# Valuing Sustainable Food and Fibre: Implications for integrated supply chain approaches to sustainability

## Saan Ecker

**ANU**

THE AUSTRALIAN NATIONAL UNIVERSITY

# *Candidate's Declaration*

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author's knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

Saan Ecker                                                    Date:

# Acknowledgements

# Abstract

The social life of food and fibre production and consumption is often overlooked in efforts to develop policy and programs aimed at shifting to more resource efficient and environmentally and socially benign food and fibre systems. Issues of economic survival, lifestyle influences, values, identity and empowerment contribute as much to the complexity of sustainable production and consumption as do product life cycle issues such as water and energy efficiency, soil management and dealing with waste.

That production and consumption is socially constructed, within the environmental and economic context, is well accepted. Emerging social research approaches that consider entire systems of food and fibre production and consumption are transcending segmented approaches focusing on either production or consumption. Understanding the extent to which production defines consumption and consumption defines production is an important element in the development of sustainable food and fibre systems.

The aim of this study was to investigate potential frameworks for implementing whole of supply chain approaches to addressing the environmental and social sustainability issues associated with food and fibre production and consumption. This approach is based on the philosophy that all supply chain actors, including consumers, are implicated in social and environmental sustainability issues associated with our food and fibre systems.

This was achieved by exploring how social and environmental sustainability issues were valued and integrated in ten production-to-consumption system case studies which represented five different commodities including wool, dairy, horticulture, grains and viticulture. The farms sourcing these supply chains were located in the Blackwood Catchment in the South West of Western Australia. As an established 'social catchment' the location provided an important context for the project given the largely community-based efforts to support sustainable agriculture which had occurred over time in the catchment.

Theoretical concepts from systemic intervention and soft systems methodology were explored to inform a situation-driven methodology based on adaptive theory. The use of adaptive theory enabled a disciplined approach to integrating the complex sources of data and information in the study. Through interviews and forums, information was gathered about how sustainability

values held by supply chain actors influence (or fail to influence) the development and operation of integrated supply chain sustainability approaches.

The study used 'product narratives' or product stories as the form which best communicated the experiences associated with sustainability in each food or fibre product chain. The narrative form was selected because of its potential to be transformative and because of the increasing relevance to markets of the story behind the product. As a study of 'best practice', the research considered supply chains which involved both farmers and consumers that were already making efforts towards sustainability. A participatory research model was used, building on established relationships between the researcher and participants.

Attitudes to sustainability were examined at the farming, warehousing, manufacturing and retail stages in the supply chains. 'Green' consumers were surveyed because they were the most information rich on the topic. Non-certified supply chains were paired with certified supply chains (e.g. organic and EU Eco-wool) to allow comparison between these approaches. The study tracked the transfer of sustainability values through the supply chains with a particular focus on the transfer of environmental sustainability values.

Farmers interviewed held strong environmental and social values and were generally concerned about the transfer of these values along the supply chain. The middle chain actors were generally unconcerned with the transfer of social and environmental sustainability values, with the exception of some actors in certified supply chains. The 'green' consumers targeted for this study were concerned with environmental and social sustainability values (as secondary issues to price, health, quality, freshness and taste).

A set of characteristics of sustainable supply chains emerged including 'core sustainability values' and 'dimensions' of sustainable supply chains. Sustainability values which emerged from the empirical data as central in the supply chains included those related to health, environmental sustainability, social equity, prosperity, animal welfare and regional sustainability issues.

Based on existing sustainable supply chain enterprises and new models of sustainability that emerged during the study, an intervention framework to support the development of sustainable supply chains is proposed, targeting all supply chain actors. This intervention framework outlines proposed pathways for supporting sustainability in food and fibre systems through addressing impediments and building on drivers identified in the study.

# Table of Contents

# List of Figures

## List of Tables

## *List of acronyms and abbreviations*

| | |
|---|---|
| BBG | Blackwood Basin Group |
| BMP | Best Management Practice |
| CSIRO | Australian Commonwealth Scientific and Research Organization |
| EMS | Environmental Management System |
| EU | European Union |
| EUREPGAP | Euro-Retailer Produce Working Group for Good Agricultural Practice |
| CSA | Community Supported Agriculture |
| CSR | Corporate Social Responsibility |
| HACCP | Hazard Analysis at Critical Control Points |
| ISEAL | International Social and Environmental Accreditation and Labelling (Alliance) |
| ISO | International Organization for Standardisation |
| LEAF | Linking Environment and Farming |
| QA | Quality Assurance |
| NASAA | National Association for Sustainable Agriculture Australia |
| NGO | Non Government Organisation |
| NRM | Natural Resource Management |
| PETA | People for the Ethical Treatment of Animals |
| RMIT | Royal Melbourne Institute of Technology |
| SCARM | Standing Committee on Agriculture and Resource Management |
| SQF | Safe Quality Food |
| SW WA | South West Western Australia |

# Chapter 1: Introduction

## *1.1  Background*

This study is strongly linked to people and place and considers the interactions between these aspects in the context of food and fibre supply chain systems for five commodities important in the case study area, the Blackwood River catchment, South West Western Australia.This study considers influences by supply chain actors, particularly at the farm and consumer stages, in creating environmentally and socially sustainable food and fibre systems. The study builds on previous efforts to understand the place of farm scale and consumer efforts in achieving environmentally and socially sustainable food and fibre systems. These efforts have been both at the practical and the theoretical level.

Applied research that aims to better understand the role of other supply chain actors including consumers in sustainable food and fibre systems include studies of mostly small scale cooperative approaches such as community supported agriculture models and efforts by non government organisations (NGOs). Theory generation relevant to describing sustainability efforts by producer and consumer actors can be found within a wide range of sources including ecological, food sociology, agri-food systems and sustainable consumption literature.

This study brings together aspects from both practical and theoretical approaches to better understand attitudinal drivers of and impediments to sustainable food and fibre systems. This study is embedded in place, in relationships and in specific agricultural commodities. The place is the 2.5 million hectare Blackwood River Catchment located in the South West of Western Australia. This area was useful as a case study area because of the diversity of commodity production systems represented within the region. The relationships important in this study are those between supply chain actors and also those between the researcher and the communities of practice represented in this study. The researcher was catchment coordinator for the Blackwood Basin Group, the main natural resource management organisation in the catchment, for seven years (1998-2005). Commodities chosen for the study are those that dominate in the catchment, being wool, grains, dairy, wine and horticulture.

Important in the research setting are the efforts by Commonwealth and state governments, agricultural industries and non-government organisations to build a support base for sustainable on-farm production. This includes importantly the $30 million National Environmental Management Systems (EMS) program (2003-2006) delivered by the Commonwealth Department of Agriculture, Forestry and Fisheries.

The initial driver for this study emerged out of the Blackwood Basin Group's BestFarms Environmental Management System (EMS) project, which was one of the 16 national pilot projects funded under the National EMS Program. This driver was related to the need to understand how the capacity for sustainable production built on the 300 participant farms in the BestFarms program might interact with the rest of the supply chain. A key enquiry was whether the BestFarms system and others like it could improve returns to farmers by communicating improved sustainability values of food and fibre to the market.

The research literature on the topic of farm assurance programs points to the lack of connection between environmental and social sustainability efforts at the farm level and consumer demands and expectations. Much of the research initiated from the EMS 'sector' has started with a farm production focus and ventured into the consumption and demand area only to find a lack of understanding and interest relating to agricultural sustainability issues.

Therefore, whilst the issue of farm scale efforts at sustainability provided the impetus for this study, it was considered necessary to consider farmers within the context of the entire supply chain. As such, this study has a significant focus on the attitudes towards food and fibre sustainability held by middle supply chain actors and consumers, as well as farmers.

Based on perceived lack of interest by post harvest supply chain actors, Cary et al. (2004:29) suggest that, 'markets for food products that are sustainably produced … will not be commercially viable in the short to medium term'. This study considers this perspective using examples of existing supply chains, aiming to explore and explain this apparent lack of interest and in so doing, progress the discourse on the development of sustainable food and fibre systems.

## 1.2   Developing a terminology

This study focuses on food and fibre systems inclusive of selected stages and influences from 'paddock to plate' or 'farm to fork'. Food and fibre systems are described in the sociological literature in many and varied terms including agri-food systems, commodity systems, systems of provision, supply chains, value chains and production to consumption systems.

Value chain is a term traditionally used to signify the process of adding economic values throughout the cycle between producers and consumers. A business management concept described in Porter (1985), a value chain is a chain of activities where economic values are built at each stage. More recently, the term has come to be understood as customer focused, with the actors working together to create more value for customers (O'Keefe 2003).

The term supply chain is often defined as a term that covers the entire system from pre-production to post-consumption and can be considered as a set of activities that transform raw materials into a consumable product. The term supply chain and value chain are compared by O'Keefe (2003) with supply chain referring to a more logistical productivity approach compared to the marketing productivity approach of value chains.

A third term, 'production to consumption systems' is a useful definition for the describing the full extent of the systems involved in food and fibre production and consumption. Based on Courville (2001), this terminology is inclusive of not just the supply and consumption actors but other influences such as government, community, certifying organisations and lobby groups, as well as less immediately obvious influences such as global politics.

The terms 'supply chains' and 'production to consumption systems' are both used in this thesis, according to the scope of the issue being discussed. Supply chains are used as the terminology when discussing processes involved between production and consumption for each case study product line. Production to consumption systems are used to refer to the dynamic system of relationships and influences that the supply chain exists within.

That is, supply chains sit within the wider context of production to consumption systems which incorporate socio-economic and environmental contexts including industry, government and

community influences. A conceptual diagram outlining the relationship between these two terms is shown in *Figure 5: Production to consumption system used in this study* in Chapter 4.

This study focuses its major emphasis on the farm and the consumer ends of the production to consumption cycle. The term 'supply chain' has emerged as a useful term for describing the discrete system of production and consumption for each of the ten product lines considered in this study. Supply chain is also the common language used by participants, both farmers and consumers in describing food and fibre systems.

Although the term 'value chain' could be adapted to mean sustainability values, not just economic, the existing definition was considered too loaded for this adaptation, because of its primary focus on economic values. Using this term in a study that focused on attitudinal values would also present significant room for confusion.

The definition of supply chain used in this thesis embraces processes (both physical and social) occurring from farm to consumption stages. This includes farm production, processing, manufacturing, distribution, wholesale, retail and consumer purchase. For the purposes of this study, 'supply chain' does not include pre-harvest stages such as fertliser production or animal feed production or post consumption stages such as eating and disposal of post-consumption waste. Pre-harvest or post consumption supply chain actors and processes are not the focus of this study; however they do receive some limited attention where necessary for context and meaning.

Because this study focuses on values related to sustainability, the supply chain is considered as a vehicle for communication of these values. That is, values can be considered to be passed along the supply chain, being exported by the farmer, communicated by middle chain actors and imported by the consumer. Values may also go back up the chain or values may not be shared amongst supply chain actors.

## *1.3 Study aims and objectives*

The aim of this study was to investigate potential frameworks for implementing whole of supply chain approaches to addressing food and fibre sustainability issues. Ten case study food and fibre supply chains are considered in this study, all of which included significant efforts at sustainability at the farm scale.

To better understand the role of certification in the transfer of sustainability values, certified (organic, biodynamic and EU Eco-wool) supply chains were paired with conventional supply chains. Commodities expored were wool, dairy, horticulture, wine and grains, with two supply chains for each commodity being investigated.

Furthermore, the study aimed at identifying the relative contribution of environmental management systems to whole supply chain sustainability approaches and six of the ten farms involved had undertaken some part of an Environmental Management System (EMS). A description of the requirements of a farm EMS and the reasons why this context is important is provided later in section 2.5. The selection of case studies allowed the exploration of key differences between supply chains where there was a strong sustainability focus throughout the supply chain and supply chains that demonstrated a limited focus on sustainability (e.g. a concern only at the farm stage).

Within these broad aims, the study has four-related objectives that relate to the consideration of sustainability values in food and fibre systems. The first objective was to better understand key features that contributed towards or impeded the development of sustainable food and fibre production and consumption systems within the chosen context and setting.

Associated with this objective was the second objective of determining the level of transference (or sharing) of sustainability values along food and fibre supply chains. This involved exploring how social, environmental and economic values were held and shared within the case study production to consumption systems.

The third objective was to enquire about the role of sustainable consumption as a driver of sustainable food and fibre systems and sustainable practices at farm and other stages within food and fibre supply chains.

The final objective was to develop a conceptual framework for describing and explaining sustainable supply chains. This objective included the identification of intervention pathways effective in encouraging the development of social and environmental sustainability values and transferring these values from farmers to consumers.

## 1.4  Thesis overview

This chapter provides a brief background to the study as well as aims and objectives. The orienting concepts that provided the initial theoretical basis for the study are also outlined.

Chapter 2 provides the geographical and operational context of the study including background information about the regional context of this study and a brief history of sustainable agriculture efforts in the case study region. This basically provides the context from which the research project emerged.

Chapter 3 provides the conceptual setting for the study, providing a literature review covering various sources related to the topic including emerging trends in sustainable production and consumption as well as information on relevant theoretical approaches to understanding this topic.

Chapter 4 (Theoretical approaches) describes the key theoretical influences in this study and how they are applied in research design and to develop theory. Chapter 5 (Method) describes the data collection and analytical methods used.

Chapters 6 and 7 present the results of the study. Chapter 6 provides the core of the thesis and the ten supply chain product narratives are told here. In Chapter 7, the quantitative results from the consumer survey are presented as well as the outcomes from the interactive forums.

Theoretical concepts begin to be built from the context, settings and outcomes of the research investigations in Chapter 8. This chapter describes the first of two iterations of theoretical models describing the conceptual basis of 'sustainable supply chains'. The first, in Chapter 8, describes production to consumption systems as observed.

Chapter 9 involves a discussion on the central theme of this study, the sustainability values, outlining the presence, importance and transfer of these within the production to consumption systems considered in this thesis.

Chapter 10, describes the potential for production to consumption systems that emerged. The theoretical model outlined in Chapter 10 is described as an intervention framework. It essentially emphasises the positive drivers and addresses some of the impediments in the first model (described in Chapter 8). The first model is for understanding supply chains. The second model explains the elements that allow supply chains to work as 'sustainable supply chains'. Key intervention points are also identified in this second model. Empirical anchorage (Layder 1998: 112) is used to explain both of these conceptual models.

Chapter 11 outlines the conclusions, describing project outcomes according to the four key objectives of the study and also the broader outcomes of the study including outcomes related to the methodological approach. The key dilemmas for sustainable food and fibre as observed in this study as well as recommendations for the implementation of the intervention model are also outlined in Chapter 11.

## 1.5  Orienting concepts

Whilst the intent of this thesis originally began with a question about the value of Environmental Management Systems (EMS) on farms as a mechanism for broadscale environmental change, the research journey involved took the researcher to a significantly more complex understanding of this question. Involvement in the stories of sustainability shared by participants led to a deeper understanding of the interaction between environmental, social and economic issues within the food and fibre systems case studies. Sensing an inherent mistake in a primary focus on farms, an approach emerged that considered all the relevant actors in a systems approach. Equally, the grip on the desire to focus on examining values related to environmental (i.e. 'natural systems') was also loosened by a more grounded understanding of the worldview of participants which necessarily integrated the environmental into social and economic arenas.

It also became clear that to focus on the role of EMS in an isolationist way was not desirable in terms of understanding sustainable food and fibre systems, as knowledge of a fuller complement of issues was needed. It was also difficult to isolate the role of EMS in sustainable food and fibre systems because EMS occurs as one of many elements in the human activity systems involved. Hence food and fibre production to consumption systems and related environmental, social and economic sustainability issues became central to the study.

Within this emerging understanding of the research topic were several orienting concepts. These background, or orienting, concepts (Layder 1993, 1998) represent established themes, useful information and issues related to the area of research. Layder (1998) advocates the use of preconceived theories as orienting concepts, rejecting Glaser's (1978) and Strauss's (1987) emphasis that theory should strictly emerge only from data. Layder (1998:113) notes that 'it is only possible to commence analysing, theorizing and explaining aspects of social life if one is already in possession of certain assumptions and ideas about the social world'. He notes that inclusion of these assumptions as orienting concepts deals with the issue that observation is 'always saturated with theoretical ideas' (1998:113) in a systematic way. Orienting concepts can assist in the initial ordering of information and data, and also play a part in the development of theory (Layder 1998).

The orienting concepts used in this study include concepts related to creating change through the research activity, understanding systemic influences, recognising the role of community engagement and participation in fostering change and a range of ideas concerning the sustainability of agriculture.

Adaptive theory (Layder 1998) allowed the integration of these concepts as well as new attitudinal and empirical data collected through the study, allowing both an inductive and deductive approach to data analysis. This is discussed at length later in the thesis.

The following section explains how a range of theoretical frameworks and concepts were considered that synchronise with these orienting concepts. The first and most enduring experience of the researcher was the desire to explore positive interventions to improving the situation. This desire to contribute to positive change was a key orienting concept and is described below through the concept of systemic intervention.

## 1.5.1 Making a difference

An important orienting concept was the objective to intervene to create positive change in my community of practice rather than undertake research for the sake of research. The subject matter, sustainable food and fibre, had been a focus of mine for some years. As catchment coordinator for the Blackwood Basin Group (BBG), I actively participated in sustainable agriculture programs that were assigned to me under my coordinator responsibilities. I also intervened in this topic area by developing business plans and initiating new projects focused on the topic, such as the BestFarms EMS program.

Researching this area of prior interest signified an opportunity to explore a more theoretically rigorous intervention approach to improving sustainability in food and fibre systems.

Intervention is described by Midgley (2000:113) as 'purposeful action by a human agent to create change'. These actions, he argues, can be ascribed to a range of agents including individuals, organisations and communities. Using Midgley's systemic intervention model in the research design was appropriate for this research where the primary intention was to undertake research for social benefit and the objective of exploring the robustness of certain methodologies was secondary. My experience in the Blackwood catchment relates well to Midgley's model of systemic intervention with the Blackwood Basin Group operating as an agent of change.

Midgley's systemic intervention methodology has three pillars: the first being the need to critically reflect on the boundaries of the system in question: the second the need to make choices between theories and methods to guide action: and, the third relates to the need for the methodology to be explicit about taking action for improvement (Midgley 2000:130).

Reflecting on the boundaries of this study and the overlaps between different beliefs and opinions held by different supply chain sectors, industries and other sub-populations was an important aspect of this study. The integration of the second pillar, concerning the choice of theories and methods, is evident in the selection of a range of techniques chosen to undertake this study.

That the methodology is explicit about taking action for improvement, the third pillar, is clear in the objectives and the methods used in the study. As Midgley notes, 'improvement' is subjective and needs to be defined in context and according to values held by those directly affected. On this he suggests the use of the term 'sustainable intervention' which will: '…last into the indefinite future without the appearance of undesired consequences' (2000:131). Determining what this sustainable intervention might involve in the context of sustainable food and fibre systems in Australia was a key driver for this study.

## 1.5.2 Interconnected human and ecological systems

Another important orienting concept was the view held by the researcher that the separation between humans and the environment is socially constructed and that there are interdependent links between ecosystem health and social well-being.

These links require understanding through a systems approach that recognises the interdependence of things and that nothing exists in isolation. This includes the worldview that ecologically sustainable production should be linked to sustainable community development through a systems approach which recognises the interaction between these aspects.

It became clear that the questions I wanted to answer could only be answered through considering entire production to consumption systems and the interactions between people and the environment that occurred within these systems. The importance of understanding the world of food and fibre systems through the lens of human activity systems became apparent. Soft Systems Methodology (Checkland 1985), which has as its core concept ordering our understandings of the world through human social activity systems, provided a useful model to explore the systems influences driving or impeding environmentally or socially sustainable food and fibre systems.

Human systems considered within this research include the supply chain actors for each product, related organisations (e.g. certification organisations, landcare organisations, cooperatives, government agencies, conservation organisations and other organisations), community networks, families and individuals. The ecological systems considered included agro-ecological and natural ecosystems at farm through to global scales. Concepts from systems thinking regarding the interaction between human and natural systems were helpful in ordering this information.

Aspects of sustainability cannot be looked at in isolation and increasingly natural resource management researchers and practitioners are taking an integrative approach to social-environmental questions and problems. In recognising the interdependence between environmental, social and economic aspects of sustainability evident in the case study material, it was necessary to build a systems approach to adequately address the topic.

## 1.5.3 Developing knowledge through community participation

My involvement in community natural resource management (NRM) has led to a belief that broad local participation rather than distance governance or regulation leads to effective solutions. In addition, my experience had led me to observe the critical role that power relations play in the development of institutional frameworks relating to NRM and agriculture.

This included observations of the marginalization of some people including women and indigenous peoples (e.g. as described by Lawrence 1995) as well as non-conventional (e.g. organic and biodynamic) producers from decision making within rural NRM communities. Hence, an inclusive approach was preferred for the research method.

Having practiced participative planning and design of natural resource management and sustainable agriculture programs in the role of catchment coordinator in the Blackwood, it was also necessary to choose a research style that matched this experience. I had an already established role of facilitator of the 'participatory exploration of ideas' (Midgley 2000:202), inherent in participatory research methods which enabled a smooth transition from project manager to researcher in the community.

Flyvberg (2001) argues that the purpose of meaningful social science should be beyond purely the development of theory. He suggests it should be:

> ...an activity in public for the public, sometimes to clarify, sometimes to intervene, sometimes to generate new perspectives and always to... (assist in)...understanding the present and deliberating about the future..

Flyvbjerg's (2001) public benefit approach is entirely appropriate for this study. Also, given that the relationships developed over my seven year stint in the area were of great value to me, it was critical to use a methodology that allowed the potential to continue building these relationships as well as maintaining and strengthening the existing bonds.

## 1.5.4 New narratives of sustainability

Another orienting concept related to the value of telling life stories. Telling the 'sustainability' story behind the case study products emerged as a way of sharing both everyday as well as outstanding efforts of the supply chain actors. These sustainability stories are rich with sub-plots, difficult circumstances and hope and they essentially describe a vision for a better world in relation to food and fibre systems.

The choice of the narrative form to describe the social, environmental and economic influences related to the case study products was a natural one. The increasing trend to incorporate stories into product advertising and labelling is an indicator that this form is suitable for describing values associated with products.

The 'life story' of the product picks up the collective life stories of the product supply chain actors as the outcome of interactions between each of the participants (as well as interactions within the wider social, ecological and economic context). The resultant unified whole of this community of practice is the product. Where sustainability values have been an important element in these food and fibre systems, the product stories can also be seen as sustainability narratives where supply chain actors 'create new narratives that vividly depict…a vision of a better world and the pathway there' (Leiserowitz and Fernandez 2008:36).

The objective to tell these sustainability stories was motivated by the desire to explore the detail of what was going on with people involved in the study. This approach involved an exploration of the 'human tale' (Giddens 1974) of sustainability in food and fibre systems. Narrative tells of human projects and their consequences as they unfold over time and for these reasons it is useful in this study.

The narrative form was also useful in this study because it encouraged contemplative thinking by the participants about the processes involved in each supply chain product and provided an alternative to dispassionate lists of factors and events. Also the identity of supply chain actors seemed an important factor in the study context and the narrative form is renowned for its ability to retain identity compared to other methods. Narrative approach also assists with the humanist goal of this study of attempting to understand the meaning of behaviour and experiences from the perspective of the individuals involved (Elliot 2005: 4).

The three facets of narrative, the temporal, meaningful and social elements (Elliot 2005:4) make this approach suitable for use in expressing the processes and interactions that make up the collective human stories involved in each of case study products.

## 1.5.5 The need for alternative food and fibre systems

Another orienting concept for this study relates to the belief that the dominant productivist agriculture model of rural Australia is ecologically and socially unsustainable. This is addressed by many contemporary social researchers considering rural sustainability with bell ringing concerning this issue evident since the 1990s (Barr and Cary 1992, Gray and Lawrence 2001, Vanclay and Lawrence 1995,).

Whilst many serious natural resource management issues in Australia have historical causes, there is little doubt that some current production systems are further degrading the environmental resource base (Williams and Saunders 2002). In the farmland dominated wheatbelt of Western Australia there are some 50 species that are critically endangered and salinity affected areas are expected to increase from 2 million ha to 6 million ha in the next 100 years under the current do-nothing scenario (Hatton et al. 2003). Significant research and effort has been directed at defining land use practices that do not cause further damage to the environment but for a myriad of reasons, practices that degrade the resource base dominate.

At the international and national scales, there is a desire for a shift in production practices that reduce impacts on ecosystem processes and reduce species losses at the same time as generating farm income. Williams and Saunders (2002) comment that the effects of unsustainable land management practices are '…enduring, not easily reversed, and are becoming increasingly expensive to correct'. They go on to qualify that this damage has reduced the productive capacity of lands (although in some areas productive capacity has increased), adversely impacted on water quality and biological diversity, threatened human health and put agricultural trade at risk through failure to demonstrate production systems that do not damage the environment (Williams and Saunders 2002).

However it is also accepted that the productivist model has a constantly changing form and not all aspects of the productivist model are to be rejected in the quest for sustainability. In drawing on existing systems to inform the development of improved ones, some assumption is made in this study that the desired intervention towards sustainable food and fibre systems will incorporate aspects of current 'conventional' systems.

Lang and Heasman (2004:19) describe the productivist paradigm in the contemporary context. They characterise it by the shift from local and small scale to concentrated production and mass distribution (acknowledging that local scale agriculture produces a significant amount of the worlds food), increased use of inputs including plant and animal breeding, reduction in the number of farms, mechanization and a reliance on fossil fuels.

In the regional context of this study, two clear paradigms relating to food and fibre exist; organic (inclusive of biodynamic) and conventional.

## 1.6    Synopsis Chapter 1

This study uses a case study approach to enter into the rich detail of supply chain actors' attitudes and values relating to environmental and social sustainability issues and how these values are shared and communicated. The study objectives relate to better understanding the forces involved in driving or impeding the development of sustainable food and fibre systems. Another objective of the study is the exploration of the presence of sustainability values and how these values are shared or communicated amongst supply chain actors. Understanding the role of sustainable consumption in sustainable food and fibre systems is also an objective of the study.

Whilst the study considers processes and procedures within food and fibre production and consumption systems, it maps a social landscape rather than undertaking a life cycle assessment approach often associated with supply chain studies.

The study builds on a background of effort in the Blackwood River catchment and also at national level to implement farm environmental management systems and other approaches that can potentially communicate sustainable agriculture values to the wider community. It also builds on a long term relationship between the researcher and the community of practice represented in this study.

There are five orienting concepts that provide a useful reference for this work. They are used to provide guidance both to what the study is about and how to go about it. That is, they provide both substantive ideas and theoretical support. The concepts are related to systems of intervention for positive change, the need for participatory approaches to develop effective and relevant solutions, the integration of human and ecological systems, the importance of capturing life stories and the view of productivist agriculture as unsustainable. This provides the underlying basis for the study and the motivational drivers influencing the researcher in undertaking the study. The next chapter describes the 'place' and the operational context of this study in greater detail, necessary for understanding the influences and wider context for the case study production to consumption system actors.

# Chapter 2: Research Context

## *2.1    Definitions of sustainability*

Sustainability is recognised as having three pillars, ecological sustainability, social sustainability and economic sustainability. A significant and widely cited reference is the Brundtland Report *Our Common Future* (Bruntland 1987), which defines sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. Figure 1 provides a more recent overview of the different interactions of the three pillars of sustainable development.

**Figure   1:  The   interactions   between   ecological,   economic   and   community development**
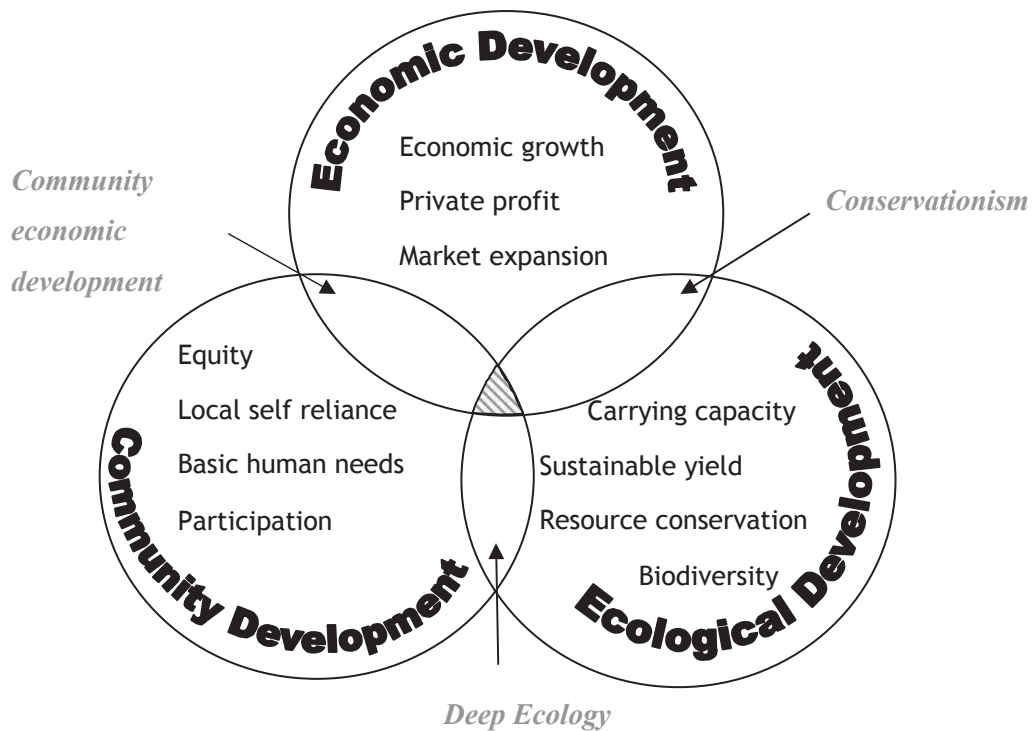


Source: Bell and Morse (2000)

In terms of sustainable agriculture, the United Nation's (UN) Food and Agriculture Organization (FAO) adopted the following official definition of Sustainable Agriculture and Rural Development in 1988:

> Sustainable development (in the agriculture, forestry and fisheries sectors) should conserve land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable

During the UN Conference on Environment and Development, in 1992, a number of non-government organizations (NGO) drafted their own NGO Sustainable Agriculture Treaty which states:

> Sustainable Agriculture is a model of social and economic organization based on an equitable and participatory vision of development which recognizes the environment and natural resources as the foundation of economic activity. Agriculture is sustainable when it is ecologically sound, economically viable, socially just, culturally appropriate and based on a holistic scientific approach.
>
> Sustainable Agriculture preserves biodiversity, maintains soil, fertility and water purity, conserves and improves the chemical, physical and biological qualities of the soil, recycles natural resources and conserves energy.
>
> Sustainable Agriculture uses locally available renewable resources, appropriate and affordable technologies, and minimizes the use of external and purchased inputs, thereby increasing local independence and self sufficiency and insuring a source of stable income for peasants, family, small farmers and rural communities, and integrates humans with their environment.
>
> Sustainable Agriculture respects the ecological principles of diversity and interdependence and uses the insights of modern science to improve rather than displace the traditional wisdom accumulated over centuries by innumerable farmers around the world.

## 2.1.1 National definitions and standards

Beginning in 1991, several studies have been carried out to establish a framework for sustainable agriculture in Australia, and to better understand approaches to agricultural sustainability. Related studies have been conducted by the Standing Committee on Agriculture and Resource Management (SCARM) and its predecessor the Standing Committee on Agriculture (SCA), the National Land and Water Resources Audit (NLWRA), ABARE and the National Food and Industry Strategy (Allen Consulting 2004). The Australian Standing Committee of Agriculture (1991) defined sustainable agriculture as:

> The use of farming practices and systems which maintain or enhance the economic viability of agricultural production; the natural resource base; and other ecosystems, which are influenced by agricultural activities.

The guiding principles for sustainable agriculture were stated by SCARM (1998) as :

- farm productivity is sustained or enhanced over the long term
- adverse impacts on the natural resource base of agricultural and associated ecosystems are ameliorated, minimised or avoided
- residues resulting from the use of chemicals in agriculture are minimised
- the net social benefit derived from agriculture is maximised
- farming systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets

(SCARM 1998)

The indicators of sustainable agriculture according to SCARM (1998) are related to long term real net income, natural resource condition, off-site environmental impacts, managerial skills and socio-economic impacts.

In addition to SCARM, Australia has a number of processes to measure indicators relevant to sustainable agriculture including State of Environment reporting (SoE 2001), Triple Bottom Line Environmental Performance Indicators (EA 2003), the ABS Headline Indicators, and the more recent Signposts in Agriculture indicators (Chesson 2006).

## 2.1.2 Definition of sustainability used in this study

For the purposes of this study, 'sustainability' emerges from the range of definitions presented by study participants. These definitions emerged during the research process. As discussed later, sustainability definitions presented by participants covered a range of aspects, including: environmental and social sustainability, intergenerational equity, local community viability, animal welfare, health and economic sustainability.

Sustainability indicators developed by the Standing Committee (SCA) on Agriculture (1991) and the Standing Committee on Agriculture and Resource Management (SCARM) (1998) as stated above were used to inform the study but not limit it. These indicators were not directly used in the study but were helpful in framing the issue of sustainability. Adopting a broad framework including these indicators provided a context to discover what the participants' views of sustainable agriculture were; with the objective of developing a definition that could be useful for food and fibre production to consumption systems, rather than just a focus on the farm stage.

## 2.2  Sustainable agriculture issues in South West WA

At a state scale the Department of Agriculture, Western Australia (AGWA 2003) identify a range of economic and market challenges for food and fibre systems. This includes the weakening relationship between farm returns and food prices; social issues including population decline, environmental issues including those related to climate change; and a decline in land and water resource condition, including soil decline and salinity (ibid).

Despite these issues, the prospects for agriculture in Western Australia are positive, with economic growth continuing in many sectors. AGWA (2006) suggest that farmers have responded to economic challenges by adjusting their input and enterprise mix, adjusting household expenditures, investing off-farm, maintaining high equity and increasing their production efficiency and scale of operations. They are using new technology and research and development findings, diversifying enterprises, creating off-farm investments, increasing the use of contract services and improving their business planning skills (AGWA 2006). AGWA (2006) also suggests that producers will respond to challenges by increasing participation in supply chains, including becoming an equity partner in those chains. Farmers are responding to these pressures within their financial capacities including shifts in land management practice. The following table indicates changes in investment in NRM by WA farmers over time, albeit showing a limited definition of sustainable land management:

**Table 1: Effort in NRM by Western Australian farmers**

| Practices | 2002 (%) | 2003 (%) | 2004 (%) | 2005 (%) | 2006 (%) |
|---|---|---|---|---|---|
| **Agronomy Practices** | | | | | |
| Planted non-irrigated perennial pasture species | 34 | 33 | 39 | 39 | 42 |
| Planted saltland pasture species (agriculture region only) | 23 | 15 | 21 | 17 | 32 |
| Stubble retention or mulching practices (agriculture region) | 62 | 48 | 71 | 60 | 64 |
| **Land conservation management** | | | | | |
| Tree/shrub planting | 62 | 56 | 56 | 59 | 70 |
| Preserved or enhanced areas of conservation value | 60 | 57 | 62 | 58 | 75 |
| Excluded stock from areas impacted by land degradation | 60 | 58 | 65 | 60 | 62 |
| Protected river/creek frontages from grazing animals | 42 | 48 | 43 | 47 | 48 |
| **Resource monitoring** | | | | | |
| Regular soil testing for nutrient levels | 70 | 59 | 72 | 67 | 73 |
| Regular soil testing for pH | 70 | 61 | 72 | 66 | 73 |
| Regular monitoring of pasture/vegetation cover | 56 | 48 | 58 | 66 | 54 |
| **Surface water management** | | | | | |
| Water on sloping lands (e.g. grade banks) | 54 | 43 | 59 | 47 | 64 |
| Water on valley floors using surface drains (agriculture region) | 32 | 29 | 41 | 31 | 49 |
| Water on valley floors using deep drains | 16 | 12 | 15 | 12 | 27 |

Source: EPA 2007

While there is indication of some increase in uptake of sustainable practices in agriculture, the scale at which these practices are being implemented is having limited impact on the serious natural resource management issues in the region. Issues include rising areas of saline land, soil fertility decline, biodiversity decline and issues related to water quality and availability (South West Catchments Council 2005).

The South West region covers 5.1 million hectares stretching from the peri-urban areas just south of Perth to Walpole on the South Coast and into the wheatbelt (shaded area in Figure 2). The region has a population of 193,000 which is growing at one of the highest growth rates in Australia (South West Catchments Council 2005). The region includes six subregions of which the Blackwood Catchment is one. As the wider regional context of this study, some features of the region are discussed below.

**Figure 2: South West Region, Western Australia**



Source: South West Catchments Council (2005)

In 2001-01 there were approximately 5000 farm businesses in the South West Region and agriculture generated $947 million which represents around 25% of the state's GVP (SWCC 2005). Environmental issues for the South West region include land salinisation which impacts approximately 18% of the region (Dept of Agriculture 2003), land degradation and pests and diseases. Just over half (55%) of the South West Region is dedicated to agriculture (Department of Agriculture, WA, 2003).

Technical, social and institutional issues for agriculture identified through the regional NRM planning process include access to water and land, lack of paddock scale support, irrigation water salinity and declining access to resources (SWCC 2005). Some further information on the social aspects of the South West region is provided by Hanslip et al. (2007) including evidence of an aging and largely farming based community which while relatively settled, is facing significant economic pressures:

> The median age of property owners in the South West Catchment was 50 years and the mean age was 53 years. Almost one quarter of respondents (24%) were under 44 years, and 17 per cent were aged 65 years or over. The Blackwood Catchment had the highest proportion of older people.
>
> Farming was the single most common occupation reported by respondents with 55% saying this was their primary occupation.
>
> Less than half of all respondents (43%) made an on-property profit for the 2004/05 financial year and the most common amount was less than $10,000. Farmers were most likely to have reported an on-property profit. Three quarters (75%) of respondents reported an off-property household income for the 2004/05 financial year.
>
> Respondents indicated they had lived in their local district on average for 30 years, and on average had lived on their properties for 24 years.
>
> 64% of respondents indicated agricultural production was the primary purpose of their property; 24% listed the primary purpose of the property to be a hobby or lifestyle farm.

While this profile represents the major demographics trends across the region, these trends do not necessarily represent the case study participants considered in this study.

*Change and agricultural sustainability in the SW Region*

Cullen (2007), focusing on a national level rather than on the South West, suggests that the future landscape will have less water, different land values, different land sizes needed to support a family, new enterprises and markets, including markets for biodiversity and a carbon tax or carbon trading scheme..

The degree to which the agricultural sector understands the implications of the changing biophysical landscape is variable. In an attitudinal survey undertaken in the South West region (URS 2001), participants were asked what new activities had been undertaken in the past two years. No changes, computer use and changing enterprise mix were the most common responses to that question. URS (2001) determined that amongst farmers surveyed:

> ..overall there was no clearly articulated future (vision) for what agriculture will look like in the future… most responses suggested (farmers) will focus on adjusting to external forces as they arise, rather that actively designing their future.

URS (2001) also found that the majority of changes undertaken were related to changing the enterprise mix and changes driven by industry requirement (e.g. dairy deregulation). This suggests that many farmers are not adequately prepared for changes and may require industry or government enforcement to support change .

Climate change predictions relevant for the South West of Western Australia (SW of WA) include the potential for decreased rainfall and runoff; rising sea levels and increased seasonal intensity and variation of storm events. Winter rainfall in the southwest of Western Australia has decreased with a sharp and sudden decrease in the winter rainfall in the mid-1970s by about 15-20% (ibid). IOCI (2002) suggest that it was not a gradual decline but more of a switching into an alternative rainfall regime. This reduction in winter rainfall resulted in an even sharper fall in stream flow in the southwest and temperatures have increased gradually but substantially over the last 50 years, particularly in winter and autumn (ibid). Climate change is predicted to greatly affect agricultural practice in the region (IOCI 2002) with the potential for less reliability of seasons that have until now been a strong feature of the South West.

As well as less water potentially being available in the South West because of reduced rainfall and resultant reductions in stream flow (and ultimately groundwater), water legislation reform is occurring. The 2007 State Water Plan (Govt of WA 2007) aims for 20% improvement in water use efficiency in agriculture. Significant support for change is likely to be required in the area of water use and water efficiency as well as helping farmers to adapt to new legislative controls.

In the South West there are growing numbers of small landholdings that are potentially removing land from agricultural production (although they may also contribute to agriculture) both in coastal and inland areas. Loss of priority agricultural land through development, particularly in the coastal productive landscapes, poses a serious threat to the sustainability of agriculture in the South West. Lobbying by developers has led to changes in land classifications and development of land previously preserved for agriculture (AGWA 2007).

In summary, there are a range of socio-economic and environmental issues associated with food and fibre production in the wider case study region. For many of these issues there are no clear solutions. Allison and Hobbs (2006:180) suggest that natural resource management and policy in WA has failed to resolve NRM and sustainable agriculture problems for a range of reasons including a pro-development ethic, lack of coordination between institutions responsible for NRM and lack of financial means to adopt land management strategies. This implies the need for new and different approaches to deal with changing circumstances beyond those currently being implemented.

## 2.3 The Blackwood Catchment

The Blackwood Basin covers an area of 2.2 million hectares, is organised into 18 local councils, covers a range of landscapes from mallee to tall forest and is home to around 38,000 people.

**Figure 3: Blackwood Basin showing land type and use zones**
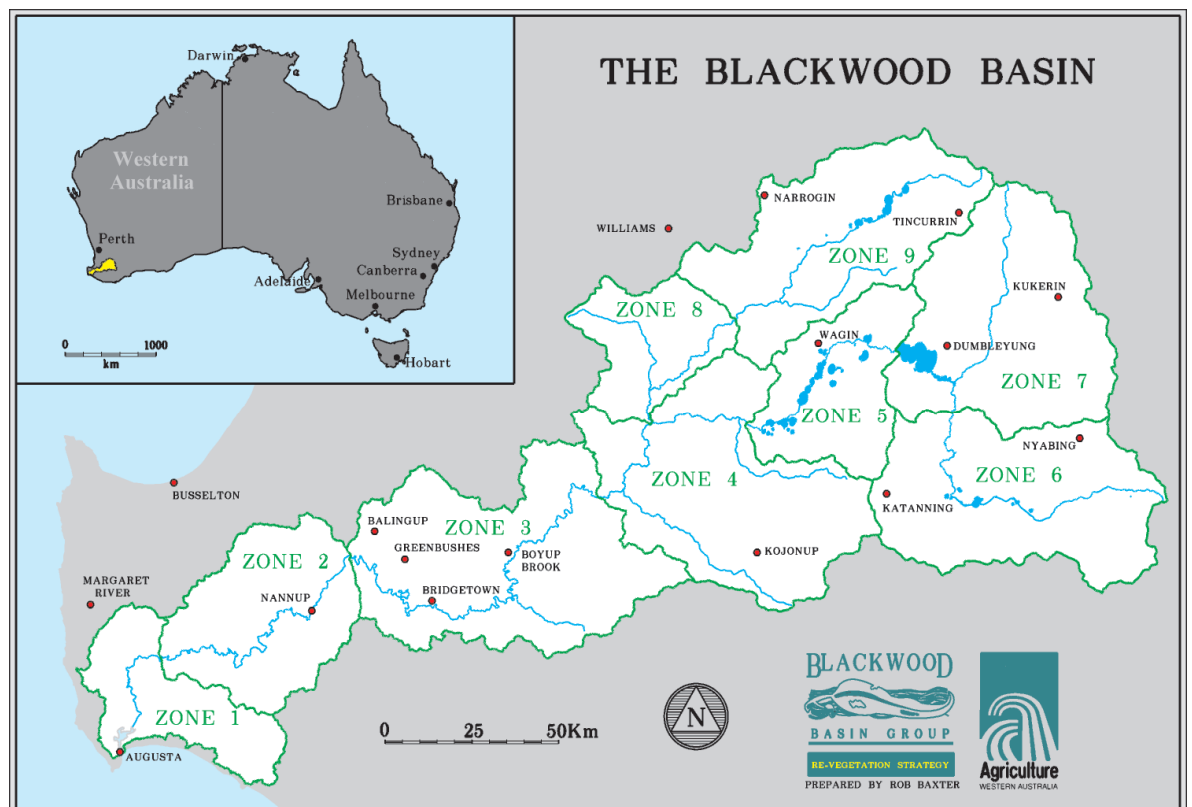


Source: Blackwood Basin Group 2000

The land use zones shown in Figure 3 are practical natural resource management planning units. The zones were established by by the Blackwood Basin Group and are based on original vegetation cover, land use, rainfall, soil landscapes, slope and most significantly,

major catchment divides. As such, they indicate the variation across the catchment with each zone boundary representing a significant change in environmental characteristics.

The catchment community is connected by the Blackwood River which travels around 800 km from its headwater tributaries in the eastern parts of the catchment to the river mouth at Augusta, south of Margaret River.

The Blackwood Catchment contributes 45% of the annual agricultural production income to the South West region (SWCC 2005). Arguably it is the most functional agricultural production area in the South West with a larger proportion of farmer occupants (75%) than elsewhere in the region (Hanslip et al. 2007): and also the highest proportion of respondents who reported on-property profit (based on 2004/2005 figures); 52% showed profit in Blackwood in that year) (ibid). Agricultural landuse is dominated by sheep-meat, wool, beef, grain, dairy, horticulture and viticulture (Blackwood Basin Group 2001).

The Blackwood Basin faces environmental challenges including salinity, erosion, waterlogging and the decline of biodiversity. Over 12% of agricultural land in the upper Blackwood catchment is affected by salinity with potential for 30% of the basin to become saline in the future (Blackwood Basin Group 2000). The Blackwood River, once fresh, carries over 1 million tonne of salt to the sea each year (Ecker et al. 2001).

Natural vegetation covers around 26% of the catchment but only around 10% in the upper catchment and continues to be lost at the rate of 4% every year (Ecker et al. 2001). There are 43 declared rare and endangered species of flora and 12 of the 37 species of mammals in the Blackwood Basin are either extinct or at risk (ibid). Waterlogging is widespread, causing serious reductions in crop and pasture yield. Increased flooding as a consequence of soil profile saturation from rising groundwater is also a threat with predictions of up to threefold increase in peak flood flows in a 40 to 50 year timeframe (Bowman and Ruprecht 2000).

Social sustainability is under pressure with an aging population and population decline in some parts of the catchment, with 10% decline from 1997 to 2000 in the upper catchment, and increasing in coastal areas (Ecker et al. 2001). Socio-economic issues presenting a challenge to sustainable management of natural resources include importantly, farm profitability. A survey of landholders in the Basin (Blackwood Basin Group 1999) identified that more than half of those surveyed felt farm profitability and commodity prices strongly influenced their decisions on the level of landcare work planned.

The survey also showed that a lack of resources including financial, labour and time are limiting farmers' efforts more significantly than attitudinal factors. Reduced terms of trade and the perceived and real gaps between economic realities and implementation of sustainable practices contribute to uncertainty about engaging in sustainable practices (BBG Business Plan, 2000).

**The Blackwood Basin Group**

The Blackwood Basin Group (BBG) is a community-managed organisation formed in 1992 in response to increasing resource degradation throughout the Blackwood River basin. The group maintains strong links with its stakeholder groups and has evolved strategic alliances with state government agencies. The key roles of the Blackwood Basin Group are: coordination of landcare activities, strategically directing funds/resources for natural resource management, contributing to government decision making, fostering regional identification and facilitating the development and achievement of community goals and targets. The Blackwood Basin Group has implemented a range of activities including awareness raising, data collection, best practice management demonstrations and on-ground action incentives programs. The aim of the Blackwood Basin Group's program is to provide mechanisms to accelerate broad scale on-ground activity by providing technical, strategic and information support and through the use of targeted incentives programs.

The Blackwood Basin Group is the key delivery agent for natural resource management in the basin and since 2003 has operated as a sub-region of the South West Catchments Council. Prior to this it operated as one of the first NRM regional initiatives in Australia.

The South West region and its sub-region, the Blackwood Basin, provide the spatial context for this study. These are unique areas which carry significant place identification amongst residents, tourists, as well as consumers who purchase products from these areas and others who interact with these places. Having located the study in its place and to some degree its people, the next section considers the context of the five agricultural industries considered in this study. These are considered with attention to the South West context.

