists than farmers. Further, among the New Zealand critiques of extension is research at Massey University which focuses on farmers in a Farmer First Research Programme. This has been carried out since the change to user pays.

The Farmer First Research Programme aims to study farmers' circumstances, their constraints to change and involving farmers in the research process (Brazendale et al. 1994). The first phase of the research established farmers' circumstances, including their goals and constraints to change. The second phase designs and evaluates appropriate strategies expected to improve farmer wellbeing. To date this research has focussed on the first phase and interviewed two random samples of 30 sheep and beef farmers in two distinct North Island regions using three semi-structured interviews. Data collected include historical, physical, financial and personal factors, and specific attention was given to the use of three beef production technologies. Results showed that farmers were aware of the technologies but had chosen not to adopt them for rational reasons, including the unsuitability of the techniques for harsh environments and the farms' inability to provide the preferential feeding required. Other results showed that high debt and low income were major factors limiting the cash available and were therefore significant constraints on innovation. These results suggested that new technologies should address the farmers' constraints and their circumstances (Reid et al. 1993).

McRae et al. (1994) reflected that the first phase of research has shown that the hill country farms are operated under complex and diverse circumstances which seem to prevent widespread uptake, and benefit from, innovations that would entail changes to the farmers' systems. Regarding the second phase of research they noted that, to date, the implications of the above conclusion have been widely accepted, but they emphasise that the farmer oriented approach must be accepted by institutions. To encourage this change they are pursuing this second phase by encouraging dialogue and participatory projects between researchers and farmers.

This innovative research has responded to criticism of the linear adoption model and attacked the issue of incorporating farmers' viewpoints into understanding innovation and developing effective extension. It is now attempting to link farmers to the actual research and development side of the extension process. It is too early to fully assess the achievements of this Massey programme. Clearly, it is a novel approach in New Zealand, however, some reservations can be raised about its approach to farmers. The methods used, while participatory, have been largely quantitative. The results have identified constraints to decision making but they do not fully reflect farmers' views about innovation. In large part, the semi-structured interviews have precluded discovery of key issues that orient farmers to innovation such as will be detailed in this report. Further, the farm management disciplinary background focussed the enquiry onto management topics rather than the deeper issues of farmers philosophies or general approaches to technology transfer.

New Zealand scientists have only recently investigated critiques of technology transfer suggesting that farmer involvement in research design is needed as well as involvement in the transfer process. Apart from some investigation of the "Farmer First" model at Massey University, there is interest in participatory analysis in AgResearch's extension programme (Whatawhata Research Centre 1992). This is targeted at overcoming the loss of two way feedback between farmers and scientists in a user pays environment. Community involvement in research also ensures that values other than maximisation of production may be incorporated into research and technology transfer and that the needs of a variety of farmers are met. An innovative project in the Mackenzie Country is compiling a database using farmers' and scientists' knowledge of the area and ways of managing this environment, which is then being developed into a decision support system. Community involvement in the project is seen as essential to its success. This isolated high country farming area is the site of several research initiatives, including some of New Zealand's earliest Landcare groups to facilitate environmental projects at an individual and community level. The severity of the environmental problems in this area, and the marginality of many of the leasehold farms there has focused interest on new ways of doing things, and accessing all possible knowledge about the area.

## 2.6 Conclusion

The linear diffusion model has been challenged by a farmer oriented model of extension, although perhaps not universally. New Zealand Government involvement in extension prior to 1984 was based on the linear model with MAF advisers playing the role of educators to assist in spreading innovations from researchers to farmers. Since 1984 the government role has significantly reduced, to be taken over by Agriculture New Zealand operating in a private consultancy role with a policy of full cost recovery. Early assessments of MAF-based extension showed that there were problems with its effectiveness in reaching all farmers because of the emphasis on face-to-face methods, and this assessment was supported by Australian research. Our review of AgResearch shows that it is trying its own innovations, including total quality management systems, computer assisted learning, and focus farms. It is premature to make an assessment of these new approaches, but at least, they are significant changes from the earlier extension model. For sheep/beef farmers user pays and then privatisation of the MAF Advisory Service have led to a reduction in the overall amount of use of consultants, but an increase in focus on specific projects and among specific groups, particularly corporate farmers. For dairy farmers, the situation has changed little, with LIC consultants still subsidised by a levy and information either free or cheap. The review of currently available extension systems shows that the bulk of extension contact continues to be by traditional methods: media, discussion groups, service

people, and educational institutes. No doubt the original criticisms still apply: the need for adult education, farmer networks, and better use of media with - face-to-face discussion with extension agents a minor source of information for the majority. Discussion groups are favourably viewed by farmers and fulfil many of the needs identified - they are based on local information, farmer networks, and because they are interactive should facilitate learning skills. Current problems identified by consultants are identification of the most appropriate information from the wealth of material available, and the reduction in feed back to scientists. This is essential to future success, but will not be followed up in detail in this research project because of its focus on farmer views.

Conspicuously minimal in the above New Zealand literature is research that carefully documents farmers' views about innovation. Such research is the key need identified by those approaches that are critical of the linear diffusion model of technology transfer. In this view it is essential to understand farmers' needs for new technology, and to understand on their terms why innovation occurs, and use this understanding to inform the research process that develops the innovations. The need for farmer oriented research is also suggested by the early assessments of MAF-based extension. Research at Massey University on a 'Farmer First Research Programme' begins to redress the balance but that research has not achieved its full potential because it has failed to focus on farmers' viewpoints and instead, looked at farmers from a management perspective.

In order to better understand technology transfer it is important to document innovation from the farmers' point of view. The results of this approach can be used to guide future research, or, even further, indicate that farmers should work with researchers in deciding research priorities.

The research reported here has as its main objective the task of documenting why farmers decide to take up, or not take up, innovations. The research achieves this main objective by carefully interviewing both sheep/beef and dairy farmers, as explained in the next chapter.





## **CHAPTER THREE**

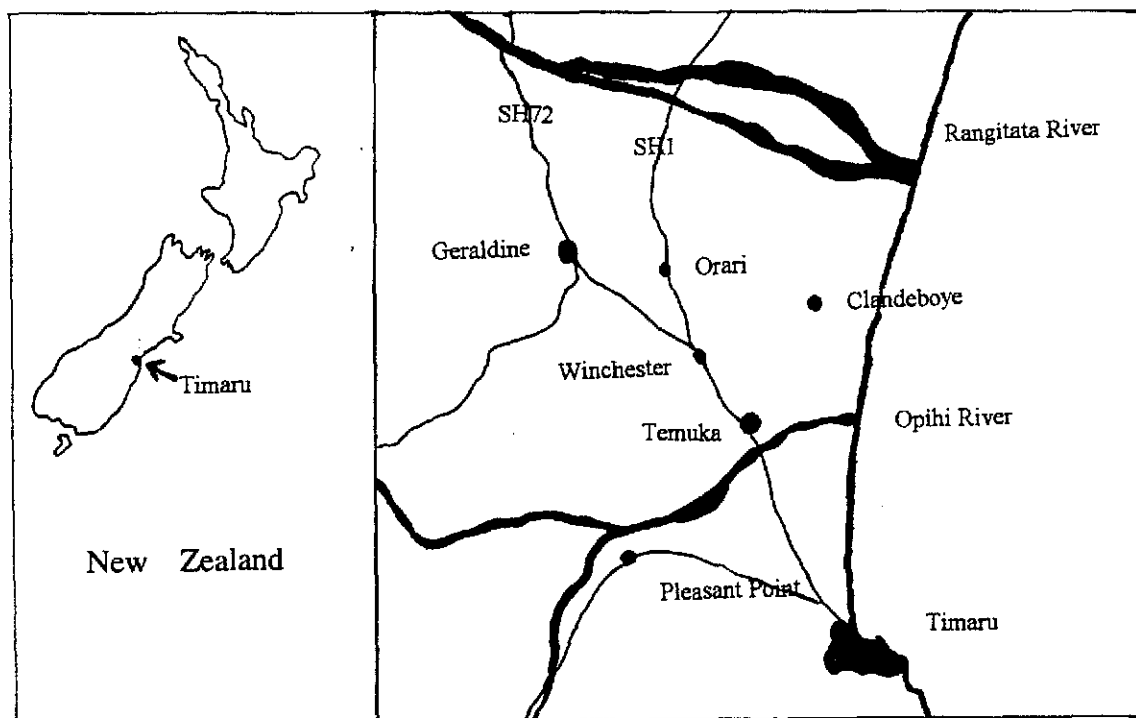
### **QUALITATIVE METHOD**

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#### **3.1 Introduction**

The aim of this project was to describe and analyse farmers' perspectives on and experiences of technology transfer and innovation in dairying and sheep/beef farming, and to document the factors that influenced decisions farmers made about changing, or not changing, their farming practices.

The research was based in the Temuka/Geraldine area in South Canterbury, New Zealand. This locality includes land between the eastwards flowing Rangitata River and the Opihi River, about 20 kilometres apart, and from the East Coast to about 35 kilometres inland. The locality is about ten kilometres north of the regional centre, Timaru (see Figure 1 for a map of the location of the study area, and an insert map of New Zealand showing the location of Timaru). The decision was made to base the research in this locality primarily because it is one of few areas in Canterbury where dairy farming has a long history and has established farms as well as farmers on conversion farms (dairy farms newly established on sheep/beef farms). It also has a long-established sheep farming industry. Furthermore, the area was far enough away from Christchurch and Timaru not to be affected by the growth in lifestyle farms or smallholdings.



(Scale: 2.2cm = 11km)

**Figure 1**  
**Map Showing the Location of the Study Area**

An approach using qualitative methods, in this case in-depth unstructured interviews and participant observation, was chosen as being the best way to ascertain farmers' perspectives. Though not a full ethnography of farming in the area, the report has an ethnographic focus in that a key aim was to develop an understanding and explanation of participants' experiences of technology transfer.

The field researcher stayed on a dairy farm in the Temuka area for four weeks in October 1994, and on a sheep farm in the Geraldine area for four weeks in November/December 1994. From this base farmers were interviewed using a snowball sampling technique. In the case of the sheep farmers, contacts made at a Federated Farmers meeting attended during the dairying phase of the research were also followed up.

An attempt was made to interview farmers who farmed in different ways by asking farmers interviewed for names of farmers who they thought would be interesting to interview. This approach identified farmers who farmed like them, and farmers who farmed differently. This proved relatively simple in the case of dairy farmers where farmers readily identified groups of farmers with different approaches and farming practices, but more difficult with sheep/beef farmers where there was more variation in practices and approaches between individual farmers. The sheep/beef farmers did not divide so readily into groups based on approach as did the dairy farmers.

Farmers were interviewed in their own homes and the interviews were tape recorded. The interviews were semi-structured and most took about one hour to complete. Farmers were asked to outline their farming history, concentrating on the changes they had made to their farming practices, why they had made those changes and where they had obtained the information necessary to make those changes. As the interviews proceeded topics of common concern emerged and farmers were asked about specific topics if they did not come up naturally. If farming partners were present and wished to do so they also participated in the interviews. In addition, informal discussions, observations and participation in farming occurred at other times, both on the farms where the field researcher was staying and at events such as discussion groups.

The interviews were transcribed, and then analysed using the Nudist qualitative data analysis computer programme to draw out common topics and themes among the farmers and to explore the differences between them. These were integrated with field observations to develop a full account of farmers' perspectives on farming change.

### **3.2 Background Information on the Farmers Interviewed**

According to local farmers there are approximately 48 factory supply dairy farmers between the Rangitata River and Timaru, of whom 32 were interviewed. Two town supply dairy farmers were also interviewed. For the Geraldine area, 29 sheep/beef farmers were interviewed. Below are data on the age, educational attainment, length of time in current position and farm labour for all farmers interviewed.

### Age of Dairy and Sheep/Beef Farmers

Age of farmers	Dairy farmers	Sheep/Beef farmers
21-30	4	1
31-40	12	4
41-50	15	12
51-60	0	10
61-70	0	1
71-80	1	1
<b>Total</b>	<b>32</b>	<b>29</b>

Most sheep/beef farmers (22 out of 29) were aged between 41 and 60 years, whereas most dairy farmers (27 out of 32) were aged between 31 and 50 years. Sheep farmers were in general ten years older than dairy farmers.

### Education of Farmers

Form of education	Dairy farmers	Sheep/Beef farmers
Primary school	1	0
Secondary school - 3 years or less (S.C.)	14	14
Secondary school - more than 3 years	4	5
Tertiary - diploma or certificate in Agr.	6	4
Tertiary - degree in agriculture	7	4
Tertiary - non-agriculture	0	2
<b>Total</b>	<b>32</b>	<b>29</b>

The level of educational attainment of the farmers interviewed did not vary greatly between sheep and beef farmers, except at the level of university degrees in agriculture, where there were seven dairy farmers and only four sheep farmers with these qualifications.

### Length of Time in Current Position

Number of years	Dairy farmers	Sheep/Beef farmers
1-5	12	6
6-10	11	2
11-15	3	3
16-20	3	11
21-25	2	4
26-30	1	3
<b>Total</b>	<b>32</b>	<b>29</b>

It is clear that in general dairy farmers have been in their current positions for a considerably shorter period of time than have sheep farmers.

**Farm Labour**

Type of labour	Dairy farmers	Sheep/Beef farmers
Farmer only	5	20
Unpaid family (labour usually the spouse)	12	10
Paid family labour	1	2
Part-time paid labour	1	0
Casual labour	2	5
Permanent labour	19	7
	32	44

N.B. Several farmers had more than one source of labour.

Far more sheep farmers than dairy farmers farm alone, and far more dairy farmers than sheep farmers have permanent employees.

## **CHAPTER FOUR**

### ***CHANGES IN SHEEP FARMING IN THE GERALDINE AREA***

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#### **4.1 Introduction**

Over the last 40 years sheep farmers have made many changes in their farming practices, some minor, and others that have revolutionised farming systems. Examples of these latter changes include the introduction of aerial topdressing (which allowed fertiliser to be applied to rough country), the development of electric fencing (which enabled the easy subdivision of paddocks and greater control of pasture and stock, leading to the introduction of all-grass wintering systems), labour saving inventions (which have enabled ever greater areas of land and numbers of stock to be farmed by increasingly fewer people) and developments in chemicals (including animal health remedies, pesticides, herbicides and fertilisers).

This chapter describes in detail some changes in the last 20 years in sheep farming from the farmers' point of view. These changes have been in the areas of breeding and lambing management, pasture management and supplementary feeds, animal health, marketing and diversification, and information sources. The changes within each aspect of the farming system are outlined, showing why farmers made (or did not make) changes to their farming practices, and analysing the factors that influenced their decisions. It will become clear that although there is much variation among farmers in their reasons for adopting and not adopting changes, within this group as a whole there are common philosophies and theories about farming, and to some extent the differences in practice among farmers are different paths to similar ends. These philosophies and theories orient farmers' attitudes and approaches towards innovations and change in farming practices, and have evolved in response to changes in the structure of the sheep industry over the last twenty years.

The process of deciding to change a particular farming practice or introduce a new practice can be complex, as a change in one aspect of management may have ramifications for many other aspects of farming, and may be difficult to reverse once introduced. Other decisions are comparatively simple, as the change is isolated and contained within one aspect of the farming system. In considering changing their practices farmers have to balance the comparative advantages and disadvantages of adopting a new practice against the topography and micro-environment of their property - is it possible to do a particular thing on their particular farm? If it is possible, what impacts will it have on other aspects of the system? Is that change compatible with their goals and aims, both farming and non-farming, and will it advance those goals and aims? Will the change be worth it in terms of the time and effort needed to introduce and manage it, and in terms of economic returns? For each farmer there are aspects of his or her farming system that they are willing and able to change, and others that they are less willing to alter.

We acknowledge that the complex decision making involved in changing farmers' practices is influenced by many well known factors, some to do with the farmers, some related to the innovation in question and some related to the industry in which the farmers are located. According to the literature, younger and more highly educated farmers are more likely to adopt new innovations than older, less educated farmers. Adoption of new innovations is also positively correlated with economic status. Furthermore, innovations that are less complex, divisible into stages or parts which can be introduced separately, comparatively inexpensive in terms of financial and intellectual input, and are compatible with other aspects of the farming operation are more likely to be adopted. Finally, innovations may be more likely when financed returns are stable.

While individual farmers have different personal goals in the short and long term, there are common goals among them. All aim to farm successfully, though success is defined differently by different farmers (Fairweather and Keating 1994). For some, success is the maximisation of production and top financial returns, for others success is to raise what they define as "*good stock*" and to "*farm well*". Goals and aims change across the life course. Younger farmers with heavy debt loadings farm to pay off that debt and to secure their ownership. Older farmers aim to pass the farm on to a son, and they use the farm as an economic base to do other things. These different approaches explain why some farmers have adopted some innovations and some have not.

The dominant themes which emerge clearly from the following account of farmers' experiences of changes in farming practices are: flexibility, safety, profitability and easy-care. These are interpreted in terms of two key orienting principles: increasing profitability and controlling risk by farming safely. While the above-mentioned factors do influence farmers' decision making regarding changing their practices, we argue that orienting principles also play an important role. These have been poorly documented to date.

This chapter begins by considering changes to sheep breeds. It then goes on to consider the other major areas of technology transfer and innovation that relate to farm production. In addition, two later sections consider changing practices that relate to marketing and diversification respectively, and a third section reviews sources and utilisation of farming information. All these sections are used to make conclusions about the orienting principles that guide farming practice.

## 4.2 Sheep Breeds

Sheep farmers aim to produce as much as possible off their properties (within self-defined boundaries on how much work they wish to do and how much money they wish to spend on inputs).

Farmers have changed their sheep breeds in order to increase production (e.g., changing to Coopworths because of their higher fertility), to steer their production in certain directions as a result of changing market requirements (e.g., the introduction of Drysdale to take advantage of the market for carpet wool and of Texels to get leaner meat), and to achieve other farming aims such as the reduction of labour at the same time as increasing production to achieve greater economic efficiency. In addition, the management of risk to achieve safe farming is a primary guiding concern for farmers. As part of a risk management strategy, sheep breeds are changed only in so far as they do not compromise the goal of the maintenance of flexibility in producing both wool and lambs, so they can meet the instability and unpredictability of markets for both these commodities.

### 4.2.1 Romneys versus Coopworths

Traditionally farmers in the Geraldine area have farmed Romneys, and some still do, though since the 1970s many have changed to Coopworths. Farmers changed breeds because of problems with Romneys, primarily to do with lambing. This breed change is associated with the trend in lambing management over the last twenty or so years towards less labour intensive, easy-care approaches. This trend towards less labour intensive farming systems is the result of changes in the economics of pastoral sheep farming, where fluctuating, though generally declining, prices for both lambs and wool combined with (at times) high land prices and interest rates, have reduced profitability, leading farmers to attempt to increase profitability by reducing labour costs and increasing levels of production.

Romneys, one informant said, "*are like Herefords and Angus, they're basic things*". Many of the farmers who do farm Romneys do so because they always have, many inheriting the flocks from their fathers, and have seen no reason to change:

*"We took over a fairly good flock from Dad. That was one of the main reasons. Wool-wise we could produce quite a good lamb, and the ewes were always mated with South Suffolk rams which gives an early draft plus an easy lambing. So once we had a good line of ewes we didn't chop and change, we couldn't see any benefit from changing."*

Romneys are a dual purpose sheep, though with a tendency to be stronger in wool production than in lambs. Even farmers who have changed from Romneys to other breeds said that they have lost wool production:

*"With the lambing percentage, we never did much over 100%, but as far as wool weights went we were well in excess of 5.5kg per head."*

Farmers said that Romneys do better on harder country than Coopworths and eat less:

*"This farm here, while at the time it was considered Coopworth country, it's a little bit hard and I don't think we're getting the maximum out of it. Now there are many different strains of Romneys that remain a Romney but with Coopworth characteristics as far as easy care is concerned. If we'd stayed with the Romney we probably would be in the same place, and I think we would have a slightly higher production."*

*"You can run more Romney's per acre than you can Coopworths, they don't eat as much."*

In the early 1970s many Romney farmers turned to Coopworths because of the perceived problems with Romneys, problems with lambing and production levels. Coopworth sheep have been bred out of a Romney base to overcome problems with Romneys.

Some farmers felt that Romneys were not being bred for production and for ease of management, which was what many farmers wanted:

*"The Romney breeders stuffed their own breed up. They just had them bigger and fatter and wool down to the end of their noses, small pelvises, they couldn't lamb. They've only just woken up in the last few years."*

Romneys were considered to be very labour intensive at lambing time and to have poor mothering instincts:

*"We changed because we were disillusioned with the Romneys, they're a hell of a lot of work at lambing time. When I came home to work in 1966 there were four of us here, 2,000 ewes and four of us full time lambing. Now two of us do the lambing for 5,500."*

*"We used to go round three times a day with the Romneys with two of us, we worked our butts off, just lambing. Because if they did manage to get it out on their own, which some of them did, they walked away from the lamb anyway. Terrible mothers, well the ones we had were."*

Romneys are prone to wool blindness which causes management problems:

*"I bought a property three mile away from here and Romneys are not nearly as mobile, they didn't shift well because they're wool blind."*

Farmers acknowledge that their criticisms of Romney sheep may no longer be correct, and that modern Romneys do not have the problems of earlier years, have higher lambing percentages and require less shepherding:

*"Romneys went through a bad patch then, they have improved since, but they were sods of things in those years."*

Coopworths are more of a 50/50 meat and wool breed producing less wool than Romneys. They were considered to have higher fertility and produce more lambs which many farmers find necessary as the price for lambs has declined over the last decade. This is one key reason for farmers' decisions to change to the Coopworth breed:

*"I couldn't put up with 100% lambing so I changed breed. With the new breed and identical management we get 140%, a terrific boost. With identical management we were consistently getting a 30% lambing off the Coopworths."*

*"The Romneys don't seem to be as good a mothers as Coopworths, and not as fertile, and lambing percentage has been pretty important lately because wool's been worth nothing, so you need your lambs."*

The higher fertility levels of Coopworths, with a greater number of multiple births, have contributed to easier lambing:

*"With the Coopworths you don't have to pull them anyway because there are so many multiple births you get away with it, they just make it so much easier. Last year I'd say they would have had to be dropping 185%, had to drop that, but there were a lot of deaths. Guessing, I probably got 150 sets of triplets."*

Furthermore, Coopworth lambs mature earlier than Romney lambs, which is an important consideration for many farmers as summer tends to be the time when there is the most pressure on feed:

*"Romneys are very late developers. There's two sorts of breeds of sheep, there's fat lamb breeds and there's wool breeds, and Romneys are a wool breed really so their lambs aren't mature until April on this country, so it's quite late."*

Farmers also said that Coopworths were more "vigorous" as a breed than Romneys and that they have "more brains" and are less "cantankerous".

There are disadvantages to the Coopworth breed though. According to farmers interviewed Coopworths do not produce as much wool as Romneys, and over the last few years Coopworth wool, being crossbred wool, has attracted very low returns:

*"What a lot of Coopworth breeders miss out on is they don't get the wool. But their argument is that the wool's not worth anything anyway."*

Coopworths do not last as long as Romneys do in terms of wool production:

*"As soon as the Coopworth's had a lamb her wool production falls away. They don't last as long as the Romney. You find that the Coopworth breeders have to keep a lot more ewe hoggets whereas the Romney will last longer."*

Coopworths too are less able than Romneys to cope with difficult conditions:



*"The Coopworths are all right when the goings good, but when the going gets tough they don't measure up. The drought years give high producing sheep a hell of a hiding, more so than low producing sheep. They've got the genetic ability to produce lambs and feed them, but if you haven't got the feed they just can't do it."*

The decision for a particular farmer to breed Coopworth or Romney sheep is a complex one as sheep breed has implications for other farm management practices such as lambing and pasture management. The decision involves weighing up the various benefits and disadvantages of the breeds in terms of marketing and management requirements, including labour requirements, as well as the suitability of a particular property for one or other of the breeds. Farmers changed to Coopworths primarily because of their higher fertility and easy-care management, resulting in greater returns to the farmer for the same amount of labour and similar inputs.

#### 4.2.2 Drysdales

Drysdale sheep were developed by Professor Dry at Massey University in the 1960s, and are basically, according to some farmers, a "hairy Romney" or a "mutant Romney". Drysdale rams became available to farmers via a carpet manufacturing company, which leased rams and for whom the farmers grew wool on a contract basis.

The five Drysdale farmers all changed to Drysdales (from Romneys primarily) because of the premiums offered on the wool, and also because of the contract buying situation which offered some certainty of price:

*"We went into Drysdales for the amount of wool they grew, and the fact that we were able to secure a contract with a carpet wool company which gave us a premium above cross bred wool of about twenty eight cents."*

They also changed breeds to cut down on the amount of labour that farming Romneys required:

*"We changed to Drysdales because we were disillusioned with the Romneys, they're a hell of a lot of work at lambing time."*

Because Drysdale sheep are more of a wool breed than Romneys and Coopworths, they were particularly appropriate for farms not well suited to finishing lambs:

*"A lot of this place faces the sun and we can dry out and we didn't want a whole lot of lambs around so we thought we'd be better off growing wool."*

Drysdale farmers liked the breed because they were good mothers:

*"Drysdales are pretty rough when you're dealing with them, they're very stubborn and they're not very scared of dogs. They're great mothers, very defensive of their lambs, they'll attack a dog."*

Being born comparatively woolly, Drysdales were tough enough to survive storms:  
*"They're born woolly, so they'll survive where a Coopworth might die."*

Drysdale sheep were regarded as only having low fertility - *"Their fertility is mediocre, usually 110% to 120%"* - compared with Coopworths in particular. They are *"also smallish and slow maturing"*. Because they are a wool-producing sheep and have long, straight, hairy wool they are prone to dags and require more time in the shearing shed, which is an added expense and extra labour:

*"With the Drysdales we're shearing all the sheep twice a year, and there are crutchings in between, so we spend a bit of time in the wool shed, so Drysdales are more expensive from that point of view. Drysdales have quite a problem with dags because of the long wool they grow."*

Because they are primarily a wool breed lamb production suffers, which means Drysdale wool growers lose flexibility in relation to the markets to some extent:

*"Drysdales don't grow fat lambs or prime lambs quite as well, they tend to grow more wool and meat. You can't guarantee getting a lot of lambs away before Christmas."*

These disadvantages were offset by the quantity of wool and the premium it has consistently commanded. Drysdale wool still is worth more than crossbred wool:

*"They grow lots of wool, very coarse fibred wool, a specialist carpet wool, and at the moment it's a bloody good price. It did drop like all the others over the last couple of years, but it's come up very quickly these last six months."*

Though the lambing percentage of Drysdales may be low, because they were smaller animals, a farmer could have a higher number of sheep per acre, and so end up with the same number of lambs as a Coopworth farmer with a higher lambing percentage:

*"They scoffed at Drysdales because we had only 110% lambing and they were getting 150%, but they didn't realise they only had four ewes to the acre and we had six, so we had more lambs. And our six ewes were producing about another kilo a head of wool, so we almost doubled them on wool production."*

Drysdale farmers took advantage of an opportunity that arose from the development of a new breed of sheep for a particular niche market, and capitalised on the premiums offered for the wool. Furthermore, changing to Drysdales was another way of avoiding the problems with farming Romneys as Drysdale sheep have the traits of good mothering and easy-care considered to be lacking in Romneys.

#### **4.2.3 Texels**

According to the seven farmers who have them, Texel sheep were introduced and heavily promoted by MAF some three to four years ago, along with other new breeds such as the Finnish Landrace and Oxford Downs. They heard about Texels from farming magazines and newspapers, and MAF ran field days on local farms at which Texel sheep were displayed. Both farmers with Coopworth flocks and farmers with Drysdale flocks have introduced Texels.

Most of the farmers who have introduced Texels into their flocks did so to improve their meat production, and use them as terminal sires, putting the rams over their older and poorer ewes. Texels produce leaner meat with less fat, which is why all of the farmers who have introduced them were interested in Texels in the first place:

*"They don't grow as much fat. They don't grow as fast as some breeds, but they produce good meat, less fat. We have a few problems with fatty lambs sometimes, and this seems to overcome it."*

Farmers also introduced Texels into their flocks because they were thought to have an earlier maturing date than primarily wool breeds like Romney and Drysdale:

*"We wanted to get them grown earlier. Romneys are very late developers, their lambs aren't mature until April on this country, whereas Texels are often ready much earlier than that."*

Another reason was to get a bigger sheep, one Drysdale farmer said:

*"When they came out I thought they might be suitable for crossing with the Drysdale to get a larger carcassed animal, because a Drysdale is a smallish sheep, and it's quite a slow maturing sheep, so I thought that by introducing a bit of Texel I may get a bigger framed animal."*

There has also been a spin-off benefit for some farmers with Texel wool. Texel wool is fine wool (around 32-35 microns), and has qualities which are currently commanding a premium:

*"The Texel wool was commanding a premium because it's such fine wool and it has a lot of bulk and elasticity which the wool board is demanding at the moment."*

A further benefit of the Texel is that it is a tough sheep that can cope well with adverse conditions, an increasingly important consideration given that the local climate is, according to one farmer, becoming more extreme and more erratic:

*"They've got hardiness. We had hoggets lambing there in the snow and the wet near the end of September, we had six inches of rain plus snow. We still ended up tailing 115 live lambs out of 120 hoggets, and they lambed in atrocious weather. They just seem such a hardy breed."*

For Drysdale farmers in particular the introduction of Texels has created some problems, particularly with wool quality:

*"Certainly we got bigger lambs, but I've found that the wool has deteriorated quite badly, it's just a mess. I couldn't market a lot of it."*

One farmer also reported that he had problems with their feet, and another said that he found that the performance of the Texels did not compare to the Black Face:

*"I was disappointed in the size of them. The sires are 10kg lighter than comparable Black Face sires which will show a 5kg difference in their progeny. Apart from that they're all right."*

There is no local consensus as yet on the relative merits of Texel sheep, and how they perform in the longer term and in different climatic conditions and on different farms in conjunction with other breeds is as yet unknown.

One farmer who breeds Texels and is very enthusiastic about their performance and potential said that it will be difficult to get the breed established:

*"It's been pretty hard pushing the breed. There's resistance from stock firms that have clients with a lot of money tied up in existing breeds, and they probably get a nice commission out of taking clients there for rams. I think the Texel has the ability to make the most significant step forward in our meat breeds, but it will be difficult for it to reach its potential."*

In general, Texels have been introduced by farmers to try to take advantage of the better returns offered for leaner meat. However, most farmers have introduced Texels in part, and only to the extent that they do not conflict with the retention of a balance between meat and wool production.

#### **4.2.4 Factors Influencing Changes in Sheep Breeds**

Changing sheep breed is something farmers approach cautiously, as the ramifications of a change are far reaching, with implications for lambing, shearing, grazing management and marketing strategies. Farmers introducing Texels, for example, are generally testing them on the older, poorer ewes rather than introducing them to the core flock. As well, the change from Romney to Coopworth was a change that happened slowly: farmers did not sell their Romneys and buy flocks of Coopworths, but bred their Romney flocks into Coopworth flocks using Coopworth rams. As with the Texels, Coopworths could be introduced slowly and the results tested on the poorer sections of the flock before the final change was made.

Farmers work to retain flexibility in their farming operations by maintaining a balance between wool and meat production as a safety measure in a situation of uncertain returns from volatile markets. They will therefore make changes to their breeds which they think will enhance their ability to capture the higher returning sections of markets. This can be seen in the case of Drysdale farmers taking advantage of a niche marketing opportunity, and in the case of Texels with farmers attempting to produce leaner meat. They will not do this however at the expense of maintaining a balance between wool and meat that allows them to operate with some success in both markets.

Farmers will alter their sheep breed when they perceive that the benefits outweigh the costs for their situation. Despite a widespread attitude that Coopworth sheep have higher performance and are easier to manage than Romneys, quite a few farmers have retained Romney flocks, indicating that the benefits reside not so much in the breed per se as in its suitability for particular farmers and farms. Most, but not all, of the Romney farmers were either older farmers or farmers with more extensive hill country properties. For the older family farmers, with smaller mortgages, the possible benefits of higher production did not outweigh the costs in terms of the effort required to change their systems. For the hill country farmers, Romneys were better suited to their farms, and they worked to breed out of their flocks the less desirable Romney characteristics.

Farmers generally changed sheep breeds in order to increase production (or to produce more appropriately for the market) and therefore to increase returns, at the same time as reducing shepherding requirements and developing easy-care management systems. This push for production though is constrained within a paradigm of risk management and safe farming, which guides farmers' approaches to changing breeds. In terms of sheep breed, risk is managed by the maintenance of flexibility in relation to markets through achieving a balance between wool production and meat production, and this is the overriding aim of many farmers.

### **4.3 Lambing Management**

Lambing is obviously a critical aspect of sheep farming, and farmers give a lot of thought and attention to lambing management. Whether lambing is successful or fails, is comparatively easy, or difficult, stressful or exhausting is acknowledged by farmers themselves to be largely the result of the farmer's ability and success at managing the process. However farmers admit that lambing is complicated and that some key influences are beyond the farmer's control. The following example encapsulates the multiple factors farmers have to balance correctly to achieve a successful lambing:

*"Ninety percent of your lambing troubles is the operator management, the six weeks prior to lambing is most important. You've got to make sure you don't overfeed, but don't underfeed either, and it's a very fine line. Practically it's not so easy as theoretically, because ninety percent of the time you're also short of feed, and there's*

*the elements to work against in August into the bargain. You think you've got a nice paddock of feed and two days of rain and you've got a mudbowl."*

Over time there have been several major innovations in lambing management, including the change to set stocking and more recently, pregnancy scanning. The change to set stocking occurred as a result of and in concert with changes in other aspects of sheep farming: higher lambing rates brought about by breeding and changes in breeds, and the subdivision of farms and greater control of pasture that arose as a result of developments in electric fencing. It also came about as a result of a more general impetus to less labour intensive farming methods, the need for which was accelerated by the rural downturn of the mid to late 1980s and the resulting decline in the amount of labour farmers could afford to employ. Scanning is part of a tendency towards closer monitoring in farming generally, which also includes soil testing and faecal egg counting.

#### **4.3.1 The Change from Shedding Off to Set Stocking**

One area of sheep farming in which there has been considerable change in the last fifteen to twenty years is in lambing management. Traditionally farmers used a system of shedding off, where the ewes were mobbed up, and each day (or twice or more a day depending on the lambing rate) sheep that had not lambed were shed off onto new pasture while those that had lambed remained. The change was to a system of set stocking, where ewes were stocked at a set number per hectare before they lambed and left in the same paddock until weaning.

