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Executive Summary

The ARGOS (Agriculture Research Group on Sustainability) project was designed to enable the interrogation of the condition of sustainability in the New Zealand agriculture sector. To account for the country's reliance on a neoliberal (or market driven) policy orientation, the research programme compares groups of producers organised into panels whose members comply with similar audit schemes that regulate entrance into high value export markets. Because these audit schemes often include criteria or standards associated with improved environmental or social practice, comparison of the panels on the basis of economic, environmental and social measures and indicators provides insight to the potential for such schemes to promote a more sustainable agriculture sector in New Zealand. To the extent that such schemes do influence practice, we would expect to differentiate among the panels in reference to such criteria. As part of the overall ARGOS analysis, this report provides a synthesis of the social research conducted within the project and contributes to the examination of the ARGOS null hypothesis, namely that there is no significant difference in the economic, environmental and social dimensions and characteristics of the participating farms and orchards. The report's main objectives are to assess both the extent to which it is possible to differentiate among the management system panels of ARGOS farms/orchards and how such difference is manifest in the social dimensions of farm life. To the extent that this analysis provides evidence to reject the null hypothesis, it is possible to inform understandings of agricultural sustainability as well as provide insight to the potential pathways to improving this condition.

The social analysis conducted in ARGOS is informed by a broad international literature on a range of social dynamics (for the 15 identified in the report, see pages 5-6) that have been identified as influencing the relative sustainability of agricultural production systems. This literature provides a palette of potentially significant differences among ARGOS panels, although these have generally not been applied in a context (similar to that of New Zealand) of emerging market audit systems as a key structuring feature in the promotion of more sustainable production systems. Thus, this report provides a meta-analysis of these recognised social dynamics with the objective of identifying coherent themes that characterise distinct orientations or approaches to management. Its general conclusions refer to the findings of separate analyses of the kiwifruit, sheep/beef and dairy sectors supplemented by a national survey. In order to indicate the relevance of these themes for concepts of sustainability and resilience, they are presented as fields of differentiation within which it is possible to locate the panels from a given sector. Because audit schemes can play a dual role of either encouraging the adoption of improved practice or limiting the available management options leaving substantial uncertainty relevant to long-term outcomes, the analysis provides no conclusive evidence regarding the impact of audit schemes on social sustainability or resilience. Furthermore, any conclusions regarding the association between the identified fields of social differentiation and economic, environmental or management indicators are subject to the emerging transdisciplinary engagement within the ARGOS research team. To reflect the importance of the emerging transdisciplinary themes, the report concludes with suggestions for possible contributions and insights from the social data.

The testing of the ARGOS null hypothesis in this report is restricted to comparisons within specific sectors of production: kiwifruit, sheep/beef and dairy. This analytic structure takes into account the observation that, as a result of the different production systems and social positioning, differences between sectors would overwhelm any potential difference between management system panels. It is also noteworthy that the structuring influence of production systems and industry relations within each sector has contributed to strong similarities in the social characteristics of the producers in each. As a result, the participating farmers and orchardists are socially very similar to their peers within each sector. It is, however, possible to identify distinctive characteristics or tendencies for each

of the panels in each sector. The organic panels, in particular, can be distinguished on the basis of their greater willingness to account for environmental and, to some extent, social concerns in their management strategies. In addition, they demonstrated less risk aversion in regard to socially accepted conceptions of appropriate management practice. For their part, the Gold kiwifruit and Integrated sheep/beef panels showed a greater tolerance for financial risk and technological innovation. By comparison, both the Green kiwifruit and Conventional sheep/beef panels are likely to exhibit more conservative positions relative to risk and innovation.

Principal findings:

The analysis of the social data identified seven fields in which the panels within a given sector demonstrated difference:

- the farmers' conceptions of *good farming* as a feature of their subjectivity—positioning in this field is indicative of relative willingness to consider the potential viability of practices that do not fit shared, socially accepted standards of appropriate management;
- their *breadth of view*—positioning indicates the relative willingness to acknowledge the potential scope of interactions between farm management and society, economy and environment and to allow the impacts of these interactions to influence management;
- their e*nvironmental positioning*—positioning indicates the relative extent to which the state of the environment is an objective of management practice as well as the proactive nature of the engagement with the environment;
- the type and number of *feedbacks* to which they respond—positioning indicates the relative extent of the information and indicators that are taken into account in farm management;
- their particular *farm management approach*—positioning in this field is similar to work on farming types and varies according to the objectives of management and the level of control exerted over the production process;
- their *on- and off-farm relationships*—positioning refers to the type, quality and extent of social relationships and is indicative of the role of social influences on management;
- their response to *innovation and risk*—positioning indicates the relative willingness to take actions that involve social or financial risks that are often associated with a change in management practice.

Kiwifruit panel differences (p. 19-21)*:*

The assessment of difference among kiwifruit panels reflects questionnaire results (six variables with statistically significant differences between the Organic and the other panels), qualitative data (distinctive characteristics attributed to the Gold or the Organic panel) and causal map analysis (Organic orchardists assigned more importance to particular factors). These individual differences inform the analysis of fields of differentiation including:

- *good farming*: Organic—promote biodiversity over tidiness on property, reduce production gap with non-organic orchardists; Green—maintain tidy orchard, remain economically viable; Gold—pursue innovation and achieve leading production indicators.
- *breadth of view*: Organic—broader environmental and social scales of reference relative to management.

- *environmental positioning*: Organic—greater level of engagement with environment and more proactive response to environmental health.
- *feedbacks*: Organic—biodiversity favoured over production; Green—look (tidiness) of orchard favoured over production; Gold—production emphasis and more frequent reference to performance of vines.
- *management approaches*: Organic—family orientation and collaborative knowledge and skill development; Green—income orientation, with orchard as investment; Gold—business orientation, with attention to productivity and financial bottom line.
- *on-* and *off-farm relationships*: Organic—broader view of community, but also greater tendency to self-reliance; Green—greater confidence in and reliance on ZESPRI to reduce uncertainty, reflected in greater aversion to independent risk taking; Gold—more managers, who tend to separate orchard management from off-farm relationships.

Sheep/beef panel differences (p. 28-30)*:*

The sheep/beef results reflect questionnaire results (14 variables with statistically significant differences between the Organic and the other panels), qualitative data (distinctive response of Integrated and Organic panel to several topics of enquiry) and causal map analysis (Organic farmers had a greater number of connections). These contribute to the following fields of differentiation:

- *good farming*: Organic—emphasis on developing resistant stock and on environmental health; Integrated—emphasis on achieving weight by deadline; Conventional—emphasis on the intrinsic value of management for food production and environmental benefit. (Tidiness important for all panels)
- *breadth of view*: Organic—broader environmental and social scales of reference relative to management.
- *environmental positioning*: Organic—work with nature and more proactive in regard to environmental health; Integrated and Conventional—both more control oriented relationship to nature.
- *feedbacks*: Organic—soil recognised as living substrate; Integrated—attention to costs as well as income; Conventional—no particular distinguishing traits.
- *management approaches*: Organic—more likely to privilege environmental justifications in management decisions; Integrated—more willing to accept audit compliance as metric of good management; Conventional—more conservative in regard to alteration of established practice in sector.
- *on-* and *off-farm relationships*: Organic—extend off-farm relationships to include marketing of farm products; Integrated—compliance with audit indicates distinct relationship with industry; Conventional—maintain conservative conception of community.
- *innovation and risk*: Organic—assume social risk of adopting an alternative management system; Integrated—assume financial and management risk associated with meeting contract stipulations; Conventional—more risk averse than other panels.

Dairy panel differences (p. 39-40)*:*

The dairy assessment reflects questionnaire results (17 variables with statistically significant differences), qualitative data (distinctions relating to environment and nature, productivity and risk) and the causal maps analysis (converting farmers emphasised distinctive factors and had more complex maps). As in the other two sectors, these differences established a similar set of fields:

- *good farming*: Organic—emphasised factors such as animal, family, environmental and soil health to a much greater extent than tidiness; Conventional—strong focus on production as indicator, with tidiness an indicator of productivity and efficiency; cows viewed as collective (cf. individual animals).
- *breadth of view*: Organic—broader environmental scale of reference relative to management.
- *environmental positioning*: Organic—frequently more proactive in regard to environmental health; Conventional—tendency to insist that current practice takes sufficient account of environmental impact.
- *management approaches*: Organic—pursuit of self-reliance and avoidance of purchased inputs; Conventional—more likely to consider production enhancing inputs (e.g., palm kernel or molasses).
- *on-* and *off-farm relationships*: Organic—possible growing disassociation with Fonterra due to perceived lack of recognition of symbolic qualities of organic product; Conventional—greater level of group association, especially in response to 'attacks' on dairying.
- *innovation and risk*: Organic—accept social risk associated with reduced production levels; Conventional—greater aversion to risks that involve reduced production.

Despite identifying these differences among the ARGOS panels, the conclusions of the social research fail to establish any of the systems as optimal in regard to the overall sustainability or resilience of the sectors. Rather, we conclude that each sector currently benefits (in the case of kiwifruit) or has great potential to benefit from the diverse production subjectivities represented by members of each of the panels.

Finally, the report interprets the findings in terms of their potential to differentiate among the panels on the basis of social dimensions. While the social science literature includes at least 15 potential bases for social differentiation between panels, our results support 12 of these. Of these, six (community; grower networks; craft orientation; sense of place; grower stress and wellbeing; identity) provide evidence for subtle to moderate differentiation while the remaining six (commercial and economic orientation; learning and expertise; symbolic 'look' of the farmscape; indicators of on-farm processes; positioning towards nature/environment; farm management approaches) offer stronger bases of differentiation. The national survey data complement and extend these interpretations. In its conclusion, the report identifies key indicated themes that have potential for transdisciplinary discussion, including audit and market access, resilience, and intensification.

1. Introduction

The underlying objective of the ARGOS project is to develop greater understanding of and insight into the condition of sustainability in the New Zealand agricultural sector with the aim of contributing to the sector's environmental, economic and social resilience. This report, which updates an earlier report with a similar focus (Rosin et al. 2007), takes a crucial step toward this objective by providing a synthesis of data from the Social Research Objective within the ARGOS research framework. These data—collected during the period of 2004-2009—are the product of a range of interactions with the farmer, orchardist and industry stakeholders in the project, including two semi-structured qualitative interviews, a causal mapping exercise, and two national farm surveys. More detailed analyses of the data collected by each method are available in a series of previous reports:

First qualitative interview:
- Qual 1 Kiwifruit (Hunt, et al. 2005)
- Qual 1 Sheep/Beef (Hunt, et al. 2006)
- Sketch Maps (Read, et al. 2005)

Second qualitative interview:
- Qual 2 Kiwifruit (Rosin, et al. 2007b)
- Qual 2 Sheep/Beef (Rosin, et al. 2007a)

Combined qualitative interview dairy
- Sector report (Blackwell et al. 2007)
- Wellbeing report (Mortlock and Hunt, 2008)

Semi-structured climate change interview:
- MAF Policy Report (Rosin, et al. 2008)

Causal map study:
- First Kiwifruit (Fairweather, et al. 2006)
- Sheep/Beef (Fairweather, et al. 2007a)
- Dairy (Fairweather, et al. 2008)
- Second Kiwifruit, and comparisons between sectors (Fairweather, et al. 2009a)

National farmer survey:
- Survey Panels Report (Fairweather, et al. 2007b)
- National Survey Report (2005) (Fairweather, et al. 2007c)
- National Survey Report: Kiwifruit sector (2005) (Fairweather, et al. 2007d)
- National Survey Report (2008) (Fairweather, et al. 2009b)

Multi-sourced report:
- Wetlands review (McLeod, et al. 2006)

The intent of these earlier reports was to present and discuss the findings specific to each method and its research objectives.[1] In addition to a general discussion of the findings, each report addressed the null hypothesis at the basis of the ARGOS project's research:

> H_0: There are no differences in the environmental, economic and social outcomes of the management systems on the participating farms/orchards.

In the following synthesis, we integrate the findings of these prior publications to provide a more robust and temporally informed explanation in relation to three central enquiries:

[1] Key themes included: farmer identity, vision, perspective on environment in Qual 1; constraints on farm management, especially in regard to farmer-industry relations in Qual 2; perceptions and knowledge of the farmscape in the sketch maps; important relationships in the farm management system in the causal maps; and demographic characteristics; intentions to use, and attitudes to alternative management systems; financial, production, environmental and social performance indicators; approaches to practices; breadth of view; emissions trading; community participation; birds, trees and shrubs in farm management; farming background; future prospects; condition of environment; relationship to land; Māori connections; attitudes to nature in the national surveys.

Are there any differences between the management systems of ARGOS farms/orchards?

If so, how are these differences manifested in the social dimensions of farm life?

To what extent do they inform our understandings of sustainability for New Zealand agriculture?

This synthesis report is specifically focused on the differences among the ARGOS panels (each defined by a management system as explained in the following section) that were evident in the social data. As such, it does not examine the full scope of social data, much of which involved shared social characteristics among panels resulting from their participation in a production sector that structured engagement with society and nature. In addition, some areas of difference noted in the social data did not map onto an individual's membership in a given panel and may involve other aspects of individual orientation or practice[2]. Given this focus, the report is both the culmination of a set of social science investigations (to the extent that its findings inform the ARGOS project's examination of the null hypothesis) and an intermediate outcome (providing insight to social data that may either correlate with or help to explain differences in the economic, environmental or management findings).

ARGOS Panels

In order to facilitate an evaluation of management systems that was pertinent to the contemporary situation of agricultural production in New Zealand, the ARGOS research has focused on the role of market-oriented audit schemes in promoting particular sets of appropriate or acceptable management practice. We have, therefore, identified distinct approaches to management in the Kiwifruit, Sheep/Beef and Dairy sectors, as defined:

- in the Kiwifruit sector by compliance with the GlobalGAP (formerly EurepGAP)[3] audit, plus either organic certification for the 'Hayward' variety ('Green') or the KiwiGreen[4] system for both the 'Hayward' and 'Hort 16A' varieties ('Green' and 'Gold' respectively);
- in the Sheep/Beef sector by compliance with organic certification, 'quality assurance' audits[5] and minimally audited conventional practice;

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[2] These latter instances are discussed briefly in the Conclusion.

[3] EurepGAP is the acronym for an audit scheme designed by the Euro-Retailer Produce Working Group (EUREP, representing over 30 of the largest European food retailers) to accredit the produce of farms and orchards utilising environmentally and socially friendly management practices (**G**ood **A**gricultural **P**ractice). In effect, compliance with the scheme has become required practice for the export of horticultural products to the European market. More recently, the Working Group has sought to consolidate a proliferation of GAP designations developed at the country level by coordinating these audits under the umbrella designation of GlobalGAP. ZESPRI, the single-desk exporter of New Zealand kiwifruit, has strongly encouraged its suppliers to comply with first the EurepGAP and currently GlobalGAP audit criteria in order to ensure greater marketing flexibility in its pursuit of specific, higher value markets.

[4] ZESPRI's KiwiGreen (and Organic) systems are intended to meet the legal requirements of export markets (such as maximum residue limits) as well as consumer requirements for safe fruit that is produced in an environmentally, socially and ethically responsible manner. Growers must comply with the Crop Protection Standard in order for their fruit to be accepted in to the ZESPRI inventory.

[5] In the case of the Sheep/Beef sector, these audits also enable access to higher value European markets, but are the product of the marketing strategies of individual UK retailers, Waitrose and Tesco.

- and in the Dairy sector by compliance with organic certification and minimally audited conventional practice.

These distinctions provided the basis for selecting twelve clusters for each of the sectors, each comprising three farms/orchards for Sheep/Beef and Kiwifruit and two farms for Dairy. The members of each cluster are located within relative proximity to each other in order to minimise environmental variation and to facilitate the direct comparison of the contrasting management systems. As a result, the ARGOS research framework has been designed as a longitudinal study that consists of the comparative analysis of 111[6] participant farms and orchards in New Zealand. For the purposes of social research, the owners and managers of the participating farms and orchards are grouped into *panels* of twelve properties corresponding to the respective management systems in each sector (Organic, Green and Gold for Kiwifruit; Organic, Integrated and Conventional for Sheep/Beef; and Organic and Conventional for Dairy). Thus, the composition of the panels reflects aspects relevant to both environmental (distinguished by management system) and economic (orientation to distinct market niches) as well as to social (compliance with particular market audit pathways that define a given system for commercial purposes) differentiation.

The designation of panels relative to a farmer's/orchardist's compliance with externally defined best practices provides the means for comparison between markedly different approaches to agricultural production. Because these practices are justified on the basis of distinct targeted outcomes, it is expected that the relative acceptability of each approach will reflect differences in the social dimensions of the representative farmers or orchardists. As a result, the identification and discussion of significant[7] social differences among the ARGOS panels in this report involves conditions and factors related to the characteristics of individuals and their interactions both with a wider society and with nature that vary with an individual's participation in a market audit scheme. That said, the direction (causal or otherwise) of such associations may not be entirely evident from the data collected to date. In some cases, a given social difference indicates that an audit scheme is more attractive to a particular group of farmers/orchardists because it more closely approximates their existing conceptions of good agricultural practice. Alternatively, social structures surrounding successful participation in any one of the schemes can be shown to create technical or economic barriers that exclude a particular group. Yet again, some of the differences reflect variations in the extent to which the farmers or orchardists perceive that they must work with, rather than control, nature. Consequently, our presentation of the social findings necessarily shifts between the descriptive and the analytical, the general and the idiosyncratic. Furthermore, in this report, we have limited the scope of our discussion to the delineation of social differences with the expectation that the full implications of the findings for agricultural sustainability will become evident when evidence of environmental, economic and management differences are also taken into

[6] The entire ARGOS programme currently involves over 100 farms (36 kiwifruit, 36 Sheep/Beef, 24 Dairy, eight High Country and seven Maori properties). The exact number varies when properties are sold or converted to alternative land uses, with new properties being recruited and some properties leaving the programme. This report examines the panel differences in the three main ARGOS sectors—96 properties in Kiwifruit, Sheep/Beef and Dairy.

[7] This term should not be understood to imply *statistical significance* unless specifically stated, especially when used in reference to data from the qualitative interviews. The significance of many of the findings of the social objective involves the identification of a notable trait, characteristic or perspective that would be expected to impact on the operation of the agricultural sector and the condition of its sustainability. As such, the concept is distinct from that of statistical significance, which would establish whether a value or measure is greater or less than that expected by chance.

account. The latter assessment is the objective of a forthcoming ARGOS report that synthesises findings from across the research teams.

Sustainable Agriculture: The Social and Transdisciplinary Dynamics

As noted above, the foundational questions for the ARGOS project demand an enhanced—and necessarily extra-disciplinary—examination of the condition of sustainability in the agricultural sector. Implicit to the development of this approach was the reference to an established and strengthening critique of both the existing state of agricultural science and the assessment of agricultural sustainability. These accounts of agricultural sustainability as a research focus identify several tenets that both informed the initial theoretical positioning of the project as a whole and helped to orient the essential contribution of social science perspectives to its objectives:

- Current approaches to agricultural science have overemphasised (in fact, reified) the technical bases of production and a related suite of scientifically derived technical inputs. This emphasis has been contested within a range of more integrative disciplines (including both rural sociology and rural geography) for many decades.

- Prior studies of agricultural sustainability, by focusing on isolated spheres of action, fail to account for or develop an understanding of the dynamic interaction of technical, environmental, economic and social dimensions of farm activity.

- There is, to date, a substantial dearth of suitable research, data and analysis on the social dynamics of farm households in relation to agricultural sustainability.

- Social research on farm activities—in combination with technical, ecological and economic analyses—is a necessary and integral factor of a more comprehensive understanding of sustainability. The examination of the social dimensions of agricultural production acknowledges the impact of the producer's role and position in society on the management options that are considered appropriate or viable, aspects of farm management that are often unaccounted for in the analysis of economic efficiencies or the environmental impact of specific practices.

This early discussion of the parameters of good practice in the study of agricultural sustainability helped to establish the role of social research in the ARGOS programme. Not only was social research acknowledged as an integral contributor to programme objectives, it also substantially contributed to the project's transdisciplinary orientation relative to the on-farm experiences of the farmers/orchardists. The findings derived from this research inform explanation of existing practice and outcomes to the extent that these reflect farmer/orchardist response to the existing social, cultural, political, economic and environmental contexts of farming. In this sense, the predictive capacity of the findings involves presumptions of the likely palette of response subject to the evolving context and potential interactions of elements of that context from the perspective of the farmer/orchardist.

As has been the case with similar projects internationally (Stauffacher et al. 2008, Deconchat et al. 2007, Dewulf et al. 2007, Morse et al. 2007, Christie et al. 2007, Tress et al. 2007, Attwater et al. 2005, Cundill et al. 2005), the ensuing evolution of ARGOS approaches and ideas in the pursuit of transdisciplinary engagement has been a piecemeal development. The current status of the project is characterised by increasingly successful dialogue between established disciplinary approaches and the identification of key sites of transdisciplinary engagement around particular issues at the farm or orchard scale. In light of this situation, the project is reporting its findings in two stages:

1. Each disciplinary approach within ARGOS that is directly studying the management systems of commercial farms in the panels (i.e., Social, Economic, Environmental and Farm Management) will report on the insights that have accrued in largely separate examinations of the project's initial null hypothesis. This will entail a summary of the first six years of data collection on ARGOS farms—and forms something of a disciplinary benchmark against which future years of data gathering can be measured.[8]

2. During the final two years of the first ARGOS programme (2007-2009), key sites of activity or on-farm dynamics have been addressed across the approaches in order to achieve transdisciplinary analysis of and more profound statements regarding sustainability issues.

This report updates and finalises the first part of this process for the ARGOS Social Objective. In order to create some context to the analysis in this report, a brief review will be undertaken of both the literature on social dynamics of agricultural sustainability and the emerging significance of market audit systems as a key structuring feature of contemporary attempts to achieve more sustainable production systems.

Positioning the ARGOS social science approach

In the introductory document to the Social Objective of ARGOS (Rationale document—Campbell, et al. 2004), a broad distinction was made between two styles of research into sustainable agriculture. We summarise these here in order to elaborate the constraints to more comprehensive understandings of agricultural sustainability that are confronted in a largely disciplinary focused literature. We contend that, while these research styles provide substantial insight to the social dimensions of agriculture, they do not offer satisfactory explanations of sustainability more generally. The failure of these approaches to comprehensively inform the analysis of sustainability lies in their reliance on idealised management types: the conventional and the alternative. While this dualism facilitates the critique of generalised failings of either type, it does not account for the social processes through which individuals are embedded within the conventions that justify a particular set of practices. Rather than providing a research framework for the ARGOS project, these approaches establish the evolving context within which social science attempts to explain the social dimensions of sustainable agriculture. In other words, they represent recognised theoretical building blocks that hold some explanatory currency in social analyses of agriculture.

The first research style involves the reaction by a small group of scholars to the emerging and consolidating practices of industrial agriculture in modernity, a trend that was associated with the degradation of the farmed landscape. This reaction and critique took shape over the whole course of the 20th Century (Stuart and Campbell 2004) and generally developed in the form of a critique of emerging industrial agricultural practices (focusing especially on new soil management techniques and fertiliser regimes in the first half of the century, and then shifting to include new pesticides post-WWII). Such practices were associated with deteriorating soil fertility, escalating pest and disease threats and declining health and safety in the food system, although the causal relationships were seldom confirmed empirically. Implicit to this critique was an aspirational set of prescriptions for what alternative agriculture *ought* to look like, involving the avoidance of chemical control agents, the maintenance of small to moderate scale family-owned farms and valuation and

[8] A further research objective—He Whenua Whakatipu (HWW)—is using a structure that is distinct from the panel design and is, therefore, not reporting in this framework. Because it incorporates all of the disciplinary approaches in ARGOS within a case-study based design, HWW acts as an important methodological check on the efficacy of the more structured, panels-based objectives.

development of local knowledge systems. These prescriptions for alternative agriculture included desirable social dimensions to farm activity and rural life, including the reduction in unintended environmental consequences, a greater focus on social and environmental (as opposed to only financial) aspects of agricultural practice, greater potential for community development and location appropriate management strategies. The research conducted within this approach generally compared the findings of case study analyses against aspirational goals for agriculture without providing strong analyses of or statements about the real world implications and impacts of the alternative practices.

The second research narrative into the social dimensions of sustainable agriculture took shape in the 1980s. This narrative emerged in response to the development of new production-consumption linkages creating commercial opportunities for the development of sustainable agriculture. Throughout the 20th Century, there had been a small number of growers, cooperative gardens and other small-scale ventures that directly sold produce grown under the principles of organic agriculture (see Campbell and Liepins 2001). This group sold to the wider public under an 'on trust' basis—usually in face-to-face interactions. Often these arrangements also endorsed alternative social arrangements and discourses that facilitated greater interaction and familiarity between producers and consumers as well as promoting more equitable distributions of income and capital.