## *2.4  Agricultural commodity context*

This study considers supply chains that represent five of the major commodities in the Blackwood Catchment. These case study industries are briefly explored below with reference to the interaction between these commodities and environmental, social and economic sustainability issues. Even though livestock is a major component of agricultural production in the catchment, no meat products were involved in the study for two reasons. Foremostly, at the time of the study there was no 'sustainable' meat supply chain available for the study in the study area. Wool rather than meat was the major focus of the grain and wool growers considered in the study. Secondly, the large amount of resources needed to track meat products through the supply chain was considered prohibitive for the resources in the study.

### 2.4.1 Wool

Australia is the world's largest producer of wool, and remains the main exporting country (NLWRA 2001). In the South West region, sheep are the second most common land use (after beef) particularly in the Upper and Middle Blackwood (Hanslip et al. 2007). In the Upper Blackwood sheep are used in combination with cropping on most grain-growing properties (ibid).

There has been a decline in profitability for Australian wool growers since 1991, with some fluctuations since that time such as the recovery in Australian wool prices in January 2006 (The Land, May 31, 2007). Markets for organic, low pesticide and uncontaminated wool markets are receiving increased prices and increased demand. Certified organic wool gathered by Elders in May 2007 received up to 20% above premium price (*The Land*, May 31, 2007).

Considering sheep production (e.g. wool, mutton and lamb) across the pastoral and higher rainfall areas across Australia, farm business profit in 1998 was negative, with an average loss of $31,000. Farm debt averaged $135,000, being less in the wheat-sheep zone (NLWRA 2001). Weeds, soil acidity and dryland salinity were identified as the most serious problems in the high rainfall and temperate zones for sheep farmers (NLWRA 2001). Lack of domestic processing and labour shortages are also key economic viability issues for the wool industry.

## 2.4.2 Grains

Approximately 75% of the grains produced in Australia are exported, earning about $6 billion a year (NLWRA 2001). More than half of the exports are wheat and Australia produces about 3% of total world production (NLWRA 2001).

Western Australia, after an initial decline in the area producing grain during the late 1980s, has shown expansion to new record areas with approximately 7 million ha committed to grain in 1997 (NLWRA, 2001). A national grain industry survey in 1998 showed that Western Australian grain producers identified soil acidity, dryland salinity, waterlogging, water erosion, weeds, and loss of soil structure (in that order) as the most important natural resource management issues (NLWRA, 2001).

The survey also indicated that the industry average for total adoption of nominated best management practices was around 7%, despite evidence that 74% of farmers had changed their farming practices in the last five years directly due to new information, and 57% had changed their farming practices in the last two years (NLWRA 2001). NLWRA identified best management practices as being associated with; tillage (minimum tillage and stubble retention), rotations (use of crop and pasture legumes), soil fertility assessments, maintaining cover on drainage lines and use of contour banks (NLWRA, 2001).

## 2.4.3 Horticulture

The National Land and Water Audit and Horticulture Research and Development Corporation's (HRDC & NLWRA 2001) assessment of Australia's horticultural industries showed that improvement in environmental performance is occurring across all horticultural crop groups with industry changes being driven by new and revised codes of practice including best management practices and quality assurance standards. They also note an increasing focus on integrated solutions to pest and disease management, improvements to the structure, management and planning of industry organisations and greater investment in research and development (HRDC & NLWRA 2001). Signals for improved environmental management in horticulture are also emerging from the marketplace (HRDC & NLWRA 2001).

HRDC & NLWRA (2001) suggest sustainability issues in horticulture that need to be resolved include poor linkages between programs (particularly research and development and codes of practice), inadequate industry databases for monitoring environmental and economic performance, and the lack of resources and skills in some crop groups to adopt better practices.

NLWRA (2001) suggests that the horticultural industry is generally ahead of other industries on quality assurance and equal with other industries on environmental management practice; however, its fragmented and multi-commodity nature creates barriers for introducing environmental initiatives. The body propose that accountability for food safety and environmental compliance will be increasingly important to future (horticultural) markets and that access to resources (especially water) is considered the key industry risk (NLWRA, 2001).

Horticultural producers are generally aware of the regulatory environment and the limitations of resources. A study into adoption of sustainable irrigation management practices by stone and pome fruit growers showed that there were some growers who are unlikely to change unless the policy or external operating environment were to change (Boland et al. 2005). Boland et al. (2005) suggests that voluntary adoption of more sustainable irrigation practices on a large scale would require extensive resources using a one-on-one extension methodology. They argue that other non-voluntary mechanisms (e.g. regulation) may need to be introduced to achieve government policy in relation to natural resource management (Boland et al. 2005).

## 2.4.4 Viticulture

This industry is characterised by issues related to gluts in supply and a strong focus on the international market. Between 1995-06 and 2005-06 there was a large increase in the wine sector. This includes a 125% increase in the number of wine companies, a 97% increase in employment in the sector and a 143% increase in hectares under vines (Australian Wine and Brandy Corporation and the Winemakers' Federation of Australia , 2007). At the same time, the average price per litre dropped by 18% (ibid).

The value of promoting the wine industry as using sustainable practices has been recognised and has been part of the industry's marketing strategy for some time, as depicted in the 1996 *Strategy 2025, The Australian Wine Industry*. More recently, the report Sustaining Success (Australian Wine and Brandy Corporation and the Winemakers' Federation of Australia, 2006) identifies cause marketing, and environmental cause marketing in particular as an important strategy for the industry. Australian Wine and Brandy Corporation and the Winemakers' Federation of Australia (2006:8) also summarise the priority environmental issues for viticulture including:

- Water quality and use in viticulture, winemaking and packaging
- Generation and disposal of wastewater from winemaking and
- packaging
- Management of solid waste products, such as grape marc, filter material
- and treated timber vineyard posts
- Use of insecticides, fungicides and herbicides (pesticides)

- Maintaining and enhancing natural ecological systems and protecting
- biodiversity
- Conflicting land-uses with local communities and other industries
- Ramifications of future greenhouse gas-induced climate change on viticulture.

### 2.4.5 Dairy

In 1998/99, 3% of Australia's dairy farms were in Western Australia, largely in the South West region. Western Australia averaged the largest farms (199 ha) and the lowest stocking rates in Australia (1.1 cows/ha), however the latter is likely to have changed with the development of several larger (e.g. 1000 cow) dairies in the South West in recent years. The dairy industry has experienced declining terms of trade since 1978 (NLWRA 2001), however since 2007, the industry in Western Australian has experienced improved returns.

Water availability is a critical limitation for the sustainability of the dairy industry. WA dairy farmers were using considerably more water than the Australian average in 2001 with WA farmers using an application rate per hectare for irrigation at almost double the rate of the average (NLWRA 2001). In 2005-06 Western Australia, irrigated pastures, which would be largely devoted to dairy cattle, represented 79,315 ML or 25% of total state water used in agriculture (ABS 2008).

In terms of the dairy industry's attitude to resource degradation, around 50% of dairy farmers surveyed nationally in 2001 considered dairying in their regions was having minimal impact on land and water degradation and over 30% considered 'environmentally friendly farming' in their regions would reduce farm profits. Issues identified for dairy farmers nationally are related to effluent management, wet soils or pugging, soil acidity, soil structure or compaction, irrigation-induced salinity and weed invasion.

## 2.5  Farm environmental management systems context

Chapter one introduced efforts to develop farm scale systems for supporting, measuring and reporting on environmental sustainability as an important impetus for this study. This context is described in more detail in the following pages.

Environmental management systems or voluntary environmental management arrangements (VEMAs) are defined by Mech and Young (2001:2) as

> ... a diverse range of arrangements in which firms and in some cases other organisational structures, may voluntarily choose to participate for the purposes of enhancing environmental management. VEMA is an umbrella term denoting many very different arrangements and production protocols that may (or may not) be part of environmental certification or labelling scheme.

The use of a formalised auditable procedure to formulate and monitor farming systems that are more benign for the environment has been used by a variety of farming, government and non-government organisations around the world. The aspect of EMS that is attracting many sustainable land management focused organisations is the promise of a system that combines commercial operations and on farm environmental management, possibly to the benefit of both.

An EMS for Australian agriculture is likely to involve self-assessment to gauge current environmental performance, a list of best management practices/principles to reduce environmental impacts, indicators and monitoring tools to measure improved performance and potentially, a third-party audit to independently verify improved performance (Patterson 2001). Drivers for undertaking EMS included; potentially increased access to markets, improved sustainability, increased land valuation and reduced liability (ibid).

Hundreds of farms around Australia have been assisted to implement Environmental Management Systems or abbreviated forms of EMS through the EMS National Pilot and EMS Pathways Programs (URS 2005) and the many other government, NGO and industry programs. A stocktake of EMS in Victoria found over 1000 farmers had 32 different approaches to EMS (per.comm. Anna Ridley, 2006).

Despite this, uptake represents only a small proportion of farmers across the country. The relative lack of interest in implementing EMS was shown by the poor uptake of the means tested $3,000 Commonwealth rebate from 2003-2006 which required farmers to undertake a basic EMS. Using this as an indicator of interest is problematic because primary producers in the income bracket above $35,000 per annum were excluded, and there were also issues in the way the program was delivered. Based on the successful Canadian Ontario Environmental Farm Plan scheme which was not means tested, the Australian scheme has since been abandoned. .

In attempting to understand better the potential supply chain related drivers of EMS, the integration of farm Environmental Management Systems into supply chain approaches has received considerable research interest in the last few years. This was largely in response to the spike in the Commonwealth investment in EMS from 2003 to 2006 through the funding of pilot programs for training land managers to undertake a farm EMS across Australia.

Investigations into the likely flows beyond the farm gate that can capitalise on EMS efforts were undertaken by a number of the Australian EMS pilot projects exploring methods of getting certified EMS products to the market. Supply chain studies associated with these efforts included the Queensland Eco-range project (MacNamara & Pahl 2003, Pahl et al. 2006), the Gippsland Beef Enviro-Meat program (Roberts 2004), the Tasmanian King Island EMS project (Brand DNA 2005) and the Sugar Link project (Woodhead et al. 2006). In addition, research into the role of EMS and environmental certification in supply chain dynamics has included the Western Australian government commissioned Buying Green report (Backshal 2000, Cary et al. 2004).

The national EMS framework developed by the Commonwealth Department of Agriculture Forestry and Fisheries, emphasises the need to consider the vertical integration of EMS, suggesting that '…for maximum credibility, all levels in the supply chain should be certified, not just the farm' (EMS Working Group 2001). The EMS Working Group considers the integration of EMS with catchment and regulatory processes and suggests that EMS may be driven by regional coalitions or branding opportunities (ibid). They consider a potential mix of regulations and NRM and regional coalitions to communicate farm sustainability values, shown in Figure 4.

**Figure 4: Market and supply chain features of EMS for agriculture**
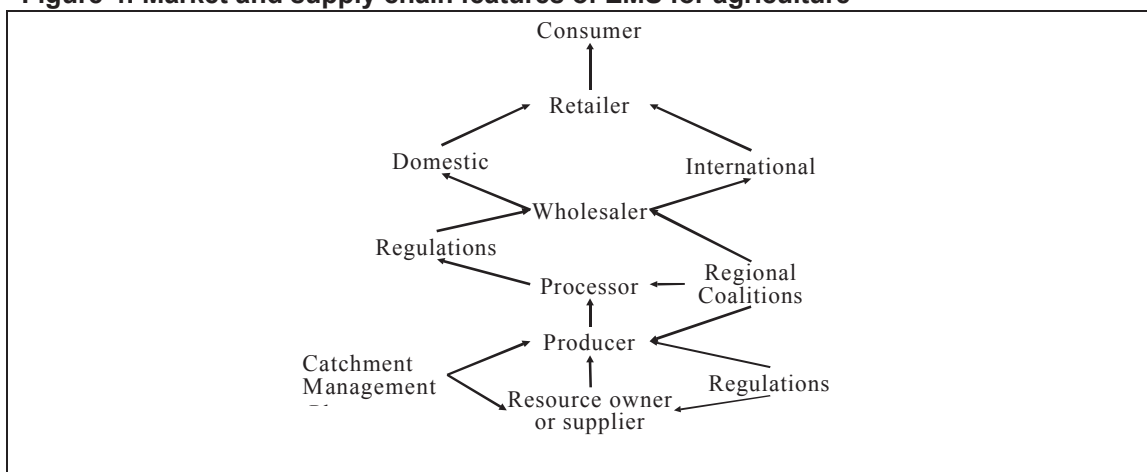


Source: EMS Working Group (2001)

This national framework for EMS stated a range of objectives including improved practices on farm and better accounting of impacts of production at regional scales. Some of these objectives were realised in the short term through the range of programs that were established, many of which have since disbanded.

Unlike its Canadian counterpart, the Ontario Environmental Farm Plan Program, which has been running for fifteen years and has engaged around 30,000 farmers (OMAFRA 2008), the Australian program represented a flurry of activity in which dozens of systems were designed and implemented, but were left with an uncertain future. The question remains as to the future for Environmental Management Systems in Australia.

## 2.5.1 Local attitudes to environmental assurance

As mentioned in the introduction, the development of an environmental assurance framework for the Blackwood forms an important background for this study. The Blackwood BestFarms system was developed by the Blackwood Basin Group in 2003 with the aim to develop and trial an Environmental Management System framework that could support development of EMS on farms. Since BestFarms training of farmers commenced in March 2004, over 200 farms in the South West region have developed an EMS through the program (per.comm Kirsten Skraha, BestFarms project coordinator, July 2008). Land managers from a further 92 farms in New South Wales have also been trained in the BestFarms system (ibid). The program is supported by issue based workshops, seminars, newsletters and field days as well as site visits and a range of other support mechanisms. Farms can receive BestFarms 'certification' and have this reviewed annually if they wish.

In the lead up to this development of this system, efforts were made the Blackwood Basin Group to understand the catchment community's perceptions of environmental assurance. A landholder survey, which covered aspects of environmental certification of agricultural products amongst other natural resource management issues, was undertaken in the Blackwood in December 2001. This queried the willingness of both farmers and non-farmers to pay more for environmentally certified products. Nearly half the respondents said they were willing to pay more for environmentally certified produce (BBG 2001).

An interesting finding was that whereas 40% of farmers were not willing to pay more for environmentally accredited produce, only 18% of non-farmers were not prepared to pay more for environmentally certified foods (ibid). As the main consumer of agricultural products, the latter finding has positive implications for marketing sustainable products.

The results suggested willingness to reward farmers who achieve sustainable production objectives but for any system of environmental certification to win community confidence, the respondents showed that it must first address community concerns. Respondents felt that regulation and monitoring of environmental certification would need to be stringent and "above board" to ensure credibility (BBG 2001).

The survey asked about the degree to which quality assurance systems are in place. The concept and operation of quality assurance systems are already quite well understood in the Blackwood, with a quarter of farm respondents having some kind of quality assurance system on their farm (ibid) A further 36% of landholders would like to implement some sort of quality assurance system (ibid).

When farmers were asked if they wanted to implement an Environmental Management System, 21% replied in the affirmative (BBG 2001). Most farmers needed more information on EMS before making decisions. Respondents were invited to comment on the concept of differentiating food and fibre products based on sustainability. Respondant comments from both farming and urban parts of the catchment included the following (BBG 2001):

> Some people can only afford cheap food.
>
> Increase the price and the 'bigboys' will increase imports.
>
> It should be a commitment of producers to shift to this product.
>
> Not practical, segregation costs too high.
>
> I would only pay more if they are sustainable in terms of productivity and profitability for the farmer.
>
> This would be impossible to work out and to monitor.
>
> Environmentally accredited produce could be advertised as such to gain consumer support and thus place pressure on the producers to use this method.
>
> I don't know of any produce that is produced in a more environmentally friendly way.
>
> I would only pay more if the producer received extra dollars.
>
> I would not put any trust in any self-regulated group to be honourable in their day-to-day activities when profit is involved.
>
> The cynic in me says the other players in the food processing industry would manipulate the system for profit.
>
> I would pay more based on health/ hygiene benefits for self and environment. Doubt our ability to certify - tends to be a lawyer solution rather than real!

I would like to know more about how the accreditation system would operate (very complex).

The term "environmentally certified" is too loose and hard to prove as credible.

The catchment survey provided a positive impetus for the development of the BestFarms EMS system. However the results also indicated that more empirical evidence would be needed to truly assess both the catchment community perspective and the wider community perspective of the role of farm environmental management and certification systems. This, as mentioned previously provided the key impetus for this PhD study.

## 2.6   Synopsis Chapter 2

This chapter provide the reader with an understanding of the biophysical and social context in which the study is situated. The Blackwood River catchment within the South West region of Western Australia is an important agricultural area, although threatened by a range of environmental factors that have generally resulted from agricultural development in this area over the last hundred years. A large percentage of residents in thie area are involved in agriculture. Conversely, the agricultural population is aging and declining in numbers., People in this area generally have a strong sense of attachment to place.

The status of the five agricultural commodity groups (wool, grains, horticulture, dairy and wine) considered in this study is discussed briefly showing that whilst all of these industries face issues related to environmental and socio-economic sustainability, there are efforts underway to address these. However these are generally uncoordinated and limited information is available on the success of these efforts.

An important context of this study is the efforts by natural resource management organisations to encourage consideration of sustainability issues in the farmed landscape. Of note is the development of farm environmental management systems support frameworks, including the BestFarms program developed in the case study catchment.

Having described the biophysical and operational context of this study, the next section explores some of the contemporary ideas concerning sustainability in food and fibre production to consumption systems.

# Chapter 3: Research Setting

In terms of popular non-fiction, there have been a number of publications focusing on ethics of food from paddock to plate in recent years. This included a number of bestseller non-fiction books including The Ethics of What We Eat (Singer and Mason 2006) and The Omnivore's Dilemma (Pollan 2006) which use a paddock to plate approach to assess the ethics behind food products. Much of this work is based on American and European examples which while informative, some of which would have to be adapted for application to Australian producers and consumers. There is a place for exploring the issues associated with values and ethics along supply chains from a number of perspectives and in a number of geographic areas.

In the following sections, the broader context of the two sides of production to consumption systems are discussed, followed by a discussion about the interaction of these elements within a systems approach.

## 3.1 Trends in sustainable production

The wider context of sustainability trends in agricultural production is an important context for this study. As demonstrated in the following discussion, recent consideration of agricultural sustainability issues shows evidence of recognition of the wider socio-economic context and particularly the supply chain context.

Love (2005) suggests that the common themes repetitively influencing Australian agriculture include; global demand from consumers and the supply chain for 'clean and green' food and fibre production; increasing government regulation, global and national standards on land stewardship; and the need for farmers to manage a profitable farming enterprise.

The 'Trends in Agriculture Report' published by the Productivity Commission in July 2005 highlights 'shifts in consumer demand' and 'emerging environmental concern' as key drivers for agriculture along with the 'unrelenting decline in the sector's terms of trade'. The report also notes that profitability and productivity at farm scale is a national concern with an aging workforce and limited labour availability (Productivity Commission 2005).

Corish (2006) identified issues and challenges that need attention if the agricultural sector is to be successful over the next ten to fifteen years. He suggests that actions are required on a number of fronts including in the areas of markets, competitiveness, natural resources and adaptation to change. Corish (2006) recommends a whole of chain, paddock to plate approach to service consumer requirements efficiently and effectively.

Heilbron and Larkin (2006) also emphasise the need for Australian agriculture to develop a more customer focused approach, particularly in response to increasing competition from developing nations and the rapid growth of the higher value produce market. This includes the growing organic and wholefoods market (ibid). They recommend that farmers develop strategies to create value or capture value (ibid). This includes, for example, creating value through speciality products that enhance the producer's participation in the supply chain and capturing value by forming producer cooperatives to build processing plants (ibid).

Despite the agriculture sector representing just 3% of GDP, measured on the basis of farm-gate value of production (Australian Farm Institute 2005), it has been demonstrated that either natural or policy shocks to agriculture can have a very significant impact on the entire national economy.

Issues of socio-economic sustainability are increasingly being considered alongside issues of environmental sustainability and rural community sustainability. Concern regarding the progressive demolition of social infrastructure in rural Australia and the recurrent theme of loss of services and infrastructure as part of this rural decline is expressed by Davis (2003). Cocklin and Alston (2003) highlight that the state of rural communities across Australia is a matter for intense political, academic and public interest, with many factors contributing to a pattern of social and economic decline including falling commodity prices, cost-price squeezes, metropolitan-centred social and economic policies and extreme weather patterns.

There is also concern that populations of less than 4,000 could be particularly vulnerable (Cocklin and Alston 2003). ABARE (2001) reported that the economies of small towns are highly dependent on farm expenditure and the smaller the town the greater expenditure by farms per resident, hence farmers need the town and the towns need the farmers.

- The National Land and Water Audit summarise studies undertaken between 1991and 2001 (NLWRA. 2001). This showed the following trends in relation to awareness of producers of the need to change:

increasing concern overall about chemical residues in agricultural produce and about the environmental and health effects of agricultural chemicals, but with those who are regular users of chemicals, such as cereal or fodder crop producers, being less concerned and showing relatively little change over the period

- increasing awareness that farm practices have impacts beyond the farm boundary and increasingly favourable views nationally towards consideration of the wider public interest in farm decision making
- increasing acceptance that there will have to be major transformation of agricultural landscapes if farming is to be sustainable, with just over 46% of respondents agreeing with the proposition that if Australian agriculture is going to have a long term future, a lot of cleared country will have to be put back to bush and forestry plantations.

Sustainability as a wider social construct that potentially exerts pressure on farmers to be sustainable as a social standard of behaviour is discussed by Fenton et al. (2000) who reflect on the institutional representation of sustainability as a social norm. If sustainability does become more of a social norm then there is also the issue of farmer willingness to conform to the social norm of sustainability (Fenton et al. 2000).

Allen Consulting (2004) identifies wider society needs and aspirations for sustainability as key drivers of agricultural sustainability and observes the following trends related to international drivers of and demands for environmental assurance relevant to agriculture in Australia:

- Generally, environmental concerns are not a widespread driver of common consumer demand for food in overseas markets at present.
- The growth in consumers of organic produce is related to human health concerns rather than environmental concerns.
- Particularly in industrialised countries, a raft of subsidies and certification programs related to environmental management on farm are in place, including arrangements to remove environmentally valuable land from production.
- Efforts to use environmental assurance as a trade barrier, while likely to fail under the WTO, can significantly impede market access.
- Australian competitors, including New Zealand, are promoting a clean, green image.
- Multinational food businesses are using triple bottom line accounting as a strategy for maintaining government and customer networks.
- These influences can be expected to flow through to Australia despite consumer differences.
- Inaction by Australia producers could put at risk the perceived environmental integrity of Australian products.
- Stronger linkages between product, brand and regional performance may assist in substantiating green claims.

The Australian Government's progress in promoting sustainable production measures ('supply-side') has fared better than its efforts in promoting sustainable consumption ('demand-side') (Bentley et al. 2004). Programs acknowledged in a UNEP (2003) review of sustainable production and consumption included the Department of Environment and Heritage (DEH) Eco-efficiency Agreements and government and industry programs (ibid).

This includes programs such as the National EMS Program and other agricultural industry related programs funded through the Natural Heritage Trust. Sustainability reporting according to the Global Reporting Initiative (GRI) is another initiative being implemented in Australian production systems although this is at an early stage.

Agriculture is a significant contributor to Australia's declining international environmental performance, as demonstrated in coming fourth last for environment in the 2007 Commitment to Development Index, due to our high per capita greenhouse gas emissions (Center for Global Development 2007). According to the Australian Food and Grocery Council (2003) Australian agriculture accounts for 70% of total water consumption and approximately 18.4% of Australia's total greenhouse gas emissions (98.4 megatonnes of $CO2$) including methane from livestock (62 %), nitrous oxide from agricultural soils (18 %) and prescribed burning (16%).

Environmental assurance systems for food and fibre production have recently come onto the agenda in Australia. For the purposes of this report, the term environmental assurance includes certification, standards (including type, adoption and application), issues and principles, auditing and product labelling (after Pahl & Sharp 2007). It is worth noting that Pahl and Sharp (2007) found differing levels of understanding of these terms. They found that agricultural industry and environmental groups used the term 'environmental management system' (EMS) as a generic term for environmental standards and auditing processes, while consumer groups used the term 'environmental assurance'. For the industry groups, standards related to QA and food safety and to a lesser extent managing environmental impact. For consumers, standards accounted for the true social and environmental costs of production (ibid).

Outside of organic certification schemes and other environmental schemes including EUREPGAP, EMAS and ISO 1400 series, there are limited formally recognised systems for endorsing environmentally sustainable production approaches available in the South West of WA. The ISO 1400 series has had limited adoption nationally and no known adoption by farmers in the case study area. Efforts to develop national or state environmental certification frameworks have included the Queensland Farm Management System, WA Farming for the Future, Draft Options developed by Australia 21 and discussions through the Primary Industries Ministerial Council. The implications of environmental assurance for farmer, markets and consumers has been considered extensively, summarised in Rowland et al (2005) and Rowland (2005).

Potentially, the future of sustainable agricultural production in Australia involves a stronger emphasis on reducing water and energy use and investing significantly more in carbon–offsets. Given the resourcing issues currently faced by farmers in Australia, this will not be possible without more consideration of how demand (including demand for environmental services) and supply can be better integrated to achieve sustainability outcomes. Better integrating the world of production with the world of consumption is potentially a key to the co-creation of sustainable futures for food and fibre, as is discussed in the following section.

## 3.2     Trends in sustainable consumption

Consumers are increasingly interested in the 'world behind the product' (Brandt 2003) including wanting more information about environmental and social impacts of production. Spencer and Kneebone (2007:8) note the development of specialty niche foods as an important consumer driven trend including 'interest based on ethical grounds or a wish to indulge in "the story" of the food'.

Policy goals for sustainable consumption are generally related to using less, consuming local or in-season products or consuming ethical products (DEFRA 2006). This study focuses largely on the latter although there is also a focus on the local, and to some degree, the seasonal aspects of sustainable consumption.

In terms of national effort to support sustainable consumption, Australia lacks the policy leadership being shown in the EU including initiatives such as the DEFRA Food Industry Sustainability Strategy (2006), the Towards Sustainable Household Consumption policy document (2002) and the European Commission Integrated Product Policy (2004). Integrated Product Policy (IPP) seeks to minimise environmental impacts by considering all phases of the product life-cycle and taking action where it is most effective. Whilst Australia has accepted responsibility to promote sustainable consumption as a signatory to the UN Ten Year Framework of Programmes on Sustainable Consumption and Production (Johannesburg 2002), promoting sustainable consumption of food and fibre has not been a major policy direction of the Australian government.

The Australian Government's More With Less (DeniGreen Consulting 1996) publication whilst dated, reflects the current policy focus on sustainable consumption in the transport and water and energy utility sectors. The report has only a passing reference to food, stating that 'the aim of changing patterns of food consumption is to encourage people to base more of their diet on products with lesser environmental impact' (DeniGreen Consulting 1996). It relies on organic certification as the only initiative identified to support this objective. There has been little progress on sustainable consumption of food and fibre at a national level since this report, and arguably organic certification remains the best known vehicle of communicating sustainable production values to consumers in Australia.

A policy framework for sustainable consumption is argued as important in the OECD Towards Sustainable Household Consumption report (2002) which recommended five general conditions needed to enable sustainable consumption including:

- A price structure for consumer goods and services that internalises environmental costs and benefits.
- A policy and regulatory framework that makes clear the priorities and direction for change.
- Availability of a range of environmentally friendly goods and services.
- Technology and infrastructure that includes environmental quality criteria in the design and running of products and services.
- An educational and information-rich environment that motivates and enables consumer action.

Owen et al. (2007) quotes Danish EPA figures that suggest that food and drink production and consumption is one of the highest contributors to environmental impact, with about one third of households' total environmental impacts related to food and drink consumption. In Australia in 2004, consumption of food and drink represented around 17% of total household expenditure (ABS 2006). This represented the largest component of spending on goods and services followed by housing (16%) and transport (16%) (ibid). Owen et al. (2007) add that the largest impact is outside of the consumer's control as it is incurred during production and processing. This is challenged by the Australian Food and Grocery Council (2003), who in support of processing and retailing sectors suggest that that the majority of environmental impact is shared between farmers and consumers.

Much of the research into sustainable or green consumption has focused on the role of labelling for environmental and social values and consumer preparedness to purchase products labelled as such. Consumer research has generally targeted individual consumers and has not necessarily been integrated into a whole of supply chain perspective, nor a wider socio-economic perspective.

Demographics such as income, age and gender are commonly incorporated in consumer surveys in an effort to associate these variables with purchasing behaviour (Gordy 2002, Brickley 2002, Howard & Allen 2006, Teisl et al. 2002, Pahl et al. 2006, Longworth & James 2004 and Brand DNA 2004).

Consumer research demonstrates that whilst price, taste, freshness and quality remain the primary consumer issues when deciding on a product (Barstow 2002), there is an emergent theme related to interest in environmental and social values in food and fibre including environment, human rights, animal rights and locally grown (Barstow 2002, Brickley 2002, Gordy 2002).

A number of US studies into consumer preferences (Gordy 2002, Brickley 2002) show that the attitudes, values and demographics of consumers can have an effect on whether consumers purchase products with eco-labels. Explorations into eco-friendly purchasing undertaken by the U.S Harvest Cooperative found that increased awareness about the impacts of the production cycle is driving the need for alternative food sources (Brickley 2002). Brickely (2002) also found that approximately 50% of the ethical food customer base was highly educated. Barstow (2002) suggests that the US white middle class are no longer the primary markets for 'ethical' products.  Barstow (2002) also found that US consumers increasingly prefer local and small-batch products, with the number of farmers markets in the US growing. If growth in farmers markets is a measure of preference for local, then this trend towards local preference is also being demonstrated in Australia, with an estimation of Australian farmers markets turning over at least $1 million per week (*The Land*, 14 Dec 2006).

Howard and Allen (2006) undertook a survey of 1000 households in California. Amongst the sustainable consumption values they researched, humane treatment was the most important, followed by local origin and living wage requirements. Living wage requirements refers to the adequacy of wages in supporting agricultural workers. Worker's rights is a high profile issue in the Californian study related to poorly paid migrant workers. Howard and Allen (2006) also discovered minor differences to ordering of preferences related to gender and age. They did not specifically examine environmental values in purchasing; however their work establishes an argument for labelling based on environmental and social criteria in response to the desire for consumers to know more about these values. They make recommendations to either incorporate this labelling into existing organic certification schemes or develop a new system.

In Australia, a study undertaken on consumers of the EMS certified Gippsland Beef Enviromeat product (Roberts 2004) found that many consumers 'felt that a sticker like that used by the heart foundation' to demonstrate that products were environmentally friendly would be useful and appreciated. Roberts (2004) also found that consumers were supportive of the product's environmental attributes being audited by an external body. A study focusing on the King Island EMS Dairy products, found that 71% of the sample interviewed were sometimes influenced by environmental issues in their purchases and 37% were often influenced (Brand DNA 2005).

Pahl (2003) notes the difference between sustainability demands amongst Australian consumers and consumers in other countries, with concern for environmental issues being higher in European markets. Research conducted for the Eco-range EMS beef project found that 50% of European and US consumers would prefer environmentally friendly beef at the same price whilst Australian consumers surveyed showed a figure of 22% (Pahl 2003).

Darnton (2004) examined results from several European surveys regarding consumer considerations for sustainability. He determined the following:

- Key considerations for sustainable produce were: food miles; seasonality; level of processing, packaging and environmental impacts.
- When making food purchase decisions, the most important issue was quality (71% of respondents), ahead of cost (68%), followed by taste (40%), special offers (29%), convenience (27%) and brand (17%).
- Environmental considerations were seventh, cited by 12% of respondents.
- 18% of respondents reported having bought organically-produced food, and this rate varied widely by social class.
- Many respondents acknowledged that they ignore product information, and often didn't look at labels.
- The core target audience for ethical products represented 11% of all consumers.
- 19% of respondents, who shopped locally, did so to support the local community.

Batt et al. (2006) explored values held by key customers of Australian produce and compared these with the capacity of both Australian suppliers and their competitors in Asia, Europe and the US to address these values. As Batt et al. (2006) states, provision of safe food will remain the major priority, especially in Europe and the US. However Batt et al. (2006) suggests that food businesses will be forced to give greater attention towards ethical trading practices including worker welfare, animal welfare and more sustainable production systems. Batt et al. (2006) observes that Australia's competitors are placing more importance on ethical claims, sustainable production, conservation and biodiversity and the more efficient and responsible use of resources.

They warn that current assurance systems in Australia are less able to cope with the ethical trade issues than overseas systems and suggest that:

> in the long term, there is the distinct possibility that Australia may loose its "clean and green" image" unless it is better able to integrate these credence issues.

The non-market values (or credence issues) considered important now were potentially not on the radar for many Australian customers ten years ago and are still not considered as important by many Australian producers (Batt et al. 2006). In addition, the work of Batt et al. (2006) showed that customers are increasingly associating non-market values with food and fibre products or commodity groups, signifying a quantum shift.

Whilst many of the findings reported above are based on attitudinal surveys rather than consumer behaviour because of the lack of 'sustainable' products on the market, they clearly demonstrate interest in ethical purchasing. This may represent occasional efforts by consumers to purchase sustainable food and fibre or the use of purchasing preferences to express their ecological citizenship sentiments (Seyfang 2006).

Whilst the evidence of sustainable consumption is weaker in Australia than Europe and the US, Australian consumer studies have demonstrated potential markets for sustainable food and fibre products. They also provide support to the theory that eco-labelling and product information, whilst necessary for distinguishing ethical food and fibre products, is problematic with many consumers ignoring this information..

## 3.3 Supply chain approach to sustainable food and fibre

Until recently, attempts to explore the social dimensions of food and fibre in Australia have largely focused on production, with consumption often considered as a separate object of analysis (Lockie and Pritchard 2001). Marsden et al. (1999) observed that consumption concerns had not been well grasped in agri-food literature, along with other neglected elements such as the spatial development of food and incorporation of nature (ibid).

A number of researchers (Bentley et al. 2004, Costanza 1991, Gunningham & Sinclair 2002, Lockie and Pritchard 2001, Toyne et al. 2004) make the link between sustainable consumption and sustainable production. Bentley et al. (2004) present an argument for a 'process through which producers can influence consumption through product designs and marketing…consumers, in turn, influence production through their market choices'.

Toyne et al. (2004) suggest that green consumer preferences or supplier motivations can drive environmental preferences along the supply chain. They quote the concept of 'environmental supply chain dynamics' or ESCD developed by Hall (2000), where a value chain actor influences or stimulates environmental changes along the supply chain (Toyne et al. 2004).

Lockie and Pritchard (2001) argue for the integration of production and consumption in research concerned with the social life of food, suggesting that the 'simplistic dichotomy between the "production of consumption" and the "sovereignty of the consumer" ... fails to problematise the multifarious and contested relationships between these spheres of activity' (2001:10). As stated by UNEP (2003) in preparation for discussions on sustainable consumption policy:

> Given that consumption and production are two sides of the same coin, there are clear benefits to coordinating strategies for sustainable consumption and production.

Also, to quote Southerton et al. (2004), 'production configures consumption and consumption configures production'.

Regarding apportioning environmental impacts throughout the supply chain, the Australian Food and Grocery Council environment report (2003) report makes the following observations:

> Processing and packaging make a vital contribution to the environment by preserving the shelf life of products and reducing product wastage. The environmental cost of packaging and processing, compared to the overall food and grocery production and consumption system, is relatively minor. Improved packaging design and recycling are further reducing this impact.
>
> The most water intensive process in the food and grocery supply chain is primary production, followed by use and consumption in the home.
>
> The greenhouse impact for most food and grocery products is evenly spread across the production and consumption cycle. The processing of most food products generates less than a kilo of carbon dioxide equivalent gas per kilo of product, although some non-food products are higher. The retail component of this is estimated at around 0.3 kilos per kilo of food.
>
> About 2.2 million tonnes of food waste is generated in Australia each year (prior to consumption).
>
> The consumption and disposal of food and grocery products by households has a significant impact on the environment. This is because waste materials generated in the home are less homogenous than they are at the supply end and the capacity to divert them to another purpose or to re-use them diminishes.
>
> Australian Food and Grocery Council (2003)

This portrays the food manufacturing sector as having significantly less impact than at the production or consumption ends of the supply chain, however this information presented by Australian Food and Grocery Council (2003) assumes a conventional approach to both production and consumption.

Communication in Australia between farmers and other conventional supply chain actors is generally undeveloped and uni-lateral. For the majority of farmers the main method of communicating beyond the farm gate is the vendor declaration system (e.g. certifying appropriate chemical use). Also the use of QA and food safety assurance is common and often mandatory in horticulture. Outside of organic certification, other methods used to communicate sustainability values include pesticide residue testing, the use of government endorsement in marketing (e.g. endorsement of clean and green beef by the Tasmanian government), relationships and informal communications between supply chain actors, EUREPGAP and other overseas systems (mostly retailer driven) and the more limited use of EMS documentation.

Unique combinations of supply chain actors, institutional frameworks and drivers can act to facilitate and promote sustainability values not only on farms but throughout the whole supply chain. Cary et al (2004) dubs these 'eco-conscious' supply chains. Woodhead et al. (2006) defines a sustainable supply as: 'a supply chain that explicitly considers the social and environmental as well as the financial benefits and costs of its operation'. In this conceptual framework, all actors in the supply chain, including consumers, are able to contribute to environmental sustainability rather than putting the major onus and responsibility for sustainability on the farm scale actors.

Methods to take efforts at sustainability at farm scale through to a whole of supply chain approach may be used in tandem with an eco-label or environmental certification. This is a relatively new and little researched area with Cary et al. (2004) suggesting that holistic sustainability based food production and food marketing system are rare. That is; with the exception of organic/ biodynamic systems, it is rare to see an approach inclusive of all supply chain actors where sustainability has been considered throughout the whole production system.

Policy related recommendations for the use of supply chain approaches to sustainability include The National Food Industry Strategy (NFIS) Report: Environmental Sustainability in the Australian Food Industry (Allen Consulting 2004), which recommends raising the capacity in the food industry to streamline, simplify as well as build trust in, claims made on food product labels regarding the environmental sustainability attributes of those products.

Allen Consulting (2004) also proposes that food industry leaders should promote easier access for Australian environmentally sustainable food products within food supply chains.

The Australian Food and Grocery Council (2003) also support the development of a supply chain approach to sustainability and state:

> It is important to develop a whole-of-system rather than a partial approach to environmental management. By focusing on single issue environmental outcomes in isolation, without a full understanding of the overall environmental benefits and costs, we risk developing strategies and policies that may reduce, rather than improve, environmental performance

The advantages of a whole of supply chain approach for on-farm sustainability and farm producers are discussed by Cary et al. (2004:11):

> Integration of environmental issues into all aspects of an extended supply chain may allow a producer to exert increased control over stages and actors in their business relationships, thereby allowing demonstrable conviction, should they choose to eco-label all or part of the product or process.

Listed below are some current examples that potentially demonstrate whole supply chain approaches to sustainability in Australia and overseas:

- organic certification of whole supply chains
- sustainability values reflected in products (Gippsland Enviromeat, QLD red tipped bananas, New Zealand Green Tick Certification)
- conservation oriented certification programs (Koala Friendly certification and labelling program for the Australian pastoral industries, WWF endorsed products)
- manufacturer-led farm sustainability programs (e.g. Bega Cheese EMS)
- overseas large apparel manufacturers who are increasingly looking to organic and ecologically friendly sources of cotton and wool
- retailer sustainability labelling programs (e.g. UK Tesco retailer proposed use of carbon footprint on products).
- manufacturer sustainable sourcing programs (e.g. the Global Sustainable Agriculture Initiative http://www.saiplatform.org/ which Australia joined in October 2007 including McDonalds, Kraft, Sara Lee, Fonterra, Dole and McCain)
- farmer-retailer-consumer programs (e.g. LEAF in the UK http://www.leafuk.org/leaf).

Teko Socks are a successful example of a whole of supply chain approach to sustainability. The core message of the marketing campaign for this US manufactured product is related to the efforts to farm sustainably at the farm where the raw product is sourced. The Teko socks manufacturer purchases Australian wool from Downie-Dungrove farm in Northern Tasmania, which practices conservation farming.

This wool is made into high quality socks, marketed as eco-socks. The marketing promotes the farm from which the wool originates as 'practising holistically sustainable techniques for over one hundred and fifty years' (Teko socks brochure, 2005). The Teko socks website promotes the socks as below:

> Fall 2005 Teko's Eco Merino™ wool socks will be made from Tasmanian Merino wool exclusively from Downie-Dungrove farms. Teko chose Tasmania because it has the best quality Merino available and then Downie-Dungrove farms for their commitment to holistically sustainable farming techniques with the least environmental impact.
>
> Accessed from http://www.tekosocks.com/co.suppliers.html, July 2006

This example has some similarities with the Australian managed eco-wool production chain case study examined as part of this study, described in Chapter 6. Importantly, they both use the same wool broker to source wool that can be verified as sustainable, primarily because of its low pesticide residue status.

In summary, there is evidence of whole of supply chain approaches which aim at achieving sustainability objectives. Whilst this is largely emergent in Australia due to the lack of regulatory or market drivers, there are Australian examples of whole of supply chain approaches to environmental and social sustainability. Whilst these are mainly related to niche products or product categories, the principles applied in these supply chains have implications for larger operations.

## 3.4   Sociological research approaches to food and fibre systems

This section on sociological approaches to food and fibre systems draws significantly on material within agri-systems research. This material has strong resonance for this study because of its focus on commodity systems. However the contribution of this material to this study was related more to 'extant theoretical materials' (Layder 1998) and in providing information and commodity systems case studies rather than as methods for exploration.

Agri-systems research includes theories relating to actor interaction, theories concerning the important elements for research within commodity systems and theory concerning the social organisation of food production and consumption, including power dynamics and environmental and social impacts.

Although agri-food systems analysis provided potential methodologies which directly relate to the topics of this research, the highly structured nature of each of these approaches was not deemed applicable to this study. Some issues raised in agri-systems research that are pertinent for this study are discussed below.

*Methodological approaches in commodity systems analysis*

That production and consumption is socially constructed, within the environmental and economic context is well accepted (Lockie and Pritchard 2001). There are emerging theories that consider the influence of entire systems of food and fibre production and consumption. These are transcending the approach that considers the socio-economic circumstances of individual actors involved in those systems.

Lockie and Pritchard (2001) suggest that society is long past the debate of whether to include environmental and social issues in considering food, and rather that the current debates are about 'defining sustainable food systems and (methods to) communicate and validate claims regarding the environmental and social credentials of food commodities' (2001:1).

Lockie and Pritchard (2001) suggest that social scientists have used either 'materialist' or 'constructivist' approaches to consider sustainability debates; although they also suggest that there is no rigid distinction between them. They describe the materialist approach as being concerned between the biological reality between humans, environments and foods. This approach focuses on the social organisation of food production and consumption as well as environmental impacts. The constructivist approach involves considering 'the different things that sustainability means to different people' (Lockie and Pritchard 2001:9). They suggest that this approach is concerned not with defining sustainability, but with 'how actors compete to promote their own understandings of what the general principle of sustainability actually means in practice' (ibid).

Friedland (2001) comments that commodity systems studies are rarely based on theoretical pre-occupations and usually begin with a social or empirical problem. Partly due to this, he argues that 'methodologies tend to be drawn eclectically from a variety of sources' and are developed inductively.

In the development of theoretical frameworks for exploring and explaining dynamics occurring within agricultural production to consumption systems, there are a number of key methods of analysis.

As Friedland (2001) and Lockie and Pritchard (2001) point out, there is variable nomenclature in the field of agricultural supply chain analysis including 'commodity systems analysis' originated by Friedland (1984), 'filieres' (or channels), 'systems of provision' (Fine and Leopold 1993) and the actor-network theory, utilised by a number of researchers including Arce and Marsden (1993) and Goodman (2002). Friedland (2001) quotes Buttel (2000:9) who suggests that commodity studies are one of the major emphases of 1990's agrarian studies however he suggests that these approaches rarely attempt to take on the totality of a commodity.

Dixon (1999:151) summarises Friedland's Commodity Systems Analysis framework (1984) which she suggests 'challenged us to think of commodities as entities with a social as well as a physical presence'. The research foci of Friedland's original methodology included five key components; production practices or labour process, grower organisations, labour, science production and application and marketing and distribution (Friedland 1984) and excluded consumption stages. In 2001, Friedland's reprise on commodity systems analysis involved adding consumption stages to the original methodology as well as the additional elements of 'regulatory politics and state-producer relationships' acknowledging influence by Wright (1999) and Dixon (2000).

Actor Network Theory (ANT) is a key method used for understanding the inter-related nature of commodity systems components. Lockie and Kitto (2000) also note the role of ANT in better understanding inter-relationships between different factors in food provision and consumption and in developing a focus on how these relationships are formed and maintained rather than focusing on the individual components.

Friedland (2001) also reviews influences of Actor Network Theory (ANT) and its inclusion of non-human aspects in the analysis of networks. He quotes Busch's (1990) eleven rules to guide commodity systems analyses which are reproduced here in light of the resonance of these for the study reported in this dissertation. These are:

- there is nothing natural about nature;
- there is nothing natural about society either;
- production neither starts nor stops at the farm gate;
- commodity chains have values embedded in them;
- the weakest link in the chain will stop commodity production;
- science, technology and bureaucratic decisions can create and recreate commodity chains;
- commodity chains have histories;
- commodity chains have geographies;
- the power relations in commodity chains change when an actor in the chain attempts to modify it; and
- finally, commodity chains do not exist (they are conceptual creations).

*Sociological issues explored in commodity systems*

In terms of the issues that commodity systems analysis studies seek to resolve or understand, Friedland (2001) observes that globalisation has been a central problematic in a number of studies. Another problematic issue concerns issues related to power relations within commodity systems (Dixon 1999, Hollaway et al. 2007, Konefal et al 2005). A number of issues within commodity systems are explored within the agri-systems literatures which are relevant for this study including relationships, (both human relationships and relationships between the human and natural worlds), scale issues, power relations and the role of the state (Friedland 2001).

Friedland (2001:92) emphasizes the need to consider scale in commodity systems studies where 'scale refers to a geographic or spatial dimension and to social relationships and their intensivity'. Friedland (2001: 92) suggests scale is important because:

> …some agricultural commodities impose qualitatively different levels of social organization and social relations than other commodities which are more limited in circulation. Social relationships in the banana commodity system are spatially more extensive than with apples because of the necessity to coordinate many different dispersed activities.

Friedland (2001) also introduces the concept of commodity communities which are constructed around commodity systems. This may include grower communities, the buyer communities or even regulatory communities associated with one or more agricultural commodity. Friedland (2001) also emphasises the need to include sectoral organisation and state which is pertinent for the political and economic status of a commodity. As he points out, 'the state should never be taken for granted, especially since its intervention and involvement in regulation and support are ubiquitous in modern capitalist economies'. This is perhaps more relevant in Europe and the US in terms of grants and tariffs but still applies in some ways to commodity systems in Australia. Sectoral organisation can be highly influential in some commodities (Friedland 2001). Subsidisation of water, science, and maintenance of legal structures that facilitate commodity organisation are also important influences in commodity systems (Friedland 2001).

*Including consumption*

The importance of including consumption in commodity systems analysis is well documented. Lang and Heasman (2004:15) suggest that 'consumption is the key to understanding the food system'. However the act of integrating consumption and production in commodity systems research is not straightforward and there are a number of debates about how to go about this relevant to this study.

Dixon (1999) presents an approach for understanding the inter-relationship between production and consumption through adapting Friedland's 1984 framework. She develops a 'cultural economy model for studying food systems' which she uses to better understand power relations in commodity systems, proposing that this adapted model is an infusion of cultural and economic processes. Dixon (1999) presents this 'cultural economy' model for analysing food systems which she suggests can assist in 'determining where the balance between production and consumption lies' (1999:158). This includes a range of organisational, regulatory, political, resourcing and experiential issues relevant to production, distribution and consumption sectors (ibid).

Goodman (2002:271) suggested that whilst consumption matters were now being acknowledged in agri-food studies, 'consumption is still very much a theoretical black box in agri-food studies'. He emphasises the focus in these studies on production, suggesting that 'consumption continues to be "used" to talk about production (Goodman 2002:272). Goodman (2002:272) suggests:

> The analytical challenge … is how to move beyond the theoretical asymmetries and linearities of this framework ... and acknowledge consumers as relational actors in recursive, mutually constituted food circuits.