The great majority of Geraldine sheep farmers now set stock for lambing. Those farmers who still shed off tend to be older farmers with comparatively small flocks of sheep. Behind the shift from shedding off to set stocking was an increase in the scale of farming with concurrent developments in pasture management and increases in the breeding capability of sheep, reductions in the amount of labour on farms, and reduced and unstable returns from sheep. The change to set stocking is part of a trend in sheep farming towards easy-care, less labour intensive management practices:

*"My father shedded off, but he only had 600 sheep. They all did it down at Clandeboye there, and a lot of them still do. It gives you the impression that you can look after the sheep better because you're seeing them all very easily, and twice or three times a day. When lambs were worth \$70 or \$80 it was worthwhile saving that extra lamb, but when you're getting \$17 a lamb it didn't matter if it died really."*

Almost all farmers in the Geraldine area now use a system of set stocking or semi set stocking, but a few still shed off. They shed off because they consider that that system is easier to manage and has benefits that set stocking does not:

*"We found it was easier. If you got a storm at least you had all your lambs in one paddock. You can't get round the whole farm and pick up cold lambs, you don't have time. You can put them in a sheltered paddock when it's getting stormy, and we have quite a few storms."*

These farmers also consider that shedding off creates more feed:

*"That's why I don't like set stocking. You've got all your paddocks set stocked, whereas with shedding off you're still rotationally grazing, and you end up with more feed and you get better lambs, I'm convinced of it."*

Shedding off is also the only viable method on some farms because of their topography:

*"Shedding off is the way hill country farmers have always done it because it's the only way they could do it. We didn't set stock them because we've got too many*

*creeks and things that lambs get into. We've got about six paddocks that are just not suitable for lambing."*

On a smaller farm there may not be enough space for successful set stocking:

*"I only ever have enough space to have them up to six or seven to the acre, and it's too crowded really, there's always trouble with mis-mothering."*

Shedding off has disadvantages though, disadvantages that became apparent to some farmers as other aspects of farming changed. Set stocking was the answer to many of these problems. Increases in lambing percentages made shedding off difficult:

*"When I had Romney ewes with percentages of one hundred or a bit over, I used to shed off in those days. But since I've been getting higher lambing percentages I've been tending to set stock. When I was getting 140%, shedding off was just a big balls up."*

With the larger numbers of twins from Coopworths mis-mothering of lambs became an even greater problem:

*"I had them all in one mob and you would shed off twice a day, morning and night. You got a lot of mis-mothering and a lot of pinching, that's quite prevalent under that system, but with the set stock system it's quite rare strangely enough. Not so many lambing I suppose, if there's an awful lot lambing they get all fired up. I had a lot of mess ups and created difficulties for myself by shedding off."*

Contributing to the problems of mis-mothering with so many sets of twins were aspects of sheep behaviour:

*"The theory is that sheep like to lamb in their own little possey, and they choose it several days before they are going to lamb, so by shifting them every day you end up with mis-mothering. She keeps going back there too. If you see a lamb without a ewe it's often best to leave it and check later, because if you move it she'll come back and won't be able to find it."*

Another problem that emerged with shedding off was that the last ewes to lamb had been eating new pasture every day for up to six weeks, which created bearing problems:

*"With the old system they were gorging and gorging, and I'm certain that brought on many of our lambing problems. Some of them had been eating for up to six weeks, getting the best of everything, getting a shift every day. By the time they came to lamb, the lamb was nearly as big as they were. It's always those last ones you got the odd hung lamb in."*

A further advantage of set stocking is that it is easier to manage than shedding off and requires less labour. One farmer said:

*"I used to do semi set stock, put them in a paddock ten or so to the acre, and then after three or four days shed out the ones that hadn't lambed. But that's become a bit awkward, the old fellow must be getting a bit older, can't run as quick, or the dogs are not as good, or the sheep are getting faster, or something. So I set stock now."*

*"You've got to be really on the ball to shed off, it takes a damn good stockman to do it."*

Set stocking overcame the problems of mis-mothering and overeating associated with shedding off to a large extent, though some farmers acknowledge that there are disadvantages to the system. These are the same reasons that the farmers who still use the shedding off system give for not adopting set stocking for lambing: reductions in the amount of pasture as the sheep are not rotationally grazed, problems with having new lambs scattered all over the farm if there is a storm<sup>1</sup>, and unsuitability of particular farms for set stocking.

Particular farmers weigh up the benefits and disadvantages of set stocking versus shedding off for their particular farming situation, and several use modified versions of the system which combine set stocking with periodic shedding off to reduce the amount of time spent checking the flock as lambing proceeds and to promote pasture growth:

*"I use a semi set stock system. With a set stock system, as lambing progresses there's a lot of paddocks where there's just a few lambing, so you spend all your time driving round the farm. What I do is about half way through lambing I shed off, take the unlambed ones out. I can reduce the lambing paddocks by about a half and I mob up the ones that have lambed. I carry on and periodically shed off until I've got just one paddock left."*

*"Most of them probably leave the ewes and lambs set stocked until weaning, but I find that you know more where your grass is and I find that the ewes in particular do much better if they are rotated. But my weaning date is a wee bit later too, I wean early in January."*

A major change in lambing over the last decade or so has been a change in attitude towards lambing, influenced by the declining profitabilities of sheep (and concurrent increases in lambing percentages) and reductions in on-farm labour. Many farmers have adopted a hands-off approach to lambing and do far less shepherding than was traditionally done. This change is directly related to the choice of lambing system: set stocking is inherently less demanding in terms of time:

*"Lambing's less intensive now. I do all the lambing myself. Two or three of us used to go round three or four times a day. Now I might go round once a day if I have to. I used to mark twins and mother them on, spend half the day mismothering lambs and spend the rest of it trying to re-mother them. Now I keep out of the paddock if I can. State of mind is the thing, that's the change. It was just tradition, you just did run around all day. Now with better management, not having them too fat, making sure there are no ewes with bad udders in the mob, its easy."*

Some of the reduction in the time spent shepherding is because sheep have been bred for easy lambing:

*"We don't worry about mis-mothered lambs. As far as I'm concerned if they get mis-mothered it's their problem. We adopt the attitude that it's got to be easy care. Any ewe that we touch, if it's a difficult birth, it's culled, it's progeny are culled. We've got the lambing side of it very easy."*

Most farmers have adopted an easy-care, hands-off approach to lambing, but not all have. Those who lamb more traditionally and mother-on were almost apologetic about it and acknowledged the extra work it involved:

*"I'm an animal lover and lambing is a full time job for me. A lot of people laugh at me, I'm daylight to dark, save everything. I just put on the wet weather gear and stay*

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<sup>1</sup> There has been an increase in the planting of shelter belts that seems to parallel the trend in set stocking for lambing. Farmers regard the weather as increasingly unpredictable and plant shelter belts as part of risk management strategies.

*out there, tie the ewes up and feed the lambs. I mother on a lot, skin lambs and mother on."*

*"I go round once or twice a day and if I find a spare lamb I bring it home, 'cause I'm soft. We mother up but a lot of people don't, we've got motels. A lot of people don't do that, but then they've got a higher percentage probably. It's work though, it's time consuming."*

These farmers indicated that they thought that their approach probably was not worthwhile in terms of labour and economic return, but that they did it because they liked sheep. It is interesting to note that farmers will not necessarily adopt new practices even though they may acknowledge that the new system is more efficient and economic in terms of labour if they do not fit in with their orientation towards farming.

#### **4.3.2 Scanning for Pregnancy**

In the last two to three years there has been a major new innovation in lambing management: scanning for pregnancy. Scanning is used by some farmers who set stock at lambing. It has not changed the way in which they manage lambing radically, but it has enabled them to fine tune the system. The practice is not yet widespread in the area, though all farmers know about it, and many are considering adopting it.

Scanning can be done for two purposes: to assess pregnancy, and to determine the number of lambs. Ewes are scanned for their pregnancy status and dry sheep are taken off the farm. Essentially this is culling dry ewes, which farmers have traditionally done after lambing. Pre-lambing culling allows farmers to conserve their feed for their in-lamb ewes:

*"We scanned for the first time this year and it was very good. We just did wet and dry and lates, and it worked really well to take the dry ewes out in July. They were sent to the works and they were gone. Over time hopefully it will improve our fertility too."*

More recently farmers have scanned for twins and singles, as this allows them better pasture utilisation and more control at lambing time, and the ability to monitor and improve the genetic potential of their flock:

*"I can see tremendous possibilities for doing it. We can lamb the singles on the rough country and put the twins onto better country. We can tag all the ewes that are twin rearers so that we can get into a flock with only twins, which is much better than marking the lambs as twins because you've got a huge fall out."*

*"In the spring the ewes that are singles don't need a lot of feed or the lamb gets too big, whereas the ones that are having twins need heaps and heaps of feed, because there's a huge difference in the survival rate of lambs from well fed ewes compared to underfed. We grain fed the twinning ewes, poured the tucker in. Any bearing problems that you have will come out of the twin mob so you've got half the number to look at."*

Having the single bearing ewes and the twin bearing ewes separated also brings benefits in the reduction of mismothering (as the twin bearers are more lightly stocked and have plenty of space), better pasture utilisation, especially in a drought, and better labour management, with more attention being given to the more valued and potentially problematic twin bearers:

*"I put all the single bearing ewes down on 70 acres of dry land and they were pretty short of feed but it worked quite well. Very easy care, sometimes I only went round*



*every second day when I got time. I just tore through on the bike, it didn't matter if you disturbed them, they only had one lamb each so it didn't worry them. Then because of the drought I had the space here to set stock the other ones at about four to the acre which worked excellently, with the twins there was very little mis-mothering. It was quite an easy lambing."*

Twin bearing ewes are not necessarily more likely to need handling at lambing than single bearing ewes, and controlling the feed intake of single bearing ewes prior to lambing can reduce the number of problems:

*"Usually it's the singles that have problems, if you don't ration their feed the lambs get so big inside them they have lambing problems that you create, so you stock them heavier."*

Not all farmers are convinced of the benefits of scanning, considering that it would not provide enough benefits compared to the costs (in time and money) for their farming system:

*"It seems to be a pretty expensive exercise. I know they say you can get rid of dry ewes early, but I don't think it pays for fifty cents a ewe."*

*"With the percentage I get now I don't think it warrants scanning. I'm only looking at 30 drys out of 1600 ewes, it's not worth spending the money. They say you can put them on better feed, but on my scale I don't think I'd get any advantage. I can see how the hill farmers could put their singles out on the hill to lamb and shepherd the twins, but on my farm it's not worth it."*

Those with very high lambing percentages in particular could not see any advantage:

*"Waste of time for me. We get 180% drop of lambs. Ninety per cent of ewes have got twins in them anyway so there's absolutely no point in doing it."*

Scanning for pregnancy is a good example of a new innovation that is widely known, and increasingly being adopted. While there are many benefits there are still situations in which farmers actively decide not to adopt this technology.

#### **4.3.3 Factors Influencing Changes in Lambing Management**

The major changes in lambing practice have been the shift from shedding off to set stocking and, recently, the introduction of scanning. The move to set stocking is part of the trend towards easy-care approaches to farm management. These approaches have developed as a result of the downturn in the sheep sector and subsequent reductions in farm labour. At the same time there have been increases in sheep fertility and stocking rates, and there has been a need to develop management practices suitable for this combination of circumstances. Scanning is an innovation which allows sheep farmers to increase their efficiency by allocating their feed to stock which will gain maximum benefit from it, and is part of a wider trend in farming towards monitoring farming practices to increase effectiveness and efficiency. In lambing farmers aim for maximum production, but balance this goal against the expenditure of time and money in labour.

#### **4.4 Pasture Management**

A current issue for many sheep farmers in the Geraldine area is pasture quality. A combination of recurrent droughts from the mid 1980s through the early 1990s and the mid 1980s crisis in pastoral farming (in response to which many farmers cut back on fertiliser inputs), has led to a perceived decline in pasture quality:

*"During Rogernomics I ran into two or three problems. I went from the biggest profit I ever had to a fairly large loss from one season to the next, and there was a drought thrown in there to help it along. So we stopped putting fertiliser on and some of the pastures deteriorated quite quickly."*

Many farmers said that in the last few years they have embarked on extensive pasture renewal programmes and are experimenting with new grass species. They have also considered increasing fertiliser applications since it has become financially possible. There is confusion and uncertainty about the comparative advantages and disadvantages of the new species, and doubt among some farmers as to whether the new grasses are as good as the advertising and experts say they are. There is also a wide variety of fertilisers available, more so than in earlier years, and this adds to the challenge of pasture management.

#### **4.4.1 New Grass Species and Pasture Renewal**

In making a decision about which grasses to sow and in judging the results of planting a particular grass, farmers consider and weigh up a number of elements and attempt to attain the maximum benefits with the minimum disadvantages. These elements are: pasture durability, drought resistance, endophyte level (which influences the incidence of grass staggers in stock), control of weeds, how well the stock will produce on the pasture and resistance to grass grub. For different farmers on different properties these factors will be weighted differently.

A particular species may work well for one farmer in a particular situation, and not for others, and this contributes to the difficulty of making a decision to renew pasture.

Farmers said that in the last few years there has been a dramatic increase in the number of grass varieties available, and many are currently experimenting with different species. The most common of these are prairie grass, cocksfoot (Wana and Kara), fescues, Gala grazing brome, and chicory. Each of these species are considered to have strengths and weaknesses, and to be suited to some farm conditions and aims and not to others. Because they are new species there is as yet no consensus of opinion as to their relative merits and faults:

*"We've got more drought resistant pasture around now than we used to, but we still haven't decided on the right pasture species yet. There's still reasonable debate, it's been going on for a year or two, the likes of fescues against the low endophyte ryegrasses. The Pacific Ryegrass was a new variety with low endophytes, but they found another trait that made the sheep heat up a bit. It seemed quite good then they took it off the market till they sorted out the few problems."*

In general sheep farmers like to farm safely (however this is defined by the individual farmer) and to minimise risk. The introduction of new varieties of pasture species is a component of strategies to manage drought risk, pest control, animal health and the feeding of stock, and decisions about which species to sow are worked out to maximise benefits and minimise negative outcomes in all of these aspects. In a situation where there is much conflicting information, slow, cautious change, or no change at all, is considered by many to be a sensible strategy.

While some farmers are actively pursuing new grasses, others are reluctant to change their grass species and emphasise the negative aspects of new species, including: their unproven nature, their poor results and the belief that they are expensive or difficult to adapt to particular farms. Some farmers are reluctant to adopt new innovations whose worth they consider has not been proven:

*"Those new grasses, well they haven't been tested over a long period have they? Most of the research has only been three or four years, they can't tell you if it's going to be there in ten years or fifteen years time."*

*"I've got pastures here that are twenty and thirty years old, and I'm fattening lambs on them. They're as good as gold."*

Some farmers have tried new species, but have been unimpressed with the results. The general problem with the new pasture species is that they tend to be much more expensive than the traditional grasses. They are also perceived to be more delicate and more difficult to manage: "You need to look after them" and farmers said:

*"There's always a down side, they're either very expensive to put in, or they're sensitive to spray, or they take a long time to establish, there's nothing easy unfortunately."*

As these grasses are new it is difficult for farmers to work out which particular combination of grasses will be most appropriate to their farm and their farming system, and to the particular micro-environments on their farms. Because of the amount of conflicting information and variations in experience with new pasture species in the area, many farmers are experimenting cautiously with new varieties, planting different grasses in different locations on their farms and monitoring their performance closely.

Often when a new grass species does not perform as well for a farmer as it has for his neighbours or as well as the seed companies say it ought to, farmers will explain this in terms of its unsuitability for a particular part of the farm:

*"I did put a hill paddock in prairie grass and that really wasn't suited to the wet clay downs and it didn't last all that long."*

When deciding which pasture species to sow and in evaluating a particular species' performance, farmers have to take a variety of factors into account and try to achieve some balance between them. They consider: durability, drought resistance, endophyte level, weed control production and grass grub resistance.

Given the number of droughts over the last decade and a perception among local farmers that the weather has become increasingly unpredictable and extreme, farmers are changing from the traditional ryegrass/clover pastures to species which are more drought resistant:

*"A lot of people in this area are changing their grass species. After that '86 drought everyone was looking at their grass species."*

Improved stock feeding is another reason for the change from ryegrass based pastures to more mixed pastures:

*"It's pretty obvious when you take your sheep down the road that they like to eat everything, not just ryegrass. Feeding the sheep a variety is the thing, we put in yarrow and chicory and things. The trend is back towards mixed grasses, not just straight ryegrasses. It shows up in the growth rate of the bulls. I weigh them regularly and you can see the benefit over the ryegrass."*

Grass staggers is an animal health problem caused by high-endophyte levels in grasses. As ryegrass ages endophyte levels increase and so farmers are both replacing older pastures and planting species with low-endophyte traits:

*"Some of the pastures were very old so we were very high in endophyte in the grass which caused grass staggers. It caused us terrible trouble in the sheep and the cattle and the deer, it was affecting growth rates. You couldn't shift a mob of sheep to do anything because half of them would be falling over in the paddock. So I decided to*

*introduce some of these newer varieties of grasses, grazing bromes and fescues and chicory to try and help that problem."*

Pasture renewal is one of the more difficult areas for farmers to begin changing their farming practices. There are many factors to weigh up and a variety of species available. Some farmers are reluctant to change grass species but some are finding good reasons to change. The issue of pasture renewal illustrates one of the more difficult decisions farmers face. In such cases there are strong opinions on both sides of the issue and a slow, cautious policy is a sensible strategy.

#### 4.4.2 Fertiliser

Regular applications of fertiliser is a cornerstone of pastoral farming, essential to the continued fertility of the farm and to the maintenance of the high stocking rates currently found amongst farmers. Reductions or cessations in fertiliser applications lead to a rapid decline in pasture quality and in production. Farmers aim to apply fertiliser to their pastures every year. They apply superphosphate annually, and many apply lime every five years or so. In less accessible country fertiliser is applied by plane. The philosophy of many farmers is to put on as much fertiliser as they can afford:

*"When there was a bit more money you did it annually without thinking"*

*"Farmers put it on when they've got the money. A lot of people are like that, put on as much as they can afford to."*

All farmers recognise and understand the importance of fertiliser for the continued productivity of their farms. However, almost all farmers admitted that during the 1980s they had not put any on because they could not afford to. It is interesting that despite universal recognition and acceptance of the necessity of applying fertiliser, in an adverse economic climate almost all farmers ceased applying it:

*"Over the dark years, the Roger Douglas years, we all let our farms go. Our P levels used to be 15, 16, and the majority of them now would be 4 to 12. We're all trying like hell now to get them up to the twenties. People cut back a lot on fertiliser and now they're all trying to get the levels up again. Sheep farmers fell behind, but if you'd kept it up you wouldn't be on the farm today, so there was no choice."*

*"In the last 20 years there's probably only two years we haven't put any fertiliser on. Even in the really bad years we kept it up, it's the lifeblood of the farm. I've seen too many drop it off and the next thing their pastures go to pieces and they can't fatten lambs."*

*"I like to put 250kg per hectare on, but it's like all farmers, the only way to get some cash is to cut your super. That's cutting off your nose to spite your face, but it's the only way to get more cash and so in the eighties I didn't put any on."*

Farmers are now applying fertiliser again. Some are applying large quantities of super because of low levels of fertility after the 1980s, but many are now being more selective and focused in their fertiliser application programmes. They do this through soil testing:

*"They say a maintenance dressing is 200 [kg per hectare], but it's a pretty tricky area this soil fertility. Over the last few years one of the big changes in farming is soil testing, being able to get paddocks tested to see where any deficiencies were. Years ago there was none of that. You'd make the wrong decision, go and put heaps of lime on, when it doesn't need lime at all, it needs superphosphate."*

With soil testing farmers are able to monitor the fertility of their farms more closely and apply fertiliser more appropriately and selectively:

*"I did soil tests to establish the pH levels and it moved the fertility of the farm up very rapidly over that time. Now I'm not putting quite as much on, 175kg now, which was the rate that gave the best response in a trial on a similar soil type. I'm specialising now, when it looks like a feed shortage I'm using nitrogen."*

The biggest change in fertiliser since the introduction of aerial topdressing is the introduction of nitrogen, which is used increasingly by sheep farmers. Applications of nitrogen to boost grass growth are common amongst dairy farmers and the practice is promoted in the farming magazines. There have been field days in the area at which nitrogen use has been advocated. Farmers said that nitrogen use to control pasture growth was something they had learned from dairy farmers. Sheep farmers use nitrogen to grow grass to increase production, and to feed cattle, which many farmers run along with sheep:

*"I suppose really we are heading towards the dairy type management sort of thing, nitrogen in the spring and autumn just to grow as much feed as possible..."*

Though quite a number of farmers indicated that they were interested in nitrogen and thought that they probably would use it, there is anxiety among some farmers about the consequences of using nitrogen:

*"I don't believe in nitrogen, the humus in the soil just dissolves. Nitrogen uses up the humus which is what the whole soil structure is based on, and if you use up your humus you're up the creek. It's happened in Europe a lot."*

Changes in fertiliser use are not fundamental changes, farmers are simply refining and tinkering with practices and systems which are well established and well understood.

#### **4.4.3 Factors Influencing Changes in Pasture Management**

The current experimentation with new grass species and farmers' approaches to fertiliser applications have been significantly influenced by the recent history of sheep farming. Fertility levels declined in the 1980s because of reductions or cessations in fertiliser applications, and pasture renewal programmes are designed to improve this situation. New grasses are being experimented with by farmers to increase production through the improved feeding of stock. Achieving the objective enables them to farm more safely.

Working against the introduction of new pasture species is their unproven nature, and the perception that they can be difficult to manage and expensive to sow. Despite this, and the difficulties of working out what grass is most suitable for a particular property, many farmers are experimenting with new grasses as the concern with improving pasture is very high. While there is uncertainty with new grass species the situation is less complex when it comes to fertiliser application, and farmers are making decisions to change their practices quite easily in this area. These data show that where there is experience with a technology (such as fertiliser) the decision to change practices is easier, while for new technology (such as new species) the decision to change practices is complex and farmers adopt a very cautious policy.

### **4.5 Winter Feed and Supplements**

Many sheep farmers aim to build "buffers" into their farming systems, to provide insurance against the vagaries of the weather and the economy. Buffers in farming systems are one way in which sheep farmers manage risk. In terms of winter feed and supplements the creation of buffers (by growing winter feed crops and/or by stockpiling silage, hay or grain) allows farmers to be sure that they can feed stock regardless of the weather. Farmers said that the weather has been extreme and unpredictable

in the last decade or so, with several serious droughts and the "big snow" in 1992 and for many the creation and storage of feedbanks has been a concern. The creation of feed buffers shows in two ways: in the return to growing winter feed crops rather than all-grass wintering, and in the trend from making hay to making silage, silage being a higher quality feed than hay and one which can be stored almost indefinitely.

The decision about how to manage supplementary feeds is a complex one, and there are several solutions available, all with pros and cons that farmers must balance up for specific circumstances. The answers to the questions of whether to grow a winter feed crop, whether to rely on hay and/or silage, and whether to make chopped silage or baled silage are constrained largely by the economics of production and feeding out given the financial position of the particular farmer, and by the limits imposed by the topography of the farm and labour availability. The aim for many farmers is to achieve higher production with minimum labour and minimum costs in inputs, though this aim is countered by the need to manage what are perceived to be the greater risks and uncertainties in farming currently.

The two key points that emerge from sheep farmers' talk about supplementary feed and the changes they have made in this area are risk avoidance and safety in unpredictable climatic conditions, and reductions in labour as the profitability of sheep/beef farming has declined and forced many farmers to farm alone.

#### 4.5.1 Patterns of Change in Winter Feed

In terms of winter feed, there has been a change from growing winter feed crops, to all grass wintering, and back to cropping again. These changes have been caused largely in response to pasture fertility as a result of reductions in fertiliser applications in the 1980s. Given unstable climatic conditions many farmers consider that all-grass wintering is no longer a "safe" practice. Not all changes in farming practice are new innovations; in certain circumstances farmers will resurrect old practices.

Traditionally sheep farmers in the Geraldine area grew crops such as swedes, turnips and chou-moellier to provide winter feed for their sheep and cattle. Then around 15 to 20 years ago, all-grass wintering was introduced into the area:

*"Everything was cultivated then, no all-grass wintering. Everything was wintered on swedes and chou. Then we went to an all-grass wintering system rather than relying on paddocks of swedes and chou."*

The development of permanent and temporary electric fencing was instrumental in allowing the development of all-grass wintering. It cut down on the labour needed to break-feed stock, improved farmer ability to contain stock, and enabled better utilisation of crops and grass through subdivision. It gave farmers more control over the feeding of their stock.

*"We used to grow winter feed for our sheep and it was a hell of a business. We used to winter feed our sheep out on the hills and it was one step up and four back carrying the rolls of netting on your back, that was in the days before electric fencing. With electric fencing you can contain stock. I can erect 100 metres of that in five minutes. You can subdivide a lot more easily and utilise grass so much better, you can feed the sheep the right amount every day."*

Most of the farmers had taken up all-grass wintering because of the benefits in terms of labour and cost savings and increased efficiency in grazing management:

*"We used to grow acres and acres of swedes years ago. I've grass wintered for 15 years I suppose, it saves sitting on a tractor. It used to be a big expense. There was a boy working here, used to employ him to drive the tractor to feed the sheep to pay his wages to drive the tractor to feed the sheep. Round and round in circles, wearing*

*out tractors and gear. So I decided I'd do it on my own, so I just dumped all the gear, put it in the shed and covered it and I haven't worked a paddock since then."*

All-grass wintering was promoted at field days and in the farming magazines, and was taught at Lincoln University, but it was not really a new system, farmers said:

*"Grass wintering had been around in Southland for 15 or 20 years. There were people round here doing it, but not many."*

Not all farmers chose to adopt all-grass wintering systems. These farmers saw the system as too risky, with potential costs outweighing benefits, and considered that all-grass wintering was not compatible with their farming situation:

*"With all-grass wintering sooner or later you get caught in a bad winter, or a bad autumn and you can't get enough grass, then it becomes very expensive. Only six or seven years ago none of them had any free hay, they had to pay tremendous dollars to graze their sheep off the farm. They got caught in a dry spell and couldn't build up a feed bank."*

*"I've never all-grass wintered, I grow winter feed, turnips, chou and hay. Our stocking rate is too high to go on all-grass, and we get too much drought."*

In the last few years, though some farmers have gone away from all-grass wintering and have started growing root crops again to feed their stock over the winter. The major reason given was that all-grass wintering is no longer regarded as "safe" because of climatic changes:

*"I was a total all-grass farmer for 15 years, but I found in drought years with dry autumns that you ended up pretty short of grass, and you were feeding a large quantity of hay and silage. You spent the whole winter doing nothing but feed out supplements, it was high in work and the stock were suffering. So I've gone back to growing winter feed and making less silage and hay, and one of the reasons for that is the cost of making supplementary feed, it's increased quite dramatically."*

Associated with climate changes has been the decline in pasture quality that farmers said occurred as a result of reductions in fertiliser applications in the 1980s. Presumably, the financial restrictions of that period also meant that pasture renovation was also postponed. Pastures are no longer growing enough high quality feed to make all-grass wintering effective. The need to renew pasture and the increase of winter crop growing are closely linked:

*"We used to be all-grass wintering but we found it was getting harder and harder to finish lambs. So we looked at their requirements and the pastures needed renewing."*

A return to fodder crop growing is not the only answer to the problems of all-grass farming in a situation of uncertain climates, pasture fertility decline and pasture renewal programmes. One farmer manages by increasing and decreasing stock numbers, particularly cattle numbers:

*"I'm more flexible in the autumn now. If I can see we're short of grass, we're heading into winter and there's not much hay on board, the numbers just get cut down, don't buy cattle or something like that. I didn't buy cattle one year, we had a bad year, cut the ewes down to about 1700 and had 400 hoggets and just gradually built stock numbers up when the seasons came right."*

This is an example of an atypical response and illustrates the diverse ways farmers change in response to changing problems. The change to winter feed by using root crops illustrates a change to an earlier

system, showing that changes in farmers' practices may be quite conservative, albeit in response to different causal factors.

#### 4.5.2 From Hay to Silage

Even those who have returned to growing fodder crops make hay or silage. Traditionally sheep farmers primarily grew hay as a feed supplement. The major change in hay making over the last decade or so has been the change to large square and large round bales. The advent of large bales has greatly reduced the labour requirements of hay making. Contractors bale the hay, and it can be carted to sheds and fed out again by one person on a tractor. Some farmers still make some small conventional bales as they are convenient to feed to small numbers of stock, and as a lot of farmers still have older-style haymaking equipment, it is cheaper and more convenient to bale small amounts of hay themselves rather than get a contractor in.

While most farmers still make some hay and like to have their sheds full as "insurance", many now make most of their excess grass into silage:

*"It's been traditional to make hay. Over a period of 30 years guys have been geared up for hay, so that's what they make. Around here it's probably about 50:50 hay and silage now, a big change in the last five years."*

There has been a lot of publicity about silage and silage making in the farming literature over the last few years, and there have been several field days in the area. One farmer said, *"I'm probably finally going into silage because I've read so much in the paper about it."*

Silage is considered to be a higher quality feed for stock than hay, one that will lead to higher production:

*"In the last ten years I've been making silage. It was all hay before that. Silage is a higher quality feed, they can actually exist on it if they have to whereas they can't exist on a solely hay diet. Because a lot of my pastures are old the hay isn't that good a quality, there's not a lot of quality in it."*

Furthermore, farmers said that the stock prefer silage to hay:

*"Last year I put out what I thought was reasonable hay in a rack for the calves and took some silage out, and the hay sat there for about a fortnight, they just occasionally chewed at it if there wasn't enough silage."*

Only one farmer said that he does M.E. tests<sup>2</sup> on his silage. He does this so that he can feed out the right amount of silage for his stock's needs. M.E. testing is very new technology, and is part of a wider trend in farming towards increased monitoring:

*"We try to get each paddock tested to get an idea how much to feed out. We didn't do it the first year, but then there was more publicity about poor quality silage, so we thought we'd better sample it."*

Aside from being high quality feed, another benefit of silage is that it is easier to make than hay. Given the uncertain and unpredictable climate, hay, requiring a period of several days of fine weather to dry before it is baled, is more difficult to make:

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<sup>2</sup> Metabolisable energy (ME) is "the energy available for use by ruminant animals from feeds such as pasture" (Nicol 1987:144), and tests have been developed to measure the amount of ME available in different types of feed.



*"Some years it's very difficult to make hay up here, difficult to get it in. With silage you're not so much at the mercy of the weather, you can cut this afternoon and bale it the next day."*

Some farmers who graze dairy herds are also putting in silage pits so that they can be sure that they will be able to feed the cows:

*"I'm going to put in a 500 ton pit of silage for the dairy cows this year if I can, just as an insurance, so I can guarantee that I can take the cows."*

There is debate amongst farmers as to the relative merits of pit or bun silage versus baled silage. Pit silage has advantages in that it is cheap to make, and keeps almost indefinitely:

*"That's the beauty of a bun or a pit, it's cheaper, and you can put it down and it keeps for God knows how many years."*

The down side for many farmers is the capital outlay needed to be able to feed out pit silage safely (or at all) on the hills in wet conditions. Feed wagons make a mess of paddocks, and the capital outlay required for the machinery to feed out pit silage is considered high:

*"A bun is the best, but then you've got to go to a wagon. It's the tractor not the wagon that's the problem. You can grab a wagon for ten grand for a second hand one, but it would be too dangerous dragging that much weight around with a two wheel drive tractor in winter, because some of it's a bit hilly and a bit wet. You have to have a four wheel drive tractor for safety reasons."*

*"There's a lot of money involved. I'm stuck with a 60 horsepower tractor and this year when it was so wet in the winter I wouldn't pull the silage wagon around, it kept getting bogged. You have to get a feed wagon and a grab and a bigger tractor, and you have to get it all at once."*

Baled silage or balage is more expensive to make per bale than pit or bun silage, but does not require the same investment in machinery. Many farmers already have the equipment necessary to feed out large round or square bales of hay, which can also be used to feed out bales of silage:

*"Mainly it was the cost factor why I went to baled silage. It's dear to go into pit silage, you need an expensive feed out wagon. While conventional silage is probably the cheapest on area, you need the ideal country to carry the heavy wagon around, and I didn't have a four wheel drive tractor to haul it. So the only extra cost with balage was per bale, and with the contractor I didn't have to buy any more equipment. Some of the critics say it's an expensive way to make feed, but if you get hay wet and its poor quality it's an expensive exercise in making rubbish."*

Balage is also considered to have advantages in terms of labour for the one-man unit farm:

*"I'm a one man band, so I've got to keep it as simple as possible. The baled silage fitted the bill ideally with being able to lift them onto the feed out unit for hay. It's a simple one man operation. It's easier to feed out."*

Another advantage is greater management control:

*"It's convenient too. You can get a paddock sample analysed, weigh the bale on the cattle scales and find out how heavy it is. It's much easier than trying to tear it out of a pit and get the accurate amount to feed out."*

Some farmers have had trouble with holes in the plastic coverings letting air in and spoiling the silage - managing balage can be problematic. Farmers also have different opinions on which type of balage is best: individually wrapped, a covered stack, or tubes:

*"I see some of them are using those big tubes now, cheaper, but you run the risk of damaging several bales if you get a hole halfway along. We've found that while the single bales are a wee bit more expensive you're more likely to get a better quality feed for the stock."*

*"I did have a bit of trouble with sticks. Sticks puncture the cover and let the air in. With a tube rather than a stack even if you do get a stick you only lose one bale. They say mice can get into it too."*

*"I like the square bales in the stack that's covered because they're cheaper than individual wraps."*

Aside from the expense of balage, there are other problems. Balage does not last as long as pit silage does:

*"Some fellows say two years, piece of cake, but if they could say five years, then I'd do it. It seems such a pity, if you have a big heap and you have lots and lots of grass, and you're worried about the covers and you've got to go and feed it out."*

The problems of storing balage over a long period of time is the most important consideration in farmer's preference for pit silage, because one of the major purposes of silage is as insurance. Some farmers have pit silage as well as balage, the pits being kept as a back up for times of drought or snow:

*"We'll build up a bank of silage, we've got to make provision for a snowstorm so that we can transport the feed to the animals wherever they are."*

*"We've got three big pits, they're all full. They're more of a drought strategy sort of thing."*

Again, the removal of agricultural supports in the 1980s is a reason for farmers stockpiling silage:

*"The subsidies took out the troughs. If there was a drought we used to get help, now we don't, so we either make more silage or carry less stock or grow winter feed, we do our own insurance."*

As with many of the problems facing farmers, there are always other alternatives. A few farmers use grain as their insurance against the vagaries of the weather:

*"I think that grain is the cheapest form of feed going, people don't realise the value of it. It's the easiest thing out to store, it doesn't take much room, it's high powered feed, and it's easy enough to grow. I have about 60 ton of barley that I keep on hand as a backstop, it just stays in the silo, I've got it there as an insurance."*

One farmer said that he trains his hoggets to eat grain each year, so that if there is snow and they have to be shedded up and fed on grain they know what it is and are prepared to eat it.

Instead of making only hay for winter feed farmers now have a variety of winter feed options including silage in different forms and grain. There are a variety of ways to preserve silage and a variety of machines involved in using it. The changes in stored winter feed practices are considerable. Using more silage has increased the quality of stored winter feed and it provides insurance against adverse

climatic events. The decision to use a particular storage method is a complex issue for any particular farmer.

#### **4.5.3 Factors Influencing Changes in Winter Feed and Supplements**

The main changes currently taking place in the management of winter feed and supplements are the return to growing winter feed crops and the shift from hay making to silage making. Farmers have made these changes primarily to enable them to farm more safely by ensuring that they have enough feed on hand to cover any climatic eventuality. This is indicated both by winter feed crops and by silage stockpiling, and by the use of grain by some farmers. Once again for farmers, there are several paths to the same end, and which path a particular farmer takes depends on his economic circumstances and his particular farming situation.

Farmers are constrained in the type and amount of silage they manufacture by the economics of production and feeding out and by the topography of their farms, but generally the change to silage production is widespread and widely accepted as beneficial.

### **4.6 Animal Health Management**

There are several diseases that sheep are, or have been in the past, seriously afflicted by: worms, footrot and abortion. Each of these diseases poses, or has posed, a significant threat to the health, and therefore the productivity, of the flock.

Some animal health issues, such as footrot and abortion, are comparatively simple problems which can be controlled easily by drugs or culling and which do not impact on other aspects of farm management. Footrot is really no longer a problem, and abortion is a matter of weighing up the likelihood of an abortion "*storm*" and the resulting costs in loss of lambs against the cost in labour and money of inoculation.

The control of internal parasites on the other hand is more complex with implications for pasture management and lambing practice now that worms are unable to be easily controlled with drugs. With set stocking on a smaller farm it may be difficult for the farmer to create "*clean*" pasture, particularly as lambing hoggets is becoming increasingly common. It may become difficult to maintain high stocking rates, which has serious implications for the viability of many farms, and concern over drench resistance is one of the reasons for the increasing proportion of cattle on Geraldine sheep properties.