Commencing with certified organic agriculture, a small, but growing, group of consumers began to pay premium prices to obtain food produced from farm management systems that were distinctly alternative to mainstream agricultural practices. Fuelled by a series of food scares in the 1980s, and an increasing public acceptance of the negative consequences of industrial agriculture (both in health and environmental terms), a new niche market opened for products claiming special qualities in counterdistinction to mainstream food products. Since the emergence of larger-scale commercial markets for certified organic foods in the 1980s, a related body of social research has developed with the objective of examining the different dimensions of the new 'sustainable' food products as they are manifest in social reality (cf. how they *ought* to be configured—as per Narrative 1). This narrative has become even more complex with the parallel development of mainstream 'greening' of food supply chains—particularly through the use of Integrated farming systems (in which inputs and sets of practices are controlled) as a form of agricultural best practice promoted by Japanese and European food retailers. More recently, this entire 'greening' trend has come under attack from writers like Michael Pollan (Pollan 2004) who argues that the 'organic industrial complex' has ceased to have any particularly compelling points of difference to the mainstream industrial food system. Other scholars have claimed that while organic agriculture commenced as an alternative to mainstream practices, over time the commercialisation of organic production and trade has resulted in a parallel 'conventionalisation' of organic growers and systems. In short, apart from some technical differences in management systems, organics is increasingly indistinguishable from conventional production[9].

Despite this challenge to the claims of alternative systems like organics, there has been little research into the social dimensions of the increasing prevalence of market audit schemes (and how these compare to claims of organic or Integrated approaches) at the farm and commodity level—precisely the focus of the ARGOS programme. The questions are clear: 1) are Organic or Integrated growers, as characterised by distinct market audit

[9] This perspective is represented in the distinction made between committed and pragmatic organic (and conventional) growers (Fairweather 1999, Brodt et al. 2005, Darnhofer et al. 2005)—committed growers believe in and practice organic philosophy, whereas pragmatic growers may take up organics because they see it as providing them with a better financial return.

systems, actually different to their conventional peers?; 2) if difference is established, what are its implications for the sustainability and resilience of agricultural production?

Framing Social Difference in Market-Audit Demarcated Production Systems

Given the absence of any in-depth research into the social differentiation associated with market-audit compliance, the ARGOS programme occupies a unique position from which to provide greater understanding of the social dynamics of sustainable agriculture. The literature reviewed in developing the ARGOS research framework (see Campbell, et al. 2004 for a more detailed examination of the literature associated with each of the approaches listed) gives some indication as to the variety of social dimensions to agriculture that might, or might not, differ across audit-demarcated production systems. Much of this literature is based on the assumption that existing management systems are following unsustainable trajectories of negative social, economic and environmental impacts. Divergence from these trajectories is impeded by the strength of existing justifications and rationalisations thus requiring socially risky contestation of the status quo. The presence or absence of specific differences—or, for that matter, of the relationships of these to sustainable practice or outcomes—should not be interpreted as an absolute statement about a system's sustainability. Rather, each of these categories is related to an axis of differentiation within a farming population. In the social science literature, these have hypothesised relationships to the practice of sustainable agriculture thereby forming a theoretical basis for explanation. The following list, thus, provides a palette of social factors, features and characteristics from which to derive the initial orientation for the examination of social dynamics within the ARGOS framework:

Demographic Characteristics. Do the ARGOS panels differ in terms of basic demographics—age, gender, education, etc? A common argument or assumption is that younger people are more open to innovation, while their older peers have greater experience with and knowledge of local conditions. Female farmers are often considered less embedded within the established structures of agricultural production and more open to alternative practices. The level of education is often considered a factor in a person's willingness to pursue diverse sources of information and the capacity to assess the validity of arguments. Such expectations provide the basis for associating demographic characteristics with a shift away from existing trajectories and associated costs. Thus, in the ARGOS context, is the tendency to move into a particular market audit framework characteristic of particular demographic groups? Claims that organic growers are more highly educated are often made in popular media. Is this kind of demographic claim supportable?

Family Farming. Most authors implicitly support a family-based farm unit (without articulating particularly compelling reasons why), while associating corporate ownership with unsustainable trajectories. Possible attributes of a family farm include: the advantage of collective decision making; multiple points of view; offsetting of financial risk over multiple generations; greater integration with local communities; and greater commitment to long term sustainability due to the likelihood of family succession. By contrast, corporate farms are expected to emphasise financial issues to the detriment of the environmental or social implications of production. Thus, do market audits privilege or exclude family farming? Are production systems that are subject to audit more or less amenable to family ownership structures?

Grower Identity. Early literature on alternative agriculture suggested that organic and other alternative growers had different identity attributes around issues like gender and politics. These unique attributes, it is argued, explain the ability of such growers to challenge more commonly employed practices and (potentially) to increase the resilience of their practice

by expanding their management options. There is little empirical evidence to validate the association between identity and sustainable practice in this claim. Relevant to ARGOS, however, the structuring and disciplining capacity of audit schemes may be more acceptable to particular identities and, thus, privilege or discourage desirable identity attributes in a management panel.

Positioning Towards Nature/Environment. Given a widespread attribution of a nature/culture binary operating in Western societies, and the potentially deleterious effects of operating with a worldview of 'separate nature' or a more utilitarian approach to natural resources, the potential for different positioning around nature and environment may be instructive. This insight to human-environment relations has been incorporated within binary assessments of environmental positioning as a factor contributing to the choice of 'alternative' practices, following the assertion that conceptions of an external nature subject to and improved through human control is essential to unsustainable management trajectories. Among the ARGOS participants, does adherence to a given audit scheme reflect a greater or lesser separation from nature or sense of control over the environment? Do any of the schemes encourage change in positioning as a feature of compliance?

Commercial and Economic Orientation. A common criticism of the dominant existing trajectories in agricultural management is the extent to which commercial interests and economic benchmarks influence practice. In New Zealand's export oriented sector, this feature is likely self-perpetuating as current marketing conditions privilege those producers most likely to conform to commercial and economic orientations. Does this suggest that the social and environmental impacts of agriculture will be increasingly ignored? Do the representative panel members have different attitudes to their industry, governance structures, audit systems and consumers? Does any difference between panels influence the relative attention devoted to economic, social or environmental benchmarks?

Craft Orientation. To some extent, this category parallels the previous one, although they are not opposite ends of the same axis. A craft orientation refers to the symbolic quality of a product that is associated with the ownership and pride derived from engagement in a skilled process. The current unsustainable trajectory of agricultural production is represented, by comparison, as an industrial process that—through standardisation—has reduced the skill and craftsmanship of the producer. Given that some authors argue for a need for craft to triumph over industrialism in sustainable agriculture, are different attitudes and positioning towards the products, production techniques and product attributes evident among the participating farmers and orchardists? In the ARGOS context, compliance with audit schemes has the potential to further standardise the production process by limiting acceptable practices. On the other hand, compliance may be considered an achievement resulting in a product that is recognised for its higher quality in the market. Thus, the directionality of panel differences relative to sustainable practice will likely reflect the extent to which producers are able to incorporate audit compliance as a demonstration of skill as opposed to mere regulatory paperwork.

Sense of Place. A further claim related to the unsustainable trajectory in agricultural production is that the emphasis on commercial objectives and chemical solutions to problems of soil fertility and pest control diminishes the importance of local knowledge. In other words, a more industrialised agriculture relies on skills and practices that can be applied anywhere. In the process, strategies developed in response to local conditions of production become superfluous. Thus, the extent to which individuals maintain a strong sense of place (alternatively characterised as being 'native to place') is considered to be a good indicator of a continued capacity to challenge and deviate from predominant practices. For the purposes of the ARGOS research, panel differences related to 'nativeness to place', a sense of bonding with the land, or identification with a particular locality will indicate whether compliance with audit schemes either enhances or weakens sense of place.

Grower Networks. Prior literature has suggested that sustainable agriculture may be characterised by different styles of grower-grower interaction, different learning, benchmarking and flow of innovations. Often, these differences are represented as networks of interaction within which other actors or things are enrolled in order to reaffirm a particular approach and practice of production. Within the ARGOS context, this raises the question of whether audit schemes encourage the reformation of networks and, in the process, increase the relative power and capacity of particular actors or the relative values attributed to particular things or practices.

Learning and Expertise. Just as a more industrialised agriculture has the potential to distance producers from place, it can isolate producers from more diverse knowledge and information about production. Prior literature strongly identifies the need for sustainable agriculture to break with mainstream expertise and learning systems. Is this the case? Do alternative farmers think in more systematic and less reductionist ways? Are they more 'ecologically literate' than conventional farmers? Do they rely more on 'local' or 'indigenous' knowledge in their production systems? Do audit schemes constrain or enhance access to and valuation of diverse sources of information?

Grower Stress and Wellbeing. A possible ingredient to sustainable farming is the degree to which panel effects demonstrate differences around issues of stress and wellbeing among farm families. The causality of stress in the ARGOS analyses can assume two directions: 1) does the introduction of audit schemes and associated increases in oversight raise the level of stress experienced by farmers/orchardists?; 2) do existing conditions of stress and wellbeing in farm/orchard families influence their response to audit schemes?

Community and Rural/Urban Dynamics. Many authors have suggested that alternative agriculture could be better for the long term viability of rural communities. Given an identified point of tension emerging between intensifying agricultural systems and urban communities, do different panels experience rural/urban tensions differently? Does the implementation of auditing practice strengthen or weaken existing community relations? Is audit compliance likely to satisfy concerns of urban interests regarding the impact of farming/orcharding practice.

Symbolic 'Look' of Farmscape. The managed landscape's appearance is often the most readily assessed aspect of farming/orcharding practice. The maintenance of appearance demonstrates the relative skill or dedication of the practitioner. Following Egoz et al. (2001), do some growers manage their farms/orchards towards achieving a particular 'look' or level of 'tidiness' of their farmscape? To what extent does this look impact on the environmental, economic or social sustainability of the farm/orchard?

Indicators of On-Farm Processes. The indicators to which farmers/orchardists refer are a practical demonstration of orientation (as discussed above). For example, biodiversity and soil microbiology would be more relevant indicators for farmers/orchardists with a stronger environmental orientation. By contrast, financial returns would be more relevant for the commercially oriented. Are the panels different in the kinds of indicators that growers use to signify environmental, economic or social health of their operation? How might such signifiers indicate a systems approach to farm management? Does it make a difference which feedbacks are being observed? Is the claim true that growers who observe more ecological feedbacks will be more sustainable?

Farm Management Approaches. Shared approaches to management among groups of farmers have been referred to as farming types or farming styles. The suggestion of such analyses is that it is possible to distinguish particular trajectories of farming practice and associated environmental, economic and social impacts. In this case, do the members of the panels differ across a range of farm management strategies, including: biodiversity management, risk evaluation, planning timelines, productivity and production strategies,

and soil fertility? Do such differences reflect shared understandings of and response to indicators? To what extent can such approaches explain the relative sustainability or resilience of the panels or sectors?

Social Capital in Relation to Management System. An alternative approach to the examination of the social networks (relations with other farmers, organisations, sources of information or other benefits, etc.) utilises the concept of social capital. The literature argues that greater social capital contributes to the sustainability and viability of a production system by providing a wider social set of references and support in dealing to systems shocks. Is there a marked difference in the social capital to which members of the various panels have access? Does a greater cognisance of sources of social capital contribute to the sustainability of a management system?

These social dimensions to farming activity and life, suggested in the social research literature as potential indicators of sustainable agriculture, will be addressed in this report as themes around which differentiation among ARGOS panels would be expected to occur. More specifically, we will evaluate the degree to which these are represented in differences between different market audit demarcated panels.

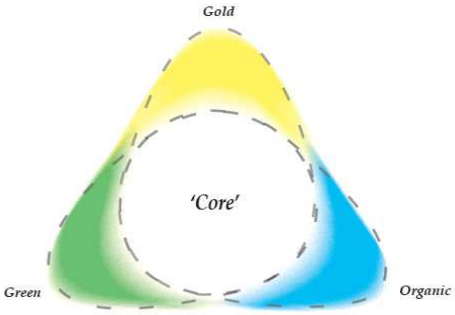
Preliminary ARGOS results and Ovoid Ideal Types

Having established the need to undertake comparisons between panels as the key guiding question of this report, an important clarification needs to be made. In an earlier report on qualitative interview data (Qual 1 Kiwifruit, Hunt, et al. 2005a), it was suggested that, in order to understand the social characteristics of different panels of orchardists, it was important to recognise that in many cases the similarities between the panels were just as instructive as the differences. In that report, a heuristic device was developed to try and account for how the farms differ. This was termed the 'ovoid ideal type', deriving from the Weberian concept of 'ideal types' to distinguish between social groups relevant to shared characteristics.

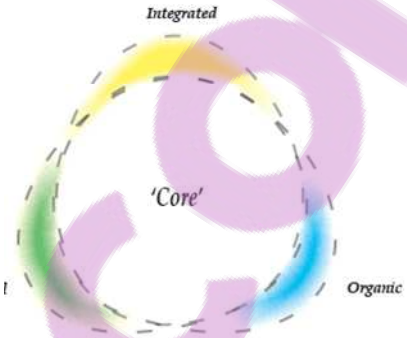
The ovoid ideal type provides a heuristic device that helps to explain our understanding of the data from the first qualitative interviews of farmers (see Qual 1 KF, Qual 1 S/B). This understanding addressed the important issue of whether the relationships and differences among the panels were more appropriately represented as a continuum of difference, or in multiple and non-linear ways. The significance of this question rests in distinguishing between early hypothetical models of how the panels were structured and the later ovoid model. The model used at the outset of the programme reflected the general hypothesis that the three panels would represent three different levels of 'green-ness'. For example, the Organic panel would represent the most environmentally engaged panel, the Green (as holding the most similar position to the Sheep/Beef Conventional) panel the least, and the Gold (as being comparable to Sheep/Beef Integrated) panel would mark a half-way point on this continuum. This perceptual model proved to be poorly equipped to explain the large extent of similarity among participants within a given sector. As a result, this early model was revised to an Ovoid model, as shown below. The bumps that extend from the core refer to the extent to which an individual's attraction to the underlying ideals of a specified management system might distort them from the core character of that sector. The diagram attempts to demonstrate the furthest differentiation observed, although not all representatives of a management system panel would necessarily be as distinctive from the core. In other words, in the Kiwifruit diagram the Green orchardists might be located anywhere within the green shaded area. The diagram further indicates that some might be more similar to Organic and others to Gold orchardists. This representation is a significant divergence from the original continuum model and has implications for the way in which panel difference is understood. The ovoid shape implies both that the panels have considerable shared practice and are indistinguishable across many criteria, but also that

the continuum is better understood as a triangle. In other words: in some cases, Organic and Conventional are more closely associated than either is with Integrated. Integrated does not, therefore, sit in the middle of a continuum.

Kiwifruit



Sheep/Beef



This point about the relationship between management systems will be re-examined in the conclusion of this report, once the findings of subsequent investigations have been evaluated in terms of their fit with the continuum or ovoid models. First, however, we will establish the integrity of the ARGOS panel distinctions (that is, provide justification for designating and assigning membership within the panels) based on the participants' responses to the 2005 National Farmer Survey.

Methods of social data collection

The methods employed in the collection of social data for the ARGOS research objectives ranged from those of a more qualitative, semi-structured interview to that of a formalised survey. The variety of methods were utilised in order to best collect different types of data and to facilitate the triangulation of findings within the social objective. Here, we will provide an overview of the methods employed in each study as an indication of the types of data and response that are available. The reports for each of the exercises provide a more detailed presentation and justification of the methods used in each specific case[10].

First qualitative interview (Qual 1): this was a semi-structured interview designed to gather baseline data across social dimensions of interest to the social, economic and environmental objectives of the ARGOS project. The interview included open-ended queries of participant identity, vision (for self and farm), wellbeing and indicators thereof (for self, family, community, economic and environmental condition) and expectations of participation in the project. Participants were also asked to create a map (referred to in this report as *sketch maps)* of their farm/orchard that included aspects important to their

[10] Each of the methods described in this section were applied in a uniform manner to the kiwifruit, sheep/beef and dairy sectors with three exceptions: 1) the first and second qualitative interviews were combined into a single interview for the dairy sector, involving the elimination both of less relevant topics and the sketch map exercise; 2) the causal mapping exercise was refined following its first use, resulting in a repeat engagement with kiwifruit orchardists noted below; 3) the climate change interviews were conducted only with the pastoral sectors due to the greater exposure of these farmers to the proposed greenhouse gas regulations. Finally, the qualitative interviews were not conducted with the high country farms resulting in the reduced reporting for that sector.

management practice. For both Qual 1 and Qual 2, the interviews were transcribed and then coded by themes using NVivo qualitative analysis software.

Second qualitative interview (Qual 2): this was also a semi-structured interview designed as a means to investigate participants' response to constraints (and enablers) on their management practice. The interview included open-ended questions that encouraged participants to describe constraints (grouped by their relationships to the environment, society, industry or inputs to management) and elaborate the effect of these on management strategies. The participants were also asked to identify the sources of information on which they relied and to indicate their response to innovation and change more generally.

Semi-structured climate change interview: this included a series of interviews with participants in the sheep/beef, dairy and high country sectors. It addressed topics related both to their level of awareness and to their acceptance of human causation of climate change as well as any efforts to adapt to it or to mitigate the greenhouse gases associated with pastoral production. Approximately one half of these interviews involved providing estimates of a farm's carbon liabilities under the proposed emissions trading scheme (ETS, as relevant in March 2008) as a potential driver for increased forestry planting on farms. The remainder of the interviews occurred subsequent to the postponement of the ETS by the National government elected in November 2008.

Causal mapping: this was a more structured exercise in which participants first, following Q methodology, identified the important factors in their farming/orcharding system. Subsequently, they mapped the relevant relationships between these factors. Factors were placed on a large sheet of paper and the relationships were then indicated by arrows (both uni and bi-directional) and weighted (on a scale of 1-10) as to their relative importance. The resulting maps were combined for each panel and assessed on the basis of number of factors and arrows including the relative importance of factors (their *centrality*, reflecting the number and weight of connections involving that factor) and the structure of the resulting maps. The kiwifruit orchardists completed the causal mapping exercise twice because the method was refined after its first application. The second application used the same method as for the other sectors.

National farmer surveys: ARGOS participants completed the same questionnaires used in national random sample surveys of New Zealand farmers and orchardists. These surveys included queries on various demographic characteristics and management intentions as well as attitudinal positions (using Likert scale responses) on a wide range of topics including assessments of the environment, farm practices and attitudes to nature. The differences discussed in this report reflect the responses of the ARGOS participants in the 2005 survey. Results from the larger sample in the national surveys are used more narrowly in order to confirm the wider implications of difference among ARGOS participants where relevant.

From the data gathered and analysed in association with each of these methods, we have identified numerous panel differences as well as significant similarities as discussed below. These findings are presented (by sector) in detail below and subsequently summarised in relation to themes that facilitate both an engagement with existing literature on the social dimensions of sustainable agriculture as well as a contribution to transdisciplinary reflection within the ARGOS project.

2. Identified ARGOS panel differences: kiwifruit sector

As noted above, members of the each of the kiwifruit panels employ a recognisably distinct suite of orchard management practices that augment the basic shared elements of kiwifruit orcharding. These differences are evident across the range of data sources, although the extent to which they contribute to panel differentiation varies as demonstrated for the kiwifruit sector in Table 1 showing the key panel effects across the methods used[11]. The purpose of this and similar tables for the sheep/beef and dairy sectors is to compare results across methods within each sector with an emphasis on patterns in the results rather than on the results themselves. Emphasis on the actual findings is confined to the text of the report. Throughout the process of design, implementation and analysis, the data have been grouped according to the various aspects of the orchardists' social life. In this report, we have structured our discussion to range from the personal characteristics of the participants to those elements defined through their interactions with wider social and physical environments, including their attitudes and subjectivity, the systems they manage, expressions of difference in their management practice and finally other differences that more directly involve off-farm and non-productive relationships. With reference to the overall sustainability or resilience of the kiwifruit sector, the significance of the individual differences identified in the following sections is not easy to determine. We do, however, offer a more informed statement about the patterns of social differentiation among the panels—including their implications for the relative sustainability of the panels—in the summary sections for each of the sectors.

Demographic characteristics

There is little to distinguish among the ARGOS kiwifruit panels based on the demographic characteristics of the participant orchardists.[12] For example, each of the panels includes a statistically similar range of age and education. They also consist of a similar distribution of orchardists from the range of lifecycle stages, although there appears to be a perceptual difference noted in the qualitative data whereby the Green orchardists are more likely to emphasise the orchard's role in their retirement planning (discussed below). The data collected in the national survey questionnaire do, by contrast, indicate some distinctions based on an orchardist's primary means of achieving ownership of the orchard. In this case, the distinctions correspond with qualitative data suggesting that the Organic orchardists include a larger number who are not from a farming background (less likely than Gold to rely on other agricultural income and more likely than Green to rely on non-farm earnings to obtain orchard). In addition, Green orchardists (being less dependent on inherited land) include a larger number who are not from an orcharding background than Gold. Interpretation of these differences is further influenced by the fact that (based on 2005 data) the Organic and Gold orchardists reported to have been on their current orchard for seven to eight years longer than their Green counterparts. This indicates that the Green orchardists are more likely to have taken up orcharding after a career elsewhere

[11] NB: Not all differences between panels have been included in the table. For the survey data only those differences that showed one panel as different from the other two were included. This simplifies the search for panel effects and emphasises the main effects. For the results from qualitative interviews and causal maps, all the differences were included. Listed in the left hand column are the methods used along with a brief reference to variables for which panel effects were found. The remaining columns include the panels. The columns include values for ratio and interval data (e.g., age), ordinal data (e.g., more or less innovation) and nominal data (e.g., the qualitative characteristics of the variable).

[12] This feature of the panel data is not dissimilar from data for similar groupings of orchardists in the national farmer survey—that is, the lack of differentiation likely holds for orchardists outside of the project as well.

Table 1: Differences for ARGOS orchardists in the kiwifruit sector

		Gold	Green	Organic
Surveyed Data	Years of association with orchard	16	8	17
	Intention to use organic methods	Weaker	Weaker	stronger
	Farming position (Commitment to Conventional or Organic)			Conform with Organic farming position
	Dependency			Less: chemical pesticides, fertilisers More: composts, organic remedies
	Prospects			Saw future prospects as less bright
	Staff	High: contractors, and permanent staff	Medium: contractors and owner	Mainly casual, family and owner
	Difference in sketch map features	Fewer houses	Prevailing wind	More streams and rivers
Causal	Emphasis in farm systems	Production expenditure. Information.	Quality and Quantity of Production. Contractors/packhouse. Fewer double arrows. Fewer connections	Decision making. Regulations. Govt policies. Off farm activities. Orchard environment health. Community.
	Emphasis in farm systems	Packhouse. Post harvest quality; Family needs	No distinctions	Orchard gate returns; Fertiliser and soil fertility; Satisfaction; Family needs; Vine health; Orchard environmental health
Qual 1 (all comparisons)	Environmental pro-activity	Active	Passive	Pro-active
	Innovation	More	Less	More
	Desirability of biodiversity		Birds	Soil, landscape
	Orchard look		More tidy	Untidy, diverse
	Working with nature	Believe in tech. solutions		Recognise natural limits
	Controlling nature	Vines out of control	Danger in nature	Work with nature
	Lifestyle	As commodity and amenity	Retirement objective	Based around home/orchard
	Symbolic qualities of fruit	Importance of taste and storability	Productivity	Health benefits, taste, storage
	Relative performance	To be the best	As good as other Green	As good as Green
	Urban rural tensions		Concern with visitors	Fewer issues; more subject to neighbours' actions
Qual 2	Knowledge sources	Progressive	ZESPRI, packhouses	Location & proximity to others
	Nature as constraint	More susceptible to wind, bird damage		Reliant on natural cooling,
	Attitude to other organisations, connections	More role for ZESPRI in innovation	Conform to industry	Stronger connection to grower org. (COKA), want better marketing, product differentiation.

and, as a group, have a lower level of experience with kiwifruit orcharding. The differences between the panels recorded in these latter characteristics provide some contextual explanation for the differences in the business orientations in the panels noted below. As a whole, however, any explanation of difference between panels will necessarily transcend the demographic characteristics of the panels. Thus, we argue that panel differences in the orchardists' demographic characteristics gain significance only as they reinforce findings from across the social methods and analyses.