## 3.5    Synopsis Chapter 3

This chapter presented the setting for this study, considering a range of literature and information sources that represent efforts to describe sustainability in food and fibre production to consumption systems. The literature is firstly reviewed in terms of sustainable production and then sustainable consumption. These two areas are brought together in a review of approaches and ideas that consider sustainablity across entire production to consumption systems. This is followed by a brief review of literature relating to sociological approaches to exploring food and fibre systems, drawing largely on agri-systems literature.

The methodology used in this study to integrate information from production and consumption actors is discussed in the next chapter..

# Chapter 4: Theoretical approaches

## *4.1          Synergies between theoretical techniques*

With Systemic Intervention (Midgley 2000) as the overarching framework for this study, a number of theoretical approaches were used. As Midgley (2000) points out, the use of a plurality of methods may be helpful in the development of practical means to address problems within systems intervention approaches. Midgley (2000:225) argues for pluralism of both methodology and methods:

> …most situations are perceived as sufficiently complex to warrant the use of a variety of methods and there is often a need to develop new methods from scratch. Therefore it is more useful to think in terms of the design of methods than simple choice between 'off-the-shelf' methodologies.

Midgley's 'creative design of methods' provides significant influence in the development of the theoretical framework used in this thesis. Key to his approach is a requirement to define and use purpose as guiding principles. Midgley (2000:226) suggests that:

> This involves understanding the situation in which an agent wishes to intervene in terms of a series of systemically interrelated questions, expressing the agent's purposes for intervention. Each purpose might need to be addressed using a different method or part of a method. The purposes ... may evolve as... understandings of the situation develop…Different purposes may emerge at different moments of inquiry.

Midgley (2000:229) adds that

> it is not a matter of 'stitching' methods together in an additive fashion… a whole system (interrelated set) of purposes can be pursued through a synergy of different methods.

Research techniques used in this study relate to five orienting concepts describe in Chapter 1. These include understanding how community-wide participation in sustainable food and fibre could be achieved; identifying appropriate interventions to improve communication of sustainability value along supply chains and investigating what sort of production to consumption systems could better address social and ecological issues than current mainstream practices.

Layder's (1998) multi-strategy research and Midgley's methodological pluralism or creative design methods (Midgley 2000) are based on the use of multiple sources of data or the use of multiple methodological or analytical strategies in theory generation. Layder (1998:68) argues that 'a multi strategy approach increases the strength, density and validity of theoretical ideas and concepts that emerge from data collection and analyses'. He comments that it allows triangulation, or cross-checking of the findings and development of concepts, and produces a synergy which can lead to re-orderings and re-interpretations (ibid). As Layder (1998:69) notes:

> Theory and concepts emerge most often and most frequently in a robust form where there is a genuine interchange and dialogue between methods and strategies, sources and techniques.

There are four major theoretical techniques used in this study which were considered within this 'creative design of methods' model. They are: adaptive theory as the key methodology for theory generation; and, within that, systems approaches, participatory research and the use of narrative.

Adaptive theory defines the primary method used in the analysis of the data, whilst system approaches and participatory action research relate to the context of the study. Soft Systems methodology was used to define the unit of analysis, the supply chains. Narrative approaches were used to collect and make sense of the information collected on each product, using 'product narrative' as discussed later in this chapter.

Adaptive theory is the 'engine room' where the all of these influences are brought together in theory development. These techniques are contained within a systems intervention approach. These four theoretical techniques are discussed in more detail below.

## 4.2     Adaptive theory

A method was required that allowed the integration of shared understandings and experience in the field of sustainable food and fibre systems and new attitudinal and empirical data to be collected. The adaptive theory method was selected because this study does not test a hypothesis but is rather an exploratory investigation seeking a model, or theory, drawn from the participants' experiences situated within the wider social context. This methodology also welcomes the use of the researcher's prior knowledge and understandings of the subject matter as a key element in theory generation.

Layder's (1993, 1998) adaptive theory provided a basis for this combination of deductive and inductive procedures. Adaptive theory 'is about the generation of theoretical models of the social reality that is the subject of the research' (Layder 1998:152). As Layder (1998:135) states:

> Adaptive theory tries to steer clear of this incompatibility (between deductive and inductive) by avoiding extreme, rigid or dogmatic definitions of induction and deduction and by conceiving of them as potentially 'open' discourses.

The form of adaptive theory chosen for this research project leans heavily on grounded theory as one of the core influences of adaptive theory (Layder 1993). Grounded theory has its origins in symbolic interactionism, using the perspective that reality is negotiated between people, always changing and constantly evolving (Morse and Richards 2002). As for grounded theory, the adaptive theory method of collecting and analysing data reflects a commitment to understanding the ways in which reality is socially constructed.

Grounded theory is based on the concepts of theoretical sensitivity (Glaser 1978) and techniques for creating grounded theory in data (Strauss 1987; Strauss and Corbin 1998). The key goal is the creation of new theoretical concepts from the data and the seeking of core concepts and the underlying 'basic social process' (BSP) or 'basic social psychological process' (BSPP) (Glaser, 1978). Charmaz (2006:6) summarises the defining components of grounded theory according to Glaser (1978) and Strauss (1987) as:

- Simultaneous involvement in data collection and analysis
- Constructing analytic codes and categories from data, not from preconceived logically deduced hypotheses
- Using the constant comparative method which involves making comparisons during each stage of the analysis
- Advancing theory development during each step of data collection and analysis
- Memo-writing to elaborate categories, specify their properties, define relationships between categories and identify gaps
- Sampling aimed toward theory construction not for population representativeness
- Conducting the literature review after developing an independent analysis.

Adaptive theory embraces the 'organic' nature of grounded theory, allowing theory to emerge through engagement with the 'real world', but it rejects the narrowly defined parameters of what is permissible using grounded theory, extending its terms of reference (Layder 1998:147).

Adaptive theory '... preserves the core of grounded theory but strips it of its empirical limitations' (Layder 1998:150). Layder (1998:136) states that in adaptive theory:

> Both forms of theory generation, construction or elaboration are permissible within the same frame of reference and particularly within the same research project and timeframe… Thus it is not only a matter of allowing their dual influence on theory-construction but also of allowing their mutual influence on each other

A key purpose of the enquiry into food and fibre systems emerging from the South West was to form a better picture of the wider social network implicated in food and fibre systems beyond the farmers and regional participants. Using Layder's (1998) terms, the objective was 'to produce an enhanced or more accurate rendering of the nature of (the) social reality under scrutiny' than currently existed and to develop knowledge towards the 'formulation and presentation of ever more powerful explanations of social phenomena' involved (1998:142).

Also given that the research topic was concerned with the social construction of food and fibre production-consumption systems, the primary focus of adaptive theory on social relations and 'agency-system linkages' (Layder 1998:148) was entirely appropriate.

Adaptive theory is concerned with 'systemic and structural forces, mechanisms and generative processes' as well as the forces that 'subsume these diverse elements and which represent the "ligatures" which bind lifeworld and systems elements together' (Layder 1998:143).

Given the existing interest in relationships and interconnections within the topic material, adaptive theory with its focus on interconnections is pertinent to this study, as Layder (1998:144) points out,:

> … adaptive theory is most pertinent to research which attends to the interweaving of system elements (settings and contexts of activity) with the micro-features (interpersonal encounters) of social life

Adaptive theory also supports the use of theoretically useful cases (Strauss & Corbin 1998). The case studies selected were chosen to help develop concepts that are useful in explaining features of sustainable supply chains. Importantly, a method was required that was in accordance with my own practice. According to Strauss and Corbin (1998), grounded theory methodology suits researchers who 'hope that their work has potential for both academic and non-academic audiences' and have a 'sense of absorption to the work process' (Strauss & Corbin 1998:6). These qualities very much describe my own ambitions for my practice in the field of sustainable food and fibre systems.

The process of adaptive theory used in this study follows the grounded theory procedures outlined by Strauss (1987) as well as the interaction between extant theory and emergent theory used in adaptive theory. Grounded theory procedures used included development of a concept-indicator model which directs the coding, data collection, coding, development of core categories, theoretical sampling, comparisons, theoretical memos and theoretical sorting (Strauss, 1987:23).

Layder (1998) adds that in adaptive theory, 'the creative use of sampling and sampling techniques, the generation of codes and concept indicator links, and the writing of theoretical memos' are used as continuous features of the overall process rather than being discretely marked out as defined stages of research (1998:174).

In summary, the exploratory intent of this study of sustainability in food and fibre supply chains is suited to adaptive theory because of the focus on social relations and 'agency-system linkages', because it permits the incorporation of prior theory which was an important context of this study and because it is useful for making use of the wide range of data sources available in the strongly emergent theme area considered in this study. The use of adaptive theory in theory generation is discussed at the end of this chapter. The next section considers the other two theoretical approaches that were used in this study, Soft Systems Methodology and narrative.

## 4.3      Systems approach

Key to the methods used in this research is a systems approach that recognizes the interdependence of social, ecological, economic, psychological and behavioural aspects of sustainability.

Checkland's (1985) Soft Systems Methodology (SSM), 'developed as an alternative to the methodology of systems engineering based on defining goals or objectives' is considered appropriate for the study of the 'messy, ill-structured real world problems' (ibid) associated with food and fibre production to consumption systems. Soft Systems Methodology is described by the following crucial ideas; the realisation that all real world problem situations are characterised by desire for purposeful action, that models of purposeful action can only be built on the basis of a declared context (or 'Weltanshauung') and that the problem solving processes require learning cycles 'in which models of human activity systems could be used to structure a debate about change' (Checkland 2005:A54).

A systems approach places as much emphasis on identifying and describing the connections between objects and events as on identifying and describing the objects. Checkland (1985) describes a seven stage description of action research using soft systems methodology:

1 The problem situation unstructured
2 The problem situation expressed
3 Root definitions of relevant systems
4 Making and testing conceptual models
5 Comparing conceptual models with reality
6 Identify feasible and desirable changes
7 Action to improve the problem situation

Soft Systems Methodology involves a comparison between the world as it is and models of the world as it might be, resulting in a better understanding of the world. In stage one, two and three the researcher considers the real-world problem. In stages three and four, new conceptual models are developed, and then compared with the real world model. In this process "ideal" models are compared to the actual situation to improve understanding of potential areas of improvement. Differences between the models and reality become the basis for planning changes.

Soft Systems Methodology was used in two important ways in this study. Firstly it was used to define and understand the main units of analysis used in the study, the production to consumption systems described below. Secondly, it was used in combination with adaptive theory in the development and comparison of conceptual models that describe both understandings of the 'actual' reality of sustainable supply chains and the 'ideal' or intervention model.

## 4.3.1 Production to consumption systems

As set out in Chapter 1, the study considers production to consumption systems rather than individual supply chain actors or segments as the primary source of information concerning food and fibre sustainability. The analysis involved assessment of environmental and social issues associated with the cycle of production from growing to consumption. This form of analysis is based on the methods developed by Courville (2001), who uses production-to-consumption systems as the main unit of analysis in her study into supply chain dynamics in Fair Trade certified coffee. Courville (2001:51) describes production-to-consumption system as a 'hybrid of designed physical systems and human activity systems based in and limited by natural systems'.

This approach departs from literature on sustainable agriculture derived from the Natural Resource Management (NRM) / Landcare model, with its strong focus on farmers as almost the sole performers in the theatre of sustainable agriculture. The perspective used in the study views farmers within the production to consumption systems they are involved in, symbolized in the system output: the product. The model developed for use in this study was adapted from Courville (2001) and is shown in Figure 5.

**Figure 5: Production to consumption system used in this study**
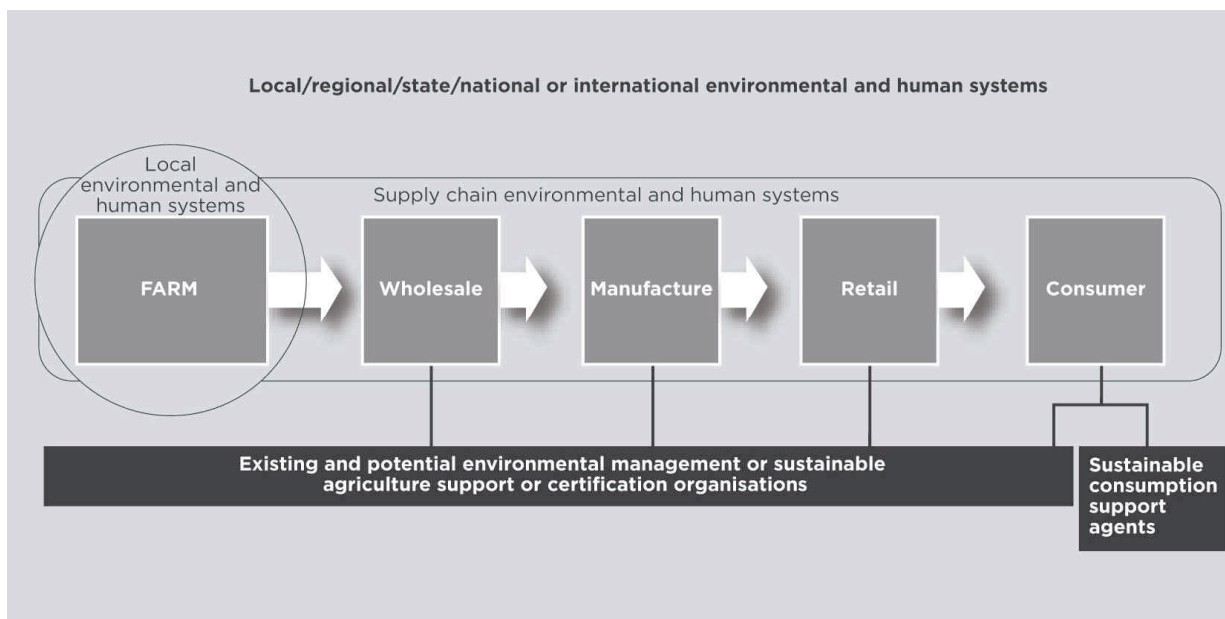


The production to consumption model recognises both human and environmental systems recognising the different scale at which human systems and environmental systems operate (after Courville 2001). The model focuses on the human and environmental systems directly related to the supply chain and is inclusive of all supply chain sectors from farm to consumer. However, the model also recognises within its boundaries other human systems that influence food and fibre production and consumption such as the wider community, government, non government organisations and industry. As some of the case study products are exported, local, regional, state national and international human and environmental systems are included in the model. There is a particular focus on the environmental and human systems at the farm scale. Key sustainability supports are also considered in the production to consumption systems model, represented by the black boxes at the bottom of the diagram. These may represent certification organisations, government or NGOs that support environmental and agricultural sustainability initiatives and sustainable consumption.

This model allows supply chain sectors to be considered independently but also allows the supply chain, as well as the entire production to consumption system to be considered as a complete entity. This assists in the addressing the issues raised in the agri-food literature reviewed in the previous chapter concerning the difficulty of integrating both consumer and producer perspectives.

## 4.3.2 Boundary critique

As Midgley (2000) points out, understanding the boundaries of analysis is an essential component of operational research. Midgley (2000) argues that the development of boundaries is crucial and suggests that boundary development should consider both the type and nature of the intervention and the stakeholders involved. Boundaries need to be defined in dialogue by all those involved and affected by the intervention (Midgley 2000).

Even in the case of the insider, which I consider myself to be in this study, Midgley (2000) highlights the need to take care and time to hear the questions and associated purposes of stakeholders related to the topic. He adds that precisely because of this insider role, the researcher may not be privy to all of the relevant issues.

Once these views are established, the intervener, or catalyst, is responsible for managing the tensions between the different viewpoints of stakeholders and their own viewpoint. This, Midgley (2000: 229) points out is a critical factor in the emergent intervention:

> …selection and or design of methods will be influenced by whatever boundaries are accepted during, or become dominant in the intervention

Based on this, boundaries of the study were continually assessed during the research, resulting in new participants being brought in, as described in the next chapter,. This boundary critique has important implication for determining effective interventions. The outcome of the boundary critique is considered in the concluding chapter of this thesis.

## 4.4　Participatory research

As Midgley (2000:199) suggests

> The emphasis in Participatory Action Research is on professional researchers working with organisational members to collaborative evolve locally relevant knowledge. ... A key principle is that organisational members are involved from the very beginning of the design and executing of the research, and this participation should continue to the very end with the production of conclusions and the implementation of recommendations.

A proponent of participatory approaches, Flyvberg (2001), proposes rules for "phronesis" or prudence or practical wisdom. In phronetic science, researchers focus on values, they get close to the people and phenomena they study; it allows for voices other than the author's and enters into dialogue assisting the authors to reflect on their values. The aim is to make moral debate part of public life (ibid).

Participatory Action Research (PAR) is often proposed as a method that can accomplish problem solving, emancipation and empowerment. Hayward et al. (2004) problemitise Participatory Action Research (PAR), particularly these claims of PAR (2004:96). They present challenges to the idea that participation is always a positive experience or always leads to empowerment. They also point out the validity of non-participation and peripheral participation. They also criticise the use of participatory methods in confronting social exclusion issues. As Hayward et al. (2004:98) state:

> participation ... means different things to different people in different settings. For some it is a matter of principle, for others a practice and for still others, an end in itself.

They note that participation should be defined in terms of 'who', 'what', 'where' and 'how' as well as 'why' people participate and what the result of participation will be. Arnstein's (1969:217) ladder of participation ranging from manipulation to citizen control outlines the different types of participation in relation to empowerment. Mikkelsen (1995) uses a more process orientated definition of the different types of participation as summarized by Hayward et al. (2004:99).These range from voluntary contribution without partaking in decision making to involvement of people in self-determined change, including development of themselves, their lives and their environment.

The use of numbers of participants is not necessarily a measure of effective participation. Hayward et al. (2004) also notes that the relationship between numbers of participants and social inclusion and empowerment is not linear and also that this does not adequately account for people who choose not to participate or participate on the fringes.

Participants in this study included individuals from the ten case study supply chains, as well as a range of other industry, government and community-based actors involved in forums. For this study, participation was used as a tool to gain a better picture of the contextual issues and to observe the interactions between different value positions (e.g. in forums). Hayward et al (2004) notes that 'participation as a tool' models take account of the unique local context, including community mores, knowledge and skills (Hayward et al. 2004:101). The use of participation as a tool in this study also provided the means for ongoing collaborative social learning (Keen, Brown and Dyball 2005) within the researcher's community of practice.

Using Mikkelsen's (1995) categories of participatory research, the method used in this study is best expressed by 'the voluntary involvement of people in self-determined change'. This statement matches the participation intent best because most of the individuals involved expressed through their words or actions the desire to participate in the dialogue relating to sustainable food and fibre. That is, it was assumed that they wanted to engage in efforts towards developing more sustainable systems and it is believed that this desire was a key factor in their involvement in this study.

Participatory processes were reflected in many but not all of the techniques used in this study, most importantly, the forums, ongoing email updates (which encouraged comment) and ongoing informal personal contact with many individuals involved. These are described in the next Chapter (Methods).

## 4.5     Narrative approach

The defining features of narrative, in reference to its use in social science, is that it 'organises a sequence of events into a whole so that the significance of each event can be understood through its relation to that whole' (Eliot 2005: 3). Eliot proposes three key features of narrative – chronological sequences of events, connection of events in meaningful way and development for a specific audience.

Regarding narrative approaches to the analysis of data, Eliot (2005) suggests while there is no standard approach, researchers tend to use three different focuses. The first of these is the temporal nature of social life (Elliot 2005: 36). The second focus is an evaluative or subjective dimension and thirdly; a focus on the social processes surrounding the production and consumption of stories (Elliot, 2005: 37).

Content or form can be analysed in the narrative, but most social research will involve an interest in both. The use of holistic analysis of narrative can be progressive (the story of advancement, achievement or success) or regressive (a course of deterioration or decline) (Elliot 2005:48).

In this study, the progressive approach was deemed most appropriate for telling the sustainability story of the case study products. Narrative was used as an evaluative tool and allowed the pulling together of attitudinal data and physical outcomes related to sustainability in each supply chain through the use of 'product narratives' discussed below.

## 4.5.1 Product narrative

The term product narrative was developed independently as an explanation for the product story for each supply chain but a literature search for this term revealed prior uses. Morey and Miller (2004:6) in their chapter "Forget Reality – Perceptions Rule" use the term in describing aggressive business strategies for new products which include providing the full story of the product development and the values behind it:

> …early adopters.. want to see the "product narrative" on the label; they are looking for a unique character and values in the areas of development, manufacture and ingredients.

The term product narrative is also associated with advertising where narrative strategies are targeted to attract consumers with particular values and lifestyles. Advertising narrative techniques where the story of the product is used to sell the product include print and TV media and "advertorials" generally constructed to maximize profits (Huisman et al. 2005:7)

Narrative as an ideological product which expresses particular worldviews and arises out of particular social situations and interactions is not dissimilar to 'product narratives', where the products and their associated values also express worldviews and represent particular social situations.

Elliot 2005:50 quotes the following from Plummer (1983) which could be considered as providing argument for the use of 'product' for a synonym of 'story':

> Story (.i.e. product) production and consumption is an empirical social process involving a stream of joint actions in local contexts themselves bound into wider negotiated social worlds.

Plummer (in Elliot 2005) argues that stories (or in this interpretation, products) can be used to maintain the status quo or can have an emancipatory function, transforming individual lives and the wider culture (in Elliot, 2005:50). This interpretation is appropriate for this study where the range of stories communicated by case study product chain actors represent approaches that both challenge and conform to the status quo.

Second order narratives, which are distinct from individual or first order narratives and are used to 'make sense of the social world and other peoples experiences (and) present social and historical knowledge' (Elliot 2005: 13), were the obvious choice for the product narratives.

Czarniawska's (1998:20) discussion of the use of narrative in organisational studies is relevant for the understanding of product narrative used in this study. She discusses the products of organisations such as reports, services, social relations and economic facts:

> … all these products must be connected as a meaningful whole. Although statistics are some of the ways of such connections, the narrative is the dominant one. Narrative...and the process of association… builds the connections between actions and events and the readers.

This statement can be applied to the use of product narrative with the readers being the consumers.

In summary, the use of product narrative is based on the premise that products are socially constructed through interactions with supply chain actors and therefore the sustainable properties of those products are also a construction which can be captured through the stories of those products.

### *Combining adaptive and narrative theories*

Combining the adaptive theory and narrative approaches does not appear to present any conflicts. Strauss and Corbin (1998) advocate the use of descriptive narrative or 'storyline' as a technique to aid integration. They note the following (1998:148):

> One way to get past the impasse (of having a gut sense of what the research is about but not being able to articulate it) is to sit down and write a few descriptive sentences about what is going on here…Eventually a story emerges.

Interview techniques for narrative and adaptive theory are complementary as are data analysis techniques as discussed later. Examples where both approaches have been used include Swatton and O'Callaghan (1999:413) who used grounded theory to generate and analyse six participant's life narratives in their counselling psychology study. This study considered the impact of 'healing stories' in the life narrative. Grounded theory coding analysis of participant accounts revealed three categories which explained experiences of turning around difficult life events. These categories were then used to develop a narrative representation of the effects of 'healing stories' and a resultant theory; Swatton and O'Callaghan (1999: 427) summarise the process:

> …experience of the healing stories was constructed from data grounded in the participants lived experience … It provides a sense of central themes indicating a theory.

Combining the grounded theory and narrative approaches in analyzing interview data required a number of steps. Table 2 shows interaction between narrative and grounded theory analysis to form the product narrative.

**Table 2: Interaction between narrative and adaptive theory**

| Narrative | Adaptive Theory |
|---|---|
| **1.** Thematic analysis to piece together data from each set of supply chain interviews to form a plot and story outline and themes for each supply chain actor. Identify data that relates to the themes identified ⟹ | **2.** Open and axial coding of interview data ⇩ **3.** Selective coding of data ⇩ |
| **4.** Themes that emerge from the informants' stories are pieced together to form a comprehensive picture of their collective experience – i.e. the product narrative ⟹ | **5.** Development of 'descriptive story' and storyline memos – integration of core categories and concepts ⇩ **6.** Further coding, model and theory development |

In summary, narrative was used as a way to collect and evaluate the 'sustainability stories' associated with each supply chain. The next section considers the development of adaptive theory in this study.

## *4.6    A note on theory generation*

An anticipated contribution of this study was the development of theory that explains and predicts the character or behaviour of sustainable food and fibre systems through both deductive and inductive processes.

Layder (1998:100) describes key aspects involved in theorizing. He proposes that theory generation:

> is about providing explanations of social phenomena, it requires the application of logic and reason to tease out the relations between concepts and empirical variables (and) it involves the ability to move from the concrete and particular to the more general and abstract.

Layder's adaptive theory approach allows the multiple influences of all of these theoretical discourses including extant theoretical models and those that emerge from the research. As Layder (1998) states, this dual approach 'ensures that extant or prior concept and theory both shape and inform the analysis of data which emanates from ongoing research at the very same time that the emergent data itself shapes and moulds the existing theoretical materials' (1998:166). Figure 6 demonstrates 'the relationship between extant theory, emergent data and the adaptive theory that results from their interaction, depicted as a continuous circuit of influences and effects' (ibid).

**Figure 6: The relationship between extant theory, emergent data and adaptive theory**
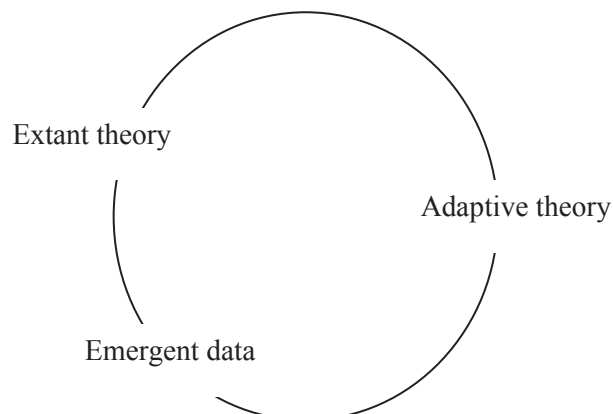


Source: Layder (1998:167)

'The continuous and processual nature of adaptive theorizing' (Layder 1998: 174) was appropriate for this research which took advantage of 'serendipitous incidents and circumstances' (ibid) related to the topic of sustainable food and fibre systems. Theory generation took place throughout the course of the study and continually influenced the direction of the study as outlined in the Methods section.

**Identifying the core concepts**

Layder (1998:116) discusses the generation of theory through 'theoretical elaboration of orienting concepts... leading to the development of conceptual frameworks and more inclusive theoretical ideas'. He suggests three ways of achieving this. These are deriving new concepts deductively from core concepts, deriving them from empirical works or a combination of both of these.

As Layder (1998:175) suggests, 'any element of the analytic process which may contribute to theory or theorizing' and the development of codes, categories and memos all need to be considered as integral to the development of theory. Individual concepts, clusters or networks of concepts and even stand alone concepts may turn out to be as important as concepts that are regarded as central. 'The open ended and continuous characteristics of adaptive theory are complemented by its unfolding, cumulative and incremental nature' (Layder 1998: 175).

Orienting concepts that guided this study (as outlined in the introduction) included the importance of understanding the material of the study through a systems perspective, the use of active participation models as well as the overarching desire to contribute to change towards more sustainable food and fibre systems as part of the research effort. These orienting concepts were used to guide the data capture and also advised the initial coding. A range of nodes emerged from the data that took the research beyond the orienting concepts. Development of concepts based on these nodes was undertaken using the concept-indicator model.

The concept-indicator model provides the essential link between data and concept used to generate theory from data. Glaser's (1978) model is based on comparing indicator to indicator and comparing indicator to concept (1978):

> From the comparison of indicator to indicator the analyst is forced into confronting similarities, difference and degrees of consistence of meaning between indicators which generates an underlying uniformity which in turn results in a coded category and the beginning of properties of it. From the comparisons of further indicators to the conceptual codes, the code is sharpened to achieve its best fit while further properties are generated until the code is verified and saturated (Glaser 1978:62).

In order for the theory to be considered for accuracy, it is necessary to compare predictions of that theory with relevant occurrences in the real world. Concept indicators provide the means to achieve this, allowing for inference of measurement of the concept. Indicators link concepts with observations or empirical data. Relationships between concepts and indicators can be used to explore emergent theory.

These relationships may not be directly causal. However, given that theory is supposed to describe the character or nature of phenomena, it is likely that theory will consist of a set of propositions linked by causal relationships (Gilbert 1993). Nevertheless, the use of causal relationship to explain concepts should not be reduced to positivist explanations where 'law-like generalizations of the same kind as those which have been established in relation to natural reality' (Giddens 1974:5) are made in relation to particular observable facts. Issues of validity and reliability of indicators are raised by Gilbert (1993) who observes that the adequacy of the concept-indicator link relies on the technique by which the concept-indicator link is measured.

Layder (1998: 80) identifies four types of concept–indicator linkages that relate to 'different features of social reality which lie beneath [the] more empirically accessible surface manifestations' in observable data. These linkages relate to bridging or mediating concepts, behavioural concepts, system concepts and theoretician's concepts such as those drawn from general theory, however the distinction between these is not a sharp one (Layder 1998).

Layder (1998:85) suggests that behavioural concepts describe aspects of the participant's behaviour, predisposition or attitude and may relate to types of participants and nature or quality of interpersonal relationships. Layder (1998:88) suggests behavioural concept indicators are:

> …primarily to do with illuminating the subjective worlds of people from a broadly 'inside' point of view [which] requires some attempt to depict the social experiences of those studied from a subjective point of view and that the concepts themselves should register the inner texture of this lived experience in a way that is recognizable to those whom they apply'.

Layder's systemic concepts are 'non-behavioural' (Layder 1998:88) although there is significant interaction between systemic and behavioural concepts. Systemic concepts relate to the 'reproduced aspects of social relations' and are 'part of the contextual conditions which constitute the wider social environment of social life and activity' (Layder 1998:89). Layder (1998) adds that relations of power, control and domination are important features of these concepts. Importantly, systemic concepts are likely to have different recognizability to participants because they are not necessarily immediately relevant to individuals. Because of

this, Layder (1998) emphasises that the validity of systems concepts cannot be dependant on whether they make sense to participants.

Layder's (1998) bridging concepts represent a balance of both behavioural and systemic concepts, combining these effects and reflect a '…dual emphasis on the effects of objective and subjective aspects of social life' (1998:92).

The fourth of Layder's concept-indicator linkages, theoreticians' concepts, represent the prior assumptions that the researcher brings and are derived from particular theorists, approaches or schools of thought (Layder 1998:93). The value of these general theory concepts is the extent to which they explain the empirical world in the research (Layder 1998:95). The analysis used various extant theoretical or conceptual resources with the intention to extend, elaborate, modify or revise (Layder 1998:127) concepts emerging from the data, as revealed throughout this dissertation.

Layder explains that awareness of these different types of concept-indicator linkages assists conceptual innovation and enhances theoretical formulations and helps develop an understanding of the different types of connections between concepts and social phenomena (1998:99). In Figure 28 at the start of Chapter 8, theoretical ideas emerging from the research data are ordered according to Layder's concept- indicator categories.

## *4.7 Synopsis Chapter 4*

This chapter describes a systems intervention approach to researching production to consumption systems within the context and settings described in earlier chapters.

The four major theoretical techniques used in this study are explained. They are: adaptive theory as the key methodology for theory generation and within that; systems approaches; participatory research, and the use of narrative.

Aspects of these approaches were used in two ways, signalling the methodological contributions of this study. The first was the the development of a model for analysing production to consumption systems which allows the incorporation of all supply chain sectors and intermediary organisations into the analysis.

Secondly, 'product narratives' were used to enable capturing the sustainability stories of different case study participants into one story. The term 'product narrative' was found to have prior use, in commodity studies in the work of Appadurai (1986) and also in a marketing context.

The chapter concludes with a discussion about how theory was developed in this study, drawing on the use of concept-indicators to develop key themes from emergent data and extant theory.

# Chapter 5: Research design and techniques

## 5.1 History of research topic

The study evolved from the researcher's background, experience and the context of questions about environmental certification of agricultural products in Australia. This context presented a significant bias within the research (as discussed in Chapter 1). The study objective: to analyse social drivers and impediments relating to 'sustainability' within supply chains commencing in farms in the Blackwood Basin, represented a key question relevant to the researcher's role as community catchment coordinator.

The location, the Blackwood Basin (although one of the farms studied was in urban Perth for reasons explained later) was chosen as a system which represents a both an ecological and a 'social catchment' and has been a functioning NRM community since the Blackwood Basin Group (BBG) was formed in 1990.

Whilst the PhD study commenced with a specific question about the validity of an environmental certification system in the Blackwood, the data 'opened up' this question and led to a number of enquiries. Initially, the objective was to assess issues and probe into attitudes related to the potential for extending the pilot environmental certification framework. This "project manager" focus changed along the way to a broader interest in sustainable food and fibre production and consumption. Certification and its drivers and impediments became one of the issues rather than the key research question.

## 5.2 Design overview

This research aims to determine the social drivers and impediments to sustainable production for consumption systems in Australia with a focus on products commencing in the Blackwood catchment. Outside of organic certification schemes and ISO 14001 (the latter which has had limited adoption nationally and no adoption by farmers in the Blackwood) there is currently no system of endorsing environmentally sustainable farming practices or whole of supply chain approaches available in the South West of WA.

The Blackwood Basin Group's environmental management system program, BestFarms, and other similar systems being trialled or considered both in Australia and abroad provide an important context for this study.

Semi structured interviews, participant observation, questionnaires and a range of organized and synchronistically available forums were used to gather data. Information on attitudes and efforts towards sustainability in each supply chain were collected and presented in a narrative form. This form was recognised as most suitable for conveying the interactions between actors, personal drivers and changes over time that characterized each of the case study product sustainability stories. As mentioned in the previous chapter, adaptive theory approach was used in the development of theory from data collected. Methods used are described in the table below and expanded upon in the following pages.

**Table 3: Research approach by stage**

|  | **Outcome** | **Method** |
|---|---|---|
| Stage 1 | Background, contexting<br>*What is the context for this research?* | Experience, participation, literature |
| 2 | Capturing life cycle, overview of 'product narrative' and chain relationships. *Where does sustainability fit in the farm system?* | Semi- structured interviews with farmers |
| 3 | Clarifying issues and new issues<br>*Where does sustainability fit in the rest of the supply chain?* | Semi- structured interviews with other supply chain actors |
| 4 | Capturing end of chain attitudes<br>*What do consumers think about sustainability?* | Consumer interviews |
| 5 | Assessing and understanding context for sustainable supply chains<br>*What are the emerging policy and institutional roles and attitudes related to agricultural product sustainability?* | Involvement with national EMS discourse |
| 6 | Development of explanatory models<br>*How are sustainability values transferred along the supply chain?* | Developing supply chain models |
| 7 | Testing early concepts<br>*What do (interested) participants in the wider production to consumption systems consider as the major issues for sustainability?* | Supply chain forum<br>Industry forums |
| 8 | Filling theoretical gaps in data<br>*What is missing to tell the complete story?* | Further interviews as indicated by data |
| 10 | Adaptive theory<br>*What issues emerge from the data?* | Coding, concept indicator links |
| 11 | Development of theory models | Model development |

## 5.3     Participant selection

Using Patton's (2001:243) sampling definitions, this study used mixed purposeful sampling including intensity sampling (information rich cases that manifest the phenomena intensely), chain sampling (cases which are able to lead to other information rich cases) and opportunistic or emergent sampling (following new leads and taking advantage of the unexpected).

The study used production to consumption cycles starting in the Blackwood Catchment. The ten supply chains chosen including two examples of each commodity, broadly covers the major non-meat industries in the region (dairy, horticulture, wine, grains and wool).

The supply chain activity explored was mostly situated within the regional (e.g. Western Australia) and sometimes national scope. In all but one case, a proportion of the products do leave the state and a number of them are exported. One of the products is purely for export, due to the producer's perception of a lack of Australian market for 'sustainable' products. The export component is considered secondarily to the regional and national scope of this project. That is, the objective of exploring the importance of sustainability values for Australian export products, whilst no less important, was tangential to the domestic context. However it is recognised that exports are of critical importance in agricultural sustainability in Australia, particularly with the current trend of rising export prices. Relative to imports, average export prices (of all commodities) have risen by around 65% since 2002 (*The Weekend Australian, 14-15 June*). An issue relevant to exports that was explored in this study is the lack of processes in Australia to support sustainable food and fibre systems in comparison with the many certification and other processes overseas.

Nine of the ten case study chains were initiated from farms in the Blackwood River catchment, South West Western Australia. The tenth case study product originated from a market garden farm located in the Perth outer suburbs. This case study was used as there were no conventional strawberry growers available within the catchment for comparison with the organic strawberry example.

Details on the location of the farming and manufacturing operations in each of these supply chains is not specified in this dissertation because of the need to respect and maintain the confidentiality of these people and their businesses. This is discussed further in the section on ethics in the research.

## 5.3.1 Best case selection

Purposeful or "theoretical" selection with an intentional bias was used to select 'information rich cases for study in depth' (Patton 2001:230). Purposeful sampling in this study aimed, as Patton describes it, 'to yield insights and in-depth understandings rather than empirical generalizations' (ibid). Because environmental assurance and other systems that recognize and support whole of supply chain sustainability are not common practice in rural WA and arguably Australia (outside of organics), a random selection would have very likely returned limited or even nil data on this topic.

Best practice farmers and consumer case studies were deliberately chosen as they are the most likely examples to expose the drivers of and impediments to the transfer of sustainability values along the supply chain. These case studies are also likely to provide rich information on the topic and allow central themes to emerge (Ritchie & Lewis 2003). The 'extreme cases' (Patton 2001) selected were growers known to have environmental and social values that challenged or complemented economic values associated with their production systems in a visible and public way. Intensively studying a small number of these 'illuminative cases' (Patton 2001:232) should lead to a better understanding of the drivers and impediments to 'sustainable' approaches.

Farm managers were chosen for interview through the researcher's community landcare network. All farmers in this study were considered to be environmental best practice farmers and were selected on that basis, using a number of signatures to define best case including involvement in NRM and agricultural sustainability programs, and on-farm activities such as soil and water conservation and biodiversity protection. It was understood that all ran successful commercial enterprises that fit within the over $50,000 per annum bracket. They had all undertaken significant industry best practice and landcare efforts on their landholdings and all spoke of strong environmental values as major drivers in their farming business and lifestyle (not to neglect the major driver of economic sustainability).

All farming families selected as case studies were actively managing their properties to improve the environmental conditions as well as the financial equity and family values of their farm businesses. They all used a whole–farm approach based on a good understanding of the limitations of the farm resources. This was developed mostly over many years of committed effort towards environmental and industry best practice but also though implementing property management plans, biodynamic and organic systems and implementing whole of farm systems such as keyline, rotational grazing and regular soil testing and fertiliser practices.

All but one of the growers was known to me and all immediately agreed to participate when their involvement was requested. Requests for involvement included an explanation that the research would consider methods for better recognition and rewards for sustainable farmers. It was also promoted as helping to inform the future of the BestFarms project. Six of the ten farms were involved in BestFarms, which also served as a signature of the best practice status of the farmers.

## 5.3.2 Comparison – certified and conventional chains

The decision to study both a certified chain and a conventional (non-certified) chain for each of the five products has contributed a range of data for comparative analysis. Whilst certification for environmental and social sustainability values was an important focus of this study, there is no such certification system in existence in Australia and a proxy certification system was required. Hence, organic certification was used for four of the certified products. A product certified under a European certification system was the other certified product.

Advantages of including a certified and non-certified chain include the ability to contribute data on drivers and impediments in both systems. With both approaches considered, information from both production to consumption systems for the same product (essentially) can be incorporated in the analysis.

Because there is some level of argument as to whether organic certification systems are including environmental and social sustainability issues adequately (e.g. Watts & Suter 2005) analysis of these systems can also determine how adequately organic certification systems are addressing a range of sustainability issues.

## 5.4        Data collection

Data collection commenced with a single semi structured interview with each grower participant. During this, an overview of the supply chain dynamics was developed.  This then led to semi-structured interviews with other supply chain actors. There were a number of criteria for selecting these other actors for interview. Firstly they had to be known to the farmer or other supply chain actor. For example, conventional wool and grains farmers could not identify all the manufacturers in their supply chain. Interviewing supply chain actors also had to be approved of or recommended by the farmer. They also had to be accessible within the resources of the study. Initial consumer interviewing at point of purchase led to the need to develop appropriate forums which would attract consumers who were "best case". This was supplemented by a forum 'Food for Thought' held in Perth in May 2006 which allowed interaction between both producers and consumers on the topic of sustainability. The data sources and how emergent theories advised data collection is shown in Figure 7.

**Figure 7: Emergent theory led data collection design**
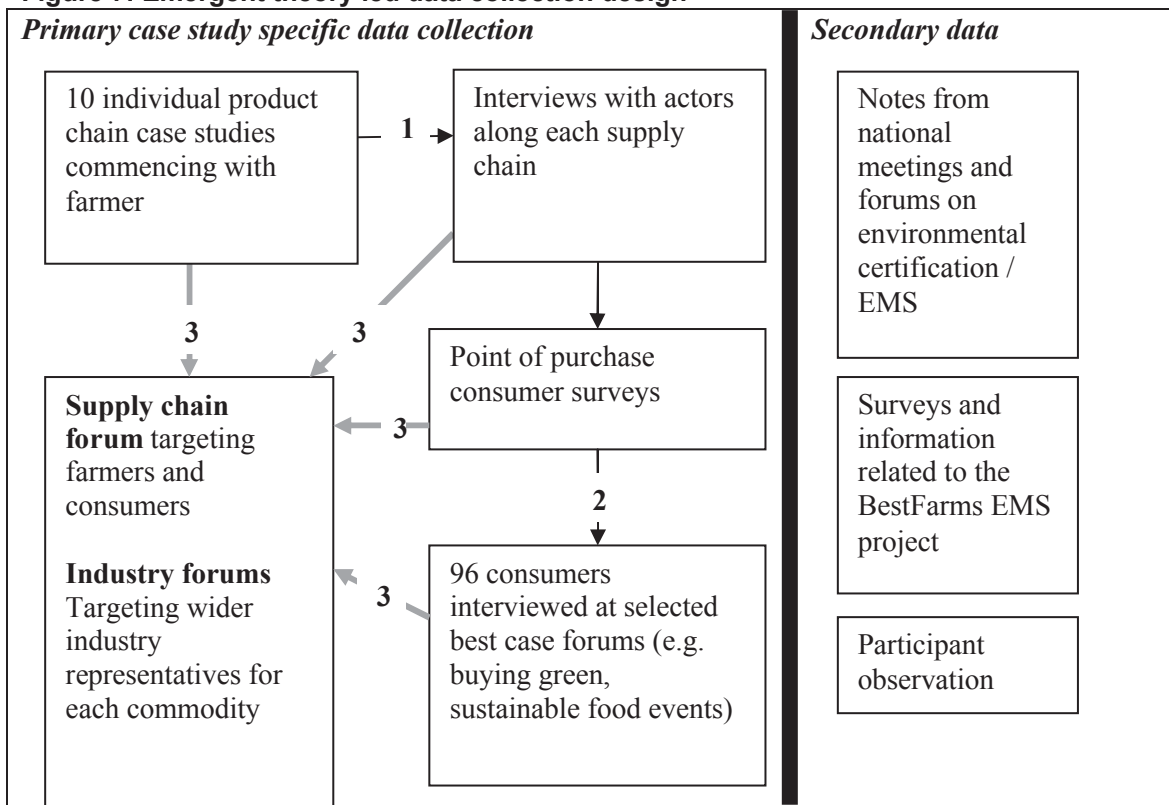


1. Farmer interviews identified the overall product chain actors and also which branch of the supply chain would be both the most receptive to the topic and the most information rich.

2. Initial attempts to track each product to consumers showed that consumers gave the same responses when surveyed about different products. This led to the decision to target best case consumers at appropriate 'buying green forums' – using existing or created forums to do this.

3. Interviews with all supply chain actors showed emerging trends relating to value driven behaviour in supply chain actors. Supply chain and industry Forums were held to test these emerging theories.

Secondary data collection included: data collected through the BestFarms project, random participant observation; and notes on related activities such as a national forum held to discuss the development of an Australian Environmental Certification system (Australia 21 Forum, Brisbane 2005).

## 5.5 Interviews with supply chain actors

Interviews with farmers, other supply chain actors and consumers focused on environmental and social sustainability issues associated with supply chains, environmental initiatives, monitoring of environmental indicators, perceptions of sustainability and perceived benefits or advantages of having the product environmentally certified.

Also explored were the interactions and relationships between supply chain actors, focusing on how values related to sustainability were transferred (or shared) within the supply chain.

The ten supply chains and methods used to collect data from each supply chain segment are shown in Table 4 below. Consumers were surveyed through a separate process described later in this section.

**Table 4: Case study supply chains and method of data collection**

| Product | Farm | Wholesale | Manufacture | Retail |
|---|---|---|---|---|
| Certified biodynamic grains supply chain | ✓ | ✓ | ✓ | ✓ |
| Conventional grain supply chain | ✓ | ✓ | ? | ? |
| Certified organic wine supply chain | ✓ | ✓ | ✓ | ✓ |
| Conventional wine supply chain | ✓ | ✓ | ✓ | ✓ |
| Certified organic strawberries supply chain | ✓ | ✓ | ✓ | ✓ |
| Conventional strawberries supply chain | ✓ | desktop | ✓ | ✓ |
| Certified biodynamic dairy products supply chain | ✓ | ✓ | ✓ | ✓ |
| Conventional dairy products supply chain | ✓ | N/A | ✓ | ✓ |
| European Eco-wool supply chain | ✓ | desktop | desktop | desktop |
| Conventional wool supply chain | ✓ | desktop | ? | ? |

✓ = face to face interview, desktop = review of company documents and policy, **?** = unknown

With permission, interviews were tape-recorded but where that was not possible or appropriate, notes were taken. Pseudonyms have been used in this report to observe the in-confidence agreements negotiated between the researcher and farmer or other supply chain actor interviewees. Where the supply chain actor is from a large company, and information covers company policy that is public knowledge, the need for confidentiality arrangements was not deemed necessary.

In all, 49 people were interviewed within the ten supply chains. This included 19 farmers from ten farms, with a couple involved in the enterprise being interviewed in all but one case. In addition 96 consumers were interviewed making a total of 145 interviews as shown below in Table 5.

**Table 5: Case study interviews**

| Value Chain Sector | Number of interviews |
|---|---|
| Farm | 19 |
| Manufacture | 9 |
| Retail | 21 |
| Consumer | 96 |
| **Total** | **145** |

In addition to the 145 interviews, 35 people attended the industry forums and 48 people attended the supply chain forum (described later). Some people were involved in more than one of the data collection methods.

The semi-structured interview approach allowed interviewees to focus on values that were important to them. The importance of the value to each supply chain actor was assessed by its inclusion in the discussion, the number of times it was referred to and how much coverage the issue received. In addition, all supply chain actors were asked to rate the importance of seven sustainability values. Consumers undertook this as part of their interviews but supply chain actors (e.g. farm, manufacturer and retail) were requested to do this retrospectively and only about 50% of them undertook this exercise.

The sustainability values that participants were asked to rank were:

1. price
2. environmental friendly
3. animal welfare
4. minimal transport
5. local
6. small business
7. workers rights
8. other.

Interviews with all supply chain actors showed emerging trends relating to sustainability value driven behaviour in supply chain actors. Two forums were held to test these emerging theories. As mentioned in the previous chapter, narrative was also used in the collection and representation of data.

## 5.5.1 Farmer interviews

All farmers in this study are considered to be environmental best practice farmers and were selected on that basis. They have all undertaken significant landcare efforts on their landholdings, were familiar with industry best management practice (BMP) programs and held membership with industry and natural resource management associations. All farms with the exception of one, which was located in Perth, are located in the Blackwood catchment, South West Western Australia. This was because each certified chain was paired with a conventional chain and there were no conventional strawberry growers of an adequate size in the case study area. Hence a conventional strawberry grower was located in Perth with the assistance of the national Strawberry Growers Association.

Of the ten farmer case studies, six had undertaken the BestFarms EMS training and five of them had a certified system. This is shown in Table 6 in Chapter 5.

The first task was to map out the production to consumption chains. This was done at a broad level, during a face-to-face interview held mostly at the farmer's home. Interviews took an average of two to three hours and usually included a meal and paddock tour. Where possible, the interviews included the whole family or other significant decision makers / influencers. Interviews were semi-structured following a checklist of topics to ensure that all topics are covered.