Farmers tend to change their approaches to animal health management when existing remedies or approaches fail. Animal health is managed with strict cost/benefit ratio calculations, and at the present time, with the price of sheep depressed and farmer incomes low, many farmers have adopted a programme of culling in an attempt to eradicate health problems from the flock.

#### **4.6.1 Worms and Drench Resistance**

There are major changes currently occurring in the management of parasitic worms in sheep, as farmers respond to the threat of drench resistance. Farmers are currently altering their management practices in an attempt to reduce their reliance on drenches to ensure that the drenches remain useful for as long as possible. These management practices include reductions in the frequency of drenching by monitoring the worm burden in the sheep with faecal egg counts, pasture management systems utilising cattle, and culling for susceptibility to worms in order to breed a worm-resistant flock. Farmers are making these changes because the existing management regime is no longer functional: they have very little choice.

Internal parasites are a major health problem in sheep, particularly so for lambs. As sheep get older they develop some immunity to worms. High stocking rates also contribute to the development of worm problems, causing egg build up on pastures. Traditionally farmers have managed the worm problem

through a combination of a drenching programme and pasture management. Lambs were drenched every three weeks without fail, *"I used to drench like it was going out of fashion"* one farmer said, and types of drench were alternated every drenching. Farmers attempted to wean lambs onto *"clean"* pasture, which is pasture that ewes had not been on for some time, and is presumed to be relatively free of worms.

In the last few years there has been increasing concern among farmers about the development of resistance to drench among parasite populations, and farmers are having to alter their worm management practices to avoid and/or combat this:

*"The resistance problem with worms and lice is going to be a major problem for farmers, it's just the beginning."*

Drench resistance has developed, farmers said, partly because of past over drenching:

*"You used to religiously drench them every three weeks whether they looked like they needed it or not, and that's probably contributed to weakening their resistance."*

A further factor contributing to the development of drench resistance was under-drenching by farmers:

*"You've got to be so careful that you don't under drench, because if there is a worm problem the worms will build up immunity. Some farmers have been careless in calibrating their drench guns or underestimating the weight of the lambs."*

Interestingly, though most of the sheep farmers said that there was drench resistance in the area, particularly to the white drench family, only one farmer said that he thought he had resistance on his property. The farmer who said he has resistance put it down to his past drenching practices:

*"In hindsight I should have been using a clear drench for a season and then a white drench. But I'd try to keep the cost of drenching down, use an expensive drench and then a cheaper one."*

Farmers are developing new strategies to cope with the possibility of drench resistance. Drench resistance is most common with the white drench family, and as yet there is no evidence of resistance to the Ivermectin family of drenches. Farmers are now using this drench family, though it is far more expensive than the others:

*"I'm on Ivomec this year, and that's the first year I've used it. I've been putting it off and putting it off. It's very expensive but there are no cases of anything being resistant to it to my knowledge, no proven examples of it in New Zealand."*

Another solution is to use a drench which is a combination of the white and clear families:

*"This combination one is the first time I've used it. It's a relatively new product, a white and a clear drench. If you have a resistance problem with the white drench then the clear drench is obviously going to clout it so it shouldn't be a problem."*

Extender, or slow release, capsules which last for a longer period are another new development in drenches, and farmers have found them successful. They are very expensive though:

*"The capsules have been out for a couple of years, but it's so expensive. It's about three dollars each, we're used to paying ten or fifteen cents to drench a sheep. It's a slow release capsule and it's supposed to keep them worm free for 100 days, and it's certainly noticeable how clean the ewes kept. The ones I didn't do got quite dirty."*

The Vedectin injection which is "midway between the oral drench and the extender in length of time" is another option. Some farmers worry though that injections and extender capsules will create resistance in worms. They say that the dosage will tail off near the end of the period, and dosages that are not strong enough allow the worms to develop drench immunity.

Farmers are also experimenting with reducing the amount of drenching they do:

*"I used to drench like it was going out of fashion, but this year I'm doing a bit of an experiment. May was the last drench my hoggets had, they've come right through the winter, been shorn, and out of 500 there's probably 25 got a few dags on them, the rest are as clean as anything, they're looking good. It's another job less to do too."*

Some also allow their sheep to "get a little wormy, to try and give them some natural immunity".

Aside from taking advantage of new drench products on the market, farmers are using pasture management techniques to control worms:

*"The other thing is to spell your pastures for so long that the worms don't have a chance to hatch, so it goes past that period. You need to wean your lambs onto pastures that haven't been touched by sheep for quite a while."*

Grazing cattle is a common way of creating clean pasture for sheep:

*"I use the cattle to improve the pastures for the sheep. In the spring I rotate the cattle and the hoggets around part of the farm so that when I wean the lambs in December I've got a percentage of the farm that's relatively clean of worms. There's not all those eggs lying there, so they're not going to re-ingest it and start the cycle again."*

There is a belief among some farmers that resistance to worms is in part an inherited characteristic and they are breeding and culling to create a worm resistant flock:

*"We're on Animal Plan and as I understand it we'll get a list detailing which sheep have worms and which don't. It's to identify sheep that don't have worms or have a very low worm count and the idea is that you've got a flock that have damn all worms so they're not spreading them. It will be interesting to see whether the ones that don't have worms come from one ram or not, to see if you can breed for not getting worms."*

In order to be able to control worms while reducing the frequency of drenching, and to determine whether the drenches they are using are effective or not, farmers are beginning to monitor the extent of worms in their sheep through faecal egg counts:

*"As far as I know we've got no drench resistance. We've done egg counts after we've drenched and the drenches have worked. For the last three years we've been on a minimum drenching programme, so rather than drenching every three weeks they've been drenched every eight or nine weeks."*

This saves labour and money as well, if by testing a farmer can avoid drenching:

*"Last year I cut out three drenches by using worm egg counts. I was due for the three weekly drench and I didn't think the lambs looked as if they needed it, so I did a count and there were very low eggs so I left it for a couple of weeks. I saved a bit on drenching that way."*

Until very recently egg counts were done by veterinarians, but in the last year home testing kits have come onto the market and several farmers said they were considering buying them to save money:

*"We're going to buy one of those home worm testing kits. You can take faecal samples from the sheep and send them away to be tested and they send you the results for \$40. Every time you drench you should test them beforehand to see if they have got worms, because they could be dirty without needing worming necessarily, and then you're supposed to test them afterwards to make sure that it's worked, so it becomes a bit expensive. But the kit is only \$250."*

Recent research has indicated that tape worms, which were thought to be of no importance in sheep, do have an impact on animal health, so farmers are now taking another type of worm problem into account:

*"This is the first time I've used a tapeworm drench. I saw a few segments in some of the lambs and I thought it was warranted. In the past they thought tape worms don't affect lambs, so a lot of the drenches don't deal with tapeworms. But they did a trial recently and found that killing tapeworms had a significant increase in live weight gain, and less dagging and less flystrike. It's very expensive though, \$450 for ten litres."*

Farmers are just beginning to learn how to deal with the problem of drench resistance, and are anxious about the future. There are differing opinions about what constitutes clean pasture, and how to manage rotations and drenching. A lot of farmers hope that science will rescue them from the drench resistance problem, but do not believe that this will inevitably happen:

*"I hope the scientists come up with another type of drench, but they say there's nothing in the pipeline at all at the moment. Though with Ivomec, if we're prudent in the way we use them we should be right for four or five or six years."*

Farmers seem to be very aware of changes in drench resistance and are pursuing a variety of responses including using new products, reduced drenching, grazing management, culling and monitoring. Some of these changes entail complex alterations in management practice.

#### **4.6.2 Footrot**

Footrot used to be a problem among sheep, causing enormous amounts of work for farmers, who had to run the sheep through a foot bath and/or trim rotting feet. The problem has all but disappeared. One reason for this is improved health in sheep as a result of worm control:

*"Dad used to have footrot but as soon as he started drenching the footrot disappeared. The worms made the animals weak and they became susceptible to other diseases."*

The main reason for the decline in footrot has been culling:

*"Footrot was a major problem, but we've got over it through culling, particularly on rams. Any rams that got footrot the dogs ate, any ewe that was lame at weaning time, just drafted it."*

The decline in the incidence of footrot has reduced labour requirements as well:

*"When I came here there were ten staff, now there's five. One of the things is there's no footrotting to do. They used to put all the sheep through the trough, it wasn't*

*particularly successful and it was quite a lot of work, now we don't do anything for footrot."*

#### **4.6.3 Abortion**

There are two types of abortion in sheep, fibrio campylobacter and toxoplasmosis. Both types of abortion can be managed through inoculation, toxoplasmosis by one injection which lasts for life, and fibrio by two injections in the first year of life and an annual booster thereafter. Some farmers inoculate and some do not, and some inoculate for one type of abortion and not the other. Whether they inoculate or not is decided upon primarily by their recent (last ten years at the outside) experience of abortion compared with the cost in time and money of inoculating. One farmer said:

*"With the fibrio the highest I ever had was ten percent of the ewes, 180 slipped in one year. I can put up with that, it only happens every five, six, seven or eight years, because if you've got a little bit in the flock they get immunity, so I don't inoculate them. But three or four years ago I got toxo, and I got 500 ewes out of 1900 slip, and I wasn't very pleased about that, so now I inoculate for it. And that's a good inoculation, because it's a once in a lifetime jab, whereas the fibrio one is two jabs in the first year and a booster after that."*

Deciding whether or not to inoculate for abortion is about managing risk, and for different farmers the risk they can afford to take differs:

*"Because of the size of the property [small] you've got to make every post a winning post, you can't afford to have 100% lambing, so I cover them for abortion, both lots. There have been neighbours that have had abortion storms of the two different types, there's been some terrific losses. For the few cents it costs it's like insuring your house for fire."*

*"I vaccinate for toxo, it's the better one to have. It's a once only vaccine, it costs 80c or 90c, quite expensive, but they're immune for life. I haven't vaccinated for fibrio, I'm gambling a bit, but I haven't had it so, fingers crossed."*

#### **4.6.4 Factors Influencing Change in Animal Health Management**

Farmers change their approach to animal health management in response to changing circumstances and as scientific knowledge about different diseases and how to control them changes. Strategies for managing animal health problems are often worked out on the basis of the costs of prevention or cure (in terms of time, labour and money) versus the return available from the animal. Thus, some farmers do not inoculate for abortion, and for most diseases farmers have a policy of culling any problem animal, and/or its progeny. Farmers are constrained in this practice to some extent by the need to keep flock numbers up, especially those with lower lambing percentages. This attitude is not universal though, and some farmers spend more money and effort on stock health than others. This can be for two reasons: either because of an "animal lover" attitude towards the stock (as in the case of those farmers who spend a lot of time mothering-on), or because the farmer believes that the returns from a very healthy flock outweigh the costs in terms of remedies and preventative action.

The control of internal parasites in sheep is a different matter, with all farmers accepting that worms need to be controlled to achieve adequate production. The changes they are making in this aspect of sheep health are the result of the development and spread of drench resistance, and are probably not changes farmers would have made themselves as they involve complex alterations in management practices.

## 4.7 Marketing: Strategies to Retain Flexibility and Control

*"You can only sell your produce once, so you might as well sell it well."*

This is an axiom that all farmers hold true, but in reality selling produce well is a difficult process.

Markets for wool and lambs are unpredictable, especially since deregulation in the mid 1980s, and it is impossible for farmers to predict how much they are likely to receive for various types of produce from season to season. The central principle in decisions about marketing policy among sheep farmers is the preservation of flexibility of their overall farming practice. Farmers prefer long-term potential. Most farmers decide on a selling strategy and keep to it, judging that returns will even out over a longer time span. This tactic is part of a safe farming strategy developed to manage the oscillations and unpredictability that are the features of the lamb and wool markets. In addition, some farmers are pursuing innovative selling policies for their wool in order to increase their net returns.

### 4.7.1 Meat Processing Companies: Farmer Perceptions and Responses

While there is the occasional farmer who regards marketing as something of a challenge, with opportunities there to be exploited - *"if you're a bit flexible with your policies you can hang out or aim for those higher valued markets"* - most farmers seem to feel somewhat at the mercy of the markets, or, more specifically, the meat processing companies. The processing industry is perceived as having opposing interests to those of farmers'.

*"Early in the season they'd say lambs are going to bring good money and within three months it had evaporated, gone. For no reason it had disappeared. Everyone lost faith in anything that was said. They'd say you're going to get sixty dollars for your lambs, and no one believed them."*

This disillusionment and distrust with the processing industry has deepened in the last couple of years with the collapse of two meat processing companies, Fortex and Weddell, and with what is considered to be price fixing within the industry:

*"It's pretty unsatisfactory. You should be able to aim for a certain weight and a certain price and know you're going to get it, but it doesn't work that way. For the same lambs this year I'm expecting to get \$10 a head less than last year, and the market doesn't indicate that that should be so. I think we're paying the bankers the money they lost on freezing works that have been closed down, they're taking it out of us. It's not really fair, they took the risk and if they didn't suss out that company why should it be our problem?."*

Farmers said that the meat companies take advantage of situations like droughts to drive lamb prices down:

*"There's a drought on and we've just got to unload. They know you've got to unload."*

Given the instability of markets and the fact that farmers have no control over them, attempting to farm to the markets was generally seen as risky, foolhardy and probably impossible. This is clearly illustrated with lamb drafting. Many farmers said that the best thing to do was to keep on drafting lambs regularly and to take the price offered, chasing markets being a hazardous approach:

*"I always try to get a fairly big weaning draft away because they're the cheapest lambs you produce. I don't even ask prices at weaning draft normally, I just say I want 500, 700 or whatever to go and that's it. It pays to hop into them at weaning. Lots of times you can keep them and put two to three kilos on them and the schedule*



*goes down. You sell them in March and you don't get any more than you would have got at weaning anyhow."*

A common strategy among farmers was to stick to one system which they believed evened out returns over the years:

*"Lamb marketing is difficult because every year seems to be different, they have different requirements for weights, it's swings and roundabouts. You're better to just keep drafting throughout the year, you win sometimes, you lose some others, but you come out about average."*

*"You stick to the same policy. If you sell in the shed all the time, fine, whatever you do stick to one thing. Then you do get the good and the bad and it evens out."*

A few farmers had changed their farming practices to produce what they thought would be required by the processing companies, which had not paid off:

*"We've changed the emphasis and we're keeping our lambs longer into the winter, growing them bigger. But they don't want bigger lambs now so I don't know what we're going to do."*

Other factors constrain farmers' marketing strategies. The weather is one factor: farmers cannot keep and grow lambs if they do not have the feed:

*"I'm due to draft next week and the way the weather is I'll get stuck into them at the weaning draft, hit them hard. It'll be numbers, not weights or dollars."*

Farmers perceive meat companies as having opposing interests, and they believed they could not effectively arrange their production to take advantage of farming to the market. The general strategy among sheep farmers for managing volatile markets for lambs is an averaging strategy, with farmers adopting one particular system and sticking to it, believing that returns will even out in the longer term. This strategy is another "safe farming" practice, with a conservative approach being regarded as the most sensible.

#### **4.7.2 Marketing Options for Lambs and Wool**

The main area of marketing in which farmers do have some control, is in deciding to whom they sell their produce. There are several options that farmers have available at different times in the season, and there is no predicting when they will become available. Farmers have options for selling both lambs and wool.

Most farmers sell their lambs to the major meat processing companies, either in a pool, or at a set rate per head. With the pooling system the farmer receives 90% of the schedule price at the time of sale, and a bonus, which is not paid out until ten months or so later, if the meat is marketed and sold well. Most farmers pool their lambs, figuring that if the lambs do return a good price to the meat company, they will get a share of it. The option of selling per head at a set rate is only available when lambs are in short supply. Freezing companies then pay a higher rate than the schedule price. In times of shortage lambing drafters will also buy "on the place", where the sheep are sold as is where is with no penalties for overfat lambs, and the cartage is paid by the freezing company.

Many farmers have been loyal to particular meat companies, particularly the Primary Producer's Co-operative Society (PPCS), a co-operative company in which many farmers have shares. There is a belief that if you are loyal to a company they are more likely to be loyal to you and you will have priority in getting your stock away in times of drought. Sticking with the same company is another aspect of the "swings and roundabouts" strategy of not chasing markets adopted by many farmers:

*"Normally I try to be loyal to PPCS because I'm a shareholder, but I have sold to Fortex in the past. Basically on the day it's who's got the best price and if they are all within cooee [close] I'll put them in the PPCS pool because they've always paid out well. At least in a co-operative if they make a profit I'm going to get some of it back."*

If a particular company does something which annoys farmers they will stop selling stock to them:

*"Dad was with Waitaki Alliance for years and I just stuck with them. Then Waitaki were the ones that held the lamb price down. The other companies knew that they were trading from week to week so they just kept the prices down, and that bugged me. I just got grumpy, got a bee in my bonnet and changed to PPCS, and that was it."*

Some farmers grow store lambs, that is, lambs that they will sell to other sheep farmers to grow out. Farmers who do this tend to have farms that because of topography and climate are unsuitable for finishing lambs. There is also the possibility of selling on contract to smaller private firms. Though these smaller concerns often pay higher rates than the large processing companies, they operate with forward contracts and many farmers are nervous about these as it reduces flexibility. Under this arrangement farmers contract to supply a certain number of lambs at a certain time, which can create difficulties if there is a drought and feed is short and farmers cannot get the lambs off their property.<sup>3</sup>

An option that has become available in recent years is live sheep shipments. Though there is a considerable premium paid for these sheep, the market is impossible to farm for, being extremely unpredictable with information difficult to obtain:

*"It's a difficult market to access, it depends who you know. We kept ram lambs for the boat and they were ready, and we said we've got 100 and we got 30 on. There's quite a lot of work, you've got to weigh them. They're worth another \$10 or \$15 a head but I don't think we'll do that any more."*

Several farmers have sold lambs for live shipments, but they said it has more been a matter of luck, having lambs ready at the right time rather than something you could plan for. One farmer said that he would not send boat lambs because of animal welfare reasons:

*"I'm a little against live shipments, I just feel sorry for the stock. I suppose most of us are in farming for the dollars, and I am too, but I still don't like seeing the stock suffer."*

While wool prices have been depressed generally over the last few years, returns have varied quite markedly depending on the type of wool demanded by the market at various times. Farmers can breed towards certain wool types, but it is not something that can be changed rapidly or easily, and again has to be balanced against lamb production. Like lamb markets, wool markets are unpredictable and changeable:

*"You haven't got rich on crossbred wool over the last few years."*

*"The market changes its mind depending on what it hasn't got. Two or three years ago everybody wanted long, lustrous wool, which tends to be the heavy wool weight"*

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<sup>3</sup> Forward contracts are more common perhaps in cattle marketing than in sheep. Again, farmers are cautious about signing forward contracts and several said that they had been caught out with having to keep cattle on when they were pushed for feed.

*sheep, so people kept their stronger wool sheep. Now they're going back to the fine bulk."*

Many farmers sell their wool in the auction system, but the rising administration costs associated with auctioning wool have led some farmers to look for alternatives. Another option that many farmers take is to sell in the shed: they get two or three buyers to look at their clip and take the highest price, which may be more than if the wool was auctioned.

There have also been producer selling co-operatives established at various times, particularly for less mainstream types of wool such as Drysdale. Farmers said that it was hopeless selling Drysdale wool through the auction system - *"You take a bath basically"* - so a Drysdale marketing co-operative was established. In the last five or so years farmers have become disillusioned with the co-operative because *"Their overheads got too great, the co-op got too top heavy"* and their prices were not competitive with private buyers. So some farmers changed to selling in the shed. Three years ago a group of five neighbouring Drysdale growers tendered their wool to local brokers. They then moved on to tendering it to exporters, and last year sold straight to an Australian manufacturer. They are now taking wool from other Drysdale growers to increase the amount of wool they have to sell. Farmers said that they have been getting around 20c a kilo more through the tendering system than they were from private buyers.

Similarly, a group of 35 or so Coopworth and Romney wool growers have formed a company to sell their own wool. This company was originally based around members of a couple of farm discussion groups. They said that they were not getting more for their wool per kilo, as the price they get from Wool Services International is based on auction prices, but they are making significant savings in costs. They are working towards supplying end users, as the Drysdale farmers are doing.

These developments in the marketing of wool are attempts by farmers to retain a higher percentage of the returns from their wool for themselves, and give farmers a sense of more control over the markets:

*"It's a real buzz for us, because farmers usually are price takers not price makers. This gives me the sense that I'm setting the price a bit here."*

Wool markets have been similar to lamb markets in that they have been unpredictable though with generally declining returns. With wool though, farmers have had more options available for selling and have been able to develop different strategies that have enabled them to capture a greater proportion of the wool price for themselves. Farmers have been very willing to change their selling policy (in terms of where they market their wool) and have done so rapidly if the economic returns are higher.

#### **4.7.3 Factors Influencing Farmers' Marketing Strategies**

Obviously, farmers' marketing strategies are influenced by the state of the markets for wool and lambs, by the prices currently being returned and by the outlook for the future. Marketing strategies are tied in with other aspects of farm management, in particular, sheep breeds and the timing of lambing, and farming for a new market niche may require fundamental changes in the farming system. Farmers will alter their practices in response to market signals provided that they consider the new market opportunities to be either comparatively long term opportunities (e.g., the demand for Drysdale wool) or require only minor and easily reversible changes in farming practice (e.g., the introduction of Texels to produce leaner meat). In general, however, farmers are very cautious about altering their farming systems to follow what are perceived to be unpredictable markets.

The key philosophy in the management of marketing among sheep farmers is the retention of flexibility. Most farmers develop a selling policy and stick with it, hoping prices will even out in the longer term. This is part of a safe-farming strategy designed to cope with the fluctuations and uncertainties in the markets for their produce.

## 4.8 Diversification: "Another Egg in the Basket"

Diversification is a key tactic for maintaining flexibility. Farmers have diversified away from sheep into cattle and deer, and within sheep almost all (merino wool farmers being the exception) attempt to maintain a balance between wool and lambs in the hope that one or the other will attract reasonable returns. This is one of the primary reasons why sheep farmers have not specialised in wool breeding or meat breeding to any great extent:

*"We've tried to cover our options with the wool and the meat and it has been worth it in the past."*

*"The main thing is to have a few eggs in different baskets, that's why we've got a bit of a spread. We've always been inclined to be that way, a mixed bag rather than specialising in any one thing."*

*"We've always tried to stick to a mixed bag of things. Dad always did the same, not all your eggs in one basket so to speak, not all sheep or all cattle or all deer or whatever."*

Sheep farmers in the Geraldine area have traditionally farmed other things along with sheep. They have done this because diversification is seen as a strategy for coping with uncertain returns for agricultural products - *"not having all your eggs in the same basket"* - is how it is expressed locally. The nature of the eggs in the basket has changed over time. Earlier, sheep farmers grew grain crops, but more recently diversification has taken the form of deer farming or forestry ventures. Cattle always have been and continue to be a part of sheep farmers' systems but there has been an increase in the ratio of cattle to sheep. Historically there has been a change from diversified farming systems, towards more, though not total, specialisation during the period of subsidies, and then, since the downturn in the mid 1980s, increasing diversification again as sheep farming became less profitable. Diversification or specialisation are strategies for maximising returns that are appropriate in different periods.

While there is a strong incentive for farmers to retain diversity in their production and therefore achieve flexibility in relation to markets, there are conflicting pressures towards specialisation. These pressures are the increase in the costs and in the specialised nature of the machinery and other inputs for particular forms of production, and in the increased specialisation in knowledge and skills needed to manage different systems. Diversification or specialisation are strategies for maximising returns that are appropriate in different periods.

### 4.8.1 The Decline in Cropping

Growing crops for sale was traditionally part of many sheep farming operations but has now almost died out:

*"There's not nearly as much cropping done around here now as there was. One time you used to grow barley after you'd grown turnips and before you put it into grass, but now it's a specialist thing, either you do it or you don't."*

Almost all of the farmers said that they, or their fathers, used to grow crops. They grew crops to have *"another iron in the fire"*, and as part of a system of pasture management. Farmers grew winter feed crops such as turnips and swedes, and then crops of barley or wheat before resowing pasture. Crop rotation was used to improve soil fertility and maintain pasture quality. It was *"good for the soil"*, as well as for controlling weeds such as Californian thistles.

Three farmers continue to grow crops for sale. One of them has a comparatively small, irrigated farm. The small size of his farm means that he has to farm more intensively in order to make a living. Another said that he was *"not really a crop farmer, it just worked out well in the rotation of*

*regrassing*". The third farmer is one who might be called a traditional farmer. He has always grown crop and has simply continued to do so. He said that he will probably go out of cropping in the next year or so because of the labour involved: *"It's the work factor for my age. I'm just trying to take it a bit easier"*.

Most sheep farmers, however, have gone out of cropping entirely. The cost of inputs increased, and returns diminished. There was also the problem of timing of payment: *"You had to wait so long to be paid, in some cases up to 18 months"*.

Fertilisers, pesticides and herbicides became increasingly expensive, and it seemed that greater quantities had to be applied. For one farmer this was an environmental problem: *"We went through a phase of using a lot more chemicals, it put me off growing crops"*

For others it was a matter of more complex and difficult management:

*"You don't just sow the crop and forget it now, you're always monitoring it for pests and mildew, its the same with any farming now, you've got to be a bit more of a specialist just to get that result."*

*"I found that with cropping my timing wasn't good enough. I relied on contractors for spraying and harvesting, and I found that unless your timing was spot on you could blow a whole years work through missing the timing."*

The work and complexities in managing cropping in conjunction with sheep and cattle operations prompted some farmers to stop cropping:

*"This type of farm [sheep and cattle] is just so much easier to manage than the mixed cropping type of unit where you're forever going from one busy period to the next busy period. Doing straight livestock there's just a couple of busy periods. It's easy to set things up and have the free time."*

Management of crops was seen as a specialised skill, and cropping was regarded as risky:

*"I grew barley for about three years, just one paddock each year. It was too wet at harvesting time sometimes, it was very risky. You can grow the crop all right, but getting it off the paddocks was a problem. The last year I did it we were towing headers with a crawler tractor, towing trucks and all that, and I thought, we could do without that."*

The amount of labour involved in cropping, as well as the particular type of labour, was also a factor in the decline of mixed cropping/sheep farming:

*"We started off with a mixed cropping unit, and the more I worked with cattle the more I enjoyed it".*

Along with increasing input costs, the substantial amounts of money tied up in depreciating machinery led many farmers to go out of cropping. As equipment became old and/or outdated farmers had to decide whether to invest in machinery and continue with cropping (which would have required the farmer to increase his cropping operation to make the investment in machinery economic) or to cease. The decline in cropping was further encouraged by changes in aspects of cropping technology. The introduction of the autoheader for harvesting, for example, put some farmers out of production, as it was unusable on their land:

*"Dad did crop with wheat and barley, but once we got into the autoheader situation it became impossible, the land didn't lend itself to cropping, so we knocked that on the head in the mid sixties."*

Another farmer said that he went out of barley production as he did not have the storage facilities. Grain companies bought a crop of barley or wheat, but no longer took all of it straight from the farm, and the farmer might have to store it for six months or a year or more before it was removed.

Changes in markets also contributed to the decline in cropping on Geraldine sheep farms. Around 13 years ago the linen flax mill in Geraldine was closed, and the market for that crop disappeared. Many farmers used to grow malting barley under contract to the Canterbury Malting Company. But increases in production in North Canterbury meant that farmers south of the Rangitata River could no longer get contracts (the company saving on transport costs). Growing stock feed barley was less profitable, so again farmers stopped growing the crop. Farmers also said that malting companies used quality control restrictions (which farmers considered to be just an excuse) to limit access to contracts for malting barley, which has to be of higher quality than the barley grown for stock feed.

Some farmers, though, regret what they see as the loss of the pasture management benefits that occurred when they stopped cropping:

*"I should be growing barley again because I think my pastures are suffering because of it. We're just going into short rotation turnips and grass then straight back into grass, and I don't think it's doing the ground any good. It needs to be turned over more than that."*

Generally the decline in cropping amongst sheep farmers was the result of the impetus towards specialisation in agriculture at that particular time, which resulted from the changing economies of scale for cropping, making small-scale crop farming uneconomic. In addition there were changes in markets, technological developments in production methods and changing attitudes to both the management and labour requirements of crop farming.

By the late 1970s Geraldine sheep farmers had gone out of cropping and were concentrating on sheep and cattle farming, their operations becoming more specialised and less diversified. Then in the early to mid 1980s the situation for sheep and cattle farming in New Zealand changed suddenly and radically with economic reforms which dramatically reduced the incomes of sheep farmers. These changes had a profound impact on sheep farming in Geraldine. In response to the collapse of sheep and cattle farming, many farmers sought to diversify their operations again, but not back into cropping:

*"At that time the Labour Government were saying that sheep and cattle farming was no good, was finished, was going to die out. It was when the subsidies going off was imminent, the profitabilities of sheep and cattle looked pretty bad. I don't like cropping and it requires too much investment in machinery, so the other alternative was to go into deer and to spread my income over the three types of livestock, plus velvet"*

*"You thought when you had lambs and wool that you had two things covered, but in 1989 both crashed..."*

Farmers diversified primarily into cattle, deer and forestry, and a few into tourist ventures.

#### **4.8.2 Diversification into Cattle: Flexibility and Profit**

In recent years there has been a general increase in the ratio of cattle to sheep on farms in the Geraldine area. This increase is the result of farmers responding to the declining and erratic returns from sheep, and is part of a series of tactics that are designed to lead to "safe" farming. In order to farm safely

farmers aim to create flexibility in their farming systems, both in relation to unstable markets and to the extremes of climate. Cattle serve this purpose for many farmers and, furthermore, have benefits for the sheep operation in terms of pasture management and worm control.

Cattle have always been a part of many sheep farmers' systems, numbers and stocking rates fluctuating according to changes in the markets for sheepmeat, wool and beef:

*"We have [a] policy of buying in weaner calves in the autumn and taking them through, depending on whether they're heifers or steers, but we're fairly flexible, depending on the schedule. In the last few years we've had 40 or 50 calves we buy in, its economics and price that decides it."*

Cattle have traditionally been used by sheep farmers as part of a system of pasture management and worm control. Cattle are used to "clean up the rough stuff", to eat down pasture that is unpalatable to sheep, encouraging new pasture growth. They are also used extensively in the control of worms, as was discussed in Section 4.6.1.

*"Sheep and cattle are very good together because one lot combats the worms that the other lot has, so you graze the sheep behind the cattle. Cattle will clean up the pasture of sheep worms, so they're very beneficial in that sense. In the spring I rotate the cattle and hoggets around part of the farm so that when I wean the lambs in December I've got a percentage of the farm that's relatively clean of worms."*

Almost all farmers have some cattle which they use in this way, and given current concern with increasing resistance among sheep parasites to drenches, the use of cattle in worm control may become even more important.

In the last few years, farmers report, there have been increasing numbers of cattle in the area, with many farmers increasing their numbers because returns from beef have been higher than returns from sheep - "I've changed, we'll have about 35% to 65% cattle/sheep ratio, but in 1988 I was all sheep". Farmers have increased their cattle numbers for a variety of reasons, including financial ones, though there are conflicting opinions on whether sheep or cattle produce higher returns. Some farmers said that "looking back at any stage the sheep have never equalled the cattle", while others said "sheep can still out-perform the cattle beast as far as dollars and cents go at the end of the day per stock unit". It seems that while cattle may have been providing higher returns in the last few years (several farmers indicated that cattle had kept them afloat throughout the downturn) this may have not always have been the case.

While economic factors have played an important part in the increase in cattle numbers, it is not the sole factor. The maintenance of flexibility or the creation of flexibility is a major factor in sheep farmers' decisions to change, or not to change, their farming practices. For sheep farmers the core of their farming system is the flock of breeding ewes, and other aspects of the farming operation are modified around this core. Cattle are used by many farmers to introduce flexibility into their systems:

*"I'm probably going to drop the sheep numbers and increase the cattle, just to give me a bit more flexibility. The straight ewe breeding flock is certainly pretty inflexible, you haven't got too many options about what you can do."*

Flexibility is important because of the uncertainty of the weather, and cattle numbers fluctuate in response to it:

*"We started off with a mix of sheep and cattle and then when the droughts hit we dropped the cattle, which in hindsight was a bit of a mistake, but we gradually worked our way back into a mix."*

*"I normally raise bulls to two and a half year olds, they're my drought insurance. If we get a dry year the bulls go to the works. I keep them prime so that any time the ground dries up they go to the works."*

Flexibility, in terms of being able to be able to rapidly reduce stock numbers on the farm without taking a huge loss financially, is an important consideration for farmers in deciding what kind of cattle they will run. Equally important is how the cattle will fit in with other aspects of the farming system:

*"A cow is quite an easy stock unit here with the tussock and bush, she's not a big drag on me at all. They work in well with the hay. We're a bit susceptible to a drought when we're all sheep, when you're feeding hay to sheep kiss goodbye to ten percent lambing and half a kilo of wool, but the cattle do all right, so that makes it a lot more flexible."*

Different types of cattle have different advantages and disadvantages within particular farming systems, and farmers choose different types of cattle, with particular attributes, to fit in with their current system.

Farmers who grow bull beef choose them because they do not put on fat and are therefore saleable at premium prices at any time:

*"With bulls they'll grow a lot quicker, and you've only got one grade, no overfats. You just feed them up and they put on beef, not fat, not like steers. With steers you couldn't get the weight onto them, they just got fat. Bulls are flexible, you've got a product you can sell any time, and they're always sellable."*

Heifers, by comparison, are inclined to put on fat and therefore do not fit with many farmers' systems, where cattle are used as a buffer to be bought and sold rapidly depending on markets and on feed availability on the farm:

*"I've had a bit of trouble with heifers getting over fat, and just when I need them to keep the grass down I have to sell them before they get too fat. They just don't fit my system."*

Though heifers may get fat, their earlier maturing date means they can be sold earlier, freeing feed for the sheep, which suits some farmers:

*"Only just got into heifers in about the last five years. I used to have all steers, but when we started getting one or two dry patches the heifers are quite good, because they mature a bit earlier, so you can start getting rid of them a bit earlier. That's the theory anyway."*

In the last few years, since the dairy boom in the area, sheep farmers have started to graze dairy heifers throughout the year, and dairy herds over the winter months. With heifers grazing at \$4 to \$5 per week, and cows wintering at \$1 per day each, the returns from dairy grazers, with no investment in stock (the grazier is responsible for feeding the cows and needs to grow silage or some other winter feed crop) and with no risk to the sheep farmer, are considerable. Many grazing arrangements are organised on a year by year basis, and if the season is difficult and grass is short, the farmer has the option of not taking the grazers. Dairy grazing is another example of sheep farmers' strategies to maintain flexibility through diversity, and demonstrates that sheep farmers will rapidly take advantage of opportunities presented if they contribute to the achievement of this aim:

*"Currently I've changed the farming operation quite a bit. Now I'm grazing 120 dairy heifers for somebody else. It's relatively new, I've never grazed dairy heifers until the last three or four years. The dairy farmer takes them home for calving for*



*three months, that's a real bonus, they're not here when I don't want them. Currently it looks like I won't be able to run them but I haven't completely shut that option out. If we got a substantial rain in the next fortnight it could change things. Later if I found I did have the surplus feed I could get grazers in on a per week basis, it's always easy to sell grazing in a dry year. It's good to have that high proportion of cattle because the stock health situation is much improved."*

Flexibility in terms of marketing is another important consideration for farmers in deciding if and how to diversify their cattle operations.

