Understanding the Costs and Risks of Conversion to Organic Production Systems

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PROJECT TEAM:

Dr Alec Mackay, AgResearch Grasslands, Palmerston North
Murray Doak, MAF Policy, Christchurch
A (Tony) P. Rhodes, Agriculture New Zealand, Dannevirke
Trish Burborough, MAF Policy, Dunedin
John Jackman, MAF Policy, Hamilton,
Duane Redward, MAF Policy, Hastings
Dr Pru Williams, Crop and Food Research, Lincoln
Tony Pearse, AgResearch, Invermay
Dr Jo Pollard, AgResearch, Invermay
Dr Phillipa Nicholas, Dexcel, Hamilton

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Executive Summary

Despite the current interest in the organic option, there are significant differences in the rate of conversion to organic farming systems. Organic horticulture is well established, while the number of organic livestock and arable farms as a proportion of their respective sectors, are relatively low. In a series of facilitated sector-based workshops, the major behind-the-farm-gate constraints to increasing organic production in the sheep and beef, dairying, deer and arable sectors were identified and prioritised. A detailed financial analysis was then undertaken to quantify the impact of each constraint on the financial performance of the business. MAF Farm Monitoring models were used as a basis for each evaluation.

This report provides a summary of the workshop findings and the financial analysis. It also summarises the discussion with each of the sector groups on the implication to the environment from the widespread adoption of organic practices by the primary industry.

The major and common technical constraints to growing the organic sectors identified and highlighted by participants at the workshops included; nutrient and soil management, animal health (i.e. gastro-intestinal parasites in all livestock, mastitis in dairy cows, lung worm in deer), woody weeds, and the limited skills, knowledge and access to information. Organic producers do not have the same knowledge and management infrastructure available to them as conventional producers. Gaining knowledge can therefore be more difficult, more time consuming and more expensive.

In contrast to the technical challenges, there were few similarities between sectors in infrastructure and industry constraints. A substantial premium was identified as critical for the organic sheep and beef and arable sectors, but for extensive deer and dairying the “size” of the premium was not a major constraint to growth. The lack of processing and marketing capability was identified as the single biggest factor limiting the growth of the organic dairy sector.

Of the constraints facing the sheep and beef sector, the loss of premium would have the most immediate and devastating effect on the financial viability of the operation. The radical change to the stock policy, with a shift to more and older cattle was a major reason for the need for a premium, because of the lower profitability of older age-class cattle finishing policies.

For more extensive sheep and cattle systems than that examined in this study, fewer changes to the existing livestock policy would be needed to accommodate the constraints to organic production and hence the impact on the financial performance of the operation would accordingly be reduced. This is in contrast to more intensive finishing operations, where the changes required to stock policy would result in a substantial drop in profitability.

Both the cropping and livestock components of the arable business require a substantial premium to be profitable because of the changes necessary in the balance of the cropping and livestock operations, and from the low nitrogen environment for crop growth. Given this, it is reasonable to assume that the conversion process would be financially difficult because premiums are generally not available during conversion.

In contrast to the sheep and beef and arable sectors, dairying was not dependent on a premium to be viable. The major threats to the organic dairy unit are animal health, primarily mastitis, as it reduces the numbers of cows in milk, and the ability to maintain soil fertility.

The deer workshop concluded that extensive, low-stocking-rate deer operations are close to complying with certification for organic supply and require little change and support during conversion. More intensive deer operations, however, would have to drop stocking rate to remain viable so it is reasonable to assume that the conversion period would be financially difficult.

The threat of a breakdown in animal health on an organic livestock system, e.g. gastro-intestinal parasites or lungworm, would impact primarily on limiting the range of intensive finishing options that can initially be considered on a property.

The long-term threat to all sectors is a weed infestation as it affects all aspects of land use. For arable producers the threat of weeds can also be immediate and devastating on crop yield, quality and value. The need to use mechanical control for managing weeds in an organic arable system imposes an additional pressure on the soil resource.

One risk of organic production is that if something unforeseen does occur there is a limited range of allowable responses to fix the problem if the organic status of animals and their products are to be maintained.

The workshops suggested that potential outcomes of the widespread adoption of organic systems would result in:

- a change in the make up of the agriculture service industry in rural areas;
- an increase in the labour requirements, putting more families into rural communities or at least arresting the current decline;
- a greater diversity of land use options, including more forestry, eco-tourism, and mixed livestock and cropping farming systems, with each contributing to landscape enhancement;
- a sense of pride in the community if the origin or location of the product is associated with a brand name and the opportunity to integrate this with eco-tourism to build a greater range of life experiences;
- improved soil and water resources under deer and dairying. Under organic sheep and beef and arable production there could be deterioration unless research gaps were filled;
- potentially improved control of animal pests because the reduced range of control options available in organic systems requires a greater emphasis on preventing problems arising;
- similarly, weeds would not necessarily become rampant in the wider environment under good organic management because, despite the technical challenges that weeds pose, organic farmers are aware of the implications of losing control of weeds.

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1. Introduction

Current interest in the organic farming option is high. This interest is driven by a range of people, from producers with a growing awareness of the future challenges facing the industry, through to those who see a medium- to long-term commercial opportunity. This is apparent in the livestock and arable sectors, although this interest has not translated into a significant number of conversions to organic production when compared with the horticultural sector.

In the horticultural industry, significant growth has occurred in recent years in kiwifruit and, in the last two years, in the pip fruit sector. The initial growth in the arable industry appears to have stalled, with the exception of the vegetable component of the industry. There has been some recent growth, be it small, in dairying and sheep and beef. In the deer sector, the interest in organic supply is restricted to a very small number of producers. Knowledge about the constraints, and the risks associated with tackling each of these constraints, on the viability of an organic livestock operation be it dairying, sheep and beef, deer or arable, is lacking. With current interest high, it is timely to identify and quantify the barriers to the growth of these sectors.

The project presented in this report had two objectives:

- to identify, prioritise, and quantify the risks and costs associated with the main behind-the-farm-gate constraints to conversion to organic production;
- to collect information on changes in the resource requirements and potential changes in the attributes of the production system, both on- and off-site, as a result of widespread adoption of organic practices.

This study engaged sheep and beef, dairying, deer and arable sector interests to identify and prioritise the constraints to organic production for each of their sectors, and define and quantify the risks associated with tackling the constraints as they influence decision-making behind-the-farm-gate.

Four facilitated workshops (Focus Groups) were held with participants including organic producers, conventional producers with an organic industry interest, and a range of agribusiness service providers. The issues identified by the Focus Groups were used in detailed financial analysis using the MAF Farm Monitoring models as base models.

This report identifies and provides a summary of the constraints in priority order, along with quantitative data and the financial implications of addressing each constraint for each sector. A list of changes in the resource requirements and attributes of the production system, and off-site impacts following conversion to organic production are presented. The report also identifies some of the research gaps. The information in the report will be of use to all sector interests.

2. Method

2.1 INDUSTRY WORKSHOPS

The industry workshops had two objectives:

- **Primary objective:** Identify, prioritise and quantify the risks and costs associated with the main behind-the-farm-gate constraints to conversion to organic production. The latter exercise required a number of assumptions because of gaps in current understanding of the efficacy of many alternative practices, lack of infrastructure, and uncertainty surrounding market and price signals for each sector. Two sets of organic production standards, BIO-GRO and a composite UK Soil Association/EU standard (CERTENZ), were used for the exercise.
- **Secondary objective:** Collect information on, and participants' opinions about, the changes in the resource requirements and the potential changes in the attributes (e.g. environmental condition, etc) of the production system, both on- and off-site, resulting from widespread adoption of organic practices.

One workshop, comprising 14-20 producers and associated support sectors (e.g. consultants, agribusiness, research, etc), was held for each of the dairy, sheep and beef, deer and arable sectors. The farmer participants of each workshop were organic or conventional producers, some of whom had examined the organic option.

The workshops were held as follows:

Sheep and beef: held on 26 March 2001 in Palmerston North, and utilised some members of the North Island low chemical Focus Group. This group has examined the constraints to conversion to low chemical and organic production as part of a recently completed Meat New Zealand project.

Deer: held on 2 April 2001 in Dunedin, and focus on the Otago and Southland regions.

Arable (which includes cereals, small seeds and vegetables): held on 3 April 2001 in Canterbury and organised by Crop and Food Research.

Dairying: held on 10 April 2001 in the Waikato, and utilised members of the Waikato organic dairy group. This workshop was organised by Dexcel.

2.2 OUTPUT OF WORKSHOPS

1. *A summary of the constraints, in priority order, along with quantitative data and information about each constraint for each sector.*

   Where hard data were not available, an effort was made to obtain participants' estimates and opinions. This included participants' opinions about necessary changes in policy to best meet the needs of an organic production system. Estimates of production and the likely effect of different quality assurance systems on productivity were assessed.

2. *A list of the changes in the resource requirements and attributes of the production system, and off-site impacts following widespread conversion to organic production.* Participants' opinions were also obtained to complement any available hard data.

2.3 FINANCIAL ANALYSIS

The financial implications of the risks and costs associated with each of the major constraints identified in the workshops, on the performance and viability of an organic production unit was investigated using the MAF Farm Monitoring models (MAF, 2000). The expertise of the MAF Policy staff responsible for the Farm Monitoring model was utilised for each sector. Revenue calculations were done using current premiums and also using no premiums to reflect the situation during conversion. In the preparation of the final report further comment on the outputs from the financial analysis was sought from each of the workshop participants and from sector interests.

Output of analysis

The costs and associated risks of each of the major constraints were listed, and, where possible, quantified. They were then incorporated into a matrix to establish the relative weighting of the factors limiting the expansion of organic production in each sector.

3. Results & Analysis

3.1 SHEEP & BEEF SECTOR

3.1.1.Prioritisation of issues

The major technical issues facing sheep and beef farmers switching to organic production are the limited ranges of options for endo-parasite and woody weed control.

Endo-parasites, by reducing the productivity of young stock, decrease farmers' ability to supply animals to market on time and to tight specifications. They also limit the ability to mate young stock (e.g. hoggets, heifers). Treatment of young stock with chemical remedies, particularly lambs under BIO-GRO certification, results in a loss of organic status for 12 months, effectively removing them from the organic supply chain. This is less of an issue with older cattle finishing policies.

Ecto-parasites, particularly flies, while not having a major impact on production, are seen as a major animal welfare threat that is difficult to tackle. Both these animal health challenges pose an immediate constraint to the development of the sector.

In contrast, woody weeds represent a medium- to long-term threat. In some situations it may be possible to eradicate all woody weeds using sprays prior to conversion, and then simply control the re-growth. Such a time and capital constraint would be likely to prevent many farmers from converting to an organic system. Once converted, mechanical control has its limits as a weed control option for large-scale operations.

Premiums and market stability were regarded as an important issue for all of the workshop participants. The credibility and consistency of the market was of major concern. This is a problem not restricted to low-chemical or organic systems. The instability in the industry explains in part why many service providers have been reluctant to enter the industry. The lack of technical support was another major constraint to growing the sector. Organic producers do not have the same knowledge and management infrastructure available to them as conventional producers.

The limited knowledge and skills of the grower was the other main technical issue. The participants believed that gaining knowledge about organic farming can be more difficult, time consuming and expensive than for conventional farming. As the size and scale of businesses considering conversion to organics expands, there is a need for employees to be re-trained in the skills required for organic production systems and management. However, this situation is constantly improving as more information is developed and new networks and common-interest groups become established.

There was concern that the general release of GMOs represented a threat to the wider organic sector.

In summary, the major technical issues confronting sheep and beef farmers considering converting to organic production are endo-parasites and woody weeds. These same two constraints were identified by two large groups of sheep and beef farmers located through each of the major geographic areas of both the North and South Islands (Mackay *et al*., 2001). The economic effect of endo-parasites can be offset by adequate premiums, but the problem of woody weeds is likely to prevent many farmers entering the industry, except those who can afford to purchase weed-free farms, or can eradicate woody weeds prior to conversion. The most limiting industry and infrastructure issue is market instability. As the market becomes more stable and more farmers express interest in converting to organic production, advisory services will become increasingly available.

Constraints to conversion to organic sheep and beef production identified by the Focus Group and listed in Table 1 and Table 2.

Table 1 Technical constraints identified by the Focus Group, and their relative importance to conversion to organic sheep and beef production

Issue	Comment	Rating[1]
Soil fertility/biology of soils.	Lack of fertiliser options	Many
	Building soil biological activity	
Soil health	Soil management and impact of higher cattle number	Few
Animal health	Internal parasites, flies, lice	All
Animal management	Limited availability of stock, stock numbers	Few
Genetics	Supply of rams with resistance/resilience genes	Few
Animal nutrition/pasture quality	Greater emphasis on pasture composition, mineral content and nutritive value	Few
	Higher pasture covers, allowances	
Weeds	Weed control, particularly gorse Confidence/attitude (to weed control)	All
Energy use	Increased fuel use for weed control	Few
Management skills/knowledge	Management Needs to be proactive and flexible • Attitude and confidence • How to survive the transition? - Knowledge/experience/opinions • Suitability of property - Soils - Land (in relation to weeds, etc) - Management systems	Many

1 The words “All”, “Many” and “Few” rank the importance of an issue in terms of the proportion of votes it received by workshop members.

Table 2 Infrastructure and industry – Constraints emphasised by the Focus Group, and their relative importance in conversions to organic sheep and beef production

Issue	Comment	Rating[1]
Signals on premiums/market stability	Market credibility	All
	Standards/premium	
	Uncertainty in a rapidly changing environment	
Standards	Comparing assurance systems Tension with conventional industry	Few
Industry infrastructure and strategy	Market size/strategy/specification	Many
	Marketing skills/development Confidence in assurance system	
Services	Lack of good independent information/advice Leadership/national policy	All
Genetics	GMOs	All
	Apparent inability to assure freedom from GMOs	
	Impact on New Zealand's image	
Perceptions about organics	Neighbours – rules/attitudes	Few

1 The words "All", "Many" and "Few" rank the importance of an issue in terms of the proportion of votes it received by workshop members.