Orchardist subjectivity and attitudes

In addition to demographic characteristics that describe the relative position of participating orchardists in recognised social categories, it is relevant to examine their more subjective self-assessments in order to achieve the ARGOS research objectives. Such assessments involve the construction of shared and emergent orcharding identities and the interactions of these identities with broader social and cultural structures (what social scientists would refer to as the orchardists' subjectivities). Such characteristics help to define the attitudes of the individual participants toward the environment, the practice of orcharding and other social actors. Due to the focus of the ARGOS project on the influence of factors associated with systems of food production, our observations of participants necessarily accentuate their roles as land managers operating within a system designed to produce a high quality food product. As a result, participants' off-farm relationships and broader community relationships have received limited attention in the social research to date. Furthermore, the existing emphasis within the project on orchard level factors has largely confined our analysis to the perspectives of orchardists without attributing comparable attention to the conditions and subjectivities located at the community or industry level. Despite this narrow focus, the data collected to date provide significant insight into the influence of the orchardists' subjectivity and attitudes on the sustainability and resilience of the sector. We will present aspects of these subjectivities that distinguish among the panels beginning with the orchardists' representations of their sources of esteem or stress, their sense of place on the orchards, the symbolic qualities they attach to the fruit produced and the means through which these factors are used in comparing themselves with peers. This is followed by a discussion of the orchardists' explanations of their relationship to a) the physical environment and nature; b) the kiwifruit industry; and c) the wider community.

Orchardist esteem, stress and satisfaction

The esteem that participants derived in their role as orchardists largely revolved around their participation in an industry with well-established standards for determining the acceptability of given management practices and the quality of the fruit produced. In many cases, compliance with the GlobalGAP (formerly EurepGAP) audit scheme provided a re-affirmation of the orchardist's identity as a producer of a premium product who employed practices which respected both environmental and social wellbeing. To the extent that it was perceived as testing the appropriateness of the individual orchardist's management, however, the audit was also a potential source of stress. A similarly double-edged assessment of kiwifruit quality—the Taste ZESPRI programme, which offers premiums on payments for fruit with higher dry matter levels—alternatively rewards orchardists able to meet standards while frustrating those (often with orchards located in more marginal production regions) who bemoan the lack of proven technologies for increasing dry matter in their own fruit.[13] Despite exhibiting a range of responses to both the EurepGAP audit

[13] It is, furthermore, noteworthy that the orchardists expressing the strongest negative response to EurepGAP can also be those most excited about building their own capacity to raise dry matter on their orchards.

and Taste ZESPRI in the interviews, however, the position of an individual orchardist was not associated with their panel membership. Thus, it is not possible to distinguish among the panels on the basis of the esteem or stress associated with external assessments of the orchardist's ability or the quality of their product.

A further aspect of the possible satisfaction that individuals draw from orcharding involves the lifestyle that they associate with the practice. While this lifestyle is often reflected in their visions of the future and business orientation (see below), here we refer to a more general feature of an orchardist's personal affinity with kiwifruit orcharding (both its practice and the social and environmental context of that practice). For example, it is possible to identify a positioning among the Gold orchardists that demonstrates a greater propensity to evaluate lifestyle as a commodity, largely valued in reference to the amenities it offers in regard to recreation and entertainment. The Gold orchardists would, thus, more likely identify the benefits of the climate for personal comfort, their proximity to the beach or the attributes of regional urban centres. They also gave more attention to off-orchard activities in their second causal map. For the Green orchardists, by contrast, the orchard and the practice of orcharding embodied a desirable lifestyle. Many in this panel engaged with orcharding as an aspect of their retirement objectives. For members of this panel, the orchard was viewed as holding both financial value (associated with land values) and the opportunity to remain active and choose the extent of their participation in orchard management. Finally, the Organic orchardists approached orcharding as a means to have a positive influence on the environment and society. For members of this panel, the practice of orcharding was often a means of achieving wider goals. In this case it is, therefore, possible to distinguish among the panels in such a manner that would suggest that those who employ organic practices are more likely to consciously attribute value to and take account of the relationships with society and the environment. By contrast, the Gold orchardists appear to separate these relationships from the act of orcharding and the Green orchardists are more likely to subsume them to considerations of financial stability.

Sense of place; bond to orchard

Also related to the lifestyle of orcharding is the orchardists' sense of place. This refers to the attachment that the individual forms to the orchard as a place to live, to recreate and with which to interact as well as from which to extract a product. As expected, this aspect of the orchardists' subjectivity is strongly akin to the source of satisfaction they find in the orcharding lifestyle. Thus, members of the organic panel often characterise their sense of place by describing the orchard as a haven for themselves and other humans, domesticated and wild animals as well as a variety of plants. Their orchard is a place that they want to inhabit and, often, the organic orchardists have included their home as an integral element of the orchard. This relationship to place was confirmed in the second set of causal maps, in which the orchard environment as a place to live was only included in the organic group map. The group map also showed that Organic orchardists gave more emphasis to satisfaction from orcharding, suggesting that the orchard was an environment which enhanced their sense of place. The Green orchardists are more likely to emphasise their ability to enjoy a rural setting for their eventual retirement home. The majority do have their houses on the orchard, but they do not necessarily view the residential space of their property as integral to the productive spaces. Members of the Gold panel are the most likely to perceive of the orchard solely as a workspace. This attitude toward the orchard likely reflects the fact that almost half of the ARGOS participants in this panel are managers of the orchard being analysed. Despite this, the Gold panel joined their Organic colleagues in more strongly integrating family needs into the overall orchard system in the second set of causal maps. The relative parameters of the sense of place expressed by each of the panels were also evident in the sketch maps drawn of their orchards in the first qualitative interview. In that exercise, the Organic and Green orchardists tended to include a greater number of features on their maps and the Organic were the most likely to have

included rivers or streams that either crossed the orchard or formed a property boundary. The maps of the Gold orchards, by contrast, were the least likely to include houses as a feature. Such differences may potentially contribute to explanations of variation among other aspects of the orchards (including both economic and environmental) to the extent that individuals incorporate a range of beneficial elements in their decisions regarding the management of an orchard.

Symbolic qualities of the product

In addition to imbuing orchards (as places) with meaning, the orchardists may also attach symbolic qualities to the kiwifruit that they produce. The application of symbolic qualities enables an alternative valorisation of their product that privileges it relative to similar ones. Thus, for the Organic orchardists, their kiwifruit embodies health and environmental benefits that are realised in distant markets as well as locally, regionally and nationally. They also claim that their fruit has a better taste profile than non-organic fruit whether or not this is confirmed by tests such as dry matter levels and storage life. The Gold orchardists are more likely to emphasise the importance of industry measures (dry matter, reject rates and storage quality)—qualities that are rewarded by means of payment incentives—as symbolic of their fruit's quality. Better performance relative to these measures is perceived to provide a higher quality, better tasting product for consumers. Among members of the Green panel, the capacity to produce large quantities of consistently good quality fruit assumes more emphasis in this regard. In comparison to the Organic panel, the symbolic qualities attributed to the kiwifruit produced by members of the other panels are more likely to reflect the level of an individual's capabilities (as opposed to those of a management system). These differences may again contribute to explanations of variation in the extent to which environmental considerations and individual competition on the basis of production criteria form an important aspect of management decisions.

Peer comparisons

As noted in the discussion of the symbolic qualities of kiwifruit production, peer comparisons are an important feature in the orchardists' subjectivity. The tendency to focus on relative performance is enhanced through the feedback orchardists receive from ZESPRI on production indicators within the sector. Orchardists from all the panels utilise this information as a means of benchmarking their management against that of their peers. The specific focus of such comparison does, however, vary among the panels. For instance, members of the Green panel generally expressed the desire to maintain production within the more productive band for all Green producers. By comparison, the Gold orchardists expected to be among the most productive and have the highest dry matter among their colleagues. They also took great pride in their abilities to work with a more challenging and demanding plant, an assumption of risk that set them apart from those who grew green kiwifruit exclusively. The Organic orchardists incorporated a yet different approach to such benchmarking by stating a desire to achieve production at levels comparable to their Green counterparts. This attitude reflected the intention of many of the Organic orchardists to prove the value of organic practice by demonstrating that it was capable of achieving similar productivity to more conventional practices.

Environment and nature

The panels of kiwifruit orchardists in the ARGOS project can be distinguished by various aspects of their positioning with regard to the physical environment of the orchard and nature more generally. A commonly recognised distinction in the social sciences involves the extent to which an individual or social group positions itself either as a part of or as separate from nature (i.e., the *nature/culture binary*). This binary is evident in the first qualitative interview in which orchardists either represent the activity of orchard management as an example of *working with nature* or an expression of the need to *control nature* as an actor separate from it. The former position is most commonly stated by

members of the Organic panel who recognise and adapt to natural limits on production. This is also evident in their more limited use of external inputs and their aversion to the use of GMOs as indicated in the survey responses. The Gold orchardists, by contrast, express a stronger belief in the potential of technological solutions to problems associated with production. In discussing their approach to the orchard, they further represent their management objectives as involving the domestication of vines that threaten to become *out of control* relative to the Hayward variety. The Green orchardists also express a greater need to control nature. Their position is most evident in their emphasis on tidiness as an objective of orchard management. This practice suggests that uncontrolled nature was to be feared, an attitude that is further demonstrated in their identification of gullies and bush as the source of unwanted and bad impacts on management. An interesting comparison between Organic and Green orchardists is found in the first causal maps data in which the former panel places more emphasis on the role of the decision maker in orchard management. This distinction suggests that the Organic panel feels less subject to influences that are beyond their capacity to negotiate.

Differences in other aspects of the orchardists' perception of the role of nature and ecology in production discussed in the first qualitative interview are also noteworthy. For example, both Organic and Green orchardists indicated that enhanced biodiversity was a feature of good management practice. The Organic orchardists generally associated such benefits with diversity in the orcharding landscape as a whole, including surrounding areas of bush and waterways (noted in the sketch maps) as well as shelterbelts and wetlands on their orchards. They were also more likely to refer to soil as a biotic feature requiring management that encouraged macro- and micro-organisms. As a result of such attitudes, the Organic panel exhibited a greater acceptance of less tidy (and presumably more diverse) orchards as indicators of appropriate management within the panel. The Green orchardists, by contrast, emphasised the increased presence of birds since adopting reduced spray regimes as an aspect of biodiversity on their orchards while maintaining a tidier orchard. Further evidence of these differences is found in both sets of causal map results in which the Gold and Green orchardists were statistically less likely than their Organic counterparts to emphasise environmental health as an important influence on orchard management.

In order to develop an alternative classification of the orchardists on the basis of their interaction with the physical environment, each orchardist was assessed according to their relative level of *proactivity* toward nature as indicated within the first qualitative interview. Using this metric, orchardists were assigned a code from zero to three (corresponding to a range of no indication of environmental activity, to passive, active and proactive approaches, the latter defined as the pursuit of environmentally beneficial actions that extended beyond the boundaries of the orchard block and, in some cases, the property). The members of the Organic panel proved to be the most proactive with seven proactive, three active and two passive orchardists. By comparison, the Gold and Green orchardists were more likely to demonstrate active (six and four, respectively) or passive (three and six) responses.[14] This assessment reaffirms earlier findings that the Organic orchardists appear more likely to include concerns for the physical environment in their management decisions.

Further insight to the orchardists' engagement with nature emerged in the second qualitative interview in which nature was discussed as a possible constraint on orchard management. While differences were noted among the panels, these also reflected factors associated with the location of an orchard, its exposure to wind and frost and local

[14] The remaining orchards in each panel were proactive (three Gold and two Green) with none of the interviewed orchardists receiving a score of zero.

edaphic conditions. The relevance of such variation may be more evident when compared with data collected by the ARGOS environmental objective. For example, the gold kiwifruit is more susceptible to wind damage and its buds are a more favoured target of birds during the spring. Such factors suggest that Gold orchardists may have a different approach to shelterbelt management (and, perhaps, a greater predilection toward the use of artificial shelter) and a distinct knowledge of bird species or types distinguished by their on-orchard activities. In the case of organic management practices, orchardists have more limited capacity to affect bud break on their vines and must source 'alternative' products to enhance soil fertility. Both of these factors may have more pronounced locational effects, providing greater resilience where environmental conditions favour kiwifruit production (sites with sufficient winter cooling or with more fertile soils) or severely limiting the viability of orcharding where climate or soil is a limiting factor of production.

A final aspect of the orchardists' relation to the environment by which the ARGOS panels can be differentiated involves an individual's perception of the potential consequences of management practice on the environment. The data for this comparison are taken from the orchardists' responses in the 2005 survey. Once again, the Organic panel proved to be distinct from the Green panel being statistically more likely to see human impacts as potentially harmful to the environment and less likely to believe that human ingenuity would provide solutions to negative impacts of human action. These attitudes closely correspond with many of the other differences noted in this section and suggest that positioning relative to the environment is a principal distinguishing characteristic of Organic orchardists.

Positioning relative to the kiwifruit industry

Among other influences on kiwifruit orcharding, the orchardists frequently referred to their relationship with ZESPRI and other actors in the kiwifruit industry. All of the orchardists demonstrated a good awareness of the consumers of their kiwifruit and the demands that these placed on their product, although a small number did question the validity of such standards and the uniformity of their application. At the time of the second qualitative interview, the orchardists' attitudes toward the industry largely involved their responses to the two programmes noted in the discussion of grower esteem—GlobalGAP and Taste ZESPRI—both of which are designed to raise the quality of their fruit from the perspective of international markets. There were, however, additional vectors of difference among the panels. In regard to their relationship with ZESPRI, the Organic orchardists sought greater differentiation of their product from the non-organic kiwifruit marketed by the organisation. Several claimed that marketing of the latter as residue-free fruit limited the potential to market the health benefits of organic fruit. The greater level of concern over the marketing potential of kiwifruit felt by the Organic orchardists is also demonstrated in a significantly lower rating of their future prospects in the survey results. By contrast, the Gold orchardists were most likely to rely on ZESPRI as the driver of innovation in the sector, often referring to the development of additional kiwifruit varieties. The second causal map results showed that Gold orchardists recognised a greater role for packhouse and post harvest quality. reflecting the greater importance of these factors in the processing of the more perishable gold kiwifruit. The Green orchardists, except for those in marginal areas prone to low dry matter fruit, appeared the most comfortable with the conditions in the industry. A final difference is evident in the generally stronger connections with COKA (Certified Organic Kiwifruit Association) demonstrated by the Organic orchardists in comparison to that of the other panels with KGI (New Zealand Kiwifruit Growers Inc.). It is likely that the differences among the panels in regard to positioning relative to the industry will gain more relevance when combined with the economic data collected by the ARGOS economics objective.

Positioning relative to society

In addition to their respective positioning relative to the kiwifruit industry, the kiwifruit panels also demonstrated differences in regard to their relationships with a wider society. More specifically, in the qualitative interviews the Organic orchardists voiced fewer issues or concerns regarding their own impact on neighbours (e.g., in regard to the drift of sprays) but also indicated that they were more subject to the actions of orcharding neighbours that might compromise their organic status. The Green orchardists, for their part, expressed greater concern over the potential negative impact of visitors to the orchard, including destruction of property or theft. This latter position likely reflects the fact that most of the Green orchardists had their place of residence on the orchard property.

Further differences were also evident in the causal maps drawn by the orchardists which showed the relative emphasis that individuals and the panels gave to aspects of management originating off the property. For example, the first causal map results show that the Organic orchardists placed more emphasis on the influence of regulations than the Green panel and more on government policies than either Green or Gold panels. In combination with their environmental orientation, this suggests that Organic orchardists may be more open to the need for and compliance with environmental regulations. In addition, the Green panel emphasised the effect of off-farm activities and the community less than the Organic panel. These results may reflect the fact that many of the participating Green orchardists are *in-comers* to their local communities. While these differences point to varying levels of interaction, confidence and security within their communities among the orchardists, there is no theoretical basis from which to suggest that they are related to economic or environmental aspects of sustainability.

Learning and networks

A group of factors that demonstrates significant variation among the panels involves the orchardists' positioning in regard to innovation and learning as well as their preferred sources of information. Indicative of their position as less numerous and more recent alternative elements of the kiwifruit sector, both the Organic and Gold orchardists tend to be more innovative in their management practice. Both panels more frequently reported (in the second qualitative interview) their experimentation with alternative practices. Organic orchardists commonly tried alternative inputs in order to improve bud break and soil fertility while the Gold orchardists were more likely to seek out and test alternative pruning practices and experiment with artificial shelter. By comparison, the Green orchardists appear much more 'comfortable' with existing parameters and methods of production. (A similar distinction is noted in the discussion of risk below.)

The sources of knowledge which the orchardists utilise also provide some means for distinguishing between the kiwifruit panels. For all of the panels, neighbouring orchards or orchardists who are recognised as good managers are seen as important sources of insight. Most also claimed to have attended field days or workshops held either by ZESPRI or by the packhouse that they supplied. Access to these activities is potentially limited for Organic orchardists, especially those located further from established centres of production near Tauranga and Te Puke. Much as they engage in more innovation, the Gold orchardists are also more proactive in pursuing knowledge, encouraged both by the relatively weak understanding of gold kiwifruit production and the high payment incentives for dry matter. This trait is also evident in the first causal maps in which the Gold panel placed greater emphasis on information than the Green panel.

Expression of difference in management actions

In addition to providing insight to the subjectivity and positioning of the orchardists, the data collected by the social research objective also identified variations in their management actions. While not including actual observation of management practice, the

various social methods did extract indications of the effects of the orchardists' subjectivity on their approach to managing the orchard. Thus, the individual orchardists referred to overall objectives of their management that they used to justify particular sets of action. Considering the data collected to date, we are able to identify two axes of differentiation among the orchardists based on their relative emphasis on productivity as an outcome and their relative willingness to engage in the risks associated with alternative or innovative practice.

Productivity/productivism

The social science literature on sustainable agriculture in Europe includes a strong focus on the extent to which productivity objectives (or productivism) dominate the management orientation of agricultural producers (Burton and Wilson 2006, Burton 2004, Setton 2004, Silvasti 2003). In this body of literature, those producers who more fully incorporate such goals are regarded as less likely to recognise or consider environmental constraints on production. In this regard, it is possible to distinguish between the causal maps (from the first mapping exercise) of the Green panel, which place a greater emphasis on production compared to the Organic panel, and those of the Gold and Organic panels, which are more likely to emphasise production expenditure. This suggests that the latter panels more readily acknowledged limitations on their pursuit of higher production. Further evidence of differences in the emphasis on production is found in the orchardists' strategies for improving the dry matter levels in their fruit, although panel differences here may reflect the incentive structure (higher for the product of the Gold and Organic panels in comparison to that of the Green panel) of the Taste ZESPRI programme. Finally, to the extent that adoption of organic practice involves an acceptance of lower production targets, the Organic panel is less likely to allow productivism to dominate their management decisions (as indicated by their significantly greater commitment to other management practices in their responses to the questionnaire used in the 2005 national survey). These findings provide an interesting comparison in the types of benchmarking incorporated by the various panels as noted in the first qualitative interview and discussed above. The orchardists' positioning relative to the production statistics published by ZESPRI suggest that members of the Green panel are more willing to be among an upper level of producers, whereas the Gold and Organic orchardists saw greater production (relative to peers or to non-organic orchardists, respectively) as a challenge. As a result, it is difficult to distinguish a linear axis of differentiation relative to production in the kiwifruit sector without reference to data on orchard management practice and economic expenditure collected outside the social research objective.

Risk, innovation, and challenges

The relative tolerance for and willingness to engage in innovative or alternative practice expressed by members of the panels has already been discussed above. Here we interpret such responses through the lens of risk, noting that risk can involve a potential decline in social status or environmental wellbeing as well as the individual's financial situation. To the extent that individuals are risk averse in any of these dimensions, they may construct more brittle (less resilient) management systems. If risk aversion involves the inclusion of redundancy in orchard management, however, more resilient systems may also result.

While alternative practices involve social risk (e.g., the association of organic practice with a 'green' political position), there appears to be a less marked assumption of risk in the kiwifruit compared to the sheep/beef sector (see below) in New Zealand. This likely reflects the fact that both organic and IPM practices have been normalised in the sector. Where orchardists indicated the limiting factor in their consideration of conversion to organic practices, they overwhelmingly identified lower production (due to the lack of access to chemicals such as HiCane and fertilisers) and associated financial risks. Early

adopters of the gold Hort 16A variety also referred to the financial risk of their investment in a product that lacked a proven market. Many in the Gold panel maintain a similar acceptance of financial risk in regard to management innovations involving alternative support structures, new pruning techniques and novel applications of artificial shelter. Thus, differentiation along a risk axis among the orchardists is limited to that between the more innovative Gold and Organic panels in comparison to the Green panel noted above. Between the Gold and Organic orchardists, the former were more likely to pursue innovations requiring an investment of capital.

Summary of Kiwifruit

The panel differences identified among the kiwifruit orchardists participating in ARGOS indicate several avenues of inquiry that contribute to the analysis of the comparative sustainability of the management practices they employ. We suggest that these avenues coalesce around broader themes, many of which parallel existing approaches to agricultural sustainability utilised in the social science literature. In contrast to the preceding presentation of specific differences between panels identified above, here we present the foundations of what may become more coherent explanatory frameworks, especially when eventually combined with research on the economic and environmental aspects of orchard management. The order in which the themes are presented follows a similar pattern to that used above beginning with factors involving the individual perspectives, attitudes and approaches of the orchardists and moving to relations with increasingly external influences on orchard management.

From the differences noted in the orchardists' subjectivities and attitudes, it is possible to designate two themes: *breadth of view* and *good farming*. The first theme involves the distinctions between the Organic and the other two panels—specifically their vision for the future and discussion of environmental and personal wellbeing in the first qualitative interview, the identification of intangible fruit qualities in both qualitative interviews and their reported participation in COKA from the survey. We argue that in each of these aspects, the Organic orchardists express greater awareness of and devote greater consideration to broader scale landscape and societal factors in developing their management systems. As such, the Organic orchardists may be more likely to adopt alternative practices on the basis of their environmental or societal benefits. The theme of *good farming* is more common in the existing social science literature and refers to an individual's concept of acceptable practice and their justification of these practices. In this case, it is possible to identify distinguishing characteristics of good farming among the panels.[15] The concept of good farming held by the Organic panel is distinguished by similar factors to that noted in their breadth of view. In addition, they are less committed to maintaining a tidy orchard, preferring to encourage biodiversity by means of more animal-friendly sward and shelterbelt environments. For the Green orchardists, by comparison, the tidiness of the orchard is a principal indicator of good farming as is production comparable to their peers and the presence of a numerous and diverse array of bird species. Environmental criteria are less evident in the representation of good farming found in the data from the Gold panel. For the latter group, the demonstration of innovative practice in pruning, shelter management and vine support structures is a more important indicator of good management. The expected reward for these efforts is increasing dry matter levels and production from their orchard, both of which are rewarded with incentives from ZESPRI.

[15] As we have noted in previous reports, the participants in both the kiwifruit and sheep/beef sectors have a greater number of shared aspects than differences in the understandings of good farming. For the purposes of this report—identifying differences among panels—we focus only on those aspects of good farming that distinguish one panel from the other two.

The differences among the kiwifruit panels in relation to breadth of view and good farming suggest that members of the panels hold diverse palettes of acceptable practices. The Green orchardists, for example, appear to maintain a more restricted set of management options, relying on established guidelines and not as actively pursuing innovation. Generally, they consider alternative practices as viable only once these have been proven in trials and are recommended by either ZESPRI or their packhouse. The Gold orchardists expand their options through their pursuit of innovation with the goal of improving the productivity of the gold vines. This pursuit is, however, limited by its tendency to focus on orchard oriented objectives such as the productivity of the vines and the efficiency of shelterbelts. The Organic orchardists exhibit perhaps the greatest range of options, actively pursuing innovations to improve the organic product while referring to broader social and environmental implications of their practice. The Organic orchardists, however, also recognise the most restrictive audit criteria which exclude a suite of practices based on chemical treatments. The underlying tenets of resilience as a means to pursue sustainability assert that resilience is enhanced through access to a wider array of options. Thus, for the kiwifruit sector, the social data provide some evidence to suggest that the panels could be ordered from least to most resilient: Green, Gold, Organic. This statement does not, however, necessarily apply in reference to all potential shocks to kiwifruit production, some of which likely advantage a more conservative approach to innovation or change in practice.