Information collected at farm interviews included the following:

- product and supply chain mapping
- production inputs
- who is involved in the production on farm
- identification of other supply chain actors
- relationships between the actors along the chain
- decision making processes
- advice and support received or given
- understandings of 'sustainability'
- environmental, economic, interpersonal risks associated with this product
- changes relating to sustainability incorporated into production or processing
- perceived sustainability of the production system
- potential changes to make this production system more sustainable
- belief in the product
- benefits (or disadvantages) of having the product environmentally certified.

This base set of interviews determined the set of interviews that were needed with other actors in each production to consumption cycle.

## 5.5.2 Wholesaler, manufacturer and retailer interviews

Wholesalers, manufacturers and retailers were selected for interview through the supply chain descriptions provided by farmers as described earlier. This included individuals representing both large and small companies. These are shown in Table 6 in Chapter 6. A range of large and small retailers and manufacturers associated with the supply chains were interviewed. Interviews with these other supply chain actors were in most cases shorter and less detailed than farmer interviews because these interviews covered just one sector whereas farmer interviews covered the farmer's knowledge of the whole supply chain. These middle chain actors indicated greater time restrictions than the farmers and were generally less engaged in the topic. These interviews were held mostly face-to-face but a number were held by phone. The information checklist used for farmer interviews (above) was also used in these interviews.

## 5.5.3 Consumer research method

Interviewing consumers was essential because of the production to consumption approach used in this study. Consumer interviews were conducted during 2005 and 2006, with 96 consumers interviewed. Consumer participants were self-selecting and were invited to be interviewed at events or outside shopfronts.

Initial attempts to track each product to consumers, as well as being extremely difficult, showed that consumers gave similar responses when surveyed about different products. This implied that broadly interviewing about attitudes to sustainable products, rather than attempting to track each product to the consumers, would suffice. The first sets of interviews were conducted at stores where the case study products were sold. These make up only 20 of the 96 interviews, as this exercise was unrewarding and the decision to focus on the more information rich 'green' purchasers led to a change in approach. This led to the decision to target best case 'green' consumers at appropriate 'buying green forums' – using existing or created forums to do this.

It was assumed that these people were more likely to have an interest in food and fibre sustainability issues and might represent potential 'green' product purchasers. 'Green' purchasers were also thought to be the most information rich on the topic and be the most likely to drive demand for sustainable products. Also the awareness or lack of awareness, amongst this group represents a best case scenario in terms of attitudes toward sustainable consumption in the wider population.

Existing 'Buying Green' or Sustainable Food forums provided an opportunity for consumer research in a forum where participants were likely to be sympathetic to the topic of sustainable food and fibre products. This included the Buying Green Conference in Perth, May 2006, the Food Consumption and Production Symposium held at the University of WA in August 2006, the Blackwood River Festival in Bridgetown in the South West in September 2006. Attendees at the Food for Thought forum (discussed later) were also provided with the questionnaire in written form, as there was limited time to interview at this event.

These events provided an opportunity for consumer research in a forum where participants were likely to be sympathetic to 'green' food and fibre products. Using a context of a display of sustainable products (including case study products and other organic, fair trade and ecolabled products) and product 'tastings', participants at the conferences and festivals were given approximately 10 minute interviews regarding attitudes to 'green' products.

Information about sustainable production support programs (e.g. the Blackwood Basin Group's BestFarms EMS project and the WA Dept of Agriculture's Farming for the Future program) were employed in the displays to provide context.

Consumers were interviewed using open-ended questions regarding their purchasing behaviour followed by more specific questions focusing on environmental and social values. They were also asked to rank a list of sustainability values. This was based on the premise that they were choosing between two products where other factors were equal. As well as extensive qualitative data collected through the consumer interviews, there were 14 quantitative observations on 96 subjects. The number of quantitative observations were measured. Participants were asked to rank the last 6 factors (points 9-14 below) in order of importance:

1. the importance of purchasing environmentally friendly products as compared with other criteria (listed below No.9-14)
2. whether the interviewee could identify environmentally friendly products
3. whether the interviewee supported environmentally friendly products in their purchasing
4. whether the interviewee supported the use of an environmentally friendly label
5. the importance of environment as a key value when interviewees were asked what was most important to them
6. gender
7. age
8. location
9. the importance of price associated with the product
10. the importance of localness of the product
11. the importance of efforts at minimum transport associated with the product
12. the importance of workers' rights associated with the product
13. the importance of animal welfare associated with the product
14. the importance of supporting local communities in product purchasing.

## *5.6*      *Forums*

The objective was to use a more dynamic method than one-on-one interviews. As mentioned earlier, a key function of these forums was to enquire as to whether the concepts and theories emerging from the interviews were held more universally. Shared and different understandings and values, comments about relationships and apparent impediments in the transfer of information along supply chains that had emerged from the interviews, indicated that a forum where a range of relevant actors were brought together may provide further insight.

### 5.6.1 Industry forums

While supply chain actor interviews provided information on the immediate system it was also necessary to locate these food and fibre systems within the larger context of the industries with which they were associated.

Initially a forum was held which targeted the wine industry, which out of the case study industries represented in the study was considered to be the most likely industry to be information rich on the topic. This is because the industry has been involved in discussions concerning environmental assurance for approximately ten years in the Margaret River area. Held in partnership with the Curtin University Centre for Wine Excellence and the Margaret River Wine Association, this forum was attended by 15 people including representatives from one of Australia's largest wine corporations, smaller winemaking operations and regional NRM. This was a more structured forum with a presentation by the Wine Federation of Australia (WFA) on the research being undertaken on international trends relating to 'green' demands. This was followed by a discussion.

Additional industry forums were held in the South West region in August 2007. These targeted broadacre, dairy and horticulture industries and included representatives from government, industry and farming groups. Another meeting was held with representatives from the earlier viticulture workshop, which reviewed the previous findings. The aim of these forums was to obtain direct input from these groups about the nature of sustainable agriculture, the drivers and barriers to achievement of sustainable agriculture and the measures used to detect change towards sustainable agriculture. The forums followed a semi-structured format which allowed for open discussion. The following questions were put to each industry representative group.

- What changes are required to improve sustainability in this industry?
- What has worked to bring about change towards sustainability in this industry? What has prevented it?
- What approaches to adoption of sustainable practice and change management are unique to this industry?
- How do we know when positive changes towards sustainability have occurred in this industry?

The industry forums aimed to bring together key informants for those industries rather than larger representative numbers. Invitations were sent out broadly to industry contacts with around one third of the people invited attending. The first of the industry forums, the wine forum, was held in the South West in May 2006 with the other four industry forums held between in early August 2007. Workshop notes were forwarded to participants for further comment.

## 5.6.2 Supply chain forum

A forum for consumers and case study supply chain actors was held in partnership with the Conservation Council of Western Australia. This was called 'Food for Thought 2' (after a preceding 'Food for Thought 1' forum). This was held in Perth in May 2006 to test emerging theories and was an example of theoretical sampling (Glaser and Strauss 1967, Layder 1998) where new people, events or settings are sampled on the basis of emerging theory. Layder (1998) reviews the Glaser and Straus' concept of theoretical sampling to include prior information, data and models This is consistent with Layder (1998:47) who suggests that theoretical sampling involves the progressive inclusion of new people or events in the sample through the 'combined force of prior theoretical ideas or models and the collection and analysis of data in relation to them'.

This event was specific in its objectives to allow interaction between supply chain actors. This forum attracted 48 people from a diverse range of interests including farmers, wholesalers, retailers and 'consumers'.

Participants were invited through the researcher's farmer, environmental NGO and government networks and the WA Conservation Council networks. Strongly represented at the forum were people associated with organic food. 'Sustainable' food including products from the case study supply chains was used in the event catering. The event was held using an open forum technique which involved a dialogue between consumers and farmers about issues of food and fibre sustainability. A number of farmers attended included three of the ten case study farmers. The dialogue was recorded.

## *5.7 Analysis*

As described in Chapter 4 Theoretical approaches, adaptive theory was used in the analysis of interview information. Qualitative data from interviews was analysed using Nvivo (QSR International, 2007) a software program that enables the ordering of interview and other data into areas of significance. The matricing function of Nvivo allows for comparison between variables within and across case study product narratives.

Some limited statistical analysis was conducted using the data from consumer surveys. This included a multiple regression of the preference to purchase environmentally friendly products against consumer demographic variables as well as other value preferences. This was undertaken using ordinary least squares regression. This was done to identify how the other variables interacted with preferences to purchase environmentally friendly products.

## 5.7.1 Product snapshots

While this research focused on qualitative data, some quantitative data was collected in the description of product life cycles by supply chain actors that would contribute towards the development of the product snapshots. Such quantitative data can corroborate the findings from qualitative data.

Assessing the ecological footprint of each product through Life Cycle Analysis was beyond the resources of this study however, an abbreviated form of this was undertaken in the form of a product sustainability 'snapshot' including retail price and product miles.

## *5.8     Ethics*

The major ethical consideration in this study concerns the protection of anonymity of the case study participants and the information they have provided in interviews. This research was undertaken with adherence to the principles of ethical research with participation rather than using people as a means to an end as a key principle. Clearance was received from the Australian National University Human Research Committee in 2003, prior to commencing interviews.

To protect the identity of participants, names of people and businesses have not been associated with the case study information in this dissertation or in other published material. Businesses are described using descriptive terms e.g. 'conventional grains' and pseudonyms were developed for the key participants in the study.

Participants were made aware of the purpose for which the information was being collected and where and how that information will be disclosed. Once participants decided to be involved and their questions about the research had been adequately answered, a consent form was signed by participants. With permission, interviews were tape-recorded and transcribed. It was made clear to participants that their decision to withdraw from the research project was perfectly acceptable.

Where requested, interviewees had the opportunity to check the accuracy of interview information collected. This was requested by only one of the participants and no changes were made to the transcription.

Personal questions were not directed at participants about their beliefs and values. Rather, these issues arose (or did not arise) from conversations concerning the products.

The potential impact of increased knowledge amongst actors within the supply chain to the detriment of that relationship was carefully managed. Where the interviewee identified potential sensitive information, the utmost effort was made to keep that information confidential.

The use of semi-structured interviews to develop product narratives was not considered to have any detrimental impacts. Elliot (2005:135) considers the ethical issues around the choice of narrative enquiries as a way of empowering subjects of research. She suggests that informant structured interviews allow informants to select what they believe to be the most salient information (ibid). She also warns that the potential for exploitation is just as great in structured interview and survey methods. She suggests that unlike data collected in other forms, narrative yields information that cannot be readily disassociated from values and meaningful life experiences. As the interview method sought to capture information on beliefs and values, without directly asking participants, this risk of exploitation was managed. That is, participants only shared information on beliefs and values as they chose, rather than being directly asked.

## *5.9      Reflexivity, bias and reliability*

Particularly because this research arose from a particular path that the researcher has invested time and energy in, a reflexive approach was very important. The researcher's personal and professional history provided strong bias about what constitutes sustainability, for example, having worked for seven years as the catchment coordinator of the Blackwood River catchment, the case study area. The researcher's perspective is explored in Chapter 1.

As Maxwell (1996:67) summarises, reflexivity is the recognition that the researcher is inextricably part of the phenomena studied. The researcher, for example, 'gained entry' (ibid) with the participants on the basis of previous involvement as catchment coordinator and also project leader of the BestFarms project (discussed in Chapter 2).

Participant's responses at times may have been influenced by the researcher's previous position as driver of the BestFarms program. Coding and noting proximity of participant comments and researcher comments allows demonstration of this influence. Transcriptions of interviews retained the researcher's questions and comments and these are coded along with participant comments. Also notes were taken after interviews and journaling of researcher observations and ideas occurred during the study. This reveals common themes pursued by the researcher and shows where these complement or contradict participant comments.

Elliot (2005: 154) notes that for researchers committed to producing research that makes a difference, 'the adoption of an explicitly reflexive approach… provides a way through this crisis of representation'. Noticing emotional and intellectual responses to participant comments is an important method in managing this issue. In terms of influencing the product narratives, memos kept during analysis of transcriptions allow responses to be acknowledged which in the words of Mauthner and Doucet (1998) cited in Elliot 2005, helps to '.. retain some grasp over the blurred boundary between narratives and our interpretation of those narratives'.

## 5.10    Assumptions and limitations of this study

Value transfer is recognized as a problematic term, because it is unlikely that the values held by one supply chain actor can literally be transferred to another supply chain actor. However, in this study, value transfer refers to the sharing of values between one or more supply chain actors. It also refers to the ability of supply chain actors to influence each others values.

This study focused on value chain actor attitudes rather than behaviours although these were also observed and documented where possible. Other researchers considering consumer preferences for sustainable products (e.g. Gordy 2000 and Teisl et al. 2002) have found that intent does not necessarily translate to practice. Without a range of 'sustainable' products which can be used to test purchasing preferences, only information on perceived action and intent can be collected at this stage.

That is, it is likely that values presented as important during interview may not be actually acted upon in some cases. Nevertheless, intentions to act are still valuable information in this analysis. Arguments can be made that these intentions to act may be either exaggerated or under-exaggerated. For example, Vermeir and Verbeke (2005) suggest that the limited availability of 'sustainable' produce restricted the ability to test intentions against action.

They suggest that intentions reported in consumer surveys related to the purchase of ethical products were actually lower than they would be with greater ethical product availability (ibid). This lack of 'sustainably certified' produce does present a problem for this study. Attempts to address this included the use of product displays associated with consumer interviews and information about the case study products that could indicate the sustainability values associated with it.

Some assumptions are made in this report around the importance of sustainability to supply chain actors. Participants' aspirations are not straightforward, are often contradictory and are influenced by a number of drivers that are not fully explored in this study (e.g. economic status, levels of knowledge, health, habit, family and wider community issues). It is also possible that less important issues may be taken for granted and therefore be the most difficult to track. Hence it is recognised that ethical values present only a part of the explanation of how and why the case study supply chains have developed in their current form.

Data on importance of values was not available for all supply chain actors. Where this has not been supplied by the supply chain actors, the order of values is estimated based on interview or desktop information. Also, as mentioned frequently in this report, consumers were not asked to rate the importance of key consumer issues such as quality, convenience, health, offers, taste and availability. To address this, consumers were asked to assume that these factors were equal when rating sustainability value preferences.

Another issue is that not all case study supply chains were equally represented. This is largely due to some of the supply chains being more information rich than others in regard to the topic of sustainability in food and fibre systems. This was often the case with the certified chains, with actors in these chains often being able to better articulate thoughts about sustainability. It is also noted earlier in this section that the main focus of this study was on farmers and consumers and hence, information on middle chain actors perhaps does not provide the full range of perspectives exist amongst wholesalers, manufacturers and retailers.

There are also some limitations related to the choice of the case study setting and location. The data was collected from only one region in Australia and hence may have limitations in its application to other parts of Australia. The region selected however, does represent a wide climatic range as well as a wide range of issues and agricultural industries. Another limitation of the study is that with one exception, where the business was owned by a syndicate, all farms considered in this study are family farms.

However, according to Liao and Martin (2009), more than 98 per cent of broadacre and dairy farms are owned and managed by families.Also, the focus on the five commodities chosen for this study means that there may be limits to application of the findings to other industries, notably meat supply chains which were not considered.

# Chapter 6: Supply Chain Case Studies

In this section, results are presented by each case study supply chain. This is presented as product narratives with a focus on the sustainability values held by supply chain actors and also how they were transferred or were not transferred within the supply chain. The relative importance of sustainability values to different supply chain actors, with a particular focus on the transfer of environmental sustainability values, is also discussed. Key influences on sustainability values along the chain are presented as well retail price and product miles.

The assessment of importance of values to supply chain actors is presented in the value transfer diagrams for each supply chain (see Figure 8 to Figure 17). Although other values were shown to be transferred, the focus here is on the transfer of environmental sustainability values.

Whilst the results from the consumer interviews are presented later as a second part of the Results section in Chapter 7, they are also incorporated into each of the supply chain value transfer diagrams in the following pages. In some cases there was information from consumers relating to specific products, however the consumer values in these diagrams are largely generalised from the results of the wider consumer survey (detailed later).

An overview of the case study supply chains and related supply chain actors considered in this project is provided in Table 6. This includes a description of the products concerned and the range of actors (farmers, manufacturers, distributors, wholesalers and retailers) involved in the supply chain. Table 6 also shows if the product is certified and by which certification organisation. It also shows which of the supply chains have a farm EMS and also the stage of implementation the EMS.

During the study, it became apparent that the supply chains differed in two distinct ways which were considered to affect the ability to transfer values. That is, some there were supply chains in which the farmer had a significant input into beyond the farm gate (farmer driven supply chains) and those where the farmer had little input past the farm gate (supply chain driven farmers). As such, the supply chain descriptions are ordered under these headings.

The following descriptions of value transfer in supply chains focus on environmental sustainability values and this is a focus of the discussion on each of the case studies, as well as in the diagrams which depict the flow of values through each supply chain.

However, it is notable that this was often not the most important of the values explored. Lack of reference to a certain value does not necessarily imply that this was unimportant to the supply chain actor, just that it was mentioned less than other values.

The term 'transfer of sustainability values' is used to describe the communication of values held by one supply chain actor to another. Of course, sustainability values are not wholly dependent on transfer from another supply chain segment as supply chain actors will hold certain values as important, independently of any influence from each other. Essentially whether these values are independently created, or influenced by other actors in the supply chain, it is essential that there is some sharing of these values in order to communicate, or transfer, sustainability values from one end of the supply chain (i.e. the farm) to the other (i.e. the consumer). It is this transfer that is the focus of the following discussion of case study supply chains.

**Table 6: Case study supply chains and supply chain actors interviewed or researched**

| Case studies | Farmers | Manufacturer / Value Adding | Distributor/ wholesaler | Retailer | Certifi-cation | | Destination |
|---|---|---|---|---|---|---|---|
| Farmer Driven Supply Chains | | | | | | | |
| **Biodynamic grains company** | Susan and Andrew (company directors) | Company owned biodynamic grains mill & SW biodynamic bakery (Reiner and Anna) | Perth, Melbourne and Albany (WA) wholesalers | Case study company biodynamic bakery, Perth and SW wholefood and conventional outlets, interstate wholefoods outlets | ) Demeter | | WA, eastern states |
| **Organic strawberry company** | Warren and Olga (company directors) | Farm based jam making operation, local and eastern states organic dairy product manufacturers | Local SW distributor, Perth organic fresh food wholesaler | Perth wholefoods outlet, local SW supermarkets, Woolworths and various other retailers, eastern states outlets and farmgate. | NASSA | ✓✓ | WA, eastern states |
| **Biodynamic milk company** | Kurt and Elaine (company directors) | South West small dairy foods manufacturer Richard and Margaret (mgrs) | Company managed | Perth organic health food shop, local town health food shop, conventional supermarkets and various other suppliers in WA | Demeter | ✓ | WA |
| **Organic wine company** | David and Rebecca (company directors) | Farmer managed | Farmer managed | Mail order, various bottle shops incl SW rural towns, Perth suburbs, interstate outlets | NASSA | ✓ | WA, eastern states |
| **Eco-wool company** | Matthew (farmer & production mgr) | US / China / Australian processors | Owner managed, Tasmanian wool broker | US: Nike, Patagonia, Columbia etc, Aust: Mountain Designs | EU Eco-wool | ✓ | US, Australia, Europe, Canada |
| **Conventional wine company** | Mark and Christine (company directors), Derek(vineyard mgr) | Company owned winery Martin (winery mgr) | Company managed | Mail order, various SW & Perth bottle shops, interstate & overseas outlets | none | ✓ | WA, eastern states, overseas |
| Supply Chain Driven Farmers | | | | | | | |
| **Conventional grains** | Sarah and Robert | unknown | Perth Grains Bulk Handler | unknown | none | ✓ | Australia, overseas |
| **Conventional milk case study** | Peter and Elizabeth | WA dairy foods manufacturer | WA dairy foods manufacturer | Extensively sold throughout WA | none | ✓ | Australia, overseas |
| **Conventional wool** | Nadia and Bede | unknown | Various wool brokers | unknown | none | | Europe, China, Japan etc |
| **Conventional strawberry company** | Alan (company director) | Farm jam making operation, South West gourmet jam producer | Perth fresh food wholesalers | Woolworths, Various small supermarkets, farmgate | none | | WA, eastern states |

[1] Ticks indicate progress towards a certified BestFarms EMS or other EMS on farm. One tick indicates attending training workshops and development of a Draft EMS Farm Action Plan and two ticks indicates a completed and 'certified' system. All farms were observed to have whole farm management systems that would meet many of the EMS criteria.

## *Farmer driven supply chains*

## *6.1 Biodynamic grains – Realising the impossible with grace*

Susan and Andrew converted the wheatbelt farm which had been in Andrew's family to biodynamics the year they got married in the late 1980's. They later introduced a post harvest processing stage into their operation because of the lack of profitable markets for biodynamic grain. The WA grains bulk handler that they originally dealt with was not prepared to differentiate the organic grain. They established a flour mill at a nearby wheatbelt town to guarantee their on-farm grain price. They produce a range of fine gourmet flours and they also initiated the development of a bakery in the coastal strip of the South West. Their motivation to farm biodynamically relates to concern about exposing their family to chemicals but also because they enjoy it immensely. Susan noted a research finding that farmers who do organic farming get the most joy out of farming.

The farm has an area of 2000 acres, and the boundaries follow a catchment, so they are relatively independent from downstream impacts from other farms. They are also relatively high in what is a very flat landscape. This is important because the area of the upper Blackwood catchment they live in is significantly affected by secondary salinity, with over 12% of the area affected. Tree planting on the farm started in the 1950s, most of the fences are on contours and the keyline system has been implemented on some parts of the farm.

While most of the flour they mill is from their own grain harvest, they also buy from other organic properties as required. As well as flours and bread, they also produce other certified products including whole grains for milling and sprouting, eggs from free-range poultry and stock feeds of straw, hay and formulated livestock pellets for sheep, cattle, horses and goats. Waste is addressed through the production of a poultry feed line which Susan and Andrew have also developed, which supplies free-range chicken farms. All produce is hand packaged. As well as overseeing the mill, marketing and supply chain relationship building, Susan overseas the distribution of these product lines. Andrew works long hours on the farm and is passionate about farming. A partnership between Susan and Andrew and another family led to the development of a biodynamic certified bakery. It is run by Reiner and Anna, a family of third generation wood fired bakers who specialise in biodynamic, stoneground, woodfired-oven baked bread. Their son operates the mill under Susan's direction.

The bakery building is ergonomically designed and the operations are based on the Steiner tradition. Susan and Andrew are the sole suppliers of flour to the bakery.

Reiner and Anna and their staff make three kinds of bread with around 600 to 700 loaves produced per day. Values important to them in their business are related to community sustainability and also nutrition. They believe their customers buy the bread because it is different, wood fired and it lasts 3 to 4 days (white) or 5 to 6 days (wholemeal). They also believe people appreciate being able to see how the bread is made. Reiner and Anna do not aspire for the business to be any larger and in the interest of staff wellbeing, they don't have a night shift, which is different from most bakeries. Providing a product for the local community is very important to them. Market networks have been established for the bread that include winery restaurants along the coastal strip, wholefood stores throughout WA and a number of the smaller conventional supermarkets, both in rural South West and in Perth. In terms of environmental values they feel that Steiner agriculture necessarily addresses environmental issues. They communicate this to consumers but don't use it as a marketing tool.

The bread is mostly distributed within the South West and in Perth but the range of gourmet fine flours produced at the mill is sold through wholefood wholesalers in Perth, Melbourne and Albany to wholefood retailers all over the country. Both 1kg and bulk quantities are packaged for the retail market. Significant effort has been put into experimenting with marketing and label design, orientated to capture the higher value market and communicate sustainability messages. The marketing design used in packaging flour products has won design awards.

Perth organic retailer, Marian, says that is impressed by the product and has a good relationship with Susan and Andrew, but is somewhat frustrated by the purchasing arrangements. Marian would prefer to buy it direct but says that to do this they have to buy a tonne of it (or 80 sacks of flour). A Canberra wholefood store manager who stocks a range of the gourmet flours said that the product is of extremely high quality. He commended it as a good hard wheat flour with high protein, saying that this is hard to find. He added that this indicates that the soil balance must be right.

Establishing and orchestrating the immense task of production, promotion and distribution of these products is primarily the responsibility of Susan and while she manages this with remarkable grace, the stress and pressure of forging this new path is evident. Another key stress is the lack of support and degree of suspicion from local farmers in the area.

However, this is counteracted by strong and vibrant community support associated with organisations like Slow Food and the wider organic lifestyle community. The values held by supply chain actors and the successful transfer of environmental values is represented below in Figure 8.

**Figure 8: Transfer of environmental and other sustainability values in biodynamic grain case study**
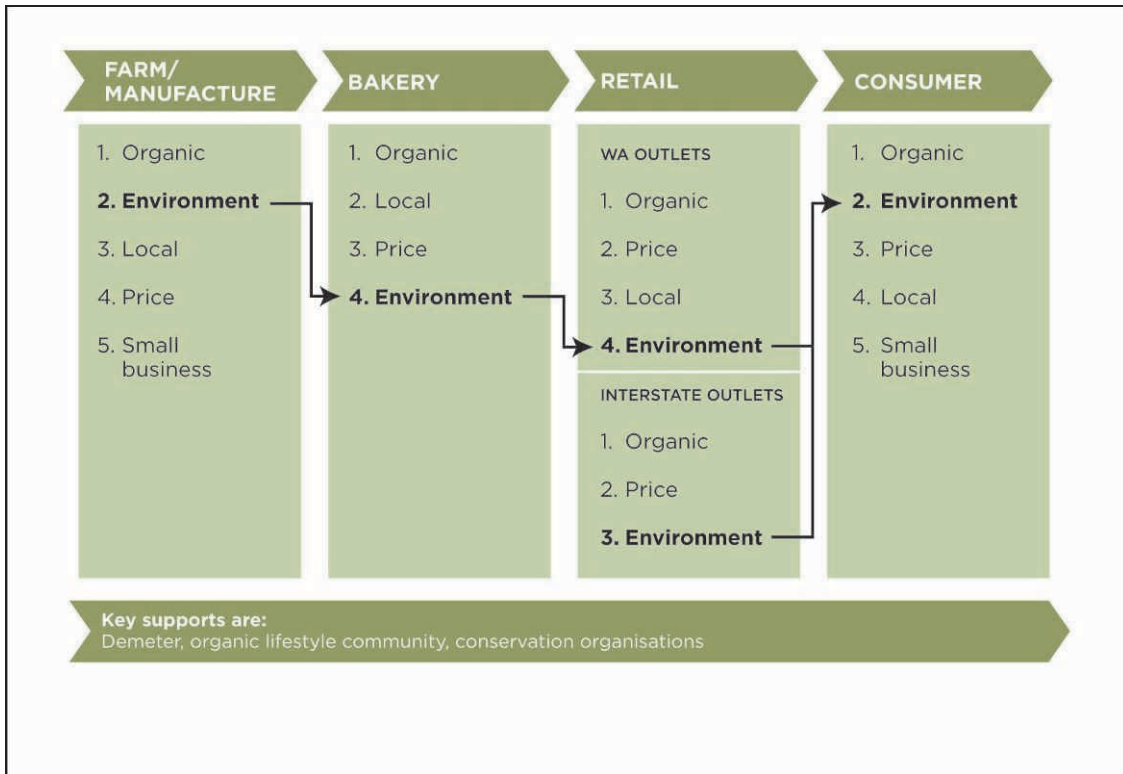


**Product statistics**

Retail price = $5.75 kg (flour) 287% higher than conventional flour

Product miles = low to high: Minimum 584 km (South West Bakery) to 4620 km

## 6.2 Organic strawberry case study – A taste for the environment

Warren and Olga initiated their organic strawberry operation in 2003. Set in bushland near a medium sized SW rural town (population over 4000), they are certified by NAASA and produce approximately 20 tonnes of organic strawberries per annum for Western Australian and interstate markets. They supply to organic retailers as well as supermarket chains. In 2006, with the help of regional development grants, they established a small processing plant on their property with a view to using their seconds (which previously went to an interstate organic foods manufacturer) to produce their own labelled products. They are also setting up a café and plan to run a farm tour business focusing on production of organic and high quality food and on the importance of the environment.

Their goals are to create profitable, meaningful and enjoyable work, to manage the environment sustainably and to provide fresh and tasty strawberries. They take a pro-active role in marketing and product placement and make efforts to communicate their environmental commitment. They were the first farm business to be 'certified' under the BestFarms EMS program and Warren is a strong advocate of the program. Through the development of their EMS, they established an environmental vision for the enterprise which is advertised on their website.

Sometimes sustainable practice to protect the resource base does involve financial loss. Warren and Olga operate from exceptional principles of environmental sustainability, demonstrated in their growing techniques but particularly when they turned off the water to 40,000 plants in order to maintain their wetland which they see as an indicator of sustainable water use. Drought conditions put their main groundwater supply source under stress and in January 2007 they let the strawberry crop die both to retain the future season's water supplies and to keep the wetland in good health. An explanation of the reason for the fall in supply is posted on their website. Unlike most strawberry growers, there is no wastage with all seconds going either to an interstate processor or to a local fruit ice small business, and in the future to their own jam making operation.

Using a personalised approach, Warren communicates closely with his supply chain. Primarily his focus is to ensure the cool chain approach is faultless but he also takes an active role in following his product to understand his markets better. He deals primarily with a Perth based organic fresh food wholesaler for WA distribution and a number of other conventional wholesalers for interstate distribution.

Through his wholesalers, he sells to Woolworths, Coles, Safeway and organic fruit suppliers. Warren and Olga also make an effort to stock the local town with their produce though this is more a social networking exercise than it is a financially beneficial one. Committed to organic food, Warren is a serious and professional business manager who believes the only way to make the business grow is to compete with the conventional growers, rather than targeting niche markets (although this is also a strategy). Warren and Olga are independent and knowledgeable and know where to source information. Warren commented that despite trying he received no support from industry associations such as the strawberry growers association, who suggested that commercial growing of organic strawberries wouldn't work.

An important actor in this supply chain is the Perth based organic fresh food wholesaler mentioned above. Managed by a husband and wife team, the company has a staff of 12. They are enthusiastic advocates of the organic food industry and were involved in lobbying Coles and Woolworths to develop organic food sections. They also pay strong attention to quality and they ensure that the cool chain continues to the shopfront. They ranked environment as their most important concern. For them, environmental management issues are adequately addressed through organic farm production.

They support eco-efficiency initiatives in their operation and also recycled and minimum packaging. They continually explore methods to better communicate the environmental and organic values of their products and packaging is a key issue in this. Whilst not opposed to the concept of environmental assurance or certification, they were opposed to any system bringing more paperwork into their already hectic schedule. With several organic certification paperwork trails to manage, they have more than enough to deal with.

One of the retail outlets that sells Warren and Olga's strawberries is a Perth organic outlet in the suburbs of Perth. The store manager, Marian, commented that whilst they attempt to stock them, Warren's strawberries can be hard to obtain because they are often sold directly over east or sold out because of Warren's good reputation. She said that Warren understandably chases the markets so there are no guarantees of supply. When asked about having this and other products environmentally certified, Marian suggested that 'it's not going to matter a jot and we may not even put (the related information) in the shop because it would be just another bit of paper to stick up to confuse people'. She commented that the important thing for this shop is the organic certification. She suggests that most of her customers are primarily concerned about their well being, but there would be a percentage of people who are buying organic with an environmental aspect in mind.

Interactions throughout the supply chain are largely driven by the active presence of Warren in each stage. Except in his interactions with Coles and Woolworths, where he says he loses influence and control, the product which is labelled with information about sustainability, as well as the NASSA logo, seems to maintain the key values it leaves the farm with, which are health, nutrition, environmental sustainability, taste and organic. This was confirmed in interviews with the wholesaler, retailers and consumers as shown in Figure 9. Taste was an important issue mentioned by all supply chain actors including the consumers interviewed on this product and so is added here as a value. Taste was mentioned by all supply chain segment except for wholesale.

**Figure 9: Transfer of environmental and other sustainability values in organic strawberry case study**
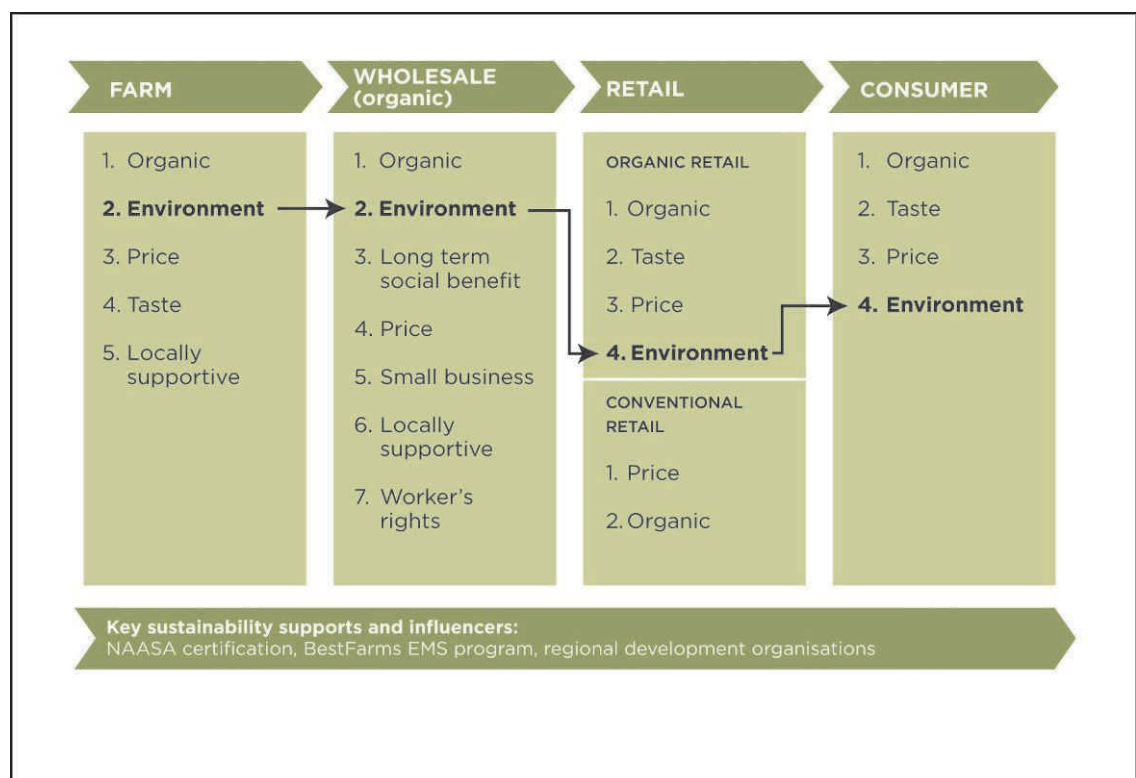


Product statistics

Retail price = $4 to $5 per punnet (200% conventional)

Product miles = medium to high: minimum 350 km (Perth) to 4300 km (Sydney)

## 6.3    Biodynamic dairy products case study – A dream in progress

Previous to the development of this milk and cheese production syndicate, the farmers involved sold their milk to one of WA's largest dairy foods manufacturers. Despite being a Demeter certified organic farm, the manufacturer was unable to segregate or pay premiums on this product and it was mixed in with the conventional milk supply. Managed by farmers Kurt and Elaine, this was WA's only organic (cow) dairy. The farm is located in what is generally considered marginal dairy country between the forests and the wool belt in the South West.

Policies of the dairy manufacturer prohibited the sale of milk to any other milk processor. This meant that in order to sell milk elsewhere, the farmer involved had to leave the company altogether.  A supply chain that was able to communicate the environmental and 'biodynamic' values of this farm product was established in 2003, primarily driven by Kurt, the instrumentalist of the new company which was formed as a syndicate. Kurt and his partner Elaine's aims were to look after land and animal as a priority whilst providing a healthy product.

Kurt is also very active in the community, speaking at various events where he can indulge his passion of educating about sustainable farming. Kurt attended the BestFarms EMS training workshops, however he had his own customised system of environmental monitoring and responsive action already in place. Kurt also communicated a spiritual aspect of farming that guides his actions. He felt that the Demeter label adequately promoted the sustainability values of the products and did not support an additional environmental certification or labelling process.

The dairy is a dryland operation that uses biodynamic principles in combination with a stock nutrition supplement program called Annutriculture. This is a nutrient and mineral feed management practice that is fed ad-lib, allowing the animals to meet their nutritional requirements through their own 'nutritional intelligence' (Hin-Gee, 1995). There are number of significant differences between Kurt's dairy farm and conventional dairies, including no grain feeding and no irrigation of pastures. It is a small operation with approximately 100 cows in milking at any time. The cows are trained to manure outside the dairy, thereby eliminating the need for dairy wash-down and associated effluent issues.

There was also less turnovers of cows than in most conventional dairies. The heifers are milked for up to ten lactations, rather than the average of four or five. In the old style, they all had names. They were also allowed significant freedom to range about the property.

In terms of economic sustainability, Kurt has been running the operation along the biodynamic principles for over ten years and supplying milk to the dairy manufacturer mentioned above. He suggested that the company would need 12 more biodynamic milk suppliers, preferably in the South West, to enable long term economic sustainability of the product lines.

Involved in the syndicate were Richard and Margaret, the operators of a small milk and cheese processing factory located 100km south of Perth. Producing fine cheeses and unpastuerised milk, the arrangement between grower and manufacturer enabled the small quantities to be transported and processed using a small milk truck purchased specifically for this role. Products were sold at premium prices, still undercutting interstate organic milk products. Margaret and Richard, who are deeply involved in community development in the area, valued stronger socio-economic values over environmental and organic values. They also recognised the commercial value of organic niche products and were receptive to consumers' desire for chemical free products. From their interactions with consumers they believe that people are more concerned about organics than environmental values. They have a HACCP system in place but no particular environmental innovations. They are considering recycling water within the plant in the future. Their key focus is on community development in the local community and they feel that by setting up the processing plant and outlet they are supporting this objective. They recognize environmental values as important but they believe the quality of the product is the key priority. They pride themselves on their cheese making ability and want to be the best.

The case study milk and cheese products were distributed throughout Western Australia, both in wholefood shops and small supermarkets. Retailers of the product interviewed generally knew the story and were able to communicate the values of the product. One retailer of the product is the Perth organic food store run by Marian. The milk and cheeses are delivered direct to the store from the manufacturer twice a week. Margaret (representing the manufacturer mentioned above) also comes into the store and is friends with Marian. Marian is pleased to be stocking these products because previously their organic milk came from South Australia and now they can supply organic milk for less. They sell around 60 to 80 litres per week. When the product was first introduced, they lowered the price to encourage people to try it. The product was very well accepted in the local town where the dairy is located and was sold at both the health food shop and the local town supermarket.

Individual consumers from the local town said they supported it primarily because the product was local but they also appreciated the organic, animal welfare and environmental aspects of the product. Kurt was well known in the community and many knew of his unique dairy operation and were keen to support it. Personal issues led to the closure of the biodynamic dairy case study supply chain after 2 years of operation. This was not the result of a lack of market demand, which was reported as extremely high from all retailers interviewed. Some aspects of the operation were taken over by another member of the syndicate at a different organic dairy. This business is still in operation and filling much of the same market niche. Figure 10 below shows the values held by supply chain actors interviewed and the relatively successful transfer of environmental values from farm to consumer. Essentially the environmental concerns do appear to be transferred to the consumer, through common understandings of the benefits of biodynamic agriculture amongst supply chain actors and consumers.

**Figure 10: Transfer of environmental and other sustainability values in biodynamic milk case study**
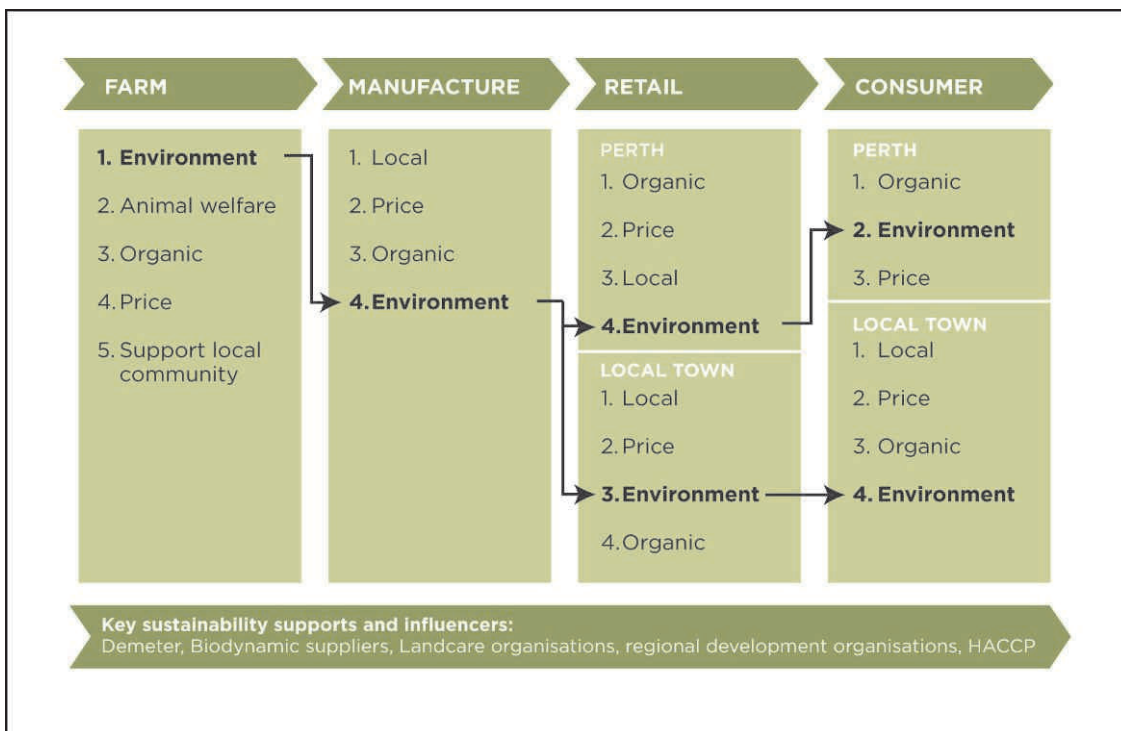


Product statistics

Retail price = $3.50 litre adjusted to 2007 prices (200% conventional)

Product miles = low to medium: minimum 280 km (Perth) to 560 km (South West)

## 6.4　Organic wine case study – Changing the world one bottle at a time

David and Rebecca are champions of the organic, landcare and sustainable agriculture communities. Environmental sustainability and stewardship are paramount to them. They are often called upon by these communities to speak on sustainability issues. Whilst profit is necessary, farming is a lifestyle choice for them. A later life venture, they commenced growing vines organically in the Margaret River area in 1990s. The farm is located in a bushland setting, chosen for its aesthetic and wildlife appeal. David, an engineer in his previous occupation, applied his impressive experimental learning style to the operation.

Their decision to farm organically was influenced by David's involvement in solar energy development in Australia in the 1970s and 80s. They didn't set out to be organic growers but discovered that there was no reason for them to use chemicals. One of the first organic vine growers in the region, they learnt through experimentation. Their convictions have influenced not only their farming methods but their whole farm approach involving rehabilitation of the creek line, creation of buffer zones and wildlife corridors. They have won environmental awards for their on-farm environmental management.

They undertook the BestFarms EMS training but felt that their system to manage and record environmental issues was already sufficient. Only one farm production issue seems to be beyond their extensive capacity and that is the spread of kikuyu grass.

They felt that their NASSA certification adequately communicates their efforts towards sustainability to their buyers. They don't see the need for another environmental certification label on top of the NASSA label but they do support a system of formal accounting of the environmental impacts of production and think that this would be helpful. They oversee and manage the whole production process. They work in collaboration with a winery in the Margaret River area and also store their wine at a nearby warehouse. Many of their sales are by mail order and they maintain a close relationship with their mail order buyers through web updates and invitations to open days.

They also distribute through a number of liquor outlets in the South West and Perth as well as Victorian outlets (distributed through their Melbourne based son) and an outlet in Canberra. They also make efforts to maintain relationships with these retailers.

They make significant efforts to communicate their interest in sustainability through their products. This includes the use of pictures of natural landscapes and images on their labels, a website which tells their story, of which sustainability is a major focus, and they have a significant presence in the WA sustainable lifestyle community. This loosely refers to the network of people that are concerned with food sustainability in Perth. Mostly concerned with organic food, it includes organic farmers, retailers, caterers, consumers and consumer groups such as Slow Food. This network was observed as a functioning community during this study. They have held organic and sustainable information days at their farm aimed at educating people about organic farming and caring for the environment. They have formed a partnership with the a local NGO and were listed on the NGO's eco-friendly wine list.

Retailers interviewed said that key values that attracted buyers were the organic and locality (Margaret River) values. Consumers interviewed specifically on this product associated organic wines with a lack of preservatives or other additives added to the wine post-harvest. Whilst some mentioned the absence of chemicals during production, the focus on additives appeared more important to potential consumers of this product. Consumers interviewed on this product did not pick up from the label that the wine was produced in an environmentally friendly manner and some did not immediately notice that it was organic. About half of these consumers said information related to environmentally friendly production on the label would make a difference to them. When asked about what values of this product would influence their purchasing they stated locality (it is labelled as Margaret River wine), price and environmentally friendly. Organic production is also clearly a primary reason for choosing this wine over other available wines.

Figure 11 overleaf shows the potential transfer of values from farm to consumer. It is suggested that when purchased directly from David and Rebecca (e.g. through mail order), it is more likely that the environmental values are transferred to the consumer. Purchasing directly brings the consumer in contact with the product website which promotes the goal of environmental sustainability. In contrast, retailers interviewed did not convey any interest in the environmental values of the product.

However despite this, the environmental sustainability values did reach the consumers even when they went through the retailers who did not hold these values. This is likely to be a result of the labelling and marketing program used by David and Rebecca, as well as the organic certification.

**Figure 11: Transfer of environmental and other sustainability values in organic wine case study**
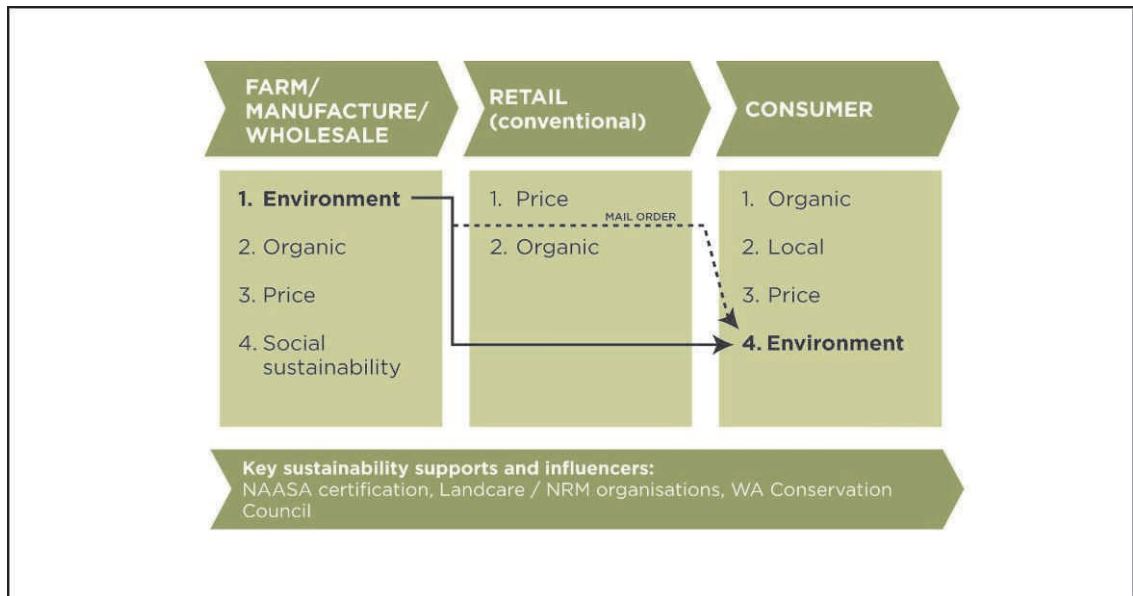


Product statistics

Retail price = $18 to 25/bottle

Product miles = low to high: minimum 340 (Perth) to 4000km (Canberra)

## 6.5 Eco-wool case study – Boldly going where no merino has gone before

This case study involves an international company owned by Australian fine merino wool growers. The company specialises in wool marketing and wool supply chain management with a focus on the environmentally conscious outdoor wear market. The fabrics produced through this company were awarded a European eco-label in December 2003 and this company brand carries the ISO 14024 certified eco-label. The company has been in operation since 1998 and has sold eco-wool since 2000.