3.1.2 Hawkes Bay summer moist sheep and beef model

The MAF Farm Monitoring model (MAF, 2000) represents an estimated 1,066 summer moist farms from Wairoa southwards through the western side of Hawkes Bay and Wairarapa, extending down to the northern Tararuas. The farms have breeding flocks of predominantly Romney and Coopworth, with a trend to increased breed diversity. All replacements are bred on the farm and most lambs and surplus ewes are sold for slaughter. Most farms have breeding cows, but many are tending towards more flexible cattle policies and introducing dairy-bred bull-beef policies.

The Hawkes Bay summer moist sheep and beef model was used as the base on which to examine the financial implication of addressing the major constraints to organic meat and fibre production.

Assumptions for conversion to organic production

Changes and assumptions made to accommodate the constraints identified by the Focus Group included:

Stock management policy

- Reduce stocking rate by 10 percent.
- Higher cattle to sheep ratio (50:50) for managing feed quality and endo-parasites.
- Older-aged flock and herd, same reproductive performance and same losses.
- Switch to a Texel x resilient Romney cross to get hybrid vigour.
- Hogget lambing: mate top 30 percent only, with 50 percent lambing.
- 350 ewe hoggets. Culling throughout autumn.
- Smaller numbers of lambs sent more frequently to sales. All stock sold by the end of April.
- 80 percent lambs and 90 percent of cattle finished to CERTENZ standard with premiums of 15 percent for both. 60 percent of lambs and 90 percent of cattle finished to BIO-GRO standard both with a premium of 50 percent.
- Apart from breeding rams and an increase in the number of breeding bulls, no stock are introduced from outside the farm.

Agronomic management

- Shift in fertilisers to unprocessed products (e.g. reactive phosphate rock with elemental sulphur), no processed nitrogen fertiliser.
- Weed control results in the use of more fuel, and higher wages and ACC for mowing or hand control of thistles, gorse and trees, but no herbicide costs. Overall expenditure is similar to the current chemical budget.
- Reduced expenditure for pest control.
- More proactive management, with higher labour requirements.

In the next section the implications of incorporating the stock policy changes (e.g. lower stocking rate, higher cattle ratio, etc) on the financial performance of the business are examined, followed by an evaluation of the effect of lower stock performance and premiums on the profitability of the organic stock policy model.

Organic stock policy model

This model shows the changes in stock management policy recommended from the workshop, and uses production data from the MAF base model. It shows the differences in farm profitability arising from changes in stock policy before adjustments are made for productivity. The differences in stock policy between the two systems are summarised in Table 3 and Table 4. The reduction in stocking rate of the organic stock policy model was 12.8 percent rather than 10 percent. The percentage of sheep and cattle stock units less than 12 months of age declined by 34 and 35 percent respectively, in the organic stock policy model.

Table 3 Differences in stock on hand

Stock type	MAF base model	Organic stock policy
Ewe hoggets	846	350
MA ewes	2626	1777
MA rams	33	20
Rising 1 year heifers	35	67
Rising 2 year heifers (dry)		65
MA cows	83	150
Rising 1 year steers	22	67
Rising 2 year steers	24	45
Rising 1 year bulls	90	
Rising 2 year bulls	19	
Breeding bulls	3	6

Table 4 Other differences from the MAF base model

Category	MAF base model	Organic stock policy[1]
Stocking rate (su/ha)	10.0	8.7
Sheep to cattle ratio	70:30	50:50
Stock purchases	Stock purchases from other farms occur	Except for breeding rams and bulls, no stock purchases
Rising 2 year heifers	Mated	Not mated
Labour costs ($)	16,917	13,917
ACC ($)	786	647
Freight ($)	4,137	3,700

[1] The organic stock policy option, modelled using Stockpol, was found to be feasible, despite the higher pasture covers throughout the year than the MAF base model, resulting from the lower stocking rate and emphasis on an older cattle policy. The decision by the focus group to drop the stocking rate was made without the benefit of the Stockpol analysis. The implications of changing the stock policy but not the stocking rate is explored further later in this section of the report.

Organic production model

This model has the same stock policy as the organic stock policy model but includes the effect of the higher endo-parasite burden on animal performance. The main difference is decreased lamb growth rates of 15 percent from weaning to sale. This is based on production data collected from a systems comparison between sheep and beef production under conventional and non-chemical farming practices (Mackay *et al.*, 1999). In addition, differences in cost structure are factored in at this stage as shown in Table 5.

Table 5 Differences in cost structure between the MAF base model and the organic production model

Category	Explanation	MAF base model ($)	Organic production ($)
Labour	= MAF base labour + weed and pest ($3,652) + monitoring ($5,000) – sheep ($3,000)	16,917	22,569
Fly	Increased costs from controlling fly strike, such as increased dagging and fly traps	0	2,000
Compliance	Registration and certification fees	0	1,500
Animal health	Decreased because less chemical is used	14,323	4,000
Weed and pest	Transferred into labour	3,652	0
Information	Increased information required by organic farmers	0	2,000

Organic final model

The final organic model has the same stock policy and production assumptions as the organic production model. Added to this model are premiums for organic produce and the percentage of stock finished to organic standards.

3.1.3 Financial outcomes from the modelling

MAF base model

Organic stock policy model: changes to the stock policy of the MAF base model to accommodate the constraints to conversion identified by the workshop members.

Organic production model: same stock policy as the organic stock policy but with the effect of the higher endo-parasite burden as it affects animal production factored into the model, and with differences in costs between the MAF base model and organic production model.

Organic with premium model: same as the organic production system with returns based on a premium of 50 percent for both lamb and beef, with 60 percent of lambs and 90 percent of cattle finished to specification.

Changes in stock policy and specifically a higher cattle ratio of breeding cattle and cattle mated as rising 3-year-olds had the single biggest effect on the profitability of the organic farming system (Table 6). A change in stock policy, assuming static production and prices, results in a reduction of $65,361 in gross farm revenue, and a decline of over 50 percent in economic farm surplus. Contributing to this is a drop in sheep gross revenue of $52,869, mainly because of reduced sheep numbers.

Cattle gross income increased by only $6,572 despite a significant increase in cattle numbers. This reflects the lower profitability of breeding and older cattle mating and finishing policies compared to the model's mixed enterprise. While cattle numbers increased significantly, the number of cattle sold increased only marginally, as a major part of the increase was in breeding cows. The changes to the sheep and cattle policy were necessary to provide the tools to manage the endo-parasite challenge to young sheep in a sustainable way within the system.

It is reasonable to assume from these findings that funding the reduction in farm income resulting from the changes required in stock policy to accommodate the constraints to organic production during the conversion period would be a major constraint to growing the organic sheep and beef sector.

When decreased production, consisting of decreased lamb growth rates, is factored in (using static price assumptions), gross farm income was reduced by a further $10,536.

Table 6 Financial outcome for the MAF base model and the organic farming systems under various scenarios

	MAF base model	Organic stock policy (no premiums)	Organic production (no premiums)	Organic with premiums
Stocking rate	9.96	8.66	8.66 (9.96)[1]	8.66 (9.96)
Sheep:cattle ratio	70:30	50:50	50:50 (50:50)	50:50 (50:50)
Lamb price	49.10	51.02	46.77 (46.77)	60.84 (60.48)
1 year steer price ($)	743	819	819 (819)	1,187 (1,187)
2 year steer price ($)	889	945	945 (945)	1,371 (1,371)
Sheep gross revenue ($)	154,927	104,868	94,333 (108,493)	121,248 (139,450)
Wool income ($)	53,497	34,423	34,423 (39,591)	34,423 (39,591)
Cattle gross revenue ($)	91,035	97,607	97,607 (112,259)	141,529 (162,775)
Gross farm income ($)	299,459	234,098	223,562 (257,123)	294,401 (338,595)
Farm working expenses ($)	138,677	129,505	127,682 (130,371)	127,682 (130,371)
Cash farm surplus ($)	118,258	62,068	53,355 (84,227)	124,194 (165,700)
Cash farm surplus/ha ($)	254	133	114 (181)	267 (356)
Cash farm surplus/su ($)	25.47	15.36	13.21 (18.40)	30.74 (35.66)
Economic farm surplus (EFS) ($)	110,299	50,789	42,076 (72,948)	112,915 (154,421)
EFS/ha ($)	237	109 (176)	90 (157)	242 (331)

[1] The values in brackets are when the changes are made but the stocking rate is maintained.

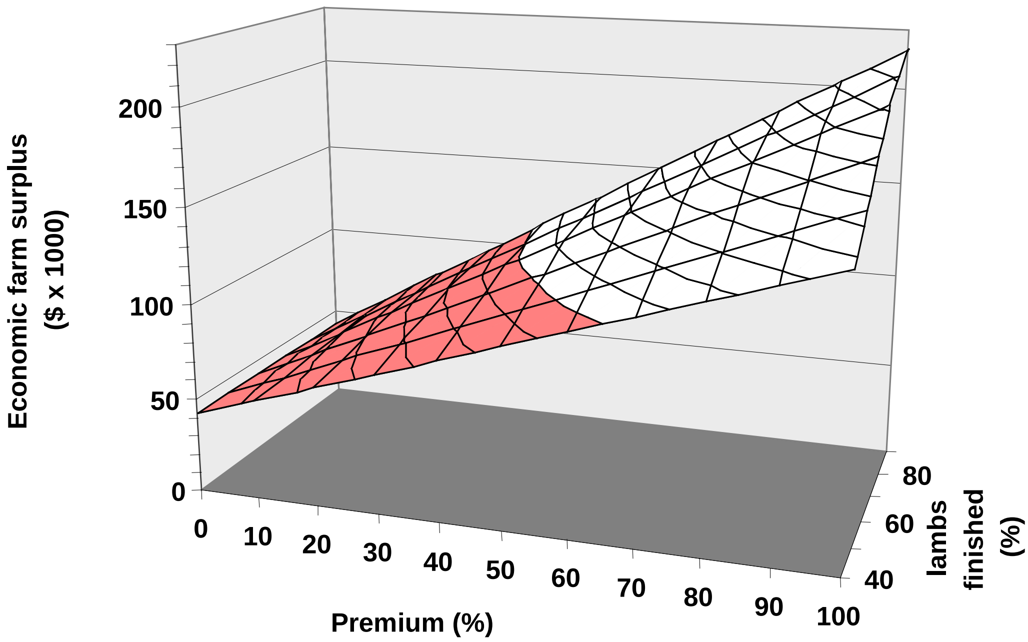
The **Organic stock policy** column shows the effect on income of a change in stock policy assuming that there is no associated drop in production. The **Organic production** column accounts for the drop in growth rates of young stock (about 15 percent) that results from the increased endo-parasite burden of organic stock. The **Organic with premiums** column shows the returns based on a premium of 50 percent for both lamb and beef, with 60 percent of lambs and 90 percent of cattle finished to specification.

The StockPol model of the organic system developed by the authors indicates that with emphasis on older cattle classes, the 10 percent drop in stocking rate suggested by the Focus Group to reduce the pressure on young stock following conversion was overly conservative. The decision by the focus group to drop stocking rate was made without the benefit of a pasture model on hand to examine the implications of a change in stock policy on feed demands. Pasture covers of the organic stock policy option modelled by Stockpol, indicate that the stocking rate did not have to be reduced below that of the MAF base system, to maintain per head performance and to provide a greater feed buffer for the organic enterprise. If the comparison with the MAF base model was made at the same stocking rate, the economic farm surplus (EFS)/ha for the **Organic stock policy, Organic production** and **Organic with premiums** at a stocking rate of 9.96 EFS increases to **$176/ha, $157/ha** and **$331/ha** respectively. The premium required to break even at the same stocking rate as the MAF base model is 23 percent on all stock sold.

The effect of premium, the proportion of stock finished, and certification system

When considering BIO-GRO and CERTENZ certification systems, it is necessary to understand the relationship between premiums, the proportion of stock finished, and EFS (Figure. 1).

Figure 1 The effect of premium and the percentage of lambs* finished on economic farm surplus (EFS) in an organic sheep and beef farming system



The shaded area of the graph represents EFS that is lower than for the MAF base model, while the area in white represents an EFS greater than the MAF base model.

* As the percentage of lambs finished increased, the percentage of beef cattle finished was increased by the same proportion, to a maximum of 100 percent. The percentage of cattle finished to specification was 30 percent higher than the percentage of lambs finished.

Figure 1 shows that when premiums are high, EFS is more sensitive to the percentage of lambs finished than to an increase in premium. However, when premiums are low, EFS is more sensitive to an increase in premium than to an increase in the percentage of stock finished.

Because of the large variability in premiums received by organic farmers producing under CERTENZ and BIO-GRO specifications with both season and location, it was decided not to include comparative premiums for the two-certification systems. The workshop concluded that BIO-GRO products currently receive higher premiums than CERTENZ products due to BIO-GRO's history, reputation and more stringent standards. It was also considered that a higher proportion of stock could be finished to certification specifications under CERTENZ than BIO-GRO, as the CERTENZ standards allow a greater degree of intervention without the loss of certification. The workshop participants estimated that around 60 percent of lambs and 90 percent of cattle could be finished under the BIO-GRO certification system, and 80 percent of lambs and 90 percent of cattle under the CERTENZ system.

3.1.4 Comparison with other sheep and beef systems

The MAF base model (Hawkes Bay summer moist) can be characterised as being intermediate between the more extensive sheep and beef operations found in the drier or hill country regions of New Zealand, and the more intensive sheep and cattle finishing systems found in Southland and Waikato/Bay of Plenty. For the more extensive systems, fewer changes (livestock species and age cohorts) would need to be made to the existing livestock policy to accommodate the constraints to organic production, and hence the impact on the financial performance of the operation would accordingly be reduced. In contrast, with a more intensive finishing operation the changes to stock policy would be likely to result in greater income loss.