Another avenue of notable means of differentiation among the kiwifruit panels involves their respective interactions with the environment. The assessment of this avenue refers to groups of responses relevant to the orchardists' positioning in regard to the environment, the environmental feedbacks to which they respond and the resultant features of their management systems. From the perspective of *environmental positioning*, the Organic panel consistently demonstrated a greater level of interaction with environmental features, being more proactive in their engagement with the environment, seeking to create a haven for diverse life forms on the orchard and stating greater awareness of their position as part of natural systems. It is more difficult to differentiate between the Green and Gold panels from this perspective, although the former is more passive and the latter more active in their engagement with the environment. The relative environmental positioning of the three kiwifruit panels reflects arguments referring to breadth of view above. In this case, members of the Organic panel are expected to place greater weight (in comparison to the other orchardists) on environmental relative to economic justifications of acceptable practice—thereby increasing the likelihood of environmentally sustainable management. Such a predisposition does not, however, necessarily lead to measurable differences in environmental impact.

Further differentiation may be made between the panels with reference to the *feedbacks* to which they respond in their management systems. These feedbacks include a range of indicators to which the orchardists refer in assessing the current state of their properties. For example, the 'look' of the orchard signifies the wellbeing of its environmental, economic and social states. For the Green panel a tidier orchard (referring to all of its elements: vines, structures, sward, shelter, buildings, etc.) provides evidence of the owner's attention to detail and capacity to control external impacts on production. For these orchardists, the association between the pursuit of a tidy orchard and good farming is reinforced by the perception that their management contributes to an increasing number of birds that inhabit their orchards. The appearance of the orchard appears to be a stronger signifier of a healthy management system than its production, which is of secondary importance as long as targeted returns are achieved. By comparison, the Gold panel are more likely to refer to indicators that are more directly related to production: attention is more narrowly focused on the vines (pruning to combat the vigour of the vine, which contributes to fruit size and dry matter); achieving better production statistics than colleagues is an important endeavour; and biodiversity does not appear to enter

assessments of management, except where birds are identified as pests that damage buds on the vines. Finally, the Organic panel respond to a unique set of feedbacks that privilege indicators of biodiversity—as is evident in a busy orchard (less tidy; more noisy; healthy smell)—over those of production (production indicators are only important in establishing competitive potential of organic relative to more conventional management practices). These panel differences identify the relative attention that orchardists pay to diverse features of their production systems. The relevance of such differences for sustainable agriculture will become apparent to the extent that the distinctive feedbacks help to explain any economic or environmental differences between the panels.

Due in part to their varying attention to system features and feedbacks, orchardists in each of the panels identify and respond to distinct sets of incentives when developing their *farm* (orchard) *management approaches*. In this case we suggest that, despite the basic shared practices of orchard management, individual orchardists will strategically employ practices that conform to their management objectives. Thus this theme incorporates such differences as: a) the greater reliance on family and casual labour and the cooperative development of knowledge and skills among the Organic orchardists; b) the greater production orientation, the propensity to live on the orchard and reliance on proven practices among Green orchardists; and c) the stronger business orientation, greater involvement of managed orchards and tendency towards self-driven innovation in vine management among the Gold orchardists. The differences between the panels indicate several areas of greater or weaker flexibility of management, including dependence on positive labour relations, potential creativity in responding to system shocks and the capacity to incorporate environmental concerns within management decisions. As a whole, such management differences also define a distinct, but difficult to elaborate, *scope of control* realised by each panel: a) the Green orchardists appear to assume that the kiwifruit orchard is subject to almost absolute control (there is or should be a management solution for any problem, preferably devised by the packhouse or ZESPRI); b) the Gold orchardists demonstrate a perception that, by creatively controlling the gold vines, they can achieve desired ends—thus, the importance of having the orchards show signs of their innovativeness; and c) the Organic orchardists engage in a controlled proliferation of biodiversity that is capable of enduring wilder actions by the ‘accepted’ elements of the system. The relevance of these distinctive panel characteristics to the sustainability or resilience of orchard management will likely depend on the specific pressures the sector faces at any particular time. All involve strategies designed to deal to aspects of orchard management that are considered a particular challenge of the system employed. Thus, based on the persistence of each panel, they demonstrate some level of resilience to changing regulatory, economic and environmental conditions. Similarly, however, it is possible to identify potential elements of brittleness in each: the apparent inflexibility of proven practice, including a reliance on hydrogen cyanamide; the limitations on management options posed by organic certification criteria; or the risks of innovation in managing at the edge of production and quality. Furthermore, members of all of the panels demonstrated a desire to exert control over their orchards, albeit with some relative laxity amongst the organic orchardists.

The final avenue of variation among the kiwifruit panels consists of their interactions with a wider society. Here we refer to differences in the *on and off-farm relationships* of the orchardists, including the orchardists’ responses to innovation and risk. Again, in their relationships with society, the Organic panel differs somewhat from the other panels taking both a broader view of community (noted above) and perceiving themselves as providing a beneficial environment for their neighbours while emphasising the importance of family life within the orchard experience. On the other hand, they tend more toward self-reliance with higher levels of owner and family labour in the management system. The greatest contrast to the Organic panel from this perspective appears to be the Gold panel which includes more managed properties, relies more heavily on contracted and permanent labour and

has a stronger business orientation. The differences between the Organic and Gold panels (as well as those noted in the feedbacks above) do not result in strong panel effects in regard to the orchardists' approaches to innovation and risk taking. In this regard, it is the Green panel that demonstrates a distinctively low level of innovativeness. Overall, these differences suggest that members of the Organic panel are more likely to take account of social issues or concerns in their management approaches. As a result of this characteristic, the Organic orchardists may be more resilient in the face of demands for more stringent social or environmental criteria driven by consumers in export markets.

The differences in social dimensions identified among the kiwifruit panels fail to identify any of the management systems as optimal to the exclusion of the others. A more accurate assessment suggests that the interactions among the different management systems may better explain the current resilience of the sector. The differences between panels provide evidence that there is a wide diversity of 'acceptable' practices which contribute to the overall goal of producing fruit that meets the standards required for an international market. The management systems associated with each panel enable the orchardists to achieve additional objectives (e.g., environmental benefits, greater certainty of production, challenge and opportunity to innovate) which make them more attractive to individual orchardists. The current strength of the sector suggests that kiwifruit orcharding is accessible to a wide range of 'identities' as people entering it are likely to come from diverse backgrounds and therefore institute into their practices innovation derived from their earlier enterprises. In addition, there is evidence of significant levels of redundancy in the sector expressed in the acceptance of the apportioning of payouts (as mediated by Zespri) and the willingness and capacity to learn from the experiences of orchardists engaging in other management systems.

3. Identified ARGOS panel differences: sheep/beef sector

As in the kiwifruit sector, it is possible to identify a range of differences among the ARGOS panels for the sheep/beef sector as demonstrated in Table 2.[16]

Demographic characteristics

The data collected on a range of demographic characteristics for the sheep/beef farmers indicates a similarly limited capacity to differentiate among panels as found in the kiwifruit sector. Overall, the Integrated panel is younger but not at a statistically significant level (mean of 45 compared with 48 for Conventional and Organic). The variation in ages reported for the Integrated panel (from 27 to 57 years of age, compared with 40 to 56 for Conventional and 38 to 57 for Organic) largely accounts for this age difference. In regard to their respective lifecycle stages, all except one household included married couples or partners, and nearly all had children living with them. Organic farmers had spent slightly less (but not significantly so) time on the farm (18 years cf. 21 for Conventional and 24 for Integrated). Each panel included a similar range of educational attainment and nearly all of the farmers were from a farming background, with at least half in each panel living on the family farm. The outstanding significant difference was that the Organic farmers were more likely to have moved a further distance to the farm (31% more than 100 km away) than members of the other panels. As with the kiwifruit sector, the overwhelming lack of significant differences evident in the demographic characteristics suggests that they will contribute minimally to the explanation of differences among the management panels.

Farmer subjectivity and attitudes

The sheep/beef farmers demonstrated a similar range of subjectivities and attitudes relative to their social and physical environments to those of the kiwifruit orchardists. Similar to the reporting on the latter sector, differences in this section are elaborated in order of the extent and scale of interaction with external management factors, both on and off the farms. In addition, the available data are similarly limited to the perspective of the farm households without comparable input from other social actors.

Farmer esteem, stress, satisfaction, identity

Among the sheep/beef farmers (and in comparison to the kiwifruit orchardists) esteem was less uniformly associated with the relationship of an individual to the processing industry. By contrast, it tended to more explicitly reflect their role within the New Zealand society and economy. For example, while all of the panels demonstrated a proclivity to benchmark the production of individual farmers with that of colleagues, the Conventional farmers were more likely to compare their performance with that of other sectors of society. As such, farmer esteem is subject to public assessments of farming and the influence of non-farmers' perceptions of observed practices. All of the farmers also shared a strong identity as dry stock, pastoral farmers, with many of them sharply demarcating their sector from that of dairying. Furthermore, because the sheep/beef panels are the result of more voluntary assignment criteria (i.e., compliance with non-mandatory market audit schemes) in comparison to the kiwifruit panels, an individual's membership in a panel more strongly reflects the state of their relationship with the industry and the sense of satisfaction they are able to derive in reference to such relationships. Thus, as is evident in the second qualitative interview, the Organic and the Integrated farmers overwhelmingly include those with a demonstrated capacity to meet the timing, weight and fat cover stipulations of procurement contracts. This is especially true of the latter group who have

[16] See footnote 7 for an explanation of the table and the nature and structure of its content.

Table 2: Differences for ARGOS farmers in the sheep/beef sector.

		Conventional	Integrated	Organic
Survey	Intentions			Stronger: use organic methods, integrated methods, listed management systems and not to use GMO's
	Farming position (Commitment to Conventional or Organic)			Conform to organic farming position
	Dependency			Less: synthetic pesticides/fertilisers More: organic remedies
	Evaluation of environment			Lower rating of condition of native species five years ago
	Organic practices			More importance to two organic practices
	Sketch maps	Location differences		
Causal maps	Emphasise in farm systems: Location differences	Customer requirements, marketing and processing organisation, weed & pest management	Advisors/consultants, farm working expenses, Quality and quantity of production	Customer requirements, off-farm product quality, farm environment health, fertiliser and soil fertility health. Higher map density (connections/variables^2) and hierarchy (cf. Integrated only)
Qual 1 (all comparisons)	Environmental pro-activity	Active	Active	Proactive
	Identity, stress and coping	Feel more trapped	More likely to take time off	
	Emphasis on succession	More	Less	Less
	Sense of place	Farm as lifestyle	Farm as space	Farm as space
	Sense of distinction (elite)	Lower	Higher	Lower
	Urban-rural tensions	Concerned about deterioration	Public service commitment	Broader sense of community, stronger commitment
	Emphasis on environmental indicators of good farming	Low	Medium	High: Emphasise soil biota. Avoid chemicals
	Economic indicators of good farming (non strong)	High	Medium	Low

Qual 2 (all comparisons)	Incorporation of paperwork into idea of good farming	Low	High	High
	Coping with contracts	(Medium)	High	(Medium)
	Soil			Greater emphasis on soil and soil biota
	Attitude to other organisations, connections	Stronger references to community	More positive about industry than conventional	Cognisant of consumer preferences
	Risk/challenge	Familiarity of practice	Pursuit of challenge	Pursuit of challenge

often been selected by stock agents as preferred clients based on such history. Because meeting the tighter timing criteria often requires greater management control, these farmers appear more willing to test the environmental limitations on production in their efforts to meet contract demands. The Conventional farmers, by contrast, tend to emphasise the extent to which they farm within such constraints and attribute weaknesses in the sector to low international prices, the high exchange rate and in some cases abuses within the industry. These attitudes are similarly reflected in the farmers' approach to audit schemes attached to the contracts with the Organic and Integrated panels less likely to perceive the audits to be excessive impositions.

Besides differentiating among the farmers on the basis of their positioning within the sheep/beef industry, the more stringent audit schemes (organic certification and quality assurance programmes) appear to influence the relative sense of empowerment held by each panel. In other words, the extent to which farmers have been able to successfully pursue management strategies that involve a more active engagement with the market appears to affect the levels of stress to which they are exposed. Both Organic and Integrated farmers associate the price premiums earned through their audit compliance with a stronger position vis-à-vis the market. This perception is reinforced by the positive public recognition (albeit that of a market niche) of the 'higher' quality of their products. By committing only a portion of their production to more demanding contracts, the Integrated farmers appear to employ these as a means of strategically diversifying their income streams and production objectives. The Conventional panel, by comparison, has a greater tendency to feel besieged by changing public perceptions of their role in the New Zealand society and economy, including questions about the environmental and animal welfare practices of the sector. The latter also identify perseverance—as opposed to creativity or adaptability—as their greatest asset in the face of difficult conditions, whether environmental, social or economic.

Data from the first qualitative interview suggest that differences between panels extend to issues of lifestyle as well. Similar to their response to the industry and society, members of the Conventional panel are more likely to feel trapped by their role as farmers. As such, they were most likely to represent themselves as burdened by problems of farming, which inhibited their capacity to commit time to their families or to take holidays. While such issues were a source of conflict for farm households in each of the panels, they appeared more consistently among the Conventional farmers. The Integrated farmers, in particular, were more likely to take time off from farming. Finally, the interviews also indicated that there was more emphasis on and worries about the process of succession (both current and, in some cases, future) in the Conventional panel.

Sense of place; bond to land

As a whole, the sheep/beef farmers across the panels demonstrate a similar sense of place. Nearly all of them, in some form, expressed their belonging to and interacting with the land and none failed to demonstrate a complete lack of attachment to place. A subtle difference involving the farmers' representations of their farms did, however, emerge in the first qualitative interview. Within the Organic and Integrated panels the farm is conceived as a particular locale, occupying a given space. The Conventional farmers, by contrast, were more likely to emphasise social factors of farming and to attribute greater lifestyle values to farming. For all of the panels, however, the farmers' attachment to their farm is often translated into a capacity to sense when all is well with the land, although data from the national farmer survey suggest that this relationship to the land is not understood to assume mystic or mysterious qualities. In the second qualitative interview, several farmers also acknowledged the essential role of the continued interaction with a particular landscape in increasing the depth of their sense of place. This latter factor is, however, more likely to differentiate among farmers on the basis of the duration of residence on a given farm than according to panel membership.

Symbolic qualities of the product

Reference to the symbolic qualities of their product reflects the positioning of the farmers relative to the sector more generally. The Conventional farmers are prone to view their production as a pillar of the New Zealand economy rather than incorporating particular characteristics. From their perspective, New Zealand meat embodies their contribution to a thriving society and strong economy, but seldom involves direct references to its qualities as a marketed item. Both the Organic and the Integrated farmers, in comparison, attach additional qualities to the meat from their farms that are the direct result of their personal efforts and skill—they are able to taste the difference between their product and that of other farmers. As with the kiwifruit sector, the Organic farmers also attach social and environmental attributes to their product that contribute to the overall quality of the product from the perspective of the consumer. For the latter two groups, the value of these qualities is reinforced through positive interactions with retailers and consumers.

Peer comparisons

Comparisons—with peers, other farming sectors, other professions, other countries, etc.—represent a very prominent feature of the farmers' subjectivities as expressed in the first qualitative interview. Similar to the kiwifruit panels, most of the farmers benchmark their own performance against that of other farms, with lambing percentage being the most commonly used measure. The capacity to engage in such assessments is more limited, however, as the farmers have less access than do kiwifruit orchardists or dairy farmers to types of production information that facilitated direct comparisons within the sector. Despite this situation, benchmarking remains a very important element of the farmers' self-worth, the better farmer being able to encourage greater production from the property. It is noteworthy in this regard that most of the farmers are reported to consider themselves among the top ten percent of producers in the sector. The logic of these claims is facilitated by the farmers' reference to environmental, capital or land constraints that limit an individual's production capacity and, thus, justify their relative productive capacity. Differences between panels are evident with the Integrated farmers assuming an (self-ascribed) elite status among suppliers to a given processing firm as a result of increased interactions with firm representatives. The Organic panel generally emphasises its lower costs, the symbolic qualities of the organic product and their environmental practices when comparing themselves to non-organic peers. The Conventional panel is more prone to direct comparisons of production and returns without reference to costs. These differences reflect the distinctive aspects of their management orientations (discussed below) and suggest that each panel would respond to innovation or change from unique points of reference with varying impacts on the resilience of their farming practice.

Environment and nature

Several features that distinguish between the sheep/beef panels are evident in the farmers' positioning relative to the physical environment both on and surrounding their farms. The extent to which they separate themselves from nature (as in the kiwifruit sector) provides an initial focus for such differentiation. For the sheep/beef farmers, the panel differences are more a matter of degree than approach. That is, all of the farmers expressed the objective of taking nature into account when making management decisions; the manner in which this objective was pursued, however, differed among the panels. In the first qualitative interview, discussions of environmental wellbeing indicated that the Organic farmers were less likely to see their farm management as exerting control over nature. The farmers' approaches to environmental constraints in the second interview demonstrated a more uniform concept of farming within the parameters of the physical environment, although such activity may not necessarily be understood as *working with nature*. Often, the intent was to mitigate the negative impacts associated with commonly occurring climatic or topographic features of the farm. The survey also suggested that managing in a way that is compatible with natural cycles was more important (a greater number ranked this as *very* important cf. important)

for the Integrated and Organic panels. Some contradiction to these general positions has already been noted in specific management actions of the Integrated panel: their willingness to challenge environmental constraints that limit their ability to meet contract deadlines and their greater desire to control weeds as noted in the weed management survey.

Much as in their positioning relative to nature, the sheep/beef panels demonstrate few differences in their discussion of the role of nature and ecology in production in the first qualitative interview. Attention to biodiversity varies more by location (that is, it is highest in locations where the landscape encourages a wider diversity of wildlife) than by panel. Where they are present, the sightings of native birds (especially bellbirds, tuis and wood pigeons) are seen as indicative of appropriate management practices. A notable exception to the uniformity among panels, which mirrors the response among kiwifruit orchardists, involves the more frequent references to the biotic nature of soil by the Organic farmers. The causal map data provide further evidence that the Organic panel differs from the others in this regard: the Organic panel gave greater emphasis to 'fertiliser/soil fertility and health' and 'farm environmental health'.

Assessments of environmental proactivity were also applied to the data from the first interview in the sheep/beef sector. As with the kiwifruit data, the members of the Organic panel proved to be the most proactive with eight proactive, three active and two passive farmers. By comparison, the Integrated and Conventional farmers both more strongly reflected active (eight and five, respectively) or passive (three and four) responses.[17] This assessment again confirms that the Organic farmers are more likely to include concerns for the physical environment in their management decisions. The remaining panels were equally active in their response, neither differentiating itself as a more passive group similar to the Green orchardists. Further insight to this aspect of the farmers' environmental positioning can be drawn from the national farmer survey in which the Integrated farmers valued the recreational qualities (waterfowl shooting and fishing in wetlands) of these features more than the Organic farmers.

Finally, differences between the perceived consequences of management practice on the environment provide additional understanding of the farmers' interaction with the environment. The national survey data show that the Organic farmers believe that humans have a greater impact on the environment, rating both past on-farm species diversity and soil health lower than their counterparts. All of the farmers, however, think that they are having beneficial effects on such environmental indicators. In addition, the Integrated panel is more prone to think that humans do not have a disastrous impact on nature (40% agree) and that human ingenuity can solve such problems (50% agree). Conventional and Organic farmers, on the other hand, are more likely to agree that humans can affect nature disastrously with Organic farmers feeling more strongly than Conventional farmers about this.[18] As a whole, these survey findings point to a similar differentiation of degree among the sheep/beef sector panels in their response to nature.

Positioning relative to the sheep/beef industry

The positioning of the sheep/beef farmers relative to that sector's industry has already been discussed as a factor of farmer esteem. Here, we only reiterate the strong apparent

[17] The remaining two farms in the Conventional panel were proactive with none of the interviewed farmers receiving a score of zero.

[18] Among Conventional farmers 64% agree, with no-one strongly agreeing; whereas 31% agree and 46% strongly agree among Organic farmers. When tested statistically (Likert scales as valid rational numbers) this shows up as a statistically significant difference between Integrated and Organic panels.

difference between the Integrated and Conventional panels, with the former enjoying a more positive and collaborative relationship with the processing firms based on their capacity to meet contract demands. The Conventional panel also demonstrates a less well developed understanding of their customers (retailers and consumers in export markets) largely due their limited engagement with these actors[19]. This finding is contradicted to some extent by the lower emphasis on 'customer requirements' and 'marketing/processing organisation' in the Integrated causal maps, which suggests that the audit allowed such concerns to become external assessments. In other words, their strong integration into a customer-oriented audit scheme may mean that such factors were perceived as less important in their farming system given that they were subsumed within the audit process. None of the farmers claimed to have an active role with their self-identified political interest group, Federated Farmers, eliminating any possible differentiation among panels in this regard. The distinct responses to and experiences with audit schemes does, however, suggest that the audit pathway to improved environmental and social performance may meet with uneven acceptance in the sector.

Positioning relative to society

The farmers' conceptions of community as articulated during the first qualitative interview provide a further means of differentiating among the panels. Community and participation in the working of that community are an important aspect of the lives of members of each of the panels. Again in this case, the differences that have emerged are more the result of a different focus or degree of emphasis. For example, the Conventional farmers place the greatest emphasis on the role of the farming community as part of the farming lifestyle (see comparison with sense of place above). Often, this reference to the importance of the community involves a concern for its deterioration in the face of a poor farming economy and the encroachment of dairy farms in traditional sheep/beef producing regions. For both the Conventional and Integrated farmers, contributions to the community are viewed as a public service commitment whereas Organic farmers are as likely to engage in such activities without framing their actions as 'public service'. Finally, and in a manner similar to that demonstrated in the kiwifruit sector, the Organic panel places greater emphasis on their engagement with a broader community that extended beyond the immediate locality. In part, this likely reflects the spatially dispersed distribution of similar (organic) farms on the South Island, which effectively creates a more dispersed social network in the form of national and international relationships related to their alternative management practices. Furthermore the Organic farmers are more likely to be directly involved in the marketing of their product to distant locations, both domestically and internationally.

Learning and networks

Based on data from the second qualitative interview on the farmers' learning processes and pursuit of innovation, it is possible to undertake a limited differentiation of the panels. For the most part, all of the farmers identified journals received by post and neighbouring and 'successful' farmers as their primary sources of information. A small number utilised farm consultants, although it is not possible to distinguish among panels on this basis. It is, however, possible to make subtle distinctions among panels in regard to the most important aspects of their own knowledge development. For example, the data from the national survey indicate that the use of local knowledge and maintenance of good relations with neighbours as sources of feedback[20], while considered valuable across the panels, is more

[19] This characteristic of the Conventional panel may be changing with the emergence of a farmers' movement in response to low lamb prices which has publicised the importance of meeting consumer demands in order to better position the lamb industry as a whole.

[20] In the survey this feedback involved the capacity "to discuss farming issues, practices, problems or projects with [neighbours]".

important to the Integrated farmers (significantly different from Conventional farmers only); developing knowledge about the ecosystem, by contrast, is most important for the Organic farmers (significantly different from Integrated only). A final difference relates to those already noted as features of farmer stress, whereby the Organic panel is more prepared to try alternative management systems with the exception of GMOs. This is further evidence of a greater propensity to pursue and engage in innovations (outside the standard realm of chemical or mechanical inputs) among the Organic and Integrated panels.

Expression in management actions

Our examination of the explanations of management actions provided in the qualitative interviews (and sometimes reinforced by the mapping exercises and the surveys) identifies three axes of differentiation among the sheep/beef panels. Similar caveats to those raised for the kiwifruit sector (above) should be placed on these findings.

Signifiers of *good farming*

Based on the discussion and comparison of data of farmers' positioning relative to the environment, it is possible to distinguish a trend in the utilisation of environmental indicators of good practice from Organic (being the strongest) to Integrated and then Conventional. For the Organic panel, their avoidance of agrichemicals was a principal component of good farming relative to their non-organic peers. Survey findings also indicate that they place more emphasis on soil microbes (92% very important) and biological pest control (54% very important)—although the latter are also valued by the Integrated panel. A similar trend in the opposite direction appears to involve the application of financial indicators of good farming. In this case, the Conventional panel is prone to employ financial returns as a means of benchmarking whereas the Integrated panel is more likely to emphasise farm working expenses according to the causal maps. These two trends appear to define a continuum of *good farming* in the sheep/beef sector.