*"If you're a little bit flexible with your policies you can hang out or aim for those higher valued markets, like the feedlots. They are there in cattle at the moment, you have to keep your eyes and ears open. I sell a lot of bulls to the dairy farmers, which is another diversification in beef which is pretty good. Selling bulls to dairy farmers is a better return than the prime market at the moment."*

While some farmers are confident in their ability to take advantage of what are regarded as volatile and fragmented beef markets, others have a more fatalistic attitude and appear to feel that it is beyond their control:

*"I would like to increase the cattle more, but it's pretty hit and miss as to how well we're going to do in 12 months time."*

The labour requirements of cattle farming are another major reason why farmers have chosen to expand their cattle operations:

*"There's less work in cattle, you don't have to dag them or shear them or drench them to the same extent, sheep are a lot more work than cattle."*

In the current situation where many farmers cannot afford to employ extra labour and many farms truly are one man units, increasing cattle numbers and reducing sheep allows farmers to maintain their stocking rate and income while reducing labour requirements. One way of diversifying into cattle is to purchase the "Technosystem" package and run bull beef intensively<sup>4</sup>.

Increasing the ratio of cattle to sheep on many farms in the Geraldine area is the result of several factors, the most important being flexibility and the relationship between cattle and other aspects of the farming system, in a context of declining returns from sheep farming, a comparatively strong beef market (until this season) and farmers' strategies (involving investment, management and labour) to make a living.

#### **4.8.3 The Increase in Deer Farming**

There has been a major increase in deer farming in Canterbury in the last decade, with numbers increasing from 23,369 in 1982 (Department of Statistics, 1982: 58) to 201,162 in 1992 (Statistics New Zealand/Te Tari Tatau, 1994: 31)<sup>5</sup>.

As a group, farmers adopted deer farming to diversify their operations and increase the number of agricultural products they produced in order to safeguard their farms and their income. The "crisis" in pastoral farming that resulted from the policies of the Fourth Labour Government was the cause at the

<sup>4</sup> Technosystem involves intensive rotational grazing. The system is purchased as a complete package, of specialised fencing and other technology plus advice on management practices, from its developer who provides purchasers with local support.

<sup>5</sup> Figures for Canterbury rather than for Timaru County have been used because District Council boundary changes in 1989 make the statistics difficult to compare, and because in 1982 deer were counted by province, not by District Council area.

macro level. For individual farmers the decision to introduce deer (or not to introduce deer) was a complex one, which varied greatly between farmers. Income maximisation was the main reason for adopting deer, but farmers had to have a certain amount of finance available to be able to get into deer farming as the costs of entry were high. Many more farmers diversified into deer when the price of hinds fell. Also involved in these decisions were management concerns (how deer would fit in with existing systems, labour requirements) and personal preferences, (some enjoyed working with deer) though money, both the desire to make it and the availability of it to spend, was the key factor.

For many farmers the decision to go into deer was influenced by the costs of entry, in terms of the price of deer and of fencing and sheds. The price of deer fluctuated wildly and the cost determined when particular farmers decided to introduce deer into their farming systems:

*"It cost a lot of money to go into deer though, it cost a quarter of a million bucks to set up 125 acres, fence it, a shed and stock. We looked at them in 1985 when hinds were \$1,500 bucks each, then they went to \$4,000 each, we bought ours for \$500."*

*"...they were so damned cheap at \$55, I knew guys who got into deer paying \$3,000 a hind. I decided one thing I wasn't going to do was to borrow money to buy deer."*

*"I couldn't see where the money was to be made paying \$2,000 for a hind..."*

Deer farming in New Zealand was a comparatively new industry at the time and farmers had experience of managing deer. Farmers learnt to farm deer from other farmers, but for those who diversified into deer comparatively early on there were not many others to learn from:

*"There wasn't a lot of other farmer experience either. It would have helped if I could've gone and worked on another deer farm, but I just found out as I went along."*

Many farmers mentioned learning how to set up their deer farms and to manage deer from other farmers. They looked at other farmers' fencing arrangements and yards and *"picked the good points off other people"*. The particular networks that a farmer was involved in gave (or restricted) access to information about deer farming. Farmers from large properties mentioned the Aclands at Mount Peel and Mount Somers as being important sources of information and learning<sup>6</sup>. Smaller farmers mentioned neighbours and friends who farm deer as teaching them about deer farming. Many of the smaller deer farmers also talked about the Deer Farmers' Association field days as being important sources, and now that a lot of farmers have some deer, relevant topics are discussed at discussion groups that are ostensibly sheep discussion groups.

While deer have been a very popular diversification, not all farmers have introduced them (or have only introduced them in limited numbers). The capital outlay for establishment led some farmers to decide not to farm deer:

*"Probably the reason I didn't go into more deer was the price of the fencing. It frightened me off. I'd just done it all out of income. We got our fingers burned back in the eighties when the interest rates went up, so you just be careful."*

Another reason was a perceived loss of flexibility that came with deer farming:

*"The one thing I didn't like about deer is that if you fence up a deer block you're committed to deer really, with that expensive fencing. Yes, you're committed to it."*

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<sup>6</sup> The Acland family at Mt. Peel Station started farming deer very early on and built up a very large herd (2,300 head) from wild deer they caught on their own property.

Labour requirements were another factor:

*"It's another job in the winter. I've got a mob of ewes, a mob of hoggets and a mob of cattle. That's three mobs, you've got deer, that's another lot."*

Personal preference was another reason:

*"I just don't like the animals" one farmer said, "I like looking at them, but I wouldn't like to work with them."*

Diversification into deer is a strategy that some farmers have adopted as a means of farming more safely through having *"more irons in the fire"*, as they say locally. Producing a wider range of commodities means that farmers have access to more markets, and they hope that not all of the markets will be depressed at once. However, a variety of factors influenced farmers in different ways, so that not all of them have taken up this particular diversification.

#### **4.8.4 Forestry and Tourism: Unconventional Diversification**

There has been an upsurge in interest in forestry in the Geraldine area in recent years:

*"There's a lot of planting now for money, lately the interest in farm forestry has gone off the end of the scale."*

Forestry (including coppicing for fuelwood) is another diversification undertaken by Geraldine sheep farmers to spread the economic risks of farming and to provide income for the future, often for retirement. Like other forms of diversification, farmers have gone into forestry for varied reasons, and particular farmers have ventured into forestry for more than one reason.

Investment in forestry is generally seen as a long-term investment, *"a bit of a retirement fund"*, and it is only some farmers who have the capital available to invest, and the ability to wait for the returns from that investment:

*"If you look at farm forestry, it might be there in the long term, but what do you live on in the meantime?"*

*"We're talking about planting some poplars, I think that's our best option. They're a better option than to wait 14 or 15 years for pine trees, at least I get something out of them."*

Forestry is also a means of getting some production off poor or unproductive land:

*"Most farmers have got some poor waste land, back facing or something, that's producing nothing. We're taking out the poorest country that doesn't produce the grass."*

Another benefit of forestry is gorse and erosion control:

*"Most people now would use trees to combat gorse. We started to plant them mainly for control of gorse on the back faces. A lot of ground slips on the back faces so it's ideal for trees."*

The capital outlay and the waiting time before there are any returns has stopped many farmers planting forest blocks on their farms. However, many farmers have planted trees because of their other benefits. Shelter for sheep, particularly at lambing time and in a situation of erratic and extreme weather patterns, is an important concern for farmers: *"That's a big change in recent years, shelter belts."*

*There was none round here". Changes in pasture and sheep management in the last decade or so have led to more subdivision of paddocks and with that subdivision natural shelter is lost:*

*"You've fenced off all these paddocks and then you find you've fenced off all the shelter, the gullies and like. The sheep have got nowhere to go. It's because of the subdivision, there's no natural shelter left for them since you fenced it off."*

For some farmers shelter is a more important consideration than the money to be made out of farm forestry:

*"I bought twice as many trees as I should have. I did my two metre spacings like they recommended but I'm not after quick returns from matchsticks, I'm after long term shelter...."*

Two farmers were using their farms as the basis of tourism ventures. One farmer runs farmstays, and has done so for 15 or so years. *"It's not a great money making venture"*, he said, *"but it's quite interesting"*. For the other farmer the tourist venture (providing morning teas for busloads of Japanese tourists) is part of a very diversified operation that encompasses several types of farming, as well as non-traditional uses of his farm base.

#### **4.8.5 Factors Influencing Diversification**

Farmers are currently diversifying their operations in response to adverse and unpredictable markets and climatic conditions. Diversification is a key strategy in managing the current risks involved in sheep farming, as diversifying allows farmers to develop flexibility. The extent to which farmers can diversify their operations, and in what direction they can diversify is influenced by several factors: by the costs of diversifying (e.g., deer farming), by the financial ability of the farmer to wait for returns (e.g., forestry), and by preference (e.g., tourism). Diversification is also constrained by the need for most farmers to keep labour costs to a minimum - either the new operation has to bring high enough returns to pay for the costs, for another labour unit and to provide some profit for the farmer, or it must be manageable with existing labour and the use of contractors. Moreover, diversifying makes the farming system more complex, and has costs to the farmer in terms of ease of management.

#### **4.9 Sources and Utilisation of Farming Information**

In the extension literature adequacy of access to information has been shown to be an important consideration in farmer adoption of new farming methods and technologies. Farmers said that they considered that the information they received was up to date, and they did not consider that they were missing out on valuable information. The major problem with information for farmers is coping with the sheer amount of information, and the difficulties in sorting through the conflicting reports to work out whether a certain innovation is possible and advisable for their farm.

Farmers prefer information that comes from, or is channelled through, other farmers, particularly farmers in their own area working with similar opportunities and constraints. They see this information as being practical, reliable and applicable. Many also like to test things out for themselves, and do small on-farm experiments to see whether what is reported in the farming literature is true.

Generally sheep farmers in the Geraldine area reported that they felt that information was easily accessible; all it took was a phone call:

*"Usually if I want to know something I can find out on the phone within a day, I don't feel isolated."*

*"There's nothing that I haven't been able to get information on if I've wanted it. I keep asking till I find out."*

It was a matter of making contact with the right person, and farmers said that they simply stayed on the phone until they found out what they wanted to know.

Farmers acquired information from a large variety of sources: magazines and papers, field days, talking to other farmers, attending discussion groups, farm consultants and specialists on particular subjects such as veterinarians, contractors, stock buyers, seed merchants and accountants, bankers and lawyers. The following sections review the farming media, word-of-mouth sources, discussion groups, farm consultants, MAF and privatised information.

#### **4.9.1 The Farming Media**

All farmers mentioned hearing about innovations from written sources such as magazines and newspapers, company newsletters and reports. These sources were generally considered to be reliable and comprehensive in their coverage of relevant research and of market information:

*"I think if there's a good idea you usually get it in some of the farming magazines. It's in the interests of anyone that's got a good idea to tell everyone about it."*

Farmers considered that the "New Zealand Farmer" was one of the better publications, but that as much of the information contained in it was reproduced in the following weeks in the proliferating give away papers - "*most of it's repeated in every magazine you pick up*" - some farmers no longer subscribed. There was also some criticism of the paper. One farmer said that it had "*too much from the North Island*". Farmers also said that they read the farming pages of the local newspaper, the "Timaru Herald". Both the Meat Board and the Wool Board send out market reports, and members of Federated Farmers receive the "Straight Furrow". A few farmers also mentioned listening to the farming report on the radio, and watching "*that programme on TV on Sunday lunchtime*".

Farmers said that the amount of written information they received had increased in the last few years, and that it was difficult to find the time to read it all:

*"I used to get the 'New Zealand Farmer' and it was very good, but then I dropped it. There's too much other material coming through. There's been an increase in the amount of stuff coming in, you're just bombarded with it. You can get three papers in a day..."*

Generalised information about new farming practices that is not aimed at particular farming situations can be difficult and time consuming to apply. Farmers need to keep track of relevant information and figure out whether it is useful to their aims and situation. They have to sift through the information that is presented, decide what is relevant and appropriate to their aims and circumstances, and retain the information until it is required: "*There's heaps of stuff. The difficulty is to retain it and apply it to your situation*".

#### **4.9.2 Word of Mouth**

Other farmers, directly and indirectly, are a key information source for farmers: "*It's people who relay information from other people*", one farmer said. Farmers talk about farming wherever they meet, at stock sales, the pub, on the street and at sports and service clubs. The people a particular farmer talks to about farming is a reflection of other social networks, such as kinship, neighbours and friends.

There are particular farmers, regarded generally in the locality as good farmers, whom other farmers will contact for specific advice and information on aspects of farming, and whose farming practices others will watch:

*"There are one or two very good farmers in the district. You look over the fence and see what they are doing. I think that's the best advice you can get. They're doing it in your district so you can see what can be done. Good cockies, who've got good stock and good pastures, their management would obviously be pretty good."*

For information and advice on particular subjects, farmers rely on experts in the field. The veterinarian is one example: for any animal health inquiries this is the person the farmer will contact for advice. The local veterinary club also sends out newsletters to their clients, including most of the farmers, on topics of common concern. Bankers, lawyers and accountants are consulted about financial matters, and many farmers said that they rely on information provided by their stock buyer to make lamb selling decisions. Specialists have to be perceived as neutral for their advice to be seen as reliable. Information provided by company representatives is viewed as less reliable because they are seen as being partisan:

*"It's like my spraying contractor, I rely heavily on him for advice for timing and that sort of thing, they know when to do it. I tell him I want a paddock sprayed because I'm going to do this or that, and he makes up the brew to do the job. I rely on him, he's the expert, it's his field, he's up with the latest stuff. I don't really listen to the guys who sell the spray to the same degree, they really just want to sell you something. The guys I rely on are the contractors, you get pretty sound ideas and information from those guys."*

Field days such as those run on specific topics by Agriculture New Zealand (formerly the MAF advisors) are another source of information. They are valued because the information presented is on one topic only, and as they are held on local farms, information is immediately transferable. Farmers particularly mentioned the field days run on the trial farm at the Seadown Fertiliser Works as being a useful source of information about how different crops and pastures responded to different fertiliser applications. They were seen as relevant and useful trials because they were carried out in the local area and the results were therefore seen as being applicable to local farms. Several local farmers have had field days on particular topics on their farms.

#### 4.9.3 Discussion Groups

There are three discussion groups in the Geraldine area. Two were based primarily on locality, though some of the farmers in one of these had been recruited from outside of the area via friendship networks. The other consisted of a group of younger farmers who attended Lincoln University together.

Farmers said that for discussion groups to be effective it is important that participants have similar types of properties and farming systems<sup>7</sup>. Discussion groups involving different farming systems (e.g. crop and sheep) do not work, and neither, farmers said, do groups involving high country and low country sheep properties. This explains why discussion groups tend to be locality based, as farmers on different country face different constraints and opportunities.

Farmers outlined the benefits of attending discussion groups:

1. Learning new things about farming:

*"At discussion group you always see something that you think, I'm going to try that, even if it's just a latch on a gate."*

2. Maintaining farmers' interest in and enthusiasm for farming:

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<sup>7</sup> Though the group of younger farmers who attended Lincoln together have quite varied properties and systems.

*"Discussion groups have been very good for farmers, you need to keep being stimulated all the time."*

3. Support in difficult times:

*"If you've got a real problem, drought, and you can share it, it's great therapy. You can come home and think, well, at least I'm doing everything I can, or perhaps I should be doing this, a new idea. It's good to get off the place and look at how somebody else is doing it, and see that they have the same concerns and worries and stresses as you."*

With the reduction in the amount of labour employed on most farms many farmers now truly farm alone. Combined with the fact that many farm women are now working off farm, sheep farmers spend long periods of time working alone and can easily become isolated. The discussion groups counter this, providing social contact:

*"Part of the discussion group is the social thing too, it's a big day out once a month. We wouldn't go to the pub, we'd stay home and work, but we go to the discussion group."*

There is a belief among many farmers that other farmers are the source of most changes in farming practice, and the discussion groups are beneficial in that they promote the exchange of ideas and information:

*"Most things come from other farmers, most innovations happen through farming, and the discussion group lets you get around and see a lot of different properties and see what other people are doing."*

The fieldwork included observation of a sheep farming discussion group in the Geraldine area. The discussion group was run by a farm adviser from Agriculture New Zealand. He met with the farmer at whose farm the discussion group was to take place a week or so before the discussion group and obtained details about his farm, including fertiliser history, lambing rate and so on, and what issues the farmer wanted to cover at the group, (things like lamb selling policy, feed supply, new pasture, and balance of sheep to cattle). The discussion group is generally focused on the concerns and issues of the particular farmer. At the beginning of the day these problems and goals were presented to the group. Participants got on to the back of various farm vehicles and drove around the farm, stopping to look at hoggets and lambs and ewes, and various paddocks where the farmer had planted new pasture species. At each of these stops questions were asked and comments were made. Participants went back to the house, opened the beer and put the sausages on the bar-b-que, and there was a discussion, led by the Agriculture New Zealand adviser, about the issues raised. Everyone (except one man who was new to the area and who was attending the discussion group for the first time) contributed to the discussion, asked questions, made comments, and did not seem to mind being disagreed with or shown to be wrong. The atmosphere was supportive and encouraging to the farmer whose farm was under discussion.

Later (which is not usual practice) a local veterinarian came to talk to the group about drench resistance and worms. This talk had been organised by one member of the group as a result of questions raised at the previous discussion group. It was interesting to note that there was a considerable variation in ideas and knowledge about worms and drench resistance, and that the farmer information (and many of their strategies for controlling worms) were incorrect and inappropriate according to the veterinarian. Again, farmers seemed unembarrassed to ask questions that demonstrated their lack of knowledge or faulty knowledge.

Some farmers said that the social side of the discussion group was very important to its success, that it was because the participants were friends that it worked well, as it meant that the discussion could be free and open:

*"From the discussion group you learn a bit each time, someone's always doing something different, and you hear a bit when everyone's loosed up and having a beer. In our group especially because we all know each other reasonably well, nobody's frightened to say anything. You can say anything as long as it's genuine, and ask questions."*

*"People tend to speak their mind, so that if you're doing something wrong you find out about it. They're not critical, you're not abused, it's constructive criticism. If the group's suggested something and the next time you come round to his place and he still hasn't done it you have him on."*

Another reason given for its success was that there is a variety of farmers in it, and because some of the older farmers were committed to it:

*"We're lucky in that we've got some real good farmers amongst them. They stick to the group even though they may not need it much for their own farming. They have a loyalty to others in the district."*

Enquiries to farmers about what kind of farmers attended discussion groups, and what kind did not, and why, revealed that it was "mostly better farmers" who attend discussion groups "because the better farmers are better farmers because they look for the information and this is one way of doing it". Farmers who do belong to discussion groups said that there were farmers who ought to attend but did not because "some people want to be tops at everything and they don't want other people finding fault in their operation" and "some people are too sensitive".

These comments reflect disapproval of farmers who do not attend discussion groups. However, some reasons for farmers not attending discussion groups were accepted. Farmers who attend discussion groups tend to be interested in farming for its own sake, but some farmers were not interested in increasing production, and didn't need to:

*"Some of the farmers who don't go, they're not interested, probably because their aims and ambitions are different to ours. One neighbour doesn't have a mortgage so he doesn't have to work hard, he doesn't want to travel overseas or buy a new boat so he's quite happy ticking over the same as he did twenty years ago. He's got other interests from farming."*

Another acceptable reason was the situation of the particular farmer. At different times during an individual's career a farmer may choose not to attend discussion groups:

*"When I first started farming they said come along to the discussion group. I reckoned that there was a lot of things I wanted to do and I knew I should do and I didn't have the money to do, and I didn't need anyone else to tell me that. After a while when I started to get it together a bit and more the way I wanted then I joined up, and I've really enjoyed it since."*

*"Every farmer's circumstances are different and the ones further down the scale get disheartened because the better ones say why don't you do this and that?, and it might not be the way he wanted to run the farm but because of his debt load he mightn't have any choice."*

Farmers who did not belong to discussion groups gave a variety of reasons for not attending, including lack of interest and lack of benefits:

*"I've never been to one. They do run one locally but I don't bother going. I've usually got something to do. I've never been involved in those sort of things."*



*"I went for ten years but I found I wasn't getting enough stimulation. I was paying a consultant to help me get to where I was and then they were using me."*

#### **4.9.4 Farm Consultants**

A number of farmers in the Geraldine area use paid farm consultants, and many have used a consultant in the past. Those that use an adviser regularly do so for the stimulation provided and as a source of information:

*"It's another point of view on what you could be doing. You don't have to take it on board. It's very easy nowadays to get stuck in a rut and just do it because you did it last year. I like to have challenges, keep motivated. And an adviser is very good for that, keeping you motivated."*

Other farmers use a consultant occasionally for specific purposes:

*"I've used one a couple of times during drought situations, when its 'what the hell should I be doing' type of thing, when I'm not sure what to do."*

Farmers particularly use consultants when making major financial decisions such as buying new property or restructuring debt:

*"Over the years we've looked at other farming ventures, buying extra land. You get an adviser to do the cost analysis, maximum and minimum we can afford to pay and debt servicing and that. They've got everything at their fingertips. You could sit down and spend a day or two with the calculator, but they can just feed all the relevant data in."*

Those farmers who did have advisers but no longer do generally stopped because particular farm advisers left the area and they didn't like the new ones, and because they "weren't getting a lot out of it anymore.":

*"I had a paid farm adviser for quite a long time. The initial one I had a good rapport with, but then he left, and the next one came along and we were really getting going with him and he went to England, and then I felt I wasn't getting a lot out of the next one. I'm older, and I'm much more sure of what I'm doing so I don't need the advice. Financial advice would probably be more important now."*

Farm advisers are commonly used in sharefarming arrangements and in situations where the farm is run by a manager. In these cases the consultant works between the manager and the owners, particularly in the areas of budgeting and policy changes.

The farmers who do not use farm consultants tend to have quite strong views as to why they do not use them. They do not use farm consultants because they believe that being a farmer is making the kind of decisions that consultants help farmers make:

*"I don't believe in paying a huge fee for something you should be able to work out yourself if you've been all your life on a farm. If you can't work it out you shouldn't be there."*

They do not like consultants because they are not accountable if their advice is wrong:

*"It's not their money they're playing with. You take all the risk and if it goes wrong they've got no worries at all, you're carrying the can."*

The Ministry of Agriculture and Fisheries has been the major source of consultancy for sheep/beef farmers, and was responsible for agricultural research and extension until the mid-1980s. MAF extension services were funded by the government and were free to individual farmers. MAF provided locally based farm advisers who were responsible for promoting innovations that would improve farming in line with government policy of the day. Some former MAF advisers have become private consultants. Though the extension functions of MAF have been privatised and are now run as a private business by Agriculture New Zealand, farmers still refer to the organisation and personnel as MAF.

Among farmers there are ambivalent views about MAF. They recognise that the organisation has been a primary source of research and information, much of which has been valuable to farming, but also have negative attitudes towards the organisation.

Many farmers mentioned MAF as a source of information, particularly via the field days organised on different topics, and in respect of innovations and technologies that MAF "push", such as the introduction of Texels and all-grass wintering. It is this "pushing" that causes concern among farmers though. Some of the practices that MAF has promoted over the years are considered to have contributed to some of the current problems in sheep farming:

*"A few years ago MAF said you have to drench lambs every three weeks, drench them every 21 days, but that's being looked at fairly seriously now, challenged."*

Incorrect advice from MAF, combined with a perception of a lack of accountability of its personnel, is another issue for farmers. One told me this story to illustrate this point:

*"The MAF did a naughty thing once, with soil testing. The same fellow analysed the same results with a three year intervening period and recommended two entirely different things. So I thought what's the point in this, they don't know what to tell you anyhow? I had it out with him, but he was a bureaucrat, he didn't need to have an answer, he was getting paid. But if that's the quality of their advice, what's the point?"*

There is also a perception among some farmers that MAF personnel and the kind of information they provide has been irrelevant to farming:

*"MAF blokes used to be regarded with suspicion, they'd learnt it all out of a book and didn't have a clue as far as how it would work practically."*

Though farmers are ambivalent about MAF's past extension, there is concern that privatisation will result in poorer advice and a reduction in the accessibility of information:

*"I've felt in the past from the Ministry of Ag I've had a good source of information, and I've made use of that. That source is a bit deficient these days compared to what it was, there is going to be a problem there. The younger farmer will be searching around for information and I think he will be at a loss from now on."*

Commercialisation of research and advice means that the information is regarded by farmers as biased and no longer reliable. This makes it difficult for farmers to judge the veracity of the information they receive:

*"The thing I find difficult today is ... you couldn't call it being dishonest..., commercial hardness I suppose it is. It's very difficult to make a decision."*

Sheep farmers obtain information from a wide variety of sources, and there is a general feeling that they are getting more than they need at the moment, or, at least, that they are getting more conflicting information than they can easily process. This is to some extent the result of the complex nature of their production systems in which they produce a variety of commodities: wool, sheepmeat, beef, and, for some, venison and velvet as well. Farmers need to work out how a new innovation or change will impact on all aspects of production, and what is good for sheep management may be disastrous for the deer management. They therefore prefer information that is proven, and by proven they generally mean proven by working farmers on farms that are similar to their own. This preference towards information either from or channelled through other farmers was further reinforced by farmers' experiences before and during the downturn of the 1980s, when, farmers said, it was innovative and progressive farmers who went under as a result of following the advice of the experts.

#### **4.10 External Influences**

Many of the changes in sheep/beef farming practices and in particular farmers' cautious attitudes to change can be explained by the recent history (last twenty years) of the sheep industry and the changes in government policy.

Before Rogernomics, farmers said, the sheep industry was stable:

*"Farming's been very sheltered up until the 1980s. You had SMPs, you had guaranteed prices, the loans from the Rural Bank..."*

Most farmers who were farming in the 1980s said that the economic policies of the Fourth Labour Government had had an impact on their farming, and that there had been a greater impact on others in the area:

*"The Labour Government, when they cut the subsidies off over night, they strangled the sheep industry. You had no income, you didn't do your fencing or the fertiliser, which is self defeating, because if you don't put the fertiliser on then you don't grow grass, and if you don't grow grass, you don't grow sheep."*

In order to manage the economic downturn farmers simply stopped spending money:

*"Till Rogernomics came along I developed every year, then it came to a shuddering halt for five years. I feel as if we're just getting going again now."*

Farmers who had taken most advantage of the subsidies and assistance on offer were hurt the most in the downturn. Interestingly, few of the farmers interviewed said that they had utilised much of the assistance available:

*"We never took advantage of the rabbit breeding programme, SMPs, we're not into that sort of rip-off-the-system, so we didn't get stung by the downturn so much as a result."*

This may be because some farmers who were "progressive" and who had high debt loadings and did make full use of the aid available to agriculture did not survive the downturn. Farmers said that it was not necessarily "bad" farmers who lost their farms in the downturn:

*"Quite a few round here lost their farms. We had a few friends who lost their farms and some of them had been on their farms for generations. They were just unlucky,*

*they got caught either paying other members of the family out on a high valuation or purchasing some more land for a son, or they'd gone in for major development such as irrigation. But then things dropped so badly, land values dropped, the farms were suddenly worth nothing, they couldn't pay their interest and they were finished. It wasn't that people necessarily were bad farmers. It got the farmers at the bottom end of the scale who weren't performing, but it also got the high performers because they were the ones stretched right out on a limb, they were pushing things to the extent of their financial limits. They were the go-getters, but some of them were so far out on a limb when it happened they had no equity left in their properties all of a sudden."*

While all farmers say they are better off in the longer term without subsidies, it was very difficult at the time:

*"Rogernomics. It didn't do much for my wages, damned near crucified us. But in hindsight it's been a good thing. But at the time he gave it to the cockies right up the nose from word go, it was bloody hard."*

The decline in profitability of sheep farming has remained, and farmers said that there was far less money in sheep now:

*"Since the Roger Douglas era there hasn't been the money in sheep farming, in fact most sheep farmers have been struggling until possibly the last two years just to stay afloat. Sheep farmers 25 years ago used to buy a new car every year, now they all drive Jap imports."*

Moreover, farmers said, the affects of those years have had long term impacts on sheep farming, resulting in a situation where there is little innovation or confidence in the industry:

*"In the seventies every time there was a field day on, you learnt something, someone was doing something. But since the mid eighties there's been none of that. Basically the development side of things has taken a downturn. I think farming got such a whack in 1987 when they took away the subsidies."*

*"To develop things, if you can see that at the end of the day you're going to end up with a dollar you'll spend it, but it was taken away so quickly people aren't prepared to take the risk any longer. That whole decade, if it wasn't one thing it was another, nearly every year. I think it knocked the stuffing out of farming, especially out of our generation."*

This decline in confidence in the sheep industry shows in the decline in sheep numbers in New Zealand: *"We're down from 70 million sheep to 50 million and we're heading to 45 million..."* The strategy many farmers have adopted is to reduce the risk associated with debt and expansion by trying to farm more efficiently and more safely:

*"I've decided that it's far better to intensify on a smaller area and try and avoid that debt, just try and intensify and make higher production on a smaller area. The cost of land is too high, all your money would be tied up servicing the land costs and you wouldn't have enough money to utilise the property. And the markets are so volatile you can't predict your income."*

*"I'm pretty careful, more careful than I used to be. Everything just went along through the sixties and seventies, it just flowed along and you knew it was going to happen. Now we think about things."*

Younger farmers who did not go through the subsidised period of agricultural support and the downturn have a different attitude and do not have the same lack of confidence both in the industry and in their ability to farm successfully as farmers who went through the downturn do:

*"Farmers haven't got as much money to spend now. It hasn't affected me because I haven't farmed in the good times, I started farming in the poor farming times."*

Coinciding with the economic downturn in the rural sector, resulting from Rogernomics economic policies, was a series of droughts and snows:

*"The eighties were full of droughts, and they came at the same time and knocked us around as much as the Government did. The drought really had a big impact on farming operations."*

*"I went from the biggest profit I ever had to a fairly large loss from one season to the next, and there was a drought thrown in there to help it along."*

The unpredictability of what are considered to be changing weather patterns in the area is another key factor that has led to the development of safe-farming/low-risk practices in farming amongst sheep farmers:

*"The whole country suffered dramatic climatic conditions in the eighties, for 12 years really. You couldn't actually plan more than three months ahead."*

*"I suppose we took a few more risks in those days because the area didn't seem to be drought prone, and we ran substantially more stock than I do now. We didn't have a problem with droughts, we always had feed growing. Since the early eighties we've been into droughts, it's just been a never-ending saga in the last 12 or 13 years. Odd years it was all right, but whereas this used to be a safe area here, it's not safe now, it's highly prone to drought."*

Because of the risky economic and climatic conditions in which sheep farmers are operating, a conservative approach to farming and a cautious approach to innovation is considered to be the most sensible mode of operation. Therefore, farmers will adopt innovations that will allow them to farm more safely and more effectively within these constraints (demonstrated by the change to silage making, the current flurry of diversification activities where any extra money farmers have is not invested in sheep, and scanning, for example).

The situation of sheep farmers becomes more clear when compared to the situation of dairy farmers in the same area. In the following chapter dairy farmers' experiences of and decisions about change will be documented.

#### **4.11 Conclusion: Factors Influencing Changes in Practices Among Sheep Farmers**

The above account of changes in farming practices among Geraldine sheep farmers clearly shows emergent themes. Almost all of the changes farmers have made have been attempts to maximise profitability, either through reductions in labour or increases in efficiency and effectiveness. However, these changes have been limited by the competing requirement of farming in a way that is safe. Another minor theme has been the trialability of innovations. Farmers prefer to test an innovation in part of their farming system before they make changes in the whole system. The main points of the chapter are:

1. Farmers changed from Romneys to Coopworths to reduce the workload while maintaining or increasing production. Some changed to Drysdale instead, to take advantage of a higher returning market niche, and also to reduce the labour requirements associated with farming Romneys at that time. Currently Texels are being introduced into flocks to produce leaner meat in response to market signals. However, farmers have been constrained in changing breeds (and in specialising to any great extent in wool or meat production) by the necessity to retain flexibility in relation to markets.
2. There was a major shift from shedding off to set stocking in terms of lambing management. This innovation led to increased efficiency in terms of labour and allowed the farmer to successfully manage higher lambing percentages with less (or no more) labour. However, some farmers have stayed with shedding off, as they consider that set stocking is too risky given the likelihood of inclement weather. An innovation in lambing management has been scanning of ewes to determine both pregnancy status and the presence of twins. This innovation has enabled farmers to utilise their feed more efficiently and to use their labour more effectively at lambing time, and is part of a wider trend in farming generally towards monitoring to increase effectiveness and efficiency. This practice also allows farmers to reduce the risks to lambing success associated with underfeeding twin bearing ewes and overfeeding singles.
3. In terms of pasture management the key changes are the experimentation with new pasture species and the introduction of nitrogen to control pasture growth. Pasture renewal programmes are being undertaken currently because of the decline in pasture fertility that occurred when farmers reduced fertiliser applications to save costs during the rural downturn. Farmers are now seeking to increase production from their land to increase profitability, and also to reduce the risks to their operations posed by droughts, pests and threats to animal health. The use of nitrogen to boost pasture growth is another way in which some farmers are trying to farm more safely - through gaining greater control over their feed supplies.
4. There has been a shift from hay making to silage making among Geraldine sheep farmers, a return to growing winter feed crops for stock, and a move away from all-grass wintering. Farmers are trying to feed their stock better in order to increase production. These alterations are also the outcome of a perception of increased risk in farming resulting from changing weather patterns and a decline in government intervention and assistance to farmers, and are a part of a wider strategy of low-risk or safe farming.
5. Health problems in stock reduce production and therefore profitability. The aspect of animal health management that is currently undergoing the most change is worm control. With the development of drench resistance in parasite populations previously accepted practices of drenching are no longer working, and farmers are currently developing and adopting practices that will allow them to control worms in this environment, thereby lessening the risk to profits from poorly performing stock.
6. Marketing lambs and wool is a crucial aspect of farm management and one that has implications for other aspects of the farming system such as lambing management and breeding, and subsequent ramifications on pasture management and supplementary feed strategies. Farmers try to gain the best returns that they can from the market by positioning their production in relation to market signals. However, they are highly constrained from pursuing markets by the unpredictability of returns from different sections of the market, and therefore attempt to maintain a balance between different forms of production. Market unpredictability is perhaps the key influence restricting specialisation of production within sheep farming and farmers' responses well illustrate the emphasis given to safety, risk and flexibility.
7. Diversification is a key farmer strategy for managing risk (market and climatic) in sheep farming, and almost all farmers have diversified systems including cattle, deer, forestry and tourism. Though there are substantial pressures towards diversification, this process is constrained by the costs (financial and intellectual) of diversification, and by the limitations of particular properties. Where it can be done, it may provide flexibility and therefore safety.

8. Farmers in general prefer information that is channelled through other farmers, either through personal networks or via discussion groups or field days held on local farms. They are therefore more likely to adopt innovations that have been tested and proven by other farmers in the area. In the area there are several farmers regarded by all as "good farmers" and many farmers look to what these farmers are doing (or are not doing). If one of these farmers has adopted a certain practice it is likely that others in the area will too. The farming media are also a key source of information, but many farmers considered that they are bombarded with information, and find it difficult to process the material. The use of farmer exemplars illustrates the caution with which new technologies are approached. Profitability and safety are more likely to be achieved if the technology has been demonstrated by a competent local farmer.

This chapter has provided a detailed account of the major technological options for farming among Geraldine sheep farmers, from the farmers' point of view. It details their experiences of technology change and shows their reasons for changing and for not changing their farming practices. It is clear that there is much diversity among farmers in their approaches to and experiences of change, and that there is often more than one path available to the same end. Further, it is evident that nearly all farmers know about the available technological innovations (though some will have more detailed knowledge than others, usually because they have sought it out) and that non-adoption of available technology is, in general, the result of deliberate and considered decisions not to change. Farmers are diverse because of their different positions within the structure of the industry: farmers with very high debt loads, small farms, and farms which are highly constrained topographically are in general more limited in the options available to them than farmers with larger, more flexible properties with financial surpluses. Several farmers noted that young farmers who had not experienced the downturn of the 1980s had a different approach to farmers who had come through that time. Young farmers were far more willing to take risks and were far less concerned with safe farming. However, it is also apparent that while there is diversity among farmers, there is also common ground created by the industrial structure within which they all operate and the common experience of farming. This common experience provides a basis from which to identify some common farmer perspectives.