3.1.5 Risks and the impact of risk on financial performance

A decrease in premium paid has an immediate negative effect on the financial viability of those sheep and beef producers that had to make fundamental changes to their existing livestock policy operation. A higher ratio of breeding cattle and cattle mated as rising 3-year-olds was necessary with the MAF base model used in this study to effectively manage the parasite challenge in young sheep.

A major breakdown in endo-parasite management threatens the percentage of lambs that are finished to specification. Since most lambs are finished before the start of autumn when the cumulative effect of parasites is at its greatest, the impact of an outbreak on the financial performance of the business can be managed. If registered to CERTENZ rather than BIO-GRO (as the CERTENZ standards allow more intervention without the loss of certification), there is greater certainty in being able to supply to specification.

With cattle sold as rising 2- and 3-year-olds, the need to treat weaner cattle following a parasite outbreak does not jeopardise their organic status as 2- and 3- year-old animals. Similarly, with ewe lamb replacements, a parasite outbreak in their first autumn and winter of life can be managed without affecting either their breeding performance or certification as breeding animals. A recent study (Mackay *et al*., 2001) examining the challenges to conversion to low-chemical or organic supply demonstrated that, with planning, production loss can be reduced. The development of decision rules to identify and treat at-risk stock at an early stage is an integral part of that planning process.

Physical damage to soil and pasture by the older cattle during the winter and early spring has the potential to reduce pasture growth and cause environmental damage. Removal of fertiliser nitrogen as a risk management option requires that a more conservative approach is taken for feed budgeting. In dry environments and high pH soils, the inability to maintain soil fertility and legume growth is compromised by the limited range of fertilisers available.

In the long-term, the greatest risk to the sheep and beef sector, and for all sectors, is weed infestation as it affects all aspects of land use.

3.2 DEER

3.2.1 Prioritisation of issues

For converting to organic deer farming, the major issue agreed by all workshop participants was how to control lungworm. This technical issue is likely to prevent many farmers from converting to an organic system, even if other factors, such as premiums were increased. The discussion on potential options for lungworm control highlighted that extensive deer operations have a greater range of options for tackling lungworm than intensive deer finishing systems. Some considered that in an extensive grazing system lungworm could be managed. For intensive systems a high stock density and more emphasis on single species grazing appear to constrain management options. Another important technical issue was the need to develop an alternative technique for velveting that does not require the use of drugs. Research on the use of compression acupuncture anaesthetics is well advanced, but questions remain about its effect on successive crops. One lingering view held by participants at the workshop was the perception that an organic system is less caring of animals and more vulnerable to pest outbreaks and extreme climatic events.

Better management of the land resource, watercourses, and indigenous vegetation would be needed in an organic system. Discussion on this reflected issues for the wider industry. Control of woody weeds again emerged as a very important issue in converting to organic production. The lack of organic certified processors is a potential limitation to growth, as is the current small supply base.

Information on market premiums was considered to be limited. The perception of many customers that deer and venison production is natural and therefore close to organic might suggest that organic venison would command only a small premium in the market place. Organic certification may therefore be useful in reinforcing the “natural” branding the product already enjoys.

In summary, the major issues for the deer sector are the control of lungworm, the need to develop an alternative method for velveting, and the ever-present issue of woody weed control. Once these issues are resolved, it is likely that the perceptions of the organic deer industry, and the industry infrastructure and supply issues will follow suit.

Constraints to conversion to organic deer production identified by the Focus Group are listed in Table 7.

Table 7 Constraints and their relative importance to conversion to organic deer production, as identified by the Focus Group, are listed below

Issue	Comments	Rating[1]
Technical		
Long-term soil fertility/ biology of soils	Fertiliser/trace element options, DDT level	Many
Physical health of soil	Heightened concern for water/soil erosion	Few
	e.g. deer and soil erosion, wallowing in stream beds, treading along fence lines, etc	
Animal health	Lungworm control	All
	Others: Yersiniosis outbreaks, control of ticks, possum/Tb vector control	
Pests	Tb vectors	Few
Disease		Few
Weeds	Woody weeds	All
	Herbaceous weed control, esp. nodding thistle and ragwort	
Genetics/adaptation	Genetic selection for disease control versus production	Many
	Breed type, Fallow, Red, Elk. Are any more suitable?	
Animal nutrition/ feed/ stock	Pasture quality control as a result of lower stocking rate	Few
	Lack of grazers	
Animal management	Velvet removal techniques	Few
	What stocking ratio and overall intensive level is appropriate in an organic format given climatic changes?	
Pasture seed	Availability, pasture options	Few
Skills and knowledge of manager	Lack of knowledge e.g. on interactions between fertilisers and soils, animal remedies and end products, pesticides and residues, so-called natural products and their effects	Few
Infrastructure and industry		
Signals on premiums/market stability	What are the market premiums (especially in relation to carcass weight). Markets - tonnage available	Few
Standards	Validity of certification, integrity of system, testing of products to maintain standards, adherence by farmers to standards, sensible specifications	Few
Industry infrastructure and strategy	Certified processors and critical supply base	Many
Services	Certified meat processing, issues with booking organic kill space especially in busy times.	Few
	No advisory structure	
	People and network, almost no practical farmer support system e.g. discussion groups	
Perceptions on organics	Image that the system is less caring of animals and more vulnerable	All

1 The words "All", "Many" and "Few" rank the importance of an issue in terms of the proportion of votes it received by the workshop members.

3.2.2 South Island deer model

This model is representative of deer farms in Southland and South Otago. It is based on a farm running only deer and the base numbers are 520 mixed age breeding hinds with 120 rising 2-year hinds (Tables 8 and 9). Seventy of the rising 2-year hinds are retained as breeding herd replacements. A herd of 90 mixed age stags is run for velvet production. Progeny from the breeding hinds that are not required as replacements in the breeding or velvet herds are sold for slaughter. Most are slaughtered at 10-18 months with final culling of replacements at the two-year-old stage. Not all rising 2-year hinds are mated. The model is based on running predominantly red hinds in the breeding herd.

Table 8 Model in summary 1999/2000.

Effective area	**180**	**ha**		
Stock wintered:				
Breeding hinds	640		R1yr stags	230
R1yr hinds	230		R2yr stags	55
Total stock units opening	2,115	su	R3yr+ stags	100
Closing stock units	2,136	su		

Table 9 Key parameters of the Model

	1998/99	**1999/2000**	**2000/01f***
Fawning %	86	85	85
Velvet (kg/stag)			
Farm average (incl. regrowth and yearling velvet)	1.14	1.16	1.22
MA	3.2	3.3	3.3
3-year-old	2.6	2.7	2.7
2-year-old	1.4	1.5	1.5
Carcass weights (kg)			
Cull MA hinds	50	52	52
Cull 2-year-old hinds	51	52	52
Cull MA stags	92	92	92
2-year-old stags	65	65	65
Yearling stags	56	56	56
Gross farm revenue ($)	161,338	216,759	247,617
Cash farm surplus ($)	51,738	107,159	132,377
Net trading profit ($)	48,018	109,659	113,537

* Forecast at May 2000

The South Island deer model (MAF, 2000) was used as the base on which to examine the financial implication of addressing the major constraints to organic venison and velvet production. The assumptions and changes made in stock policy, production levels and timing of supply are considered in the next section.

3.2.3 Assumptions for conversion to organic production

In the construction of the organic South Island deer farm system, changes and assumptions were made to accommodate the constraints identified by the focus group including:

Stock management

- Effective area: a quarantine area is required which reduces the effective grazing area by 2.8 percent (5 ha).

- Stocking rate is reduced from 11.86 to 9 su/ha. This lessens stress on stock and results in better animal health, growth and social behaviour, etc.

- Levels of venison production remain the same because of the lower stocking that reduces stress on stock giving better animal health, growth and social behaviour, etc. on the organic system.

- Reproductive performance is the same, as are the numbers of culls and deaths.

- In the organic system calves will be weaned later (May/June), compared with 75 percent weaned pre-rut in the MAF base system.

- A high proportion of adult stock aids animal health. Velvet production per head will be similar given the same feed level per head. The effect of compression acupuncture on subsequent velvet growth may be a factor that needs to be considered.

- Velveting will be carried out on organic properties based on non-chemical antler removal e.g. compression acupuncture anaesthetics.

- Slaughter dates maybe slightly later in the organic system, but have no effect on price.

- Grazing of outside stock: 100 cattle from another farm must be grazed for six months to control pasture surplus and maintain feed quality on the organic system (100 cattle for six months. 180 days @ 0.7 kg lwg/day = 126 kg lwt. Carcass wgt = 65.5 kg @ $3:00/kg).

- Less work involved with animal health. More work associated with controlling pasture, controlling weeds, and monitoring.

- Stock purchases: organic producers will want to source stock that is suitable for this system. As there is a small pool breeding for organic production, the costs may increase. Stock may also come from further away.

- No difference was made in the percentage of stock or product produced to BIO-GRO or CERTENZ specification. There is a small difference in the cost of the certification systems.

Agronomic management

- Conserved feed: more supplements are made to control surpluses.

- Fertiliser: the chemical fertiliser used in the MAF base system will be replaced with RPR and elemental sulphur. Trace elements will be the same if reason their for use is shown. Liquid fertilisers will be used. More monitoring and testing will be needed to keep soil health up. Slightly less lime used. No change in costs.

- Pasture management as a result of the lower stocking rate will require more mechanical topping to maintain pasture quality.

- Organic deer farms are likely to have more shade and shelter trees.

- Organic forage and grain supplements are not easily purchased so will need to be made on the farm.

These changes, along with the cost structure listed in Table 10, have been incorporated into the organic deer model.

Table 10 Assumptions for conversion to organic production

Category	Reasons for change	MAF base	Organic
Wages	Less work involved with animal health. More work associated with controlling pasture, controlling weeds, monitoring	$3,600 pa	$4,320 (> 20%)
Animal health	Cost will decrease for medicines but Tb testing and pregnancy testing remains. Fewer animals in total to treat	$4.24/su	$2.97/su (< 30%)
Electricity	No difference anticipated	$1700	$1700 or $1.10/su
Feed	Hay and silage costs could increase due to controlling surpluses mechanically rather than using animals to clean out paddocks	$5.82/su	$6.40/su
	Any imported feeds would be 60-90 percent organic These may be up to 50 percent more expensive	$0.59/su	$0.81/su
	Grazing off-farm would not fit the certification criteria. This would be replaced by purchased feed	$0.69/su	$0.90/su
	Total feed costs.	$7.10/su	$8.11/su
Fertiliser	Current rates are 250 kg/ha 0-9-0, some DAP plus 40 kg of nitrogen per ha. This will be replaced with RPR and elemental sulphur. Trace elements will be the same if reason for use is shown. Liquid fertilisers will be used	$108/ha $8.88/su	$107/ha
Seeds	Organic seeds may need to be sourced. Mixes will have a higher proportion of more expensive species like tall fescue	$11/ha	$28/ha
Freight	This will need to be done by a certified carrier which may be more expensive	$1.48/su	$1.50 /su
Weed and pest	Less spent on chemicals	$1700	$1000
Tax	This is the amount payable on current year's income	As calculated	As calculated
Levy	BIOGRO has a 0.5 percent additional levy to use their label	Nil	$872
Administration	No additional admin. for MAF base model CERTENZ = $800 to $1200 per annum BIOGRO = $1181	No change	Same as conventional plus $1,000 $1,181
Consultancy	More time spent getting advice, attending field days, joining organisations, Internet, more monitoring of feed budgets, soils and animal health	$450	$600

The organic system sells $31,800 of velvet. If a non-chemical, ethical method of removing velvet is not found or it is banned on philosophical grounds, this also changes the analysis. Velveting stags would be replaced with hinds, and breeding stags only would be run.

3.2.4 Financial outcomes from the organic model

The financial results (Table 11) are based on the changes discussed above and the costs reported in Table 9.

Based on changes to the MAF base model and in the absence of grazing, the organic systems cash farm surplus is reduced by $228/ha. The reduced stocking rate drives this, rather than a drop in per head performance. A number of costs are the same even though stock numbers are reduced. These include wages, electricity, re-grassing, rates, sundry, repairs and maintenance, and administration. To maintain pasture quality in the organic system, however, additional grazing must be included in the spring and summer to maintain the viability of the systems. If the value of grazing is included then the organic system returns improve by $109/ha.

Grazing is based on using young cattle (yearlings). Venison price per kg under an organic system would need to be an additional $2.11/kg (a 29 percent premium) to achieve the same value as the MAF model venison sales. This provides an indication of the premium required by the organic system in the absence of grazing income to generate the same gross farm income generated by the MAF base model. If grazing is included in the income of the organic system, the premium required drops to $1.03/kg (a 14 percent premium).

Velvet would need to be an additional $17.25/kg (a premium of 20 percent) to achieve the same value of velvet sales.

This is a guide only, as each farm needs to do its own analysis of returns under an organic system.

The additional costs between BIOGRO and CERTENZ are insignificant and the production is assumed to be the same.

Reducing the stocking rate will reduce stress not only on the animals but also on the operator. Time originally spent on administering animal health may now be taken up in non-chemical ways of reducing weeds.

No account is taken of the expected environmental improvement under an organic system resulting from the lower stocking rate and the lower levels of chemical use. Existing organic farmers also appear to have a greater goodwill factor from the wider population that organics is a “better” way to farm.

Table 11 Key financial indicators of the MAF base and organic models.