Productivity/productivism

Similar to many of the other distinctions in the sheep/beef sector, the relative emphasis on productivism among the interviewed farmers is fairly uniform. As such, all comparisons of the panels involve identifying differences among farmers who recognise limitations on their capacity to increase production. For members of each of the panels, respecting the needs of their livestock is important; but the survey results suggest an even greater emphasis on this in the Organic compared to the Integrated panel only. A similarly greater emphasis can be reported for the relative efforts of the Organic panel to reduce dependency on external inputs in comparison with the Conventional panel. This latter difference is most likely the result of the willingness to forego chemical solutions for pest control or soil fertility maintenance among the Organic farmers. Finally, to differentiate among the Integrated and Conventional farmers, the apparent confidence of the former in being able to meet the demands of contracts despite potential environmental constraints and their preference for more complete weed control suggests that the Integrated panel may have a stronger inclination to productivism. Thus, this second axis extends from a strong awareness of environmental constraints at one end (exemplified by the Organic panel) to the desire to exert somewhat greater control of the management system at the other (Integrated).

Risk, innovation and challenge

The farmers in each of the sheep/beef sector panels demonstrate distinct responses to risk and innovation. Of the three panels, the Conventional farmers maintain the most traditional form of sheep/beef farming. Many have experienced the crises of the 1970s through 1980s and successfully adapted to a shift from carcass to cuts in the processing of their products. They appear more conservative, however, in responding to the demands of an increasingly retail and consumer-oriented market. By comparison, both the Integrated (in complying

with the external gaze and timing demands of the audit-governed contracts) and the Organic (in submitting to the social risk in the form of potential critique of a contested alternative practice from colleagues) panels demonstrate a willingness to assume additional risk in order to actively approach the challenge of this market. In a further distinction, the Organic panel seeks to reduce risk by increasing crop diversity. The national survey data show that the Organic (77%) panel places more emphasis on maintaining and promoting diversity by increasing the number of crop and plant varieties and/or animal breeds compared to the Integrated (50%) and Conventional (36%) panels. These findings suggest that differences in response to innovation can be defined by an axis with endpoints represented by the willingness to engage challenges and pursue alternatives (as exemplified by the Organic and Integrated panels) and by the preference to retain familiar practices (Conventional panel).

Summary of Sheep/Beef:

As was the case with the kiwifruit sector, we will summarise the differences identified among the sheep/beef panels on the basis of several unifying themes. We also suggest that these themes—many of which are very similar to those identified for the orchardists—will likewise form the basis for a more comprehensive assessment of the farms, facilitating a transdisciplinary perspective.

Perhaps among the more noteworthy findings in the ARGOS research is the confirmation of the distinctive character of Organic farmers relative to their non-organic counterparts (both traditional and alternative). This difference is nowhere more evident than in the *breadth of view* expressed across the research instruments. As with the kiwifruit orchardists, it is the Organic farmers who demonstrate the broadest perspective on nature and society, placing themselves and their farms within a larger landscape and less localised community. They also placed the greatest emphasis on off-farm product quality in the causal maps. By comparison, the Conventional and Integrated panels demonstrated a more narrow focus on the processes and conditions that they recognised within the boundaries of their own farms or their local communities.

The concept of *good farming* as a cohering theme for the social data does not, to the same extent, mirror the panel differences evident in the kiwifruit sector. Most notably in the qualitative interviews, none of the sheep/beef panels articulate an emphasis on tidiness comparable to that evident among the Green orchardists. That said, tidiness is identified as an important indicator of good management in the most recent survey data by the great majority of respondents, suggesting that it may be a ‘taken for granted’ aspect of pastoral farming. The similarity in the attitudes towards tidiness held by members of the panels is reflected in the lack of readily apparent visual distinctions among the farms of the respective panels. This relative uniformity in understandings of good farming likely reflects the enduring traditional approaches to pastoral production.

The subtle distinctions in good farming which do emerge largely involve the greater extent to which the Integrated and Organic farmers are willing to push and/or adjust their management systems to meet the standards of their respective niche markets. In other words, for these two panels, the pursuit of quality includes direct references to the necessities of meeting the demands of the market, especially retailers and consumers. By comparison, the emphasis on a high quality product indicated by the Conventional panel involves an affirmation of the intrinsic value of the New Zealand pastoral sector and its contribution to the country’s society and economy—features that become symbolic qualities of their product. Thus, in the case of the former two panels, the symbolic qualities of the product involve more narrowly defined characteristics of the product that result from an alternative method of production. The fact that the Organic and Integrated farmers have directed their production toward a specifically defined market appears to be associated with

their greater willingness to comply with auditing structures and to conform to contract stipulations. The management practices associated with good farming remain, however, relatively uniform among the panels as demonstrated by the fact that audits are described as invoking minimal changes in practice beyond the attention to paperwork and documentation. Here again, the Organic panel is more distinctive as their concept of good farming involves a stronger emphasis on the condition and health of the environment especially in regard to the soil. Two factors likely contribute to the lack of strong differentiation between panels in regard to good farming in the sheep/beef sector: the relative novelty of the audit schemes in the sheep/beef compared to the kiwifruit sector; and the limited impact of audit compliance on accepted management practice. Thus, to this point, concepts of good farming may not have emerged as explanatory factors in the relative sustainability or resilience of management in the sector with the exception of some of the Organic farmers.

As noted in reference to the Organic panel's concept of good farming, the sheep/beef farmers' perceptions of and engagement with the environment (their *environmental positioning*) provide a further theoretically relevant means of differentiating among the panels. Again in similar fashion to the kiwifruit sector, the environment themes provide a principal axis along which the Organic panel can be distinguished from the rest. For example, the Organic farmers are consistently more proactive in their engagements with the environment, are the most insistent on working with nature and are the least convinced of technological fixes for the remediation of human-induced environmental problems. By comparison, the responses of the Integrated and Conventional panels more closely emulate each other suggesting that the proclivity to adopt organic practice can be associated with a greater concern for one's impact on the environment. The existing data does not, however, indicate whether the environmental positioning of the Organic farmers preceded their conversion or emerged thereafter. By comparison, the non-organic farmers were more likely to refer to the need to control aspects of the environment that impeded the rate of growth in the stock or the condition of the pasture. Therefore, in regard to the ARGOS research questions, the environmental positioning of the sheep/beef farmers indicates that the Organic farmers are more likely to defer to environmental rationales in developing their management strategies. The relevance of this positioning for the sustainability of the agriculture sector will depend on the relative economic, social and environmental benefits and costs that accrue to practices deemed to be more or less sustainable.

Despite the panel differences in their environmental positioning, the farmers appear to share relatively similar responses to *feedbacks* within their production systems. For example, all of the panels provide comparable references to the importance of the state of the paddocks and of stock health as indicators of environmental wellbeing, with the Organic panel expressing greater emphasis on the soil and soil biota in this regard. The indicators of economic wellbeing identified by the farmers are also overwhelmingly similar. Here the emphasis is on returns as the most important gauge, although many in the Integrated panel also include costs in their assessment. In earlier reports we suggested that this characteristic reflected a sense among the farmers that their costs were essentially set and proper management in the context of numerous influences (such as low market prices and variable weather conditions) involves achieving sufficient returns to realise some profit, or at least pay the bills. This suggests that the greater reference to costs among the Integrated panel reflects their stronger tendency to employ technologies that involve costs (and are considered optional by the other panels) in order to more effectively meet the contract stipulations. The largely common reference and response to feedbacks among the sheep/beef farmers suggests that these will contribute only marginally to the explanation of sustainability in the sheep/beef sector.

The final avenue of differentiation among the sheep/beef panels involves the farmers' social positioning. These distinctions coalesce around themes—including *on and off-farm*

relationships, production system management and responses to *innovation and risk*—in which the more conservative orientation of the Conventional panel distinguishes it from the others. In regard to the first theme, the Conventional panel maintains a perception of community that borders on nostalgia by referring to more coherent and interactive rural communities of the past. These more traditional social relations remain strongest in regions not disturbed by increasing urban/ex-urban pressures nor targeted as the site of rapid conversion to dairy farming. By comparison, the other panels demonstrate the capacity to expand their conceptions of community to include relationships with the processing industry (especially within the Integrated panel) as well as with local and more distant consumers. In reference to production system management, the Conventional panel appears less willing both to diverge from more traditional metrics and indicators and to accept and comply with the external gaze of audit schemes (as is evident with both the Organic and Integrated panels) or to give precedence to mitigating their impact on the environment (cf. Organic panel). A similar situation is evident in the varying responses to innovation and risk in the panels, with both Integrated and Organic farmers showing a greater predilection to adopting new or alternative methods or approaches. In contrast, the Conventional panel appears much more risk averse. As a result, the latter group expresses a more limited scope of control that narrowly focuses on the practice of growing grass and producing meat whereas the Integrated and Organic farmers have taken (at least the initial) steps to strategically reposition themselves within a wider scope relative to the contemporary marketplace. These differences suggest that members of the Conventional panel consider fewer options and alternatives when confronted with economic or social shocks, a characteristic that implies a lower level of resilience in such situations. They do, however, refer to their own capacity to persist through hard times as a source of pride. The variation noted does not provide much insight to the relative impact of environmental shocks or stresses on the different management systems.

In comparison to the differences in social dimensions identified among the kiwifruit panels, those among the sheep/beef panels appear to more strongly separate the Organic panel from the other two. This is likely a result of both the more limited extent to which organic production has become a normalised element of farming in the latter sector and the relatively weak criteria associated with existing audit schemes in the sector. In other words, the price premiums achieved by Organic farmers are not as widely acknowledged as appropriate allocations within a broader marketing strategy nor are their experiences as likely to be seen as sources of innovation for the rest of the sector. Furthermore, the audit schemes have not seriously challenged established understandings of good farming to the extent that accepted practice is being altered. This situation would suggest that the sector as a whole may be less resilient than the kiwifruit sector, especially as it faces growing demands from consumers on environmental and social best practice and the reduced efficacy of chemical controls of weeds, parasites and other pests (all of which are conditions which Organic farmers have confronted with some success already). That said, the social dimensions of sheep/beef production similarly fail to indicate that any of the management systems is optimal to the exclusion of the others. For example, despite a more conservative approach to alternative practices and innovation, many of the Conventional farmers have demonstrated increasing willingness to engage strategically with the range of contract options offered by the meat industry. Furthermore, none of the panels has demonstrated a greater capacity to remain viable in the face of low lamb and wool prices and pressures to convert to dairy farming. Because the sheep/beef sector is currently subject to high levels of uncertainty (with issues around pricing and producer/industry relations, the potential introduction of more stringent best practice audit schemes and the regulation of greenhouse gas emissions), more telling assessments of resilience and sustainability are likely to develop with continued observation and analysis of the sector. In the context of further study, the development of interactions among the distinct characteristics of the subjectivities of members of the ARGOS panels will provide a particular area of research interest.

4. Identified ARGOS panel differences: dairy sector

Panel differences in the dairy sector reflect comparisons of data collected from dairy farmers in the process of conversion to organic certification with that from colleagues who retain more conventional practices. The social research directed toward the dairy sector within ARGOS involved a modified set of methods, namely the combination of the two qualitative interviews into a single engagement with each farmer. The qualitative interview was subject to a less comprehensive analysis procedure, with greater emphasis placed on factors identified as relevant to ARGOS objectives in the other sectors. Thus, outputs included: an update on the dairy sector by providing an understanding of barriers to further adoption of organic management by dairy farmers (Rosin and Grice, 2006); an analysis of farmers wellbeing and environmentally sustainable land use (Mortlock and Hunt, 2008); and a causal mapping study similar to that conducted in the other sectors (Fairweather et al., 2009a). On the basis of these analyses, a more directed assessment of differences is presented below and is summarised in Table 3, which lists the social differences between the Organic and Conventional panels identified in the dairy sector.[21]

Demographic characteristics

The data collected on a range of demographic characteristics for the dairy farmers indicates a similarly limited capacity to differentiate among panels as found in the other sectors. There is a greater variation in ages reported for the Conventional panel (1943 to 1983 birth dates) compared with Organic (1942 to 1969). In regard to their respective lifecycle stages, all except two households included married couples or partners, and nearly all had children living with them. Both organic and conventional farmers have spent similar lengths of time on the farm (15 years cf. 16 for Conventional). Each panel included a similar range of educational attainment and nearly all of the farmers were from a farming background (two in each panel from non-farming backgrounds), with four (Conventional) and five (Organic) living on the family farm with similar numbers coming from within 100 km from the place of their upbringing. Therefore, it is unlikely that demographic characteristics will contribute to the explanation of differences between the management panels.

Farmer subjectivity and attitudes

The conditions of production and the focus on productivity growth in the dairy sector are reflected in the shift in emphasis in the subjectivities and attitudes demonstrated by the dairy farmers relative to the other two sectors. In order to draw attention to these differences, the differences identified in this section are elaborated in a similar ordering of the extent and scale of interaction with external management factors as to that employed in the other sectors. Despite changes in the methods employed, the limitation of analysis to the perspective of the farm households without comparable input from other social actors holds for the diary sector as well.

Farmer esteem, stress, satisfaction, identity

The strong association between production and farmer esteem in the dairy sector has been identified previously (Jay 2007). The interviews with the ARGOS participants confirmed this relationship, with farmers frequently referring to the daily docket they received that indicated the amount and quality of their milk supply. This docket was used to benchmark against past performances and against neighbours or other colleagues with higher production

[21] See footnote 7 for an explanation of the table and the nature and structure of its content.

Table 3: Differences for ARGOS farmers in the dairy sector

		Conventional	Converting to Organic
Survey	Intentions	Neutral: use organic methods	Stronger: use organic methods
	Farming position (Committed Conventional to Committed Organic)	Slight agreement: conventional (committed and pragmatic) Slight disagreement: organic (pragmatic)	Slight disagreement: conventional (committed and pragmatic) Slight agreement: organic (pragmatic)
	Dependency	Slight: chemicals for pests and parasites; organic remedies Moderate: chemicals for weeds Very: synthetic fertilisers	None: chemicals Slight: manufactured fertilisers Moderate: composts Very: organic remedies
	Household food	Produced less from the farm	Produced more from the farm
	Evaluation of soil health	Good, five years ago	Neutral, five years ago
	Evaluation of environment	Native species diversity very good at present	Native species diversity good at present
	Organic practices	Three rated from neutral to important	Three rated very important
	Attitudes to nature	Agreed: farm an extension of natural systems	Neutral: farm an extension of natural systems
Causal maps	Emphasise in farm systems:	Exchange rate/macro-economy Net profit before tax	Farm environmental health Increasing plant and animal biodiversity
	Map characteristics	Greater number of receiver variables Greater total number of variables	More connections per variable Higher map density Greater number of ordinary variables
Qual 1 / 2 (all comparisons)	Production emphasis	High	Low
	Alternative practices	Palm kernel meal more acceptable	Homeopathic remedies more acceptable
	Risk tolerance/preference	Financial risk more acceptable	Risk of social sanctions on becoming organic more acceptable
	Environmental pro-activity	Passive	Pro-active
	Role of farm family		Greater participation of family including partner, parents and children

indicators providing a sense of satisfaction or accomplishment. Additional assessments were provided for the presence of somatic cells and antibiotics in the milk supplied, both elements that were regulated by Fonterra through fines for high levels. Thus the daily reporting operated as a test of 'good farming' that was promoted by Fonterra and reinforced both the utilisation of higher input practices such as all grass pasture (which required greater applications of nitrogen) and the acceptability of feed additives such as molasses and palm kernel meal that were shown to raise production of milk solids. In addition to production levels, farmers also referred to the quality and quantity of grass (several using tools to track the progress of their grass production or comparing the greenness of the paddock) and the health of their cows as visible factors of their esteem. These measures of esteem within the sector were equally recognised by members of each of the panels. The

response of the organic farmers differed, however, to the extent that aspects of the organic systems they were adopting (the lower production levels, in particular) weakened their capacity to achieve esteem according to these criteria. Several of the organic farmers reported that colleagues would question their adoption of organic practices by referencing the relative measures of production for the two systems.

Much of the stress referred to in the interviews was also related to the criteria for esteem. The desire to attain status within the dairy farming community made the lack of performance in any of the criteria a source of concern. For example, several farmers indicated that targets for growth in the dairy sector set by Fonterra placed a burden on them to contribute to a collective effort of increased production through additional inputs. This pressure influenced the organic panel in contrasting ways: some referring to the stress of justifying practices that resulted in reduced production and others claiming that stepping back from production pressures was one of the appeals of the organic system. Animal health was also a potential source of stress due to both the individual response to the apparent suffering of the animals and to the social sanctioning associated with visible indicators of sick animals. A slight distinction between the panels involves the extent to which the resulting stress is associated with the effects on production (more marked among the conventional farmers) in contrast to uncertainty regarding the relative reliability of alternative medications. A further source of stress is associated with climatic conditions and is likely heightened by recent experience with drought in the study regions, although some farmers also referred to extended periods without sunshine as a factor that limited pasture growth and quality. A noteworthy finding is that the size of a farmer's mortgage was not necessarily a cause for stress as some of them viewed a large mortgage as evidence of a greater capacity to invest in the farm and of the rising value of their property.

The emphasis placed on production indicators in the esteem and the stress which the dairy farmers realised remains an important aspect of their sources of satisfaction and their overall identity. Thus, farmers from both panels commonly referred to the health and welfare of the cows, the maintenance of an efficient farm and the management of good pasture as contributing to their satisfaction as dairy farmers. Further satisfaction was derived from their contributions as members of a community—both in their involvement in community activities (from school fund raising to the local tennis club) and in their participation in an important industry for the New Zealand economy. The resulting identity of the dairy farmer was characterised by individual achievement as demonstrated in farm productivity and commitment to the collective success of the sector. It is noteworthy in this regard that these tests of good farming were more closely attuned to the practices and objectives of the conventional than to those of the organic panel. This distinction is further indicated in the rationalisations for the shift to organic production that often focused on a family's or individual's rejection of production as the ultimate objective of management practice.

A typology developed by Fairweather (1999) and Darnhofer et al. (2005) seems to usefully fit dairy farmers (Mortlock and Hunt, 2008). The first dairy farmers to become organic were more likely to do so for reasons to do with the organic philosophy (committed organic) whereas the later ones were more likely to do so because the premium paid for organic milk made conversion to organics a pragmatic, economic choice (pragmatic organic). Without a premium, they would be likely to revert to more conventional practice. Other farmers may be environmentally conscious yet not see organic as good agricultural practice (environmentally conscious but not organic). Some of the conventional farmers (pragmatic conventional) are busy watching the organic farmers 'over the fence' and if and when they see organics as being something they could do that fits their aspirations and identities, would become organic farmers. Committed organic and committed conventional farmers, on the other hand, are unlikely to change to another farming system.

Role of family in farm operation

An additional point of differentiation between panels noted specifically in the dairy sector concerned the extent of the farm family's role in the farm operation. The majority of the conventional farmers ran the farms as individuals with family assistance generally limited to that of the female partner during calving. By comparison, the organic farms were more likely to involve the participation of the partner in day-to-day activities as well as contributions from parents and/or children. Often on the organic farms, female partners assumed the responsibilities for animal health where these relied on homeopathic and other alternative remedies.

Sense of place, bond to land

Within the dairy sector, it was not possible to establish difference between panels relative to the farmers' sense of place. The representation of sense of place in the interviews remains of interest, however, as it was qualitatively different from that expressed in the kiwifruit or sheep/beef sectors. The most notable aspect of the dairy farmers' sense of place was their strong sense of belonging and responsibility relative to the locality, a characteristic in which they more closely reflected the sense of place amongst some of the sheep/beef farmers. For many of the dairy farmers, the value of their land was most closely associated with its economic value as they realised the investment potential of the farm. Often this resulted in what appeared to be a closer bond to their cows than to the particular location of the farm. This bond may reflect their experience with the practice of share milking as a common means of access into the industry. Currently, very few of the ARGOS farmers are sharemilkers, with many in this situation working on their father's property. A further basis for the emphasis on cows is related to the financial value of cows that is foundational to the economic security of the owner. Because the cows can be moved from one farm to another, a stronger focus on the animals could be related to a lower concern about the environment as explained later. These latter statements do not apply in the same degree to the subgroup of farmers who have only recently taken ownership of the farm (whether from family or others) and are much more cognisant of the present and future value of the land.

When reflecting on the location in which they farmed, many of the dairy farmers would refer to the value of the broader environment in which they lived and worked. In other words, they would articulate the benefit of working in a beautiful, green environment rather than the aspects of their own farm. Furthermore, the locality was generally considered a good place to bring up children, especially given the opportunities available to engage in outdoor activities and a rural lifestyle. Thus, their sense of place was more oriented toward the effect of the natural and social amenities of the location than on the relationship of their management practices with farm level impacts and outcomes.

Symbolic qualities of the product

Despite the attribution of distinctive qualities to organic milk in the marketplace, there was no apparent difference in the symbolic qualities that members of the two panels attached to their respective products. This situation reflects the fact that the majority of the milk produced by these farmers enters the market as ingredients, the quality of which is more closely associated with processing and handling subsequent to the milk leaving the farm than it is with on-farm practices. At the time of conducting the interviews Fonterra had yet to designate a distinct market or product line for the organic milk, which limited the ability of the organic farmers to attach additional symbolic qualities to their product. Some of the organic farmers stated their frustration with the failure to attach sufficient value to their activities, especially given the relative price of organic milk in retail outlets that clearly exceeded the price premium they received. This situation may be changing, however, as some of the organic farmers are members of an organic producers group that is exploring the possibility of starting an organic cheese cooperative. For these farmers, there appears to be a growing awareness of the symbolic qualities of the organic product.

Within the current production environment, all of the farmers attached similar symbolic qualities to Fonterra products, with often strongly voiced emphasis on the superiority of New Zealand production technologies, the sector's contribution to New Zealand's economic growth and wellbeing, the value and benefits of a cooperative business framework and the market strength and reputation of the brands. During subsequent visits to discuss climate change issues with some of the dairy farmers, there was general concern about the damage to the Fonterra brand caused by its implication in the melamine scandal in China. The extent to which these associations of product qualities are not attached to the practices of individuals is, however, evident in the greater emphasis on characteristics of cows and pasture as referents for farmer esteem relative to qualities of the milk produced.

Peer comparisons

In comparison to the kiwifruit and sheep/beef sectors, peer comparisons are a more prominent aspect of the social dynamics in the dairy sector. The importance of peer comparisons to the identity of the dairy farmers and to their sense of esteem has already been discussed. Furthermore, the potential stress associated with such comparisons especially for the organic farmers, has been identified. The references to comparisons facilitated by the daily reporting of milk supplied has helped to establish production as a predominant test of 'good farming' in the sector. Because compliance with organic standards prohibits access to some practices and technologies that enhance production, it is perceived by many as a challenge to existing management strategies. The fact that organic practices are promoted as being more environmentally friendly establishes a further threat to existing standards of good farming. This threat is exacerbated by public campaigns that target the dairy sector as a major source of stream pollution. Peer comparisons are, therefore, a source of strongly articulated social difference between the AROGS dairy panels.

Beyond the comparisons regarding production, the interviews provided further evidence of peer comparisons that are related to the differences between the panels. For example, members of the Conventional panel frequently referred to characteristics of good pasture management, including a green appearance with even growth across the paddock and a lack of weeds or of plants other than grasses. These characteristics do not, however, reflect the objectives of many of the organic farmers who were introducing a variety of pasture species (e.g., plantain, chicory and clover) which they believed would better maintain and enhance animal health as well as improve soil fertility. As in the case of production comparisons, some of the conventional farmers would refer to these uneven and heterogeneous characteristics of the pastures to challenge the legitimacy of organic management. Often, as noted above, this involved a defensive reaction to implications that organic practice was better based on relative environmental impact. For many of the organic farmers, diversified pastures were a means to demonstrate their difference from the existing norms of production in the sector.

Environment and nature

As with the other sectors, many of the differences between the dairy panels involved the participants' engagement with and attitudes toward the environment and nature. Despite the extent of difference, however, both panels of farmers were characterised by their representation of the farm as a managed (as opposed to a natural) environment. Difference between the panels in this respect is, thus, more a matter of degree. Members of the Conventional panel displayed stronger expressions of management with an emphasis on maintaining a tidy farm and on trees as ornamental—as opposed to functional—elements of the farmscape. They were also more likely to emphasise control of their environment as contributing to their wellbeing. These farmers claim that their fertiliser use falls within acceptable limits and that they are keen to improve the condition of their waterways by

meeting the requirements of the regional councils. Their primary focus, however, remains on profitability.