Two key themes emerge from the sheep farmers' rationales for changes to their farming practices: increasing profitability (primarily by reducing labour requirements and by increasing efficiency) and controlling of risk by farming safely (often achieved through the maintenance of system flexibility). The primary aim of sheep farmers is to be able to remain farming and to obtain returns for their labour and investment that allow them a reasonable standard of living, based on increasing the profitability of the farming operation. The need to farm profitably is an overriding orienting principle that guides farmers' decision making. In addition, the experiences of the majority of this group of farmers over the last 15 to 20 years have taught them that to farm conservatively is to farm safely. Several farmers said that during the downturn it was the innovative farmers who were over-extended that lost their farms, and as a result of this "good farmers" in sheep farming terms now tend to be cautious farmers. The theme of risk and safety is the second overriding orienting principle which guides farmers' decisions about whether or not to make changes or introduce innovations into their farming systems, and which imposes limits on the development of high input/high output systems. This theme is linked directly to the theme of increasing profitability: farming profitably increases the safety of the operation.

Farming safely requires managing risk, and farmers' attention to risk management has been influenced significantly by the government policy, since deregulation, of encouraging farmers to prepare for adverse events. Farmers have received this message and taken increased responsibility for managing risk. This change in responsibility has been an important factor in farmers' thinking about their farm management practices. Further, farmers are now monitoring many aspects of their farming operations. For example, they monitor soil fertility, wool quality, ewe pregnancy (using scanning), silage quality and parasitic worm populations (using faecal egg counts). This monitoring can be used to improve the efficiency of farming, especially in situations where there is pressure on available labour and profitability is unstable.





## CHAPTER FIVE

### CHANGES IN DAIRY FARMING IN THE TEMUKA AREA

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#### 5.1 Introduction

This chapter looks at changes that dairy farmers said they were making, or had recently made, to their farming practices. These changes include alterations to breeding practices, such as heifer synchronisation, and in pasture management, such as changes in the way nitrogen fertilisers are utilised. Several orienting principles emerged, principles which guide dairy farmers' decisions about changing their farming practices. These principles are: monitoring, control, production, and efficiency. Farmers monitor aspects of their systems to gain greater control over factors which influence milk production, in order to achieve greater efficiency, in terms of both utilisation of resources (feed, stock and inputs such as water) and capital investment.

Farmers in the Temuka area said that there have been no fundamental changes in dairy farming for a very long time. There have been changes in focus such as the shift from measuring production on a per hectare basis to measuring on a per cow basis. There have also been developments in existing technologies, such as innovations in hay making machinery and irrigation equipment, and modifications in management practices such as the use of nitrogen to control pasture growth. The aim of dairy farmers is to increase their control over the factors influencing production as far as possible, and they willingly adopt techniques and technologies which assist them in doing this. Most of these technologies are add-ons, which do not require major alterations in farm management practices. However, it may well be the case that some new practices will have a major impact on dairy farming (e.g., using nitrogen fertiliser) albeit without directly affecting their management.

Dairy farmers are specialised farmers, with very few doing anything apart from dairying. There are two exceptions to this, cattle and pigs. A small number of dairy farmers also farm beef cattle, but keep them on run-offs, not on the dairy unit. A few dairy farmers farm pigs on a considerable scale and a few others have small numbers of pigs. The association of pig farming with dairy farming is very old, with pigs being reared on whey supplied free from the dairy factories. Most of the farmers who still have pigs live in the Clandeboy area, close to the Alpine dairy factory. In dairying, there has been a trend over time to increasing specialisation, as the decline in pig production indicates.

Currently a major feature of dairy farming is monitoring. Dairy farmers are increasingly monitoring various aspects of their farming practices in order to "*fine tune*" them. To manage and control pasture farmers do feed budgets, soil tests, herbage tests and moisture probe tests. To manage stock farmers use herd testing, energy testing of supplementary feeds and heifer synchronisation. Furthermore, many farmers are now using computers for both financial and on-farm management. Recently the variety of tests milk is subjected to at the factory has increased, and the Alpine Dairy Company has introduced a total quality management system which requires farmers to monitor aspects of their farming practices which impinge on milk quality.

Greater monitoring of farming practices has arisen as a result of increases in stocking rates. Many farmers with high stocking rates have finely balanced systems with little margin for error. To run such systems farmers need to be constantly aware of the feed situation on their farms and be prepared to respond rapidly. However, not all farmers are keen on the trend towards increased monitoring, which they regard as another factor that is pushing farmers towards systems that are more intensive and more stressful.

Before presenting the main findings on changes in dairy farming, it is important to appreciate that there are two main groups of dairy farmers in the Temuka area with regard to attitudes to production and self-sufficiency. The next section briefly reviews the dairy farming situation in the Temuka area. After this background the chapter considers breeding, changes in the feeding of cows, changes in pasture management, use of computers, sources and utilisation of information, and some external influences, before concluding with a statement of the orienting principles for each group of farmers. Generally this chapter shows dairy farmers to be more homogeneous in their farming practices than the sheep farmers examined in Chapter Four.

## 5.2 Dairy Farming in Temuka

There are some features of dairy farming in the Temuka area which distinguish it from dairying in other parts of the country. These factors are the basis of the local system of intensive dairying that has developed, and is currently being refined, in the Temuka area:

*"The three advantages of farming in Canterbury is that you've got your irrigation so you can have good growth right through the growing season, you've got grazing off, most people graze their young stock off and their cows off in the winter, and the purchase of feeds from crop farms or other farms."*

Farms in the area were on average considerably larger than the national average and included a number of farms recently converted to dairying (conversion farms). The average farm size (effective hectares) in South Canterbury (incorporating Timaru, the Mackenzie Country and Waimate) was 105 hectares, compared to a national average of 77 hectares, and the average herd size was 253 cows compared to a national average of 187 cows (Livestock Improvement Corporation 1994:8). Furthermore, there has been an increase in the number of dairy farms in the South Canterbury area, from 61 in the 1988/89 season (Livestock Improvement Corporation 1989:8) to 91 in the 1993/94 season (Livestock Improvement Corporation 1994:10) and a corresponding increase in the total number of cows from 11,251 in 1988/89 to 23,039 in 1993/94, indicating an increase in the scale of farming in the district.

It is considered locally that farmers in the area are perhaps more innovative as a group than dairy farmers as a whole. This idea was backed up by a farm consultant interviewed.

Temuka dairy farmers can be divided into two groups based on their overarching orientation towards farming. There are production oriented farmers and self-sufficiency oriented farmers, the former being the largest group. Generally the aim of the production group is to *"try and get the farm up to potential production, and increase profit"*. They aim to do this by *"having the stocking rate to utilise feed so you can maximise production"*. Having the right stocking rate allows the farmer to achieve an equilibrium between feeding their cows well and maximum grass production.

There is some variation among the production oriented farmers in terms of their approach to farming and their goals. Interestingly, different approaches to farming did not result in particularly different farming practices. There was not a great deal of difference between the four or so extremely innovative farmers in the area and the rest. Even among the production oriented farmers and the group of farmers who are not regarded as, and do not see themselves as, progressive there was little difference in dairy management practices. The highly production oriented farmers are not doing things radically differently from the others - it appears to be more a matter of degree. Much of the fine-tuning that the production oriented farmers concentrate on involves a technical/scientific approach to what the less production oriented farmers do intuitively.

The production oriented farmers tend, to a greater or lesser extent, to use their farms as *"milking platforms"* to achieve the most efficient use of grass:

*"We will maximise the use of grass, use the grass grown on the farm for milking rather than having grass possibly going to silage or not being used to its potential for production."*

*"You can't get full production off ground that's been heavily stocked in the winter time. That rest does it immense good."*

*"...it has had a big effect on production because you don't have all those hungry mouths hanging around on this place producing nothing. Whatever's here is actually milking."*

Generally these farms are well developed and producing to a high level, and there is not the potential to make great gains in production. Farmers in this situation concentrate more on "fine tuning" their systems to achieve greater efficiency:

*"At the moment we've got our stocking level quite high and our production levels are quite high, and by doing those things the margins are becoming a bit fine. We've got to ensure that we utilise everything we've got. We don't want to be growing grass and wasting it because it's costing money to do that. Virtually what we are trying to do is hone in on those areas to ensure that we utilise everything. It's very much fine tuning now, it's going to be hard to get huge jumps in production now."*

As farmers reach the production potential of their farms increasing profitability rather than increasing production becomes the aim:

*"My main thrust is on the financial side now, keeping production up but improving my financial performance. It's no use feeding just to get production, you've still got to keep the dollars in mind. If you're buying in food you've got to be aware of what it's costing you."*

High production is often gained through high inputs in terms of money and labour, a system not all farmers are comfortable with. Some of the production oriented farmers prefer to have a lower geared system which they consider is less stressful:

*"I try to have a wee bit up my sleeve all the time. I try not to work under real stress, have a real stressful job system. I try to take the stress out of it. We've always got a bit of a buffer, which is probably a bit more conservative than what the real high flyers would do. I'd rather be a low flyer and still be flying you know."*

Several farmers also stated that while they liked to keep up with innovations, they did not like to be first with new things:

*"I think the main thing is you've got to make sure you're not the last, the last with the old. You've got to be very careful being the first, the first with the new. Don't be too quick on being the first with the new but the most important thing is you're not still ploughing our land with horses."*

There is also suspicion that farmers with high input/high output systems concentrate on production and do not pay enough attention to profitability. Lower geared systems may have greater profit margins:

*"As to their production levels, I believe a lot of farmers spend \$7 to make \$6."*

*"At the end of the day you can have all the best production in the world but if your financial returns are no good... There's an old saying about production and*

*profitability, production is vanity but profitability is sanity. I've always got that in the back of my mind whatever we do."*

All of the production oriented farmers said that they treated their farms as businesses, and that farmers had had to become more businesslike. Most said that they were farming for the money:

*"It's a means of getting an adequate income, bearing risk but because of that risk getting a better income in general."*

*"I enjoy the life as well, I enjoy my animals, but basically we're here to make money, a business. It's not a lifestyle but it is a very good way of life while we can make money. If there was no money in it I wouldn't be doing it, put it that way."*

Lifestyle was an important consideration for most of these farmers, an aim that was not necessarily considered to conflict with the goal of making money. Farmers talked about enjoying the kind of work farming entails, the challenge of farming and the benefits of being self employed:

*"I'm in it for the challenge, to see what the cows can do. I like animals, I like the outdoor life. I like to see the cows doing well, it's a pride thing."*

*"Money's not that important. The challenge for example is doing more kg per cow, making sure you get a better figure than last year, cutting down on problems you had the year before. And trying to work in a good balanced family life at the same time. I find that doing the things I set out to do well do brings rewards."*

The production oriented farmers as a group are younger, more highly educated, and have larger farms than the group of farmers who are not production oriented. They are also more likely to employ farm advisers and attend discussion groups. Production oriented farmers also tend to make a lot of use of contractors in their farming operations. Within this group there is considerable variation in the extent towards production orientation, but they are united as a group by a general attitude to production and by similar farming practices. Some farmers within the group do things better or push them further, but it is a matter of degree rather than kind.

The farmers who are oriented towards self-sufficiency tend to be older, established farmers, with smaller farms and from family farming backgrounds. Farmers who are not production oriented have different farming practices to those who are production oriented, often having more mixed farming systems, including pigs and cattle. Generally they have lower stocking rates, are self-sufficient in terms of supplementary feeds, use fewer contractors, and do not employ farm advisers or attend discussion groups. Often these farmers are interested in other aspects of farming such as pedigree breeding. To some extent local farmers explain the difference in approach in terms of age:

*"I think it's an age thing. Young people try to change the world and as you get older you realise you can't. I'm probably a bit more laid back than I used to be. As you get older you are probably a bit more inclined to be set in your ways, lay down a practice and stick to it."*

These farmers generally have the same information about new techniques as the production oriented farmers, but they choose not to adopt some innovations as they consider them to be incompatible with their goals:

*"I tend to keep very up to date with the new technology. Whether I embrace it or not is a different story, but I keep fairly up to date with it."*

In the following sections the changes in dairy farming practice referred to occurred among both production oriented and self-sufficient farmers.

## 5.3 Breeding

Improving the productive potential of the herd is a cornerstone of dairy farm management. Farmers aim to improve their herds through programmes of breeding and culling. For the last 40 to 50 years the genetic improvement of New Zealand dairy cows has been carried out under the auspices of the New Zealand Dairy Board.

### 5.3.1 Artificial Insemination

All but one of the dairy farmers uses artificial insemination (referred to as AI or AB) to breed herd replacements, and it is generally acknowledged that artificial insemination has been one of the major advances in dairy farming, leading to dramatic improvements in production and in the genetic quality of dairy cows in New Zealand. Nationally, there has been an increase in the proportion of cows mated using AI from 45% in the 1974/75 season to around 80% in the 1993/94 season (Livestock Improvement Corporation 1994:20). Artificial insemination allows farmers to control their breeding programmes (and from there production) very closely by selecting for particular traits from well-tested bulls.

The benefits of AI are considered to be obvious, and few farmers talked about why they had adopted AI. Often the change from bull breeding to artificial breeding was made in the previous generation. One farmer said that his father had changed from using bulls to AI when he had a bull that was infertile. Another said that he had changed to AI when he bought the farm off his father. For him, it was a matter of keeping up with the times:

*"I think in those days there was a lot of natural mating done. AI wasn't natural and you were bugging things up by not doing it the natural way. But when dad passed on we moved with the times, it was logical...."*

One farmer, possibly typical of many who had converted to AI, who had recently converted from sheep/crop farming to dairying, explained why he used AI: to achieve greater genetic improvement in his herd than he could gain using stud bulls. The high cost of good bulls (and the risk of the investment) was a key factor in the adoption of artificial breeding amongst farmers:

*"Well AI, they're the best bulls, supposedly the best bulls, in New Zealand, and you couldn't buy them yourself. They'd be too expensive. A herd of my size you'd need 20 bulls at probably \$50,000 each, not really possible is it? They could fall down and break their leg the next day."*

There are several AI options available to dairy farmers. Many farmers use the Livestock Improvement Corporation (LIC), which is a wholly owned subsidiary of the New Zealand Dairy Board. There are various options available to the farmer from the LIC. Farmers can either nominate the particular bull wanted (the "Cheqmate" option) or use the "Premier Sires" system where semen from a group of bulls is used as it is available. They can also either use technicians to inseminate the cows or do it themselves (DIY), in both the "Premier Sires" or "Cheqmate" options<sup>8</sup>. Many go for the "Premier Sires" option, as it is the simplest:

*"If I just use the LIC package they will provide me with the best bull available at the time. The technician will come and do it. The semen is rostered to be sure that you have the best semen that LIC have at any time. It's not one of my spheres of worry or interest. So you can get a really high, well bred, high quality herd without thinking, without doing it yourself."*

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<sup>8</sup> There are other options available for farmers with more specialised requirements.

For farmers with a particular interest in breeding a disadvantage of the bull of the day system is that a particular bull may not be available on a particular day. These farmers nominate the sires they wish to use:

*"Sometimes they run out by the time they get to your place, and say you wanted to use bull A that day and it's not available, then you're forced to use bull B. If I want to use a certain bull on a certain cow, then I buy it and I use it on that cow. There's no hit and miss that it's not going to be available for me."*

A lot of farmers use one company, primarily LIC or Ambreed, but some farmers, those with an interest in breeding, will buy semen from a variety of sources:

*"I buy it through the LIC. But if there's a good bull I particularly like and it comes from another company I would buy it as long as all the figures stacked up."*

Farmers with pedigree herds buy semen from companies that have pedigree sires:

*"We've got a pedigree herd of Holsteins, and the LIC sires, most of the bulls aren't registered. You can't register the calves because the bulls are grade bulls. So we get the semen from other companies with pedigree bulls."*

While many farmers use technicians to inseminate their cows, a considerable number do it themselves<sup>9</sup>. Generally farmers with pedigree herds inseminate their own cows so that they can control exactly which cow gets which semen, but some non-pedigree farmers do it as well. These farmers buy their semen frozen at the beginning of the season and store it in a tank of liquid nitrogen at the milking shed. Being able to *"do them when it suited me"* was an important consideration for these farmers. They considered that DIY insemination gave them more flexibility and more control over the process:

*"We used to get sick of having to wait around for the technicians to arrive. The cows were standing around for hours sometimes, sometimes they weren't here till lunch time. And they only came once a day. Whereas when you do it yourself, the cow's on heat in the morning, you can mate it in the morning, you can mate them at night after milking. It's so convenient, plus you know exactly what's going on with your cows."*

*"I actually do it during milking. That's one time of the year we have two people in the shed and I have a little stool behind the cows and while they are being milked they get inseminated too. I feel they get less nervous doing it that way. Also because I'm not a technician, I don't do many a year. If I all of a sudden have to do 10 cows one after the other I get a very sore arm. But if I get one now, one a row later, my arm doesn't get quite so sore."*

As herd sizes have increased and farming operations have expanded, some farmers have found their workload associated with inseminating to be too high, and have started using technicians:

*"I've found that it's terribly time consuming, and this year because we bought the extra land, I just found I had no time to mess around with it."*

*"But with the herd numbers getting up it's just getting a few too many for me now. When you've finished milking and then turn around and find yourself with 20 cows to do, I used to find it a bit daunting sometimes."*

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<sup>9</sup> Farmers who do insemination themselves attended week long courses run by LIC or Ambreed, and said that AI was not difficult to learn.

One farmer with some pedigree cows who used to do his own inseminating and who used to purchase semen from a wide variety of sources has now employed a contract milker, and has changed to using the bull of the day from LIC:

*"The pedigrees have only been a hobby with me, they're definitely not a paying proposition. They're not treated any differently, they just run with the herd. With having a contract milker on I can't really expect him to start singling out the pedigrees for different bulls and individual matings, so we've gone strictly commercial now."*

Artificial breeding as a herd management practice is almost universally accepted amongst farmers, and is one way in which dairy farmers have increased the productive capacity of their herds over time, and therefore increased their control over one of the factors which impacts on production and, therefore, profitability.

### 5.3.2 Heifer Synchronisation

The major recent development in breeding in the dairy industry is a trend towards artificially inseminating heifers. Traditionally farmers have put bulls over heifers (first year breeders), even if they have used AI on the main herds, but in the last few years increasing numbers have been turning towards AI. Heifer synchronisation has been promoted, both by LIC and by other breeding companies, and in the farming journals. Dairy farmers said that the local vets had just held a seminar on the topic.

In the Temuka area most farmers graze their heifers and other young stock off farm, keeping only the milking herd on the home farm. Because heifers have not been on the main farm it has been impractical in the past for farmers to artificially inseminate them. However, in the last few years new technological developments have enabled farmers to overcome this problem. This technology involves synchronising the cycles of the herd of heifers using CIDR<sup>10</sup> devices, and then inseminating them all at the same time. In the Temuka area the technology has been taken up by a considerable number of farmers in the last three or so years.

The development of synchronisation technology means that farmers now can artificially inseminate their heifers even if they are grazing some distance away:

*"Just turn up, bang CIDRs in the whole lot and turn up six days later and put PG [prostaglandin] in them. Then turn up, pull the CIDRs out and then the technician turns up and inseminates the whole flipping lot of them. Then put the CIDRs back in a few days later, pull them out again, mark them and go in to check who comes on heat, and he turns up and does them all again. It all happens all within very narrow time slots. So you are there, you do a job, go away. It's complicated when you go there every day and you look through them and you draught out the ones. That's complicated."*

Farmers who have introduced heifer synchronisation did so primarily to improve the genetic quality of their herds:

*"Genetic gain of your stock, this is what the aim is. Improved quality of your young heifers coming into the herd. Because your heifers are obviously your best genetic animals, and if you can get heifers from your heifers you're going to be gaining much quicker."*

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<sup>10</sup> Controlled Internal Drug Release

Another benefit of synchronisation is that it enables the farmer to condense the calving period, both reducing the length of the spring calving workload and bringing his cows into the shed earlier, resulting in increased production for the season.

Synchronisation means that the heifers calve earlier, giving them a greater chance of getting into calf for the following season:

*"... to get them in calf early so that after they've calved they have a couple of cycles where they get mated again the next year."*

Having more control over the traits of the bull through AI means that farmers can ensure that they use an easy calving bull over their heifers:

*"To put them in calf to an easy calving Friesian bull if possible so that we get more replacement stock out of our potentially better animals."*

Though synchronising heifers is not considered to be a difficult process, it entails a considerable amount of work in stock handling. Many farmers consider it to be worthwhile:

*"You synchronise them and then take the CIDR out and then mate them and then put the CIDR back. Ours are up the road too on grazing so we've got to run them here, run them back, run them home, run them back. But at any rate as long as we get another ten heifers I'll be happy."*

Do-it-yourself AI farmers who have attempted to inseminate their heifers have found that they have not been very successful. Inseminating heifers is more difficult than inseminating cows that have calved before, both in terms of successful insemination and in terms of the farmers' health:

*"For a number of years I've tried to inseminate them as they came on heat. The results were not what I really wanted. For one thing they are that much smaller, and I haven't got the experience with inseminating. I felt I wasn't getting enough in calf. Maybe my timing wasn't quite right. So we decided to synchronise them, get a technician out."*

*"I have done the heifers myself in the past because I've only been doing one or two a day, but this year with synchronising the whole 40 are all going to be done in one hit. I couldn't inseminate 40 yearling heifers. My arms are too big, my hands are too big, I get cramp. So we get a technician in.... I had a sore shoulder and I've found it's got worse trying to inseminate these heifers. That's a big part of the reason to synchronise them all."*

Not all farmers have introduced heifer synchronisation, though many said they were considering it or would do it if their circumstances permitted it. The cost of synchronisation is one reason that some farmers have not introduced it. Though the cost, around \$30 per cow, is balanced against the cost of buying bulls, not all cows get in calf from AI so bulls still need to be purchased:

*"It's quite expensive, so you've got to get the results. I think the CIDRs are \$14 or \$15, and then the AI on top of that. But then again you've got to buy your bulls too. You've got to buy your follow up bulls anyway to get the tail enders because they don't all get in calf first go."*

*"There is a cost... and even once you're done you still have to have a bull running with them in case some haven't got into calf. So there is an additional cost over and above just running the bull. ... I'm not quite sure of the statistics, 78% get into calf or something like that, so really there is an extra cost."*



Other farmers do not see that synchronisation would provide any benefits to them:

*"I've never had trouble getting heifers in calf. We've never had trouble, the heifers have always calved, always submitted themselves well to the bull. We've never had any problems with conception rates, and I just don't see any point in doing it. I like my heifers to calve when they want to calve rather than having them all within a few days of each other."*

The amount of work involved in synchronisation for some farmers is another factor in decisions not to adopt the practice:

*"You've got to bring them back or have them handy to a shed to be inseminated. I would really have to bring them home to be practical. It could be done but it's one less thing to do at the moment."*

Another farmer said that he would not use synchronisation because of the herd management consequences:

*"You've got a big bunch of heifers all calving on one day which can be a hassle. I find it a lot easier if the heifers just calve in amongst the cows. When they come into the shed they're in between two mature cows and more likely to stand quieter."*

For other farmers, particularly smaller farmers, it does not fit in with their system, the benefits not being great enough to outweigh costs in money and labour:

*"It's not quite so convenient for me, I only have 20 heifers. If I got 80% in calf, that's 16 of them, and then say half of them have heifer calves, which you would be lucky to have, that's eight. So they might be theoretically worth a few more dollars, but by the time you work it all out you probably do an awful lot of work and got very little for it."*

Some farmers have considered the practice and are in favour of it theoretically, but their farming situation means that it is not practical. If there is no shed where the heifers are grazing and it is too far to bring the stock home it is not possible to use the technology:

*"I've looked into it, but with my programme it's not on for me to do it. I'm actually running the heifers away from the place so time wise and cost wise, plus the fact that we haven't got facilities to synchronise them."*

Another development in this area is inducing cows. If the cow has not calved by a certain date some farmers will induce her, even if it means losing the calf, in order to get her into the herd and milking and to get her cycling again so that she does not calve late in the following season. While some farmers have induced one or two cows, the practice, advocated by some vets, is not widespread. Many farmers consider that the costs to the cow in terms of health and production are too high:

*"The consultant told us to induce the last few heifers but we decided we wouldn't. When you get later on in the season there's a bit more risk of metabolic disorders. And the heifers don't always come into milk very well, their udders don't form in the first season. It's to get the cows producing milk, and to get them back in calf a bit earlier again. But it's a bit more risky at this time of year, and the heifers don't always pick up very well."*

The uptake of synchronisation has been rapid in the Temuka area, with most farmers using it, intending to use it, or willing to use it if they were not restricted by practical considerations. The technology has been adopted by farmers seeking to improve the quality of their herds and increase production, and as a

method of overcoming the problem of how to artificially inseminate heifers when they are grazing off farm. A further aim of farmers is to stop the spread of the calving period. Heifer synchronisation is one strategy used to achieve this as the time at which the heifers calve is controlled. Those farmers who have not adopted the practice do not see that the benefits outweigh the costs in terms of money and management. Heifer synchronisation is one area in which there is some debate amongst dairy farmers as to the utility of the technology. This may be primarily because it is new. The rapidity with which it has been adopted in the area (and the promotion of the practice by the dairy farming media and extension services) indicates that within time synchronisation may well become as accepted a practice as AI.

### **5.3.3 Herd Testing**

Testing each cow in the herd for its production (milk quantity, milkfat and protein) has been done by farmers since the mid 1950s, and the number of farmers who do herd testing has increased steadily over time, from 21% of herds in the 1955/56 season to almost 85% in 1993/94 (Livestock Improvement Corporation 1994:13). Herd testing is organised through LIC, who provide a technician to take the samples or provide the equipment for the farmer to take the samples him or herself, test the sample from each individual cow for volume, fat and protein content and somatic cell count, and provide the results to the farmer. Herd testing allows farmers to breed for higher production, by allowing them to cull cows who are low producers and to breed from cows who are high producers. Almost all farmers in the Temuka area herd test, though there is variation in frequency. Some farmers test only once every year or two, but most test several times during a season.

Culling is one major reason for herd testing:

*"Some people think they can tell by looking at a cow if it is a poor producer, but you can't. Herd tests are absolutely essential management information."*

*"It's pretty essential. You've got to test your cows somehow or other because the ones that seem to go in with the big bag of milk are not necessarily the ones that have the quality for production."*

The information about an individual cow's somatic cell counts (measuring the level of contamination) that is obtained from herd testing is another reason to test, now that high somatic cell counts result in graded milk at the factory.

### **5.3.4 Factors Influencing Changes in Breeding Practices**

Dairy farmers are able to control the breeding process to a considerable extent. They exercise this control through using AI, which gives them access to bulls with very high breeding indexes and bulls that are bred specifically for the traits New Zealand dairy farmers want in their cows. They are currently extending this control over breeding to heifers through the "Genermate" programme of synchronisation and artificial insemination. Furthermore, dairy farmers use herd testing to ascertain the production details for each cow several times a season. With this information they have detailed knowledge of the production capabilities of each cow over its lifetime, and can utilise this information to monitor performance and make decisions about culling and breeding that will enhance the productive capacity of their herd. Breeding of dairy cows is subject to a great degree of monitoring by farmers, and it is this monitoring that gives them the degree of control they have. With this level of control farmers aim to maximise the production and profitability of their farms.

## **5.4 Developments in Feeding Cows**

Over time there have been changes in what dairy farmers feed their cows. The best feed, farmers said, is fresh grass, but feeding cows on fresh grass only is impossible given the economics of stocking rates

in the dairy industry and the demands of efficient pasture utilisation. Therefore all farmers feed out supplements. Traditionally farmers have made hay to feed their cows in the winter months (or during droughts), and have grown winter feed crops such as turnips. More recently there has been a switch towards making silage. Making silage has two advantages over making hay. First, silage is higher quality feed, and second, it is less "risky" in terms of harvesting it successfully as it does not have to dry on the paddock like hay. Some farmers are experimenting with silage made from crops such as maize or oats and peas, as the feed quality is supposed to be higher than from grass silage and, because crops are grown under contract, it means farmers can ensure that they have feed available. Some farmers are also testing the quality of the supplementary feeds they give to their stock to monitor more closely what the cows are eating. Recently in the dairying sector, farmers said, there has been a change of focus from measuring production on a per hectare basis to measuring production per cow. This has resulted in increased attention being paid to feeding cows and has led to the alterations in supplementary feeding practices.

A further change in supplementary feeding is the development of the "milking platform" concept where all stock except for the milking herd are grazed off farm, and most supplementary feeds are grown off-farm as well.

Farmers have made these changes in order to improve production through better feeding of stock, and to make more efficient use of the resources available to them.

#### 5.4.1 Changes in Hay Making

Traditionally farmers have made hay to feed their cows but there have been changes in the ways in which hay has been made. These changes have come about through technological developments resulting in part from the need to manage increasingly large farms and herds with less labour.

Traditionally farmers made small, rectangular bales of hay that could be lifted by one person. There was a considerable amount of labour involved in transporting these bales from the paddock to the hay shed and stacking them, and again, when it came to feeding them out, at least two people were required to make the job simple. Farmers either owned hay making equipment themselves or in conjunction with farming relatives, friends or neighbours, and formed hay making gangs who worked on each other's hay. There has been a change in attitude to the sharing of equipment (and labour) between neighbours. One farmer said:

*"Farmers aren't good at sharing plant. Traditionally they don't like owning plant with other farmers, it just doesn't work."*

A farmer who still makes conventional bales said that relationships between farmers had changed over the years, with a decline in co-operation between neighbours<sup>11</sup>:

*"The neighbours have grown away from one another from what they were in the previous generations where they would help one another with all their shearing, dipping, hay making, harvest and all that sort of thing. We're entirely self sufficient when we make our hay. [The fellow] next door is exactly the same, virtually entirely self sufficient, the same with most of them. So there's no sort of 'will you come and give a hand for half a day just to do this job'."*

In the last ten to fifteen years there has been a move away from conventional bales to large round or large square bales, each of which is the equivalent of ten to fifteen conventional bales (Burt and Fleming 1994:B-37). The increasing size of farms and herds is part of the reason for the change from

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<sup>11</sup> One farmer who had moved down from the North Island said that in the Temuka area there was less co-operation and working together among farmers than there had been up North.

conventional bales. Large bales are a far more convenient and less labour intensive way of making the great quantities of feed necessary for a large herd, requiring less labour to make, and less to feed out.

Large bales can be carted to the shed by farmers using the same equipment used to feed it out in a shorter time and with less labour than the same quantity of hay baled into conventional bales:

*"By getting a contractor in you can use great big bales of hay where there's very little work required, very little manual effort and labour required, it's all done from a tractor seat so it allows you to make hay on a big scale."*

*"The only disadvantage [of conventional bales] really is the ability to get hay into the shed- from the paddock into the shed. That's something that a lot of guys don't seem to like doing much these days, throwing bales of hay around. And really, that's the only problem with it. I suppose it does take a wee bit longer to bale the wee square bales than it does to do the big round ones."*

The decision for particular farmers to change to large bales generally occurred when the scale of the farming operation increased and machinery became unsuitable or wore out.

Some farmers still make small numbers of conventional bales because they are convenient to feed out to small numbers of stock, such as sick animals.

*"They come in handy. We've got a feed pad at the back of the cowshed. We feed the cows when they first start calving. They can only fit wee bales in them."*

A few farmers still make most of their hay into conventional bales. Generally these are older farmers with smaller farms, and they do this because they have their own hay making equipment and because they value self-sufficiency and independence:

*"I dare say I want to be self sufficient to the extent that I control what's going on. I'm not relying on somebody else. Probably one of the biggest changes is that twenty years ago would have seen all the cow cockies making eighty percent of their own hay on their own place, and just relying on threshed straw and stuff to fill up that last bit. But now it's the other way round. Dairy farmers rely virtually on everybody else to supply their supplementary feeds. A lot grow nothing."*

*"...mainly wee bales with the meadow hay at any rate because it's just easier feeding out. Plus I've got a baler, do it myself. I sometimes get someone in to help me."*

In general, contractors are employed to bale the hay, if not to cut it as well, as many farmers do not consider that it is an efficient use of money to buy machinery that will lie unused in the shed for the greater part of the year, especially as the cost of machinery has increased:

*"We'll cut it. We own a mower so we'll cut it, but we don't own any machinery that's not getting well used. Anything like that we get someone else... you're better to get someone else to own it and just hire them by the hour."*

The changes in hay making that have occurred are the result of changes in the scale of farming, with reciprocal alterations in technology and management systems that allow farmers to cope with greater numbers of stock with less labour. Moreover, there has been a change from self-sufficiency to the utilisation of contractors for more aspects of the hay making process. This is part of a trend towards the increasing use of contractors in dairy farming generally, as farmers consider that contracting out aspects of the farming operation is a more efficient use of their time and capital than investing in machinery and doing it themselves.

Recently there has been a move from making hay to making silage among dairy farmers for several reasons. Some of these reasons are the same reasons that Geraldine sheep farmers gave for changing to silage making: the unpredictability of the weather making hay difficult to harvest, and the trend (more pronounced in dairying than in sheep farming) towards better feeding of stock to increase production. Similarly in the last few years many dairy farmers have experimented with making baled silage, and there is debate among farmers over the relative costs and benefits of it.

Feeding of stock is an area which has received increasing attention from dairy farmers in the last few years, and is perhaps the main reason for the move to silage making: increased efficiency in the utilisation of resources to maximise production:

*"The silage, we use it now for autumn feeding of the cows, to keep milking condition on them, and also for the spring in case we have a bad spring. We can use that as a back up, whereas hay, they won't milk on hay at all, it's a waste of time."*

Another benefit is that a silage paddock is shut up and out of the grazing round for a much shorter period than a hay paddock, an important consideration with the generally high stocking rates among dairy farmers:

*"...just mainly getting the grass off the pasture quicker and getting it back into the rotation of paddocks. It's back into the rotation a lot quicker than hay."*

Among Temuka dairy farmers, as among Geraldine sheep farmers, there is debate over the relative merits of chopped silage (made into pits or buns) and baled silage. Generally, it is agreed that the two types of silage are suitable for different purposes and for different farming situations. It is agreed generally that pit silage is cheaper to make than baled silage, and like some sheep farmers, some dairy farmers prefer baled silage because of the costs involved in buying the machinery to feed out chopped silage

Dairy farmers said that it is easier to make good quality pit silage than good quality baled silage, primarily because the technology involved in baling and wrapping silage is comparatively new and a body of experience and know-how has yet to be built up among farmers and contractors:

*"A few years ago we experimented with square baled silage, but it was a total disaster. There wasn't enough information, wasn't enough experience from the contractors on how to bale it and how to cover it and keep it airtight. We really didn't do a heck of a good job on that, so it put me off. We've gone back now to fine chop again in the pit...it's reliable, not much can go wrong if it's done properly."*

*"We've never had a disaster with chopped silage. As long as you stick to the three C's, the time of cutting, the compaction and the covering, that's the three C's for making silage. You only get what you put in, but if you follow the rule of cutting it on time, making a thorough job of compacting it and covering it, then the job's done."*

Moreover the work involved in feeding out large quantities of baled silage is a reason farmers with large herds in particular prefer chopped silage:

*"We baled silage last year and found it very difficult, very hard work feeding it out. It's all right for farmers feeding two bales, but we were feeding 20 a day. Extremely hard on the body, and the thistles on the fingers. So we've gone to the feed out wagons."*

Baled silage, however, is more transportable than chopped silage, an important consideration for dairy farmers who generally have dry stock off-farm:

*"You can cart it to where you want it and wrap it, and then you can easily move it around the countryside. If your cows are away down the road in the winter time, you can move it over there, or bring it back. It's quite flexible."*

In general dairy farmers are not constrained by topography in the way sheep farmers are in terms of access with feed wagons. However, for one dairy farmer who has a particularly wet property, baled silage means he does not damage his paddocks dragging a feed wagon around:

*"We find round bales are really good on this country because I'm not dragging any trailers over this wet country. With the round bale silage I looked at it and thought, well this is what we want, we can just feed it out like we feed out the hay."*

Baling silage is also the most convenient and economic way of making small amounts of silage. Farmers can easily make surplus feed into baled silage when there is not enough to be made into a pit. Making surplus grass into silage is an efficient way of managing pasture and of utilising grass :

*"There will be some baled silage made on the farm, probably two or three paddocks, it depends on the surplus. We try to harvest it and get the paddock back into rotation as quickly as possible."*

*"It appealed to me because it allowed us to do little bits, you can do small amounts. The traditional fine chopped silage you tended to have to have 30 or 40 acres to make it worthwhile to make it pay. With this wrapped silage you can put in five acres if you want to."*

Another benefit of baled silage is that there is less wastage than with pit or bun silage. Although wrapped silage costs more to make, when wastage is taken into account, some say, baled and chopped silage cost about the same:

*"Stack silage has to be done really well otherwise you get areas of waste. When you come to cover the stack of silage it always seems that a wind breaks out, so you can't put the sheet over the top. The big advantage to me is that once you open a stack of silage you have to keep on with it because you get secondary fermentation with the air getting in. Whereas wraps, especially if it's individually wrapped, you can take one bale out tomorrow and it doesn't matter if you don't take any more out for three weeks."*

*"Individual wrapping is very expensive. Tube wrapping is more expensive than the buns too, but if I have a loss of ten percent of my [chopped] silage, well that might as well go to the wrapping and I have more food for my cows."*

There are several types of baled silage, individually wrapped bales (round and square), tubes, and covered stacks of bales. There is no consensus as to the comparative pluses and minuses of the different types because the technologies are new and are changing constantly, with new products constantly appearing on the market. Despite the fact that the results of baled silage in terms of feed quality have been inconsistent and that many farmers in the area have had bad experiences with baled silage, many farmers continue to (or have started to) make it.