	MAF base model	Organic policy
Effective area (ha)	180	175
Stocking rate (su/ha)	11.8	9
Total stock units	2,136	1,624
Calving (%)	85	85
Velvet price ($)	86	86
Venison price ($)	7.16	7.16
Total venison sold (kg)	29,004	21,867
Total velvet sold (kg)	444	370
Gross farm income ($)	233,426	178,484
Farm working expenses ($)	92,523	90,790
Cash farm surplus ($)	140,903	87,694
Cash farm surplus/su ($)	66	54
Cash farm surplus/ha ($)	729	501
Cash farm surplus with grazing surplus/ha ($)	729	610

3.2.5 Comparison with other deer systems

The MAF base model used in this exercise to examine the financial implications of accommodating the constraints to organic production identified by the workshop members is based on an intensive Southland/South Otago deer unit. On more extensive deer units, such as in the hills of Canterbury, Otago and Southland, minimal change might be required to qualify as organic. These farms would be characterised as units with low stocking rates (<5 su/ha), minimal chemical inputs, little handling of deer and few weed problems. A small premium would be required and therefore funding during the conversion period would not be a major constraint to producers exploring the organic option.

3.2.6 Risks and the impact of risk on financial performance

The demand and consequently the likely premiums for venison and other products from the deer industry are not well understood. A commentary from the marketing company represented at the workshop suggested that the premium for organic venison would not be as high as other organic products because the market already has a perception that venison is a natural product. More research and marketing is required to develop a sustainable premium for organic venison. Uncertainty over the size of the market and the margins paid over and above conventional product is therefore one of the major constraints to deer farmers converting to organic supply. The difficulty of funding the conversion is another.

In the MAF base model used in the current study, a drop in premium would have an immediate effect on the financial viability of the enterprise. On the more extensive deer units in the hills of Canterbury, Otago and Southland, minimal change might be required to qualify as organic and, as such, little premium would be required and therefore additional funding during the conversion period would not be a major constraint to extensive producers exploring the organic option.

A severe outbreak of lungworm is a major threat to the venison operation. This would impact heavily on the proportion of stock that could be finished to specification. If registered to CERTENZ rather than BIO-GRO (as the CERTENZ standards allow some intervention without the loss of certification), there is greater certainty in being able to supply to specification and hence less risk to profits.

Removal of fertiliser nitrogen means that a more conservative approach must be taken for feed budgeting. In dry environments and high pH soils, the inability to maintain soil fertility and legume growth is compromised by the limited range of fertilisers available.

In the long-term the greatest risk to the deer sector, and all sectors, is weed infestation as it affects all aspects of land use.

Organic producers would need to be forward looking, good planners and managers, and have different thought patterns to conventional producers. They would need to be proactive and preventative in their management. One of the risks of organic production is that if something unforeseen occurs there is a limited range of allowable responses to fix a problem if the organic status of the animals and their products is to be maintained.

Organic producers do not have the same knowledge and management infrastructure available to them as conventional producers. Gaining knowledge can therefore be more difficult, more time consuming and more expensive.

3.3 ARABLE

3.3.1 Prioritisation of issues

The complexity of the issues involved in developing a sustainable arable system was highlighted at the workshop.

Weed control ranked as one of the most important issues facing arable farmers, and cultivation is one of the main control options available to organic arable farmers. However, repeated cultivation passes places additional pressure on the physical properties of the soil and could result in greater organic matter content and nitrogen losses from the root zone. Increased fossil fuel use is another consequence of the reliance on mechanical cultivation. Weed problems can to some degree be countered by crops that don't allow weeds to seed (e.g., process crops), but this compromises flexibility. In comparison, Brassica seed crops are best avoided because of complications later with volunteers/seed dispersal.

Livestock offer a biological weed control option. Stock performance may have to be compromised, however, to ensure effective clean up of weeds or crop residues to prevent carry over effects. Other weed control options, such as the use of compost or green manure, would supply nitrogen and reduce the number of cultivations, but may enhance the likelihood of disease. The lack of nitrogen fertiliser options was identified as a constraint that limited both the range of crops that can be grown and their yield.

The requirement for crop rotations to manage nutrients, pests and weeds, and soil physical properties was seen as reducing the flexibility in the cropping options that can be run in any one year in the organic system. Birds were seen as a bigger problem in organic systems.

With livestock representing a bigger part of the business because of the need for a pasture phase for building organic matter and nitrogen fertility, the animal husbandry skills of the organic operator are of greater importance than in a non-organic arable system.

The need for the organic arable farmers to learn new skills and be proactive in their management style to prevent rather than cure a problem was also emphasised by the group. The workshop agreed that organic arable systems require very good management skills to make them work.

Infrastructure and industry related constraints were divided between three moderately important issues. As at the sheep and beef workshop, the certainty of returns in the long-term was an important issue, along with concerns about the size of the organic market. The workshop identified the risk of price variation in the small domestic market for organic grains, but also identified potential export opportunities for grass and clover seeds into European markets.

The dependency on fewer crop options and the exposure of the organic producer to one or two major processors (e.g. process peas) adds further uncertainty. The group identified maintaining flexibility and the cash flow of the farm business as important considerations for arable farmers in general. There was a need for both certifying authorities to further develop market recognition of their standards.

Finally, the negative view of some conventional growers was seen as a “them versus us” factor that was discouraging growers from entering the organic market. The workshop participants felt that in reality, this attitude was directed at the more “politically motivated” part of the organic movement rather than the commercial organic growers themselves. There was a genuine respect among the workshop participants for each other’s choice of production system. Participants recognised that there is a need to develop an attitude of co-operation and communication between organic and non-organic growers, as the sharing of knowledge, both ways, is vital for the continued development of the whole arable industry.

In summary, methods of weed control emerged as a big issue in the organic system, as did maintaining fertility. The knowledge and skills of the grower was the other main technical issue, with knowledge required in the areas of how to develop a sustainable system, soil nitrogen supply, methods of weed control, and management techniques to prevent problems. Heightened skills in animal husbandry were seen as another issue facing the organic arable producer. The industry and infrastructure issues pointed to a need for strong leadership to emerge to secure reliable markets for organic produce, promote the organic standards to the arable markets, and encourage good communication and relationships between conventional and organic producers. The maintenance of flexibility in the production and business system was important.

Alternative land uses are resulting in falling areas of arable crops in Canterbury over the last few seasons, and this is not encouraging conversion to organic supply. Few arable operators are known to be considering conversion to organics.
Technical constraints to conversion to organic arable production identified by the Focus Group are listed in Table 12. Infrastructure and industry constraints are shown in Table 13.

Table 12 Technical constraints identified by the Focus Group, and their relative importance in conversion to organic arable production.

Issue	Comment	Rating[1]
Long-term soil fertility/biology of soils	Nutrient (nitrogen) management, biological activity of soil	Many
Physical health of soil	Additional cultivation for weed control causing soil structural decline, loss of carbon and nitrogen	Many
	Crop rotation with organic matter soil structure in mind	
Animal health	See sheep and beef section	
Pests	Managing outbreaks. Techniques to identify and monitor pest and weeds	Few
	Management of pests and weeds	
Disease	Disease control	Few
Weeds	Shift from high to low fertility weeds	All
	Need effective weed control and management strategies particularly for Californian thistle	
	Producing seed to purity standard	
Genetics/adaptation	Breeding for resistance	Few
Animal nutrition/ feed/ stock	Pasture composition, mineral content, and nutritive value	
Animal management	Integrated use of crops	Many
Pasture/crop seed	Limited availability of organic seed	Few
Energy use	Higher energy use	Many
Skills and knowledge of manager	New skills and proactive management. Must have a very good adviser to provide the many answers needed	All
	Need information on how to grow specialist seed crops	
	Surviving the transition	

[1] The words "All", "Many" and "Few" rank the importance of an issue in terms of the proportion of votes it received by the workshop members.

Table 13 Infrastructure and industry - Constraints identified by the Focus Group, and their relative importance in conversion to organic arable production

Issue	Comment	Rating[1]
Signals on premiums/market stability	Long-term market size and returns. Market certainty, will the premium or market disappear by the time a grower is certified and producing?	Many
	Productivity/premium ratios/trade offs	
	Impact of other government policies	
Standards	Standards recognised by the market, ensuring organic food is safe, product quality and point of sale; standards are based on consumer demand	Many
	Setting of standards by foreign countries, outside the influence of New Zealand producers and consumers	
	Problem – two different "types" of certification – CERTENZ, BIO-GRO, compliance costs	
Industry infrastructure and strategy	Processing capability, open access to markets, capturing more of the downstream value	Few
Services	Availability of services and skills, information on how to market products profitably	Many
Perceptions on organics	Polarisation of views "them versus us"	Many

[1] The words "All", "Many" and "Few" rank the importance of an issue in terms of the proportion of votes it received by the workshop members.

3.3.2 Canterbury arable farming model

The model is based on the Canterbury arable cropping model (MAF, 2000). More than 50 percent of the farm income is generated from growing crops. The whole farm can be irrigated, although in practice there is some dryland pasture where irrigation capacity is insufficient at peak demand. The farm is a mixture of cropping and livestock enterprises (Table 14 and 16). The model farm's stock policies involve trading lambs and running a 2-year ewe flock for lamb production. Half the ewe flock is replaced each year. There are 110 cows grazed for 12 weeks at $14/cow/week. The Canterbury arable model was used as the base on which to examine the financial implication of addressing the major constraints to organic cropping and livestock production.

In the construction of the organic Canterbury arable cropping system, a number of changes and assumptions were made to accommodate the constraints identified by the Focus Group. These cover area of crop grown (Table 14), organic crop premiums (Table 15), and livestock policy (Table 16).

Table 14 Area of crop grown (ha)

Crops	MAF base model	Organic model
Milling wheat	25	40
Feed wheat	40	
Malting barley	15	8
Grass seed	40	
Clover seed	20	
Other small seeds	12	13 (linseed)
Vegetable/brassica seeds	11	
Pulses	20	5
Silage (as cash crop)	3	
Process Peas	9	55
Irrigated pasture	42	103
Non-irrigated pasture	20	20
Green feed oats		100 or 50[1]
Green manure (ploughed in)		34 or 84[1]
Total	**257**	**257**

[1] A small area would effectively be in fallow each year.

In addition to changes in crops grown, the following changes were made to the organic Canterbury arable cropping model:

- reduction in the area under cropping;
- no fertiliser nitrogen in the organic system;
- number of cultivations increased for weed control (Higher fuel, vehicle and labour costs per hectare, offset the savings on chemicals use);
- RPR applied at 450 kg/ha across the whole farm;
- lower crop yields;
- weed and pest control costs reduced.

Table 15 Prices for conventional and organic crops.

Crop	Conventional		Organic	
	Yield (t/ha)	Price ($/t)	Yield (t/ha)	Price ($/t)
Milling wheat	6.0	275	4.0	500 (181%)
Barley	6.7	200	4.5	350 (175%)
Linseed	–	500	1.5	1000 (200%)
Lentils	–	600	1.0	2000 (333%)
Peas	6.6	300	4.0	500 (167%)

Note: these premiums are based on returns organic arable producers are currently being paid. Values in bracket are the premiums as a percentage of the current conventional price.

Table 16 Summary of the livestock policy on the MAF base and organic arable systems

MAF base model						
	Opening	**Buy**	**Natural increase**	**Sell**	**Deaths**	**Close**
Ewe lambs			390	390		
Ewe hoggets						
MA ewes	600	310		300	10	600
Wether lambs		830	0	120	10	700
Wether hoggets	700			690	10	
Ram lambs			390	390		
MA rams	5	1			1	5
Steer calves						
R1yr steers						
Cattle grazing	110 cows are grazed for 12 weeks					
Organic model						
	Opening	**Buy**	**Natural Increase**	**Sell**	**Deaths**	**Close**
Ewe lambs			690	320	9	361
Ewe hoggets	361			20	11	330
MA ewes	1200			280	50	870
Wether lambs		0	0			0
Wether hoggets						
Ram lambs			690	681	9	
MA rams	12	3			3	12
Steer calves		50	0			50
R1yr steers	50			48	2	
Cattle grazing	100 cows are grazed for 12 weeks					

MAF base model

- The MAF model farm runs 600 MA ewes, which have 130 percent lambing. All lambs are finished prime.
- Three hundred ewes are sold and an additional 310 ewes purchased each year.
- Wether lambs (830) are purchased each year and, of these, 120 are sold before mid winter, with the balance sold in July-September.

Organic model

Stock management

- Changes made to the organic system are required because of the difficulty of buying organically raised lambs. As a result, the organic system rears its own replacements.

- The organic farm runs 1,200 MA ewes, which start lambing on 10 August with 115 percent lambing percentage.

- No routine vaccination, drenching or dipping is done.

- All wether lambs (681) and 320 ewe lambs are sold prime, 70 percent by 1 December, with the balance sold by May. The remaining 361 ewe lambs are kept as replacements.

- The organic farm purchases 50 steer calves, which are sold at 20 months.

- Stock prices are based on modelled performance and the same $/kg carcass weight as for the sheep and beef model.

Agronomic management

- 1705 bales of hay are made, with 1286 being fed, and 358 t of silage is made of which 222 t is fed in the organic system. Most farmers considered that having a large buffer of supplementary feed was a prerequisite for an organic system. Thus only what is fed is costed in the budget, plus one-fifth of the remainder, as the remainder represents an adverse season buffer. One adverse year in five is assumed.

- Two different scenarios are modelled for the green manure:
  - 100 ha of green feed oats is grown and grazed, and 34 ha of green manure is grown and ploughed in.
  - 50 ha of green feed oats is grown and grazed, and 84 ha of green manure is grown and ploughed in.