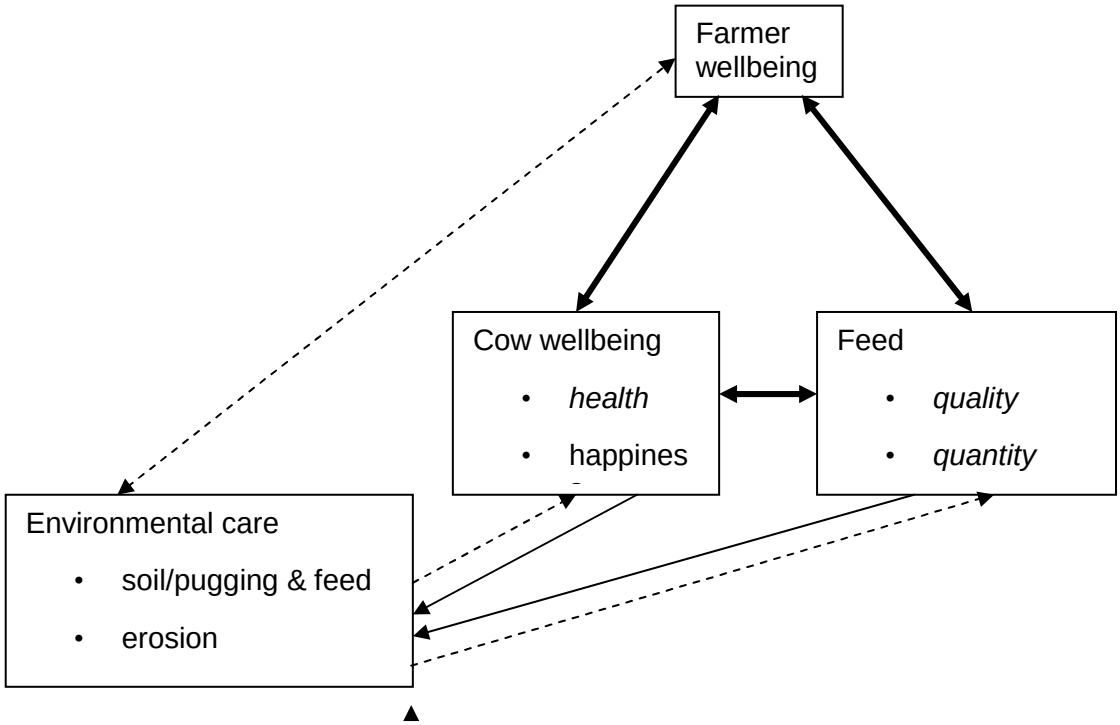
By comparison, organic farmers were more likely to accept 'wild' elements on the farm, for example in their choice of pasture species. Most of the panel, however, retained a strong desire to exert a large degree of control over the farmscape. This contradiction in the intent to manage nature is evident in the plans of one of the organic farmers to remove a poorly drained area of the (recently purchased) farm from production in order to create a pond for recreational use. A further example of the difference in degree is evident in reference to the relative command-control orientations of the panels. In general, dairy farming is a very controlled system, tuned to achieving production efficiencies, a characteristic that is very evident in the farmers' approaches to soil fertility, animal disease and weed control. Many of the organic farmers, however, referred to the challenges they faced in learning to accept less immediate and certain control than was possible in their past experience with chemical solutions. For some of this latter group, this situation has encouraged them to develop more proactive strategies that prevent or reduce the severity of problems. This proactive intention was expressed as a desire to restore the health of the environment (for example, improving or restoring the health of the soil and encouraging the return of native bird species), which contrasted to the more passive intention to avoid causing harm more common to the farmers in the Conventional panel. These differences were also reflected in the contrasting representations of soil held by the two panels. The conventional farmers generally referred to the soil's physical and chemical attributes and restricted their interactions with it to management of nutrient balances through the controlled application of inputs. The organic farmers, similar to those in the other sectors, were more cognisant of the biotic aspects of the soil. As a result, they justified practices which promoted the soil life. The causal map results provide further evidence of this panel difference in the greater relative importance that the organic dairy farmers placed on farm environmental health and increasing plant and animal biodiversity.

The distinction between the panels relative to the level of proactive engagement with the farmed environment was also evident in their assessments of their own management. Those in the Organic panel referred more consistently to environmental wellbeing as an indicator of the appropriateness of their management. This also emerged as a greater affinity with their cows indicated by the linkage between farm environment and the wellbeing of both themselves and the cows. The members of the Conventional panel tended, by contrast, to emphasise the link between their own wellbeing and the quality and quantity of feed. Despite these differences, both of the panels referred to impacts on production when identifying indicators of environmental health. For example, both groups emphasised their efforts to avoid 'pugging' of wet soils (caused by the tearing and compaction of pasture associated with hoof traffic) and to mitigate soil erosion on hillsides. Generally, failure to follow such practices was considered a threat to the financial viability of the farm. In a likely response to the impact of the Clean Streams Accord, many of the farmers provided unsolicited, and generally positive, assessments of the health of streams on their farms. In this case, the value of the environmentally beneficial activity was more symbolic (demonstrating that dairy farmers did care for the environment) than economic.

Figure 1 summarises the links between the different sources of wellbeing for dairy farmers and how they differ between the organic and the conventional farmers. The dotted lines indicate additional links indicated by the organic farmers whereas the solid lines indicate links made by both conventional and organic farmers. The words in italics indicate where issues arise for organic farmers. Conventional farmers were more inclined to see cows as a collective, a herd of cows. Some just wanted cows to behave as if they were an industrial factory system causing them no problems. In other words, they sought a simplicity in their farming practices in which cows were invisible. At the other end of the spectrum where many of the organic famers tended to be positioned, cows were seen as individuals, as

interesting and complex animals. Because farmer wellbeing was so closely linked to the cows and cow wellbeing and production was so closely linked to having sufficient high quality feed, these three aspects were closely interrelated. Many conventional farmers were aware that cows and the way in which their pasture was produced impacted on the environment; but they did not see the corollary—that caring for the environment could impact on feed production and cow wellbeing. Neither did they derive satisfaction from their environmental care because their focus was so strongly on cows and feed.

Figure 1: Model of relationship between farmers, cows and the environment



Much as was the case in the sheep/beef sector, response to the issues of climate change and the mitigation of greenhouse gas emissions did not distinguish between members of the respective dairy panels. Thus, the differences in environmental orientations between the sectors did not extend to climate change. As noted below in the discussion of their attitudes toward environmental regulation imposed by Fonterra, the dairy farmers tended to be more moderate (although equally uniform) in their condemnation of the emissions trading scheme (ETS) than the sheep/beef farmers. In many cases, they responded to estimates of the value of their potential carbon liabilities by suggesting that it was of a similar magnitude as recent price increases in the sector. (The extent to which the subsequent fall in milk prices alters this attitude has not, however, been examined.) It was further impossible to distinguish between panels regarding the acceptability of potential mitigation alternatives due to the diversity of response within each panel.

Positioning relative to the dairy industry

The qualitative interviews and subsequent causal mapping exercise provide little evidence of panel differences in regard to the relationship of the dairy farmers to Fonterra[22]. This fact

[22] As a result of project design criteria, all of the farmers participating in the ARGOS project are suppliers to Fonterra, a cooperatively owned processing firm. Fonterra collects almost 90% of all milk produced in New Zealand and is the country's largest export firm.

may reflect the limited experience of the recently converting organic farmers with the supply and marketing conditions of organic milk. As a whole, however, the farmers were generally satisfied with the relationship at a pragmatic level. Many indicated that, because of its size, Fonterra provided a sense of security in regard to sale of product and access to markets. This was especially the case for those who had previously supplied smaller processors that were eventually bought out by Fonterra. More recent interactions with the farmers with regard to climate change suggest that contestation of the firm's position may be increasing. Across the panels, several farmers commented on the potential damage to the value of their product due to the melamine contamination incident in China. These farmers suggested that the case was an example of the dangers involved in the emphasis on marketing and sales to the detriment of the interests of the producers. Some of the early organic farmers were also showing some dissatisfaction with their position in the Fonterra supply chain by examining the possibilities of supplying their own organic cheese cooperative. The extent to which these positions are permanent aspects of the sector has yet to be established.

Fonterra was also the target of some criticism from farmers in both panels in relation to its efforts to regulate production or management practice. During the qualitative interviews, this was particularly apparent in comments about the Clean Streams Accord and—to a lesser extent—nutrient budgeting requirements that were being introduced at the time of the interviews. Several farmers suggested that Fonterra was stepping beyond its role by enforcing environmental standards, a perspective that was heightened due to the universal application of recommended practice across diverse local environmental conditions. One farmer remarked that the agreement was more acceptable once the regional councils had assumed the role of policing compliance with the accord. Contestation of the demands 'imposed' by Fonterra also extended into the production sphere, with some farmers expressing unease with pressures for continued production increases. This pressure was associated with practices considered questionable by some of the farmers including the use of imported feed (e.g., molasses or palm kernel meal), the culling of animals based on efficiency criteria and the early induction of calving. Those who voiced such concerns often suggested that these were evidence of the extent to which the voice of small farmers was diminishing with the increasing size of Fonterra.

Positioning relative to society

In regard to their relationship to society, there was little evidence of panel differences among the dairy farmers. Both panels included farmers who frequently referred to their involvement in the activities of the local community as well as those who were less involved. Similarly, each panel included diverse perspectives in regard to the impact of their farm on social wellbeing at the national or global scale. In regard to these latter scales, there were frequent references to the beneficial contribution of the dairy sector to the national economy and to global demands for food proteins. This perspective is also evident in the relatively sparse reference to antagonistic urban interests in comparison to the sheep/beef farmers, in particular. In this regard, the dairy farmers appear less prone to recognise issues of environmental regulation or evolving social orientations as threats to their social status as farmers. Where such threats are mentioned, they generally involve specific local situations such as the concern voiced by farmers who were likely to be impacted by the installation of power pylons to support the Auckland supply lines. Regulations were generally considered to be just another aspect of farming as opposed to imposed external control of farm practice.

Learning and networks

In the discussion of sources and networks of learning, the shift to organic production systems appears to have initiated new areas of difference between the dairy sector panels. All of the farmers referred to the *Dairy Exporter* as an important source of information about

the sector and innovations around management practices or inputs. In this capacity, it was seen to reinforce Fonterra demands for increasing production. Few in the Conventional panel indicated that they were actively learning about farming, believing that they already 'knew' how to be dairy farmers and were more than capable of adapting to changing conditions of production based on their experience. Occasionally, the management of labour was mentioned as a possible exception that would benefit from outside input. Many of the organic farmers, by comparison, indicated a desire to gain insight to organic practices from others. For farmers in the Waikato and Taranaki, Organic Dairy Producers Groups (ODPGs) were an important means for exchange of information and experience as well as a valued source of support. Several of the organic farmers also believed that their experiences would provide a good source of learning for conventional farmers, especially as the latter confronted environmental challenges (such as drought) or pressures to reduce input levels. A further notable aspect of the dairy sector was a greater acceptance, in comparison to the sheep/beef farmers, of possible reward structures to encourage improved practices.

General positioning of farming system

A final panel difference in the dairy sector involves characteristics of the representations of farming systems collected in the causal maps[23]. In drawing their causal maps, conventional farmers used more variables. They also directed more arrows to an endpoint or terminal variable, which was not depicted as having an impact on anything else in their farm system. Organic farmers, on the other hand, had more overall connections including a greater number of variables that both were affected by and had effect on other variables. In other words, they depicted their farm as a more complex system than did the conventional farmers.

Expression in management actions

As in the other two sectors, it is possible to trace some of the differences between the dairy sector panels to the respective elaborations of management practice, especially in the qualitative interview. A similar set of axes as those identified in the sheep/beef sector are evident in the dairy sector.

Signifiers of *good farming*

The associations of production and animal health with the concept of good farming in the dairy sector have been well elaborated above. As a result of the differences in positioning, the farmers in the Conventional panel demonstrated a greater tendency to utilise management practices that resulted in pastures characterised by a green, even and weed free sward. The immediate objective of these practices was to provide a good supply of high quality feed. They further contribute to the general pursuit of tidiness on the farm that extends to the maintenance of fences, ditches, shelterbelts and other elements of the farm landscape. The organic farmers were, by comparison, more likely to accept some distortions in this tidiness, including more diverse (and uneven) pasture species, access to trees for browse and development of wetlands on farms.

The farmers' relationship to their cows was a further source of differentiation. Both panels were equally attentive to the health and wellbeing of the cows. The general appearance and condition of the cows as well as the lack of audible complaints from them were shared indicators of good farming between the panels. There was, however, a subtle difference in

[23] Because the maps include factors that span the range from individual to broader scale relationships with society and the environment, this difference is more difficult to align in relation to the preceding differences. It is discussed at this point in order to acknowledge the broadest scale of relationship involved.

this benevolent attitude toward their animals to the extent that the organic farmers were more likely to engage with the cows as individuals as opposed to a general herd as did many of their colleagues in the other panel.

Such differences were not, however, evident in the farmers' references to good environmental practice. In this case, both panels demonstrated a shared general approach to soil conservation (including the removal of cows from pastures subject to 'pugging' or erosion during heavy rainfall events) and effluent management. Highly publicised cases of pollution related to effluent were often referred to as the acts of 'cowboys' in the sector and definitely the antithesis of good practice.

Productivity/productivism

Differentiation between the dairy sector panels in reference to productivism has also been elaborated above. Based on findings from the qualitative interview, it is possible to delineate an axis with the Conventional panel exhibiting greater emphasis on production toward one end and most of the organic farmers oriented toward a lower emphasis. The difference in relative emphasis is evident in the greater use and acceptance of inputs such as molasses and palm kernel meal among the farmers in the Conventional panel. By contrast, the organic farmers frequently referred to their objective of reducing reliance on external inputs and following the natural potential of their cows subject to climatic and pasture conditions. Further evidence is provided by the causal map results in which the conventional farmers placed greater emphasis on specifically financial factors such as exchange rate and the macro-economy and net profit before tax.

Risk, innovation and challenge

A consistent finding across the social analysis of the ARGOS dairy farmers involved the distinct perspectives on risk and challenge between the panels. To a large extent, this distinction is driven by the perception that organic practices result in lower production as a result of limits on the farmers ability to medicate their animals, fertilise their pastures and use high energy feed inputs. Due to this association, many of the conventional farmers viewed the conversion to organic practice as an unacceptable risk, despite the significant 20 per cent price premium offered by Fonterra. Members of the Conventional panel are more prone to accept the risks within their existing system of production as opposed to those of an unfamiliar, but possible rewarding, alternative system. Thus, they are more likely to assume large debts in order to increase their scale of production. In addition, the common representation of organic management as more environmentally friendly and as providing a higher quality and greater value product is taken as a challenge to the 'goodness' of existing practice in the sector. Conventional farmers frequently respond to this challenge by using stereotypes of organic farmers and by disparaging them.

For their part, the organic dairy farmers take on the risk from lowered income and at the same time face the risks to production by taking on a management system that is not clearly demonstrated or proven. Most of them referred to a number of justifications for organic farming that contested the use of production as the sole metric of success in the sector, including the greater relative wellbeing of their farm environment and the healthiness of their product. This difference demonstrates the potential for alternative conceptions of good farming to emerge as a basis for radically different approaches to and objectives for management. Thus, the process through which the organic farmers are coming to terms with their inability to achieve existing standards of good farming (that is, high levels of production) indicates the necessity of establishing alternative valuations of farming in order to encourage change in farming practice.

The adoption of innovation or, more broadly, the proclivity to change is a further area of subtle difference between the dairy sector panels. Members of both panels commented that their level of interest in innovations purported to increase production was subject to the

variability of their production on an annual basis due to climatic and other factors. As noted above, the relative acceptability of such innovations (for example, feed inputs) varies between the panels. Several organic farmers also noted their neighbours' difficulties in accepting any return to clover in pastures, despite its potential soil fertility benefits. Other changes—such as once-a-day milking or dual calving periods in spring and autumn—are being explored by individuals without any relationship to panel membership. These practices are being considered due to their ability to reduce labour demands and to respond to drought periods, respectively. A final difference in emphasis between the panels involves those farmers with the goal of diversification. In this case, the organic farmers are more likely to pursue other farm associated activities—e.g., farm parks, on-farm tourist chalets or camping areas and local supply outlets. By contrast, members of the Conventional panel are more likely to include other agricultural activities, such as orchards or crops.

Summary of Dairy:

As is the case with the remaining sectors included in the ARGOS project, the panel differences identified in the dairy sector can be summarised as contributing to broader themes. As argued above, these themes provide the most relevant application of the social research to the broader assessment of sustainability and resilience in ARGOS. The order in which the themes are presented follows the established pattern, with similar themes to those elaborated for the other sectors. The exception is the theme of *feedbacks,* which did not involve significant differentiation between the dairy panels.

As is the case in the other sectors, the differences identified in the dairy farmers' subjectivities and attitudes allow for the designation of two themes: *breadth of view* and *good farming.* Whereas breadth of view provided a highly significant area of differentiation in the kiwifruit and sheep/beef sectors, this was only the case relative to environmental breadth of view for the dairy farmers. Among the members of the Conventional panel, the importance of production as a metric in their subjectivity was reflected in a more concentrated focus within the property boundaries, or even more specifically its productive area, when referring to their farm's impact on environmental conditions and processes. Many of the Organic farmers, by contrast, referred to the ability for their management to influence the environment at regional or, occasionally, global scales. The differences between the panels in regard to production also form the principal element distinguishing their respective understandings of *good farming*. In fact, the decrease in production associated with the conversion to organic management is referred to by members of the Conventional panel as a primary reason for resisting such a change. For their part, the Organic farmers either refer to disheartening challenges from peers and neighbours regarding the state of their farm's production or offer alternative rationalisations (such as greater self-dependency and reduced environmental impact) of practices that allow for and uphold the value of lower production levels. These attitudes to production influence the relative emphasis on and criteria for the tidiness of a farm as it relates to the visual look of pasture, including the use of more diverse pasture species on the organic farms. The position of the Organic farmers also runs contrary to the pressures for production imposed by the main industry body. The distinct approaches to animal health between the panels, albeit a difference of degree and focus, provide further evidence of the distinct understandings of *good farming*. The relevance of these themes to the assessment of sustainability and resilience lies in their implications for the palette of options available to each of the panels. Members of the Organic panel demonstrate a greater level of willingness to consider alternative practice despite social risk, arguably providing them with a greater range of management options and making them more reflexive in regard to the social and environmental impacts of their management systems. As noted in other instances, however, these statements must be qualified to the extent that they may not be more resilient respective to economic conditions in the sector. In addition, the greater acceptance of diverse pasture species and attention to individual cow health also suggest

that the organic farmers exhibit greater potential for developing locally relevant knowledge as they develop their own health management strategies as opposed to reliance on veterinary inputs. The relative sustainability of this orientation is dependent on the actual value of the different knowledge systems in contributing to beneficial social, economic and environmental outcomes.

Dairy farmers' perceptions of and engagement with the environment (their *environmental positioning*) provide a further theoretically significant means of differentiating between the panels. Again, as in the kiwifruit and sheep/beef sectors, the environment themes provide a principal axis along which the Organic panel can be distinguished from the Conventional. For example, the Organic farmers were consistently more proactive in their engagements with the environment and most consistently referred to farm management as working with nature. The causality of this association is clearer than in the other sectors, as Organic farmers in this sector are in the process of becoming certified organic farmers and many claim that their environmental positioning preceded their conversion rather than emerging thereafter. As in the previous discussions of the kiwifruit and sheep/beef results, the environmental orientation of the Organic panel is interpreted as an indication of their greater proclivity to accept environmental wellbeing as a justification of practice. Thus, it suggests greater resilience for the organic systems to the extent that such a proclivity opens a wider palette of management options and raises early awareness of potential environmental shocks.

The panel differences in the dairy sector can be further assessed using the themes of *management approaches* and responses to *innovation and risk*. The different management approaches of the panels reflect their distinct production emphases as already noted in the good farming comparison. The approach of the Conventional panel is largely predicated on their pursuit of high, and often increasing, production. This objective also translates into their response to innovation and risk, in which the relative costs (financial, increasing input dependency, environmental or social impact, etc.) of practices are de-emphasised relative to the productive potential. Members of the Organic panel, by contrast, are more likely to consider innovations with reference to justifications involving animal health benefits, enhancements of soil biotic conditions or greater self-sufficiency in regard to feed and labour requirements. Furthermore, they have shown the willingness to accept some level of social criticism in their adoption of systems with lower production potential. A further distinction in the area of *on- and off-farm relations* appears to be emerging in the intent of some of the organic farmers to start their own cooperative cheese factory. This desire suggests that these farmers are critical of Fonterra's commitment to promoting the symbolic qualities of 'organic' milk and the potential shift in marketing focus to the provision of high quality, niche markets as opposed to the emphasis on commodity ingredients for Fonterra. The extent to which this position emerges as a means to distinguish between the panels is subject to the eventual success or failure of the initiative. It does, however, resonate with the noted differences in management approaches and response to innovation.

The panel comparison in the dairy sector offers relatively less complicated conclusions given that it involves only two groups of farmers. (In other words, when differences are identified, they are more suggestive of ends of a continuum given the lack of potential intermediate response from a third group.) Despite that qualification, the findings in the dairy sector largely confirm those in the other two sectors in regard to the distinctive character of the Organic panel and their subjectivity as expressed in understandings of good farming, their breadth of view, their environmental orientation and their acceptance of social risk. The early interview with farmers in the sector suggests a conscious construction of this distinction as the Organic farmers attempt to establish a subjectivity that is less reliant on production indicators whereas the Conventional farmers attempt to resolve the sudden legitimacy (from the perspective of Fonterra) of a management system that appears to question the existing good farming basis of their subjectivities. As noted in the case of

the sheep/beef sector, the more recent ascendency of organic practice has limited the extent to which, in the manner of the kiwifruit sector, it either is normalised or contributes to the dairy sector's overall sustainability and resilience. The dairy sector is also distinguished from the other two ARGOS sectors in that Fonterra suppliers are subject to environmental regulation (in the form of the Clean Streams Accord, nutrient budgeting and most recently effluent system audits) as opposed to retailer driven best practice audit schemes. This situation, coupled with the relatively high pay outs (compared to meat production), appears to have limited the potential relevance of organic practice beyond those currently adopting it. As with the sheep/beef sector, continued research of the dairy systems is expected to inform understandings of the role of interactions among the distinct subjectivities of the ARGOS panels in contributing to the sustainability and resilience of the sector.

5. National survey management system differences, 2005 and 2008

It is not our intention here to cover the survey results in detail but to focus on the main management system findings. Here we examine the extent to which the more representative sample of farmers participating in the survey confirms the findings of the more detailed analysis conducted with the ARGOS participants. Because surveys rely on a selected set of questions which generally impede elaboration of nuance and are subject to the interpretation of the respondent, the findings can only speak to aspects of the analysis derived from the other research methods. Rather than providing novel insight, the survey is used to help establish the extent to which the ARGOS participants are representative of the wider farming/orcharding population in New Zealand.

2005

The 2005 survey results did show differences across the management systems. Generally, the analysis of the statistically significant differences showed that the organic farmers stood out from the conventional and integrated management farmers and that the latter two groups of farmers had similar characteristics.

Many of the management system differences that characterised the survey responses of the organic farmers corresponded to those identified in the remaining social data, including the concepts of good farming, environmental orientation, feedbacks and management approaches that distinguished the ARGOS organic panels. In the survey, the organic farmers most strongly favoured using quality assurance management systems and had stronger intentions to use organic methods and not to use GMOs. They favoured descriptions of farming positions that were defined as pragmatic and committed organic, were dependent on composts, manures, and organic remedies, and produced a greater proportion of household food from their farms. Organic farmers gave more emphasis to practices involving microbes and soil, maintaining diversity, natural enemies and avoiding dependency on external inputs. They indicated strong agreement with the statement that acute natural consequences result from poor environmental practice (i.e., the nature's revenge environmental position) and a similar level of disagreement with the statement suggesting that human ingenuity and innovation would provide solutions for environmental damage (i.e., the technological optimism position). Furthermore organic sheep/beef farmers showed some support for the pure nature viewpoint. The findings from the survey therefore suggest that distinguishing characteristics of the ARGOS organic panels are a widespread means of differentiating those who have adopted organic management from others.

Several differences exhibited by the organic farmers in the surveys were less directly comparable to those identified amongst the ARGOS farmers. For example, they had higher levels of education (a statistically significant difference in the horticulture sector). They were more positive about the future and were neutral about environmental conditions five years ago, and when compared to the present reported a larger improvement in environment conditions. Finally, more organic dairy farmers agreed that their land is mysterious.

On most dimensions, conventional and integrated farmers gave similar responses. They had lower educational levels, did not attach much importance to the use of quality assurance management systems and were only slightly negative about using GMOs. They favoured the committed and pragmatic conventional farming positions, were dependent on chemicals and manufactured fertilisers, and produced a lower proportion of household food from their farms. They were less positive about the future and rated environment conditions five years ago as good. Conventional and integrated farmers rated the selected range of farm practices as important but not as highly as organic farmers. Fewer conventional or integrated dairy farmers agreed that the land is mysterious. They slightly agreed with the

nature's revenge position, agreed with the technological optimism position and, for the sheep/beef conventional and integrated farmers, gave some support for the cultured nature position.