Matthew, a wool grower from South West Western Australia, was the initiator of the company and maintains the role of production chain manager. The process involves coordination from farm to shopfront with attention to quality and environmental assurance at every stage of production. The EU Eco-label mandates restricted use of harmful chemicals and reduced water pollution throughout the product supply chain. The eco-wool company case study sources its fine merino wool from Western Australian and Tasmanian farms. The Tasmanian government supported system of vendor declarations and testing for pesticide residue makes Tasmanian wool a safe and reliable product for meeting the main criteria for the eco-wool company, which is low pesticide residue.

Recently incorporated into the standard that has been developed for this product is a farm scale management system developed with the assistance of the WA Department of Agriculture and Food. This provides growers with best practice information and benchmarks to assist them to manage their operations with minimal environmental impact. The system is provided as a two day workshop and there is a program of on-going support available for growers involved. Over and above the chemical residue limit requirements of the Eco-label, the company has identified several areas to improve the wool growing environment including soil acidity, salinity, ground water levels, erosion, animal welfare, staff training and natural vegetation management.

The company recognizes the additional cost of environmental management and is committed to paying farmers a fair price for growing their wool with attention to the environment. They believe that sustaining farming communities is as important as preserving the environment. They state that their farming management system program and their policy of fair returns for farmers help makes this company the most sustainable producer of performance activewear on the planet.

Information is transferred amongst supply chain actors using sophisticated online communication and tracking technology that contains information on product quality and environmental management. Manufacture of the wool involves processing plants in Victoria and also China. Declarations are signed by each member of the supply chain and the ISO 14024 audit is done every few years to verify that the raw wool is compliant with the chemical residue standard of the eco-label for raw fibre.

The company also has strong links with research including sponsoring RMIT University sustainable design students to create an innovative range of active wear garments from the eco-wool fabrics. It also has a relationship with CSIRO scientists involved in establishing supplies for low pesticide residue wool markets. CSIRO was also involved in verifying that the raw wool complied with the EU Eco-label standard.

Matthew sees that in general, the Australian wool industry is yet to see the merit in eco-wool but he is certain that the industry will be forced to change in the future. He believes environmental certification for food and fibre products will work and needs to happen. The company has also received strong support from the Tasmanian wool broker that has helped facilitate the supply of low pesticide wool to Matthew's company. This wool and rural supplies company has a strong commitment to developing an eco-wool industry in Australia. When interviewed, the wool broker company representative said that the eco-wool company case study is a test case for eco-wool in Australia and potentially can improve core business for Australian wool if successful. Because of this, the wool broker has provided support towards the business development of the eco-wool company.

Markets for the eco-wool include Nike and Patagonia and other US and European outdoor clothes retailers. This eco-wool product is successfully competing for floor space against organic cotton. The California based Organic Exchange, an organization committed to expanding organic agriculture, listed the eco-wool case study products, recognising that they have some of the same values as organic wool. In terms of transfer of environmental values by retailers, the US based company Patagonia has been engaged in the protection of the environment for some time. For example, in 2004 Patagonia ran a campaign encouraging American voters to take the environment into account when voting. Matthew engages in intensive market research and networking which constitute a high proportion of the operational costs, with monthly phone bills averaging in the thousands and extensive travel costs. Marketing efforts are based on linking into the retailer corporate sustainability values.

Matthew said that the main outdoor wear companies he deals with have sustainability executives and they are highly influential. Matthew has also been instrumental and is a partner in another brand which commenced marketing merino outdoor wear to Australian Mountain Designs stores in 2007. The Bunbury based store manager interviewed said that they stock the product because it fits with their environmental ethic and because they want to support Australian merino products. The New Zealand Ice-breaker brand has up to now dominated this market.

Whilst consumers were not directly interviewed on this product, it is assumed that environmentally friendly is a preference for consumers of this product. Animal welfare is also assumed to be important based on the emerging market concern for animal welfare in European and US markets symbolised by the PETA campaign to improve practices such as mulesing and the live export trade (PETA 2007). Sustainability values held by supply chain actors and the successful transfer of environmental values through this supply chain are summarised in Figure 12.

**Figure 12: Transfer of environmental and other sustainability values in eco-wool case study**
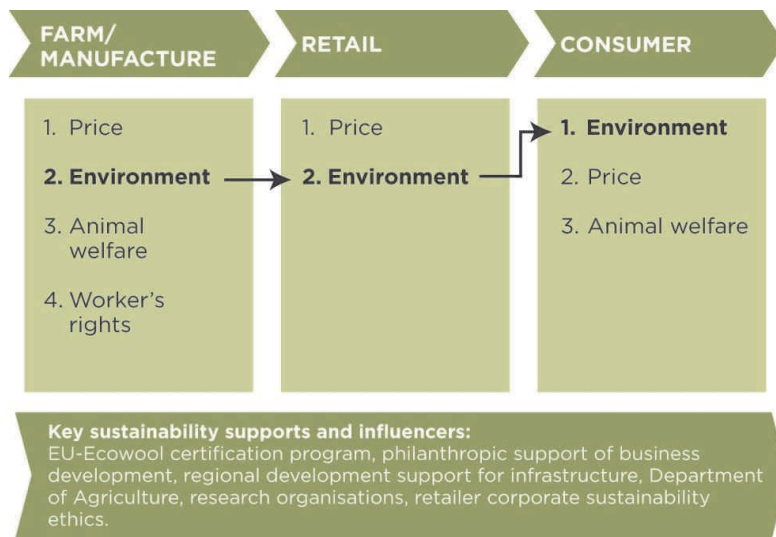


Product statistics

Retail price = variable

Product miles = extreme: minimum 22,100km (US)

## 6.6    Conventional wine case study – Bottling community spirit

This partnership-owned wine company started in 1997, aiming for production for the premium wines market. They produce a range of red and white wines sold in Western Australia, interstate and some overseas, particularly the US and Asia. Led by company directors Christine and Mark, the key drivers for the establishment of the company were to fuel employment in the South West and to engage in their passion for winemaking and business and community development. Mark and Christine both come from strong community development backgrounds and had previously managed a successful Telecentre for a number of years in a woolbelt town in the South West. Telecentres are Western Australian Government funded information and technology resource centres in rural towns. They provide computer and office support on a fee for service basis.. The syndicate manages the production from vineyard to retail, including a mail order service.

They commenced by purchasing three lots of farmland in different parts of the South West based on suitable soil types and market availability, for the establishment of vineyards. These properties were existing farming land, so minimal clearing was required. Paddocks were cleared of paddock trees and old fence lines and dams were established. The vineyard manger, Derek, oversees management of the vines and says that they are committed to best practice and they use mulching and keep machinery traffic to a minimum. Whilst they use a regular herbicide and fungicide chemical control program, they have not used insecticides since 1997 when they had a black beetle problem. They attribute this to the presence of beneficial pests and birdlife. Mark suggested that the choice of inter-row crops that support insects assists with this. They are also fortunate that in most seasons the local red gum flowers at the same time as the fruit, so the silver-eyes are attracted to the gum-flower nectar rather than the grapes.

A winery designed on ecologically sustainable principles was established near Margaret River specifically for the case study company. A wetland has been established to treat the effluent, including four ponds, two reed beds and a lake. Bores are monitored around the wetland to detect any leaching. Winery manager, Martin, says that the effluent treatment through the wetlands is working well and he believes this to be the first of its type in these parts. There is also a focus at the winery on keeping noise and pollution down, keeping chemicals used to minimum levels and keeping good records. Martin is responsible for checking spray diaries received from growers. The winery is HACCP certified. Martin believes that the product is close to classifying as an environmentally friendly product.

He added that once issues of oxidation, pH monitoring and the industry wide issue of disposal of diatomaceous earth are resolved, it could be considered as environmentally friendly. Open days are held where the public is invited to inspect the winery.

Stages of the supply chain that they contract out include the transport and bottling. The bottling contractor has QA and HACCP in place. Everyone in the chain is aware of the need for QA and food safety. They noted with some frustration the requirement for all stages of production to be registered under the US terrorism act, necessary for any product to be exported to the USA.

Christine suggests that everyone in their supply chain is generally heading in the same direction, in terms of QA, HACCP and environmental responsibility. She suggested that if wineries are demanding these standards, then everybody else that is involved in the chain will have to comply to stay in the industry.

In terms of their key objective to provide employment in the region, they have employed many individuals over the years, completing over 50 group certificates each year. While most of these are casuals, the company also employs nine full time staff. They feel that they are putting back to the community. A number of staff from this business were also encountered during the field work and all communicated a sense of commitment to the aims of the business and loyalty to the business owners.

Mark and Christine say the company's aim is to provide a product that is as clean and green as possible, for an economic benefit, but also to provide employment in the bush. They intend to get the product as clean and green as they can and said they would like to use the clean and green production as a marketing tool. Mark added that they would like to promote the nil insecticides approach and possibly offer a preservative free wine.

They supported the concept of environmental certification; however, Christine held some reservations about the validity of stamps on products. Mark added that the industry is finding that it's more efficient to be environmentally friendly anyway, because it's the way that is most cost effective. He added that wine is a good industry to be involved in because everyone is striving to present a good image and they know that image is key in selling their product.

The company formed an alliance with a local NGO who were focusing on raising awareness about and managing an environmental issue and has initiated a Foundation to support this work.

In November 2005 they launched two new wines which have information about the campaign on the label. A donation from the sale of every bottle goes to the Foundation. This product has enabled the company to experiment with the 'green' market.

Consumers that were interviewed specifically on this product identified price, then supporting local businesses and then environmentally friendly as the values that would most influence their purchase. These interviews were conducted in the South West which likely influenced the strong preference for local. The company is generally enthusiastic about the potential market advantage that being environmentally sustainable could give their products.

Figure 13 below shows the potential transfer of sustainability values throughout the supply chain. 'Selected products' refers to the Stop the Toad branded products. The transfer of environmental sustainability values only occurred with these selected products.

**Figure 13: Transfer of environmental and other sustainability values in conventional wine case study**
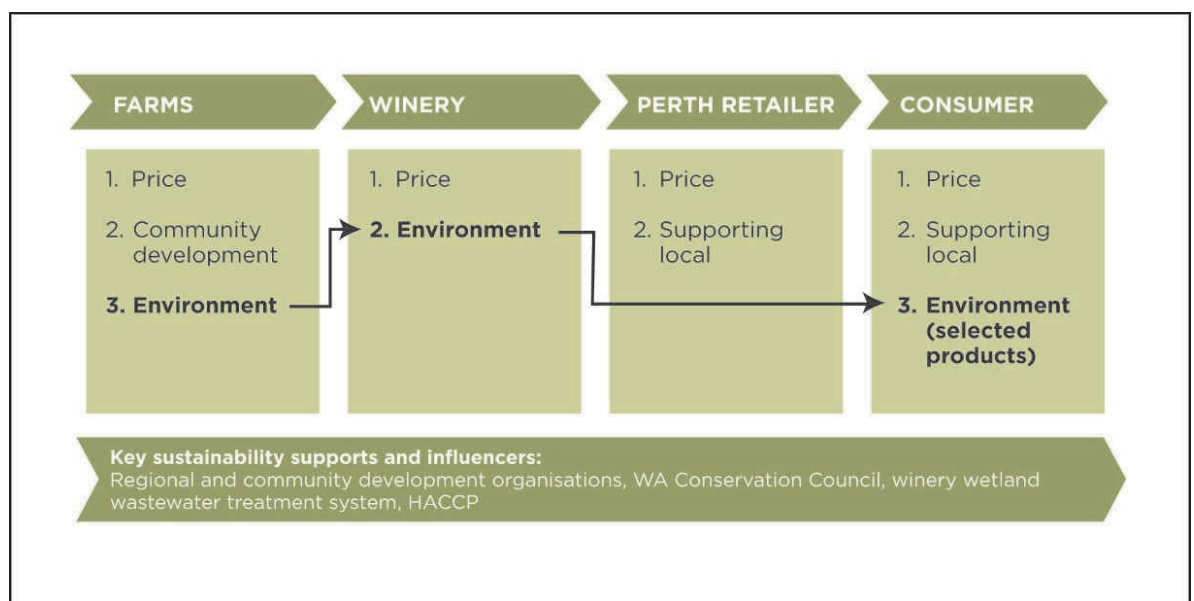


Product statistics

Retail price = $12 - 28/bottle

Product miles = minimum 350 (Perth) to 22,100km (US)

## Supply chain driven farmers

## 6.7 Conventional grains case study – Transitioning to a new ecological order

Sarah and Robert have a mixed sheep and cropping enterprise located in the South West wheatbelt. They have made significant efforts to balance sustainability and profitability. They are successful farmers and have won Primary Producer awards. Their environmental priorities are related to maintaining soil health and protection and enhancement of biodiversity. They use a no-till system and minimal sprays. The couple operate the farm themselves with one employee who assists with labour. Sarah also works off-farm. She has also held office in the local landcare group and dedicates significant time to this. They have undertaken the BestFarms EMS program which has assisted them to manage information relating to environmental management on farm.

They specialize in growing soft wheat which is used to make biscuits. Millers want low protein for biscuits and pastry. Protein needs to be between eight and ten percent so it is grown on the poorer soils which produce lower protein wheat. They produce higher protein noodle wheat which attracts a premium for protein on the richer fertile soils.

They have planted extensive biodiversity corridors with over 200,000 native seedlings established. The farm is fenced on the contour and uses a system of contour banks to harvest and control surface water and seepage, ensuring that there is adequate stock water even during drought. Along with a number of farmers in the district they are involved in the emerging oil mallee industry. The oil mallee industry in South West WA involved using endemic mallee species to produce oil. Infrastructure including oil production and bioenergy generation has been established focusing on a 50 km radius of that infrastructure which includes Sarah and Roberts's farm. Waterways are protected and paddocks have been set up to support rotational grazing and efficient movement of stock through a network of laneways. They carefully monitor and manage soil erosion. Sarah was also concerned about vehicle use and emissions from farming.

They use chemicals as little as possible and use a pre-emergent herbicide at seeding and post emergent sprays as required. Sarah would prefer to use less chemicals and has some concerns about the future of chemical use in agriculture particularly in relation to chemical resistance.

They constantly adapt their system to avoid this resistance. Sarah commented that they would like more information on integrated pest management. She says that while information about pests that should be annihilated is easy to get, she finds it just as interesting to find out which bugs are beneficial. She commented that "It's only just recently that we've studied the value of biodiversity – what can it do for us – this is all new stuff". She purchases organic food for the family where possible and is frustrated at the lack of availability of this in rural areas. She said that she considered having organic food brought down from Perth. She added that she always buys eggs that are free range and looks to purchase food that she believes is better for the environment or the animal.

Before the grain leaves the property, they put it through a cleaner. They aim to deliver the best quality grain because that will give the best dollar for it. It is mostly delivered to the WA Grains Bulk Handler and they also keep some on farm for seed and feed (sheep). The grain is fumigated in the silos to keep it from safe from weevils.

Sarah and Robert are active in the local landcare group and say that the strong landcare network has enabled them to share and learn from others regarding sustainable farming practices. In addition to this, their main sources of land management information are from chemical suppliers, their soil testing advisor and importantly, the Grains Bulk Handler that they sell their product to. They also keep a careful watch on the WA Wheat Board and other purchasers of grain. It is these bodies that determine what is to be planted and how much of it. They say that this information is provided through media and different meetings that go on throughout the year.

They believe that their operation is becoming more sustainable, particularly as a result of the no-till method. They are confident that soil is not being eroded by wind and they are making positive contributions to carbon sequestration. She said that they are constantly learning to do more to create a sustainable farm. She adds that whilst it has been a lot of work, it's been rewarding and satisfying.

They undertake a quality assurance program on farm and aim to deliver the best quality grain because that will give the best return.

In terms of contributing to community sustainability, they feel that their profitable operation allows them to spend locally and contribute financially to the community. Sarah is aware of the

shrinkage of rural communities and aware they have, in some way, contributed to this trend because they have purchased more land and a family has moved off. She suggests that one way that they could contribute more to is to intensify, creating more local employment.

Sarah comments that she would like to have a good understanding of the whole system, of 'how nature and us could be doing the same thing, to be actually working with nature instead of against it'. While she says that obviously they need to farm profitably, they haven't got big visions of creating wealth. She says that they do not want to pour all their profitability into some grand house on the coast for example. A lot of their profitability goes right back into the farm including machinery which all helps make their life easier. They value the benefits of living on the farm, their enjoyment, the education of the kids and the resource they are building. She comments that 'it's not too much of a mining operation'.

They are happy with the environmental and animal welfare values of their products. However Sarah says that because of her preference for organic food, she may prefer to purchase organic grain than their own grain. On the other hand she says that they are doing a reasonable amount to protect the environment and this may be worthwhile in consumer purchasing decisions.

Sarah said that their product is closer to 'environmentally friendly' than that produced by most grain growers. She suggests 'I think our product would stand as a middle way product in that respect'. Sarah said she could see the benefits of having their product environmentally certified and believes that farmers should be rewarded because that would encourage them. She adds that this would also 'link to consumers and could make consumers a little bit more interested and more responsible towards contributing back to environmental management initiatives'. She said that if a consumer was to buy their product on this basis, then they would have more incentive to do what they do. 'It would bring some recognition which ultimately would be financial recognition of what we do and that gives us the ability to do more'.

Two representatives from the Grain Bulk Handler that purchase Sarah and Robert's grain were interviewed. The company is run by a board of directors with 10 growers elected from within the grains districts plus commercial directors. On a philosophical level they agree with best practice environmental management but as the representatives commented, it comes down to business decisions and benefit-cost. They do however rely on their reputation as a reliable supplier of 'clean and green' grain (company website).

The grain handling operations have ISO 14001 series certification at some of their storage facilities, particularly where grain is to be exported. The bulk handler is supportive of the concept of environmental management and recognizes issues related to atmospheric monitoring (dust) and social issues. During the first interviews in 2005 they could not see potential for EMS certified grain markets and at that stage they were not getting requests from customers for EMS certified or sustainably produced grain. By 2006, the ethic of the company was shifting towards more pro-active action on demand for environmentally sustainable grain. The representative commented that there were increasing trends of demand for environmentally friendly produce that would influence the company. Overseas markets were mentioned as potential pressures towards environmental assurance of grains. An example was given where there where high levels of chemical residues in the atmosphere as a result of fumigating cells in grain storage in Esperance. This led to environmental and health inquiries.

The company's QA (food safety) focus was seen as a potential precursor for environmental assurance on farms. Customer demand was the driver for incorporating QA into farm operations. It was commented that even though grains are a low risk for food safety, (and this can work against incorporating QA in the supply chain), grains can go to quality discerning markets.

Even so, they commented that QA is only now starting to have strong flows through supply chains. The company offers a quality assurance training program based on the Safe Quality Food program (SQF) to farmers that provides a framework to help growers better manage their on-farm food safety risks. They also offer a direct financial incentive for implementation of QA on farms, introduced in 2004. Farmers who are implementing the company QA program receive an additional 50 cents per tonne.

This premium is a risk management approach by the company and is cost effective because contaminated loads cost them significantly (termed a risk reduction payment). This is because every time a contaminated load occurs, it costs the bulk handler. For example it costs a minimum of $150,000 to find a contaminant on a ship. The average cost of contaminants to the bulk handler is $5 million per annum. This makes differentiation of QA grain cost effective. Their aim was to have 50% of grain farms quality assured by 2006 but in December 2006, this figure had amounted to only 20%. Even though the training is cash positive for farmers, only 175 out of 7000 training spots offered were taken up in 2006.

In terms of environmental assurance of grain, the company representative suggested the risk mitigation used for the case for differentiating QA grain does not apply. They added that within a supply chain there might be hotspots where there's interest or action related to environmental assurance but this interest is variable. It was commented that while there was scope to add EMS to the SQF 1000 series QA program, they were not pursuing this at the time. They commented that it was difficult enough to get farmers to uptake QA, never mind EMS.

However recently there has been a massive uptake in QA training due a penalty for not having QA that was introduced in 2007. Under the new system, all grain from farms that are not part of the QA program will be tested for contamination with the cost of that passed onto the grower. This has proved a strong incentive to create uptake of the program.

In summary, the company is aware that environmental management on grain growing farms could be improved with issues such as rising water tables, biodiversity loss and chemical contamination of groundwater potentially causing problems. They support the development of an environmental system or plan on farm, but they are not in a position to demand this. Their primary focus is on supplying clean grain that meets the increasingly demanding pesticide residue requirements. As the primary grain handler for the state, they are penalised when unacceptable pesticide levels are discovered in any grain shipment, even if it does not come through the bulk handler.

They suggested that they are happy to lend their QA system as a framework and by 2007 they were undertaking EMS audits for grain growers where requested. However they suggested that they will not be the driver for sustainable environmental management on farm and this will have to come from somewhere else. Overseas markets including quality assurance demands from the UK and Canada and China's Green Food Certification were mentioned as potential pressures towards environmental assurance of grains. Given that the bulk handler does not apply chemical post harvest, they should be applicable for the China Green Food Certification.

Despite their reluctance to be a key driver of environmental assurance of grain, the company did agree in 2007 to differentiate a stack of grain from the Mingenew-Irwin area north of Perth where there is a critical mass of EMS certified grain growers. They are also moving towards segregation on a site basis, mainly to better enable segregation of QA grain but this may also have implications for EMS certified grain.

Figure 14 shows the potential transfer of values in this supply chain, indicating the potential for transfer of environmental values if the manufacturer continues its preliminary program of EMS certified grain certification.

**Figure 14: Transfer of environmental and other sustainability values in conventional grains case study**
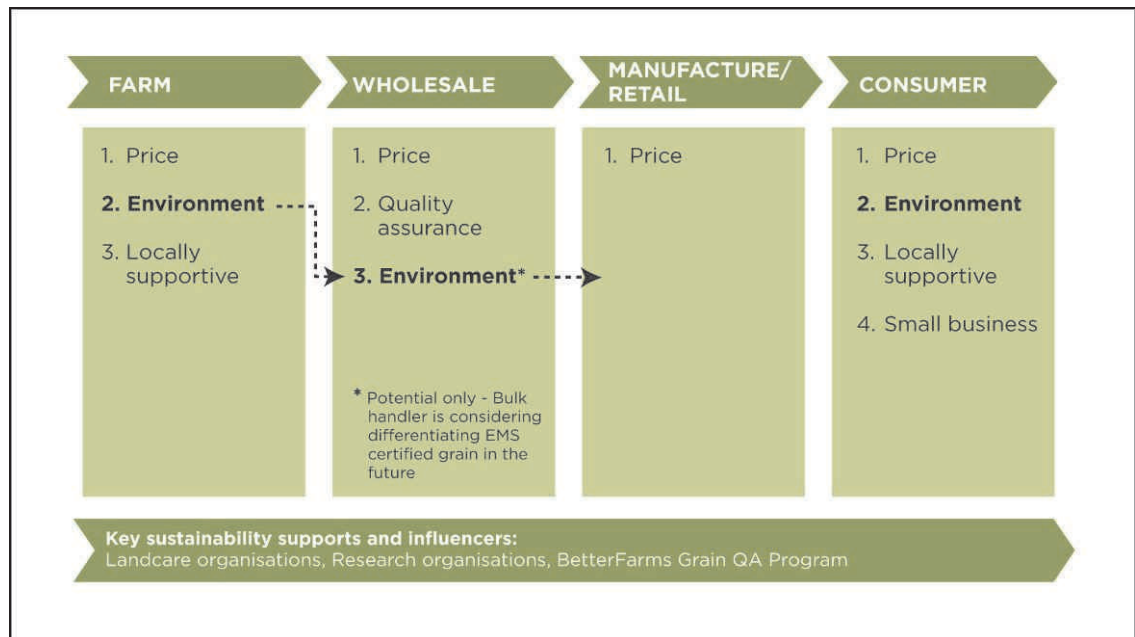


Product statistics

Retail price = 100% conventional

Product miles = low – high:  minimum 280km (WA) to 3706km (interstate) or 8,000 km (China)

## 6.8 Conventional dairy products case study – Incremental changes

Peter and Elizabeth and their children are dairy farmers in the South West. Peter is also the chair of the local landcare group and has a position on the state dairy board. Elizabeth also works off-farm. The family have a herd of 470 milking cows in two dairies with an equal number in calf. Peter has taken considerable effort in his breeding program, achieving a breeding value in the top five per cent in Australia, giving this stud the second breeding value in Western Australia. They turn over approximately 25% of the cows every year. As well as great attention to breeding, the science of nutrition and feeding is critical in their operation.

The farm area is 240 hectares with an additional 70 hectares of leased area. Peter takes considerable effort to manage his farm sustainably. However, as there is no monitoring of water quality in the stream entering and leaving the farm, he lacks confidence about the impact of the dairy operations on water quality. They use minimal sprays and limit medication, such as antibiotics for cows. Whilst they meet the best practice requirements for their two pond effluent system, Peter suggested that this could be improved. He commented that along with many other dairy effluent ponds in the area, it can overflow in the winter. Peter has taken steps to resolve this through implementing a system that uses effluent as irrigation and is spearheading the way with this in the local area.

Peter and Elizabeth believe that the manufactured product is high quality due to the high quality of the milk. They supply to one of the two largest milk manufacturers in Western Australia, a multinational company that has recently purchased the previous Western Australian based dairy manufacturer.

The dairy foods manufacturer representative suggested that differentiation of products based on environmental management on farm or for organics is not possible at this time. The process would require at least 30,000 to 40,000 litres per day, or supply equivalent from around 10 dairy farms. These would also need to be in close proximity to each other to enable efficiency of transport. There is also the prohibitive cost of extra storage and loss of approximately 2000 litres at the beginning and end of each product line. He suggested that a very high premium would be required if dealing with such small numbers. The manufacturer did not support a need for additional environmental criteria or labelling, suggesting that existing quality assurance standards and minimum standards for effluent treatment are adequate to manage impacts of concern.

He also suggested that if anything, farmers need increased financial and management accounting support. The main corporate social responsibility mandate of the dairy manufacturing company is based on supporting the community and being a good corporate citizen to communities. This includes sponsoring children's health and family initiatives. They believe this is more beneficial to their marketing campaigns than promoting environmental values. Their environmental sustainablity efforts include attempting to travel the minimum distance per litre of milk and managing waste products and effluent according to regulations. Parts of their factory operations are also ISO 14001 certified.

Towards the end of the study timeframe, the manufacturer company in this supply chain joined the international Sustainable Agriculture Initiative. This includes a commitment to source from sustainably managed farms. The dairy manufacturer states on their website that they are involved in a number of environmental initiatives, including the Dairy Industry Strategy for Sustainable Environmental Management, Pastoral Greenhouse Gas Research Consortium, the Dairying and Clean Streams Accord, and the International Standard on Environmental Management Systems. They also promote their involvement in community capacity building programs in New Zealand but this was not evident in the South West. They do, however, provide a service of Best Management Practice advice to their growers in the South West which includes information on environmental management. This program is an important source of information to growers on company policies and a link to best practice information. Another important source of information and support on environmental best practice on-farm comes from programs such as Dairying for Tomorrow, which employs a local coordinator who has contact with most of the dairy farmers in the region.

Milk products are retailed extensively throughout large and small retailers in Western Australia. Around 25% of the milk also goes to the eastern states and 15% to international markets, either as whole milk or milk powder. Comment on environmental values from the production manager of one of Australia's two major retail chains were recorded in 2005. He suggested there is significant confusion about this issue and a lack of clarity about the sort of system that might be appropriate. He suggested that a system that integrated QA management principles and environment would be of interest to the retailer.

Given the lack of interest by the manufacturer in differentiation of milk from environmental best practice farms at this stage and lack of incentive for the retailer to promote environmentally friendly products, it is unlikely that environmental values are transferred through this supply chain, despite significant efforts at farm scale. Figure 15 shows the potential transfer of values.

The environmental values developed on farm are not relevant to the manufacturer or retailer marketing or company policies. Hence these values are not communicated to the consumer, despite evidence that they are interested in this value (as demonstrated in the consumer research discussed later in the report).

**Figure 15: Transfer of environmental and other sustainability values in conventional milk case study**
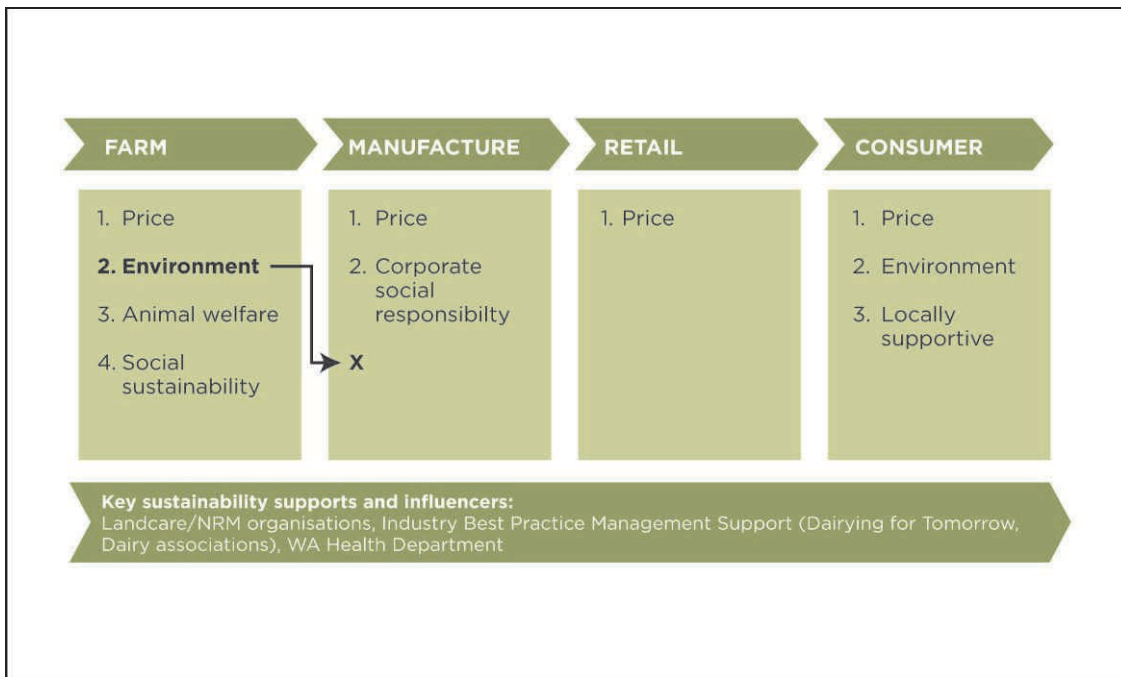


**Product statistics**

Retail price = 100% conventional

Product miles = low to high : minimum 200 km (local) to 4300 km (interstate)

## 6.9 Conventional wool case study – Intergenerational legacy

The conventional wool case study is a high quality merino stud and wool producer located in the wheatbelt of the South West. With the reins recently passed over from the previous generation, farmers Bede and Nadia have taken responsibility for a legacy of environmental sustainability and generations of breeding management. The farm has been in the family since 1905 and covers around 2500 ha. There are three operations: stud sheep, commercial sheep for wool production and fat lambs. The merinos breeding from this farm has produced some of the most influential bloodlines in the state with rams often attaining the highest prices at sales.

Environmental management was a key focus of Bede's parents and grandparents. Evidence of rising salinity prompted the planting of 100,000 trees in the 1960s. When a geological survey in 1986 showed water-tables still rising, a whole farm plan approach was implemented. As a result almost the entirety of the farm has the Ron Watkins system of water harvesting in place (a system of tree-line contour banks similar to keyline farming designed by UNEP Roll of Honour WA South Coast farmer, Ron Watkins). This along with shelterbelt and tree planting throughout the farm has helped drought-proof the farm.

They also pay particular note to soils and use a soil agronomist who works towards organic systems, advocating composting, lower input systems and managing pH and nutrient balance to control weeds. Salinity and wind erosion is also minimized because of the massive amount of tree planting that has been done. Plantings have also been designed to support bird habitat. Bede says that his parents spent hundreds of thousands of dollars on improving the farm environment before funds were available from Landcare. Whilst Bede feels that pretty much everything has been done Nadia added that land and water management on the farm has to be a long term program.

They crop around 35% of the farm compared to the local average of around 60 to 80%. Two years of cropping is rotated with five years of clover based pastures. Bede expects to have closer rotation cycles than his father, who could take 10 years between crop rotations. Bede seeks to build and improve (the already stable) economic values of the farm and expects to have less of a focus on the environment than his parents.

The operation aims to minimise chemical use but lice control is necessary. These chemicals can be dangerous and whilst Bede saw Worksafe training as a low priority, Nadia was quite concerned about exposure of farm workers to the chemicals.

They have immense pride in their wool, saying that it is whiter and softer to touch and more lustrous than most other wool. The supply relationship ends at the wool stores and they commented that past this point they have no control. Despite their strongly invested interest to see how the type of wool they have grown goes in the wider market place, they receive limited feedback. Bede's only real contact is a mate on the wool floor that gives him some insights.

This led the family to orchestrate the production of cloth from their wool through a one-off coordinated supply chain effort. The garment was made only from their wool (which is usually used to improve the quality of other less quality wool) and was of excellent quality, having the appearance and texture of silk, at least to the researcher's untrained eye.

Bede and Nadia are interested in what their consumers want and are conscious that it is almost impossible to buy quality Australian wool products. However, their hands are tied by the lack of communication flow in their supply chain. They research their customer needs by reading relevant literature and talking to people in the industry. They said that they would be enthusiastic about the opportunity to communicate the on-farm environmental values through their product but they are doubtful that this will be possible in the short term.

Bede and Nadia's wool is sold through Perth Woolstores to around 20 buyers including ITOCHU (Japan), BWK (Germany) and Zenya (Italy). ITOCHU Wool division is one of the largest buyers of Australian wool at auction. It has its head office in Sydney, and has branches in Melbourne, Fremantle and Osaka, Japan. ITOCHU aims for a closer tie with where the wool is grown.   Its largest clients are based in China, Italy, India and Japan. ITOCHU is also shareholder in a wool processing mill in Victoria and a spinning mill in Shandong, China. ITOCHU did not appear to have any corporate policy on sourcing sustainably produced wool.

From their interviews with 36 wool wholesale, manufacturing and retail companies, Pahl et al (2007) suggest that 40% of the companies had ethical wool apparel. Related to this, the most important ethical issues were labour rights and business ethics such as fair trade with on-farm environmental sustainability and animal welfare the least important (ibid). However that research did show that environmental issues would likely become more important to the companies over time, both in the processing and farm levels (ibid).

As there are no wool processing plants in Western Australia and all wool from WA has to be exported to mills interstate or overseas (mainly China), this results in extreme product miles even when consumed in Australia. ABARE (2007) figures indicate Australia exported 57 per cent of its raw wool in 2005/06 to China and 15 per cent to Europe.

As limited information was available beyond the farm gate, an approximation of the (lack of) value transfer in this supply chain is shown below in Figure 16.

**Figure 16: Transfer of environmental and other sustainability values in conventional wool case study**
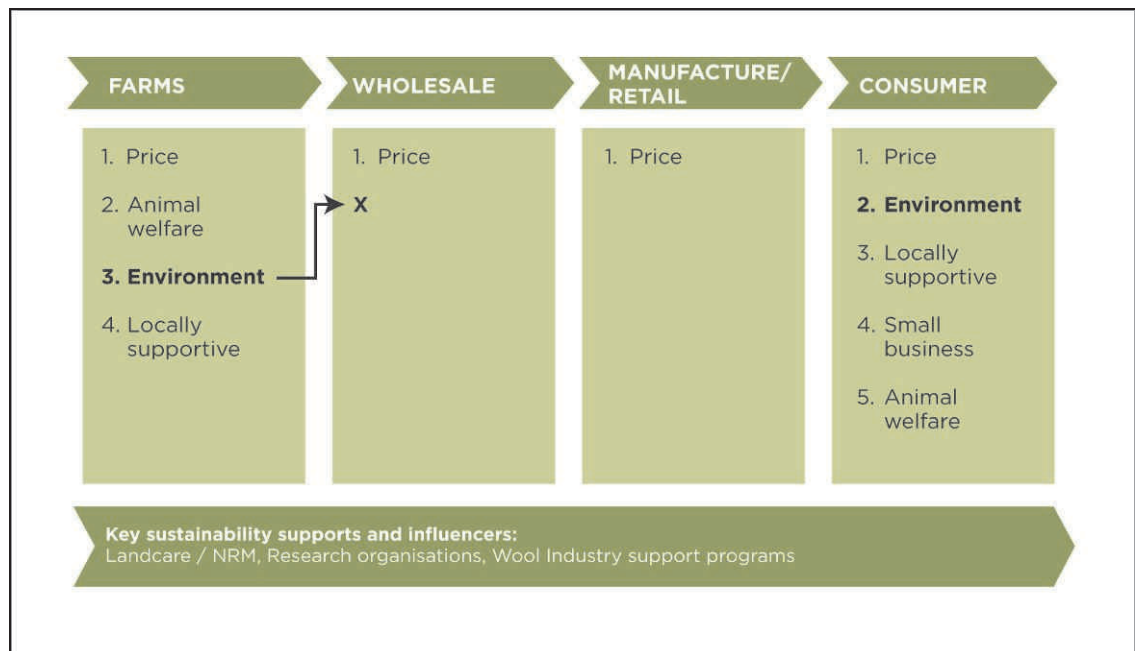


Product statistics

Retail price = 100% conventional

Product miles = extreme 21,000 (Europe)

## 6.10 Conventional strawberries case study – Still in the game, but only just

Alan has been growing strawberries for 26 years. He originally farmed in the South West, but mainly due to labour shortages, he moved his operation to Perth where he has established a market garden in the outer suburbs of Perth. This case study was the only case study outside of the South West, selected because there was no suitable scale examples of a conventional strawberry supply chain in the South West. Alan grows the strawberries on constant rotation on his small acreage and he is one of the largest growers in the state, growing around 450 tonnes annually. The strawberries are distributed throughout Western Australian and the eastern states by a wholesaler in Perth. His main market is Woolworths, both in WA and the eastern states but his product is also stocked by a number of smaller supermarket chains.

Alan makes significant efforts to manage his property sustainably with a key focus on improving water efficiency and the use of integrated pest management. He is part of the Waterwise program and carefully monitors water use, which comes from groundwater. Waterwise is a WA government program aimed at increasing water efficiency in irrigation. He is aware of the impact of market gardening on the local aquifer which shows evidence of increased nitrogen levels. Sustainability of groundwater supply is also an issue, with market gardeners in the area essentially competing with the state government owned WaterCorp for groundwater. He says extraction by WaterCorp has lowered the water table by about 7-10 metres. Alan's peri-urban farming environment has some disadvantages, such as the new road drainage installed above his property that flooded his crop and set up a cycle of disease during one growing season.

Alan's operation is fairly chemical intensive with fumigation and weed control requirements. He is gradually reducing his pesticide use, assisted by an agronomist who checks the crops weekly and advises on targeted pest control rather than broadscale preventative spraying. He is also reducing his fertliser use through improved soil monitoring programs. He recognizes that alternative methods of leaving the soil fallow and increasing organic matter could decrease the reliance on chemicals; however he suggests that implementing this would be too expensive.

Seconds and frozen strawberries are difficult to place and they are forced to dump significant amounts. Alan mentioned that he had recently had to dump around 40 tonnes of perfectly good fruit. He commented that this is an economic reality. He said 'we haven't got the workers, can't

process it and there's no processing market, they'd rather buy frozen Chinese strawberries because they are cheaper'. He added 'quality has nothing to do with it. It's about price'.

Some of the seconds are sold to a gourmet jam producer in Margaret River. This small manufacturer uses the strawberries for their own products and also produces a line of jams, sauces and strawberry wine under Alan's label that is sold from tea rooms at the farm gate of Alan's farm. Alan has experimented with a number of markets during his time including selling strawberries to the dairy food manufacturer discussed in the conventional dairy case study detailed in this report. He commented that this was a negative experience and as well as administrative bungles, the company halved its original order during growing season because they had found cheaper strawberries in New Zealand and Poland. When the New Zealand sources did not come through and the Polish consignment defrosted on the tarmac, the dairy manufacturer came back to Alan. He said that they no longer deal with large scale manufacturing companies because of these sorts of experiences.

Alan grows a number of varieties sourced from the University of California. These are supplied under license and there is a non-propagation agreement so all plants must be destroyed after fruiting and no runners produced. In terms of taste, Alan says that this is important to him and to the consumers but 'everyone else in the chain is geared to "rocks" and not losing the product'. Ability to travel is the essential criterion and flavour is a bonus. 'They want looks, plastic red strawberries'. On this Alan commented that Woolworths have rejected a new variety which is a good soft tasty strawberry because it's too soft and they can't handle it. He added that more that a million plants of this variety were established in WA in 2006 and there was no market for it.

Shelf life is critical because the produce is roaded to cities in all states, including Adelaide, Melbourne, Sydney and sometimes Brisbane. Airfreight is becoming too expensive. Alan added that the major chains such as Woolworths often have a three day turnaround at their distribution centres, lengthening the time it takes to get to the shelf. Hence even if the produce is freighted to Melbourne in 2.5 days, it could sit in their distribution centre for a few days before it gets out into their supermarkets.

Alan also commented on the retailer requirements for removal of place of origin information from packaging, saying that this means his product loses its identity. Alan used to have a significant export market but hasn't exported for the last two years, influenced by their export distributor going bankrupt. He adds that the export market is price driven and quality and flavour doesn't

come into it. Hence the options are the national market or a direct market. Alan took a deliberate move back into the local market a few years ago, setting up a van on the road and supplying shops direct. This enabled the production of a better quality product and better packaging. They campaigned with several small supermarket chains in Perth and supplied seconds for tastings. Some of these shops had a 300% increase in strawberry sales in one year. Alan says he prefers to deal with these smaller businesses but has to continue to supply around 90% of his produce to his bigger market (Woolworths) for financial viability.

On the economic sustainability of the industry, Alan was disillusioned. He said that the number of strawberry growers in the state has dropped from 170 twenty years ago to around 60 in 2006. Labour is almost impossible to obtain, particularly with the mining boom, and returns are diminishing. He did not feel positive about his future in the industry and suggested that increased land value is the major financial gain from the business.

Alan implements the Woolworths Freshcare QA program. He was one of the first growers in the state to implement the Safer Quality Food (SQF) program, and he was also implementing ISO, hoping for market advantage. He left the program after being disillusioned by the selling of SQF by the WA government overseas, 'rather than using a good idea for the benefit of WA farmers'. It was also costing the WA Strawberry Wholesalers Association $100,000 per annum so as Alan says, he was probably about the first to ditch it.

The Freshcare QA program costs only a few hundred dollars a year but Alan says it is meaningless because the inspector, who is likely to be from an unrelated sector, is un-familiar with strawberry growing and the program has a narrow focus. 'The bottom line is – you just do the basics and spend the least amount of money and time on it' suggests Alan. However he said that they have maintained the original QA systems.

Alan was generally supportive of the concept of environmental certification but was sceptical about how the process might be implemented and managed. His major concern was the economic viability of the industry in the immediate future. He said that he was not considering a five year plan at the moment because of the difficult financial climate for strawberry growing

The representative from the retailer that stocks this product suggested that meeting consumer expectations of supply were the key issues. He also suggested that the company did not anticipate a price signal for environmental responsibility:

This retailer sources products only from growers certified under the retailer's own QA program and it was suggested that any environmental requirements would have to fit in with that program. In 2006, the retailer representative suggested that there had been no consumer research on environmental values in products by the retailer and there was no immediate plan to incorporate environmental aspects into product sourcing policies.

The conventional retailer of this product suggested that a price premium for environmentally friendly produce is unlikely because environmentally friendly should be the new benchmark. According to the retailer, the cost of quality assurance and potentially environmental assurance, would not be passed on to the consumer and would be mostly borne by the growers. Figure 17 shows that any environmental values held by the farmer in this case study are unlikely to be passed onto the consumer.

**Figure 17: Transfer of environmental and other sustainability values in conventional strawberry case study**



> **Product statistics**
>
> Retail price = $1 to $3/ punnet: 100% conventional
>
> Product miles = low to high: minimum 50 km (Perth) to 4300 km (Sydney)

## 6.11   Summary of supply chain case studies

The ten supply chains, all commencing on farms in the Blackwood catchment and each encompassing a number of products, spanned a wide area of influence. The figures below show the routes of product transport or export that were explored in this study. This does not represent all destinations reached. Despite increasing transport costs, a number of products reach overseas distribution centres (Figure 18).

**Figure 18: International routes for case study products**
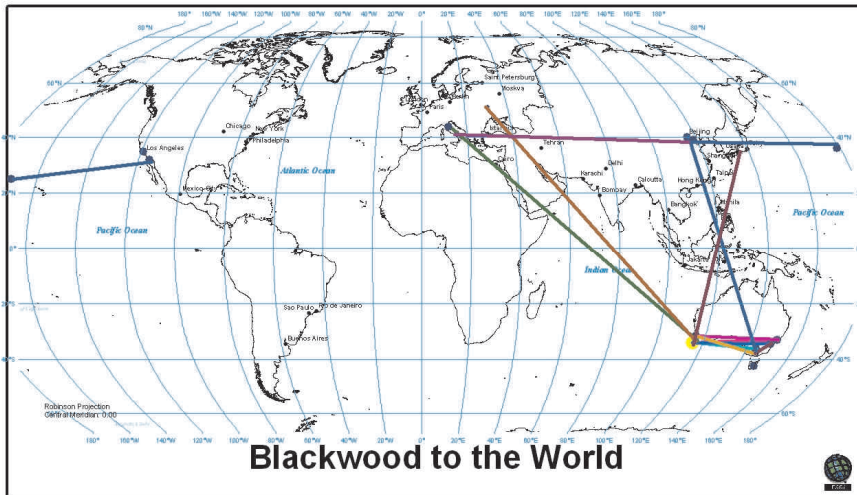


Movement of case study products to distribution centres within Australia is traced in black in Figure 19.

**Figure 19: Domestic routes for case study products**
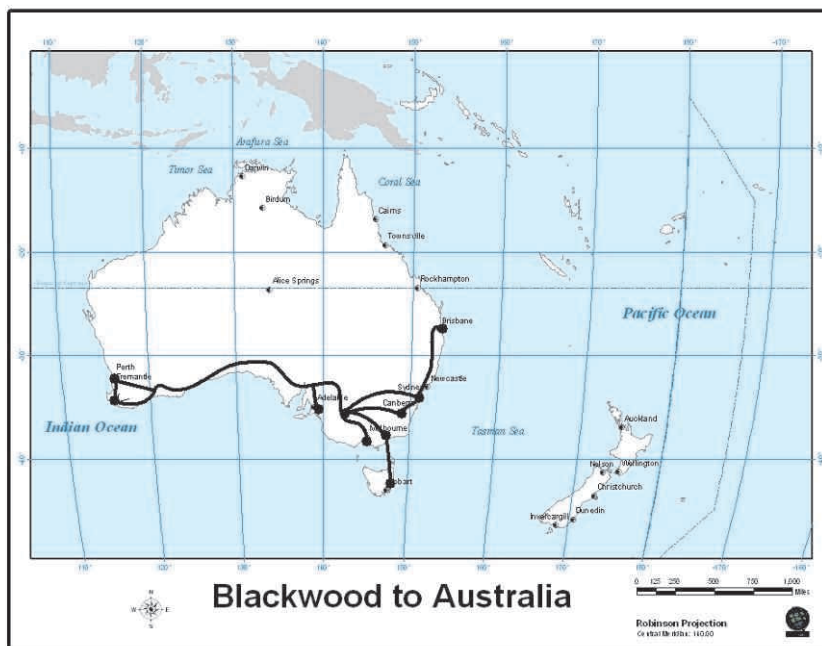
A brief summary of each of the supply chain case studies is shown below. Economic sustainability was critical in all supply chains and its importance to each supply chain is not repeated in each summary.

**Biodynamic grains company case study**

This supply chain was characterised by a farmer-led approach where the producer and manufacturer were empowered to design and influence the product to best express the product value that they created. There was also significant effort in capturing the high end, organic market. Production risks were offset against a diversity of products ranging from gourmet flours to stock feed. Creative use of waste was also employed, made possible because of the available market niche for organic poultry crumble. Values that were shared amongst actors in this supply chain included health, environmental sustainability, local support and social equity. Environmental sustainability values were successfully transferred along this supply chain, due largely to labelling and certification but also through direct contact in the case of purchase of bread directly from the bakery. However environmental sustainabilty was secondary to the importance of values associated with local and organic.