Table 17 Assumptions for conversion to organic production

Farm working expenses		MAF base ($)	Organic ($)
Permanent and casual wages	There is less cropping area on the organic farm, but it is more labour intensive.	21,810	21,810
Agricultural contracting		6,520	6,520
Animal health	Fewer animal health remedies are used on the organic system	3,400	1,700
Breeding		190	190
Irrigation (electricity)	Extra pasture irrigated.	11,170	12,930
Feed (hay and silage)	More supplements are made on the organic system	1,510	6,540
Feed		600	300
Fertiliser	No nitrogen fertiliser is used in the organic system	39,180	23,380
Lime	Less lime is needed as RPR has a slight liming effect and is more effective on acidic soils	1320	660
Freight	Fewer crops are grown in the organic system, with a slightly lower yield	7,920	6,520
Seed dressing	Seed dressing is not required in the organic system because no small seeds are grown.	15,470	0
Seeds	Pea seed is very expensive, and more peas are grown in the organic system	14,900	19,303
Shearing costs	There are more sheep on the organic system	3,142	4,640
Weed and pest control	Agrochemicals are not used in the organic system, but inter-row cultivation is needed	44,660	9,950
Fuel	More cultivation for weed control	12,640	14,572
Vehicle costs (excl. fuel)	More cultivation for weed control	12,780	14,635
Other expenditure	Includes, repairs and maintenance, rates, water, communication, insurance, accountancy, administration, and others	42,970	42,970
Cash farm expenditure		**240,182**	**186,620**

3.3.3 Financial outcomes from the model

Table 18 shows the financial outcomes for:

- MAF base model.
- Organic policy with no premium: changes made to the MAF base model to accommodate constraints to organic production. No premium.
- Organic with premiums: premiums are based on those currently being received for organic crops (crop premiums for the organic system of 167-333 percent), and the livestock premiums used in the sheep and beef model (i.e. 50 percent for lamb and beef), with 80 percent of both lamb and beef finished to specification.
- Organic "break-even" 46 percent premium: indicates that an average 46 percent premium is needed on all produce to generate a comparable cash farm surplus to the MAF base model.

Table 18 Key financial indicators of the MAF base and organic models

	MAF base model	Organic policy (no premium)	Organic (with premiums)	Break-even (46 % premium)
Revenue ($)				
Cereals	127,350	65,500	118,600	95,630
Small Seeds	163,400	9,750	19,500	14,235
Other crops	24,900	3,000	10,000	4,380
Process/fresh vegetables	17,820	66,000	110,000	96,360
Total crop revenue ($)	**333,470**	**144,250**	**258,100**	**210,605**
Sheep income	115,320	85,784	111,690	125,245
Grazing income	18,400	16,800	16,800	24,528
Other farm income	11,100	20,057	32,382	24,177
Less:				
Sheep purchases	40,770	1,050	1,050	1,050
Gross farm revenue ($)	**437,520**	**265,841**	**417,922**	**383,505**
Cash farm expenditure ($)	**240,180**	**186,625**	**188,010**	**187,620**
Cash farm surplus ($)	**146,780**	**28,662**	**179,352**	**145,326**

The major effect on the profitability of converting to an organic farming system arises from changes to both the cropping and livestock policies. The change in cropping policy and stock policy, assuming static prices, results in a reduction of $171,679 in gross farm revenue and $118,118 in the cash farm surplus. This decline is driven by the shift to less profitable and productive cropping options, a contraction in the area under cultivation, and a less profitable livestock policy.

Using the premiums currently on offer, cash farm surplus is higher in the model example than in the base model. However, the group considered there were also greater risks associated with this scenario through the loss of flexibility and increased dependency on a few crops, particularly cereals and process peas.

It is reasonable to suggest that funding the reduction in farm income resulting from the changes required in the cropping and livestock policy to accommodate the constraints to organic production during the conversion period would be a major constraint to growing this sector of the primary industry.

If conversion is restricted to the cropping component of the operation and the livestock policy in the MAF base model is retained but run as a non-certified stock enterprise, and the income then adjusted upwards to incorporate the greater area in pasture, the cash farm surplus increases to $122,000. This situation would be permitted as an interim activity. In the long-term, however, the livestock policy would have to shift to organic certification.

Differences between CERTENZ and BIO-GRO
There is little difference between CERTENZ and BIO-GRO in the stringency of their specifications for arable crops. It was therefore concluded at the workshop that the choice of most arable farmers would be to certify under BIO-GRO, because BIO-GRO has been in the organic industry for a longer period of time and therefore is better known and often commands a higher premium than CERTENZ.

However, there is a difference between CERTENZ and BIO-GRO in production specifications when it comes to livestock. It is possible to finish a higher proportion of stock to specification under CERTENZ than BIO-GRO, as the CERTENZ standards allow a greater degree of intervention without the loss of certification. Arable farmers with a large proportion of their earnings coming from sheep and beef may therefore choose to register with CERTENZ if it appears that CERTENZ premiums for livestock remain competitive with BIO-GRO. In practice, the authors understand that some organic arable farms have dual certification.

Accounting for the cost of growing extra green manure
To address the issue of increased cultivation to control weeds in the organic system, a proportion of the green manure crops were ploughed in to assist with the regeneration of the soil structure. Composting as a means of building soil fertility and improving soil structure is at the heart of an organic system. Two scenarios were examined:

Scenario 1: 100 cows are grazed on 100 ha of oats, returning $16,800. This is the scenario shown in Table 18.

Scenario 2: Only 50 ha of oats are grown, and 50 additional ha of green manure are ploughed in. Given the timing and size of feed flows, this action results in a reduction of 50 cows grazed, and income is reduced to $8,400. The alternative is to feed additional supplements at an extra cost of $1,765 and retain grazing of 100 cows. Another option would be an overall increase in premiums of 4.5 percent to account for the cost of ploughing in an extra 50 ha of green manure.

3.3.4 Comparison with other arable systems

The MAF base model used in this exercise to examine the financial implications of meeting the constraints to organic production identified by the workshop members is based on a Canterbury arable cropping unit. The arable sector, like the sheep and beef sector, is characterised by a great diversity of cropping and livestock operational mixes. The extent to which funding the conversion period becomes a constraint to an arable producer will depend on the degree to which the existing cropping and livestock policy has to be changed, and the extent to which this impacts on the financial performance of the business.

3.3.5 Risks and the impact of risk on financial performance

The financial viability of the organic arable sector depends on a significant premium for both the cropping and livestock enterprises. This is because of the less profitable cropping and livestock options, an expansion of the area under pasture, and the lower crop yields in the low nitrogen environment in the organic system.

The workshop identified the risk of price variation in the small domestic market for organic grains, but also identified potential export opportunities for grass and clover seeds into European markets. A reduction in the diversity of crops that can be grown exposes the producer to one or two major processors only (e.g. process peas) and increases the risk and reduces the ability to react to opportunities. Other factors include less flexibility in the crop rotation options and the necessity for a pasture ley to build soil fertility and restore physical structure.

For arable producers, the effect of weed invasions can be immediate and devastating on crop yield, quality and value. The necessity to use mechanical control as the major technique for managing weeds in an organic arable system creates a series of additional threats to the system by impacting on the soil resource. Repeated cultivation will reduce the structure, encourage mineralisation of organic matter and reduce the biological activity of a soil. This reduces the resilience of the soil to extreme events, reduces the window of time when soils can be cultivated, increases the number of cultivation passes to prepare the seedbed, and eventually necessitates the incorporation of increasing amounts of organic matter to preserve current production levels. However, this is countered by a less intensive rotation with a longer pasture phase. Lack of access to nitrogen fertiliser reduces not only production opportunities, but also risk management options.

The risks identified and discussed in the sheep and beef section of this report are also relevant to the livestock component of the arable model.

One of the risks of organic production is that if something unforeseen occurs, there is a limited range of allowable responses to fix a problem if the organic status of the animals and their products is to be maintained. Organic producers need to be forward looking, good planners and managers, and have different thought patterns to conventional producers.

Compared with the wider industry, organic producers do not have the same knowledge and management infrastructure available to them. This causes uncertainty and potentially results in delays in actions.

3.4 DAIRYING

3.4.1 Prioritisation of issues

As with the other livestock industries, animal health, particularly mastitis control, was one of the main issues foreseen. Woody weeds are considered to be slightly less important in dairy farming, since most dairy farmers have already eradicated this problem.

Maintaining nutrient fertility and understanding more about how the biological activity of the soil could be improved was identified as important to the development of a viable organic dairy system. The workshop also identified, as did all the other three workshops, the need for organic dairy farmers to obtain new information, and one of the industry and infrastructure limitations identified was the lack of advisers and knowledge networks.

Reflecting on the key priorities that were established during the workshop, i.e. wanting industry support/infrastructure and information/knowledge, the following needs were identified:

- with a good industry infrastructure in place, it should be no more difficult to gain information than for the "average" dairy farmer;
- tighter production-focused groups of organic farmers accessing knowledge together;
- increased access to, and assistance in, the interpretation of research that is relevant to organics;
- the lack of processing capability within the industry was a major limitation to growing the sector.

Constraints to conversion to organic dairying production identified by the Focus Group are listed in Table 19.

Table 19 Constraints identified by the focus group and their relative importance to conversion to organic dairy production

Issue	Comments	Rating[1]
Technical		
Long-term soil fertility/ biology of soils	Natural nitrogen sources, effluent management (use as strategic nitrogen source). Limited solid fertiliser application levels.	Many
	Practices for improving biological activity and balanced nutrients.	
Physical health of soil	Biological soil indicators. Soil management in winter – soil on the organic farm has greater vulnerability because of deeper organic matter layer. Environmental sustainability (e.g. waterways)	Few
Animal health	Primarily mastitis control, also, but of less significance, rearing young stock (calf health), internal parasites, lice, ticks, eczema, vaccination for *Leptospirosis,* mineral balance	All
Plant pests	Argentine stem weevil, crickets, black beetle	Few
Weeds	Major: woody weed management (blackberry, gorse); minor: bio-control, herbaceous weed management (thistles, buttercup, ragwort). Disprove "all weeds are bad" theory	Many
Genetics/adaptation	Genetic selection for longevity, disease resistance and parasite resilience	Few
Animal nutrition/feed/stock	Limited feed options, acceptable plant breeding practices for new cultivars	Few
Animal management	Source of replacement stock	Few
Skills and knowledge of manager	New skills and knowledge need a good network of advisers; research required to examine issues associated with conversion. Farmer education, information sources, confidence	All
Infrastructure and industry		
Signals on premiums/market stability	Signals on premiums/market stability, premiums/payments system. No commitment as yet from industry	Many
Standards	Universal organic standard required, value of CERTENZ and BIO-GRO	Few
Industry infrastructure and strategy	Desire for a dairy industry strategy. Lack of control, lack of confidence in what exists structure-wise in the dairy industry	All
	Processing and marketing, assurance that organic milk is wanted. Critical mass of milk. How to export products for manufacture (e.g. heat treatment – cheese is currently the only product not given heat treatment)	
Services	Advisers/knowledge networks, conversion assistance (financial?)	Many
Perceptions on organics	Social/peer pressure to remain mainstream	Few

1 The words "All", "Many" and "Few" rank the importance of an issue in terms of the proportion of votes it received by the workshop members.

3.4.2 Waikato/Bay of Plenty dairy farming model

This model is representative of seasonal supply dairy farms in the Waikato and Bay of Plenty regions (MAF, 2000). It is based on an average property of 83 effective hectares, wintering 220 cows and producing 62,250 kg MS. Some surplus bull calves are sold as four-day calves for rearing, with the remaining calves sold as bobbies. The replacement yearling heifers are grazed off the farm for 12 months. An owner-operator milks the cows and employs a permanent (single) worker who manages the farm. The all-up capital value of the business is $1.5 million with an equity level of 74 percent.

The Waikato dairy model was used as the base on which to examine the financial implication of addressing the major constraints to organic milk and meat production (Table 20).

Table 20 Key parameters of the model

	1998/99	1999/2000	2000/01f*
Area (effective ha)	83	83	83
Cows wintered	220	225	223
Cows milked at 15 December	210	215	214
Total milk solids (kg)	57,400	62,300	64,900
Milk solids/ha	692	751	782
kg MS/cow milked	273	290	303
MS advance to end of June ($/kg)	3.12	3.20	3.30
MS deferred payment ($/kg)	0.51	0.51	0.50
Company payment ($/kg)	3.63	3.71	3.80
NZDB basic payout ($/kg)	3.25	3.35	3.15
Gross farm revenue ($)	**228,524**	**245,873**	**269,520**
Cash farm surplus ($)	**65,646**	**70,347**	**91,944**
Net trading profit ($)	**50,466**	**59,477**	**75,136**

3.4.3 Assumptions for conversion to organic production

In the construction of the organic Waikato and Bay of Plenty dairy system, the following changes and assumptions were made to accommodate the constraints identified by the Focus Group:

Stock management

- 10 percent decrease in stocking rate (2.7 to 2.5 cows/ha) from the MAF base model to the organic model.
- Yearling heifers are grazed-off in the MAF base model and grazed-on with organics. Certified grazing land is not widely available at present. It is possible that organic grazing will become more widely available in the future, providing more rearing options.

- The organic farm aims to minimise herd wastage, so the replacement rate is lower (19 versus 22 percent) and the herd structure is older on the organic unit. Stock losses are expected to be lower on the organic unit. In practice, if the same replacement rate was used, stock could be more aggressively culled for high somatic cell counts and to maintain a reasonable calving spread.

- The use of maize silage as a balancing supplement when the pasture is high in protein is expected to maintain higher bodyweights in autumn and improve cycling in spring. However, it is claimed that the acidity of the maize silage interferes with mineral balance and some organic farmers may therefore be reluctant to pursue this policy. The higher energy content of the diet with maize silage supplementation is assumed to improve cow performance in early lactation.

- Graze cows off-farm in winter (must be organic land).

- Earlier calving and an extended number of milking days.

Agronomic management

- The MAF model farm conserves 40 t of silage and 900 bales of hay. The organic farm, in comparison, conserves 108 t of maize silage, 30 t of grass silage and 2250 bales of hay to compensate for the very limited availability of off-farm grazing and supplements, and the lack of a nitrogen fertiliser option.

- Since maize is susceptible to Argentine stem weevil (ASW) and weeds, the crop area (6 ha) on the organic unit is cultivated one month earlier than normal to ensure that there is no carry-over of ASW and to allow time to reduce the weed threat by extra cultivations. The yield is comparable to a conventional system.