2008

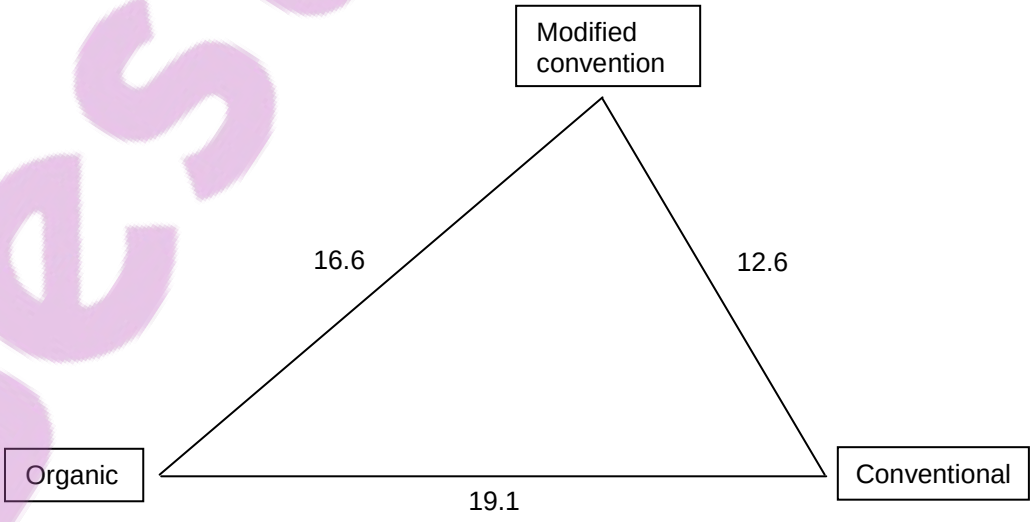
The comparison of management systems in the 2008 survey differs slightly from the previous one in that a system defined as 'modified conventional' replaced the integrated group. Despite this change, the 2008 national survey results supported the assertion that the organic farmers were distinctive as was the case with the 2005 survey.

Organic farmers had spent fewer years farming and were younger than conventional and modified conventional farmers. They gave less emphasis to the rate and volume of production, and to farm tidiness. They emphasised soil and biodiversity, saw benefits from native and introduced birds, and benefits from exotic and native trees and shrubs. They reported stronger links between their farm management and its social and environmental effects, and were neutral about acknowledging farmers' contribution to climate change unlike those in the other management systems, who disagreed.

Conventional farmers, along with integrated management farmers, had spent more years farming and were older. They were less customer-oriented, preferred the tried and true practices, and reported links between their farm management and its social and environmental effects that were not as strong as those of the organic farmers. Farm environment health was less important, and they had less interest in native and exotic trees and shrubs and native and introduced birds.

In terms of overall management system effects, the main result from the 2008 survey was that organic farmers demonstrated by their responses that they were most different from conventional farmers and less different from modified conventional farmers. Modified conventional farmers' responses were more often closer to those of conventional farmers, than organic farmers. This is in agreement with and summarised by the distance analysis (see the figure below) which was performed over all variables in the survey that had a Likert Scale or rational level response except for farm size and revenue, where it was not appropriate to compare results over sectors or management systems. In other words, management system effects were most likely to be driven by a difference from organic management. It is possible that this result is due to the environmental orientation of some of the questions in the questionnaire.

Distances between management systems (for 133 variables)



6. Conclusion

The preceding synthesis of the data collected and analyses performed by the ARGOS social research objective to date provides the basis for three categories of conclusions. First, we can establish the extent to which membership in one of the market orientation panels in the kiwifruit, sheep/beef and dairy sectors acts as an explanatory variable for the analysis of sustainable farming practice within the ARGOS research framework. Such conclusions involve the relatively straightforward listing of significant differences among the panels. This first set of conclusions provides the building blocks for comparisons and modelling exercises with data from the remaining ARGOS objectives (economic, environmental and farm management). Because each of these findings represents only a small facet of the social context of farm or orchard management, they do not necessarily provide an unambiguous delineation of panel effects in the social data. Thus, the results of statistical comparisons or modelling that indentifies specific factors as significant must be interrogated to establish their legitimacy within the broader logic of the social dimensions provided in this report.

A further set of conclusions to be drawn from the reported findings involves a dialogue with the existing social science literature on sustainable agriculture. In this case, we examine the extent to which the ARGOS social data either confirms or contradicts the claims that associate specific social dynamics with more sustainable outcomes (see pp. 6-7 above). Such comparative assessment with findings from related research in diverse social contexts facilitates the elaboration of thematic differences derived from the analysis and interpretation of the social relevance of the differences included in the previous set of conclusions. Thus, the second set of conclusions from the synthesis of ARGOS social data does provide some latitude for statements (or, perhaps more appropriately, hypotheses) regarding the relative sustainability or resilience of the panels subject to further transdisciplinary examination.

Finally, the findings encourage a set of conclusions regarding the objectives and research goals of the social analysis in furthering the understanding of sustainable agriculture within the broader framework of the ARGOS project. The objective of the final set of conclusions is to identify potential alternative means of differentiating among the participating orchardists and farmers that are expected to provide greater insight to the condition of sustainability in New Zealand agricultural practice than the current panel structure. In the process, this final set of conclusions is expected to inform the evolving transdisciplinary collaboration by pointing to the most relevant contributions that might be drawn from existing and future social research and its engagement with data and findings from the project as a whole. The three sets of findings are summarised in the following sections.

Individual factor differences

As a whole, the social data in the ARGOS project identified a limited set of differences among the panels in each of the sectors. These differences include those listed in the summary tables attached to each of the analysis of sectors. They can generally be grouped into those which delineate the distinct environmental orientation of the Organic panels; the stronger production orientation of the Gold (kiwifruit), Integrated (sheep/beef) and Conventional (dairy) panels; and, to a lesser extent, the more conservative approach to management change in the Conventional (sheep/beef and dairy) panels. These generalisations are also evident in the discussion of themes that were used to summarise the analysis of each sector. As individual factors, however, they offer a better means of contributing to modelling efforts across the diverse disciplinary datasets within the ARGOS project.

In reflecting on the potential contribution of the differences noted in individual social factors, several aspects of the social data must be taken into account. First, it must be noted that

there appears to be much greater evidence of similarities among participants in each sector than differences between panel members. As a result, the differences noted either identify the most significant aspects of the social dimensions of sustainable agriculture or reflect the lack of sufficient variation among members of panels to contradict the ARGOS null hypothesis. Additional caution in regard to these conclusions is indicated by the fact that the differences that have been noted do not necessarily reflect each individual in the respective panels equally and that marked (individual) exceptions to the noted aspects are found in most cases. Thus, it is highly likely that the differentiation within a given panel may overwhelm any relationships with other data. In many cases, the differentiation among participants for a given factor may not be amenable to strict and concise relative measures. In other words, for some of the factors difference among given individuals may not reflect metrics with consistent relative variation among the group as a whole. The inclusion of such factors in modelling exercises will require reference to the criteria for differentiation before accepting the significance of any relationships. Finally, some of the personal characteristics may be of more significance to the modelling exercise as variation in age, ownership, education and the like within a panel may indicate distinct types of participants (and associated attitudes and actions) in each panel. These aspects of the social data suggest that the significance of individual factors of difference for conclusions involving either the validity of the ARGOS null hypothesis or the relative sustainability or resilience of panels (or, more generally, individuals) is subject to interpretation informed by broader understandings of the social dimensions involved.

Combined thematic analysis

In comparison to the individual factors, the thematic analyses that summarised each of the sector presentations provide a more robust contribution to the assessments of sustainability and resilience in the ARGOS project. These analyses provide an interpretive summation of the individual factor differences, establishing the extent to which similar differences can be grouped to indicate a shared tendency that characterises a particular panel. In this manner, the themes incorporate mutually reinforcing features associated with members of panels and overcome some of the weaknesses attributed to the factor differences in the previous section.

The strongest indication in the themes involves the distinct *environmental orientation* expressed by members of the organic panel in each of the sectors. Across all the sectors, organic producers demonstrate a greater proclivity to refer to environmental limits on or the environmental impact of their farm management. This attitude is most evident in the more consistent acknowledgement of and stated preference for greater biodiversity in the farmed landscape. This orientation is also evident in the casual map data, which indicates that farm/orchard environmental health was consistently given a higher centrality score by the organic panels. A further aspect of this orientation is the tendency to represent farm management as being patterned on natural processes. The emergence of greenhouse gas mitigation regulations for the agriculture sector does, however, demonstrate the potential limits to the organic panels' environmental orientation. Whereas the acceptance of anthropomorphic climate change and the intention to mitigate impacts associated with management practice are generally considered to involve environmental decisions, the development of government regulation in the form of the Emissions Trading Scheme (ETS) appears to have transformed the issue into an economic one for many of the pastoral farmers, both organic and non-organic. Thus, among the ARGOS participants, response to climate change does not reflect panel membership.

The extent to which the environmental orientation of organic producers becomes an active element of their practice is evident in the unique metrics they apply to define *good farming*. These metrics generally reflect a reduced emphasis on production measures as a means for demonstrating the skill and ability of the land manager. (Exceptions to this

generalisation are found in the kiwifruit sector, where organic orchardists often identify a reduction in the production gap between their orchard and non-organic Green orchards as an indication of achievement. This probably reflects the fact that organic management of kiwifruit does not require a de-intensification of production commensurate with the lower stocking rates involved in organic sheep/beef and dairy farming.) The metrics employed by the organic panels also involve reference to improving environmental health as a primary objective of management. This emphasis is found in their intention to improve the biotic condition of the soil, to provide a haven for wildlife and neighbours and to eliminate exposure to toxic chemicals. Whether or not organic practice contributes to the real world achievement of these objectives is subject to transdisciplinary assessments across the ARGOS data. The distinct nature of the organic producers' environmental orientation and their approach to good farming does suggest, however, that those who have already adopted organic practice may be more inclined to incorporate alternative practices in response to environmental concerns (with reduced emphasis on economic impacts as the sole measure of acceptability). The corollary to this finding is that those producers who have not chosen to pursue organic certification can also be expected to more strongly resist calls to adopt alternative practices solely on environmental grounds. Thus, the relative resilience of these orientations will depend on the type of shock to which a producer is exposed, whether of a financial or environmental nature.

The differences in definitions of good farming are evident in the distinct management approaches adopted by the ARGOS panels. In this case, we include such factors as the stated objectives of chosen practices and the level of control over natural conditions implied within the description of management approaches. Following these criteria, it is possible to again distinguish the organic panels based on their more limited emphasis on production as a management objective. Furthermore, they were much more likely to claim that their management strategies were intended to emulate natural processes. By comparison, the achievement of high production is commonly emphasised as a goal by the Gold (kiwifruit), Integrated (sheep/beef) and Conventional (dairy more so than sheep/beef) panels. The Gold and Integrated panels also indicated stronger belief in their ability to manipulate—or control—natural process to achieve productive ends (e.g., through the use of artificial shelter or chemical fertilisers).

The concept of *breadth of view* that was developed in the assessment of the social data reiterates the distinct environmental positioning of the organic panels while also offering insight to differences between panels due to the extent of engagement with the social impacts of their management. The organic producers more consistently indicated an awareness of and attention to the impact of their management on the environment at regional and global scales. In the kiwifruit and sheep/beef sectors, the organic panels exhibited a similarly greater social breadth of view, extending their recognized influence on society to national and global scales. As a whole the differences in breadth of view suggest that a greater proportion of orchardists and farmers using organic methods (as compared to the other panels) are predisposed to taking account of the impacts of their management that extend beyond the boundaries of their farms.

At a more general level than breadth of view, a further attempt was made to distinguish among the individual participants in ARGOS based on the quantity of feedbacks referred to when discussing their management strategies. The ensuing examination of feedbacks also provided evidence of qualitative differences in the types of feedbacks to which panels would commonly refer. For example, the organic panels consistently indicated that soil biota and biodiversity more generally were important feedbacks for assessing the success of their practice. In addition, their causal maps included more connections per factor (on average). The other panels referred to more limited aspects of biodiversity, such as the emphasis on birdlife among the Green kiwifruit orchardists. Tidiness (also an aspect of good farming for many of the non-oganic groups) was a commonly mentioned indicator that provided

feedback to members of the Green (kiwifruit), and Conventional (sheep/beef and dairy) panels. Based on the lack of clear distinctions among the panels, however, feedbacks are less likely to distinguish among panels.

Another aspect that differentiates the organic panels in each of the sectors involves their apparent willingness to assume a level of social risk associated with the adoption of a management orientation that is at odds with wider accepted tenets of non-organic practice. The potential extent of exposure to social sanction is evident both in the frequent references of organic producers to not being a 'greenie' and in the frustration of several organic dairy farmers in being challenged to justify practices that involve a reduction in production. Adopting organic management practices also involves risks associated with a reduced potential to control constraints to production either in the medication of animals or the use of hydrogen cyanamide to improve bud burst. This assumption of risk reflects the reduced emphasis on production noted above.

Risk, or aversion thereto, also provides the means to distinguish between the two non-organic panels in the kiwifruit and sheep/beef sectors. For example, the Gold orchardists and the Integrated farmers exhibit a greater tendency to accept the risks of adopting unfamiliar varieties (the gold kiwifruit remaining the variety with a less well defined set of optimum practices) or to utilise alternative market strategies (committing to new conditions in supply contracts with meat companies), respectively. By comparison, the Green orchardists and the Conventional farmers demonstrate a stronger reliance on the proven practices associated with more established varieties and contract arrangements. The extent to which this is likely to impact on the relative resilience of producers is less clear, however, as the latter two groups demonstrated the potential to incorporate alternative practices (for example, the rapid adoption of ring-barking of kiwifruit vines to increase dry matter content or the strategic use of a variety of contract and sale arrangements with meat companies) once benefits have been proven.

The combined social research results for the three sectors examined within the ARGOS project involve a consistent range of themes. The consistency with which these themes appear across the research methods employed underpins their relevance to the data and the participants in the project. The national survey data reinforce the results obtained from the research on the panels confirming that organic farmers were the most distinctive and that integrated farmers, while different from both organic and conventional farmers, were closer to the latter than the former.

Relevance to potential dimensions of social differentiation

In the introduction, we identified 15 potential bases for social differentiation that have gained some common currency within the social science literature on sustainable agriculture. Given the frequent and often shared references to the social dimensions included in this literature, it was expected that differentiation among the ARGOS panels—to the extent that these represented production systems with distinct sustainability and resilience pathways—would likely align with them as well. Based on the social data collected to date and reviewed in this report, it is possible to make clear statements about the relative condition of panels in respect to 12 of these dimensions. While there are some notable features of the panel data on demographic characteristics, family farming and social capital, these do not establish significant panel differences. The differences in these dimensions appear more likely to identify distinguishing characteristics of and influences on individuals than to establish the criteria for differentiation among groups of orchardists or farmers. Among the remaining dimensions, half (six) establish the basis for subtle to moderate differentiation among the panels, often acting as the distinguishing characteristic of a particular panel as opposed to providing the basis for a continuum among the three. The remaining six provide stronger means of differentiation among panels, albeit for only

one or two of the three sectors in some cases. Below, each of the 12 dimensions is discussed in the order in which they appear in the introduction, thus not reflecting any ordering of strength of difference. Several dimensions (community and grower networks; craft orientation and commercial and economic orientation; and sense of place and the symbolic 'look' of the farmscape) have been combined in the sections below as they refer to related aspects of a particular feature of the social world of agriculture.

Community and Grower Networks

The cases in which a given social dimension distinguishes subtle variations among the panels demonstrate aspects of the research to date that weakly supports several identified dimensions of differentiation. In regard to the community interactions (including grower networks) and rural/urban dynamics of the various panels, for example, it is apparent that all ARGOS participants express some interest in maintaining good and active community relations. The importance of community in regard to farming practice and sustainability has, however, been well established in rural sociology literature. A common strand in the literature—including authors such as Bell (2004)—argues that community, and the peer pressure it exerts, is a key constraint to the contemplation of alternative practices by some farmers. There is, moreover, a further body of literature from the likes of Flora et al. (2001; 2003) and Lyson (2004) that represents the relationship as influential in the other direction. That is, 'sustainable' agriculture is seen as having potential benefits for the viability of rural communities. These claims suggest several avenues of interest that might emerge in discussions of community relative to the ARGOS panels.

First, differences among the panels emerge in both the relative scale of the community recognised (broadest for both Organic panels and more narrowly focused for the Green kiwifruit and Conventional sheep/beef panels) and the understood basis of engagement with the community (more public service oriented as compared to a more universally applicable orientation among the Conventional and Integrated sheep/beef panels). Similar differences are not as evident, however, between the panels in the dairy sector. Thus, it is possible to conclude that members of the kiwifruit and sheep/beef Organic panels would acknowledge greater responsibility for non-local impacts of their orcharding or farming practice. The Conventional and Integrated panels across the sectors, by contrast, would be more strongly committed to community participation that they considered to be an extension of their role as farmers.

Where panel differences are present in regard to community engagement, the resulting positions (broad or narrow) tend to not conform with the expectation of Flora et al. (2001; 2003) and Lyson (2004) that sustainable agriculture will have positive effects on local communities. Leaving aside any assumptions that the panels strongly represent differences in the relative 'sustainability' of management, the fact that all the panels had quite strong relations to community suggests that this is not a strong point of differentiation—making the normative claim of community benefits unsubstantiated. The argument around peer-pressure from communities is more interesting. The organic panel does have slightly weaker ties to local communities, perhaps indicating their positioning slightly outside dominant local expectations about farming. Furthermore, the organic dairy farmers frequently noted the negative peer pressure they faced in needing to justify their decision to pursue certification—a telling confirmation of the power of productivist ideologies identified in the international literature (Bell 2004; Burton, et al. 2008). The causality of such a configuration is, however, not apparent in this research.

Second, the variation in panels' participation with grower networks provides a good demonstration of the differentiation in approaches to community. For the Organic kiwifruit panel, COKA assumes the role of a more active community within which participants not only exchange information related to management practice but also promote the social and environmental agenda of the organic movement. The size and structure of COKA facilitate

the emergence of a community that pursues the objectives of a social movement that is not attached to a given locality. By comparison, the KGI and Federated Farmers are largely confined by ARGOS participants to positions as communicative and representative bodies. These growers' networks do not promote similar interaction among those who rely on their services (except in rare occasions which elicit strong and uniform outrage in reference to policy, e.g., tax on animal methane emissions or mandatory dog chipping). The local network development has formed around other groups, including those organised by the packhouses or through HortResearch (now Plant and Food Research), that are more narrowly focused on specific aspects of production. As a result, there is a general sense of belonging to a community as defined by occupation. This community does not, however, act as consistently as a group comparable to the Organic kiwifruit orchardists. In the dairy sector, many of the organic farmers participate in similar farmers' groups that provide information and feedback specific to their management strategies. Again, these groups are predominantly oriented around exchange of information with communities organised around local schools or clubs—and thus not specific to a particular panel—taking the role of broader social support.

Based on the current social research in the ARGOS project, it is possible to distinguish relatively weak differences among panels (and these largely a matter of degree rather than absolute) in regard to their engagement with community and social networks. The tentative insights drawn from these differences indicate the potential value to future ARGOS research in the examination of issues like knowledge networks and the influence of networks and community linkages on farm/community resilience. Addressing these topics will require a concerted focus on community relationships that extends beyond the project's current emphasis on farm-level social dimensions.

Craft vs. commercial and economic orientations

A craft orientation has been posed in the literature as a viable alternative for sustaining small-scale agricultural production in the face of competition with more industrialised forms of production (e.g., Hinrichs 1998; 2000). The analysis of the social objective data indicate, however, that the concept of craft orientation becomes very ambiguous when applied to a varied set of land managers. Because we are not able to extract a particular panel as engaging in a more craft oriented production (all the participants appear to respond to technological and economic rationales as well as those of the craft of farming), any differences in the craft orientation involve a distinction of degree as opposed to an absolute difference. For example, within the interviews as a whole, it is possible to identify both farmers and orchardists who more strongly associate the quality of their product with their own craftsmanship as compared to the technologies or established management packages that they employ. For others, their product reflects the marketing capacity of processors or exporters, the superiority of their management system or the characteristics of the place of production. Thus, we conclude that, where craft involves an exploratory engagement with a given management system, it does not emerge as a distinctive panel difference. Rather, it is more evident as a characteristic of select individuals irrespective of their participation in given ARGOS panel.

A common assertion in the social literature on agricultural sustainability insists that, among land managers, a strong commercial or economic orientation is likely to involve a reduced commitment to environmental or social concerns and responsibilities. There appears to be some support for this assertion in the ARGOS social data, especially in relation to the approach of the Integrated sheep/beef, Gold kiwifruit and Conventional dairy panels. Members of each of these panels demonstrated a higher emphasis on business orientations as well as relatively lower concerns (at least in comparison with the respective Organic panels) for environmental or social issues. The willingness to pursue potentially risky but greater rewards of a more demanding market audit (in the case of the Integrated panel), a less established product (Gold) or industry production targets (Conventional dairy)

does, on the other hand, contribute to a greater sense of empowerment among these panels. In this case, the Organic panels perhaps demonstrate a more tractable alternative in assuming both a riskier and potentially more rewarding product while privileging a commitment to environmental or social responsibilities, or both. The fact that claims to better quality (and to justifications of greater rewards) among the Organic growers necessarily involve an alternative treatment of the environment (and, for some, their social relations) likely contributes to the importance of both aspects for these panels. The Green and Conventional sheep/beef panels, in contrast, do not have room, by necessity and approach, within their perspectives of farming to assume the risks or pursue the potential rewards of the alternative practices. These contrasting responses suggest that members of the Organic panel would be more likely to adopt alternative management strategies which challenged existing social representations of good farming as long as these promised measurable environmental or social benefits.

Learning and Expertise

In contrast to our analysis of the participants' craft orientation, we argue that there is greater evidence with which to distinguish varying approaches to learning and expertise among the panels and sectors. All of the participants expressed a willingness to pursue more information and increase their knowledge by means of literature received through journals and from the industry and most indicated that they selectively participated in field days. Across all the sectors examined, few consistently conferred with professional consultants. For many in the sheep/beef sector, expertise resides in the craft of their practice—the skill of farming is developed by experience and, to some extent, the affinity of the practitioner for the job. This position strongly reflected the importance of their knowledge of local conditions (climate, aspect, slope and edaphic conditions on their farms, etc.) in enabling them to conform to the timing and weight demands of their contracts with the meat processing firms. For the Integrated panel, this also involved developing strategies to mitigate the limitations posed by such environmental constraints; whereas the Organic panel were more likely to privilege the pursuit of improved environmental health, with an emphasis on the soil.

In the kiwifruit sector, differentiation on the basis of learning and expertise is more distinct—perhaps reflecting the distinctions in craft orientation among its practitioners. Thus, the Green panel distinguishes itself as orchardists who are more comfortable following the successful and established script of green kiwifruit production. As a result, they are challenged by references to dry matter as an alternative means of assessing their practice largely because it is not addressed within their current script. By comparison, the remaining kiwifruit panels demonstrate a greater propensity to expand their expertise through experimentation. For the Gold panel, this appears to result from the relative youth of their crop—the gold kiwifruit script is still in preliminary draft form and Gold orchardists appear to be more comfortable with this situation. Similarly, organic kiwifruit production remains an emerging skill and Organic orchardists demonstrate a capacity to allow best practice to develop as opposed to being pre-determined.

By comparison, the relatively recent conversion to organic practice in the dairy sector appeared to contribute to greater differentiation between the panels in regard to their practice of learning. The distinctions are particularly apparent in the level of reference to experience and practice among Organic dairy farmers compared to that to scientific analysis and proven financial benefit among the Conventional panel. This is likely due, in part, to the perceived lack of credible research (and by extension, relevant information) directed toward practical aspects of organic dairy management. In addition, the Organic farmers are more likely to both list field days as important outlets for information and question the legitimacy of scientific research. This difference is further reinforced by the frequent reference by the Organic farmers to the desirability of contact with experienced organic dairy producers. Proof of the potential or reliability of new technologies or practices, thus, differs between the panels with the Organic farmers emphasising

experience and experimentation (learning from mistakes) whereas the Conventional farmers prefer proven methods. The use of homeopathic remedies and mixed leys—both considered as enhancing animal health—are practices favoured by organic farmers that reflect the different approaches to learning and expertise.