**Organic strawberry company case study**

This supply chain was also a farmer-led initiative. It was strongly characterised by values of environmental sustainability at the farm scale with evidence that natural resource management was prioritised over profit when necessary. This example provides a contrast to the conventional strawberry supply chain. Partly because this farm produces only 5% of the quantity of the conventional grower, they are able to attract adequate labour, have markets for their seconds, are free to make managerial decisions (such as to focus on taste rather than transportability of fruit) and receive a premium price for their product. Values that characterise this supply chain include most importantly health and environmental sustainability and also social equity. Environmental sustainability values did appear to be transferred along the supply chain to consumers through the certification and labelling efforts, although this also was secondary to the organic value associated with the product. Taste was also an important value for this product.

**Biodynamic dairy products case study**

This case study involved a cooperative approach between all supply chain actors, characterised by high levels of communication and relationships between most actors. The development of this supply chain involved significant risk and they were not able to reach the desired quota of milk required for financial stability of the product line.

Both the grower and the manufacturer were undertaking new enterprises and due to this, stress levels were high. The non-monetary values shared by supply chain actors were compatible and revolved around environmental sustainability and local community support. Ethical treatment of animals was a key value for the farmer involved. Environmental sustainability values did appear to be transferred through to consumers, as a result of labelling, certification and retailer involvement in promoting environmental values. Local was an important value associated with this product where the products were purchased in the local town where the dairy was situated.

**Organic wine case study**

This supply chain is also farmer-led with the growers overseeing the winery production, warehousing and distribution, as is common with many small wineries. The farmers involved take an active sustainability education role including championing the cause of environment and organics and offering information on their own sustainable practice through open days and their web site. They maintain external relationships that focus on sustainability, such as those with landcare and conservation organisations. The key values expressed in this supply chain are environmental sustainability and social equity. Environmental sustainability values were transferred through the labelling and certification but this was most obvious in cases of direct purchase from the growers.

**Eco-wool case study**

This supply chain is an example of high level sustainability accountability and product tracking. A key motivation for its development was the committed approach by the farmer and production manager. This relatively high risk enterprise has been made more achievable through the support of a wool broker company, development grants and research organisation support, again mostly orchestrated by the production manager. Values that are inherent in this supply chain include environmental sustainability and social equity. These values are maintained throughout the supply chain through the sophisticated tracking and accountability system.

**Conventional wine company case study**

This supply chain draws its strength from its syndicate approach between growers and the winery. The environmental sustainability values of this supply chain are expressed through the implementation of clean production technologies at the winery and best practice techniques in the vineyards. This is also expressed through their experiment with purchased environmental image through a partnership with a conservation organisation.

The term 'purchased environmental image' is used here to refer to the use of eco-labelling to signify that the company will donate to environmental causes, rather than an indication of sustainable production. The syndicate approach has allowed them to spread the risk and increase influence. Individuals involved in the production are committed to supporting the regional community. Environmental sustainability values were seen to be transferred only in the products that carried the Stop the Toad label.

### Conventional grains case study

This case study appears to be between paradigms with evidence that the bulk commodity wholesaler is feeling pressure or appreciating potential advantages to recognising and rewarding sustainable environmental management on farm. The wholesaler also implements ISO 14001 environmental assurance in their operations. This case study aptly demonstrates the relationship between quality assurance and environmental assurance approaches, both in terms of the customer's demands which are largely focused on pesticide residue levels and in terms of the opportunity to include an environmental module into their existing farmer QA program. Because of its high profile and the quantity of grain that the company deals with, the bulk handler is being held responsible for QA and pesticide levels in grain throughout the state. Because of the need to manage these threats, they have a natural propensity to being a leader of QA but also environmentally assured grain in the state. They emerged as a potential champion of environmental sustainability values in grains supply chains. The farmers involved are deeply committed to environmental sustainability and local community support.

### Conventional milk case study

This supply chain considers a bulk commodity for which the standards are clearly defined by the purchasing manufacturer. Strong environmental sustainability motivations at the farm scale are not at this stage rewarded by the other supply chain actors. Nor is this a goal of the farmer involved. There is some level of connection in relation to sustainability between the grower and manufacturer through the manufacturer's best management practice support program. Because the manufacturer has a factory in the region and displayed emerging corporate sustainability ethics that include social values, regional renewal can be considered as a shared value in this supply chain however these values were not visibly transferred to consumers.

### Conventional wool case study

This supply chain also considers the production of wool as a bulk commodity and limited information was available beyond the farmgate. This farm represented generations of input into creating a quality merino product and a sustainable and profitable farm operation.

Intergenerational values are also expressed through the exchange of sustainability values amongst generations of this family. These values did not appear to be transferred beyond the farm gate.

**Conventional strawberries case study**

This supply chain has some aspects of both the farmer-led and the supply led approach. The farmer involved is committed to best practice principles, but faces resource limitations which can make this difficult to achieve. Produce is supplied according to the retailer specifications and there is limited room for negotiation on this. The grower expressed his local community support values in providing local employment and also in targeting local markets direct; however, this represents a minor part of his business. Retailer specifications inhibiting labelling with place of origin and lack of opportunity to communicate other values prevented the transfer of values on farm to consumers.

# Chapter 7: Consumer survey and forum outcomes

## 7.1 Consumer demographics

With the exception of the wool and grain products, case study supply chain products are primarily consumed in Western Australia, with some consumed in eastern Australia. The consumer research design aimed to focus on consumers with a similar demographic to potential consumers of the case study products. Interviews were all conducted in the South West or Perth and approximated the breakdown of regional, Perth and interstate consumers that might be expected for these products as indicated by upstream supply chain actors (farmers, distributors, retailers).

Consumer interviewees (n=96) were asked to state their home location. The largest group were from urban Perth (45%) followed by the South West (33%) (Figure 20). On a state-wide basis, these figures are skewed towards the South West compared to ABS statistics which show 73% of Western Australians live in Perth and 11% of them live in the South West (Australian Bureau of Statistics, 2005). However this focus was intentional as many of the case study products are consumed in the South West. Interstate consumers were mostly represented at the two conferences in Perth where attendees were interviewed.

**Figure 20: Origin of consumer interviewees**
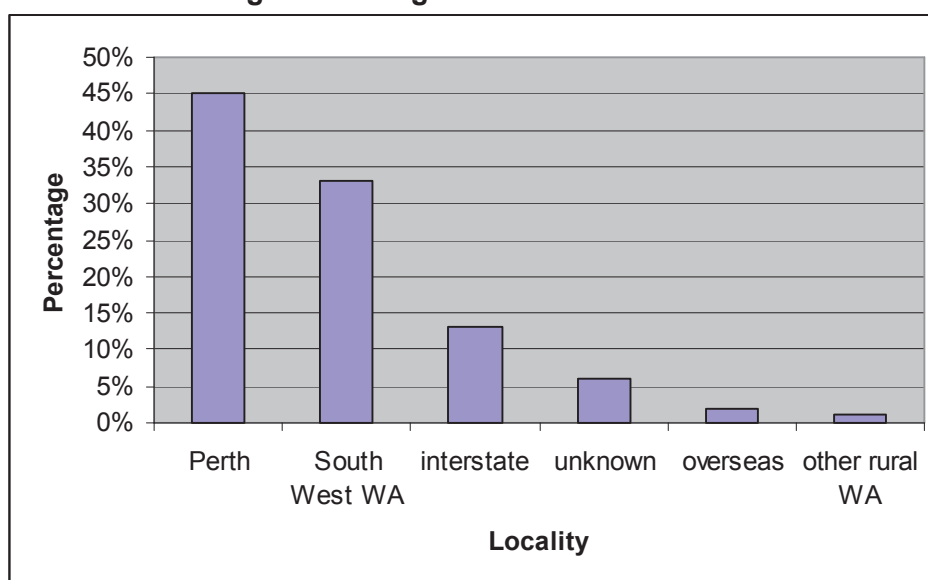


Consumers were also asked if they currently purchase environmentally friendly or eco-labelled produce. This grouping of conventional versus alternative purchasing preferences

was important in grounding the data in the current consumer behaviour. Of the consumers interviewed 61% identified as buying eco-labelled products now (e.g. fair trade, organic, other eco-label) and 23% said they did not purchase eco-labelled products. No data on eco-label purchasing was provided by the remaining 16% of the sample

With regard to the 61% of 'eco-label' consumers, this did not imply that they would exclusively purchase organic or eco-labelled products, rather that they had purchased them at some time.

Gender, age, location and employment demographics were obtained from the consumers interviewed. The purpose of this was to determine whether these factors played a part in choice of values related to purchasing preferences. Approximately the same numbers of both genders were interviewed with men being 49% and women being 51% of the consumer sample.

Age demographics favoured the 40 to 55 group which was the largest age group represented (Figure 21). Young people (under 25) and older people (over 70) were not strongly represented.

**Figure 21: Age of consumer interviewees**
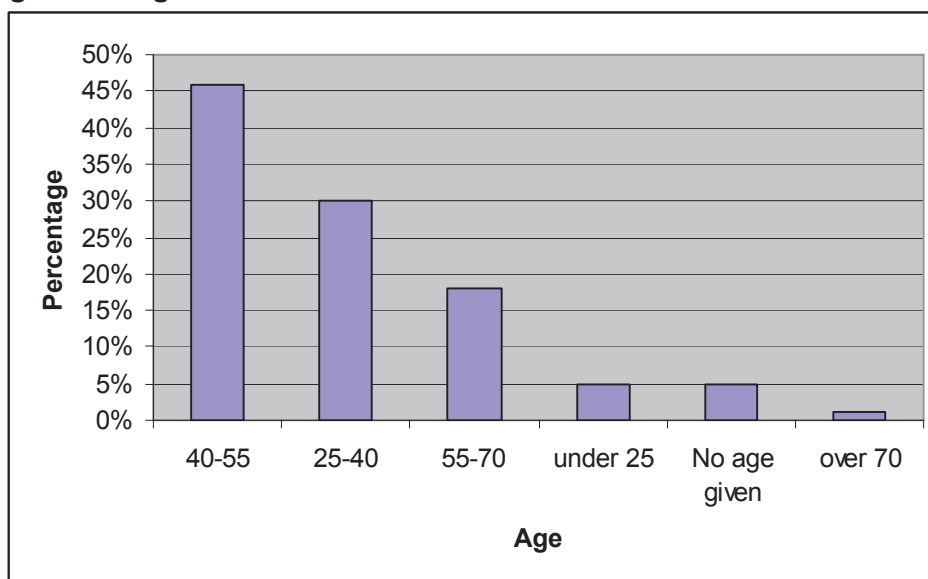


Interviewees were asked to state their occupation (Figure 22). The high percentage of people working in the environmental field (15%) was likely influenced by the focus on 'green' consumers. Academics are also well represented (13%) perhaps because of the interviews conducted at the two conferences.

It also may be suggested that these two occupation groups were more interested in the topic and therefore more easily persuaded to give time for an interview.

**Figure 22: Occupation of consumer interviewees**
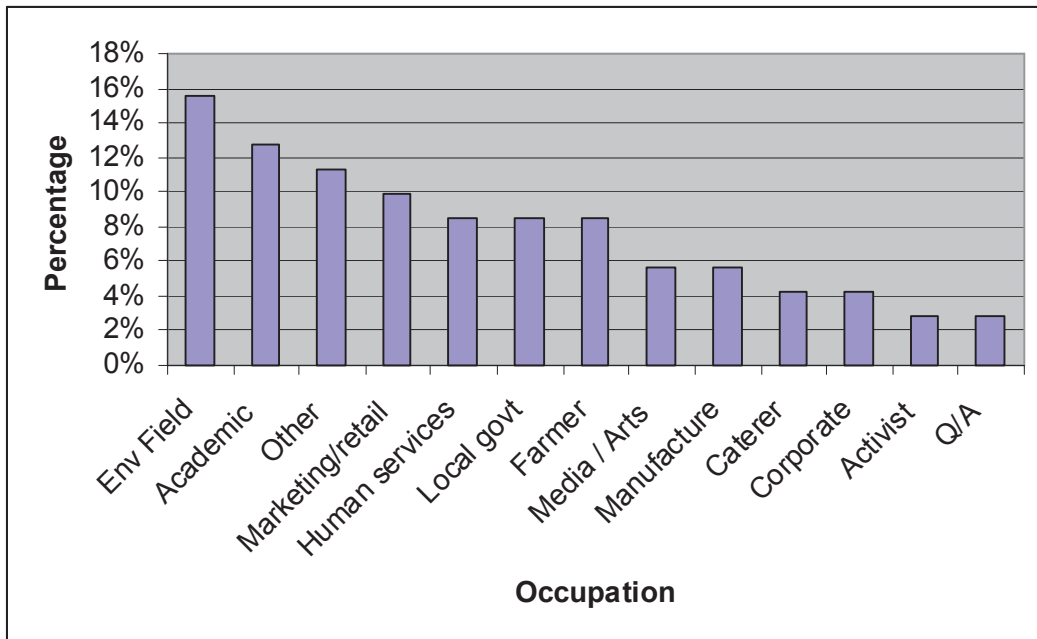


## 7.2 Consumer preferences

The relative importance of different sustainability values to consumers was also assessed. The sustainability values were ranked by consumer interviewees from a list provided to them as discussed in the Methods section.

The purpose of this was to determine how the values interact with each other in influencing consumer purchasing decisions. The following graphs show the results considered from different perspectives.

It is important to note that health (i.e. nutrition etc); quality, taste and freshness were not values that consumers were asked to rank, however, interviewees made it clear that these values are necessarily integrated with price as a fundamental requirement. These values were mentioned frequently as first preferences. Given this, the assumption is made in this study that when choosing between products, health, quality, taste and freshness are equal with consumers' first preferences. Not all of the 96 respondents chose to complete the section on preferences, giving a sample size of 84.

When first preferences were looked at individually (n=84), 48% of the sample of both conventional and eco-label consumers said that price was the most important value (Figure 23). Percentages do not total 100% because often consumers allocated first preference to more than one value. This was followed by 41% of the sample saying that environmentally friendly was the most important or equally most important value. The importance of purchasing a local product was seen as most important or equally important by 32% of the sample.

**Figure 23: First preferences – all consumers interviewed**
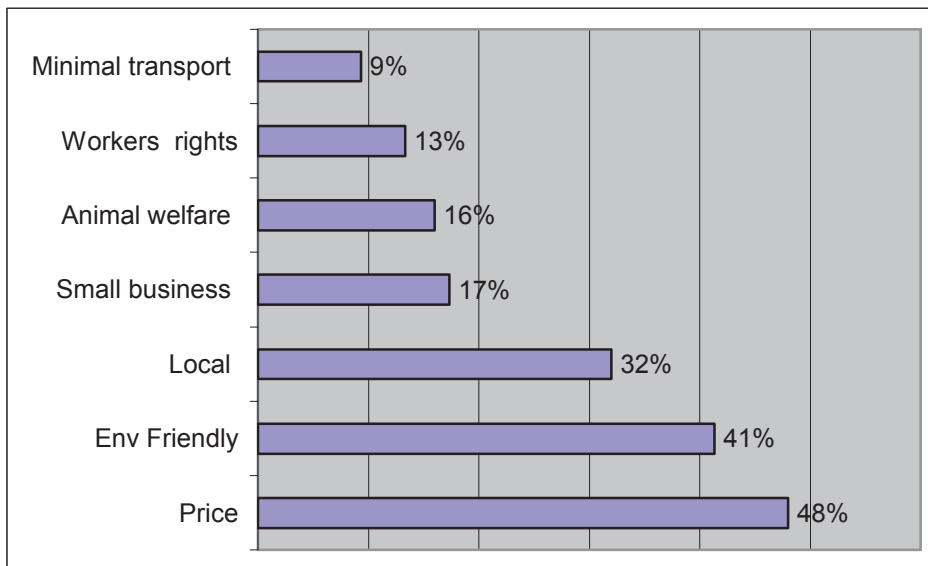


Supporting small business rather than large corporations was most important to 17% of the sample. Animal welfare was ranked as most important by 16% of interviewees. The remaining values (workers' rights, minimal transport) may reflect that a number of interviewees gave equal ranking to all values as they were generally noted of limited importance.

The minimal transport value was consistently the lowest ranked. Whist it is related logistically to the localness value, which was third most important after price and environment, it rated very differently to 'local'. This may be related to the limited understanding of this issue amongst consumers interviewed. Also it is worth noting that all consumer interviews took place between 2005 and 2006. Given the rise in awareness of climate change and global warming since then, it is possible that the importance of this issue would increase if the survey was repeated later.

This formation of relative importance of values to consumers holds relatively steady through various types of analysis, particularly the order of the first three preferences – price, environment and local.

Some small changes to the order of consumer value preferences were observed according to whether the consumers currently purchase eco-labelled products and also with gender and age. These minor changes to this 'pyramid' of consumer value preferences through analysing the data in different ways are shown in the following pages.

When consumer first preferences where separated into eco-label and conventional consumers (Figure 24), there was no re-ordering of the 'pyramid' of preferences.

**Figure 24: First preferences, eco-label consumers compared to conventional consumers**
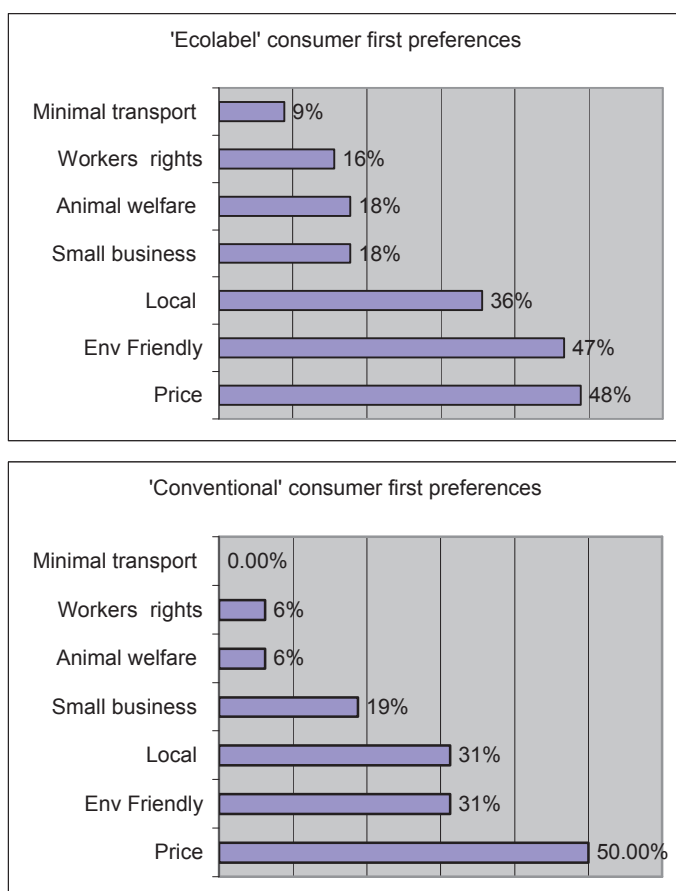


However, there were some significant differences in values with a smaller difference between the importance of price for eco-label consumers (n=45) compared with conventional consumers (n=30). The comparison also shows that animal welfare and workers rights values are more important to eco-label consumers. Importantly, the data shows that regardless of the different set of values one might assume that the two different consumer types bring, all first preferences values for both groups stayed in formation of order of importance.

When first and second preferences were combined (i.e. 1st value preference plus 2nd value preference), as would be expected when consumers are making choices based on multiple values held, environmentally friendly rose above price as the most important value for the consumers who identified as purchasing eco-labeled products (Figure 25). That is; 39% of eco-label consumers chose price as their first or second preference and 45% chose environmentally friendly as their first or second preference. This implies that the environmentally friendly preference is a strong competitor against price for this population sub-set. With first and second preferences combined, conventional consumers retained price and environment in the same order, indicating that they ranked price more often as a first than a second preference.

**Figure 25: First and second preferences combined, eco-label compared to conventional consumers**



'Ecolabel' consumer 1st & 2nd preferences

| Value | Percentage |
|---|---|
| Minimal transport | 7% |
| Workers rights | 13% |
| Small business | 17% |
| Animal welfare | 19% |
| Local | 29% |
| Price | 39% |
| Env Friendly | 45% |



'Conventional' consumers 1st & 2nd preferences

| Value | Percentage |
|---|---|
| Workers rights | 6.25% |
| Animal welfare | 6.25% |
| Minimal transport | 12.50% |
| Small business | 31.25% |
| Local | 50.00% |
| Env Friendly | 50.00% |
| Price | 62.50% |
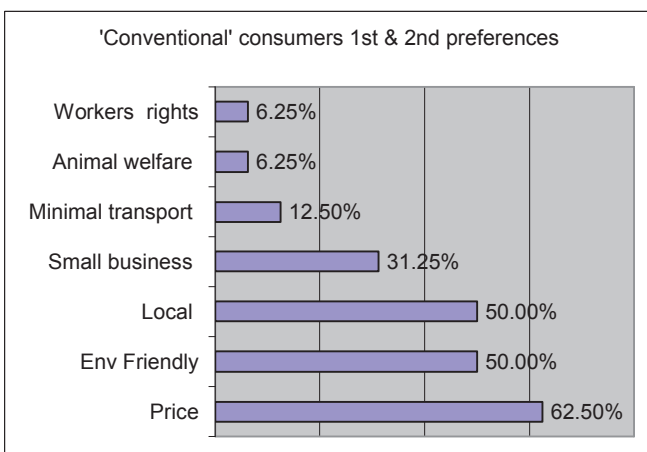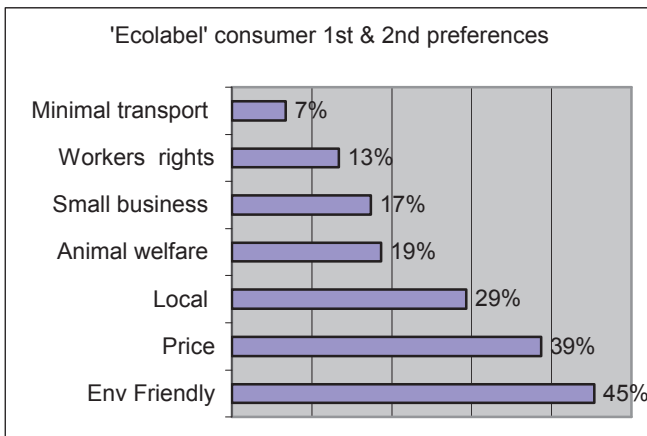
Other values also changed in order when comparing first and second preferences between conventional (n=30) and eco-label consumers (n=45). Animal welfare and workers' rights were placed lower by conventional consumers with no 2nd preferences give for these, only limited first preferences. Although minimal transport appears more important for conventional consumers in this graph, this is because whereas 12% of conventional consumers ranked this as second preference, no conventional consumers ranked it as first or equal first.

Gender differences were also noted with the order of preferences being reordered by women to favour animal welfare over small business and workers' rights (Figure 26). With the exception of these values, other values stayed in formation. However percentages differed with women more clearly articulating the differences between the importance of price, environmentally friendly and local origin compared to men. The sample size included 51 women and 33 men.

**Figure 26: Female and male consumer preferences**
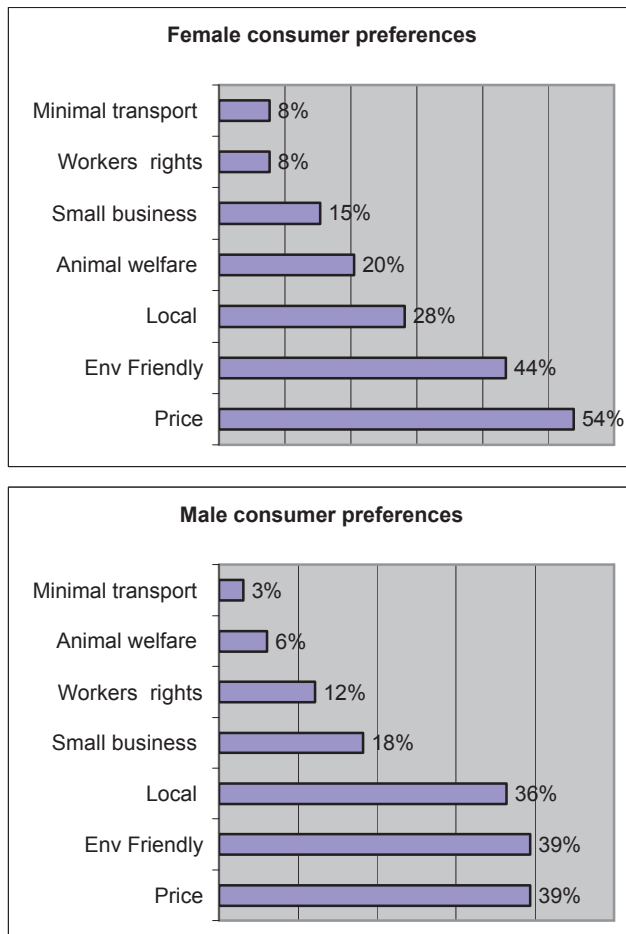


As demonstrated in Figure 27, the tendency to choose environmentally friendly as first or equal first preference was strongest amongst the under 25s and the 40 to 55 age groups (n=84). Environmentally friendly was least important to the 40 to 70 age group. There was also a strong tendency amongst the older interviewees (55 to 70) to choose local as their first preference, largely going against the trend by choosing local origin over price as most important.

**Figure 27: First preferences by age**
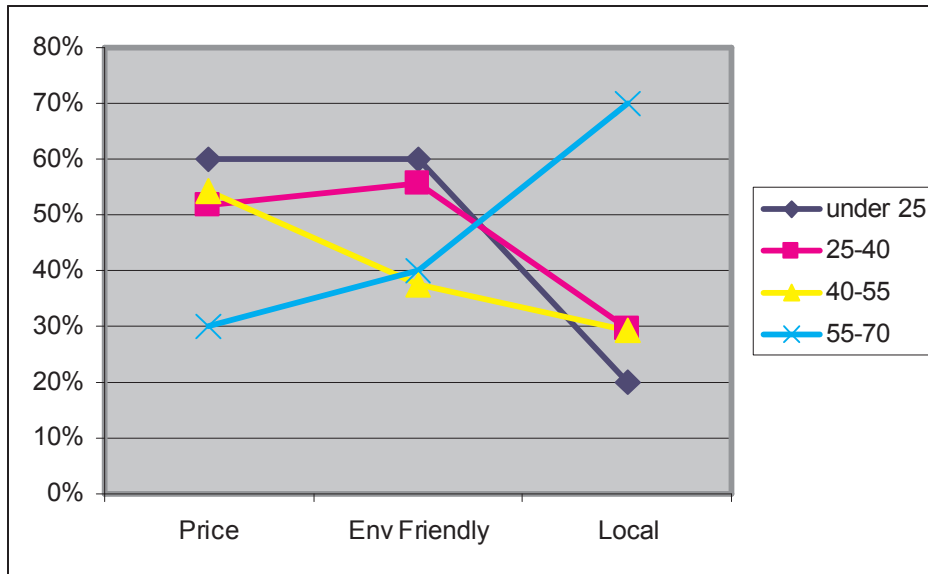


The relationship between work type and preferences was not fully examined, however 50% of interviewees working in the environmental field chose environmental friendly as their first preference and 40% of them chose environmental friendly as their second preference, showing a stronger trend in preferences for the environmentally friendly value in purchasing decisions than any other work type.

## 7.2.1 Interaction of environmentally friendly with other variables

The ordinary least squares regression of consumer demographics and other purchasing preferences against the preference for purchasing environmentally friendly demonstrated a number of relationships, shown below with related correlation coefficients in

Table 7.

**Table 7: Correlation between environmentally friendly preference and other consumer variables**

| Consumer variable | Relationship with preference to purchase environmentally friendly products | Correlation coefficients | Confidence levels |
|---|---|---|---|
| Importance of price | negative | -0.2424 | 10% |
| Gender | negative | -0.1169 | 25% |
| Age | negative | -0.0974 | 30% |
| Country or city dweller | negative | -0.109 | 25% |
| Importance of animal rights | positive | 0.3213 | 5% |
| Importance of minimal transport | positive | 0.1480 | 5% |
| Importance of workers rights | positive | 0.3986 | 5% |
| Importance of purchasing local products | positive | 0.3801 | 5% |

It is important to note that the relationships shown here between these consumer variables and the preference for environmentally friendly are only relevant where variables are taken in isolation. That is: considering only one single consumer variable, i.e. just the preference for environmentally friendly and gender alone, or just the preference for environmentally friendly and age alone etc.

Price ranking was found to be negatively correlated with preferences to purchase environmentally friendly (10% confidence level). The data suggests that consumers that are likely to choose environmentally friendly are more likely to rank price as less important.

The negative relationship between purchasing environmentally friendly products and gender (25% confidence level), showed that women were more likely to choose environmentally friendly than men.

Age also showed a slight negative correlation with preference for environmentally friendly purchasing (30% confidence levels), suggesting that the preference to purchase environmentally friendly declines with age.

A negative correlation was also shown with city or country dwellers (25% confidence levels), suggesting that city dwellers were slightly more inclined to prefer environmentally friendly produce.

Purchasing local products and supporting animal welfare, minimal transport and workers' rights all showed positive correlations (5 % confidence levels), indicating people who purchase environmentally friendly also value these issues in their purchasing preferences. Only the correlation coefficients with animal welfare, workers' rights and purchasing local products were significant at the 5% level.

# 7.3   Forum outcomes

## 7.3.1  Industry forums

Outcomes from the industry forums relevant to sustainable supply chain approaches are discussed briefly below.

The stated issues in the broadacre areas were salinity in land and water supplies, the push for diversity in land use, and the need to retain population and build agricultural confidence. Sustainability issues such as soil fertility, acidity and herbicide resistance are also recognised issues.

The stated issues in the intensive horticultural areas concerned nutrient management, nutrient enrichment (and eutrophication) of waterways, competition for land and water, water use efficiency, making decisions in a time of large land use change, diversity in people's aspirations and actions.

The South West is seen as a crowded landscape, but remains an area with large agricultural potential, subject to avaialbity of agricultural land, labour and capital to invest in agriculture.

The relationship between NRM and production in the use of land and water is still not sufficiently developed. This is despite there being many 'win-win' situations. For example reduced nutrient export means greater production on-farm and improved water use efficiency means more dollars per unit of water used. A range of factors often related to resources and infrastructure conspire to inhibit the realisation of this relationship at individual farm and industry scales.

Regulation is starting to play an increasing role in encouraging (and ensuring) behaviour change amongst producers. Examples include water resource management, land use planning and direct regulation of point source pollution. Potentially, externally imposed regulation, and self-regulation at industry scale will play an increasing role.

BMPs, EMS, and QA are starting to happen, particularly in horticulture, although the drivers to encourage widespread adoption are not apparent. The drive is occurring through industry organisations rather than natural resource management, with the exception of the BestFarms EMS program.

There is a need for NRM to move beyond the farm gate. This can be achieved by working with industry groups and associations in consultation with their supply chains. On-farm behaviour is increasingly being affected by the signals coming from processors and consumers.

The linkages between industry groups and NRM are generally poor. The NRM delivery model potentially works better in the broadacre areas, where the modus operandi was developed, than west of the scarp, where industry based organisations dominate, and the NRM catchment management model struggles. Increased collaboration between NRM and industry is required to resolve this issue.

Indicators of behaviour change can be identified for most industries, being both output indicators (activities, participation, and program implementation) and outcome indicators (changes in biophysical, economic and social status).

An important context for all agricultural industries is the issue of water trading and licensing for water use that is being introduced under the State Water Reforms and the National Water Initiative. Results from each of the five industry forums are summarised in more detail in Appendix 1.

## 7.3.2 Supply Chain Forum

As noted in the Methods section, a forum was held to enable a dialogue between farmers and consumers on sustainability issues in food and fibre. People attending were generally either associated with the case study products or the WA organic food lifestyle community. The purpose of this forum was to check that the emerging research themes from interviews were consistent with the community of practice's understandings.

Forty eight people attended the forum. There was larger attendance by women (65%). Case study supply chains attending included the representatives from the eco-wool, the organic wine and the biodynamic grain supply chains. Apologies and also products for catering were provided by the organic strawberry and biodynamic milk supply chains. The fact that these case study actors participated shows that they are interested in consumer relations.

Participants communicated that they valued having the opportunity to have their say on the issue and stayed for sometime after the end of the event interacting with each other. Feedback after the event was extremely positive and people wanted to know when the next Food for Thought forum would be held.

The agenda items were developed by the attendees as per Open Space Technology rules. Repeated were many of the issues that had previously been brought up during interviews with producers and consumers. An interesting dynamic observed at this event was that the farmers generally stepped forward to develop the agenda and consumers, happy to let them lead, responded. Using the Open Space Technology method where participants were asked to determine the agenda within the broad forum topic of 'Does Sustainability Sell?, the following agenda items were raised, using participants own words to describe the topics and topic discussion outcomes.

**How can we sell sustainability when consumers are not sure what sustainability is?**

It was proposed that generally consumers lack an understanding of sustainability and an education program is needed before a marketing / labelling program. Given this, it was suggested that identification of sustainable food and fibre demands precedes evaluation of sustainable production methods.

**Is organic production sustainable?**

There is a strong correlation between organic farming and sustainable production but they are not necessarily the same. The need for another sustainability standard was discussed but the large amount of logos and labels already existing were also acknowledged. It was suggested that there may be a place for another level of certification 'on the way' to organic certification to encourage growers to be more sustainable.

**Sustainability sells but at what price?**

Sustainability can be costly and farmers need to get better returns or reduce inputs if they are to stay in business. Consumers in this session suggested they would pay more if there was proof of sustainability. It was also suggested that conventional wholesalers and supermarkets are hampering efforts to get fresh produce into stores at prices sustainable for farmers.

**Catering with a Conscience**

This discussion concerned efforts at professional and public (e.g. school and hospital) catering in relation to sustainability. It also considered the relationship between sustainability and health in relation to 'toxic' foods and additives. Cooking classes, public relations, ethical foods guides and a focus on education around sustainable food in school canteens were suggested options. Informal lists of sustainable products are widely held by caterers such as the Cooks with a Conscience group in Perth.

**Farmers markets and overcoming regulation** Farmers markets were recognized as a good option for achieving sustainable food and fibre objectives. It was also observed that they are difficult to organize due to 'red tape' issues.

**Strategies to reduce food miles**

It was proposed that the current movement of food products is unsustainable. Rising fuel prices will reveal the unsustainablity of current practices. Also, freshness is a related issue.

**Importance of local food**

Consumers said they support local food because it is better value, it is easily accessible, it tastes better, respects seasonality, there are fewer food miles and because they want to support and have connection with local growers.

**Is a vegetarian diet more sustainable and energy efficient?**

A number of recent publications (Pollan 2006, Singer and Mason 2006) were discussed. The relative health aspects of vegetarian versus non-vegetarian diets were discussed.

Participants moved effortlessly into discussions using the whole of supply chain concept. A general shared assumption seemed to be that current food and fibre production and consumption arrangements are unsustainable and are having an impact on the world and it's a matter of time before this becomes critical.

There was a high level of understanding of the complexity of the issue of sustainable food and fibre amongst consumers attending. Consumers communicated needs for improved availability of product and convenience of access to sustainable products. They also said that they wanted simple communication about production practices and an indication of the sustainability of the product on label.

Consumer participants commented that there is possibly a stage between organic agriculture and sustainable agriculture needed. Consumers communicated that organic doesn't necessarily equate to sustainable and vice versa. A betterfarms or green tick was called for by some consumers. Consumers were aware that not all sustainability issues can be dealt with immediately so a scheme that recognized effort, rather than full compliance could be adequate.

Farmers commented on 'lifestyle' being an inappropriate word for describing farming because of the low incomes often associated with it and also suggested that consumers don't understand sustainability and that it is too complex to communicate. They also noted that there are already too many labels and logos in the market. Farmers exchanged products and ideas. Most products used in catering for the forum were donated by farmers.

Both consumers and farmers recognised sustainable food and fibres systems as highly complex. Possibilities for relationship building between consumers and farmers which were discussed included Community Supported Agriculture (CSA) or some aspects of CSA such as paying for produce in advance or paying for produce in-kind (e.g. farm work / picking). But it was also commented that CSA is hard work – too hard.

Retailers and wholesalers were represented by the case study organic wholesalers and the organic retailer discussed in this study. The forum was also attended by representatives of the state government Farming for the Future program. Comments were made that state government has withdrawn interest from organics. A Greens politician attending wanted to know where or what to target for maximum effectiveness on this issue. He commented that he wanted advice on where the optimal spot was to effect change to support the sustainable / organic food industry.

There wasn't as much discomfort between organic growers and those growers attempting sustainable practices that were not necessarily organic as might be expected given the strong opinions of organic supply chain actors regarding the importance of organic methods. Growers appeared to recognise each other as on the same spectrum.

Despite there being a number of people in the audience from the Perth City Farm and other grow your own organisations, this did not appear to emerge as a theme. The issues seemed to focus on farm enterprises (farming for a living) and the argument that sustainable food is that grown in cities exclusively was absent. A historian attending the event commented enticingly about the lessons of history related to growing food in cities and why this can and can't work, but this was not expanded on. The disconnect between people and the earth was raised as a spiritual issue in the context of sustainable food and fibre systems.

In summary, Dr Andrea Gaynor, food historian at the University of Western Australia and attendee at the forum provided her thoughts on the forum:

> *There seemed to be a great range of ideas about what is 'sustainable food', before even getting to the question of whether it can sell (though I was a little surprised at the number of people who seemed to equate 'organic' with 'sustainable', without also considering, for example, food miles). There was some discussion of whose responsibility it is to promote sustainable food - is it a public good, deserving of public support, or a private good, which should compete on the open market like other foods. Several discussions seemed to be led by producers or those with an interest in marketing, rather than people with an interest solely as consumers. It was interesting to see that the question of whether meat is more sustainable than vegetarianism is still on the agenda.*

## 7.4  Synopsis Chapters 6 & 7

This section briefly summarises the previous chapter (Chapter 6) and this chapter (Chapter 7) which communicate the three different components of the results of this study (supply chain case studies, consumer surveys and interactive forums). Some key themes emerging from the case study supply chain and consumer interviews which were validated by the industry and consumer forums are discussed below.

There was interest in 'sustainable' produce amongst the case study supply chain participants and some of a tendancies towards purchasing 'sustainable' products amongst consumers in this study. There is more interest in sustainability amongst farmers and consumers than there is amongst manufacturers and retailers (with the exception of organic actors).

Awareness and understanding of the complexity of "sustainable production" varies greatly throughout the supply chain of these case studies with farmers generally leading the way in understanding and commitment to these principles. Differences in capacity to incorporate changes to improve sustainable production and marketing efforts were shown between the certified and non-certified chains. Producers of bulk commodities such as conventional grain and milk products are unlikely to receive market or wider benefits from environmental certification of their product at this time because of perceived cost inefficiencies of differentiation.

There are a number of tangible drivers and impediments to the transfer of sustainability values between producers and consumers. Relationships between supply chain actors (mostly farmers) and external environmental and social organisations can assist with development and transfer of sustainability values. Factors enhancing or impeding the transfer of these values is discussed at length in Chapter 10.

Gender and age play a part in choosing sustainable pathways, as well as other demographic factors such as living in the city or rural areas and type of profession. Product miles imply a significant cost for suppliers but this is a largely unnoticed issue for consumers.

The organic food lifestyle network is a closed system that is hard to get into and some actors within it are making efforts to keep it closed or prefer it that way. Even stores like Woolworths potentially assist in this segregation by keeping fresh organic produce away from the same conventional products. Organic products are not necessarily seen as sustainable by consumers, despite confidence of this by organic growers. Organic / sustainable food is not being always being consumed by the local market where it is grown (i.e. rural areas.) because of processing but also because the market is too small to bother negotiating with or is not supportive of this type of produce. Organic growers are sometimes afraid of other growers coming on board with competition issues sometimes causing conflict with their ethical positions.

Even though it is claimed that many hundred Australian farms have implemented Environmental Management Systems (URS 2005), there are limited EMS certified products coming into the market and those that are, are heavily subsidized (including by volunteer NGO efforts such as BestFarms and Gippsland Beef). EMS (institutions, practices and policies) are not crossing over with organic. However organic certifiers are including EMS in their policies.

Green consumers have a triple bottom line consciousness reflected in their desire to purchase products that meet social, environmental and economic sustainability criteria and their expectation that eco-labeled or certified products will deliver this. Environmental sustainability, food miles, human health are real consumer issues. Consumer expressed a desire for sustainability in food (and less so in fibre) products and some level of communication of this at point of purchase. The assumption that all Australian produce is clean and green was common amongst consumers.

This brief summary is expanded upon in the next chapter which considers the elements that contribute to sustainable supply chain approaches in detail, drawing on empirical evidence from the case studies.

# Chapter 8: Understanding sustainability in food and fibre systems

## 8.1  Heuristic fields for understanding sustainability in food and fibre systems

Discussed below is the first of two iterations of conceptual models aimed at describing the basis of 'sustainable supply chains'. This first model describes production to consumption systems as observed and interacted with by the researcher (i.e. the 'actual') and the second, in Chapter 10, describes the potential for sustainable supply chains. The first model is for understanding supply chains. The second model explains the elements that allow supply chains to work as 'sustainable supply chains' described later as an 'intervention model'. This second model addresses the impediments and builds on the drivers identified in the first model. The model is made up of eight interconnected heuristic fields which are used to enable understanding of key characteristics of supply chains important in the context of sustainable food and fibre systems. These were developed through coding the data. The concept of heuristic fields for describing commodity systems was also used by Holloway et al. (2007). The fields are in the table below ordered by Layder's (1998) concept indicator categories (i.e. systems, bridging and behavioural) as discussed earlier in Chapter 4 Theoretical Concepts. There is significant overlap between these categories as indicated in Table 8 which shows an overlap in between the shaded areas where systems overlap with bridging and bridging overlap with behavioural concepts.

**Table 8: Key heuristic fields for understanding sustainable supply chains**

| Systems concepts | Bridging concepts | Behavioural concepts |
|---|---|---|
| Ecological Systems<br>Production Systems | Values<br>Motivations<br>Impediments to change<br>Commercial sustainability<br>Patterns of interaction<br>Production Systems | Patterns of interaction<br>Consumer behaviour |

The characteristics described under these fields are not specifically touted as 'best practice' characteristics of sustainable supply chains. It is proposed however that through exploring these fields we can move closer towards understanding sustainable supply chains. These fields and characteristics provide a basis for the assertions made later in the thesis about intervention pathways for sustainable supply chains. Fields  (headings) and sub-components (boxes below headings) of these fields are shown in Figure 28.

**Figure 28: Model showing heuristic fields for understanding sustainability in food and fibre systems**



| SYSTEMS | | BRIDGING | | | | | BEHAVIOURAL |
|---|---|---|---|---|---|---|---|
| Ecological systems | Production systems | Impediments to change | Motivations | **Values** | Commercial sustainability | Patterns of interaction | Consumer behaviours |
| Agro-ecological systems | Management practices | Financial impediments | Livelihood factors | | Competition | Relationships | Demographic influences |
| Water | Environmental management systems | Lack of knowledge | Sense of place | | Cost savings | Social norms | Understanding of sustainability |
| Biodiversity | Environmental certification | Institutional & industry barriers | Protected spaces | | Efficiency | Power relations | Demand for sustainable products |
| | | Doubts | Future plans | | Risk management | Cooperation | Lifestyle influences |
| | | Stress | | | Value adding and capture | Trust and integrity | |

The detail behind these heuristic fields and their sub components is discussed in the following sections. This discussion represents concept-indicator links that support the validity of the use of these fields in understanding sustainable supply chains. 'Values' is seen as centrally important and Chapter 9 is dedicated to discussion of this field.

It is important to note that the observations and comments that follow are generally drawn from the case study supply chains and are not universal. However, it is proposed that these observations could be extended generally to characteristics of production and consumption systems within similar contexts.

## 8.2 Relationships with ecological systems

### 8.2.1 Agro-ecological systems

*The expansion of agro-ecological approaches*

Moving towards more sustainable agro-ecosystems was a common aspiration amongst the case study farmers in this study. This included systems that utilse water more efficiently, systems that are resilient to variable weather conditions and systems designed so that the inputs can be turned off as needed during times of reduced resources. The conventional farmers were using a number of techniques commonly associated with organic farming systems.

Lang and Heasman (2004) suggest that this is a global trend with agroecology gaining increased support globally. They add that whilst agroecological methods are often synonymous with traditional agriculture methods, there is a 're-discovering of local skills…being applied with modern understandings to meet challenges of food production'.

Use of agroecological principles including composting, nutrient cycling, natural pest control and encouraging soil biological activity were daily toil for the organic and biodynamic growers. However it appeared that all of the conventional growers were in one way or another moving more towards agro-ecological systems approaches. Bede (conventional wool) explains how his family have moved from the fertliser company based agronomist to one that is sympathetic to organic systems:

> *I use a place called Soil Works. They have an agronomist who works towards organic systems. He's right into the composting and less input systems. A lot of ploughing in stubbles – a healthy balance rather than conventional farming practice.*

Crop rotations are also an important aspect of these systems. Bede and Nadia (conventional wool) ensure long rotations between cropping and grazing of up to seven years, significantly longer than the one or two years of neighbouring farms.

Warren (organic strawberries) comments on the relationship between rotations and sustainability:

> *From the environmental aspect (the farm operation) is perfectly sustainable. We rotate growing areas around so we only have 2 crops in one location every 5 years and we have the room to keep rotating crops. We have 3 fenced areas and another one further down the gully this season so we have tonnes of room for crop rotation. So probably only about 20% of our (production) area will have crop in it at any one time.*

This contrasted with Alan's conventional strawberry crop which used no rotations at all due to lack of space in the peri-urban market garden environment, and was dependant on an intensive and highly specific fertliser and pest and disease management regimes.

No-till farming, whilst raising issues for pesticide resistance, is widely considered as an important signal of sustainable farming systems. Both Bede and Nadia (conventional wool) and Sarah and Robert (conventional grains) use no till. They have also found alternatives to burning stubble, still a common practice in the area.

Despite some movement towards agro-ecological systems amongst conventional farmers, large transformative changes to production systems were not on the agenda, despite knowledge amongst conventional farmers about the benefits. Generally costs were thought to be too high. Susan (biodynamic grains) who with her partner runs a biodynamic grain operation at a similar scale to most of her neighbours observes that this lack of take up is puzzling:

> *It seems incredible that we are looking at organic farming resolving salinity, water run-off and all these issues, I guess there's no blanket solution – but why hasn't there hasn't been a greater uptake?*

### *Alternatives to chemical pest control methods*

Concerns related to the use of chemicals were expressed by the conventional farmers, usually raised by the women interviewed. Sarah (conventional grains) commented:

> *My opinion is that the whole chemical scenario has come upon us so dramatically. I reckon there is a time space of fifteen years since when I first started farming with Robert. There would just be a bit of Round-Up used just as a knockdown for weeds and they would still conventionally rip up and work back, to what it is now – such a vast array of chemicals used for so many things. And even though there's been some really good things, like with no-tillage I can see our soils springing up and there's less horsepower needed. But on the other hand the use of chemicals has got so big. That's given people lots of different options and the ability to produce greater than they would have been able, but the whole impact, I don't really think has been understood or measured and that concerns me, living amongst it.*

Peter (conventional milk), in his fifties, made a similar observation about the explosion in the use of chemicals over his lifetime. Both Sarah and Nadia (conventional wool) shared their concerns about exposure of family members and other farm workers to chemicals. Sarah said she herself buys organic food whenever possible (despite the difficulty she said she has in accessing this in her area), and hence feels somewhat conflicted about the use of chemicals on the farm.

Consumers were also very concerned with chemical use on food products as discussed at the end of this chapter.

Alternatives to chemical pest control such as integrated pest management (IPM) were being explored by some of the conventional farmers in efforts to develop more resilient systems, to save on chemical costs and to comply with pesticide residue requirements. Alan (conventional strawberries) aims to use minimal pesticides. He describes his relatively recent IPM system.

> *This year we have had low levels of Western Flower Thrip so we will put the predators out. We haven't sprayed an insecticide for quite a few weeks. We are due to spray for caterpillar. We are only spraying when levels reach certain thresholds. Wandering around out there every week to ten days keeps us on track with diseases. We don't have a broad spray program, wacking every thing. And that's kept the costings down. Some of the sprays are $2000 for 5 litres.*

Organic growers were more advanced with system techniques for managing issues such as pests and weeds. David and Rebecca (organic wine) applied their impressive scientific problem solving ability to manage weeds in the vineyard.