The assumptions for conversion to organic production are listed in Table 21.

Table 21 Assumptions for conversion to organic production.

Farm working expenses Item	Comment	MAF model ($)	Organic ($)
Labour	No change to labour. No permanent labour. Allowance is made for summer student and casual relief milking. Workload would be similar but work activities differ with less time spent on animal health and more on weeds on the organic unit	19,000	19,000
Animal health	The MAF model farm costs ARE based on actual costs for farms of this type. There will be a $5000 decrease in animal heath costs. Emphasis switches to prevention (e.g. blood testing, minerals, tonics) rather than treatment	12,390	6,000
Breeding expenses	"Green" semen is more expensive. Organic costing assumes 220 straws of green semen @ $21 "in the cow", plus herd testing ($2200) and tags ($300)	6,280	7,120
Hay/silage	Applying current prices to the quantities conserved	4,400	4,900
Maize silage	The 6 ha (108 t) of organic maize silage has a total cost of $1500/ha. Sourcing GE free varieties could become more of an issue	0	9,000
Grazing	The MAF model farm grazes off 42 heifers for the full year at $6.50/week	14,200	0
Calf rearing	The MAF model farm feeds milk replacer, whereas the organic farm relies on whole milk fed at 6 l/calf for 8 weeks and 1 t of certified meal Current certification requires 12 weeks on milk	6,000	1,000 (+value of milk)
Fertiliser	The MAF model applies 40 t of 30 percent K SSP; 35 t of 15 percent K SSP; and 12 t urea. The organic model applies 45 t of RPR and 20 t of sulphate of potash (minerals applied to the organic farm are covered under animal health) Application of potash as sulphate of potash is a restricted activity	P/K 24,200 N 4,950	26,200 0
Lime	Both systems are assumed to apply 40 t per annum	2,000	2,000
Dairy shed expenses	Differs as a result of fewer cows milked	3,900	3,600
Electricity	Assumed to differ only as a result of milking fewer cows	Farm, 4,600 House 1,000	4,400 1,000
Freight	Components may differ but overall cost the same	1,300	1,300
Re-grassing	The MAF model figure reflects actual cost. Organic farm re-grasses after the maize silage crop using more expensive organic seed	2,460	2,260
Weed and pest	Weed and pest control will decrease by 80 percent to $260. Areas susceptible to woody weed invasion should be planted in trees. Labour inputs will increase, but this is taken into account	1,750	700
Fuel and vehicle costs	Unlikely to change overall. While extra cultivation will be required, a tractor will not be required for weed control or urea application	9,935	9,935
Other admin. and interest	Repairs and maintenance, rates, phone and mail, accountancy, ACC, legal, interest	74,250	74,250
Organic audit			2800
Cash farm expenditure (CFE)		**193,815**	**176,395**

Milk production on the two systems

Milk solid production would be very similar in the mixed aged cows at 323 kg and 333 kg MS/hd for the MAF base and organic models respectively. Similarly, the R2 heifers produce 290 versus 299 kg MS/head for the base and organic models respectively.

The MAF model herd would be expected to perform better at the peak of the season. The smaller organic milking herd will produce more milk per cow over summer and this may carry on to the end of the lactation

3.4.4 Financial outcomes from the model

Revenue

For a comparative analysis of this type, expected long-term prices are used and output is assumed to be in the fifth year after conversion. The first issue is what the long-run comparative position is and, if this is favourable, the analyst should consider the transition. A milk solids price of $4.58/kg MS is forecast to be the average of next five seasons, including the current season (Source: SONZAF). On a similar basis, the price for manufacturing cow beef is expected to be $2.57 c/kg carcass weight (T. Wharton, MAF, pers. comm.). These prices are significantly lower than current realisations due largely to the expected appreciation of the NZ$ from US44c in 2001 to US$52c in 2005. Gross farm revenue is shown in Table 22.

Table 22 Gross farm revenue

MAF model	Number	$/unit	$	Organic	Number	$/unit	$
Milk solids	68,500	4.57	313,045	Milk solids	63,200	4.69	296,220
Stock sales:				Stock sales:			
Calves	160	60	9,600	Calves	143	60	8,580
Cull heifers	2	440	880	Cull heifers	2	440	880
Cull cows	37	515	19,055	Cull cows	32	515	16,480
Breeding bulls	4	600	2,400	Breeding bulls	3	600	1,800
Less:				Less:			
Purchases	4	900	3,600	Purchases			
Gross farm revenue			**341,380**	**Gross farm revenue**			**323,960**

The key issue is the premium for organic produce. As agreed at the workshop, the milk solids premium is set at the **breakeven premium** required to deliver an equal cash farm surplus. The breakeven premium is 12 c/kg MS – an increase of less than 3 percent over forecast MAF model returns.

In reality the premium on the milk price would need to be higher than this to induce a significant number of farmers to take on the risk of changing their system to organic and to cover any income loss during the early stages of conversion. The 12 c/kg MS figure suggests that the required premium on milk to deliver a similar cash farm surplus is small. Further, the organic system does not appear to be more at risk from seasonal pasture growth factors. With little premium required to address the drop in stocking rate, funding the conversion period is not thought to be a major constraint to producers contemplating a shift to organic dairying.

It is assumed that all certified organic stock are sold off the property and are worth the same as conventional beef. In some cases stock will earn a premium. A 10 percent premium on milk alone, or on milk and the value of all stock sales, would increase gross farm revenue by 14.6 percent and 16.6 percent respectively, above that of the MAF base model.

3.4.5 Comparison with other dairy systems

The MAF base model used in this exercise to examine the financial implications of accommodating the constraints to organic production identified by the workshop members is based on the Waikato and Bay of Plenty dairy model. In sharp contrast to the other sectors (particularly the sheep and beef and arable sectors), examined in the present study, the results from the dairy analysis can be extrapolated with confidence to dairy systems in other parts of the country.

3.4.6 Risks and the impact of risk on financial performance

The small change required to the dairy operation, and hence the small impact on production levels, exposes producers to little risk during both the conversion period and when fully certified. This is in sharp contrast to the sheep and beef and arable sector models examined in this study. Potentially greater threats to the financial performance of the organic dairy unit include:

- animal health, primarily mastitis as it reduces cows in milk and total milk production;
- high somatic cell counts create difficulties for some organic producers;
- the ability to maintain soil fertility and particularly potassium, as it affects the seasonality of and total pasture production and pasture quality;
- weeds as they affect pasture production;
- utilisation of forage crops, milk characteristics and the absence of a nitrogen fertiliser option for managing feed shortages.

One of the risks of organic production is that if something unforeseen occurs, there is a limited range of allowable responses to fix a problem if the organic status of the animals and their products is to be maintained. Organic producers need to be forward looking, good planners and managers, and have different thought patterns to conventional producers.

In contrast to the wider industry, organic producers do not have the same knowledge and management infrastructure available to them. This causes uncertainty and potentially results in delays in actions.

Participants identified the perceived lack of commitment by the dairy industry currently to developing the processing and marketing capability necessary for a sizeable organic industry as the single biggest factor limiting this sector.

3.5 SIMILARITIES & DIFFERENCES BETWEEN SECTORS

3.5.1 Technical challenges

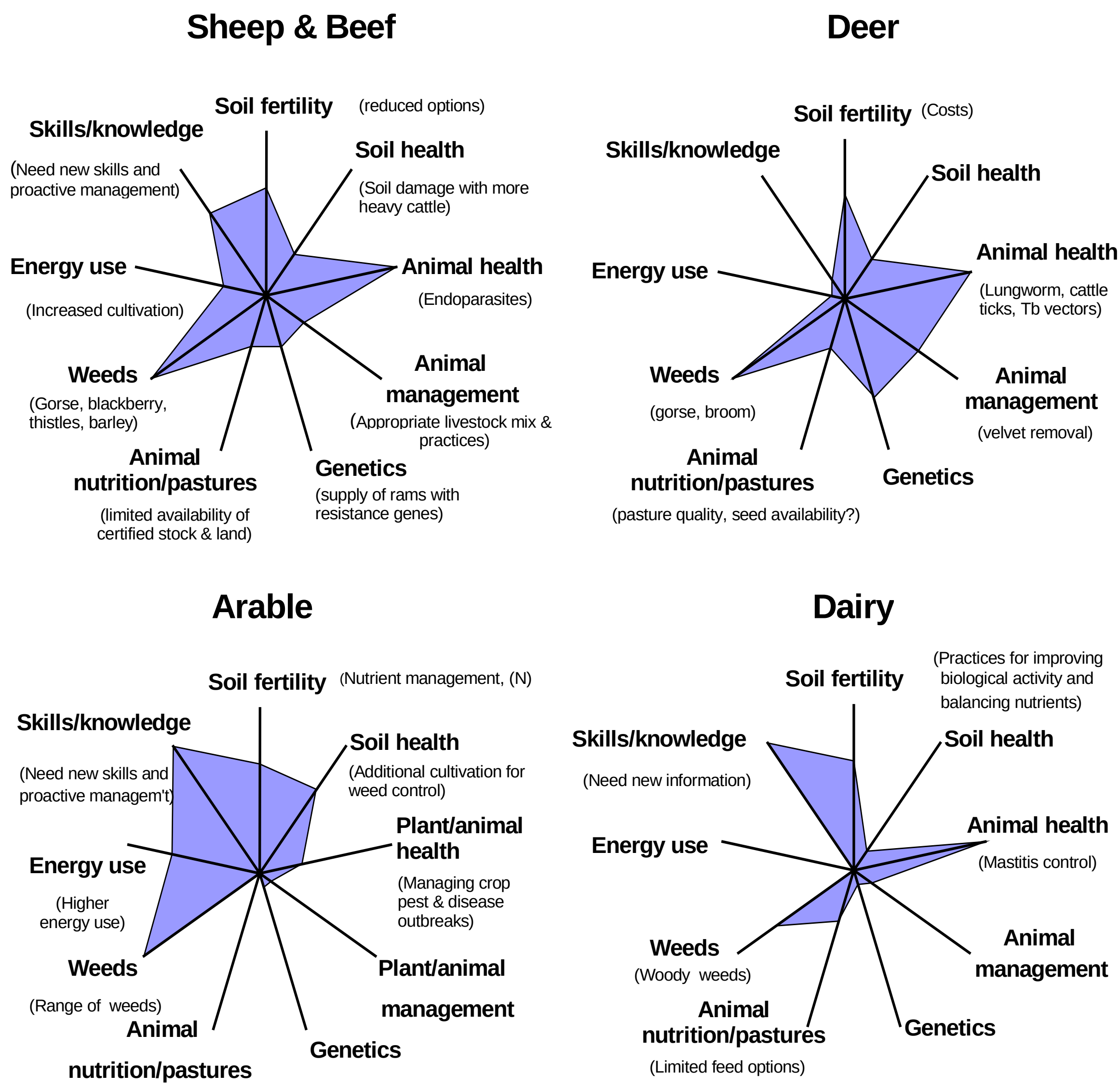
There were a number of consistent messages across all sectors and some very specific sector issues.

Technical challenges fell into five areas:

- Soil nutrient management was an issue across all sectors, and includes nitrogen, phosphorus and potassium availability. Lack of access to nitrogen fertiliser reduces not only production opportunities in all sectors, but also the use of nitrogen as a risk management tool. The lack of an alternative potassium source is an issue for the dairy sector, for arable farmers producing forage silage for dairy farms, and in sheep and beef systems where the same paddocks are repeatedly cropped for supplements due to the limited availability of flat land. The limitations of RPR and elemental sulphur in high pH soils, low rainfall environments, and in situations where there is a high short-term demand for phosphorus and sulphur, reduces the producers' ability to provide a high-quality balance for forage and crops.
- For the sheep and beef sector and, in particular, the arable sector, management of the physical properties of the soil represents a major challenge that has the potential to impact significantly on production. Although not listed as an issue, all workshops talked about the importance of having the soil resource in an optimal state for biological activity and the ability to supply nutrients to the plant in the correct ratios.
- Animal health generally, and specifically endo-parasites in sheep and cattle in the livestock component of the arable sector, lungworm in deer, and mastitis in dairying were seen as highly significant issues. Each represented a major threat to the production base of their respective sector by reducing the amount of product that could be sold at a premium. They also had the effect of restricting the range of livestock operations and the ability to mate yearling stock. Lack of information on the opportunity for genetic selection for disease control, and its potential benefits, was a constraint that could be put alongside animal health.
- Weeds were seen as a major constraint across all sectors. In comparison to animal health issues and, to a lesser degree, nutrient and physical management of the soil, weeds are a medium- to long-term threat to the three livestock sectors. Under cropping their effect can be immediate and devastating as weeds affect plant growth and contaminate the crop. Surprisingly, woody weeds were an issue with all livestock sectors, regardless of landscape.
- Skills, knowledge and access to information were major issues in all sectors except for deer. The deer sector appears to be more closely aligned with research and development. The lack of skills and knowledge requires more time to seek out help and resource, and incomplete knowledge reduces options and adds considerable risk to the business. What did not emerge as a high priority, although often mentioned, was the need for support/confidence building through networking with other organic producers.

The relative importance of each technical issue for the four sectors is shown in Figure 2.