A recent innovation in silage making is the use of inoculants - chemicals to control the bacteria in silage making to ensure that the fermentation process works correctly. Inoculants are very new and none of the farmers interviewed have used them yet. At a field day at Hinds on silage making an English farm consultant talked about inoculants. His view was that they were expensive, and did not work the kind

of miracles that some farmers hoped they would - they would not turn a bad crop of grass into a good crop of silage. Some local farmers said that they would think about using inoculants, *"If it increased the quality and was economic."* This again demonstrated farmers' concern to improve both production and profitability.

#### 5.4.3 Crop Silage

Another recent development in silage making is crop silage. Many farmers have made crops into silage or are planning to do so. The most common of these crops are oat and pea silage and maize silage. Farmers are trying out these crops for two main reasons. First, the quality of the feed is considered to be higher than that of grass silage, and farmers are currently paying more attention to what they feed their cows as a means of increasing production and making more efficient use of their cows as converters of feed into milk.

*"We've been buying in silage as well, maize silage. It has the highest ratio of dry matter per hectare that you can grow. It worried me a little bit that we haven't really got the machinery to handle maize silage but we'll adjust to it. It will be trucked in and made into a stack, that's how we do that."*

Second, given that many farmers buy their supplementary feeds off farm, because crops are grown under contract, farmers are assured that they will be supplied with what the contract stipulates:

*"We grow maize silage. The main reason for growing it is that it's guaranteed each year. We know that we're going to have it. It's not like growing grass silage and buying it off other farms, some years you'll have it and some years you won't. With the maize silage we've got another farmer contracted to grow it for us on a per kg basis and he's got a fully guaranteed irrigation system so he knows that he can grow it successfully, and we know that we'll have X number of tonnes here next year for the cows."*

One farmer grows crop for silage on his own farm as part of a pasture management and pasture renewal programme:

*"We grow oats and peas for silage. We have a rotation. Any paddock that we take out of grass we plough up and put into turnips for winter feed, turnips and Concorde [grass]. Then we plough it up and put it into oats and peas for silage, and once we take that off we put it into new pasture in the autumn."*

Almost all farmers mentioned the competition for silage contractors, and the worry that the contractor would not be available when they were needed. Growing maize silage helps overcome this problem as it is ready for harvesting at a different time to grass silage. It is also harvested at a less busy time of the year for the farmer than grass silage:

*"The other thing is that maize comes in at a slack time of the year, it comes in April. So there's no problems getting contractors the day you want them."*

*"This time of year, in November, if you're making silage or trying to buy it, it's the most critical time of the year on the farm, mating time. So we make sure we're here and getting the cows in calf rather than growing hay and silage."*

One farmer was making wheat silage for the first time this year because he had *"been talking to a guy who'd been over to England and they do a lot of it over there."* The person he heard about it from has a contracting business and *"was keen to promote the idea."*<sup>12</sup>

Not all farmers think that it is worthwhile making crop silage, because of the expense and because they are not convinced of the benefits of it:

*"The only thing we've looked at quite closely is corn silage. I've seen two or three fads of growing maize for silage and it's never really taken off. It's not a cheap crop to grow, it's quite expensive, and the corn itself is not a full ration. You can only feed it with grass or something."*

Crop silage is a relatively new innovation in dairy farming and for some farmers it fits in well with their requirements for high quality supplementary feed. Its use reflects the concerns that dairy farmers have to control feed quality to assure production.

#### **5.4.4 Other Sources of Feed**

Though silage (and to a lesser extent hay) are the main supplementary feeds, there are other options available to farmers.

Some dairy farmers still grow winter feed crops for their stock, most commonly turnips and grass and kale. Other farmers grow special crops of annual grass to winter their cows on. Generally winter feed crops are grown off farm, either on run-off blocks which farmers are in the process of improving or by the farmer who is wintering the milking herd. Farmers grow winter feed both as part of pasture renewal programmes and to improve the feeding of their cows through the winter months in line with the current emphasis in the industry on feeding cows well. Another factor that is encouraging farmers to grow winter feed crops are changes in cropping technology which allow paddocks to be regressed or put into crop and returned to the rotation system much more quickly than used to be possible, an important consideration given the high stocking rate and resulting pressure on feed on many farms in the area.

A few farmers feed their stock meal or grain, which is another way of feeding cows well. One farmer who has a very small farm (about 60 hectares) has started to feed grain to his cows in order to increase production so that his farm remains viable economically. Grain feeding is an economic proposition for Temuka farmers because of the amount of cropping done in the area.

Two dairy farmers are using non-traditional sources of feed, potatoes and carrots. These feeds are sourced from the food processing plants in the area and consist of peelings and offcuts as well as whole vegetables that do not meet the quality standards of the processing company.

Farmers utilise these other sources of feed (the most common of which is winter feed crops) both to feed their stock better to improve cow performance, because the option helps the farmer to overcome particular problems, and because the option is readily available.

#### **5.4.5 Attitudes to Off-Farm Feed Sources**

Dairy farmers are divided into two groups with regards to their attitudes to off-farm feed sources. One group of farmers emphasise self-sufficiency in their farming practices, and work towards that end either by buying run-off blocks or by farming at a stocking rate that can be supported by their farm alone:

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<sup>12</sup> Several farmers mentioned hearing about new ideas either from visits to Britain or from the Federated Farmers exchange students who pass through the area.



*"I want to be self-sufficient to the extent that I control what's going on. I'm not relying on somebody else. If the season's bad and that person hasn't been able to supply that feed I don't need to go to every Tom Dick and Harry to get that supplementary feed and be paying the earth for it."*

These farmers are not convinced of the benefits of the milking platform system of dairying that has developed in the area. There is a feeling amongst them that the milking platform system is risky as you are relying on somebody else to feed your stock, and therefore do not have control. Furthermore, in their opinion it may not work out to be an efficient use of resources:

*"It works out quite expensive when you work it out, we're just looking into this sort of thing now. Is it best to go and spend a lot of money buying in grass to bring here to fill our silage pit, or will we be better perhaps not milk quite so many cows and put the silage in ourselves off the farm here? We were working out how much it's going to cost us to buy in the extra feed, and with the very high stocking rate like some farmers have, they spent an awful lot of money buying in feed. We've got to weigh it up, does it justify the costs involved and the work and everything else? You get a hard year, a difficult year, a dry year or something like that and there's not the feed available. You can get yourself in a difficult situation."*

On the other hand, other farmers emphasise the economic benefits and efficiency of sourcing supplementary feeds off farm. While many farmers have traditionally had run offs for their young stock, in the last few years there has been a strong trend towards utilising the home farm as a "milking platform", with a milking herd large enough to eat all or most of the fresh grass on the farm. Dry stock are grazed off-farm, and many farmers now source almost all of their supplementary feed (hay, silage and winter feed crops) off farm.

*"We used to make all the supplementary feed for the dairy farm off the dairy farm, but now we make crop silage and buy in supplements. In the past we've bought standing grass and made it into balage, but now somebody is growing a crop of maize for us to harvest."*

The reason for this change is primarily economic:

*"People have become much more aware of the economics of it. People with bigger herds instead of doing it all themselves, making all their winter feeds themselves, get somebody else to grow it."*

The use of off-farm feed sources reflects the division among dairy farmers into those who emphasise production and are satisfied with the economies of it, and those who emphasise self-sufficiency and security. Clearly, the use of off-farm feed depends on which of these values dairy farmers emphasise. In either case the farmers are assuring control of production and profitability.

#### **5.4.6 Metabolisable Energy (ME) Testing**

Some farmers are now using ME tests, particularly on silage and on other supplementary feeds to work out exactly how much energy their cows are getting and to amend the type and quantity of feed as a result. ME tests are another way in which dairy farmers monitor the factors which influence production on their farms, and which they use to gain control of those factors:

*"It's probably been around for a few years but it's being used a little bit more now, probably being made a little bit more aware of feed values. I've probably been made more aware of the quality of feed we put in the cows, the true value and what the real costs are of buying that feed. We know basically what each type of feed is although it can vary somewhat. We know that straw is very low. And the amount,*

*you'd use it to make sure the cows are getting the right level of energy, that their requirements are being met over winter."*

*"I know how much I want to feed the cows, say for example, you want to feed one group of cows 100 megajoules of feed a day, then you need to know what the silage is."*

There was talk at a field day and at a discussion group about the possibilities of buying standing grass for silage on the basis of the ME value. One farmer is already using ME tests when he buys in supplementary feed:

*"It showed us the true value of the feed, what the feed was really worth in dollar terms. It was used for the price in buying standing pasture off a neighbour."*

ME tests can also be used by farmers to monitor their silage making performance:

*"It's to see how good the feed you're feeding is, you can tell if you're being successful in making silage."*

ME tests are becoming more useful, one farmer said, as knowledge about cow nutritional needs increases. Previously, this information was unavailable:

*"Before we could do the ME test, but it didn't actually tell us anything. What it did is said we had a heap of MEs. It didn't say that five kilos of protein and 15 kilos of something and something else equalled a balanced diet. We are only just starting to get that data now, where they can say a cow should have so much protein, so much metabolisable energy."*

Dairy farmers have adopted ME testing because it enables them to gain greater control over what they feed their cows (and therefore over production). ME testing is just one of a battery of tests that dairy farmers are now using to monitor aspects of their farming system. This emphasis on monitoring and control is perhaps the major current trend in dairy farming. However, there is debate among farmers about the utility and the accuracy of ME tests and the practice has not as yet been widely adopted. ME testing is a comparatively new technology and as such no consensus of opinion has been developed. As it is being promoted through the dairying extension services, which have considerable success in implementing changes in dairy farming practices, it is likely that over time the practice will become more widespread.

#### **5.4.7 Factors Influencing Changes in the Feeding of Cows**

The feeding of cows is one area in which there is currently a considerable amount of change going on, and an area that is currently being paid a lot of attention by dairy farmers. There have been alterations in hay making technology, and a marked shift from hay to silage as the primary source of supplementary feed. Farmers are currently experimenting with silage, making baled silage of various types, making silage from crops, and considering, though none have yet done it, the use of inoculants to control the fermentation process. Furthermore, farmers are using several other sources of feed: winter crops, grain, and vegetable offcuts from processing plants in the area. These changes have come about as farmers work at increasing their production and at making better use of their resources: they are trying to improve the feeding of their cows in order to maximise production. They are furthering this process of increasing control over what their cows eat through monitoring feed quality with ME tests.

A further trend in the feeding of cows is to treat the home farm as a "milking platform" and to obtain supplementary feeds from off-farm sources. This is part of a wider trend in dairying towards specialisation and to the contracting out of an increasing number of aspects of the farming operation. The Temuka area is unusual compared to dairying in most of the rest of New Zealand in that there are

comparatively few dairy farms in the area and that there is a great deal of sheep/beef farming (where dairy herds and dry stock are usually grazed) and cropping farming (supplementary feeds), which gives Temuka farmers the opportunity to farm in this way.

## 5.5 Changes in Pasture Management

The management of pasture is a crucial aspect of dairy farming, especially given the high stocking rates many farmers have. The aim of dairy farmers is to control the growth of grass so that it is available when they want it. A further aim is to make maximum utility of grass grown both for financial and management efficiency. Farmers in the Temuka area have considerable control over grass growth because all but a very few are able to irrigate all of, or the greater part of, their farms. Irrigation enables them to make maximum use of nitrogen fertilisers. Farmers also monitor the state of their pasture with moisture probe tests, soil tests, and herbage tests. Farmers also use feed budgets to monitor the feed situation on their farm and to predict what the situation will be in the future. This control over pasture enables farmers to ensure the efficient use of their pastures and to maximise production by matching the stocking rate closely to the available feed.

### 5.5.1 Irrigation

Irrigation is considered to be essential to successful dairying in Canterbury, and all but a tiny minority irrigate:

*"When you've got irrigation you've got irritation. But [in] Canterbury, you can't really dairy farm without irrigation."*

Those farmers who do not irrigate tend to have small farms on heavy soils. In their cases irrigation is not so essential because of their soil type, and, given their scale, they say putting in irrigation would not be economic:

*"There would be some advantages, but I don't think they would be economic ones. The cost of putting in irrigation, servicing irrigation versus the return, I don't think it would be worth it. If I had all my land in one spot, and it was all dairying, and the quality of the soil wasn't as good, then I would have to irrigate."*

Dairy farms in the area have been irrigated for over 30 years. There have been changes though, both in irrigation technology and in the way it is utilised in managing the farm. Once, one farmer said, irrigation was used as a backstop to get farmers through drought periods, but it is now an integral part of the pasture management system. This change has come about as farmers have amended their management practices to cope with increases in stocking rates:

*"At one time irrigation would never be brought out until at least the first of December, basically irrigation was to get you through the summer months of December, January and February. But now guys are geared up in October and go right through until April, there's no let up."*

Irrigation is now part of a system of pasture management that also includes managing soil fertility and pasture quality:

*"We've learned a lot with irrigation since we first started. It's not just a matter of pouring water on. We found that you've got to get a lot of other things right. You can't just pour water on, you've got to have good pastures, good fertility levels and good drainage. Those things go together."*

The design and installation of irrigation systems is usually done by specialists, and farms are planned and fenced to some extent around the irrigation system: *"Fencing's followed the best layout to suit the irrigation, we had to re-fence the whole block."*

Though irrigation costs a considerable amount of money to install and run, the benefits outweigh the costs as irrigation gives farmers greater control over their pasture and therefore over production:

*"We can control our environment a bit better through the irrigation. The thing we can't control is if it gets too wet."*

Farmers no longer have to farm to the level of feed they can grow at the driest part of the year as they can grow grass for a longer period:

*"You can grow grass right through, from now [October] right through to April, May you can control the growth. The cows reach a high peak up in the North Island then they fall away quickly because you aren't able to feed them as well as you can down here. On a per cow basis our production down here is as good as anywhere really because we can grow the grass between September and October and right through to May."*

Irrigation also allows farmers to make maximum use of nitrogen. Nitrogen fertilisers need water after they are applied and farmers with irrigation systems have full control of this:

*"If we feel that the pasture growth isn't quite as much as we'd like we can sprinkle a little bit of urea on in front of the irrigator, and with watering straight away you're getting a response from it."*

*"The one complements the other. Fertiliser goes on, it boosts the grass, and the irrigator keeps the grass going. Canterbury is subject to so much dry weather, you can't guarantee that you're going to get rain. Especially with those nitrogen fertilisers, they need to be watered in. So if you put those on you follow them up with the irrigator if it doesn't rain. Whereas if you didn't have irrigation and you put the nitrogen on you'd be hoping for rain, and if it doesn't rain you've wasted your money."*

Farmers also use irrigation and nitrogen to bring pasture back into the rotational grazing round more quickly after it has been used for silage or hay:

*"You can manipulate your pasture growth. Say you take hay or silage off a paddock, straight away I can zip in with some fertiliser. The paddock where you've harvested the grass off, you've taken a lot of the fertility off the paddock, more than you do just grazing it, so you can go in and put a little bit more fertiliser on and then straight away in with the water with the irrigation, just a light sprinkling with the water. Straight away you're going to get recovery growth in that paddock. So you can reduce the length of time, once the paddock is harvested until it's back into the rotation again for the cows because you can get in there quickly and put the water on. In the North Island you have to wait for whenever it rains."*

The control of pasture growth that comes with irrigation removes barriers to higher stocking rates:

*"We've all got irrigation, we know we can use the extra grass, we're not going to waste any grass. Because you can control the water you can control the grass growth, so the stocking rates are quite high."*

*"After the first year when we just had those 80 cows to irrigate for, we realised that to go up to the number we wanted to milk, which was 200, we would have to irrigate the whole farm."*

Irrigation is used by different farmers in slightly different ways, depending soil type and weather conditions on their farms. Farmers on heavier soils do not have to irrigate as much as those on lighter soils:

*"We're on reasonably heavy soil here next to the river, and we probably irrigate half of what people on light ground do. They'll start up a good fortnight before we have to, and our soil keeps the moisture a lot better."*

And those more exposed to wind have to irrigate more than those more sheltered:

*"Being out here if we don't keep those irrigators going and it does blow for a week, we're dry. Whereas the likes of —, he takes a month to dry out. It's a lot drier here, shingle. You've got to be in front of it all the way, you can't wait until it looks dry. One year we had irrigators going from August until May."*

Dairy farmers are anxious about continued access to water for irrigation. Farmers have to apply for consent from the regional councils to take ground water, and for consent to apply it to their land. Water usage may also be restricted for some farmers in times of water shortage, and to manage this situation farmers with high stocking rates obtain grazing rights or buy surplus feed on contract from farmers who are not affected by the water restrictions:

*"Where we are restricted is if we have a dry summer, if water levels in the river get to a certain level we are restricted. It's only happened about once in the last 12 years. How I have covered myself is by going to farms who are not in the irrigation restricted area, guaranteeing me a winter crop for the cows so that they have feed over the winter."*

Irrigation is widely used by dairy farmers and is an integral part of pasture management, combining with fertiliser to assure production of both the required quality and quantity of feed over a long growing season. The production oriented farmers manage irrigation to sustain high stocking rates and high production. Most of the self-sufficiency oriented farmers also have irrigation, which they use to maintain production and to farm safely through the dry season.

### **5.5.2 Moisture Probe Testing**

An innovation that has been adopted in the last few years by some farmers in the Temuka area is moisture probe testing. A consultant from a private company comes to the farm and inserts moisture probes into paddocks with different soil types. He then comes back regularly and tests the moisture level in the soil, and from this works out when the paddock will have to be irrigated again if the grass is not to suffer. This technology was first used by cropping farmers and dairy farmers learnt about it from them. There are three main reasons why probes are used: to determine the timing of irrigation, to improve pasture quality and to document responsible water use.

Farmers use moisture probe tests to decide when to commence and when to cease irrigating:

*"We don't start irrigating quite as early. In the past when we've started early when we thought it was drier than what it really was. It's quite good to know when we need to start irrigating again and when to finish."*

Delaying the start of irrigation can save farmers a considerable amount of money, which is one of the major reasons that farmers do moisture probe testing:

*"We believe that we can pay for the cost of this monitoring mainly by the water we save by not over watering . We had been wasting money in the past. Some of my lighter stuff will have to be done by next week, and the heavier stuff is still probably several weeks away. It's told me when to start without over watering. They suggest there are certain levels, that I can put on a certain amount and any more than that would be a waste of money. Hopefully the service will pay for itself, on savings alone."*

*"We have reduced our water use by about 25-30%. Instead of taking 20 hours to run up a paddock you might speed your irrigator up and do it in 15 or 16. Of course you're not using as much power and as much water, and it pays for itself."*

Moisture probe testing also allows the farmer to increase his control of the quality of his pasture:

*"I've just this last year put in moisture probes with the consultant and he does the monitoring of that and gives a fair bit of advice. He's worked out stress points in the soil for the plant and how much moisture should be there, so we use that now. Basically he says how many days away they're wanting to be irrigated before the plant comes under stress. If the soil is too dry, there's not enough moisture there for the plant to take up and it's growth rate will slow down. Your grass comes under stress. It's just efficiency. Over the years we've been putting on too much water and sometimes we've probably been watering too early when soil temperatures are too cold, maybe watering too late in the season. With monitoring you get it to the best advantage you can."*

*"I've been conscious that I've over watered at times and paid for it in the winter time with the place being too wet, winter and next spring. You get awful pasture damage with the cows."*

Another reason for moisture probe testing is the Resource Management Act which dairy farmers said is likely to impact on them in the future. Moisture probe testing can be used to demonstrate that farmers are responsible users of water resources in applications for water rights:

*"It's important to know how much water we've got to put on so we can take this information to the Canterbury Regional Council or whoever dishes out the water rights and say listen, this is how much water we use and this is how much we need, rather than just having a water right which says you can take so much an hour. We might only need half of that."*

*"The other good thing about it is with a fair bit of water conservation going on now and Regional Councils, it's another feather in our cap to say we're not using any more water than what is absolutely necessary and we're monitoring the situation on a weekly basis so we're being reasonably efficient. I think in the future there's going to be a lot more monitoring."*

Farmers who have moved to the area from the North Island need to learn how to run irrigators and how to manage an irrigated farm. They learnt primarily from other farmers, but moisture testing is another way of ensuring that they are doing it right:

*"The system was here, but we've put in probes and people come in and tell us when we should start and stop irrigating, so we've got that back up as well."*

Not all farmers use moisture probe tests. Some of those who do not are on farms with heavy soils, which, they say, makes the tests unnecessary. Others are unconvinced that the tests would tell them anything they cannot work out for themselves:

*"I think if you're reasonably observant in what's going on you can tell whether you're over-watering or too late getting started."*

*"We just haven't used it as yet. I know the neighbour across the road did it, and from my feeling we should have started irrigating in a week's time. He reckoned about a fortnight's time. He has slightly wetter land than we have so my feeling wasn't too far out."*

Others do not believe that the tests give farmers the control they need:

*"Usually the worst thing that happens, and it's already happened once this year, is you're irrigating flat out because it's coming dry and then you get four inches of rain and things are bloody sodden wet. Admittedly he can tell you when the ground is full of water and when you're losing it out the bottom, but when the ground is dry today I'll defy anyone to be sure it's going to rain tomorrow. You've got to irrigate on the dry days, there's no good waiting for the rain because ten to one it doesn't come soon enough."*

One farmer who is currently developing his dairy farm, is not doing moisture probe testing because he sees it as a tool for fine tuning rather than for development:

*"It's just the cost and the hassle. When we're fine tuning I think it's probably a good option. At this stage where you're developing the block those kinds of finer tuning things aren't as useful."*

The use of moisture probe testing is one of the few dairy technologies over which there is disagreement about its utility. Many farmers think it an essential tool while some do not. Like heifer synchronisation and ME testing, moisture probe technology is comparatively new among dairy farmers. Furthermore, it is a localised innovation, not one promoted in the dairy industry generally (as most dairy farms in New Zealand are not irrigated) and moreover to date it is most commonly used by farmers who are highly production oriented. Because of these three factors it can be expected that the use of the technology will spread in the area.

### **5.3.3 Fertiliser: the Increasing Use of Nitrogen**

The major change to dairy farmers' fertiliser applications has been the increase in the use of nitrogen in the last few years. For many farmers nitrogen is now an integral part of pasture management and a key tool for producing feed for their stock. As one farmer put it: *"Nitrogen's not a fertiliser, it's a feed"*. Nitrogen is used to boost pasture growth at specific times of the year. Farmers said that local dairy farmers generally were high users of nitrogen.

*"Last year we put on 25kg each time, so it might have been 100kg of urea through the season. This season in the spring, in the late spring, we put on 150kg of nitrogen per hectare on recommendations from our consultant."*

*"Some paddocks more, some less but we would be looking at over 100 kg of N per hectare. It's comparatively high by New Zealand as a whole. Not necessarily so by our particular standard around here though."*

*"In the last ten years we've gone from using no nitrogen on the farm to using up to 100 units a year."*

*"We've probably quadrupled our use of nitrogen over the years."*

Not only has the amount of nitrogen used increased, but the way in which it is used has altered:

*"I would say at least 90% of them would be using nitrogen in the spring, and they've actually started to do nitrogen dressings right through the whole year."*

Farmers generally apply either urea, which is a highly concentrated nitrogen, or DAP, which is a mixture of both nitrogen and phosphate. Urea is a more concentrated source of nitrogen, but DAP has the added benefit of the other nutrient. With DAP, one farmer said, *"you're basically getting the nitrogen for free"*. DAP is applied by truck whereas farmers apply urea themselves. Though the application of DAP costs more money than urea farmers save on their own (or their employees) labour.

Farmers had varied ideas about the factors causing the trend towards the increased use of nitrogen:

*"Mostly through research"*

*"Probably from farm consultants pushing it."*

*"It's farmer driven. We were 3.3 cows per hectare and we could only just grow enough feed for them, so we had to do something to go further. Nitrogen was always considered the cheapest source so we got serious about it."*

While research and consultants have played a role in promoting the use of nitrogen, a key factor in the growth of its use is the higher stocking rates on dairy farms:

*"Something I've gone into more in the last two years is greater use of nitrogen, and I've never done that previously. I probably had a lower stocking rate. Obviously with increased stocking rates I made greater use of nitrogen. Also to get more production because I've got to justify the two men I've got working for me now."*

Furthermore, nitrogen use is closely linked to irrigation in the Temuka area. With irrigation farmers can ensure that they can gain maximum benefit from applying it:

*"We've all got irrigation. We know we can use the extra grass, we're not going to waste any grass. I would imagine we would be quite high in use."*

Moreover, nitrogen coupled with irrigation allows farmers to control short term pasture growth. This enables farmers to have higher stocking rates and still farm with a big enough margin of safety. In addition to the amount of production supported by nitrogen fertiliser, farmers use it to ensure that they have grass exactly when they want it, both to feed to cows directly and to grow pasture for silage by applying at key periods, e.g., calving, silage making and to boost autumn feed.

*"I put DAP on in the autumn just to give me a bit more feed in the spring time to build up a feed bank."*

*"We put on nitrogen fertiliser in a mixture just before the cows calve, about the end of July. We put it on to boost the whole farm. We put another lot on our silage paddocks, just to boost them along, and then we'll put some more on in the autumn to boost the autumn feed. So it's three dollops a year of it."*

*"Urea is a cheap way of getting extra feed, half the cost of buying other feed. So it's worth boosting pasture production to make cheap silage. This season we used it to boost the silage, boost the whole farm so we could take out more area for silage."*

Nitrogen is considered to be a cheap way of getting more feed: *"It's a darn sight cheaper than almost any other feed that you can buy per kg of dry matter produced."*



Not all farmers in the area use nitrogen. Those with lower stocking rates and less intensive systems grow enough feed without it. There is also concern amongst some farmers about the consequences of increased nitrogen usage. One consideration is the impact of nitrogen on clover growth:

*"They also say with high rates of nitrogen you're suppressing a lot of natural clover growth. You can overdo it and suppress clovers, and it's really a bit defeatist if you use too high rates."*

Another issue is the potential for the pollution of groundwater:

*"I do wonder sometimes. With these high rates of nitrogen they're getting quite worried. It has a leaching effect and causes nitrate poisoning through into the groundwater supplies. It can take quite a long period of time to do it. I know in Europe in certain parts now it is very strictly controlled as to the amount per hectare they are allowed to put on."*

Some farmers though do not accept that nitrogen may have negative side effects. They said that nitrogen does not diminish clover, that the potential environmental impacts are exaggerated, and that the levels of nitrogen they are using are not a cause for concern:

*"There's always been a real worry in New Zealand that when you start putting a lot of nitrogen on you're going to stunt the clovers and remove New Zealand's competitive advantage. There's a lot of debate about that at the moment. Some people argue that the clovers are not supplying as much nitrogen as we think, which I agree with. Some people are concerned with the environmental impact of nitrogen, which I don't think is as bad as what people think."*

*"I don't really think it's a great big quantity. Some people in research say you shouldn't really put too much nitrogen on. They say if you're putting more than 200kg per hectare per year you're putting on too much. We would be putting maybe 150-170 on per year, and it's a little at a time."*

Nitrogen use is another example of a technology that is widely used by production oriented dairy farmers. It combines with irrigation to become an integral part of pasture management. Users discount the potential adverse effects of its use. While the cost of nitrogen fertilisation is relatively low and it stimulates pasture growth its use will continue for those dairy farmers oriented towards greater production.

#### **5.5.4 Soil Testing and Herbage Testing**

Tests can be done on both soil and herbage to acquire information about the nutrients present and missing in soil and pasture. Soil testing is a well established practice whereas herbage testing is relatively new. As such, there is no debate about the merits of soil testing, but much about herbage testing. Dairy farmers are not willing to adopt every piece of new technology that comes along that claims to enable them to increase the monitoring of their farming practices: the utility of the innovation must be either logically obvious or demonstrated.

Almost all farmers do, or have done, soil tests. They soil test in order to be able to work out what fertiliser to apply to their pastures. The aim is to grow consistent (or increasing) quantities of high quality pasture - *"We're trying to get more grass to grow so you have to see what the soil needs."* Many farmers now apply high analysis fertilisers that are designed to redress the nutrient imbalances in their particular soils, and soil tests allow them to apply the right fertiliser to the right paddocks:

*"We soil test, monitoring paddocks every two years. From that we make a strategy of what we have to put on. Because we put on whey a number of years ago half the*

*farm is so high in phosphate levels that we don't have to use phosphate there, only sulphate."*

Only one farmer said that he had received conflicting information from soil tests:

*"The first one was with some outfit in Christchurch. Some of their readings I thought were quite wrong, well, not wrong, but I queried them. So I did a follow up test on the same paddock more or less right away and the MAF reading came out different. It left me confused. You lose a lot of confidence when you spend a considerable amount of money and you get different results from the same paddock."*

Again, only one farmer said that he was constrained financially in how much fertiliser he put on:

*"We do a lot of soil testing through Ravensdown. Their field officer comes out, and on his recommendations we put on what we can afford. It's a situation where he gives us a computer readout of what we should put on and we do what we can as far as finances go."*

More recently, technologies to measure the nutrients present in pasture have been developed. A few farmers are now doing (or have done) herbage tests as well as soil tests, in order to discover the mineral content of the pasture. The aim of these tests is twofold:

1. To ensure that the pasture is taking up the minerals it needs:

*"We did do it once. It was just a pasture that wasn't performing like the ones surrounding it were, and we wondered why so we took some herbage tests off it. It was deficient in potassium I think. It came up in the soil test, but the herbage tests confirmed without a doubt that was the problem."*

2. To look at what minerals and trace elements the cows are actually acquiring from the grass:

*"Some people say you get different results from them to what you get from the soil tests, and they can be quite useful to decide what your cows are getting compared to what's in the soil. It isn't necessarily exactly the same, something may be blocking the take up of a particular element."*

Because the technology is new, farmers who have done herbage testing have not always found it successful:

*"I think we took the herbage test at the wrong time of the year and got the wrong results, it was our own fault really. Then we did what the recommendation was and ended up with that much grass it wasn't funny. It recommended to put a lot of nitrogen on so we smothered the farm with nitrogen, and boom. Blew it out of the ground, we had that much grass all winter we just didn't know what to do with it. If we'd got a proper consultant to read the report for us, I think we'd have done things differently."*

This is one area where many dairy farmers said that they were not sure what the tests were for, or what could be done in terms of changes to farm management resulting from the tests:

*"I've never seen huge advantages in doing them. We get all the advantages from soil testing, I've yet to be convinced that herbage testing is particularly beneficial."*

*"Some people say that you get finer or different results than when you soil test. It shows what the plants are actually picking up rather than what's in the soil. The*

*only thing is so far nobody has been able to explain to me what you can change if it doesn't get picked up by the plant. What is the reason why it doesn't get picked up by the plant? Because as long as they can't recommend anything to remedy that there's not much point in spending the money."*

The practice of soil testing is well established and universally accepted among dairy farmers as being a necessary and useful method of increasing production and applying fertilisers more appropriately, thus increasing efficiency. By comparison, herbage testing is a technology that has only just recently begun to be used by a few dairy farmers. The aim of herbage testing is to measure the quality of feed, but as yet farmers do not see that the tests further this aim. If herbage testing is to become common practice among dairy farmers they will need to be convinced that it provides them with information that soil tests do not, and that it is information they are able to act on to improve production and efficiency.

#### **5.5.5 Feed Budgeting**

*"You've got to do a budget of some sort, no matter how crude it is."*

Feed budgeting is part of a pasture management system characterised by increasing levels of monitoring, and increasing levels of control. The outcome of this monitoring and control is greater efficiency.

All farmers do feed budgets of some sort, in that they reflect on how much feed they think is in front of them compared to how much they will need to feed their cows and provide necessary supplements such as hay and silage. Some farmers do feed budgeting in a more technical way than others. Those with a technological approach to feed budgeting will use rising plate meters to measure the amount of dry matter per hectare on their farms and computers to work out an appropriate rotation and to determine the amount of supplementary feed they will need to provide. At the other end of the scale, farmers do it all in their head, on the basis of knowing from experience how much grass their farm will grow and how long the cows will take to eat their way through it. Most farmers lie somewhere between these extremes, utilising a combination of formal calculations and informal knowledge of their farms.

Feed budgeting is one area in which the farmers who have farm consultants use them:

*"He'll go through a feed budget with us for the winter and for spring. We purchase what feed we think we need, and he'll go over it with us and check it and basically come up with a few different ideas, forms of cheaper feed if it looks as if we're going to have a deficit. We work it out kg of dry matter, cow requirements and then feed supply."*

**Q.** Are you usually pretty right?

*Yes, this season we didn't have to purchase any extra feed so it worked out just right."*

Other farmers use a less technical approach, working it out by "gut feeling":

*"I just know how many days an acre or a paddock will last so many cows. I don't chart it with great accuracy with dry matters and all that sort of thing, but you know only too well. The main thing is to make sure you've got the feed and if you're in a bit of a period where you're running a bit short well you've got to improvise."*

*"We don't go around with a probe or anything. Because the farm is easily laid out I go past every paddock every day. I don't do an official walk to see 'look there's so many kilograms dry matter'. I know when pasture gets rank and I just drop one or two paddocks out to see how we go. It's more a feel as we go sort of thing, [if] the cows leave too much behind it's time we dropped a paddock out and keep it for silage. Or if it gets dry we might use it again. Like last year we dropped about six*

*or seven paddocks out in October. Then it became very dry and two of those paddocks we used again quite a bit later. It's an eye appraisal."*

Farmers with larger farms and higher stocking rates are thought to need formal feed budgets more than smaller farms:

*"If you're highly stocked you've got to have feed budgets and you've got to know how much grass you've got in front, because if you're going to have a deficit you've got to be able to do something quickly to make up for that deficit."*

There is some feeling among farmers that feed budgeting is not as precise and exact a measure as it is claimed by some to be:

*"I'm sceptical about it. We had discussion group a while ago and some of the people were arguing very strongly about the relative merits of different levels of pasture height, moisture, dry matter. I'm absolutely positive they wouldn't be able to tell. Even with very experienced people, if you put ten Dairy Board consulting officers in a paddock and asked them how many kg dry matter were there the answers would be 200-300 kg dry matter between the top and bottom. And it's not very practical. You would be walking a very fine line if your feed was budgeted on that narrow a margin, impossible at this stage. People don't work to that."*

Feed budgeting is an important part of farm management, but the actual techniques used can vary from sophisticated testing and calculations to eye appraisal. The use of the former approach is typical of larger farms with high stocking rates: on these farms there is less margin for error and a correspondingly greater need to monitor feed supply closely.