> *We did a root analysis to find out what was accumulating and it was potassium and calcium. As calcium levels changes in the soil a lot of the sorrel disappeared. We use weeds as biomass. We don't disturb the soil structure. If you put in a cover crop you disturb the very nature and microbial activity in the soil. The latest research from CSIRO is you get 7kg /ha of nitrogen from converting that. We developed a technique of just mulching it and turning it into a mat, so we just turn it into our own humus. We don't slash it, we mulch it.*

*Building the soil resource*

Organic growers observed that their methods, such as feeding the soil rather than the plant and using whole of systems approaches improved the general condition of the environment not just the plant or animal. Improving the soil is a key philosophical and practical outcome of organic farming. Kurt (biodynamic dairy) notes:

> *When we first started, if you walked in there in the summer time, the quartz used to blind you. You can't even see it now because as we've changed the structure of the soils and put some health back into the soil, it's got darker and darker. I tried to rip it one day with a single tyne, couldn't rip it, it was that compacted. You can go and dig a hole in it with your hand now. Because we are using BD and the soil starts to work right, everything comes back how it's supposed to be and the soil is working and alive.*

Struggling with acidic soils, Peter (conventional dairy) has a program of liming his soils but also feeds hay and silage in the worst paddocks, recognising the value in increasing organic matter, whilst acting indirectly on this. Kurt in comparison views feeding straw (as he does not feed hay) as a direct fertliser input:

> *When you buy 50 tonne of straw, you are actually buying 50 tonne of fertiliser. And it's from somebody else's farm. So you actually bring some of their farm to yours in a clean manner and put it out on your farm. You can actually mix the two farms.*

## 8.2.2 Water

As discussed in the introductory chapter, the Blackwood River faces a number of water quality challenges including increasing salinity levels (BBG 2000).

The success of community governance of natural resource management in the Blackwood is very much related to the lack of government interest in the water assets of the Blackwood. Although the reverse could also be said to be true, with less need for government assistance because of the highly organised (and sometimes intimidating) community. As such, water use has been largely unregulated in the Blackwood, apart from the high value water assets of the frontier agricultural area of the Scott River close to the river's mouth, a zone of conflict over property rights and water.

This lack of regulation means that pumping from the river, pumping salty water into the river or its tributaries (a common way to lower water tables in the wheatbelt), development of instream

dams and groundwater abstraction is very loosely managed as compared to the rest of the South West region, where water assets are more highly valued. As such, community and individual farmers have virtually been in control of water use (and abuse). This may change under the new WA Water Act (Govt. of Western Australia 2007). There was a range of relationships with water amongst the farmers interviewed. These are explored in brief below.

### *Water as the key limitation to food and fibre production on farm*

Water is a key factor in the development of and resilience of food and fibre production systems. Water, or lack of, can limit growth or act as a driver for change towards new more sustainable systems. Given that the WA government aims to reduce agricultural water use by 25% (Govt. of Western Australia 2007) and arguably, climate change will lead to reductions in run-off in the South West (Indian Ocean Climate Initiative 2003), water is central to sustainability of the region and key to the development of sustainable supply chains. Also with Australian agriculture using around 60% of total water use (National Water Commission 2005), the issue of water use in food and fibre production is increasing in importance not just for farmers but all of the community.

A good understanding of the implications of limitations of water availability was described by both Kurt (biodynamic dairy) and Warren (organic strawberries). Kurt has a dryland dairy, which he says is not unusual. However dryland dairy farmers are often considered an anomaly or at least poor farmers by the rest of the dairy community. As well as not using water for irrigation, Kurt doesn't wash down the dairy because he and his partner had taken the time to teach the cows to manure before they get to the dairy. Hence his practice saves a significant percentage of the water used in most dairies.

Warren has an annual crop, replanting his strawberry runners every year. As stated by the late Peter Cullen (Australian Farm Institute Roundtable conference 2007) a move away from permanent crops to more opportunistic crops will better suit the extreme variability in water availability expected under climate change projections. For this theory to assist our water situation, it assumes that farmers will be willing to turn off the water or choose not to plant these crops during water shortages. In the worst extremes, water will simply not be available to grow the crops, making it a moot point.

Warren was one of the few farmers interviewed that could give a measure of how much water was being used. He uses 8000 to 10,000 gallons a day during the growing season, including all production, landscaping and gardens.

Warren did turn off the water during the drought in 2007, losing most of his crop even though water was still available and there was no water pricing driver to use less. His source of water is from a bore and when he noticed his wetland was drying he made the decision to not use any more of the bore water that season. As he points out, he has set his business up for just this kind of contingency with no permanent arrangements that can't be turned off including his labour who are paid at a per kilogram rate. This indicates a resilient system that has truly integrated the information that water indeed is a limiting factor.

*Knowledge of water resources*

Having a good understanding of one's impact on downstream flows is rare. David and Rebecca (organic wine) monitor the water that comes into their property and again as water leaves their property. David has observed a 75 % reduction in nitrogen and phosphates as it leaves the property because of the sedges and paperbarks. Demonstrating his exemplary grasp on ecological impact issues, David adds:

> *The water that leaves our property is 0.1% below the ANZECC guidelines for water nitrogen and phosphate – we are right on one and below on the other. That's our objective. But that's only one measure. The measure really in the end for water is also biological activity.*

David and Rebecca also have a strong understanding of the physiology and growing conditions of the vines and the soil conditions which helps water efficiency. They are in a high rainfall area and a key management issue for them is to limit the amount of water they put on the vines.

> *We try and put on as little as we possibly can. We know our calix base is 75mm under the ground and this is where most nutrients are locked up. By using as little water as we can we hope to force the grapes roots down to that level and then they have a much better chance of survival. We don't water because we try to stress the grapes. We don't start watering until the end of November and we stop at the end of January.*

In terms of comparison between the biodynamic dairy case study and the conventional dairy case study, water use was a significant and quantifiable difference. Also, water use is related to energy use. Differences in water and energy use were apparent with Kurt's (biodynamic dairy) operation using significantly less energy than Peter (conventional dairy) who irrigates 100 hectares of pasture. Peter implied that were some losses in his watering system and he was hoping to make it more efficient.

Peter, who operates two dairies, uses about 8,000 to 10,000 litres of water a day, per dairy, for wash down. This water is pumped from an instream dam. He supplements this with bore water at certain times and uses bores for the pasture irrigation.

Whilst good quality water is required for plant cleaning, using this water for dairy yard washdown and pasture irrigation is inefficient. I discussed with Peter the results from the Victorian Bonlac environmental management on farms study (Rogers and Alexander 2000) which indicates that the most efficient dairies use under 2000 litres of water per cow per year. The average was about 9,600 litres / year / cow in the dairy sheds (ibid).

Peter estimated that he uses around 14,000 litres per cow as a rough estimate and he said he didn't know how one could get down to 2,000. He noted that his cows stand in the yard for more than two hours, increasing the water use needed for yard washdown. Also, as we noted, the lowest Bonlac study water use figures involved reuse of dairy plant wash down water in yard washdown. Peter had observed this system in northern Victoria where a holding dam is used, pumping the water back though and reusing the water several times for hosing the yard out. The water is then filtered into their irrigation tank. Peter has since been investigating a similar system for use in his operation.

Peter also communicated that costs of water are about energy and fuel, not water. Peter commented that his main cost is associated with energy costs related to pumping. Since this interview, Peter has put significant effort into revising his water system.

### Farmers are adapting to low and poor water quality

Working around high salinity levels in water was an issue for some of the case study farmers and something well known to farmers in the eastern half of the Blackwood catchment. One of the vineyards supplying the conventional wine case study is located in an area affected by salinity. Water from the dam can only be used when there have been high inflows to flush and dilute the water. To manage this, they pump out of this dam to another storage dam during winter. They use a common practice in the area which involves shandying the water which can have salinity levels up to 500 millisiemans, to achieve the maximum level suitable for the vines at around 200-250 mS.

### Water efficiency technologies are available but not widely used

Irrigation technologies have a long way to go, suggests conventional strawberry farmer, Alan. Whilst not obliged to undertake water efficient practices through regulatory pressures, Alan has meters on his bores (his only source of water) as part of the state government Waterwise program exercise. His aim is to balance his watering program, but at the time of the interview the monitoring system was yet to be calibrated to reasonable accuracy.

He has enough information to inform him of leakages in the system but not enough to estimate the amount of water used per hectare. By monitoring moisture in the soil, he reduced his watering (of established plants) to about ten minutes a day. Using the traditional system, he said watering is done for 30 minutes basically flushing the fertiliser down.

On the conventional wine vineyards where rising salinity is a problem, gypsum blocks were used to determine how much water is sinking into the ground but apart from that, technology to manage irrigation efficiency was limited.

Technologies that help farmers maximise productivity according to water availability on their properties are also important. Most farmers in the wheatbelt appear to know about the Ron Watkins system, a keyline like system developed by farmer Ron Watkins. It is so named because Ron personally goes to farms and sets it up. However very few farmers have invested in this community owned technology.

The use of the Ron Watkins system of water harvesting, described earlier, was used by the conventional wool, the conventional grains and the biodynamic grain farmers all who are located in the lower rainfall areas of the catchment (around 300-400mm / annum). This ensured maximum water collection and storage.

Susan and Andrew (biodynamic grains) are confident that their farming techniques have increased soil water holding capacity. Susan says their property greens up faster and stays greener longer than surrounding properties, essentially creating a longer growing season. As Susan pointed out, water is very difficult to catch in this country which averages around 300mm per annum.

Kurt (biodynamic dairy farmer) is also confident that his biodynamic practice has increased water infiltration. He comments:

> When it rains, all the rain soaks in. Even on the steep slopes, it takes 1.5 inches of rain now before it runs off. It only takes 20 points on the neighbour's place before it starts to run off. That's only on the other side of the fence.

Strategic management for extending water resources is also an important factor. This includes careful monitoring of water resources. Sarah (conventional grains) tells how they graze the paddocks first where they have got the least water availability and the dams are the lowest.

> *Because over the summer period the dams will dry up – there's no point having a paddock that's full of feed with no water in it. So if you've got a dam that's really low, you will use that up in December and then the other paddocks where most of the water still remains,*

Matching land type and land use also contributes to the water efficiency issue. Derek, vineyard manager (conventional wines) manages three blocks around the Boyup Brook area. He comments that some of these blocks need less water than others.

## 8.2.3 Biodiversity

Protecting the remaining biodiversity is a key issue in the Blackwood catchment, both amongst many farmers and the wider community. Native vegetation covers approximately 26% of the catchment (BBG 2000) with most of this occurring in the western half of the catchment. In the heavily cleared eastern part of the catchment, native vegetation continues to be lost due to fragmentation, grazing impacts and rising ground water, despite limited clearing since the 1970s (BBG 2000). Losses to native vegetation are estimated at around 4% per year (BBG 2000). On private land, less than 20% of the vegetation is in parcels of greater than 20 hectares (ibid). There are 43 declared rare and endangered species of flora and 12 of the 37 mammal species of the Blackwood are either extinct or at risk (ibid).

*Biodiversity protection is motivated by both altruism and self interest*

Case study farmer perspectives on biodiversity were mixed. All reported some interaction with native plants and animals on their farms. Interactions with 'nature' often seemed to relate to impacts or benefits to production. Mark, Christine and Derek (conventional wine) commented on kangaroos eating their grapes, which didn't seem to bother them as it was in small proportions. They certainly appreciated the flowering of the red gums at the same time as the fruit ripened which distracted the silver eyes from the crop.

Whilst there was appreciation of ecosystem services, people were generally exploring their positions within this. Christine had investigated a vineyard in Margaret River which was developing a wetland close to the vines and establishing plant species that flower at appropriate times, when the fruit is on the vines. She said this system has the effect of encouraging birds to be in the vineyard for their beneficial insect control function, but ensuring at fruiting times birds are in the wetland area and not in the vines.

Based on this information the conventional wine case study commenced planting trees that flower in March and April, when most of the fruiting occurs. As they try not to use insecticides, encouraging birds is seen as an effective pest management strategy for the future.

Two of the farms (organic wine and organic strawberries) have a relationship with the native biodiversity on their farm that goes well beyond production impacts and benefits. Both of these farms are Land for Wildlife members and both of them communicated that part of their lifestyle and farming aspirations included benefiting and enjoying the bush.

As well as extensive indigenous species plantings, Warren (organic strawberries) says they have undertaken forest regeneration and clearing up in the edge of their 100 acre forest using smoke techniques under the guidance of local expert Jenny Dewing. Warren says:

> I was amazed how much stuff has come up. I should have taken before and after photos. But I didn't anticipate it would have such an impact. In fact I felt guilty about doing it – burning up all these small logs and stuff that are supposed to be left for small creatures. But anyway we try and do that sort of stuff. Hopefully we can do a bit more.

*Subjective valuing of natural assets provides motivation to conserve*

Knowing the quality of your river, bush block or ecological community is important. Having its value acknowledged by an impartial source can serve to raise its importance. During 1998 to 2002, the Blackwood Basin Group ran a program to protect the best bush in the catchment. In setting up this program, spatial imagery and island biogeography principles were used to sort through the 20,000 blocks of native vegetation over 1 ha on private lands. These were then ranked 1 to 20,000 in terms of conservation value. After some ground truthing with knowledgeable local biodiversity experts, either landcare coordinators or Land for Wildlife officers and some risk management planning, the landholders with the "top 500" were approached. A letter and phone call told them 'congratulations, you have bush of state significance'. To our surprise, the response was remarkable and even though remnant vegetation protection schemes had existed in the area for around ten years, this approach brought a range of new landholders on board. The program achieved protection including fencing, management plans and management of 6363ha of this high quality remnant vegetation of which 42% was covenanted through the program. The success of this program was based on the unique combination of recognition from outside, improved knowledge of the importance of the asset and the helping hand of incentives.

Knowledge of rare and endangered species motivates the community to act. The plight of the white bellied frog is well known amongst the community in the Scott River / Margaret River area. Peter (conventional milk) has a section of his farm which was fenced off by the state Department of Conservation and Land Management (CALM) because of the presence of the white bellied frogs. When asked if this is a problem for him, he says:

> *They are rare and endangered. Its doesn't make any difference, the vegetation is that thick you can't get into it anyway. The only problem I have is that tea tree is growing over the fences.*

In 1998, the major tributaries in the western half of the catchment were surveyed. All major tributaries were rated from A to E according to condition. This determined that the riparian areas of these tributaries were 9% pristine, 35% with overstory but limited understory and the remainder in poor condition (BBG 2000). Peter (conventional milk) uses this information to explain the value of the creek on his property:

> *A lot of this was given A ratings, you know some of these waterways were given A plus ratings. Some of it got down graded from the top grading because of weeds. So even though its never been touched, its always been fenced out so there is no cattle that ever got in there but you know, you still get weeds in there. But you can see the quality of the bush.*

## 8.3  Production systems

### 8.3.1 Management practices

Farm management practices were explained in detail by the farmers interviewed but are not examined in depth here. Farm management practices described included those related to livestock management and cropping techniques, but also short and long term resource management of soil and water resources. Revegetation and remnant vegetation practices were also included in the practices described. All of the conventional farmers reported the use of agricultural consultants; however this source of support was not noted by the organic farmers.

Innovations were a key factor in many of the farm stories, including novel approaches to resource management mentioned earlier in this section. These innovations also related to water efficiency and ensuring maximum use of the limited water available. Some farmers mentioned the potential for carbon sequestration through organic matter build up in soils. Management of waste was also discussed including a range of issues. This included limited markets for seconds in horticulture, meaning that significant quantities are dumped. However this was not the case for    the    organic    horticulturalist    who    found    markets    for    organic    seconds.

Larsen et al. (2008:74) makes the point that pre-consumption waste is partly caused by restrictive specifications by the two major Australian retailers:

> the concentration of the food chain in two major retailers means that retailers can control the specifications and acceptability of produce. They can make decisions about what will sell based on size and appearance. Slightly small or blemished produce is often not accepted for sale and, in the absence of other markets is disposed of.

Other issues with waste included issues of disposal of toxic materials for which there were not always adequate solutions. There were also innovative solutions to dealing with waste such as those being explored by Sydney Market Limited, who receive one of the case study products occasionally. Sydney Markets are currently sending waste to the Veolia's Woodlawn bioreactor which aims at the production of methane for energy use (Sydney Markets 2007).

## 8.3.2 Environmental Management Systems

Having a system for planning, monitoring and recording environmental impacts on farm and in manufacturing and processing is an important factor in the development of a sustainable food or fibre supply chain. Documentation and / or compelling evidence that environmental issues have been adequately managed will need to be available even though most consumers are unlikely to want to view this. A number of key issues for the role of farm Environmental Management Systems within supply chains emerged from the study. These are described below considering EMS within the context of environmental assurance, recognising that implementing an EMS has benefits other than its potential use in an environmental certification system.

*Farmers are interested in EMS and certification for a number of reasons*

In the survey undertaken of BestFarms participants including six of the ten case study farmers, participants identified benefits of having been involved in the EMS program including social benefits and improved knowledge of natural resource management issues (Coote et al. 2006). The most significant benefit was social, with 55% reporting personal, family or community benefits including meeting other participants, having a sense of "doing the right thing for the environment" and a talking point between partners (ibid). A further 65% valued the opportunity to network with like minded people and 55% of participants found that the EMS process led to more discussions and involvement relating to decision making on farm with family and staff. (ibid). The potential for environmental certification of farms or products was also a motivator for farmers as discussed later.

Whilst economic benefits may have been anticipated at the beginning of the involvement, no participants reported decreased inputs and only one reported increased efficiencies (Coote et al. 2006). However 15% thought that the environmental management system would lead to efficiencies in time.  In addition, 20% reported increased inputs as a result of this or other property planning (ibid).

The usefulness of certification at farm scale in assisting with sustainability value transfer from producer to consumer is unlikely except in local and in direct purchase circumstances or when this is used as part of a marketing campaign. For example, producers of bulk commodities such as conventional grain and milk products are unlikely to individually benefit from the promotion of BestFarms certification of their product or other informal standards at this time.

However, in the potential case of bulk manufacturers requiring some level of environmental assurance, the BestFarms certification could be useful for farmers, even if it does have to be adapted to fit in with the manufacturer or retailer's own environmental and or social assurance program, which is likely to be the case. This is not outside the realm of possibility with the conventional dairy manufacture considered in this study recently joining the international Sustainable Agriculture Initiative (SAI) which has an objective of environmentally and socially sustainable sourcing.

*Farm EMSs need to be integrated seamlessly into whole of supply chain sustainability approaches*

The EMS national framework emphasises the need to consider vertical integration of EMS, suggesting that 'for maximum credibility, all levels in the supply chain should be certified, not just the farm' (EMS Working Group 2001). Implementing an EMS on independent farms is unlikely to achieve value transference without a whole of supply chain approach that the EMS can link into, such as the use of eco-labels (e.g. ISO 14024). Efforts to integrate products from farms with an EMS into supply chains are at an early stage in Australia with an apparent lack of interest beyond the farm gate.

Arguments relating to what kind of EMS (i.e. ISO 14001, informal or other) are more likely to be relevant to emerging manufacturer or retailer requirements than consumer requirements. The choice of certification system is also relevant to other stakeholders, such as regulators and environmental groups.

One initiative that invested in exploring the link between EMS on farm and market demand is the Gippsland Beef project (Roberts 2004). In this approach, 'green' marketing was used at shopfronts to promote efforts at environmental management on-farm. This program successfully integrated farm EMS into a whole of supply chain approach. The Queensland 'red-tipped' bananas are another short supply chain approach that communicates environmental management at the farm level to the consumer. Both this and the Gippsland Beef examples used ISO 14001 certified systems on farm.

Consumers in the study were generally not concerned about environmental sustainability values in the 'middle' of the supply chain (e.g. manufacture, transport and retail) and this study confirms that communication pathways between farmer and consumer are critical in transferring sustainability values. However, this is not possible without the commitment to transfer sustainability values by all supply chain actors.

*Middle chain actors are starting to undertake environmental management systems*

In terms of sustainability accounting utilised in downstream supply chain sectors, the Australian Food and Grocery Council (2003) reported that 76% of their member companies have a formal policy covering the environment, 49% have put EMSs in place, and 71% employed a full-time environment manager. In the case study supply chains, this figure was much smaller, with ISO 14001 used in the manufacturing stages of only three out of the ten supply chains. This was a function of size with generally only the larger wholesalers and manufacturers reporting the use of ISO 14001.

*Limited consumer interest in natural resource management issues and EMS*

EMS and natural resource management received limited interest from even the 'green' consumers in this study. Only one consumer (BuyGreen conference participant) mentioned EMS saying that environmentally sustainable meant 'accredited by some organisation for some sort of EMS (including) less environmental impact, recyclable packaging, production system efficiency and consideration of waste'. This consumer happened to work in the EMS field. Based on the consumer results, it is anticipated that only a limited number of consumers will want to know that a farm EMS or similar process is in place. This implies that information about sustainable practices on farm needs to be incorporated into product labelling or information as a preference to promoting farm EMS to consumers.

Simple and quick messages that consumers can relate to everyday life are required to communicate sustainability values. Particularly because of the complexity of explaining NRM and EMS on farms, it is concluded that the use of these concepts is unlikely to be effective as a marketing tool in convincing consumers that the product is sustainable.

In comparison, consumers were aware of eco-labelling and to a lesser degree, organic certification standards. Many consumers mentioned the need for a high level of trust related to third party certification or environmental endorsement of products.

However consumers did communicate that there will need to be mechanisms to support sustainability claims and provide an ongoing basis for this trust such as a farm EMS. This implies that while a farm level system equivalent to an EMS is likely to be required to substantiate environmentally friendly claims, this complex concept can not be easily communicated to consumers. They indicated that they require simple and easily recognisable marks such as a green tick.

Consumers also showed little interest or understanding of natural resource management issues on farm such as wildlife, vegetation and water quality. They were primarily concerned with chemical use and residues as an environmental and a health issue. Those consumers that did have an interest in wider natural resource management were mainly concerned with soil health and water use issues.

The issue here is that the key relationship needs to be between the on-farm EMS and the third party, not between the on-farm EMS and the consumer. The third party can then communicate the benefits of the farm EMS though simple messages that the consumer can easily absorb, such as a green tick.

### 8.3.3    Environmental certification

In the aforementioned BestFarms participant survey, 45% of respondents wanted environmental certification for their farm and 30% believed that a product label or logo stating that they have met conditions of environmental sustainability would be useful (Coote et al. 2006). Of the 45% of people who said they wanted BestFarms certification, they wanted it for the following reasons: recognition (20%), market advantage (10%), protecting access to resources (5%) and goal achievement (5%). The remainder said it wasn't a priority and they would 'wait and see what happened in the future (ibid).

Generally middle chain actors were not interested in the concept of environmental certification. Price signals for this were unlikely with one major retailer suggesting:

> *Price premiums are not the way to go, instead environmentally assured will be the new benchmark.*

Manufacturers (and retailers) currently handling organically certified produce were not opposed to the concept of environmental certification. There was however strong resistance to further paperwork amongst distributors, manufacturers and retailers as with so many organic certification systems they considered they already have more than enough paperwork. Cary et al. (2004) also found that members of supply chains were concerned that there were too many labels and certifying bodies. Pahl and Sharp (2007) also found that middle chain and other stakeholders in their study had issues with the diversity of labels and preferred 'just one unique and prominent product label, such as one national eco-label that has high recognition and credibility'.

### *Influence of Quality Assurance systems*

Well known in the farming sector is the poor reputation developed for Quality Assurance (QA) amongst farmers in its early years. It follows, that this residual resistance and frustration amongst growers would also prove an impediment to environmental sustainability certification. Alan (conventional strawberry grower) was initially supportive of the Western Australian government developed SQF program but disappointed by the lack of commitment to growers when the rights to this system was sold overseas for profit. Initially he threw his business right behind QA. He and other strawberry growers pooled resources to manage QA systems and reporting. He describes his QA experience which moved from a sophisticated system to the very basics under the Woolworths requirement for Freshcare:

> *We had a person and a vehicle. Reading documentation every few minutes. It cost $100,000 a year. Then it was sold overseas. And now we do Freshcare and spend a few hundred dollars a year. It means absolutely nothing because in comes some ex-meat worker, food processing type inspector who tries to link this in with that sort of industry, which is completely removed from it. They tend to be honing in on is purely chemical use, so that becomes a major issue – chemical sheds, what's your scheduling, what's your batch number. all that. The bottom line is – you just do the basics and spend the least amount of money and time on it.*

However, quality assurance systems are useful in the environmental assurance debate because they provide a model for understanding how an environmental assurance system might work. A spokesperson from Woolworths commented on the levels of confusion relating to

environmental certification and uses QA processes to aid in the discourse regarding environmental assurance.

> *There are 710 Woolworth supermarkets in Australia and 500 suppliers who are accredited to WQA (Woolworths Quality Assured). This began in the mid 90's with food safety as the driver. It started in fruit and vegetables and expanded into all fresh areas and now into brands. The aim is safe, quality food. It took 5 years to get all the producers / suppliers accredited. In the year 2000 there was 100% accreditation. The supermarkets are also accredited. WQA ensures continued business for shareholders, staff, suppliers etc. [On environmental assurance] I see the need for uniformity. We need a program that can be complied with. The question of how to integrate QA management principles and environment is of interest to Woolworths. EMS principles would need to be integrated under the WQA banner.*

### To achieve value transference, the sustainability communication vehicle needs to be product based

Value transference to consumers is reliant on product exchange. It is the exchange process that transfers the values. This study indicates that it is the product that needs to 'carry' the sustainability values. The product needs to speak for itself through a range of potential mechanisms including labelling, certification, distribution networks (e.g. farmers markets), green marketing, product placement or retail programs (e.g. Tesco's carbon footprint). Through these and other mechanisms, the product itself can transfer the non-monetary values that the supply chain embraces, to the consumer.

Because EMS is not a product or performance standard, it cannot be used for product labelling. This information can however be incorporated into the product story. The Gippsland Beef Enviromeat and the Queensland red-tipped bananas provide examples of this. Both of these products demonstrate that, with communications support, the market can recognise the sustainable values in the product, potentially even without the use of a product or performance standard.

In summary, to make best use of environmental management systems efforts on farm and in downstream processing stages, a whole of supply chain approach to environmental assurance is required involving commitment to environmental sustainability and the transfer of these values at all stages of the chain.

## 8.4  Impediments to change

Whilst many supply chain actors communicated a desire to move towards more sustainable practice, there were a number of impediments. These included financial issues (discussed in Section 8.7 Economic Systems), lack of knowledge about sustainable options, doubts about sustainability claims and a range of industry and institutional impediments. Personal issues such as stress and burnout also impacted on participants and their ability to enact their visions for sustainable food and fibre systems.

### 8.4.1 Lack of knowledge about sustainability

Hanslip et al. (2007) report on uncertainty about best practice amongst landholder in the South West as an impediment to implementing best practice activities. For example, they report that respondents were unsure about benefits of stubble retention, reduced tillage and whether using herbicides is better than using mechanical cultivation (ibid).

Generally case study farmer participants worked hard to gather information about sustainability and were members of information networks and had access to a range of information support. Other supply chain actors were generally less informed about sustainability issues; however there were also some very informed wholesalers, retailers and consumers.

### 8.4.2 Institutional and industry impediments

Institutional and industry impediments to sustainable production were outlined by case study production actors but were best summarised in the industry forums. This included lack of cohesion both within industries and government and across these jurisdictions as well as restrictive or perverse policies and legislation.

Issues with mass production were noted. This included the frustration that Nadia and Bede (conventional wool) felt over the fact that their good quality fibres are diluted through mass production but also that their fine wool is not available to Australian customers at affordable prices.

Nadia says:

> *I can tell you how hard it is to find wool jumpers that are made in Australia. Its nigh impossible. You can get a wool suit from Country Road I think for $700 but that wool is a top I think, that they send to Italy and they send it back. They are beautiful fabrics but they are expensive. Espirit, Jigsaw, all those type of places, all their woollen jumpers are made in China.*

Lack of stability in the industry was also an issue, impeding people's ability to plan. Peter comments:

> *We'd like to build a new (dairy) in the middle and run it as just one. And it has sort of been in the plans but its a lot of money. So we probably need a little more stability in the industry and we'd probably do it. It would cost about five or six hundred thousand to build.*

Lack of recognition for best practice by industry and other supply chain actors was mentioned by many of the farmers interviewed, although some were not concerned by this. Kurt (biodynamic milk) comments on the inequity of his produce receiving the same (low) return as farmers who are not undertaking sustainable practice.

> *Whereas under the current regime where we are selling our milk to (conventional dairy manufacturer) and getting the same price as everybody else, we are not even allowed to sneeze, financially.*

## 8.4.3 Doubts about sustainability claims

Particularly amongst the consumers interviewed, there were high levels of doubt about claims that products or processes might be sustainable. Cynicism and disbelief extended to claims made by farmers, brand names and certifying bodies. This was also shown in the attitudinal survey of the Blackwood community undertaken in 2001 (BBG 2001) where most comments on a potential environmental certification scheme demonstrated concerns about lack of integrity in labelling claims.

Comments from consumers about this ranged from very trusting to suggesting that 'certification doesn't mean a thing, look at the Heart Foundation' (supply chain forum participant) and suggesting that environmental labelling was just 'commercial sell' (consumer, Food Symposium).

Christine (conventional wine) sums up the sense of confusion and lack of trust that many participants (outside of those already involved in certification systems) conveyed:

> *I would certainly consider it but I would need to know what it's been measured against. I'm not convinced that these people who put their stamps on products can be trusted. I don't know what regulation there is that guarantees that if they've got this on their product that it meets certain standards.*

Cynicism about popular perspectives of environmental sustainability was evident amongst participants at the supply chain forum. David (organic strawberries) noted that some steps may be perverse. He suggested that soon we will see the new shopping bags littering the streets. He acknowledges that symbolism is needed to herald the arrival of sustainable practice but this may be detrimental in the long term. He comments:

> *Plastic shopping bag replacement bags take 60 years to break down versus the short time it takes from normal plastic bags – they are a 'symbol of arrival' to sustainability.*

Stress emerged as a common experience amongst supply chain actors involved in setting up new supply chains. This was related to long working hours, having extremely limited time for relaxation and being constantly involved in perfecting and marketing the product. Stress was evident in health issues communicated by participants and tensions between family members. Not all members of the family or business share the same energy for the big visions and this did present as a source of stress for a number of the participants. Margaret (biodynamic dairy manufacturer) confided to me that visions for expansion and the perfecting of cheesemaking of husband and business partner Richard were often overwhelming. She commented:

> *I would like Robert to slow down and leave things as they are for a while. It's really just the two of us. We do have some help in the shop but we really are pretty overwhelmed with work.*

Whilst all supply chain actors potentially experience these factors, it seemed extreme for those involved in the establishment of new products and new markets. The process of creating a new supply chain or market involves dealing with a number of insecurities. Van der Ploeg and Frouws (1999) observe that:

> *Particular actors are needed for the construction of a new chain, each of them representing a field of insecurity as it were. New consumers are needed for a new chain: a segment of the consuming public will have to change its behaviour and buy the organic products supplied.*

In terms of the development of sustainable supply chains, these 'fields of insecurity' (ibid) are potentially more complex that they would be for conventional products, particularly in the consumer stage. Because the effort in marketing can represent a large component of the effort, actors who decide to promote the sustainable values of their products can expect greater work levels and more stress. An example is Matthew (eco wool) who had monthly phone bills that averaged over $2000, due to extensive overseas marketing.

## 8.5  Motivations and influences

### 8.5.1    Livelihood factors

Motivations for being engaged in agricultural production varied but in common amongst many of the farmers interviewed was a joy in the act of producing food and fibre. Warren (organic strawberries) is extremely motivated and there is a strong link between his motivation and the sense of enjoyment he experiences doing his business. As he says:

> Once I got down here and liked being here, I hadn't retired. I was still working in Perth a couple of years after we bought the property, it just developed from there. It just keeps on growing. It's an extremely challenging and exciting venture. I wake up every morning thinking what I'm going to do next and can't wait to get started.

For the case study organic wholesaler, the motivation was more business orientated. Motivations for those in organic retail often included the general atmosphere of the organic lifeworld. As Marian, organic retail manager, says:

> Well no one would do what we do unless they believed in it because it's a lot of work. But interestingly we have people who have chosen to work in this shop because they like the way we work, they like the whole thing and the atmosphere when you come in here. The atmosphere and the feeling of shopping here is often commented on.

### 8.5.2    Sense of place

In the survey of the South West region undertaken by Hanslip et al. (2007), landholders reported a high degree of attachment to their properties and a high degree of confidence that their property was right for achieving their goals. Nine out of ten respondents (91%) said that they were very attached to their property (ibid). In addition, 77% agreed or strongly agreed that they would not be able to enjoy the same quality of life if they did not live on a rural property (ibid).

Being in or finding the right place to farm was an important aspect for all of the farmers as well as some of the other supply chain actors. Warren and Olga (organic strawberries) shared the joys and tribulations of looking for and finding the right place.

> *We've owned it for about 6 years. We just fell in love with it. We bought it within about four hours of seeing it. I was working in Melbourne at the time and our daughter saw it in the newspaper and we looked it up on the map and bid on it before we could take a look on it. We wanted a place with walks and we fell in love with the swamp. A gorgeous paperbark swamp, a totally different world. That's what made us buy it. We didn't hesitate once we saw it and all of this has happened since.*

David and Rebecca (organic wine) were swayed to a different lifestyle choice by their immediate connection with their farm

> *By a series of different circumstances we came to this property and it was actually a small farm and we had not planned to buy a small farm. We had previously owned smaller country properties and we didn't think we wanted to be farmers but there were a number of things about this property that were very appealing. It had a dwelling which we liked. It had a beautiful garden. It had reasonably good water supply, we liked the topography of the valley. And we bought the property and in the process of consulting people to give us advice about that it emerged that we had a north facing slope, that the property was suitable for growing vine. We started doing some research and we made the decision for better or worse that one of the things we could grow on this property was grapevines and we could possibly make money out of it, make a viable farm.*

Sense of place is connected to sense of community. Marian (organic retailer) explains her sadness at the lack of solid community which she believes is dependant on people staying in one place for a time:

> *I laugh when I hear schools talking about community. <u>No chance</u> (animated). What is community? People are moving around, their jobs move them around, people are no longer staying within an area, you cannot do it, and you can't create instant community. It's a load of rubbish.*

Sense of place is also positively related to willingness to invest in new and more sustainable technologies and infrastructure. Hanslip et al. (2007) found that in the South West, there were positive correlations between landholder's attachment to their properties and preparedness to invest in infrastructure such as installation of efficient irrigation systems. This was also evident in the case study farmers with all of them having committed significant funds to build infrastructure on the farm.

### 8.5.3 Protected spaces

The biodynamic dairy example resonates with the example of the development of an organic dairy supply chain in the Netherlands discussed by van der Ploeg and Frouws (1999). They suggest that 'protected spaces' are required to allow such innovations that were previously unheard of to emerge:

> *If innovations are to occur [such as the changeover to an organic dairy] then some sort of protected 'room for manoeuvre' is required. Such innovations are impossible within the rules, conditions and arrangements of the [conventional] industry; or possible only in remote areas ...which cannot be 'conquered'.*

The town where the biodynamic dairy is located is arguably such a 'protected space' as it exists between the worlds of artists and lifestylers and the remnants of a highly successful agricultural regional industry. Being on marginal dairy country and using very different methods to most dairy operations was possibly enabled by the protected space of this town community. The need to step outside of conventional dairy areas was highlighted by the participants at the dairy industry forum as important due to the limited opportunities to expand in traditional areas, largely because of expanding rural residential development. This expansion is needed to guarantee supply to ensure viability in the industry.

The organic strawberry case study happens to exist near the biodynamic dairy, on a similar landscape of granitic soils. Possibly the last place you would think to grow strawberries if aesthetics and being in the bush wasn't important to you. Warren tried eight or nine varieties 'just to see which ones were the best in the area because this isn't a known strawberry production area'. Rejected by the state strawberry association and invisible to the national strawberry association, Warren was possibly also in a 'protected space'. What's more, the local lifestyler town with strong farming roots provides an ample supply of labour willing and interested to work on an organic farm. This is a rare occurrence in rural WA, particularly since the mining boom as reported during the industry forums with labour shortages being one of, if not the most significant, threat to agriculture reported through those forums.

Protected spaces are also provided by networks of support, particularly in cases where the farmer experienced geographic isolation from people with similar values, such as the case with Susan (biodynamic grains).

Susan commented that she was sustained by the support of the organic lifestyle network, including consumer groups such as Slow Food and other farmers, most of whom lived several hundreds of kilometres away from Susan.

## 8.5.4    Future plans

Having a personal and or business vision was an important motivator for supply chain actors. Factoring sustainability into business visions was understood as an important factor in creating more sustainable food and fibres systems. The fresh food organic distributor, not satisfied with being the primary organic distributor in WA, had visions for developing a national syndicate or consultancy based around supply of organic fresh foods. He added that he would want to stay focused on health and wouldn't want to make compromises.

Warren (organic strawberries) outlined this vision to me at the commencement of this PhD and since then he and partner Olga have built a small scale factory and café:

> The objectives are to promote our produce by having people come to the farm. If they come to the farm and see it and see how stuff is produced they probably are likely to buy it in Perth. And the other objective is to sell stuff at the farm. Not just the fresh produce, we can also sell plants as well. We would also have a small restaurant and coffee shop with coffee and cake and a nice lunch of some sort. But it's primarily to advertise our product and for the onfarm visits. We want to make it an organic experience. When people come to the farm we might have site visits for groups if they are interested – show them how the whole operation works. We want to make it attractive enough so people go away and tell people you must visit the [township] Berry Farm.

Warren adds that 'the whole thing is to promote the organic experience'. Warren has developed a mission statement developed as part of his Environmental Management System, which he has up in the packing shed. In summary, the organisation's environmental mission is to 'promote the enjoyment of organic food along with the health and environmental benefits of production and consumption'.

Future plans ranged from objectives for dramatically increasing production to decisions to stabilise growth based an acknowledgement and acceptance of limits. David and Rebecca (organic wine),when asked if they had arrived at where they want to be with their farm, replied:

> I don't think one ever does. We perceive that there is an enormous amount of potential, whether we have the resources to fulfil that potential is another question. We're only mum and dad standard oldies, so physically we are limited and resource wise we are limited. We have more than enough vines to handle. We'd like to but we couldn't manage.

In contrast, Peter (conventional milk) has plans to significantly increase his dairy size by combining his two dairies into one large rotary dairy. Even though he is already limited by resources and will have to buy in more feed, this will create efficiencies, cost savings and increased productivity as well as opportunity to deal with some environmental issues. Based on the comment below, upsizing is the only way Peter can foresee of dealing with his dairy effluent issues:

> We'd like to build a new (dairy) in the middle and run it as just one…And then yeah, we'd deal with a lot of other things then, dairy effluent would be managed alot better than what it is now.

Bede (conventional wool) wants to increase production, but as he has recently taken over the from his parents, he was still considering how to work this objective into the low input system that his parents had established based on a Landcare model.

Financial freedom is clearly linked to the motivation to develop future plans. Kurt (biodynamic dairy), interviewed soon after he has initiated his organic milk and cheese production line, looked forward to the opportunity to expand his business.

> As it pays for what I'm doing then I can afford to do some stuff that I've wanted to do for a while. And when the farm next door comes up for sale, hopefully I'll have enough money in the bank to go and buy that one which is right beside of me.

Other supply chain actors communicated visions and plans that involved sustainability. The following statement was made by a caterer attending the supply chain forum:

> We want to re-write the recipe books to prove that group catering really can respect the earth, nourish the soul, meet the budget and still impress the masses.

## 8.6  Commercial sustainability

A survey of landholders in the Blackwood conducted by Hanslip et al. (2007) showed that landholders considered as their most serious problems, issues related to profitability of farming including increasing agricultural inputs, poor commodity prices, rural community decline, lack of skilled farm labour and lack of young people entering farming. These issues were also observed through the BBG attitudinal survey (BBG 2001) and as stated earlier, this information prompted the development of the BestFarms program.

A range of strategies to improve commercial sustainability emerged from the case studies as discussed below.

## 8.6.1　Competition

Competition is clearly a positive and a negative force in the context of sustainable food and fibre systems. Issues of competition between supply chain actors, mainly between big business and growers was an issue in a number of the chains.

Both of the case study dairy farmers commented on the restrictive policy of the dairy manufacturer. Peter (conventional dairy farmer) compares his situation with Victorian dairy manufacturers who allow farmers to diversify their selling. He notes that:

> *But here, our contractor with [conventional dairy manufacturer] says that we have to give him all our milk and so if we wanted to start marketing some of our own, they won't take the rest of our milk. Because you'd be in competition with them. You either give us all your milk or none of it. So it's got you over a barrel, if you wanted to start selling some of your own milk, making your own product then you have to find an outlet for the rest of your milk. So that is a problem.*

Competition is not limited to competing for markets. Competition for resources is also an important issue. Alan (conventional strawberry grower) said that the horticultural industry is actively competing for water with the state government owned WaterCorp, and losing. He refers to the deeper aquifer in his area:

> *We are not allowed to tap into that. That is reserved for WaterCorp. What we've have found is that because they have milked that, they have lowered the water table here about 7-10 metres.*

Competition between growers was also noted. Whilst conventional growers generally accepted the inevitability of competitive forces, organic and biodynamic growers appeared to have a conflict between their environmental and social sustainability values and their economic sustainability values in this area. A concern for Susan (biodynamic grains) was a competing mill starting to produce biodynamic flour.

Warren (organic strawberries) identifies the non-competitive behaviour of some organic growers which he contrasts with his proactive approach to push for space in the larger supermarkets, at which he has been successful, despite his small quantities. He comments:

> *A lot of the organic growers are on the fringe and have this little niche and don't seem to want to get out into the supermarket area and push stuff.*

However, Warren was also concerned about competing businesses particularly in regard to his organic seconds market, which he said would be difficult to replace. He notes:

> *If a big organic grower comes on stream, it could put us out of business because the market isn't big enough. The prices we sell at are sustainable commercially, but we couldn't drop the prices significantly. I can compete with the organic strawberry growers in the eastern states most of the time even with the transport costs of getting the stuff across to the eastern states. So I feel my prices are probably pretty competitive as an organic grower.*

In comparison, Kurt and Elaine (biodynamic dairy) needed more biodynamic dairy farmers to increase supply to a sustainable level. They were also not threatened by competition because of the tightly managed market which they operated in.

> *We have the market to ourselves in WA. The eastern states can't compete [because of] transport costs. We are less 30-50c/litre on their starting price. We have a niche market we can go into but as soon as we start we are short of milk. But we've already invited other people to go into it and put their hand up.*

It was lack of other growers being available to join in the enterprise that added to the personal stress that eventually led to the closure of this supply chain. Kurt and Elaine's supply chain story is amongst other things, a story of failure to cooperate despite the best intentions.

## 8.6.2    Cost savings

Reduced inputs on the biodynamic farms provided significant cost savings when compared to what might be expected on conventional farms. During drought or frost, both common in the SW wheatbelt, Susan suggests that biodynamic farmers are ahead of conventional farmers because losses do not include the high input costs of conventional farming. She says of the 2005/06 financial year:

> *We had a fantastic year last year. Our accountant and farm advisor was preparing for the worst, but our inputs are low. They find it quite amazing. That's the best budget they've seen this year.*

Despite having financial success due particularly to the low input systems, the organic farmers are not seen as role models for economic sustainability by the general farming community. This also relates to the issue of social norms discussed earlier. Susan explains:

> *In terms of affirmation from other people, last year when we were doing really fantastic during the drought, I was in the local coop and saw [regional manager state agriculture department] and asked him if he wanted to come out and have a look. And he was a bit embarrassed by it and that made me feel embarrassed. Not that I was feeling cocky but I thought it would be really nice to show it, especially in a year that things look good. He never took me up on the offer. And I guess I sort of felt there is that cringe factor. But if you've got low input costs and you've got healthy stock, why aren't they looking and asking us how we do it? (laughs). Not that we would actually want to tell them mind you, but it would be nice for them to show some interest. We do feel like the poor relation which is a bit upside down.*

Despite requirements of biodynamic farmers not to share information on production, it seemed that Susan would do everything in her power to share secrets of her financial success if only she were asked by members of her community.

Building the knowledge base is an important pathway to cost savings. Getting better technologies and information support saved on expenditure at the farm stage. Peter (conventional dairy) switched from the advisor from CSBP, a commercial fertliser company, to an independent soils advisor and significantly reduced chemical costs. Despite increased consulting costs from this advisor based in South Australia, the independent advice has reduced costs and increased productivity.

Kurt argues that being biodynamic has reduced his fertliser costs. Applying the BD preparation costs him around $1.75- $1.90 / acre per annum. He also argues that his feed costs are significantly reduced through the use of his ad-lib supplement and reduction in feeding hay, replacing it with straw. He says his animals are healthier. Also, he suggests the product is nutritionally better as a result:

> *When I first started they were eating a $1.50 worth a day of this (feed supplement), I'm now down to 1.5c a day four years later because they filled up on that and they are now just eating what they need, they are not trying to catch up. The biggest benefit that's come out – when we did the figures for the factory, we did them on conventional milk figures, litre for litre. The first batch of cheese is giving us figures 20% better than conventional. The second batch also 20% better than conventional. Because of what we do. The fat and protein content is no different to anybody else's but the componentry of the milk is.*

## 8.6.3    Efficiency

Most of the growers interviewed often had only a rough idea about quantities of energy and water use. Improving water efficiency and reducing fertliser were on the horizon but had not become business as usual for all but the conventional strawberry grower, Alan, who was facing potential for regulatory restrictions in the near future. Alan comments:

> *We've been doing a Waterwise exercise for two years now, looking at fertilizer usage and water monitoring and getting it reasonably exact and at the same time we are running an R & D program through our association which is looking at varieties, fertliser, production and returns. With the two we are coming up with something that is as exact as it can be, given all the variables you have.*

David and Rebecca (organic wine) note that it's cheaper to pull energy off the grid than to get photovoltaic cells, suggesting this as an economic disincentive for alternative energy sources.

Fuel and transport costs were a key issue for commercial sustainability, even prior to fuel price hikes since 2007. An interview with a local bulk transporter running a small business in the South West suggested that small transport companies can rarely afford to run their trucks empty and that efforts in efficiency are standard for these small companies.

Road bulk transport accounts for 32% of road transport in Australia, with food transport comprising about 22% of this (Australian Food and Grocery Council 2003). In terms of greenhouse emissions, this translates into about 0.2 kilograms of $CO_2$ per kilogram of product transported (ibid). Sustainability issues related to transport were noted as an issue for most of the case study supply chain manufacturers and retailers but there was limited focus on improving the current situation. A report by the WA Conservation Council recommends that changes can be made in freight transport including alternative fuels, more freight on rail, improved freight transport logistics and where possible, localising production and consumption (WA Conservation Council, 2004).

There was a great deal of awareness about transport efficiency, particularly amongst the smaller companies as demonstrated with the example above where another entirely unrelated product (i.e. eggs) catches a lift on the organic milk delivery truck.

Alan (conventional strawberries) provides an insight into the reduction in exports which he claims is due to increased fuel costs:

*Everyone we used to supply for international is out of business, they went bankrupt. Through a long haul exporter that went broke a couple of years ago we used to go to London, Moscow, Hong Kong and New York. Those markets have all disappeared probably to South America and to extended seasons in the US - Florida. The prices of getting it there have been prohibitive with air freight and fuel costs. We supplied up until Twin Towers and after that we supplied nothing. The price they are paying for products isn't overly exciting. For Europe, again the window is tight as they tend to be locked in with South Africa. Alot of the Sainsburys and big players in the UK or their subsidiaries have actually set up farms in various parts of Africa to supply all year around so that cuts out a lot of the opportunities.*

On the connection between increased transport costs and the Twin Towers disaster mentioned above by Alan, he felt that insurance and other costs associated with this had made an impact on transport costs.

Being efficient also relates to time and energy and prioritising efforts. Whilst Warren (organic strawberries) is committed to the local community, he can not justify the time to sell at the local Sunday market.

*I can take a load down to Manjimup which is worth probably $3000 or so in an hour whereas I would spend probably half a day selling a few hundred dollars worth at the market. It's not worth it. I just have to concentrate on the big customers.*

David (organic wine) estimated the use of around 800 litres of diesel a season. He says they have lobbied the government about the development of biodiesel. He explains that his motivation for this is primarily because he understands that diesel is a carcinogen (through the fumes) and a pollutant.