Figure 2 Relative importance of each technical issue for the four farming systems. The further the shaded area reaches towards the end of the arm, the greater the importance of the issue



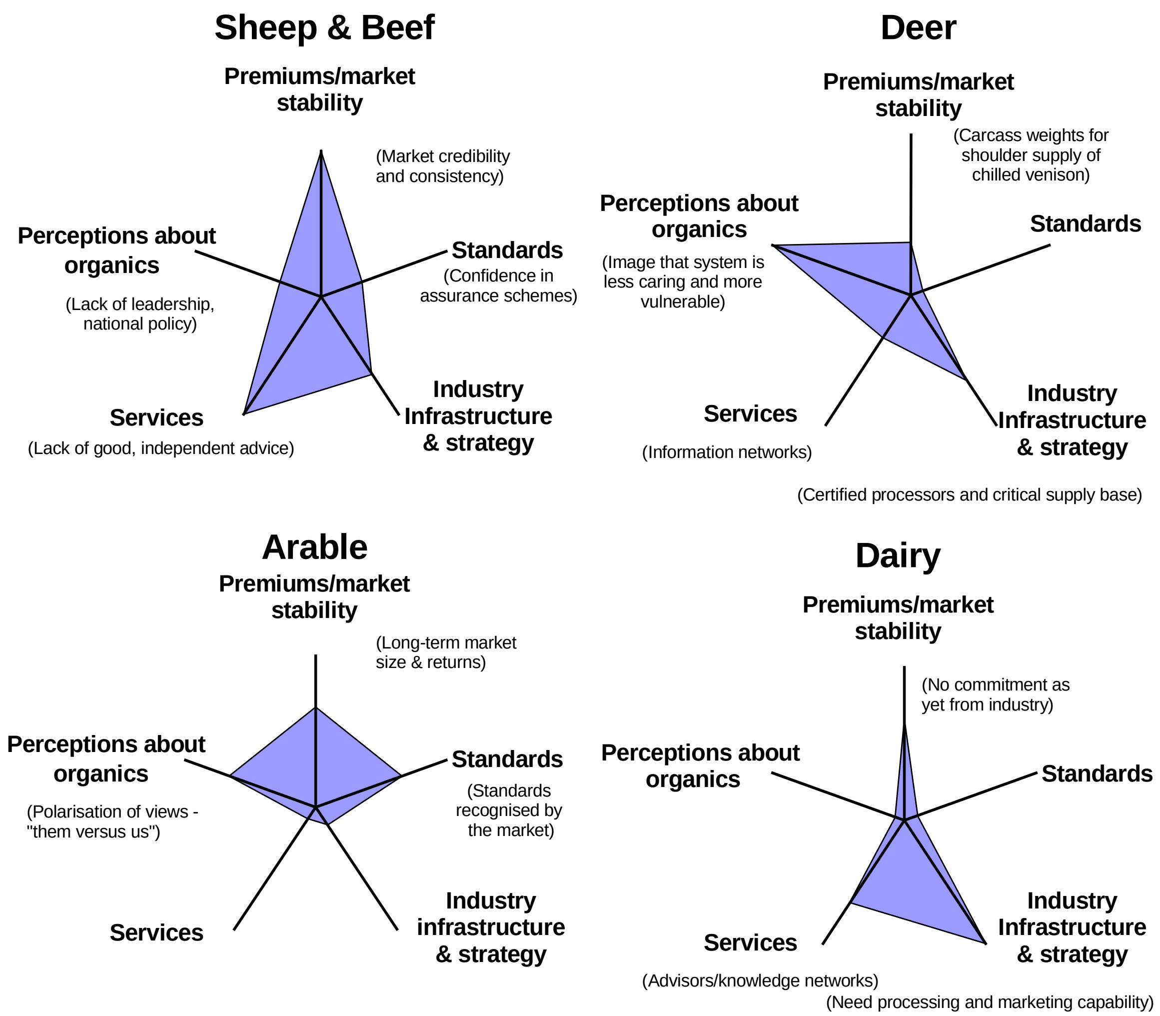
3.5.2 Infrastructure and industry

There were few similarities between the sectors in terms of infrastructure and industry constraints.

- Premiums and market stability were seen as important issues for all sectors except the deer industry. As the deer industry as a whole is already perceived by the public as operating in and producing a quite “natural” product in venison, organic branding was seen as offering the opportunity to reinforce that perception. For two of the sectors, sheep and beef and arable, a large, stable premium was identified as critical to the growth and viability of an organic industry. Premiums and market stability are common problems facing new markets, yet the demand for organic food has been growing at 10-20 percent p.a. for more than a decade.
- The perceived lack of commitment by the dairy industry to developing the processing and marketing capability necessary for a sizeable organic industry was identified as the single biggest factor limiting this sector.
- The sheep and beef workshop highlighted the lack of good independent advice for farmers planning to convert to organics. However, the slowness of the industry to respond to this need may reflect more the fact that sheep and beef farmers have only recently had the financial resources to invest in business development, rather than a lack of confidence in the organic sheep and beef industry.
- The lack of leadership in all sectors was a factor raised in all workshops as a reason for the slow growth of the organic industry.
- The way the organic industry was perceived by the general public was an important issue for arable and especially deer farmers. If the deer industry as a whole is already receiving a “premium” for being perceived as natural, then surely there is a need for the other sectors to address the perceptions held of their industries.
- The notion that an organic system is viewed as “better” polarises views. A much healthier perspective would be to see organic growers as just other producers tackling the same issues from a different perspective. Potentially, organic farmers are themselves a very valuable source of information.
- The perception that organic producers are less caring of animals and their systems are more vulnerable to pest outbreaks and extreme climatic events are factors that delay the acceptance of organic systems as a legitimate means of production.
- Organic farming standards were generally not an issue except in the arable sector where it was considered that there was a need to have standards that are readily recognised by the market and that were practical to implement. This would mean that the principles could be maintained but the risks reduced.

The relative importance of infrastructure and industry issues for the four sectors is shown in Figure 3.

Figure 3 Relative importance of each infrastructure and industry issue for the four farming systems. The further the shaded area reaches towards the end of the arm, the greater the importance of the issue



Financial implications of constraints

The implications of accommodating the constraints, identified by the Focus Groups on the financial performance of organic systems, varied between sectors.

Of the constraints facing the organic sheep and beef sector, the loss of premium would have the most immediate and devastating effect on the financial viability of the operation. The radical changes to the stock policy, with a shift to more and older cattle, was the single most important factor reducing the profitability of the organic system examined in this study. The change in cattle policy was necessary to better manage the parasite challenge in sheep. Funding the reduction in farm income during the conversion period therefore becomes a major constraint for those sheep and beef producers faced with making substantial changes to their existing livestock policy.

The MAF base model (Hawkes Bay summer moist) used in this study for examining the financial implications of accommodating constraints to organic sheep and beef production can be characterised as being intermediate between the more extensive sheep and beef operations found in the drier or hill country regions of New Zealand and the more intensive sheep and cattle finishing systems found in Southland and Waikato/Bay of Plenty. For the less intensive systems, fewer changes (livestock species and age cohorts) would need to be made to the existing livestock policy to accommodate the constraints to organic production. This means that the impact on the financial performance of the operation would be reduced accordingly. In contrast, with a more intensive finishing operation, the changes to stock policy would be likely to result in greater loss of income.

A similar picture emerges when the organic arable operation is examined. The profitability of both the cropping and livestock operations depends on a substantial premium (40-50 percent) to be profitable due to the changes required to the cropping and livestock operation to be sustainable, and from the reduced performance of the crops in a low-nitrogen environment.

A major breakdown in parasite management would threaten the ability to finish all lambs to an organic specification. However, given that most lambs are finished before the start of autumn, its effect on the financial performance of the business can be managed. With cattle sold as rising 2- and 3-year-olds, the need to treat weaner cattle following a parasite outbreak does not jeopardise their organic status as 2- and 3-year-old animals. Similarly, with ewe lamb replacements, a pest outbreak in their first autumn and winter can be managed without affecting their certification as breeding ewes.

Physical damage to soil and pasture by the older cattle during the winter and early spring has the potential to reduce pasture growth and cause environmental damage. Removal of fertiliser nitrogen as a risk management option requires that a more conservative approach be taken for feed budgeting. In dry environments and high pH soils, the inability to maintain soil fertility and legume growth is compromised because there are no suitable fertilisers available.

In the long-term the greatest risk to the sheep and beef sector, and all sectors, is weed infestation as it affects all aspects of land use. For arable producers the threat of weeds can be immediate and devastating on crop yield, quality and value. The need to use mechanical control as the major technique for managing weeds in an organic arable system creates a series of other threats to the system by impacting on the soil resource.

Repeated cultivation will reduce soil structure, encourage mineralisation of organic matter, and reduce the biological activity of a soil. This reduces the resilience of the soil to extreme events, reduces the window of opportunity when soils can be cultivated, increases the intensity of cultivation, and necessitates, in time, returning increasing amounts of organic matter to preserve current production levels. In preventing weed invasion, there is a real risk of soil damage. A pest outbreak would appear to be less of a threat to the organic arable sector than weed infestation.

Like the sheep and beef sector, the financial viability of the organic arable sector depends on a significant premium for both the cropping and livestock enterprises. Again, like the sheep and beef sector, this is partly a product of the changes that have to be made to the enterprises to accommodate constraints identified by the Focus Groups in the construction of a viable organic arable system.

In contrast to the sheep and beef and arable sectors, dairying did not depend on a premium to be viable. Aside from the lack of processing capability, which limits the growth of the sector, the major threat to the organic dairy unit would be animal health, primarily mastitis as it reduces the number of cows in milk. The ability to maintain soil fertility, and particularly potassium, is a medium- to long-term threat, along with weeds. The increased amount of conserved feed in the organic dairy model provides increased insurance against climatic extremes.

In comparison, with little change required to the dairy operation modelled and hence little impact on production levels, there is no need for a premium once the conversion period is over. Interestingly, the deer workshop concluded that extensive, low-stocking-rate deer operations come very close to complying with certification for organic supply and, as such, require little change and support during conversion. Consequently, only a small premium would be required to compensate for any production losses. In more intensive deer operations, a significant drop in stocking rate will be required and hence funding conversion becomes a major financial constraint.

3.6 RESEARCH GAPS

The project did not set out to identify research priorities as a primary objective, but in the course of the workshops many research issues were discussed as risks producers face when considering organic production. They are described here along with the authors views on what further research work could be done.

3.6.1 Soils: fertility, nutrients, biological and physical management

A recurring comment in all workshops was the view that "getting the soil right" was one of the keys to successfully converting to organic supply. This should be explored further with organic producers in order to better define the key attributes of an organic system. There is a need to better understand the functional characteristics of soils under organic management and how they influence systems performance (e.g. biological activity as it affects assimilation rates of nutrients, pest:predator ratios, resilience to adverse events, organic matter and physical management under arable, nutrient management in terms of nutrient balances and losses). Examining systems that have been under long-term (20+ years) organic management provides the opportunity to evaluate the significance of any functional changes on systems performance.

The more specific issues raised by the workshops identified the difficulties of, and consequently the need for, research into identifying options for maintaining soil organic fertility, nutrient management (phosphorus, sulphur, potassium, nitrogen, trace elements), addressing the lack of nitrogen fertiliser input options, and tackling soil physical management under sheep and beef and arable systems and policies.

3.6.2 Gastro-intestinal parasites

Of the technical issues identified in the livestock sectors behind-the-farm-gate, internal parasite management was by far the most common and offered the greatest challenge. There is an urgent need for information on the following options for controlling gastro-intestinal parasites:

- genetics (breeding for resistance, resilience, production under a parasite challenge). Utilising breed differences may be a possibility;
- plants (high protein forage, erect species, forage shrubs, tannin-containing plants, plants with anthelmintic properties);
- pathogens/bio-controls (nematophagus fungi);
- management (good nutrition, low stress, livestock species mix, age structure of herd/flock, soil fertility level as it influences forage quality and seasonality of supply, timing of weaning, cropping, mowing as a pest control practice).

Most options offer a method for reducing the endo-parasite challenge to the animal. Climatic conditions, livestock, landform, and the skills of the operator will each influence the options that can be used, and their effectiveness. None will be an effective alternative to an anthelmintic drench once a nematode burden has accumulated in the naïve animal.

One of the difficulties of fully utilising the above list of options is the lack of information on their effectiveness. Implementing many of these options will require significant changes to the enterprise and a change in priorities, such as a greater emphasis on pest management than forage utilisation. Greater use will be required of integrative models of forage supply and pest cycles.

3.6.3 Lungworm

Lungworm (*Dictyocaulus eckerti*) infections are common in farmed Red deer, with young newly-weaned stock being particularly susceptible. Prevention of clinical infections in young deer is generally achieved through anthelmintic treatments administered during autumn to spring, and older stock are also usually treated in late winter. There is a high degree of dependence on chemical techniques to control lungworm on conventional deer farms.

There is an array of alternative methods of controlling lungworm, as there are for gastro-intestinal parasites, but as with gastro-intestinal parasites, the knowledge on each is incomplete. Studies required include:

- grazing management (with respect to animal densities, rotation, grazing height, weather conditions, mixed species of livestock);
- avoiding stress to protect immuno-competence (including good nutrition and meeting social and physical needs);
- soil management (with respect to drainage and possible soil treatments such as copper sulphate);
- weaning strategy;
- forage types with specific physical (e.g. height) and chemical properties (e.g. condensed tannins);
- "natural" anthelmintic treatments (e.g. diatomaceous earth, garlic, plant extracts).
- breeding for genetic resistance.

Some of the above strategies for controlling lungworm in deer are currently being used on farms and some are the subject of current study. For example, recent research at Invermay into early versus late weaning on commercial deer farms has provided an indication that delaying weaning may be effective in reducing the size of the lungworm burden in young stock (Pollard *et al*., 2000). More work is required on this and the other options identified above.

3.6.4 Mastitis

The single biggest animal health threat to the milk production base is mastitis. This impacts on the number of cows in milk on an organic unit, because animals that require treatment with antibiotic must be removed from the herd for the balance of the year. Mastitis can be managed by good farm practice, which embraces all aspects of farm systems management from feeding levels and quality, stress and pressure on animals, and dairy shed management, through to genetics. Again, knowledge on the relative importance of each is limited. The use of homeopathy has been promoted as an effective approach for managing mastitis in an organic system, as have a number of other remedies and tonics. Our understanding of these alternative practices is limited to practitioners. To date, no rigorous evaluation of these alternatives has been undertaken.