Sense of Place and the Symbolic 'Look' of Farmscape

The term 'sense of place' has been most strongly developed in a literature produced by geographers employing both phenomenological (Relph 1976) and humanistic (Tuan 1974) approaches. These representations of 'sense of place' reflect on the individual's and society's interpretations of the spaces they inhabit. A common conclusion is that a greater sense of identity and belonging incorporated within this understanding would contribute to an enhanced engagement with and relationship to a particular place. The means of realising such a sense of place and the relative accessibility and uniformity of the process by which a given society 'places' itself is more widely contested in this literature. In reference to human use of natural resources, and to agriculture more specifically, several authors have identified a more appropriate—i.e., more sustainable—sense of place that involves *becoming native to place* (see Jackson 1994). This process involves the growing awareness of the biophysical environment and its opportunities and constraints for a given locality such that more appropriate practices are developed and employed in human interactions within nature. With the data available and the differentiations established above, however, it is difficult to distinguish panel differences in the participants' expressions of their sense of place. Differences that are evident often reflect a generational attachment to a particular place rather than the utilisation of particular management criteria.

The differentiation in sense of place also appears to be related to the symbolic 'look' that the participants seek to invoke within their respective farmscapes. There is relatively little evidence of differentiation in the look which the sheep/beef farmers establish on their farms. This may reflect a more embedded sense of what a pastoral farm should look like, involving in many cases the historical construction of place performed by ancestors. A further explanation involves the impact that the scale of the farmed landscape has on an individual's capacity to affect its appearance. That said, certain elements of the farm's appearance are more subject to change than others especially as they influence productive aspects of farming. For example, the value of shelterbelts appears to change according to the farmers' experience with climatic extremes, public perceptions of animal welfare and the relative importance of cropping practices, with the response showing some regional differentiation, especially where irrigation is an option. In the dairy sector, the size of the farm is often identified as a barrier to creative (that is, non-production oriented) place making given the imperatives of the industry and the inability to exclude more marginal land from grass production.

Because there is a more active sense of place creation on the kiwifruit orchards (they are not the product of several generations of place building already), differences between the panels which have developed simultaneously with the orchards are more in evidence. On the typical Green orchard, emphasis is placed on projecting a sense of order and ease of management as displayed in the tidiness of the orchard including the height of the sward and the sharp distinction between productive and non-productive elements. The home is also a frequent element of place construction among the Green orchardists. They do not, however, generally view it as an integral part of the orchard but as a separate place dedicated to personal and family life. For the Gold orchardists, the focus on control of nature shifts more narrowly to the state of the vines themselves. In response to the relatively unruly and wild nature of the gold variety, more time is dedicated to management of the vines relative to the rest of the orchard. This practice is rewarded by the apparent relationship between good vine management and better fruit returns, especially as rewarded by the Taste Zespri programme. The Gold orchardists also have more innovative technologies on show, many being among the early adopters of such practices as

alternative pruning and support structures, girdling and artificial shelter placement. Finally, on the Organic orchard the emphasis on tidiness is replaced with that of promoting diversity. As such, order and precision of form are de-emphasised and broken textures and colours are deemed appropriate, allowing for a wider engagement with the orchard that involves the senses of hearing and smell as well as sight. A similar rejection of the emphasis on a homogenous and structured farmscape is beginning to emerge on the Organic dairy farms as well. In this case, the operative practice is the establishment of mixed leys which are readily distinguished from the uniform greenness of grass pastures on the Conventional farms. (It is noteworthy that the decision to pursue organic certification is often challenged on the basis of the perceived untidiness or weedy appearance of the organic farms.) Rather than a lack of organisation, the resulting farmscape expresses the orchardist's or farmer's acceptance of 'natural' deviations in the state of the plants and animals that form part of the farmscape.

The observations of tidiness among the ARGOS participants were confirmed by the national survey data. In their survey response, Organic farmers rated as less important the presence of a neat and tidy landscape, and having a tidy, well-maintained farm/orchard. This finding supports the more qualified panel findings relating to the reported look of the farm or orchard and shows that, at a generic level, there are consistent differences among Organic farmers compared to Conventional and Integrated farmers.

Grower Stress and Wellbeing

It would be difficult to argue that the relative stress and wellbeing experienced by growers did not affect the sustainability of their practice. It does, however, appear evident in the ARGOS data that the relative influence of these factors on farmers (both as individuals and as groups) is heightened during periods of relative uncertainty and potential crisis in the respective production sectors. Thus the kiwifruit sector, which has experienced a period of relatively secure economic returns, exhibits little differentiation in the stress and wellbeing among the ARGOS panels. While the panels may project differing assessments of wellbeing (for example, the emphasis on profit in the Gold panel, on balancing financial with environmental and social returns in Organic and on sustaining a return on investment among the Green), this does not appear to affect the relative sense of stress or wellbeing more generally. The Organic orchardists do, however, express greater concern over the capacity for their sector to persevere if the premium for organic fruit were reduced. In the sheep/beef sector, the existing low market prices for their product generally exacerbate stress and threaten wellbeing to a greater extent. Under these conditions, differentiation between panels becomes more credible. Thus, we are able to determine that the Organic and Integrated farmers appear to have developed means of engaging with the economic factors which impose an external source of stress on their practice. Both practices involve a more active engagement with their customers and with consumers that offers potential rewards in the form of price premiums. Given the particular form of market stress to which the sheep/beef farmers are exposed, it is possible to suggest that the response of the Organic and Integrated panel is more sustainable and, possibly, resilient. Conventional sheep/beef farmers, on the other hand, are more likely to see their traditional position as the backbone of the New Zealand economy and society being challenged, threatening the core of their identity. Their commitment to this role influences their strategy of 'tightening their belts' and persisting with farming during a difficult time of low prices. It is more difficult, however, to extend these claims to other forms of external stress or shock. (For example, which panel would be most resilient in a market dominated by a general and severe economic downturn resulting in revived demand for low-cost production and the elimination of existing price premiums?) Finally, the dairy sector provides the greatest evidence of the potential stresses associated with the adoption of a management orientation that does not conform to established societal metrics of good or skilful farming. Variation between the panels, in this sense, hinges on the established reference to production measures as a

source of self-worth and esteem. The challenge of cows expressing discomfort or pain was a further stress specified by several of the Organic farmers who are minimising reliance on veterinary medications within their animal health regimens.

Identity and change

Identity is as important a facet of the study of sustainability in agriculture as elsewhere. Farmers and orchardists seek to live meaningful lives by acting in ways that reinforce and maintain their identities. This can be thought of as a moral economy; that is, behaving as a 'good farmer' should be provide the means of exchange for an acceptable livelihood and social status. The good farmer literature (e.g., Setten 2004, Silvasti 2003, Burton 2004) suggests that productivist behaviour has become very closely associated with good farming to the extent that it is deeply ingrained in farming culture. Hence, schemes and programmes that attempt to alter such behaviour (by introducing, for example, environmental or social metrics of 'goodness') are unlikely to be successful. This topic can also be approached via Bourdieu's Theory of Practice (1998, 1977), which suggests that a farmer will seek to gain economic and symbolic capital through 'playing the game' within the community and sectors in which s/he operates. The knowledge for participating in this game is gained through life experiences, family and class (habitus), education (cultural capital) and networks (social capital). This theoretical positioning helps to not only explain farmers and what reinforces and maintains their identities but also highlights potential ways of changing practices associated with farmers' identities. Encouraging change in practice is achieved by taking into consideration both how farmers operate in a given farming sector and how the context of production in that sector can constrain or enable certain practices.

It is possible to distinguish among the orchardists and farmers in the ARGOS programme in two way on the basis of identity: firstly, in regard to distinct aspects of orchardists' identity and farmers' identity; and secondly, different identities operating within each sector. While all the ARGOS participants (across the sectors) appear to assume essentially productivist orientations, there are other aspects to their identities which are of interest in terms of sustainable practices. For example, orchardists commonly expressed a need to justify their impact on their orchard, particularly its 'look' but also its impacts on the senses. No one way of producing kiwifruit appears to be dominant. Despite great similarity in orcharding practice, orchardists created 'different' orchards, which are loosely associated with the different management systems that are of interest to the ARGOS research objectives. Sheep/beef farmers, on the other hand, appear to have no need to justify their treatment of their farms. From an external perspective, there are no apparent visual differences between the farms that would result from different management practices; but many different kinds of enacted farmer identities can be identified, which are loosely associated with Conventional, Integrated or Organic management systems. The deeply engrained emphasis on daily production figures in dairying (see Jay 2007) is strongly associated with a dairy farmer's identity. Given the lower production associated with organic practices, this aspect of identity has had to be resisted by Organic dairy farmers who are developing a greater emphasis on the wellbeing of cows as individuals, the link between the wellbeing of their families, their cows and environmental wellbeing, and their achievements as pioneers of new dairying practices. By contrast, both of the dairy panels expressed the desire to resist the 'dirty dairying' label applied to some of their peers by following regional council guidelines for management of effluent. It is important to be aware of these identities because they present the availability of different models with the potential to incorporate sustainable practices.

Indicators of on-farm processes

A land manager's selection of and response to feedbacks to management practices provide an indication of the relative emphasis placed on various elements of the orchard or farm environment. Do these involve recognition of the interaction of the elements—a sort of

systems thinking—or do they focus on unidirectional processes and flows? What are the potential points of concern, the signals of excess, which may act as limiting factors on growers' actions? Are these largely related to economic, social, or environmental factors? The first bodies of data (particularly in Qual 1) provide strong evidence that feedbacks are operating, and that growers do observe and respond to distinct aspects of their operation. For each of the sectors, the causal map results indicate that the Organic panels give more weight to the farm/orchard environmental health factor. Furthermore, both organic and integrated management farmers reported paying closer attention to changes in plants/animals/insects on their farms in the national survey data. Despite such strands of evidence, the need to drill deeper in this area of data collection and to examine the role of feedbacks in terms of different approaches to farm management remains.

Current data suggest that the Organic panels differ from the others: with the health of the soil and its biota likely to operate as an important signifier of overall farm/orchard health. By comparison, members of non-organic panels referred to such things as the increasing numbers of birds (Gold and Green kiwifruit), the perceived health of streams (Conventional dairy), or the health of the stock (Integrated and Conventional sheep/beef) as a key indicator of environmental health. These contrasts also were evident in the value associated with the appearance of farmscapes. The Organic kiwifruit panel saw a 'messy' orchard as being good for biodiversity, whereas the Green panel sought to achieve a tidy orchard as an indicator of good (and necessary) control over nature. Meanwhile, the Gold orchardists did not focus on relative tidiness as an indicator, referring largely to the maximisation of productivity. Such differences were not as pronounced among Sheep/Beef farmers, all of whom named animal health as an important indicator of overall health of the farm. Furthermore, they shared a belief that the impact of their management practices on the environment was minimal. The dairy farmers from both panels shared a sense of injustice in regard to the accusations that their sector was 'dirty' and showed little concern for the environment. The instances of pollution or contamination that arose were attributed to the actions of irresponsible and unskilled farmers and were not seen as indicative of common practice.

Positioning Towards Nature/Environment

Of all the social dimensions recognised in the social science literature on agricultural sustainability, the participants' positioning towards nature and the environment provides some of the most distinctive differences among the ARGOS panels. More specifically, this feature of the social aspects of land management provides definitive proof of differentiation between the Organic and the remaining panels. Members of the three Organic panels demonstrate a much greater capacity to privilege nature—including their environmental responsibilities and impacts, the importance of maintaining and improving environmental health and the locating of their management within a broader landscape—as an element of farm management, both in its objectives and immediate practice. This suggests that the practices associated with organic production appeal more to those who consciously attempt to do well by the environment or to those with the capacity to uphold justifications of practice outside more conventional emphases on financial return or productivity. Thus, such perspectives appear to facilitate the adoption of alternative practices based on the assessment of environmental (and possibly social) returns as opposed to more narrowly financial benefits. (This should not be taken to imply that Organic growers would commit financial suicide in order to maintain their organic principles; rather the Organic panels are more likely to forego some of the certainty and productivity associated with non-organic production while pursuing what they perceive to be more environmentally sustainable management.) These findings do not necessarily exclude the remaining farmers from the adoption of alternative management practices. They do suggest, however, that the non-organic participants would be less accepting of environmental justifications as a basis for

change and would likely engage in further assessments (financial, labour cost, time commitment, etc.) to gauge the relative value of alternative practices.

These panel findings are also replicated in the national survey data. Organic farmers gave a higher rating of importance to a range of environmental factors: farm environmental health, soil biological activity, soil health, biodiversity, the presence of productive and non-productive species, the number of native bird species, the number of plant and tree species. In addition, they had more positive attitudes to the presence and role of both native and introduced birds on their farms, and to the presence and the role of native and exotic trees and shrubs.

Farm Management Approaches

Finally, it is possible to distinguish among all of the ARGOS panels on the basis of their farm management approaches. This differentiation largely reflects the extent to which farm management practices and the justification of that practice were important elements in the discussion of the first 14 social dimensions. In other words, it is possible to begin assembling shared understandings and approaches to proper (or good) management based on the various features of farmers and orchardists positioning relative to society, nature and production orientation. In the social science literature such assemblages are commonly referred to as farming styles (van der Ploeg 1994, 2000; Vanclay et al. 2006; Shadboldt and Martin 2005, Fairweather and Keating 1998; Fairweather and Klonsky 2009). Often, these styles have been employed as an explanatory mechanism through which differences in uptake of innovation or alternative practice could be assessed. As such, to the extent that membership in a given ARGOS panel can be equated with a designated approach to farming, it was expected that the panel structure would contribute to the analysis of sustainability. Given the lack of consistent panel differences across the social dynamics assessed in this report, we would find it difficult to argue that the panels represented comprehensively distinctive approaches to farming, let alone farming styles. A more accurate claim is that the ARGOS participants employ a variety of approaches to farming and orcharding, some of which have greater affinity to a particular management system (for example, a strong concern for the health of the environment and organic practices) or set of management systems.

An individual's approach to farming is, however, influenced by or subject to a variety of social, environmental and economic factors that contribute to the choice of management system. For example, even for the most conservative user of inputs, organic management may remain unthinkable because of its political associations. Thus, the categorisation of farmers and orchardists according to their approaches to management offers good indications of tendencies toward preferred practices. For example, the Organic panels in each of the sectors appear more willing to preference beneficial environmental outcomes over purely production gains. Similarly, more conservative approaches to farming tend to be represented within the two Conventional (sheep/beef and dairy) and the Green (kiwifruit) panels and the Integrated (sheep/beef) and Gold (kiwifruit) panels generally include participants who are less averse to the risk of technological innovation. Because the individual's approach to management—in and of itself—does not, effectively explain the choice of management system, it is not possible to collapse panel membership into a single farming style.

Potential for facilitating transdisciplinary discussion

This final set of conclusions drawn from the findings over the first six years of the ARGOS project elaborates on two major diversions from the balance of this report. First, in this section we engage in discussion of the research implications of the body of social analysis conducted with respect to the participating orchardists and farmers. In other words, we will progress beyond the documentation of both the social characteristics of the participants in

the ARGOS project and the social dynamics within which they operate and to which they respond, to examine what our existing analyses indicate for the direction and focus of future research—especially as this relates to transdisciplinary discussion. Second, we also abandon the concerted focus on panel differences to suggest possible alternative means of differentiating among participants based on social criteria. This relaxation of emphasis allows us to respond to the ovoid features of our orchardist and farmer types (utilising the panel designations) while continuing to engage with and inform the emerging analysis within ARGOS of the condition of sustainability in the New Zealand agricultural sector.

Initial transdisciplinary discussions across the ARGOS data (including environmental, economic and farm management as well as social) have coalesced around several themes that have been identified within the project. These themes involve dynamics which are expected both to correspond with aspects of agricultural sustainability and to reflect permutations of factors across the disciplinary approaches. As such, they involve topics and issues that are relevant both to the overall objective of the project (promoting more sustainable management practice) as well as the intention to provide a more systems and process oriented approach to the analysis. Here we will focus our discussion on five of the themes—market audit schemes, resilience, intensification, farmer orientation, indigeneity and the capitals approach to sustainability—that have gained more traction within the project to date. Our intent is to identify important issues and raise research questions relating to these themes. More detailed engagement with the themes can be found in a series of 'in progress' working papers dedicated to each.

Audit and Market Access

As a transdisciplinary theme in ARGOS, the issues of *audit* and *market access* speak to the key governance pathway that is currently available to growers/industries wishing to pursue more environmentally 'sustainable' production options (in contrast to the *regulatory* pathway and the *voluntary* pathway). The parameters of this theme are closely related to the existing panel distinctions. As such, it reiterates the expectation that the designation of good management practice in the form of audit schemes will affect both environmental and social impacts of food and fibre production as well as the expectations and understandings of management held by producers and other participants in agri-food systems. A more exclusive focus on market audits as a transdisciplinary theme, however, enables us to address additional, and possibly more relevant, emphases beyond panel differences including: a) Do producers assume the regulated practices as features of best practice and incorporate them within concepts of good farming?; b) Do the audits promote the intended outcomes (as opposed, for example, to creative 'cheating' or the reinforcement of bad practice)?; c) How do participants differ in their enthusiasm for compliance—and how does this reflect on their practice and positioning?; d) Is it possible to differentiate among the actions of the 'merely compliant' and those with more pronounced and endogenously generated attitudes of social and environmental responsibility?

Resilience

As a transdisciplinary theme, the concept of resilience appears to be a promising alternative to sustainability. Within the literature on socio-ecological resilience, the emphasis shifts from the identification of steady state target conditions (sustained balances in the social, economic and environmental systems) to developing the capacity to withstand shocks and maintain system function through both flexibility and redundancy in systems. In developing this theme, the objective of ARGOS research would involve not so much the designation of productivity goals and mitigation practices as it would the proliferation of potential responses, feedback mechanisms and alternative practices with which to increase the management options available to the orchardists and farmers as well as their understanding of the impacts of their practices. The ARGOS social objective can contribute substantially to the development of this theme through further research that emphasises differences

among participants relative to variations in: a) their sense of empowerment, on the one hand, and the agency and value of both human and non-human actors on the other; b) their proclivity to acknowledge a variety of social, economic and environmental factors as indicators of feedback loops in the management system; c) their tendency to display and react upon a growing 'sense of place' or nativeness to that place; d) traits that demonstrate greater flexibility and reflection in response to problems, crises or shocks; and e) their capacity to recognise alternatives (allow these alternatives to be 'thinkable').

Intensification

A further transdisciplinary theme assumes great importance and immediacy given the evidence of the increasing application of ecological and social subsidies to New Zealand's management systems (MacLeod and Moller 2006; Parliamentary Commissioner for the Environment 2004). Such subsidies, by opening the production system and increasing its dependence on externally sourced inputs, threaten the resilience of these systems. Despite the apparent drawbacks, however, the tendency to intensify continues and appears to be inevitable. From existing social analysis we can suggest several characteristics of the project's participants (again, not necessarily conforming to the panel designations) that either promote or discourage the pursuit of intensification, including concepts of good farming and productivism, the extent to which intensification is seen as positive innovation, and the relative thinkability of feedbacks and alternatives. Similarly, these findings indicate several areas of emphasis and sets of questions for the further development of this theme: a) Is there an equivalent productivist element among New Zealand orchardists and farmers to that found in Europe (see Burton 2004)?; b) What justifications do producers give for the adoption of more intensive practices?; c) What justifications do producers refer to when they choose not to adopt more intensive practices?; d) Are the latter set of justifications affected by an individual's sense of place or level of engagement with a more broadly defined social and environmental system?; e) Are farmers with specific social traits or in specific (social) structural situations more prone to pursue intensification trajectories? Finally, given that none of the farmers participating in the ARGOS project appear to be the most fervent proponents of intensification, the collection of data more relevant to this theme may require selecting additional participants to fit this criteria.

Farmer Orientation

Farmer orientation is a transdisciplinary theme that is largely driven by theoretical insight from the social research team. It is underpinned by evidence from a broad existing literature (including farming styles as well as recent work on motivations ranging from Bourdieusian capitals—Burton et al. 2008, Hunt in press; to household life cycle analysis—Shucksmith and Hermann 2002; to a sense of place—Jackson 1994; to evaluation in a conventions theory approach—Rosin 2009) demonstrating the extent to which the human-environment interactions occurring at the farm level involve the land manager's positioning within the farming community and society more generally. Because such factors have the capacity to supersede overtly rational or logical reactions to environmental or economic stimuli, they provide potential insight to longer-term, more persistent influences on land management decisions. Thus, to the extent that these can be quantified, these literatures provide the entry point for theoretically informed statistical analyses to identify explanatory variables that extend beyond the current emphasis on panel membership in the ARGOS project. In other words, the social objective can lead the development of inquiries around such issues as: a) is it possible to demarcate farming styles that either introduce greater nuance to or cut across false boundaries in the ARGOS panel structure?; b) to what extent does the pursuit of and investment in the symbolic capital of farming or orcharding (e.g., a focus on tidiness or productivity) influence management between and within both panels and sectors?; c) to what extent are management decisions a response to the current life cycle stage of the farming household?; d) is it possible to develop a viable metric of an individual's sense of place or social and environmental breadth of view that contributes to

explanation of outcomes (social, economic, environmental) on ARGOS farms?; e) to what extent does management practice reflect references to different justifications for evaluating practice, outcomes and status? The assessment of this theme relies on statistical tools to identify potential relationships between social factors and the data collected by the other ARGOS research teams. Ultimately, however, the significance of any findings will be determined by the coherence of the theoretical explanations that emerge from the analytical process.

Indigeneity

Indigeneity has emerged as a theme in the ARGOS project primarily as a result of the cross-cultural analysis facilitated by the inclusion of the He Whenua Whakatipu objective. Interrogation of the theme seeks to establish the extent to which an individual's or group's sense of belonging to a place or landscape influences their engagement with it. In this regard, indigeneity demonstrates some similarities to sense of place as an entry point to analysis. Within this theme, however, the emphasis is more specifically on forms and styles of *knowledge* or *knowing*. In particular, it provides a vehicle for examining the role and impact of local as compared to scientific knowledge in land management decisions (Berkes 2008; Hassanein and Kloppenburg 1995). Data and findings from the social research objective can likely contribute to the elaboration of this theme through the assessment of the learning and innovation strategies and characteristics of participating orchardists and farmers. In addition, the social team has assessed each participant according to a native to place scale which loosely incorporates aspects of an individual's or household's embeddedness in the local context (social and environmental). By extension, it is possible to argue that people who are more native to their place are likely to approach a deeper form of indigeneity. Relevant questions that emerge from reflection on this theme include: a) do the ARGOS panels differ in regard to their evaluation of different systems of knowledge?; b) to what extent does 'nativeness to place' explain differentiation within the panels?; c) what factors contribute to the development of 'nativeness to place' in different individuals?; d) does reference to indigeneity help to explain differences between the Maori and Pakeha management outcomes? This research area requires, however, more concerted examination of the process through which individuals and households become embedded in their localities in order to achieve comparable data to that available in the He Whenua Whakatipu objective. The proposed retrospective interview for ARGOS 2 is expected to provide insight to such process and, thus, contribute to this theme.

Capitals approach to sustainability

The capitals approach to sustainability has been posited as a further transdisciplinary theme for the ARGOS project. In essence, it seeks to define sustainability in an accounting framework whereby the human, social, human-made, cultural and natural capitals are assessed. Sustainability is then defined as a course of action which maintains or enhances the existing capital base. The intent of this theme is to utilise the accumulated data from across the ARGOS project as a means to assess the potential of the capitals approach and to provide grounded critique where appropriate. The social objective can contribute to this theme in providing means to quantify (and account for) elements of social capital among the ARGOS participants. The social objective will also seek to critically address the following issues related to the capitals approach: a) are equivalent measures of social capital meaningfully applied across heterogeneous populations?; b) does social capital retain its assessed value in all contexts?; c) to what extent are capitals exchangeable?

Concluding remarks

As a whole, the conclusions presented in this report indicate both the value of the analyses of the existing data as well as the imperative for a more expansive focus in future research undertaken by the social objective. While it is possible to distinguish several significant social differences within the existing panel framework, these provide only partial insight to

the wider objectives of the ARGOS project. For example, we can identify characteristics and attitudes of Organic orchardists and farmers that contribute to their willingness and capacity to adopt organic management practices. These do not necessarily inform us, however, as to the expected response to and uptake of socially and environmentally more responsible measures by means of market audit regulation among the whole of the New Zealand agricultural population. Nor can the exclusive focus on panel differences provide sufficiently comprehensive and nuanced explanations of the relative resilience of farmers or their propensity to pursue intensification trajectories. As indicated above, the process for achieving more adequate explanations of the condition of sustainability in the New Zealand agricultural sector will involve more substantial transdisciplinary interactions and discussions as well as further research targeted more specifically at the transdisciplinary themes.

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