#### **5.5.6 Factors Influencing Changes in Pasture Management**

The changes in pasture management are small changes, changes which allow farmers to fine-tune their pasture management strategies and to gain more control over their pastures. Many of the changes work together. For example, irrigation allows farmers to gain maximum benefit from nitrogen applications, while nitrogen boosts pasture production allowing increases in stocking rates, that make it viable for the farmer to increase his irrigating capacity. The aim of these changes is increased efficiency in resource utilisation and increased control of another factor influencing production. Furthermore, this is yet another area where dairy farmers use contractors or consultants to assist them in making the best use of their money and resources. This can be seen in the use of irrigation specialists to design and install irrigation systems and in moisture probe, soil and herbage tests. The general principle at work is that as production reaches maximum potential there is no possibility for increasing profitability through increasing production. Therefore farmers seek to improve their profitability through more efficient production, by fine-tuning their farming systems so that all aspects are working at maximum potential. Furthermore, as stocking rates increase to maximum potential and the system becomes more finely tuned there is a reduced margin for error and a greater need to prevent problems. Farmers are thus compelled to monitor pasture production closely and constantly if feed shortages (or unplanned surpluses that might not be able to be utilised) are to be avoided. Those farmers less inclined to innovate in this way have deliberately chosen to adopt a more conservative policy or to manage the system in a more self-sufficient way.

## **5.6 Computers**

Around one quarter of the farmers interviewed have farm computers. Those that have them use them for financial and stock management. Some of those who do not have computers plan to get one, others do not.

The most common use of computers amongst farmers who have them (and the most common reason stated by farmers who want one or are getting one) is for financial monitoring:

*"I want to refine my farm management, my budgeting and cash flows, my financial management. That's the immediate aim. Once I get going on it I might be able to think of a lot more."*

A further reason for some farmers is herd management:

*"I want to get a computer in the next year or two, mainly for herd records. LIC give you plenty of information and everything, but I'd like to put say cow 1 on it, and that she calved on 20 August and she had no calving problems, she had a sore left back teat and every bit of information from there until I culled her, she held in calf and she produced so much milk and every year. I'd do that so I'd know exactly what the cow's doing, mainly for culling reasons. Just herd management, mainly, I'd like my computer for."*

Several farmers are using the Dairyman programme from LIC for aspects of farm management:

*"All my cows are on it-Dairyman. Some of it's quite technical for what I need it for. Mainly I use it just for my own records and soil testing and that sort of thing. I know which paddocks have got what levels, pH levels, so I can keep a record of it, so I'm not looking for papers."*

*"I run Dairyman on it, which is the LIC programme. All the events are fed into the computer on each individual cow, you know where you are with that, you can keep track of your calving, you know what cows are overdue so you can go and look at them and do something about it."*

Farmers often buy computers in part for their children's benefit. Several said that they had bought a computer, or were considering buying one, as their children reached secondary school age:

*"It's more the children than anything, we've got four children, the oldest one is in 6th form, it's more for the children than for myself. I can use it, it's fairly basic really. The children put me to shame though."*

Those who want computers but have not yet got one often have not because other things have greater priority at the time:

*"It would be quite handy for doing books and stock recording. Eventually I'd probably quite like one, I can't justify it at the moment. I'd use it for accounts, stock records, budgeting."*

*"It's something I don't know whether I can justify. Although they're cheaper now, you still have to get the use out of it, it has to pay for itself. I won't rule it out but at the moment with the farm consultant's computer and livestock recording on the national computer, I can't justify the money."*

A major reason for dairy farmers not using their own computers (or for not getting one) to do stock recording is that if farmers herd test, and most do, the information is put onto the computer at LIC and is available to farmers from there:

*"I tend to use the database at LIC, it gives me all the computer information for the herd. Everything's on that so why make more work for myself?"*

Farm consultants too give farmers access to computer generated information about their farms without the farmer having to buy and use a computer: *"We get the consultant with his computer to do our cash flow."* Moreover, many farmers use their accountants to do their books:

*"I don't really see the need for one on this farm to be honest. The accountant's got a good system where we code our statements and everything and send them to him. We get it back pretty quickly. I think we can use other people to do that work for us quite successfully."*

*"My accountants have actually said it's probably not worth it. We have all our records on paper, we do our monthly accounts and cash flows, it's all written in a book. At the moment there's not really a great advantage apart from they say GST, you can push a button. But you've still got to put it in there. We'd only use it once a month, probably and you'd almost forget how to do it from one month to the next."*

Others are simply not interested in computers or do not think that they would be useful in their farming systems:

*"I'm not interested in them and too lazy to put stuff in to wait for it to come out again."*

*"We haven't got a big operation here, we haven't got a lot of records to keep. We're just a small farm by today's standards. I keep our production records in a book and I keep a cash book, old fashioned but it works all right for us. And all our herd records are done by LIC on their computer anyway. I feel I could spend money in a better way than buying a computer. The computer's not going to better our production, that's the way I look at it."*

The expense of buying a computer is another reason many farmers have not bought one:

*"They're quite expensive to buy too, to get a big enough one, you would have to utilise them very very well to make it worthwhile."*

The amount of time and energy needed to become computer literate also puts many farmers off getting one:

*"It's more work, more time. It could be nice, yes. Some days you think it could be handy and then you think oh God I'll be sitting here all night poking things into it. I don't know, I'd have to learn how to use it, I'd have to go to a computer course."*

*"I'm not terribly computer literate, probably if I started early enough, young enough I would have been..."*

The time and energy needed to become computer literate also contributes to the under utilisation of computers once they have been bought:

*"We bought a cheap one, second hand, had a bit of a blurt on it and haven't used it for a couple of months, we'll get back into it when we get a bit of space."*

The use of computers appears to be growing among dairy farmers. Computers are used to monitor and improve control over finances in particular, but are also used by some farmers to build up their own records on herd production, reproduction and health, the results of soil tests and fertiliser histories, and to do feed budgeting. All of these uses provide farmers with knowledge about their operations which allows them to improve their control and achieve greater efficiency. However, the expansion of the use of computers is constrained both by the intellectual and financial outlay required to fully utilise them,

and by the ability of farmers to access detailed, individualised computer-generated information about their farms and stock from sources such as LIC, farm consultants, accountants, soil testing laboratories and so on.

## 5.7 Sources and Utilisation of Information

Dairy farmers obtain information about innovations and changes in farming practices from a variety of sources: newspapers and magazines, consultants, discussion groups, and other farmers. They said that information was easy to find, even that there was too much given out, but none said that they found the amount of information overwhelming.

*"I notice that there seems to be more now, there's more stuff comes in the mail I reckon. You get different bits and pieces, miles of paper."*

*"There's probably too many papers. The information's saturated I feel."*

The dairy sector appears to be unique in the large amount of available information. Farmers involved in other agricultural sectors (such as those with pig operations) said that information was much more readily available in the dairy industry:

*"The Dairy Board are more together. We get our magazine every month, and we get a video. We have discussion groups and consultants. There's probably ten times more information being thrown at you, whereas in the pig industry you've got to go and find it if you really want to."*

The information presented in the newspapers and magazines is backed up by consulting officers and at field days, resulting in a comparatively integrated and focused set of information. There seems to be relatively little conflicting information presented to farmers. This situation is reinforced by the fact that the consulting officers, who run discussion groups, work for the Livestock Improvement Corporation, and it is they who run many of the field days for dairy farmers. Furthermore, the "New Zealand Dairy Exporter", the leading dairy magazine, is published monthly by the Dairy Board and distributed to all dairy farmers. Moreover, many people who use a farm consultant employ a "Farmwise" consultant, who is attached to the LIC. Overall, dairy farmers receive a coherent set of messages about farming practices:

*"When I was up North I used to go to Ruakura quite a bit, field days and things. But you've already read it in the papers often. It's really only reinforcing what you read, consolidating those ideas."*

Only one farmer said that he found that he got conflicting information, though he indicated also that this was not necessarily a bad thing:

*"So that's probably what it's coming down to, you have to find out for yourself, too much contradiction. It is interesting. It is one thing I have noticed, there seems to be more people speaking on subjects than three or four years ago. You could just about name them, who had the regular views and articles, and now you're getting three or four magazines a fortnight. Ok, they double up but a lot of it's from people who're now experts in their field. And you're getting more diversity of opinion."*

### 5.7.1 The Farming Media

Dairy farmers obtain a great deal of information about dairying through written sources, particularly from the "New Zealand Dairy Exporter". Almost every farmer specifically mentioned the "Exporter" as being a key source of information:

*"The 'Dairy Exporter's' very good, there are articles in there by Dairy Board consulting officers and people like that. I understand that of all the farmer magazines and papers that come out the 'Dairy Exporter' is one that is read and digested more by the farmers than anything else."*

Farmers indicated that the specialised nature of the "Exporter" was what made it particularly valuable:

*"I read the 'Exporter' from cover to cover, really, glean the information. A lot of the stuff that comes in the 'Exporter' is in the other papers, but nearly all what I want is in the 'Exporter'. It's actually a dairying magazine."*

Some farmers indicated that you could not believe everything that was written in the "Dairy Exporter", particularly the information given about particular farms. The information is only an indicator of something of interest:

*"I get a bit sceptical sometimes, various articles with various people in it which you know aren't true and are ill researched, and the reporter just believed what he was told. Some of the stuff that is printed is either bullshit or lies. You add up the figures and they don't tally up."*

Farmers also mentioned the free papers that come in the mail as having information in them, but because they are not specifically dairying magazines they do not contain as much relevant information as the "Exporter" or other specialised dairying publications. Another source of written information is the dairy company newsletter, which carries articles on aspects of farm management by the consulting officer. Again, this information is not new information, but reinforces ideas presented in the "Exporter".

A recent information transfer innovation in the dairy industry is the "Farming With Pictures" video series. These are produced four times a year and are distributed free to all dairy farmers. The videos have segments on topics relevant to what is happening on-farm that season. Almost all farmers had watched the videos, and many mentioned them as being a valuable source of information, because the information is presented in a different way: "You can see more on a video than a photo in a magazine".

Farmers who employed staff found them a useful way of getting information to their workers:

*"I quite enjoy it actually, probably because I'm not really a reader. It's easy and for staff as well, you can give it to them. My staff isn't thick but it's easier to give them a video to watch than give them the Exporter and say I want you to read that article. It's easier, they take more in with both the sight and sound."*

Many farmers use the specialist "Exporter" to provide them with information about innovations and new practices. It is a widely read and highly respected part of the Dairy Board's extension activities.

### 5.7.2 Farm Consultants

Around two thirds of the farmers currently employ a farm consultant. There are two ways in which farmers use farm consultants: on a regular basis or occasionally for specific purposes. Those who use



a farm consultant regularly (three to five times a year) use them as information sources, and as a sounding board and a source of stimulation.

Farm consultants bring new information to farmers, particularly technical information that farmers may not have easy access to or be able to analyse easily. Furthermore, the consultant may be able to more easily analyse farmers' situations and what practices will be appropriate:

*"Well I think he's probably your biggest avenue to bring in all the technical advantages that are available, it's his profession to know all the new things from the fertiliser requirements to the new varieties of grass and different management tools."*

*"You might have picked it up in an advert and he'll have all the technical knowledge which says well really speaking, it might work for somebody but it won't work for you, or whatever the case".*

Another benefit to be gained from farm consultants is that they see a wide variety of farms. Farm advisers also provide an outside perspective on a farmer's operation:

*"He's an outside observation. I reckon you can get too close to the trees and you don't see the wood. You're flat out doing your thing, and you don't realise what you're missing. He's coming in fresh and sees you're not doing something to the best advantage and he tells you."*

*"It's good to have someone else's ideas and inputs, he visits a lot of farms. A lot of the times they pick up bits of information from different farms they go to and farmer experiences, and of course they can pass them on to other people. You know if you've got a few ideas yourself it's good to have someone to share them with or bounce them off and hear their comments or their views. They may see things slightly differently and can have some input themselves."*

Other farmers use consultants at times of major change in their farming situation:

*"If there is a specific thing that I'm concerned about I will get a consultant from that specific area. I think I've been in the game long enough, so I feel happier targeting specific areas rather than general."*

*"In that first year we got legal advice for our sharemilking contract, we paid for a farm consultant to come and help us with that side of it."*

Farmers use consultants at different points in their farming careers because they feel that they can get more benefit from an adviser at some times than at others:

*"I'm probably using them more now. In the first few years I didn't because I knew where we had to go. We were in a developing situation so we've been going up in cows every year and building up fertility. Now that we're getting to a level of over 500kg a hectare I can use them to start fine tuning my practices more. Before it would have just been the basics and I knew the basics so I would have been spending money for nothing."*

The farmers who use farm consultants the most tend to be those who are production oriented. These farmers have high stocking rates and very tight margins, in terms of both on-farm management and, often, finance. These farmers use farm consultants to help them "fine tune" their systems.

*The area we're looking at more now is margins and profitability rather than how to get there, very much fine tuning now. It's going to be hard to get huge jumps in*

*production now so we've got to ensure that we get production as profitable as possible. One area we're looking at now is rejuvenating some of the pastures, putting in some of the newer species and the best way to go about introducing it and at the same time maintaining production. It can be quite difficult, to take paddocks out with a high stocking rate and introduce new grasses because you put yourself under pressure, that's an area we're looking at present."*

The personal reputation of a particular farm consultant is the most common reason why one consultant is chosen over another. Farmers said that a good farm consultant is one who can match his advice with the abilities and goals of the farmer and the potential of the farm rather than giving out simple, blanket advice, and one who can communicate well with farmers. Communicating well means a consultant who does not get irritated with his or her clients when they do not want to do what they are told: *"Farmers want to do their own thing. Often they want ideas from the consultant but they want to make the decisions themselves."* Most of the farmers use one consultant, who used to be a Dairy Board Consulting Officer and now works as a "Farmwise" consultant from LIC. He has a very good reputation in the area:

*"I knew he had a good reputation and he had been a consulting officer before in this area and I didn't know him that well but I knew he had a good reputation."*

Those farmers who do not use farm consultants do so for a variety of reasons, but basically because they cannot see that using a consultant would benefit their farming greatly. Some farmers do not see that they would gain a lot from using a farm consultant because of their particular circumstances:

*"I can't say there's any reason why I haven't got one or why I don't need one. Probably if I thought I was going to go bigger and buy a new farm or something I'd look at getting one but for the size of the farm it doesn't really warrant one."*

Farm consultants are thought to be more beneficial to larger farmers than smaller ones:

*"I think if I was operating on a larger scale, simply from the point of view of keeping right up to date. Well I suppose it's relevant in any situation but you probably have more choice when you've got a large-scale operation. If you've got a few thousand dollars to spare each year then it's probably you can then establish priorities as to where that money goes. In my case it's more a question of whether you can survive or not. There's always a need for more money than you've got. It's a fairly intensive system I operate, just a matter of sticking to the knitting and trying to keep the living expenses down."*

The cost of employing a farm consultant compared to the perceived benefits is another reason that some farmers do not use them:

*"I'm not sure that a farm consultant is really going to enhance my farm management that much, when I go to discussion groups and field days and everything else that's going on. I'm not sure how much actual return I would get through paying someone \$70 to \$80 an hour to walk round the farm with me."*

A few are simply against the concept of farm consultants: *"I trust my own judgement. I make mistakes, so do they."*

The LIC has recently introduced a new package called "Ulti". The "Ulti" package combines herd testing, AI using the "Premier Sires" option, and "Farmwise" consultancy. This has resulted in an increase in the use of the particular LIC "Farmwise" consultant as the cost of employing a consultant has been considerably reduced. Farmers who have not used a consultant before, as well as those who

would previously have used one only occasionally or had stopped using one, now get regular visits from the LIC consultant:

*"Apparently there's been a big upsurge in it this year, in the use of him. They've changed the funding of it. He was basically charged out at \$75 an hour but if you use livestock herd testing and their AV and it's based on numbers. With my sort of numbers I get four visits a year of three hours and then he's allowed five hours of office time over and above that, and with my numbers and the numbers I'm going to mate to AV it's costing about \$10. But a guy with a smaller herd, his hourly rate works out more and that's how they've done it this year and a lot of people have taken it up. Because it's getting towards free. One or two criticise it, if you've got a smaller herd they say it costs probably three times as much as what it is for me, they reckon they work the charge-out rate basis wrong. So perhaps it's easier for the people with larger herds to get them in than those with the smaller herds who could do with it."*

It appears that some farmers are using the consultancy that comes with the "Ulti" package to see whether consultants are worthwhile. Several of these farmers said that they had made important changes in their farm management as a result of the consultant's advice. It would be interesting to see how many of these farmers continued to use a consultant if the "Ulti" package was withdrawn.

Many, but not all, dairy farmers use consultants either regularly or for specific issues. They provide new or specific ideas, experience and an outside perspective, typically to those farmers focused on production. Some farmers do not have the need for consultants or do not see a financial gain in engaging them. Dairy farmers typically use consultants from within the industry and do not use consultants from Agriculture New Zealand.

### 5.7.3 Discussion Groups

*"Some of them are very good, informative and some can be quite social and some are just a waste of bloody time."*

The discussion group in the Temuka area, like all dairy farming discussion groups, is run by a consulting officer employed by the New Zealand Dairy Board and attached to the local dairy factory, in this case Alpine. Somewhere around half of the farmers currently attend this discussion group, and several others had in the past.

Discussion groups are a source of new ideas and information: *"Just to see the other side of the fence, to see how everyone else is doing and to get new ideas"*.

Discussion groups enable the farmer to compare his farm to others in the area, and are a source of motivation:

*"You tend to work on your own for long periods as a dairy farmer and it's just getting that contact with other people who are doing the same sort of thing. That's how we get a major part of our motivation, [and] pick up knowledge, through the discussion groups. Maybe less as you get older, but certainly over the years discussion group would be a major part of our farming operation. It would have been very much more difficult without discussion group."*

Discussion groups also give farmers access to the experience and advice of the top farmers in the area:

*"There are one or two people in it that were very prepared to try new ideas. They'll tell you yea or nay whether it's working for them. They're a reasonably good guide as to whether it's going to work or not."*

*"There's always the attraction of discussion group where some of the better operators go along. It just gives you an opportunity to pick their brains and see what they're doing, see how you can improve things on your own farm."*

The discussion group can also be a source of information and support to the farmer whose farm is visited:

*"The first time they came here was shortly after I moved, and I appreciated that day, it was an excellent day. Basically they reinforced things that I was going to do and they tossed in a few other things which helped. It was a drought year and they had things to build up the feed, things that they'd gone through when they bought their farms and found their farms with no feed."*

Farmers said that there has been a change in the nature of the local discussion group over time that resulted in some farmers leaving it, and quite a few farmers, including some who still attended, were critical of the group. There was a general feeling among this section of the group that the discussion group had moved from a focus on the particular farmer and his system and problems and helping him to improve his farming in terms of his particular goals and aims, to a more technical approach, which measures a farmer's performance against a set of external, abstract standards. Farmers who failed to conform to these standards were criticised:

*"I'm only milking 80 cows. The discussion group would come here and tell me why aren't I milking 110, 120? That would really cause a big argument because I'm quite happy doing what I'm doing, getting the cows to produce what they are capable of producing without causing all sorts of problems."*

The critical nature of the discussion group prompted some farmers to leave:

*"I went to a particular one, I found it very nit picky. They ran the person whose farm it was into the ground as much as they could by pointing out all the bad things and very few good things about them. It sort of put me off and I haven't gone back."*

The farmers who dropped out of the discussion group considered themselves (and were spoken of by others) to generally be less highly geared in their farming systems than those who stayed:

*"They [the farmers who left the discussion group] probably had a wee bit more laid back attitude to farming in general. I wouldn't say they're not learners themselves. They wouldn't be top farmers but they wouldn't be poor farmers either. It was probably more personalities, they didn't get too stressed that they had to get top production."*

This has resulted in a discussion group that is very production oriented and very technical, which some farmers in the group do not like and do not find useful:

*"In the last 18 months it's got too technical. They've got away from the practicalities, and I've heard one or two others make that comment too. They get too much into the technical data. They'll sit for a couple of hours and do a feed budget and at the end of the day you get lost in figures. I think they've gone overboard, and I know it's turning people off. Once upon a time you'd go to a discussion group and you'd look over the whole farm, but now they might just do a quick look round the farm, look at the cows, look at some pasture, then go back to the shed and argue over figures for a couple of hours."*

*"It's just all figures and you never look at pastures. You only seem to get to the cows, you never look at calves, young stock. It's just all figures and figures and more figures."*

Some farmers said that the discussion group gets "a bit repetitious", because of the technical focus - "you get sick of looking at grass. The same thing gets covered every month, you know who's going to say what". Some farmers would prefer to spend more time focused on the particular farmer's system, "To see what an individual's actually doing". There is also doubt among some farmers about the utility of much of the technical information argued about:

*"In discussion groups where they talk about so many kg per hectare etcetera, I really doubt very much whether most people who talk about it really understand it, or whether they are as specific as they like to think they are. We have had ferocious debates about whether it should be 1200 or 1800 kg dry matter for example, but the reality is most people wouldn't know the difference anyway. You can get excessively theoretical."*

Furthermore, some farmers consider that the local discussion group is very competitive, and not very supportive or encouraging, and that because of the competitive nature of the group there is a feeling that people are not necessarily honest about their problems or production:

*"In the first few years it was a better type of discussion group than what it is now. It was more of a sharing rather than a competitive nature. It was a sharing of ideas rather than, 'this is the way you should be doing it' and 'you're doing that wrong'. It got picky and critical."*

*"I felt you would go to a discussion group and share and try to learn from each other and be honest about your production. And I always had the feeling that there were quite a number of people there, once someone said what their cows were doing, their cows are always doing better. Then it took away the edge and the learning side of it for me, and I felt if you are here just to show off or to compete - what's the point."*

*"I find it hard to accept what a lot of people say they're doing. It's a bit like when I worked on a sheep and crop farm, lambing percentages were always exaggerated and the best crop of barley was always at the back of the farm where you never saw it. You get to these people's farms and they don't have a lot of grass and their cows aren't in brilliant condition and they say they're getting enormous amounts of milk out of them. I just find it hard to believe. You have to have supercows to produce milk without a lot of grass. Plus a couple of times after discussion groups we see milk dockets from those farms by accident and they didn't have it [the claimed production]."*

Farmers gave several reasons as to why they thought other farmers did not go to discussion groups. One reason given was that farmers with smaller farms would find it difficult because of the competition and the peer pressure:

*"Peer pressure is quite strong in these things. If you are only doing a little small herd of cows when everybody else has got 300 you feel it and some people say they don't, but I think most people do. You like to contribute and everybody likes to be thought of as being successful, but when you're only milking 100 cows you do feel very small. I think it might be a constraint as far as smaller farmers going to the discussion groups."*

Farmers said that at the discussion groups there is a something of a party line to follow, and anybody who does not follow this line is criticised. This seems to have happened in the case of stocking rates. There was, apparently, a push some years ago at discussion groups to increase stocking rates, and farmers who had other approaches found that they came in for a lot of criticism.

*"It happened soon after this stocking rate thing came up, people were so adamant that that was the way to go, and if you didn't you weren't up with it. 'How many cows per hectare have you got on, what are you playing at?', sort of thing. The numbers game, of numbers of cows per hectare."*

These farmers had aims and goals in their farming other than increasing production, aims and goals which were not necessarily accepted as valid by production oriented farmers:

*"We may not have done the production per hectare that some of those people did, but that's not the point, it's how you can live off it. That is my view is the important thing, economics, how you can live off it. If I got a bigger farm with more cows I would have to have more staff, that wouldn't suit me. I would get under stress if I had too many people under me to tell what to do. I think a lot of the decisions we make on the farm are to do with what suits the family, does that leave us enough time to do things with the children?."*

There is a very strong pressure to conform at discussion groups, with increased production the result all farmers ought to be aiming for. If farmers have aims other than increasing production, they are unlikely to fit in with the group. Neither are those farmers likely to have their contributions to discussion valued, or to get much benefit from a visit to their farm.

Discussion groups can provide new ideas, a basis for comparison that encourages farmers to improve their performance, access to top farmers and support for the farmer whose property is featured. However, for some farmers discussion groups can be a negative experience, where their farms, their farming systems, and they themselves as farmers are criticised and undermined. Since dairy farming practice is fairly uniform in terms of ways to produce milk efficiently, a focus on technical approaches to achieving maximum production has developed, and the local discussion group no longer focuses on how different farmers can achieve their particular goals. Because of this singular focus some farmers have found the discussion group to be unsatisfactory and they have either left, or remained reluctantly. This discussion group may be more focused on technical approaches than groups in other parts of the country because of the number of large farms, conversion farms and younger, highly motivated farmers in the Temuka area. The important point is that the discussion group works well for those who seek to maximise production and efficiency and plays an important role in innovation, but that it does not meet the needs of all farmers.

#### **5.7.4 Factors Influencing Farmers' Evaluation and Use of Information**

Ultimately the New Zealand Dairy Board is the source of a great deal of the information dairy farmers receive, through the "Exporter", the "Farming With Pictures" video series, "Farmwise" consultants, discussion groups run by LIC consulting officers and dairy company newsletters. This results in the presentation of an integrated body of information, constantly reinforced from a variety of sources. Often information is focused on the issues of the season and articles on the same topic will turn up in many places and be covered by consulting officers at discussion groups.

Furthermore, much of the research to do with the dairy industry is controlled and funded by the Dairy Board: the Dairying Research Corporation Ltd (DRC) at Hamilton conducts and disseminates research on dairy farm production, the Dairy Research Institute at Palmerston North carries out research and development of marketable milk products, and LIC does research into breeding and provides farmers with access to the results of this work.

Though discussion groups are generally rated highly by dairy farmers as a source of information, the one that is running locally does not appear to be meeting the needs of all farmers as the approach is too technical and the environment is too competitive. Although some farmers no longer attend the discussion group, and though some who do attend have commented that the approach is too technical, the farmers who do not attend will in general have access to much of the same information through other sources. Those production oriented farmers who did not attend discussion group in general were using the same techniques and systems as those who did attend.

The single source of much information on dairying results in a coherent body of dairy farming knowledge. Because of this farmers do not tend generally to receive conflicting information and there is a general attitude among farmers that innovations and information are for the good of dairy farming in general.

## **5.8 External Influences: the Impacts of Factory Tests of Farming Practices**

The only external influence on their farming that dairy farmers specifically mentioned was the impact of the increasing number of tests the dairy factory carried out on their milk and the increasingly stringent standards that the milk had to meet:

*"That's been a change, to try to get farmers to do something with their grades and hygiene. We get penalised on milk grades a lot heavier than what we used to."*

Increasingly stringent sanitary regulations to do with the standard at which milk must arrive at the factory have been imposed on dairy farmers. In the 1991/92 season Alpine introduced a Total Quality Management system to improve the quality of the milk arriving at the factory. Under this programme farmers' milking sheds are no longer inspected by dairy inspectors, instead it is the responsibility of the farmer to develop shed procedures and herd management practices that result in a consistently high standard of milk production. The aim of the system is to prevent rather than cure problems.

Milk is tested in an increasingly large number of ways by the dairy company. Alpine now carries out the following ten tests: aerobic plate count, thermoduric plate count, coliform plate count, inhibitory substances, sediment, organoleptic assessment, colostrum, freezing point, somatic cell count and temperature (Alpine Dairy Products 1994:15). If a farmer's milk fails on one of those tests the milk will be graded and the farmer may incur a substantial financial penalty. This has led farmers to pay much greater attention to aspects of herd management which may lead to milk grades. One area of focus is hygiene standards within the milking shed, resulting in more care being taken over cleaning processes and more frequent replacement of rubberware:

*"We've had to increase our quality of milk, be more careful in cleaning the plant more thoroughly, because the quality levels at the factory are a lot stricter now."*

*"We've got a booklet that we try to follow to keep our milk as grade free as possible, keep the shed as tidy as possible. It's probably just the cleaning side of it more than anything, we tend to use more detergents, more hot water."*

Another strategy that many farmers have adopted is a reduction in teat washing:

*"...just the ones that are dirty and need a wash. They recommend that it is best not done except where the teats have dirt on them. If you're not doing it properly the dirt would run down the teat. Also, handling all the cows teats all the time can spread infections."*

The two tests which farmers talked about most were the somatic cell count and the thermoduric cell count. Somatic cells are white blood cells which fight infections in the udder of a cow, and the count is

an indicator of cow health. Farmers receive a grade if they have counts of more than 500,000/ml (Alpine Dairy Products 1994:15).

*"In the old days you would never have heard what somatic cell counts were. They've just come in in the last four or five years. I think the vets were one of the first ones to say we were going to have to look more closely at cows and check them more often for mastitis. Then the dairy company jumped on the bandwagon. They've started to bring in penalties for high somatic cell counts as well."*

Cows with mastitis are a common cause of high somatic cell counts, and farmers are now monitoring the udder health of their cows more closely, and have adopted a range of management techniques to try to prevent the problem occurring:

*"They've made us more aware of our somatic cell counts and we do a lot more dry cow therapy. We use the dry cow therapy at the end of the season, and anything that gets mastitis during the year we get onto it very quickly and treat it. We make sure we teat spray more often now too."*

*"You tend to check the cows more often for mastitis. You take a closer look than what you normally would do. It's changed my practice from teat washing, I don't teat wash now. The only time you wash the cow's udder is when it's really mucky. Washing does tend to spread the bugs more and the cows develop more cracks and that with using water. So it's more hygiene for the cows' teats. It took me ages to actually try and get into it but once I got into it I'll never go back to washing. It felt wrong when you're brought up with it all your life."*

Aside from measuring production per cow, herd testing is also used to measure the somatic cell count of individual cows, so that problem animals can be treated and/or culled:

*"Herd testing is really the only way we have of finding out who's high and who's low. We found at the end of the season last year that if we dried off half a dozen cows we could halve the level of somatic cells in the herd because those particular cows had such high levels. That enabled us to treat them with antibiotics and keep the levels down in the spring."*

Thermogenic bacteria are able to survive the pasteurisation process. The presence of the bacteria indicates that there is either perished or cracked rubberware in the plant, that the cleaning system is not working correctly and is not removing deposits of fat, protein or milkstone, or that thermogenics are entering the system from an external source. Some farmers have had a problem with thermogenic counts while feeding silage:

*"It can come in from silage. I had high thermogenics last year feeding silage, up to 240. I knocked off the silage and it's 65. So obviously the silage was causing the thermogenics. The cows lie in the silage, it gets on their udders and it's getting into the milk... I'm going to grow turnips this year so I don't have to do the silage."*

Another area of concern is the impact of DDT residues on milk. The accepted level of DDE (the form DDT takes within milk) before a penalty is incurred is declining, from 0.4ppm in the 1994/95 season to 0.2ppm in the 1996/97 season (Alpine Dairy Products Ltd 1994:29). New suppliers to the company were required to comply with the 0.2ppm level from the 1994/95 season. The increasingly stringent regulations applying to DDT residues has implications for farmers' management practices. DDT residues are more likely to be picked up by cows in the winter months:

*"It's the dirt not the grass. If we're feeding turnips or something like that they'll eat the turnip with the dirt on it, that's where they're picking it up. So from now on we've*



*got to test every paddock that's going to be winter feed before the cattle go on it. It's the winter feed time that's the real problem, because they're stirring up the mud, not so much in the summer, you're grazing harder in the winter."*

Farmers, therefore, have to manage their winter and autumn feeding to reduce the possibilities of cows picking up DDT residues. Farmers said that it is important to keep cow condition up throughout the winter and autumn as this not only reduces the amount of DDE in milk the following spring, but also increases the amount of milk the cow produces:

*"Apparently they pick it up when they are not milking, especially if they pick up condition in the winter, so don't let them get too skinny in the autumn. That helps quite a bit. They don't have to put on the fat then, because the DDT goes into the fat. And then in the spring when you milk them it comes back out of the fat and into the milk. But if they're fat already they don't put on so much."*

Farmers test the land on which they are grazing the milking herd over the winter for DDT levels, and land cannot be brought into dairy production if the DDT levels are too high. Existing suppliers whose farms have levels of DDT in the soil which will in the foreseeable future be higher than the level acceptable to the factory are looking to buy or lease winter grazing blocks with low DDT levels.

Maintenance of high milk quality is yet another area in which farmers are increasing their monitoring of aspects of their farming systems in order to increase their control - in this case to control the factors that impact on milk quality and to avoid the financial penalties that result from milk grades. These changes to some extent have been imposed on farmers by what is regarded as an outside source, though in the long term and indirectly the farmers will accrue the benefits of producing consistently high quality milk because the Dairy Company is owned by them.

Aside from the increasing stringency of factory tests, dairy farmers could not think of many outside influences on their farming practices. A few said that the Resource Management Act might have some impact on their farming practices in the future in terms of effluent disposal and access to water for irrigation, but that in general they were acting responsibly in these areas already so did not have much reason to worry. Dairy farmers in general feel that they are in control of their farming systems and practices and that outside forces do not impinge on them greatly.

## **5.9 Conclusion: Factors Influencing Changes in Practice Among Dairy Farmers**

Chapter Five has examined some of the innovations in farming practice currently being adopted by manufacturing supply dairy farmers in the Temuka area, in the areas of breeding (the use of AI, heifer synchronisation and herd testing), feeding cows (the predominance of silage and experimentation with non-grass forms of silage, ME testing, and the development of the milking platform farming system), pasture management (the growth in the use of nitrogen, the importance of irrigation for the maintenance of high stocking rates, feed budgeting, and soil and herbage testing), and the growth in the use of computers. The chapter also looked at sources and utilisation of information for dairy farmers. The main points of the chapter are:

1. There have been relatively few changes in breeding management, reflecting the widespread use of AB to improve productive potential. There has been a change in recent years to fairly wide use of AI for heifers and for heifer synchronisation as a means of inseminating heifers when they are grazed off farm, and to reduce the calving period.
2. Farmers are now feeding a variety of supplements to their cows rather than the traditional hay or turnips. Recently, there has been increased use of silage to provide better quality feed and overcome the risks of haymaking, and silage has been made from maize, oats or peas. Some farmers are testing

for feed quality to monitor more closely the quality of feed. These changes reflect the keen attention dairy farmers give to feed quality and milk production, and to assuring control of production and profitability. These changes have dovetailed with the trend towards treating the home farm as a "milking platform". Farmers are specialising in milking and increasing their use of contractors.

3. For effective pasture management irrigation is essential, and dairy farmers have refined their use of irrigation and combined it with increased use of nitrogenous fertiliser to assure the supply of grass as feed for cows. Some farmers are using moisture probe technology to monitor the effectiveness of their irrigation, and some are using herbage testing to measure the quality of feed. Most farmers do feed budgeting, but the farmers with high stocking rates tend to base it on sophisticated testing rather than eye appraisal. Generally, the changes in pasture management are small changes which allow fine tuning of pasture management. The main goal is to increase profitability by achieving efficient production because their production levels typically are very high. At high stocking rates there is a reduced margin of error and increased need for careful and attentive monitoring.