3.6.5 Weeds

The management of weeds as it affects the short-term viability of organic arable producers and the long-term viability of all four sectors was identified as a subject for further investigation.

Other areas requiring further investigation include the ability to predict the potential for weed spread and infestation before implementing a conversion plan or following a change in practice, the usefulness of bio-control agents, the most effective method of introducing and managing bio-control agents in farm systems, and the interaction between land use and the above issues.

3.6.6 Systems function and management

Sustainable solutions to soil fertility and nutrient management, and to pest and weed challenges will require, in most instances, a systems change. To date there has been little analysis of the biology, resource requirements, environmental impact or sustainability of organic systems (e.g. life cycle analysis). There is currently very little investment examining systems-level issues facing organic producers, including issues as diverse as conversion planning and management, monitoring protocols and identification of critical points, risk management, and labour requirements and skills, through to advisory services and industry linkages and logistics.

3.6.7 Skills, knowledge and access to information

While not strictly a research gap, increased access to research with relevance to organics, assistance in its interpretation, and capturing current knowledge of organic producers were identified in the workshops as priority. The lack of skills and incomplete knowledge adds considerable risk to the business. The need for a “new” set of management skills or at minimum a more complete understanding the biology/ecology of a farm system was identified. With a good industry infrastructure in place, tapping into existing and new services should be no more difficult to gain information than for the “average” farmer.

3.7 ENVIRONMENTAL IMPACT (IMPLICATIONS FOR WIDESPREAD ADOPTION)

3.7.1 Infrastructure and resources

There was a general consensus that the agriculture service industry would need to change in response to widespread adoption of organic farming (Table 23). The number of suppliers of a range of organic products would increase, along with factory processing capability. Special transport requirements of some organic products and industries highlighted the need for additional and more specialised transport systems and accredited operators. The dairy Focus Group identified that council bylaws would need to change with respect to providing accreditation assurance through spray exclusion zones, etc.

Widespread adoption of organic farming systems is likely to benefit the life and vitality of rural communities. Three workshops concluded that labour requirements would increase, putting more families into rural communities, or at least arresting the current decline, and bringing in a new range of skills. This assumes that the organic farming systems would be profitable, and that people would be willing to undertake physical versus more technical work.

A greater diversity in land use and enterprises, including more forestry and the development of eco-tourism, is likely to enhance the financial stability of the rural sector by spreading the risk associated with only a small number of enterprises. The spirit of the community may also be enhanced if farmers were pooling together on issues such as weed and pest control, and learning in groups better ways of overcoming various problems. A particular sense of pride is likely to develop in the community if the origin or location of the product is associated with a brand name. This could occur whether organic systems are adopted or not.

Table 23 Infrastructure, resources: implications of widespread adoption of organic farming

Issue	Sector			
	Sheep and beef	Deer	Arable	Dairying
Local government	No opinion	No opinion	No opinion	Potentially more appropriate bylaws Spray exclusions zones Mechanical cleaning of drains rather than spraying Bylaw changes could lead to higher rates
Community viability	Repopulation due to labour demand	No opinion	No opinion	No opinion
Labour	New specialists enter and existing ones exit Those remaining will have a possible shift in focus, generating greater diversity, enthusiasm, and new opportunities	Labour different training	Increased labour input	No opinion
Infrastructure	New and different merchandise suppliers and new product lines Expansion of other suppliers of organic inputs	More transport/killing space	Changes in transport industry due to changes in volumes and the need for certified suppliers Greater need for processing capability to produce for the New Zealand supply chain. Change in terms of trade to reflect risks and returns	Increased availability of organic inputs Greater choice of inputs
Other Sectors			Restriction on chemical use – impact on conventional growers	
Services	New opportunities in adult learning Shift from simply product supply to management planning	Information networks	Smaller New Zealand market for chemicals . Fewer products registered Costs per unit higher	No opinion

Note: At each of the four workshops, participants were asked what in their view would be the implications to infra structure and resource requirements (both on- and off-farm) from the widespread adoption of organic farming.

3.7.2 Production systems

There was general agreement that organic farming would result in lower volumes of product, and that this would not necessarily be compensated for by a larger premium. This would work against the small-scale producer. Several workshops perceived an opportunity to build the geographic origin or location of the farming system into a brand image for the product or a range of products. The opportunity to integrate this with eco-tourism, and building a range of life experiences was highlighted.

Concern was also expressed about difficulties in safeguarding the integrity of the "Organic" brand with a more widespread adoption of organic farming.

Implications of the widespread adoption of organic farming on production are listed in Table 24.

Table 24 Production systems: implications of widespread adoption of organic farming

Issue	Sector			
	Sheep and beef	Deer	Arable	Dairying
Levels	Lower volume of product/ha	No opinion	No opinion	Only marginal reduction in total New Zealand production
Pricing	No opinion	No premium Already considered a natural product Organic branding reinforces natural image	Domestic premium will be diminished in time due to non-export product Impacts negatively on smaller scale Growers focused on the local market	Complex pricing models that provides some incentive within a co-operative structure
Branding	No opinion	Branding that embraces both the production system and surrounding landscape/district e.g. NOSLM Enabling market access	Critical mass enables new marketing opportunities and leverage	Some specialised processing and marketing entities Diversification of incomes
Changes in land use and activities	More forestry Fewer sheep Tourism	More integrated systems	No opinion	More diversity in land use and enterprises Tourism

Note: At each of the four workshops, participants were asked what in their view would be the implications in the production (both on- and off-farm) from the widespread adoption of organic farming.

3.7.3 Environmental impact

People often assume that all environmental parameters will improve under organic farming, but this is not true in all aspects. Both the sheep and beef and arable workshops concluded that fossil fuel use would increase in an organic system. The same two sectors concluded that both soil and water resources could deteriorate under organic production, while two (deer and dairying) concluded the opposite. These differences emphasise the importance of a complete understanding of each farming system.

In the sheep and beef system, the increased erosion and nitrate leaching,and decreased soil and water quality arises from the increase in cattle numbers. In the long-term the failure to address depletion of key nutrient reserves (e.g. potassium) could impact on future land use options. In the arable system, the decrease in soil and water quality (potentially greater nitrate leaching) arises from the increased reliance on cultivation for weed control. With dairying, the improvement results from a reduction in stocking rate. The improvement under deer was the result of a heightened awareness of the impacts of deer on the landscape.

Many of the predicted changes in environmental impact were thought to arise from a heightened awareness of the environmental issues. One workshop concluded that animal pests would be better controlled, since farmers would have a heightened awareness regarding control because of the reduced range of available control options. Similarly, all four groups concluded that weeds would not become more widespread or more of a problem under organic farming, despite the fact that weed control emerged as one of the major technical challenges to all organic producers. Again, one workshop suggested that the greater awareness of the implications of losing control of weeds would result in a more determined approach to weed control.

A more natural landscape, and a better vista with wild flowers and more trees, was a conclusion reached by the three livestock workshops. The workshops also concluded that there would be a greater diversity of land use options, which would contribute to landscape enhancement.

Implications on the environment of the widespread adoption of organic farming are listed in Table 25.

Table 25 Environment: implications of widespread adoption of organic farming

Issue	Sector			
	Sheep and beef	Deer	Arable	Dairying
Landscape/ vegetation/vista	More wild flowers in landscape	More natural landscape More trees in the landscape	No opinion	Better vista and landscape
Soil resource	Negative impact on soils of more and heavier cattle Lower nutrient reserves	Enhanced sustainability of high country and elsewhere, based on heightened awareness	Accentuated soil degradation and erosion due to increased cultivation Lower nitrogen status	Better soil structure in region Less erosion/nitrification/ sediment loading in water courses Reduced nutrient reserves
Water quality	Impact on water quality of more cattle	Potentially better water quality based on heightened awareness	Less potential control of nitrogen loss within nitrogen cycle due to increased cultivation	Better soil structure in region Less sediment loading in water courses
Weeds	No change	Better control district-wide for weeds – (broom) based on heightened awareness	No change	No change
Pests	No change	Possible outbreak of pests e.g. porina Better control district-wide for possums. Greater response due to fewer options for control.	No change	No change
Energy use	Higher fossil fuel use		Higher fossil fuel use	

Note: At each of the four workshops, participants were asked what in their view would be the potential changes to the environment (both on- and off-farm) from the widespread adoption of organic farming.

4. Conclusions

The study identifies and discusses the major constraints behind-the-farm-gate to organic sheep and beef, dairying, deer and arable production. The study also examines the implications to the environment of the widespread adoption of organic practices.

Nutrient and soil management, animal health (i.e. gastro-intestinal parasites in all livestock, mastitis in dairy cows, lungworm in deer), woody weeds, and skills, knowledge and access to information were the major and common technical constraints to growing the four sectors that were examined by the workshop participants.

There were few similarities in the infrastructure and industry constraints. A substantial premium was identified as critical for the sheep and beef and arable sectors, but for extensive deer and dairying the size of the premium was not a major constraint to growth, although it is probably important in attracting a critical mass to the organic sector. The lack of a processing and marketing capability was identified as the single biggest factor limiting the growth of the dairy sector.

Of the constraints facing the sheep and beef sector, loss of premium would have the most immediate and devastating effect on the financial viability of the operation. The single most important factor reducing the profitability of the organic system examined in this study was the radical change required to be made to the stock policy, with a shift to older cattle classes to better manage the parasite challenge in sheep. The MAF base model (Hawkes Bay summer moist) used in this study for examining the financial implications of accommodating constraints to organic sheep and beef production can be characterised as intermediate between the more extensive sheep and beef operations found in the drier or hill country regions of New Zealand and the more intensive sheep and cattle finishing systems found in Southland and Waikato/Bay of Plenty. For the more extensive systems, fewer changes to the existing livestock policy would be needed to accommodate the constraints and hence the impact on the financial performance of the operation would be reduced. In contrast, with a more intensive finishing operation, the changes required to be made to the stock policy would be likely to result in greater loss of income.

A similar picture emerges when the organic arable operation is examined. Both the cropping and livestock components of the arable business require a substantial premium (40-50 percent) to be profitable, because of the changes necessary in the cropping and livestock operations and the low nitrogen environment for crop growth. Funding the loss in farm income during the conversion period therefore becomes a major constraint to both these sectors.

In contrast to the sheep and beef and arable sectors, dairying did not depend on a premium to be viable. The major threat to the organic dairy unit would be animal health, primarily mastitis, as it reduces cows in milk. The ability to maintain soil fertility, particularly potassium, is a medium- to long-term threat, along with weeds. The increased amount of conserved feed in the organic dairy model provides increased insurance against climatic extremes.

Interestingly, the deer workshop concluded that extensive, low-stocking-rate deer operations come very close to complying with certification for organic supply and, as such, require little change and support during conversion. Consequently, only a small premium would be required to compensate for any production losses. More intensive deer operations required a drop in stocking rate to reduce stock pressure so funding becomes a factor that must be addressed in the conversion period.

The threat of a breakdown in animal health on the organic systems (e.g. gastro-intestinal parasite or lungworm) impacts primarily on limiting the range of intensive finishing options that can initially be considered on any one property. A breakdown in parasite management would threaten the ability to finish all lambs to an organic specification, although given that most lambs are finished before the start of autumn when the parasite challenge is at its greatest, the effect on the financial performance of the business can be managed. With cattle sold as rising 2- and 3-year-olds, the need to treat weaner cattle following a parasite outbreak does not jeopardise their organic status as 2- and 3-year-old animals. Similarly, with ewe lamb replacements, a parasite outbreak in their first autumn and winter can be managed without affecting their certification as breeding ewes. The major impact of the parasite threat on the financial performance of the business is therefore on the range of intensive finishing options that can initially be considered.

The long-term threat to all the sectors is a weed infestation as it affects all aspects of land use. For arable producers the threat of weeds can also be immediate and devastating on crop yield, quality and value. The need to use mechanical control as the major technique for managing weeds in an organic arable system creates a series of other threats to the system by impacting on the soil resource. Repeated cultivation will reduce the structure, encourage organic matter breakdown, and reduce the biological activity of a soil. This reduces the resilience of the soil to extreme events, reduces the window when soils can be cultivated, increases the number of cultivation passes to prepare the seedbed, and requires time to return increasing amounts of organic matter to preserve current production levels. In preventing weed invasion, there is a real risk of soil damage.

Organic producers need to be proactive, good planners and managers, and preventative in their management. One of the risks of organic production is that if something unforeseen occurs there is a limited range of allowable responses to fix a problem if the organic status of the animals and their products is to be maintained. Organic producers do not have the same knowledge and management infrastructure available to them as conventional producers. Gaining knowledge can therefore be more difficult, more time consuming and more expensive.

A change in the make up of the agricultural service industry would be one outcome from the widespread adoption of organic farming. The number of suppliers of a range of organic products would increase, along with factory processing capability. Three workshops concluded that labour requirements in rural areas would also increase. This would put more families into rural communities, or at least arrest the current decline, and bring in a new range of skills. This assumes that the organic production systems would be profitable, and that people would be willing to undertake physical versus more technical work.

A greater diversity of land use options, including more forestry, eco-tourism, and mixed livestock and cropping farming systems, is likely to enhance the financial stability of the rural sector by spreading the risk associated with only a small number of enterprises. This greater diversity in land use and enterprises will contribute to landscape enhancement, and an improved vista.

A particular sense of pride is likely to develop in the community if the origin or location of the product is associated with a brand name. The opportunity to integrate this with eco-tourism to build a greater range of life experiences was highlighted.

Soil and water resources under deer and dairying are expected to improve, while under organic sheep and beef and arable there could be deterioration unless research gaps are addressed. Animal pests would potentially be better controlled because the reduced range of control options available in organic systems requires a greater emphasis on preventing problems arising. Similarly, all workshops concluded that weeds would not necessarily become more widespread or more of a problem under good organic management because, despite the technical challenges that weeds pose, organic farmers are aware of the implications of losing control of weeds.

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