4. The sources of information are many but focused and consistent. The "Exporter" is widely read and a key element in the Dairy Board's well organised extension system. Most use consultants and attend a discussion group, and for the latter there has been so much focus on technical issues and top production that some members have left the group. For dairy farmers there is an integrated body of information presented to them backed up by research that is relevant to their needs. There is little conflicting information and a general attitude among farmers that innovations are good for dairy farming in general.

There are two main groups of farmers in the Temuka area. The largest group is of production oriented farmers; the smaller consists of farmers oriented towards goals other than increasing production, typically, self-sufficiency. From the production oriented group several themes have emerged very clearly. These themes can be regarded as principles which orient farmers towards adopting (or not adopting) new practices and making changes in their farming systems. The three themes are production, efficiency, and control and monitoring.

The primary goal of many dairy farmers is to increase production. This motivation is evident in almost all areas in which farmers have changed their practices: the almost universal adoption of AI, the increasing adoption of heifer synchronisation, herd testing, the change from hay making to silage making and the experimentation with other supplementary food sources, the use of off-farm sources of feed and the use of nitrogen and irrigation to boost pasture growth. Farmers have willingly adopted changes in these areas if those changes have increased production.

Efficiency in production is a second major theme among dairy farmers, and the aim to become more efficient (in terms of the utilisation of capital and labour resources) has been a key factor in leading to changes in farming practices. This can be seen in the following changes: the trend away from self-sufficiency in farming towards using contractors, consultants and other off-farm sources of labour and expertise in a growing number of areas of the farming operation, in the adoption of innovations by farmers if they increase the efficiency of their production and in the non-adoption of the same innovations by other farmers if the innovation is considered not to promote efficiency (heifer synchronisation for example).

The extent to which an innovation assists farmers in attaining control over factors which impact upon production is another determinant of whether or not farmers will adopt that innovation or practice. To gain control farmers need detailed knowledge about their farms and therefore they are increasingly monitoring their practices. Farmers have adopted many practices which enhance their control over aspects of their farming systems: AI, heifer synchronisation, herd testing, ME testing, moisture probe testing, soil testing, herbage testing, feed budgeting and so on.

The themes of production, efficiency, and monitoring for control emerge clearly from the discussion of recent and current changes in dairy farming as orienting principles which guide a majority of Temuka

dairy farmers' decisions about making changes in their farming practices. Farmers in this group are quite homogeneous and there is widespread use of innovations or fairly rapid adoption of them.

Within the previous discussion of dairy farming practices four areas emerged in which there was considerable debate about the utility of a new innovation. The debate was in the areas of heifer synchronisation, ME testing, moisture probe testing and herbage testing. This disagreement appears to be because all of these technologies are relatively new. However, because herbage testing, ME testing and heifer synchronisation are being promoted by dairy farming extension services, it can be expected that over time (and in the case of herbage testing with more research into how the tests can be used on farm) these innovations will be adopted by many of the Temuka dairy farmers. The practice of moisture probe testing too is currently spreading in the area.

The other group of Temuka dairy farmers, those who are not oriented towards increasing production, generally have established farming systems within which they achieve their aims (these aims vary and are not all necessarily farming aims), and they are unwilling to make changes which will upset the equilibrium they have achieved. In general these farmers have an orientation towards self-sufficiency and willingly adopt practices which do not conflict with this aim and which lead to greater efficiency in labour, investment and inputs. Therefore, several of these farmers are now making silage, for example, all but one uses artificial insemination, and most do herd testing and do, or have done, soil tests.

Dairy farmers receive a consistent set of messages about farming practices from a variety of sources. Though there is debate about aspects of farming within the industry in general farmers do not receive conflicting information. This has resulted in a common set of farming practices amongst dairy farmers.

The consistent use of this integrated set of orienting principles can be explained to a considerable extent by the nature of dairy production, the co-operative structure and recent history of the dairy industry.

Dairy farming is a comparatively simple system of production with one commodity as the output: milk. Basically dairy farming consists of growing grass to feed cows to produce milk. Co-operative manufacturing dairy companies are owned by farmers, and are required to take all of the milk a farmer-shareholder produces providing it meets quality standards. Individual farmers do not have to concern themselves with marketing their milk, but at the same time as a group farmers have control over (and receive any benefits of) the marketing process through their co-operative ownership of the dairy industry. Unlike sheep farmers, dairy farmers are not personally and individually pitted against the markets.

Another implication of producing a single commodity is that efforts to improve farming can be concentrated on a single goal. This specialisation is one of the factors that has enabled dairy farmers to achieve the level of control over the factors of production that they have. The integrated structure of the dairy industry, and its control of research on dairy farm production and on the development of products for marketing, as well as the extension process has led to a focus in research and development that is responsive both to problems and issues on-farm and to market signals.

Dairy farmers also have almost instant feedback on the impacts of their management practices on production: either there is more or less milk in the vat after milking. Furthermore, they receive daily tests on some aspects of their milk production from the factory, and tests once in every ten days on others. This instant feedback is another form of monitoring that allows dairy farmers to regulate their practices and measure the outcomes, and it means that if a practice is having negative impacts they can rapidly remedy the situation.

Moreover, the returns from dairying to farmers have increased and been stable from the mid 1960s and continued to increase even through the rural downturn of the 1980s (Reynolds and Moore, 1990:138). None of the dairy farmers interviewed said that the rural downturn of the 1980s had any impact on them at all. This has engendered an environment where dairy farmers are confident in their own

abilities and in the wider industry, and they are therefore willing to invest their energy and finance in dairying.

The orienting principles that guide the adoption of innovation are relatively consistent in their manifestations, so that most of the farmers are doing similar things on their farms for similar reasons. The data presented in this chapter show little diversity in farming practices.

## **CHAPTER SIX**

### **CONCLUSION**

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#### **6.1 Introduction**

The main objective of the research reported here was to describe and analyse what farmers said about their changes in farming practice as they make decisions to adopt, or not adopt, new technology. This objective was set in the context of critiques of linear extension systems, which tend to overlook farmers' viewpoints. The literature review showed that these linear models dominate technology transfer in New Zealand. The results of this study will then be relevant to discussion of contemporary extension needs as both traditional extension, and farming itself, have adjusted to deregulation in the 1980s.

In this concluding chapter we compare the results from the two earlier chapters on sheep/beef and dairy farming respectively. This comparison forms the basis of discussion about farmers' practices and the orienting principles that underline them in terms of industry structure and their implications for extension. Attention is then given to some limitations of the research and some ideas for future research.

#### **6.2 The Main Results Compared**

There are similarities and differences in the practices of farming among sheep/beef and dairy farmers in the Temuka/Geraldine area. Generally, the changes in dairy farming, while linked to major productivity gains, have not constituted major changes in the system of farming. Dairy farmers have a well-established system, the innovations in which are added on in an incremental fashion. Some of the sheep/beef farming changes have been more fundamental. For example, the change from shedding off to set stocking was a major change to the system of farming. The magnitude of climatic change and the impact of restructuring have provided incentives for sheep/beef farmers to search for new technologies. For those farmers, low and/or unpredictable incomes may lead to highly conservative practices in some cases. In other cases, an appropriate technology, e.g., that reduces labour or expenditure, will be adopted even if that would not have been the preferred option in ideal circumstances. In dairy farming there has been a stronger tendency to adopt new technologies as they become available, whereas with sheep farming, the period over which adoption took place has often been longer. Factors such as climate change and income reduction and instability may have been more important to sheep/beef farmers as triggers to adoption.

Other comparisons can be made for a number of specific topics, as listed below.

##### **6.2.1 Breeding**

Sheep/beef farmers have the responsibility for organising breeding of their flocks largely by themselves, through ram selection and through development flocks. They organise and run these themselves on a local basis with limited input from external sources. The MAF organised SheepPlan and BeefPlan breeding improvement systems are no longer in operation. Dairy farmers by comparison have most of their breeding research and development done at the industrial level by the Livestock Improvement Corporation (LIC), but retain control through ownership of the dairy companies, which are linked by the Dairy Board. (Private companies such as Ambreed also provide services.) Development is aimed at the New Zealand dairy herd as a whole, and individual farmers benefit from it, whereas sheep/beef farmers breed for themselves not for the industry as a whole. In part, the difference between dairy and sheep farming is due to the relative ease of managing reproduction in cows compared with the more

numerous sheep, and because the centrally held LIC records provide readily accessible data to monitor genetic improvement.

New birth technologies have been developed for both dairy and sheep farming, but their needs differ so different technologies are utilised. In dairying AI is almost universal and synchronisation is spreading. These technologies are not used by sheep/beef farmers because they would be impractical and uneconomic. Sheep/beef farmers use scanning to identify twins and dry sheep where this is crucial information.

### **6.2.2 Pasture Management**

The key issues in this area for dairy farmers were the increased use of nitrogen, the use of irrigation and the tests available to aid their control of pasture. Tests include: herbage testing, moisture probe testing, soil testing and feed budgeting. For dairy farmers, pasture management involves controlling pasture so that the feed is there for the cows when it is needed. They have control through the tests, irrigation and fertiliser, and are not limited by finance generally.

The key pasture management issues for sheep/beef farmers were increasing soil fertility levels after the losses of the 1980s, which involve capital fertiliser applications and pasture renewal programmes. Risk management is a concern here - with the planting of drought resistant/low endophyte/grass grub resistant pasture species. Production is an issue as well, but because production will not necessarily cover development costs, it is not the primary issue as it is with dairy farmers. Only a few sheep/beef farmers use nitrogen as yet. Lack of control of water is one reason; another may be that the expense will not be covered by the returns from sheep. Generally though, sheep/beef farmers are more concerned to build up basic fertility levels in the meantime and nitrogen is used for fine-tuning. Sheep/beef farmers generally soil test but are unlikely to do herbage and ME tests. Tests are not useful unless follow-up action is practical and sheep/beef farmers have fewer options for improving feed quality than dairy farmers.

### **6.2.3 Feeding Stock**

In dairy farming feeding stock for high production is the major concern. This is also a concern of sheep/beef farmers, but they face additional risks and also plan to have reserves of feed in cases of severe storms or drought. Dairy farmers have more control than sheep/beef farmers over feed because they irrigate. Being on the plains they are less at the mercy of the weather, though cold weather can slow grass growth. Sheep/beef farmers talked a lot about weather, about droughts and snow, while dairy farmers discussed it less, indicating that it is less of a concern. Furthermore, because dairy farming is currently comparatively profitable compared to sheep farming most dairy farmers can buy their way out of a feed pinch. This is also possible because local cropping farms sell grain and straw to them in emergencies. Grazing stock off farm removes responsibility for feeding some of their stock during a feed pinch because the sheep/beef farmers providing this service will have made silage as storm or drought insurance. After severe storms sheep/beef farmers have had to look as far away as the North Island for feed.

Both dairy and sheep/beef farmers have changed from hay to silage. Some of the reasons (better feeding of stock and the difficulty of making hay in unstable weather conditions) are common to both groups. With dairy farmers the major concern is better feeding of stock as silage is higher quality feed than hay. Other reasons given by dairy farmers were: more efficient utilisation of pasture (which is more expensive than sheep pasture as it is often produced using irrigation and nitrogen and therefore they need to get higher returns off it to make it economic), and that making silage allows higher stocking rates to be maintained as the paddocks are out of the grazing rotation for a shorter period. For sheep/beef farmers the key impetus for silage is stockpiling feed so that they can farm safely (against threats of drought and snow), and this is a good example of risk management. The reduced labour requirements of silage making are also important for both groups - for sheep/beef farmers as they are

mostly sole owner operators and for dairy farmers because of the amount of feed they need given the size of their herds.

Advantages in transporting and feeding out baled silage are similar for sheep and dairy farmers. Safety is less of a problem for dairy farmers because of differences in terrain. Although safety is less of an issue pasture damage from feedout wagons is of concern. Dairy farmers as a group are more able to afford the high powered tractors and wagons required.

ME testing is more common amongst dairy farmers than sheep/beef farmers, in line with the dairying emphasis on control through monitoring and the emphasis on improving stock feeding. Crop silage experimentation is also more common amongst dairy farmers for the same reason.

#### **6.2.4 Animal Health**

Animal health is a big issue for sheep/beef farmers because large numbers of lower valued stock are harder to treat economically and the use of some remedies is becoming restricted where worms are resistant to them. Dairy farmers do not face resistance to remedies in their animal health programmes, and so do not face any animal health problems with implications for the whole management system. Nor do they face so many financial restrictions on treatment. Note that sheep/beef farmers prefer to cull as a response to animal health problems, while dairy farmers prefer a cure, because cows are more valuable than sheep. Currently, the major animal health issue for dairy farmers is mastitis, in part because of its impact on the somatic cell test at the factory. They manage this through herd testing to pinpoint problem animals and follow up with treatments.

#### **6.2.5 Marketing**

Marketing is important for sheep/beef farmers and influences all of their decisions and farming practices. The aim for sheep/beef farmers is safety and risk management, but this is difficult to achieve because of the volatility of their markets and their position as individual price takers. Diversification and flexibility are their production responses, but most sell to one market in the hopes of balancing good and bad seasons and years. Farmers consult a range of experts, from veterinarians to bankers, but not marketing specialists because the farmers believe no one can predict returns. Marketing is not an issue at all for dairy farmers because their industry structure and organisation ensures all the individual farmers' produce can be sold and therefore they do not develop individual strategies.

#### **6.2.6 Diversification**

Almost all sheep/beef farmers are diversified. Dairy farmers by comparison are specialised, and the impetus is towards further specialisation (as exemplified by the use of contractors and the milking platform system). Specialisation is seen to lead to efficiency. The implications of diversified farming for management are considerable as not only is a wider range of information required to run a diversified operation, but timing and balance of inputs become a great issue. For sheep/beef farmers diversification is a key strategy for managing risk. They do this through maintaining a balance between wool and meat production, and through diversifying into other products, primarily cattle, deer and forestry. Furthermore, the maximisation of one aspect of the operation might be constrained by the requirements of another.

#### **6.2.7 Information**

Dairy farmers receive a much more coherent set of information than sheep/beef farmers do because of the Dairy Board structure (extension is provided by a subsidiary of the Board, funded by a levy on farmers). Sheep/beef farmers find the information available to them contains more conflicting material and is more difficult to apply than dairy farmers, in part because they lack a single body which sorts and coordinates information on their behalf, particularly in relation to written information. Dairy farmers do not mention MAF or Agriculture New Zealand, but for sheep/beef farmers these

organisations have been a major source of information. Sheep/beef farmers have to organise and run their own discussion groups whereas the LIC organises them for dairy farmers.

More dairy farmers have consultants than sheep/beef farmers. Again the industrial structure encourages this. The "Ulti" package is just one example of the way advice is made available at minimal cost. Dairy farmers did not talk about other farmers as sources of information to the same extent that sheep/beef farmers did. This is possibly because they all have similar information because of the comprehensive and cohesive extension programmes in the dairy industry and because they operate in similar farming situations. An interesting local variant is the presence of cropping farmers in the area, which may provide new ideas (such as moisture probe testing) and opportunities (such as the development of the milking platform system) as well as access to products such as straw which complement their dairy farming system.

Dairy farmers have greater faith in their industry than sheep beef farmers and a belief that their interests are catered for through the official dairying information sources - they trust the information they get. Again this is fostered by the co-operative structure of the industry and by the control of the research and development process by the industry. Further, dairy farmers did not have the experience of some sheep/beef farmers in the 1980s of finding that despite doing what they had been advised to do and despite their best efforts their farms failed. Sheep/beef farmers do prefer information channelled through other farmers. Most sheep/beef farmers knew someone who had lost their farm, and they said that many of those who had lost farms were "top" or "innovative" farmers who had taken the advice they were given by non-farmers and had then been caught out. This means that the confidence and trust of sheep/beef farmers in their industry and in the advice they get has been undermined. The range of media available to sheep beef farmers and dairy farmers is almost the same: specialist newspapers and supplements, field days, discussion groups, on-farm consultation and visiting on-farm trials. The dairy farming videos distributed by the dairy factories are a popular innovation which would be useful in other farming systems.

#### **6.2.8 External Influences**

Sheep/beef farmers feel less in control of key factors which determine their success as farmers than dairy farmers. Weather is more extreme in the hill country where they farm and they lack irrigation. Sheep/beef farmers also face more insecurity over their dealings with markets than dairy farmers, because their industry lacks a coordinated processing and marketing structure. Even producer owned cooperatives cannot deliver the package of research, advice, processing and marketing which guarantees dairy farmers that increased production will be bought for the same unit price. Their insecurity is also a result of their experiences in the 1980s of having the industry crash because of changes in government policy. Dairy farmers do not now perceive that they are affected by forces outside of their control. The only case mentioned was dairy factory milk quality testing, but as farmers own the factory, they did not really consider the tests to be the result of a force which was in opposition to their interests.

### **6.3 Orienting Principles and Industry Structure**

Chapter Four showed that while sheep/beef farmers were a diverse group, there was a common ground in their basic orientation to new technology. The two key themes were increasing profitability and controlling risk by farming safely. Farmers use these principles to make decisions about innovations and to assess their applicability to their individual situation. They had good awareness of available technologies, suggesting communication of information about new technologies was not a major issue at this time. They examined each idea they came across to a greater or lesser degree on the basis of their initial impression as to its relevance, and appraised them in terms of their suitability to their particular farm and the potential role of the technologies in farming profitably and safely. When technologies appeared to be suitable to farmers they then sought more information about them, and in particular, information about the performance of the technologies on a nearby farm. Hence the



importance of farmer networks in the spread of new technology. Conflicting information from multiple sources encouraged attention to trialing on their own farms and reduction of risk exposure.

Dairy farmers were more homogenous as a group and also shared a common ground in their basic orientation to new technology. There were two groups of dairy farmers within the Temuka area, those who were oriented towards production and those who were oriented towards self-sufficiency. The production oriented group is by far the largest, and their approach to farming is encouraged by the industry. The following principles apply to this group. The three key themes identified in their basic orientation to technology were: increasing production, increasing efficiency and monitoring for control. Working from these principles farmers usually decided to adopt a wide range of innovations, and this was supported by an effective extension system which provided technology which directly addressed farmers' needs. Thus, in most cases, the available innovations met the requirements of production, efficiency and monitoring for control. Consensus on the utility of available technologies existed. For only a few technologies in use in the area was there doubt about the utility of the technology among those who had not adopted it and this was, in large part, because the technology was new and the availability of complementary technologies for follow up action was an issue. For example, the utilisation of herbage testing was seen to depend on whether more could be done once a problem was identified other than remedies indicated by soil testing. Most farmers then, adopted the technologies that were presented to them as having the potential to increase production.

The comparisons of the two types of farming show up the effects of industry structure and its evolution on farming practices in general, and innovation in particular. Most of the sheep/beef farmers have experienced major changes in their industry as it was significantly affected by deregulation. These changes, along with climatic instability and low returns, have meant that sheep/beef farmers organise their farming practices to achieve the goals specified by their two orienting principles: increasing profitability and control of risk by farming safely. Thus, innovations that achieve these dual goals will be considered favourably. In comparison, dairy farming was not significantly affected by deregulation. This lack of change combined with relatively good returns have meant that dairy farmers organise their farming practices to achieve the goals specified by their three orienting principles: increasing production, increasing efficiency, and monitoring for control. Innovations that help achieve these goals will be considered favourably.

The profitability of the enterprise was a significant factor in these orientations to farming practice. The amount and reliability of returns is crucial. Since dairy farmers have had relatively good returns they have innovated rapidly to increase production and farm efficiently. Pressure to increase production may also relate to declining real incomes. The intensity of their specialisation has been such that they have of necessity sought to manage and control their farming very closely by monitoring diverse aspects of their operations to achieve efficiencies. Dairy farmers generally have experienced innovation as a successful process and they have not experienced failure. A few of the new entrants to sheep/beef farming who missed the direct effects of deregulation are also confident that their managerial abilities are sufficient to cope in an unprotected industry in a way those who have seen good managers fail are not. Sheep/beef farmers may innovate, but adoption of new practices is conditional on whether they achieve production gains without exposure to risk. Preferably they will also use the same or less labour input, because the returns from increased production may not cover costs if the market price drops suddenly, as is not unknown. An additional factor is the confidence generated by stability.

The safety of the enterprise is clearly also significant in these orientations to farming. The results show that production-oriented dairy farmers have few concerns about safety, while self-sufficient dairy farmers are concerned about safety, and sheep/beef farmers are even more concerned. Further, because of their different industry structures it appears that sheep/beef farmers take greater personal responsibility for their safety whereas for dairy farmers their safety is linked so tightly to the safety of their industry as a whole they believe that generally they do not have to make personal preparations for industry crisis.

Not only have there been different degrees of change in the two industries, but their respective industry structures are quite distinctive. Sheep/beef farming comprises a diverse group of individual farmers with varying mixes of productive activities on varying types of land. Consequently, the utility of an innovation may not be obvious to particular farmers given the particular circumstances of their farm. For those promoting an innovation to sheep/beef farmers, it is difficult to present it in the best way without a high degree of knowledge of individual farms since the 'average' farm may not be relevant to a particular case. Farmers often test out new grasses or sheep breeds on a small part of their farm before making a major commitment. With dairy farming however, the farms are similar and both farmers and providers of the innovation can more easily develop a favourable rapport.

That the coherence of dairy farmers' practices is an outcome of the structure of their industry is emphasised by comparing them to town supply dairy farmers in the area. These farmers are not part of the Dairy Board structure and do not get the same information as manufacturing supply farmers. Participation in the town supply discussion group (which was on the same topic as the other discussion group - managing pasture and surpluses) showed that the town supply farmers were not nearly so "up with the play" as factory suppliers. The discussion was far less technical and the farmers had far less knowledge of pasture management and feed budgeting than factory farmers. In general the town supply farmers were older than factory supply farmers, and they have traditionally received higher and more stable prices for their produce, reducing the pressure to increase production. Locally this is said to account for the differences between the groups. Town supply farmers may be more like factory supply farmers who are oriented to self-sufficiency. In terms of the relationship between economic pressure and innovation it seems that the two extremes, having insufficient money and uncertain returns (as in sheep/beef farming) and very stable returns with little pressure on income/unit price as in town supply, lead to reduced innovation. Although many farmers enjoy the challenges of trying to increase production, it appears that innovation is not a process that many people enter into for its own sake or at least not over an extended period of time.

Finally, at the level of processing and marketing, the coherence of the dairy industry, generated by its national integration and focus on processing one commodity, is paralleled by coherence in innovation. Coordinated research benefits the industry as a whole and the results of research are presented to farmers in a coherent manner. In contrast, the sheep/beef industry comprises diverse products, diverse innovations and complex decision making regarding the adoption of an innovation. While sheep/beef farmers do not see themselves as competing on an individual basis, competition within the processing industry and lack of an industry-wide technology transfer system emphasise they cannot depend on external support for innovation.

These observations of industry structure and change should not be interpreted as making a case that one industry has distinctive advantages in orienting principles over another. It may well be possible that dairy farmers could change their orienting principles to those more similar to sheep/beef farmers if their financial circumstances were to change. In the light of experience of many years of low or uncertain returns, dairy farmers may farm for safety first and then production.

## **6.4 Orienting Principles and the Literature on Extension**

The literature has not discussed farmer's responses to innovation in terms of orienting principles which vary by industry structure and climatic and physical constraints. The majority of research assesses individual technologies. The literature looks at speed of diffusion and the characteristics of adopters at various stages of the adoption process, particularly early and late or non-adopters. The process of decision making has also been carefully studied and seen as similar for farmers of all types, but socio-economic characteristics are linked to timing of adoption. Nothing in the material discussed in this report has challenged these processes for individual innovations, but by looking at the farmer's point of view, we see that an early adopter of one innovation may be a later adopter of another. In dairying in particular, awareness of an innovation does seem to lead to adoption if it is applicable to an individual's situation.

The literature has not discussed farmer motivations in terms of orienting principles. Attention to farmers' motivations has been advocated by both researchers working within the traditional lineal model and those interested in Farmer First models. This research on Geraldine/Temuka farmers suggests that the orienting principles would over-rule personal preferences in many situations. For instance, some lifestyle options were only available to farmers with secure financial situations, and they were likely to be innovative in areas which supported their on-farm goals, e.g., reduction in labour. Meeting variations in farmers' strategies as a result of differing motivations can be achieved if scientists are aware of all farming styles and systems and produce a wide range of innovations. However, farmer motivation is no longer a concern of government policy as the market is now considered to direct farmer decision-making rather than policy. It is not clear at present to what extent this range of innovations will be achieved. Further, the underlying assumption that innovation is good also needs to be challenged. The history of development of technology shows that until global distribution problems are solved, increasing production will be linked to surpluses and loss of individual farm viability. Extension is presented as being of benefit to farmers, but as Roling (1988) points out, governmental and commercial policies are often pursued at the expense of farmers themselves.

The move to user pays in extension has been discussed in the New Zealand literature and proponents of restructuring have claimed that it encourages targeting of services more closely to farmer needs. Lack of comment by farmers interviewed on the impacts of user pays suggests the impacts of this change have been overshadowed by other aspects of farming. While detailed information on innovations is available to determined farmers, there is unlikely to be pressure for a new system. New Zealand farmers are sufficiently knowledgeable to seek out, assess, and trial innovations to meet their specific needs. They hold views of science and its role in the development of new technology, and the role of technology in farming similar to scientists and those involved in extension. The few communication problems that were identified by farmers tended to relate to the specific personalities and perceived competence of extension agents. Further evidence of compatibility between farmers and scientists is shown in three ways. First, criticism of the handling of individual issues, e.g., drench resistance, did not seem to challenge the model of technology itself. Second, in dairy farming, although the degree of financial pressure is linked to interest in control and monitoring, some dairy farmers seemed to be interested in highly technical information for its own sake, because they enjoyed the challenge of mastering farming problems and income maximisation. Third, the Massey Farmer First programme of linking farmers and scientists would be likely to appeal to some local farmers, and some were involved in Crown funded research conducted by their local dairy factory.

A review of overseas sources such as the *Journal of Alternative Agriculture* suggests that the strongest interest in Farmer First programmes may come from those who are operating outside the mainstream of agriculture, such as organic or low input farmers. Farmers interviewed tended not to discuss sustainability and general environmental issues or to challenge basic assumptions, e.g., that more technology would be beneficial. They discussed innovations in terms of their applicability to the viability of their own farms. Market insecurity was not spontaneously linked to increasing production pressure and falling prices. Few farmers in the Geraldine/Temuka area were investigating organic farming. However the Massey Farmer First programme and the interest of AgResearch staff in this topic have identified areas in which overseas theories can be applied in New Zealand, and demand for new programmes may increase once concrete proposals for alternative models of extension are available. To date, the most innovative responses have been made in areas where pressure on incomes and environment is serious, e.g., with the Mackenzie Country initiatives. Restructuring of research and development was not a pertinent issue to local farmers, who were not yet aware of the innovations in technology transfer initiated by AgResearch. Most of the farmers had a highly localised reference group and did not discuss initiatives in other areas such as the Landcare groups set up in the Mackenzie Country.

## 6.5 Implications for Extension

The conclusions from this study have implications for extension. They are important in two different ways. First, the discussion of individual innovations demonstrates how farmers approach learning, innovation and decision making. The most recent examples of innovation, such as the use of herbage testing, are still being adopted and the outcome in terms of its distribution among dairy farmers is not clear yet, but the examples of older innovation show a process of adoption, adaptation, and sometimes rejection which is rarely studied in the diffusion literature (Rogers 1983). Second, the broad patterns identified are also useful. To successfully reach farmers any extension system must appeal to their orienting principles. Sheep/beef farmers will consider favourably technologies which will increase efficiency and minimise any risk. Dairy farmers will consider favourably any technologies which will increase production, increase profitability and provide monitoring for control.

Some extension needs were highlighted by this study. Farmers need information on how to conduct successful on-farm trials as well as information on innovations themselves. For instance, culling was a popular method of improving flock quality among sheep/beef farmers, but it was not clear from discussions with farmers whether they were clearly differentiating between problems caused by genetic faults and those aggravated by environment. Ability to design experiments in this area might also be useful.

Farmers also need information that they can trust. It was noted earlier that the failure of farmers who were both innovative and financially extended in the late 1980s has led to some distrust of any agency which "pushes" technology, and introduction of innovations in extension systems would have to be sensitive to this issue. Accountability of people giving advice is an issue, and farmers' response to this is linked to an orientation to safety and trialing of individual technologies. Because of their attitude to risk, farmers seemed happy to have the initiative to seek out information, rather than to be receiving more directive advice. National programmes in some areas which had not been trialed locally would not be appreciated given their experience during the 1980s.

An important issue for extension is the role of cost of advice. The effects of deregulation have meant that sheep/beef farmers pay for all their on-farm consultancy except for advice from sales representatives. Thus, sheep/beef farmers have experienced a major change from free advice to user pays, and have been more affected by privatisation of extension than dairy farmers. However, the results show that the general impacts of deregulation had a more profound effect on innovation compared to the availability of advice. Cost cutting forced many farmers to run down their pasture and other resources and forego any innovation requiring capital input (e.g., deer). In any case, only a minority of farmers used the free Advisory Division services on a regular basis when they were available, and although use of Agriculture New Zealand's consultancy services has dropped, it is not known exactly how many other services are newly available. Local sheep/beef farmers did not see access to information as a major problem, suggesting that changes in costs of advice have not affected achievement of farmers' goals.

Dairy farmers use consulting officers funded by a levy on payments, and pay for "Farm Wise" consultants. An integrated system, where the majority of advice is funded by a levy, works well for dairy farming where there is a relatively homogeneous group of farmers, most of whom are oriented to high production. Of course, the integration of the system will contribute to this homogeneity, thus perpetuating the system. Diffusion appears to occur rapidly and the majority of farmers accept the reasoning behind many innovations even if they do not adopt them because they consider they are incompatible with their personal goals and systems. The significant factor seems to be the unity of advice and lack of constraints rather than cost - the pressure to increase production through monitoring and increasing intensity would be self-sustaining for the majority of dairy farmers. However, the current high use of the Uliti package shows that dropping costs can encourage some farmers to use advice and presumably to innovate, but the fact that all local farmers were familiar with the full range of innovations but some chose not to adopt the full range, suggests fine tuning rather than radical change to systems is the most likely outcome of the availability of cheaper extension.

Coherency of information also affects the effectiveness of extension. Although the number of research institutes involved in sheep/beef research is similar to dairy research (private companies do little local research, but Crown Research Institutes, universities and industry based groups trial overseas innovations and initiate new programmes) the lack of coherence in the information which is made available to farmers leads to a far stronger perception among farmers that conflicting information, and information which may not be useful, is circulating.

Another important issue for extension is the potential of discussion groups. Criticism of earlier advisory services identified the need for more face-to-face contact with farmers who seemed to be less innovative, and more training in adult education skills for extension officers so that farmers were encouraged to initiate their own learning projects. Greater use of farmer networks was also advocated. The indications are that farmer initiated schemes are required to meet these needs. Discussion groups are the most likely of the current information sources to fulfil all these goals. The next question is whether discussion groups are expanding to successfully meet all information needs. Our research indicates that discussion groups do not appeal to all farmers, and that some will never learn through this medium, regardless of the quality or utility of the information and the nature of the farmer networks supporting each one.

Having reviewed the issues that relate to extension we now consider the nature of the linkages between farmers, educationalists and scientists. Since the diversity of information available to farmers makes an adult education approach more important than ever to educationalists, including extension agents, new ways of providing information are still required. AgResearch and other research agencies, including extension agents, are using focus farms and field days to demonstrate how innovations work in a local context. This may reach a wide range of farmers. Use of videos in a wide range of contexts also seems likely to be useful. It may be better that some farmers can be assisted to target information sources relevant to them rather than the targeting of technology at farmers. For instance, farmers commented favourably on 'Farm Equipment News' which includes general articles about equipment followed by coupons for those interested to access more detailed information.

Given farmers themselves did not feel access to information was a problem, the access of scientists to farmers in the new environment needs to be examined, as it is likely that the full range of farmers would not wish to become involved in research. Sheep/beef farmers are more diverse than dairy farmers, but most farmer/educationalist interaction takes place within one group - the more innovative farmers. Can scientists provide the diverse range of innovations required by all farmers without contact with all groups of farmers?

Finally, we can briefly consider the potential for major changes in extension. Perhaps a more effective extension system could be introduced for sheep/beef farmers if they had one main commodity to produce, for which there was a reasonable return that encouraged increased production. This raises questions about whether the successful specialisation in milk processing and marketing achieved by the Dairy Board is inherent in milk and its role in world trade. Is it possible for meat or wool to be organised and developed in a similar way? What degree of industry restructuring would be required first? Since changing to a single commodity is unlikely, it is possible a radically new approach to extension would be more effective than the application of a system similar to the dairy industry one.

Even if this were possible, does consultation go far enough? Because farmers face such a complex situation, even if more consultation were provided it is not easy for non-farmers to decide what might be a suitable technology. Thus, to improve the likelihood of new research producing technologies that will be adopted, farmers would need to be involved in the research design phase as well as vetting researchers' ideas. This observation has implications for the organisation of New Zealand's research institutions and faces many practical problems, given many farmers may not want this sort of involvement. The importance of individual's goals means some of the differences between scientists and farmers will never be eliminated. For instance, farming safety is a more universal issue in sheep/beef farming than dairy farming and is also interpreted differently. But by drawing interested farmers into the research process, it may be possible to do more than fine-tuning the targeting of technology transfer

to farmers. Contact is likely to create ongoing debate among farmers, extension agents and scientists, and lead to innovations in ways of approaching science and extension which are not yet anticipated.

## 6.6 Limitations and Future Research

This study has not fully explored the potential of qualitative research and has not developed a full ethnographic account of farmers' views of technology transfer. Instead it has provided a detailed account of a relatively large number of farmers, and these accounts, as we have demonstrated, have brought to light important orienting principles. The constraints affecting this programme of research have precluded spending more time with other members of the farming families and recording their views about the practice of farming in general and the adoption or rejection of technology in particular. One topic that could be examined is the effect of increasing levels of off-farm work by farmers, and more particularly their spouses, on the process of innovation. Further, we have been unable to develop an ethnographic account of the workings of the broader farming community in which these farmers are located. Surely there are some local people, such as stock and station agents, agrichemical representatives or mortgage lending agencies, who have views about technology transfer which interact in interesting and varied ways with farmers. More time spent with farmers, their families and other influential rural people would have provided a basis for a detailed ethnographic account. Such time could include interviews but also more informal interaction and participation in farming life in its many and varied aspects.

Future research could develop this general area of research in the directions outlined above. Such research would extend beyond orienting principles and link these more overtly to rural social dynamics and social structures. The density of interconnections has been illustrated by the link between orienting principles and industry structure. Further, it could entail participant observation among all types of educationalists - the farm advisors and consultants. This approach would view technology transfer not from the farmers' point of view but from the consultants' point of view. Extending this line of thinking would lead to participant observation research among scientists to examine how they define problems, allocate research priorities and conceptualise farmers' needs. Such a direction would also involve some kind of policy analysis and assessment of the funding of science.

Other needed research could focus on integrating the findings of the kind of research pursued here with contemporary theoretical issues. For example, sociological theory on the nature of change in production systems, from Fordist to Post Fordist regimes, may be relevant<sup>13</sup> The sheep/beef farmers described here, surprisingly, seem to be exemplars of 'flexible specialisation' characteristic of Post-Fordist regimes while dairy farmers seem to be exemplars of specialisation characteristic of Fordist regimes. Other needed research could analyse the views of other types of farming so that useful comparisons between farm types can be made. This direction will have growing relevance as there is a steady increase in 'other animal' types of production at the expense of sheep/beef farming. Finally, research in other regions of New Zealand can indicate whether similar farmer orientations to those identified in this report do occur elsewhere. Research of the types outlined above can contribute significantly to understanding technology transfer from the farmers' point of view.

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