An issue related to cost efficiency for manufacturers is lack of critical mass of product that is situated in a regionally accessible situation. This is relevant not only to reducing product miles but also for cost efficient processing of differentiated product lines. This is demonstrated by the suggestion that a minimum of ten organic dairies would be required in the South West to make differentiation based on organic or sustainable a possibility for the conventional dairy foods processor.

## 8.6.4    Risk management

Financial risk management strategies were a key factor in successful supply chains. This included diversification of products. Whilst all farmers interviewed with the exception of the biodynamic dairy case study communicated financial risk management strategies, Warren (organic strawberries) paid particular attention to risk management. He runs his business in a way that allows him to reduce costs.

> *A risk would be the organic strawberry industry growing too fast, which would cause us problems. It may not happen but if it did I would have to cut back production and slow everything down. It wouldn't hurt me economically because I can just reduce production at any time and our costs reduce at the same time. I pay the pickers per kilogram. All the other costs suddenly stop if we stop production. There are fixed costs for keeping the farm going but we can keep those going for a while, so it wouldn't be a disaster – we wouldn't disappear but we would have to slow everything down.*

This strategy proved very necessary when they decided to turn the water off in 2007 following signs that the wetland was drying. Managing risk at the manufacturing stage primarily related to the focus on food safety, although clearly financial risk management strategies were also important.

Most farmers reported the use of an accountant to help manage financial risk. Shortage of labour was communicated as the key business risk by most farmers.

Environmentally sustainable farming and evidence of this will not particularly assist farmers in terms of asset security at this stage, according to the bank association representative speaking at the Australia 21 Forum (2006). He suggested that environmental sustainability on farm may potentially form a component of Credit Risk Management assessments. These assessments involve quantifying capital values and assets and ability to deal with assets in case of default.

In terms of interest by banks in farm scale sustainability issues, the bank association representative suggested that banks are concerned with issues affecting cash flow valuations, which may include property environmental risk assessment and loss such as risks to crop and how much money is needed to address the issue. He added that he couldn't see the banks pushing environmental management systems or other certification from a credit risk issue. However he suggested the push may come more from a Corporate Social Responsibility aspect and concern about brand reputation which is a direct concern of the bank. He added that if international markets demand it, then not having an EMS could be seen as a credit risk.

Risk management strategies included the use of off-farm investment strategies and off farm employment. Across the South West region, the majority of households (75%) earn off-property income with the median amount earned off-farm was between $40,000 and $50,000 (Hanslip et al. 2007). However, the farmers in this study did not follow this trend in regards to off-farm employment. Only two individuals involved in the farm stages of the ten products worked off-farm. Elizabeth (conventional dairy farm), a trained nurse, works part-time at the local pharmacy. Sarah (conventional grains) works intermittently for the local NRM group, as well as her volunteer roles in this group. It appeared that neither of these women work outside the farm for primarily financial reasons. That is, off farm employment in these cases was likely to be related more to professional and social engagement than supplementing farm income.

Of all the chains, Alan (conventional strawberries) was the most concerned about future prospects for commercial sustainability. He was aware that there are other options for using his assets for profit. With his increased land values as the major economic benefit from his business he comments:

> *If you were doing a business plan and you had $5-6 million, at basic interest rates, you don't get the return [from growing strawberries] that you would from a bank.*

A key commercial sustainability risk for retailers related to the consistency of product and supply and consumer expectations that what they want will be available. Small retail business operator Marian says that she has to ensure that the business doesn't depend on supply which is consistent. She says supply is often variable because of a range of issues including lack of commitment by wholesalers and growers. She is managing this risk this by developing her own fresh food market garden. She comments that lack of dependable supply is a key financial risk:

> *That's the key thing to us having our own stuff in the shop. We don't have to depend on supply. You cant – financially we will go down the tube if we don't ensure that we've got that product.*

Clearly these issues exist for the larger retailers also who manage the financial risk of lack of consistency by insisting on highly restrictive quality standards. For example, any presence of "white shoulder" on the strawberries and the batch will be returned, as observed in the organic strawberry case study.

### 8.6.5    Value adding and value capture

Strategies to increase profitability and or productivity were a key focus for all of the certified supply chain actors utilising both value adding and value capture as a key method. The conventional wine and strawberry supply chains also applied significant effort to both value adding and value capture.

Warren (organic strawberry) uses value capture as a key strategy, ensuring that his product reaches a discerning market who values the organic product. He notes that he needs a considerably higher profit margin than conventional growers to justify this effort:

> *The top of the conventional price range usually matches about the lowest of our range for big fruit, so we can sell our large berries into the conventional market. Because our fruit is very good quality, we can get the top of the range conventional prices and still survive. With the small fruit we really can't do that because people don't want the small stuff. The prices are very low for smaller strawberries so we can't sell ours at the conventional prices otherwise we would loose money.*

In summary, there were a range of economic strategies used by case study participant including those related to product development and differentiation, marketing, business planning strategies, cost savings, competition, cooperation and maintenance of quality products. Many of the participants interviewed demonstrated a holistic approach to commercial sustainability.

## 8.7  Patterns of interaction

This entire thesis is about human interactions within production to consumption systems however it was considered useful to highlight some of the key patterns of interaction observed in and communicated by the case study participants. Whilst there were a myriad of factors to these interactions, widely discussed in this thesis, some issues stood out as particularly important in the context of this study on sustainability. These include the impact of competition, social norms, tensions between professionalism and friendship and power relations. These concepts are discussed more fully below using empirical examples.

## 8.7.1    Relationships

*For conventional growers, communication with the supply chain often ends at the farmgate*

Bede and Nadia (conventional wool) have a reasonable idea about the larger corporate customers who may be buying their wool but essentially they know nothing about where it goes.

> *Past this point you have no control. You have an invested interest to see how the type of wool that you've grown goes. Once it's sold we have no idea what happens to it. We know some because we've done so much marketing. Occasionally we might get information that a buyer likes our wool.*

Bede and Nadia are interested in what their customers and consumers want but their hands are tied by the lack of communication flow in their supply chain. Bede's only real contact is a mate on the wool floor that gives him some insights.

> *One of the guys who is very high in the wool shed is a mate, so I talk to him a lot about it. I don't have any direct links apart from a couple of mates that work in the industry.*

Just as these farmers don't know who their customers are, the reverse is also true as shown in this statement from a consumer interviewed at the supply chain forum which suggests a preference both for sustainable farming practice and for a relationship with the farmer:

> *I would happily buy fruit if it has come directly from a farm. I am ideologically driven and am willing to make concessions to sustainable growing. A relationship or forum with the grower is preferred.*

Bede said he sees the writing on the wall for increased demand for knowledge of production by customers purchasing wool and also the consumers. He expects that systems now used to track for example, chemical residues, required by some customers, may in the future be used for communication on a range of farm related issues.

> *But now farmers need to use this (the PAN chemical recording system) with the thought that they will have to have this information available for any chain because consumers are going to want to know what's been used. We may have to be quality assured down the track. It may be that every grower is going to have to have this program. We may have to have this to sell our barley for example.*

Bede also notes that there would be significant advantage of better communication between farmers and other supply chain actors, including a better capacity to produce wool that suits customer's specifications. He laments the lack of a shared perspective of quality between farm and wool buyers:

> They don't know what it should look like at the greasy stage and we don't know what it should look like on the sheep's back. We don't have their knowledge and they don't have our knowledge. There's not many in the world that have worked in this industry through all the steps.

Peter and Helen (conventional milk) have a relationship with the manufacturer company farm advisor and the "transport guy", but apart from that:

> Basically you lose control of it once it leaves your farm gate. So you can't really have any input. You can't say 'I want my product marketed from' say 'Subiaco'. What you get back is a statement in the mail saying how much was put in your bank account. That's all.

This contrasts strongly with other growers, particularly the certified growers who had significantly more communication with their supply chain. The conventional wine case study also had more engagement with the rest of the supply chain than the other conventional case studies.

### *Effective supply chain relationships require a balance of personal and professional interactions*

Methods of communication were frequently referred to by participants with the type and nature of communications impacting on whether interactions with other actors created a positive or negative experience, potentially impacting on how business was conducted. Successful supply chain relationships required firstly, some form of communication between supply chain actors and secondly, types of communication that were conducive to sharing of values or at least respectful of them.

Susan (biodynamic grain) appears to have an honest and considerate although not always highly efficient relationship with her downstream actors. She says:

> Sometimes things don't run smoothly. I guess I just try hard to please. We are really slow at filling orders because our mill doesn't have a really huge capacity. We are not perfect suppliers, not by a long shot. Whenever we send invoices out I try and write something on it so it's not just a blank slip. I try to keep them posted as to when it's coming. We let them know when it's left, so at least they can plan for it. Just basically try and communicate, try and return calls.

Her buyers are not always efficient either and her personable style can lead to difficulties. She adds:

> *Some people are really bad payers. Direct sales can be really tricky. When its friends it's really embarrassing. It's very hard and we need cashflow. That's probably the major problem actually.*

It appears that it is in part because of Susan's preference for relating directly and openly with her buyers that she has elected not to sell to the larger supermarkets. She says:

> *We've worked with Woolies before and it's been pretty awful. Because we are slow. They are just awful people to deal with.*

Marian (organic retailer), who stocks Susan's flour and Warren's organic strawberries, said that she would prefer more communication with both of these suppliers, particularly because their products are strongly sought after by her customers. On the relationship with Susan, she commented:

> *Well they are good people but they shut down for two weeks when they moved their mill and we had no knowledge of this until after it happened. If we'd known we would have stockpiled. It's a communication thing but they are the only ones, they have a monopoly.*

Organic strawberry grower Warren's interactions are tight with little room for error. His interactions with his supply chain, whilst friendly are also highly efficient, symbolised by the cool chain procedure where all fruit is kept refrigerated at a constant temperature from packing shed to display. The communications needed to ensure and monitor this may very well provide a vehicle for other sorts of communication. This objective mobilises the team into an efficient and careful supply chain.

He is proactive in helping his values to be communicated, even supplying a paper sash across the box which tells about the values of his product. This can easily be taken off and added to a product display. He is not happy with the amount of interaction with the major supermarkets. In contrast, he is satisfied with the level of interaction with the smaller retailer he deals with such as Marian, the Perth organic retailer that he deals with. This preference for dealing with the smaller independent retailers was also communicated by Alan (conventional strawberries).

*Farmers in leadership roles*

The farmers involved in this study did not sit back quietly. All of them were active participants in their supply chains although the conventional bulk commodity actors had limited in-roads into influencing what happens downstream of the farm. Some farmers had more influence than others. Warren (organic strawberry grower) had a strong philosophy of competing in the mass market rather than focusing on the niche organic market. This was a strategy to secure markets but he was also of the opinion that this is where he could make most influence in terms of sharing his values.

Codron et al. (2006) observe a group of organic growers that they term as radical–reformers (i.e. organic production actors who are working with the mass markets). They suggest that these actors believe that partnerships with large corporations and retailers may allow a broader market for organic products and a broader diffusion of the values of organic agriculture, creating a cycle of pressure on the dominant actors (2006:289). Warren's actions support the validity of this comment.

## 8.7.2     Social Norms

*Going outside social norms both destroys and creates relationships*

Being regarded as non-conventional or strange is stressful but it can be an advantage in bonding with others in your production to consumption system. All of the organic / biodynamic growers commented on some kind of trial by fire because they acted outside of convention.

Susan (biodynamic grains) has long been regarded as outside the norm in her local area both because of her conservation ethics and her farming style. She explains, inferring that there are also gender issues involved:

> *I have had such a hard time locally and some people think that what we are doing is wacky and we're pretty green. I don't antagonize people. I've basically withdrawn and I've had to try harder and I guess there are some people I don't really want to have anything to do with. That doesn't mean that I don't try hard with their wives – there must be something that they see in them which is good. Anyway I try to do the right thing.*

Getting comfortable with being regarded as strange and accepting the unconventional as everyday is second nature to Kurt and his partner Elaine (biodynamic dairy). When they tell people that their cows don't manure in the dairy (because they have been trained as described earlier) Elaine says: 'Everyone looks at us like we are bloody stupid'.

Existing in the place between what is considered socially acceptable and that which is not talked about is a space frequented by Marian (organic retailer). She said she deals daily with people who are exploring the organic food lifestyle as a refuge. Marian said that some people she deals with have just discovered that they are suffering serious illnesses. I came across one of these conventional food systems refugees on her first visit to Marian's shop as we waited for the shop to open. Recently diagnosed with cancer, she told me her story and that she wanted to try organics as a healthier option, as we waited outside the shop. Marian says that conversations with people like this go beyond talk just of reducing chemicals in food to soul searching issues between the worlds. She says:

> It's interesting because you start talking about those thoughts and people think you're mad and want to put you in the loony bin (laughs). I do it with people here because we have a lot of people who are way off the planet coming in here and I acknowledge that sometimes you've gotta be way off the planet to get well.

Social norms are an important influence on consumer behaviour, with some evidence that purchasing sustainable products was considered as an activity outside of social norms as discussed later in this chapter.

### 8.7.3    Power relations

The most consistently difficult relationship appeared to be the relationship between producers and large retail corporations, namely Coles and Woolworths. Issues for producers within this relationship related to lack of control (e.g. over product promotion and placement with the organic strawberries) and loss of ownership (e.g. removal of locality branding from the conventional strawberries) and communication styles which left the farmers feeling disrespected. Another common sentiment was the lack of choice in that some producers had to continue to deal with these large retailers for the lion's share of their produce, with efforts to diversify markets often only representing a small proportion of their volume. This is not surprising because major supermarket chains dominate the grocery channel. AC Niels (2006) in Spencer and Kneebone (2007) estimate that in Australia, the major retail chains have approximately 78% of the market share of the grocery channel.

The recent call for the Australian Competition and Consumer Commission (ACCC) inquiry into grocery pricing has raised claims also brought up by farmers interviewed. As well as the observation above that options were often limited to Woolworths and Coles, a number of case study farmers commented on the mark up price of up to 200%. Whether these big powers are actively keeping other retailers out of the market is under review.

Woolworths has had two convictions for anti-competitive behaviour in recent years, incurring multi-million dollar fines (Hoy 2008). This tactic is common to larger retailers globally with an investigation into pricing by Britain's four top supermarkets revealing admissions of collusion and price fixing (Hoy 2008). A UK Competition Commission inquiry in 2000 into retail behaviour found that that the major supermarkets acted against the public interest, including distorting competition and also one-sided relationships and a climate of fear between farmers and the supermarkets (Competition Commission 2000 in Lang and Heasman 2004).

Other claims against the supermarkets that are being revealed by the Australian inquiry and the associated media attention are late ordering, unreasonable demands on product specifications (e.g. size and consistency) and passing on the costs of specials and discounts to farmers (ABC, May 2008). Claims include mistreating suppliers and taking advantage of market power (ibid).

All of these claims were also made by farmers in this study. These difficulties are epitomised by dealings with Woolworths by the conventional strawberry grower, Alan. His experiences included demand for 'rubber' strawberries, which offended Alan's desire to produce quality, tasty strawberries, having orders cancelled because cheaper products were available from overseas and economically unsustainable returns particularly when product was in good supply.

A number of food systems social researchers examine the increasing power of retailers (Dixon 1999, Batt et al. 2006, Corish 2006). As Dixon, 1999 suggests

> ...the potentially "abrasive relationship" between producers and retailers' is leading to an examination of the balance of power between producers and consumers.

Dixon (1999) describes the term 'retail capital' which she suggests competes with production-orientated capital for value and quotes the initiators of this concept, Dacatel and Blomley 1990:224:

> The concentration of retail capital .. has swung the balance in power to such an extent that major retail firms are strong arbiters of the terrains of production, work and consumption.

Friedland (2001) observes that in her study of power relations in chicken supply chains, Dixon (2000:87) found that:

> effective power and control are neither at the beginning of the filière with growers or processors or at its end, with consumers. Power is located in between, with supermarket retailers and, to a more limited extent, with fast food producers but taking into account nutritionists, market researchers, and specialists in cultural symbol manipulation.

Whilst many of the growers felt unsatisfied with their relationships with the large supermarkets, the organic wholesaler believed they had made considerable progress in influencing the development of the organic section in Woolworths. They comment:

> *Woolies have finally realized that organics are economic. We made an effort to educate the managers. Woolies responded and worked with us to develop products. The Perth buyers for Woolies are good people.*

The growth in retail market power is an issue for farmers, however this growth does increase the dependence of retailers to source products. In 2001, Thompson (2001:49) predicted that:

> Retail markets will concentrate even further and try to take greater control over the supply chain. … The implication is that there will be increasing pressure to establish long term relationships with suppliers, whether they be distributors, producers, processors or manufacturers. They will in turn seek to secure supply agreements with the raw material suppliers.

Thompson (2001:49) suggested that was good news for producers proposing that:

> …for the well organised, (and those who are) market orientated and of adequate size to supply the level of volume required by the major buyers, there are significant opportunities to become the preferred raw material supplier for the manufacturers, retailers and food service companies.

However this position fails to recognise the value conflicts between growers and buyers that have been revealed in this study, importantly price, taste and production values relating to environmental and social sustainability. Thompson's (2001:49) observation that there is widespread inability to meet buyers' needs in terms of price, presentation, marketing support and volume of supply and the perspective he presents as farmers having an "us against them" attitude towards retailers does not consider this information. The us against them view was clearly communicated by farmers in this study in regards to large retailers and manufacturers, but the value based reasons behind it will not be solved by increased demand and dependence on supply by retailers as Thompson (2001) suggests.

Examples of taking advantage of market power are by no means balanced towards the larger corporation in every case when both small and large players are involved. The grains bulk manufacturer representative described almost a subservient or pacifying relationship with their growers, fruitlessly encouraging them to undertake the free training to obtain their QA certification.

On QA they appeared caught between (largely) reluctant growers and their international buyers with their increasing QA concerns regarding chemical contamination such as atrizine. The representative from the bulk grain handler, when asked about asking for more from landholders (i.e. environmental assurance):

> *We cop enough abuse just asking them to deliver the right variety. We would struggle with us telling them how to treat their dog and their land.*

In summary, whist this is not always the case, there were example of issues of disparity in market power between supply chain sectors. These findings are also reflected by Corish (2006:6) who observes the role of international competition and links between businesses along the supply chain in creating this disparity. He suggests that governments must ensure that competition regulation and enforcement keep pace with developments in the sector and work in partnership with industry to accelerate the development of consumer driven, efficient supply chains (ibid).

## 8.7.4    Cooperation

Kurt explains his vision of expanding the supply chain, acutely aware of the need to increase supply to a sustainable level:

> *So if we've got twenty farmers doing BD and Annutriculture then we can have a big factory, a big tanker. We could have a tonne of this product and a tonne of that product. Then we can sell to markets who want to buy at a better price. You can then start to push your product. The way it is now, we all starve to death because they want hard cheese that takes 12 months to mature and they don't pay up front.*

He proposes a community supported agriculture solution for dairy products:

> *You've got to get into that system where somebody orders a tonne of the product and pays you for it in advance. Pays you to make it, which a lot of the organic movement gets into nowadays. Pay $1000 up front per year to get your veges  and for the next 12 months they produce you x amount of veges. The cocky's been paid, the moneys in the bank, he's making interest on it. Every time he wants to buy something, he goes to the bank, there's money in there. The people put the money upfront because they want the veges. He wants the money up front because he's got to spend it 6 months, 2 months, 3 months before he gets any return for it. So it works really well for small amounts of money. If you've got 100 people paying $1000 each, so they can get their milk or their cheese.*

Examples of cooperation manifested in small ways and were common amongst the women involved in organic / biodynamic production. Margaret (organic dairy manufacturer) arranges for eggs from a farm nearby the factory in the South West to get included in the shipment of milk that goes to the Perth organic retailer. Retailer Marian tells about this:

> *She drives right by, she knew them as well, so that helps. So that's working really well because getting the eggs was hard. We were actually driving down there sometimes to collect them. Which is really not efficient. You know we are trying to get them out at a cheap price.*

Those interviewed in the eco-wool supply chain all commented on the need for a cooperative approach across industry and supply chain sectors to build the eco-wool market in Australia to a sustainable level. The wool broker commented on the need to support the overall concept of eco-wool rather than just his company:

> *We can go and talk overseas and speak on behalf of eco-wool, it's about working together and collaboration not competition.*

Participants knew about a range of collaborative models. For example, the conventional grains bulk handler explained the South Australian collaborative grains growing program which has potential to support farm sustainability efforts.

## 8.7.5    Trust and integrity

Trust is critical between consumers and retailers. Trust and integrity was mentioned frequently by participants, in the context of financial and market dealings and also in terms of trusting in claims made about products and processes. Certification was often linked with trust and many consumers mentioned that they wanted to be able to trust claims on products.

Trust between consumers and retailers is an important aspect in encouraging ongoing engagement. As Marian, (organic retailer) says about one of her customers:

> *We've known Lyn for a long time. She comes in here on a Saturday because she likes the feeling here even though she gets a box delivered. She's pretty busy but she'll always come in the shop for something and she says "I just come in here because I like the feel when I come in". You can't measure that. You can't buy it. It just happens from relationships. And it's trust.*

For the organic wholesaler, having business and product integrity is critical in his business. He said that being trusted to provide quality organic products is a key driver for him.

## 8.8  Consumer behaviour

Supply chains depend on the presence of interested and willing consumers if they are to be successful in selling their products and the associated values. This section briefly interprets the quantitative data presented in Chapter 7 and then follows with a discussion on qualitative findings arising from consumer interviews.

As reported in Chapter 7, price, nutrition, quality, freshness and taste were the primary considerations except for a small range of people for whom ethical considerations outweighed these issues. Figure 29 shows the results of the quantitative assessment of consumer sustainability values (based on first preferences) represented as a hierarchy of consumer values. Interpretation of these values from consumer comments is also provided.

**Figure 29: Hierarchy of consumer values**

Figure 29 represents how the range of values explored in the study sit in the hierarchy of consumer requirements for sustainability. In summary, with price, nutrition, quality, freshness and taste as the most important values, the next most important value is environmentally friendly followed by localness, small business, animal welfare, workers' rights and product miles (minimal transport). These are shown as steps in a pyramid with the bottom step as most important, decreasing in importance to consumers as the steps move up the pyramid.

As mentioned in Chapter 7, this hierarchy was relatively robust with the first three preferences (price etc, environmentally friendly and local origin) remaining in the same order when viewed from different consumer perspectives (e.g. eco-label versus conventional consumers and gender). Consumers currently purchasing eco-labelled produce placed environmentally friendly slightly above price when both first and second preferences were combined. It was evident that consumers currently purchasing eco-labelled products are not just considering environment but also a range of other values. In general, all values other than price were more important to current eco-label consumers than they were to consumers who said they did not purchase ecolabelled products.

The discussion below, based largely on qualitative information collected through the consumer interviews, attempts to draw out further some of the complexity of the issues of sustainable consumption.

## 8.8.1 Demographic influences

The quantitative assessment of the demographic influences on sustainable consumption is detailed in Chapter 7 and discussed briefly here. The regression of environmentally friendly preferences against gender showed a tendency for women to rank environmentally friendly more highly than men. Pahl et al (2006) also observed that women were more likely to purchase Certified Koala Friendly beef and New Zealand Green Tick Natural Damara lamb than men.

It was also evident that women were more concerned about animal welfare and men more concerned about workers' rights. This is consistent with the study undertaken by Howard and Allen (2006) on Californian consumers, where the same trend was shown. Their results also showed women placing animal welfare as more important and men placing workers' rights as more important. Dietz et al (2002) also observed differences in gender and determined that women tended to rank altruism as more important than men in regard to pro-environmental behaviour.

Preferences for environmentally friendly products decreased with age, with environmentally friendly most important for the under 25 age group, followed by the 25 to 40 year olds. It was least important amongst the over 40 age groups. Barstow (2002) also found that 18 to 24 year olds were the most concerned with environmental values.

Choosing local origin as a first preference was shown to increase with age with a strong trend towards local origin as first preference for the 55 to 70 age group. Howard and Allen (2006) also found that increasing age was associated with choosing local products. There was also slight evidence of city dwelling consumers finding environmental sustainability more important in purchasing decisions than country dwellers.

## 8.8.2 Consumer understanding of sustainability

Consumer interviewees in the study showed some confusion of the term 'sustainable'. Cary et al. (2004) and Pahl (2003) also observe that consumers have varying familiarity with the concept of environmentally sustainable products, making it difficult to interview people who have no context. However the study did have an advantage because it has an active example of a local environmental certification framework as background to lessen this confusion. The context of the BestFarms program helped provide a backdrop for people to get a grasp on what environmental certification may entail at the farm scale, making it a less remote concept.

Consumers were also unclear of the difference between certified 'environmentally sustainable' products and 'purchased environmental image' products such as those displaying a WWF logo or the Landcare hands. With the latter, proceeds from the sale of the product go to the organisation represented by the logo. As such, the purchased image products have not necessarily been through a process of assessing or managing environmental impacts. Consumers were mostly unable to differentiate these different processes behind the green labels.

*Difference between sustainable and organic*

There was significant confusion between 'organic' and 'environmentally sustainable' with many assuming no differentiation between these terms. This confusion is commonly reported in the literature (Pahl 2003, Cary et al. 2004, Watts & Suter 2005). People had more familiarity with the term 'organic', sometimes recognising organic and sustainably produced as the same.

However organic was not necessarily assumed to be sustainable by some consumers, particularly those who had considered the issue more deeply and those that were sceptical of organic certification. That is, both beliefs exist. That 'sustainability' is not equivalent with 'organic' is a key message for case study organic producers who generally appeared to take it for granted that consumers would see their products as 'sustainable'.

*Expectations of sustainable products*

Consumers attached a myriad of values to 'sustainable' products in addition to the ones they were asked to rank, including no preservatives, healthy and tasting better. 'Good for the environment' was clearly linked with less chemical use for many interviewees. Some consumers had high expectations of 'sustainable' products. For example one interviewee said a sustainable product would involve 'sustainable methods of farming, eco-friendly packaging, limited logistics and a stable industry'. A number of interviewees mentioned the supply chain, including one who said that sustainable products would be 'produced as part of an adaptive learning process or chain seeking to reduce environmental impacts throughout'.

Another finding was that many interviewees expected that environmental assurance was a fundamental part of production. They often had expectations of measures in place to manage the environmental impacts of production. Where consumers were concerned about environmental impacts, it was heavily weighted towards concerns at the farm stage, with little attention to environmental impacts of distribution, manufacturing, transport and retail. However, a number of consumers noted that a differentiation between sustainable and conventional products was that the manufacturer was concerned for sustainability. This demonstrated that consumers were aware that sustainability values could not be transferred (in manufactured goods) without commitment by the manufacturer.

*Attitudes to different products*

A significant finding which has the potential to inform other consumer research was that the values and opinions of interviewees were generally the same regardless of the product. This suggests that sustainable consumption is more about the individual's values than what type of food or fibre is being considered. However, several consumers were more aware of 'environmentally friendly' wine as opposed to the other products. This may be largely related to the consumer group's familiarity with the Banrock Station wines that use the Landcare Hands and promotion of their wetland management on packaging, as this was frequently mentioned.

*Lack of recognition of logos*

As in the Ecorange consumer study, (MacNamara & Pahl 2003) there was a low awareness of existing labels. Consumers ranged from being cynical about logos and marks to being very trustful. Generally people didn't know the organic logos by symbol or name, even those consumers who actively sought organic food had difficulty with recognition of these logos. Surprisingly, there was greater recognition of the Fair Trade logo than any of the organic certification logos. This suggests a possible difference in marketing, with Fair Trade being widely promoted through a number of campaigns around the time of the study. Information on the importance of logos was conflicting. Whilst many consumers said they wanted sustainability labelling, many also say they don't take much notice of existing labels.

*Green labelling and environmental certification*

Of the consumers interviewed, 74% said they would find an environmental label helpful as long as it did not disadvantage them through an increase in price. This matches exactly the finding by Darnton (2004), that '74% of respondents agreed that if they had more information about companies' social, environmental, and ethical behaviour this would influence their purchasing decisions'.

As for the Enviro-meat study (Roberts, 2004), a common suggestion was for a green tick along the lines of the heart foundation. A marketing trial undertaken by Pahl et al (2006) for New Zealand Green Tick Damara lamb showed that 70% of respondents were interested in the Green Tick Natural Damara lamb. However, Pahl et al (2006) comment that it was unclear as to whether this related to the environmental or other values of the product with only 13 per cent recalling that the lamb had been produced without harming the environment (ibid). Pahl et al (2006) noted that this confusion was possibly related to the low profile of the NZ Green Tick certification amongst the study group.

This last point correlates with findings in the study, with many interviewees saying they wanted to be able to confidently trust environmental and social sustainability claims made in product marketing through a trusted and known symbol (without having to do more 'homework'). However, some wanted to be able to at least once research the claims more thoroughly. The potential of websites to enable sustainability checking, searchable by barcode or label information, was mentioned frequently.

*Importance of localness*

Localness of products emerged as the third most important value to consumers, after price and environment, in preferencing decisions. Consumers had a range of understandings of local. Capital city consumers would generally see the state as local, rural consumers saw the region (e.g. South West Region) as local, and a small percentage saw produce made in Australia as local. As mentioned above, choosing local as a first preference (behind price) was most likely amongst the older age group. As discussed above, the positive correlation found between preferences for environmentally friendly and local origin suggest that green purchasers do not see these as conflicting values and would prefer to purchase both environmentally friendly and local products. Some consumers noted the conflict with buying local, recognising potential global social sustainability benefits in supporting overseas markets.

*Tensions between personal health and public good*

Consumers interviewed were concerned about finding the balance between what is good for them and what is good for the environment and wider society. Given that decisions to purchase eco-friendly food are often emotionally based (Brickley 2002), understanding people's core values is an important key to understanding 'green' purchasing behaviour. When asked what was most important, 68% of interviewees put health and family issues above sustainability issues, although many saw a relationship between their own health and the health of the environment. Issues relating to human health often outweighed environmental issues, including concern about additives, sugar and fats. It is noted earlier in this report that health is among the primary issues of interest for consumers, and is generally ranked higher than any of the social and environmental sustainability values.

## 8.8.3 Demand for sustainable products

When asked, 61% of consumers said that they currently purchased organic or eco-labelled products, meaning that they had purchased them at some time. Given that consumers were purposefully sampled to locate eco-conscious consumers, this figure is comparable with Pearson (2003), who found that around 40% of all Australian consumers claim to buy organic food, of which only a small minority are heavy, or exclusive, buyers of organic food. No information was available on the growth in demand for sustainable products amongst the consumer sample, but as a comparison, the organic/biodynamic industry has shown growth of approximately 20% per annum with the retail value in Australia growing from $28 million in 1990 to $300 million in 2004 (Biological Farmers of Australia 2004). However, even with this growth, sales of organic produce still only make up around 1% of the market (Lockie et al. 2006).

*Willingness to pay a premium*

The research design did not include quantitatively assessing the degree to which consumers are prepared to pay more for sustainable products. An Australian study into consumption of sustainably certified beef (Pahl et al. 2006) showed that that up to 30 % would be prepared to pay a premium for sustainably produced beef (ibid).

The overwhelming importance of price amongst consumers in this PhD study generally indicates that sustainable products would need to be price-competitive to ensure market acceptance. However, it is also noted that certified organic products in this study received significant premiums (over 200% in some cases) indicating people's willingness to pay more for values.

*Convenience*

Convenience, both in accessing sustainable food and fibre products and judging the environmental and social merits of these products, were strong themes. People not inside the organic food lifestyle network complained that sustainable food is difficult to find.

## 8.8.4 Lifestyle influences

There were differences between the conventional and eco-label/organic purchasing consumers, with the latter having a better understanding of where to source 'sustainable' foods. It is also likely that they are more integrated into a social grouping that supported purchasing of 'green' or organic products. During this study, the strength and functionality of the WA organic and sustainable food lifestyle community was demonstrated. This included communication and networking abilities that meant news on related topics (including the news of this project) is efficiently transferred to its members.

This community acts as a powerful communication vehicle of sustainability values and this social network invariably provides support and encouragement for sustainable purchasing amongst its members. It is noted that there was a number of farmers, including some of the case study farmers amongst this network. The segmentation amongst the interviewees, into the sustainable (mostly organic) food network and those who considered themselves as outside this network, provides some insight into the wider social norms in Australia that do not necessarily support green or organic purchasing or infer that this purchasing is unconventional behaviour.

Workers in the environmental field who tended towards environmentally friendly products more than other occupation groupings, are also likely to share a social network of support to 'buy green'.

Southerton et al. (2004) suggest that the contemporary understanding of consumption is still rooted in an individualist paradigm, '...where drivers and mechanisms are seen to boil down to a matter of individual choice'. They critically analyse the OECD focus on per capita income levels and social and economic decisions of individuals or households (e.g. in their 'Towards Sustainable Household Consumption' report, 2002). They suggest that this individualistic focus has led to a 'particularly restricted view of the processes through which consumption is constructed and evolves'. They go on to say that this 'fails to appreciate the socially situated and socially structured nature of consumption' (ibid).

### *Wider socio-economic influences on sustainable consumption*

Consumption is embedded within the socio-economic system of the supply chain as well as within the wider social system of socio-economic and political influences. There is little argument that wider socio-economic and political influences have an effect on consumer preferences. However, there is limited Australian literature relating to the impacts of this on sustainable consumption. Social influences also manifest in the differences found in gender and age groups with different social norms or practices applying to these groupings. Darnton (2004) likens the norm for sustainable consumption to the 'the norm to recycle' that was developed over time. Darnton (2004) suggests this was a significant factor in undertaking recycling and the act of putting out the recycling bin for collection acts as social pressure on other residents to join in with the recycling behaviour. The lack of policy and social drivers for sustainable consumption in Australia emerged as a key impediment to sustainable consumption of food and fibre.

## 8.9 Synopsis Chapter 8

This chapter presents a case for seven inter-related heuristic fields which have emerged from the data to best describe the key properties of supply chains in the context of environmental, social and economic sustainability. These properties were categorised using Layder's (1998) concept-indicator link categories being systems, bridging and behavioural concepts. The fields within the systems category included relationships with biophysical systems, both naturally occurring and agricultural ecological systems. Values, motivations and impediments related to sustainable food and fibre systems are considered as bridging elements between systems elements and behavioural elements. The behavioural factors within supply chains, including patterns of interaction between supply chain players, economic systems and consumer behaviours were also considered. The fields explored are considered pertinent in the development of sustainable supply chains. The next section considers the most central of the bridging concepts which have emerged from the data, the sustainability values.

# Chapter 9: Sustainability values

Having addressed the first objective of this study, to better understand the key features that contributed towards or impeded the development of sustainable food and fibre production and consumption systems in the previous chapter, this chapter addresses the next two objectives.

The second objective concerned the transference of sustainability values in supply chains. In the product narratives in Chapter 6, sustainability values present in each supply chain were identified. Some judgement on sustainability value transference in each supply chain was also provided. This is discussed in this chapter in more detail by supply chain sector.

The third objective was to enquire about the role of sustainable consumption as a driver of sustainable practices on farm and at other stages within food and fibre supply chains. Building on the material on consumer behaviour outlined in the previous section, this objective is explored in this section.

Following this, the core sustainability values are distilled and described.

The final objective, the development of a conceptual framework for encouraging sustainable supply chains is dealt with in the next chapter, Chapter 10.

## 9.1    Presence and importance of sustainability values held by supply chain actors

### 9.1.1 Sustainability values and farmers

As discussed in the case study summaries in Chapter 6, as well as economic sustainability values farmers interviewed held values associated with environmental sustainability, social equity, animal welfare and support of regional and local communities. Six out of the ten farmer representatives were concerned about the transfer of these values along the supply chain and were actively pursuing this objective. Clearly, the farmers servicing certified supply chains were most concerned with the transfer of sustainability values, and the ones without a certified supply chain generally held a sense of hopelessness about the ability for these values to be transferred.

The farmers interviewed all had in common that they had objectives for creating improved food and fibre production systems according to their different values and motivations and interpretations of improved systems. Not all of the farmers interviewed had objectives to contribute to alternative food and fibre systems, although some notably did (e.g. biodynamic grain and EU eco-wool case studies). However as in Holloway et al. (2007), the producers involved in this study, whilst they may not set out to challenge current dominant structures in food and fibre supply 'nevertheless contribute to a practical critique of those structures through their actions and discourse' (Holloway 2007:15).

As mentioned in the methods chapter, all farmers in this study were considered to be environmental best practice farmers and were selected on that basis, using a number of signatures to define best case. Each grower described in detail the production flow of the product including the environmental impacts and what procedures they had in place to manage these. These growers showed a high awareness of and commitment to managing these issues. Many of the case study farmers also have personal and business aims to achieve social benefits through their farming operations such as employment and regional growth.

A number of the case study farmers (many of whom were also company directors of the supply chains) showed enthusiasm about the potential to communicate sustainability values through a potential environmental certification system. However, the certified growers generally believed that the various certification systems (Demeter, NASSA and EU Eco-label) already adequately communicated their sustainability values to consumers and did not support an additional environmental / social assurance system.

Demographics of the case study farming families ranged from young families who have inherited the family farm to city dwellers who have chosen a 'farm change' in later life. They all communicated a strong sense of place. Generally, these growers are keen to have their environmental efforts recognized and communicated for a number of reasons. The two wine case studies particularly could see potential marketing benefits.

Farmers were concerned with a range of issues including environment, community, fairness and equity in business, animal welfare, transport efficiency, chemical use, biodiversity and moving towards more ecologically based production systems.

Some growers saw communication of their environmental values as an educational tool, communicating to the wider community what has to happen on farm to produce, for example, a litre of milk. Others saw the value in improving the general image of farming in the wider community.

Conventional bulk commodity growers generally saw no potential for the industry to separate products based on environmental assurance. Organic bulk commodity growers however, saw potential to add value to organic marketing efforts through promoting sound environmental practices on farm.

## 9.1.2 Sustainability values and middle chain actors

Whilst environmental and social values were generally important to farmers and consumers, this focus was often missing amongst the middle chain actors (distribution, manufacturing, and retail) particularly in conventional (non-certified) chains. Compared with farmers, sustainability values were less strongly held by middle chain actors with exceptions among the companies involved with certified products or in some of the smaller companies. In general, supply chain actors in the middle of the chain were not concerned with the transfer of social and environmental values.

Often, sustainability values that were present at the farm stage were weakened at the manufacturing stage, with few of the manufacturers having processes to ensure environmentally or socially responsible production above that required by legislation. The sustainability values held by middle supply chain actors related to profitability, and in some cases environmental sustainability and social equity. They were also concerned with accountability, mostly related to food safety and quality assurance. External and internal pressures to increase efforts related to environmental sustainability were evident amongst the larger manufacturing corporations but had not manifested in action in action at the regional scale.

This lack of interest was also noted by Cary et al. (2004), who interviewed senior executives of major Australian food companies about the potential for green marketing and labelling through a supply chain approach. This survey indicated a lack of awareness, understanding and preparedness relating to green marketing and labelling amongst senior executives (ibid).

For the larger companies, Corporate Social Responsibility (CSR) drove the integration of some social equity values; however this was often counteracted by policies that disempowered growers such as policies to restrict selling to other markets as shown by the conventional dairy foods manufacturer.

When wholesalers and manufacturers decide to differentiate products on the basis of sustainability values, the pressure to find niche markets moves from the producer to them. Generally, there was reluctance to do this amongst wholesalers and manufacturers. This was also found by Pahl et al. (2006) who recognised that 'processors and wholesalers are largely uninterested in the use of EMS and environmental labelling at the property level'. They give the example of Elders who showed little interest in 'environment-friendly' wool due to a perceived lack of market interest (Pahl et al. 2006). However Elders demonstrated interest in sustainability at the corporate level when it joined as a member of the global Sustainable Agriculture Initiative (SAI) Platform in May 2007. They have formed a partnership with Landcare Australia to deliver the Elders Landcare Farming Partnership to promote and encourage uptake of environmentally sustainable practices on Australian farms (Sustainable Agriculture Initiative 2007).

The disparity between ground level and corporate national or international policy was evident in all of the large corporations explored in this study. Although some did offer technical expertise to suppliers related to environmental management such as the farm advisory support service offered by the conventional dairy manufacturer. Nestlé for example, purchases milk from the conventional dairy manufacturer in this study. Both Nestlé and the case study manufacturer companies are members of the SAI and both claim social and environmental ethics as important in sourcing product. No examples of this had filtered through to the case study areas. The conventional dairy manufacturer representative in the South West of WA and the main point of contact between farmers and the company was not even aware of this initiative.

Interviews with representatives of the grain, dairy and wool bulk handlers indicated these companies did not anticipate a reward for suppliers who had undertaken an EMS or show good environmental practice at this stage. This is mainly due to the perceived costs of differentiating products. Cary et al. (2004) also note the cost of differentiation as a major impediment for large corporations.

However, differentiation of products based on food safety and quality assurance compliance in the grain industry in Western Australia does present a model of how this can be done. This is being implemented because of the measurable economic benefits of avoiding contamination.

In the last six months of this study, there have been discussions between suppliers and the case study grain bulk handlers about the potential of differentiation based on EMS certified grain. This is largely driven by the large critical mass of certified EMS (ISO 14001) grain growers in the Mingenew- Irwin district, north of Perth. However, the implementation of this vision was hampered by poor production in 2007 because of drought.

Other food and fibre manufacturers, distributors and retailers also demonstrated that sustainability initiatives are being considered. This is supported by the Australian Food and Grocery Council report (2003) which suggests that the food and grocery industry has reported sustained improvement in environment-related activity since 2001. Amongst the case studies, this included potential differentiation of EMS produced grain, potential initiatives to source sustainable milk by manufacturers and the potential for expanding retailer quality assurance programs to include environmental assurance. These initiatives noted by supply chain actors interviewed, were all at the discussion stage and not yet into the experimental stage.

Whilst there were some positive signs for change towards more sustainable practices and sourcing policies amongst wholesalers and manufacturers, generally, environmental degradation issues were considered an externality within wholesale and manufacturing systems. These supply chain actors suggested a significant paradigm shift would be needed to change this.

An exception to this general lack of interest in environmental sustainability by middle chain actors, was the Perth organic food wholesale company. The directors of this company were champions of the organic food market in Perth. A further exception to this is the EU Eco-wool case study production cycle which has ISO 14024 assurance at every stage of the supply chain, as well as a commitment to good environmental practice along the supply chain, overseen by the production manager, Matthew.

Retailers involved in the case study products were cognisant of sustainability issues and drivers, but they did not currently demand environmental or social sustainability compliance by suppliers.

The lack of interest in sustainability by retailers is commented on by Warren (organic strawberries) as he suggests for the supermarkets, 'the environmental aspect wouldn't even appear as a criteria'. He is also disappointed with their lack of interest in anything but appearance, a sentiment echoed by his conventional pair.

Concern amongst retailers for sustainably produced food and fibre was low. Pahl et al, 2007 also found this stating that 'retailers and brand company understanding of current on-farm practices is low' (Pahl et al. 2007). Retailers generally communicated the least concern with sustainability values of all of the supply chain sectors interviewed.

Australia's reluctant trend in the area of sustainable consumption needs to be understood in the wider context of the lack of drive in this direction by retailers, particularly as compared to some European retailer examples. There was no evidence of the larger retailers involved in this study taking a lead on sustainability issues. It is possible that the European trend will influence Australian retailers in the future. As Pahl (2003) suggests 'European retail chains will take a lead role in defining and driving environmental and other requirements for the production of fresh food as they expand into other international markets'.

## 9.1.3 Sustainability values and consumers

Based on reported attitudes (discussed at length in the previous chapter), it was apparent that the consumer population sample surveyed in this study held significant environmental and social as well as economic values associated with consuming food and fibre and there was evidence that these did influence their purchasing decisions. They indicated that they would generally show more customer loyalty to sustainable products, depending on tensions between sustainability issues and price, quality, nutrition and taste considerations.

The tensions for consumers in choosing between different environmental and sustainability values (e.g. price, local, animal welfare, workers' rights and minimal transport) were explored by assessing the correlation between these other values and preferences for environmentally friendly produce. A negative correlation was shown between the preferences for environmentally friendly and price, indicating that environmentally conscious consumers are more likely to rank price as less important.

There were positive correlations between preference for environmentally friendly and buying local, animal welfare, minimal transport and workers rights. This indicates that amongst the sample in this study, those that held environmentally friendly as an important value are also likely to value efforts relating to these other ethical issues during production. This implies that these consumers may appreciate a holistic approach to sustainability that addresses social, ethical and humane issues as well as environmental ones.

An important focus was the belief that individuals would benefit via health or other benefits through consuming sustainable products. There was also evidence of altruism. This apparent contradiction is supported by Dietz et al. (2002), who determined that both self-interest and altruism are key correlates in pro-environmental behaviour.

Consumers generally did not distinguish well between definitions of sustainable products with significant confusion over terms and labels. Codron et al. (2006) also focus on consumer perceptions of social and environmental attributes in food products, suggesting that consumers tend not to differentiate between organic agriculture and 'integrated agriculture' claims around these issues. Integrated agriculture refers to 'the use of sustainable technologies including integrated pest and crop management and the rational use of chemicals' (Codron 2006:286). They suggest that consumers tend to focus on the environmental and social attributes of products rather than which philosophy of agriculture they come from. Codran et al. (2006:287) suggest consumers would not easily distinguish between organic and integrated agriculture, lumping them together as environmentally friendly

The consumer results demonstrated that while price, access and convenience are primary, marketing and promotion of green products will require an understanding of the interaction between provision, lifestyle and wider social influences.

Results of the consumer survey show that 'green' consumers have the potential to support and influence the development of sustainable supply chains. This is particularly the case with consumers who are already purchasing eco-labled products. The results also demonstrate that after price, quality, freshness, taste etc, environmental sustainability is the most important of the sustainability values for consumers.

The 'green' consumers targeted in this study faced many impediments to enacting their desires to purchase sustainable products. As well as affordability issues, impediments to sustainable consumption included access issues, lack of relationships with the supply chain and the impact of social norms and lifestyle choices that work against green purchasing.

In keeping with these findings, Vermeir and Verbeke (2005) propose that

> more sustainable and ethical food consumption can be stimulated through raising involvement, certainty, social norms, and product availability.

Southerton et al. (2004) argue for a less individualistic and more systems-based approach and suggest that it may be necessary to look beyond the immediate demographics to explain why people do and don't engage in sustainable consumption. Southerton et al. (2004), suggest models of investigating sustainable consumption that considers wider societal influences, systems of provisions and social practices (or lifestyles) to better understand the drivers of and barriers to sustainable consumption. Their model of sustainable consumption uses social practice (e.g. peer group support or pressure), normative behaviour (e.g. wider societal pressure to conform) and systems of provision (eg product availability, accessibility and affordability) to explain the drivers of and barriers to sustainable consumption. This approach helps to explain the influences on consumers demonstrated in the study such as the finding that people who were already involved in the organic lifestyle community. or worked in environmental professions were more likely to purchase eco-labelled products.

## 9.2 Distilling the sustainability values in case study supply chains

From the analysis of the interview and survey results, six definitive values emerged that characterised sustainability approaches in the case study supply chains. These have been termed core sustainability values (after Ecotrust 2005).

Core sustainability values are related to motivations, attitudes and beliefs that production and consumer actors communicated as important to them. Both production and consumer actors demonstrated values relating to adequate sources of income and financial security (prosperity), protection and enhancement of environmental values (environmental sustainability), support and renewal of regional communities (regional renewal), nutrition and wellbeing (health), fairness and equity in lifestyle and business arrangements (social equity) and connections, relationships with the non-human (connectivity).

These value categories were developed through coding the data on sustainability values to core concepts using the adaptive theory model. Table 9 below shows the number of participants in each of the supply chain sectors (excluding consumers) who demonstrated value positions relating to each of the core sustainability values discussed above. These figures are based on the number of participants in each sector who referred to these sustainability values during interview. That is; the percentage of participants in each supply chain sector that had some part of the interview coded under the core sustainability values. Prosperity is not included here because it is assumed that prosperity is a precursor to other values and lack of reference does not imply lack of importance. That is; it was not overtly mentioned as much as the other values and was more assumed.

**Table 9: Referral to core sustainability values by supply chain sector**

|  | Health | Environmental sustainability | Regional renewal | Connectivity | Social Equity |
|---|---|---|---|---|---|
| farmers | 80% | 68% | 72% | 16% | 12% |
| manufacturers | 63% | 75% | 13% | 0% | 38% |
| retailers | 38% | 13% | 50% | 25% | 25% |
| distributors | 50% | 25% | 25% | 0% | 50% |
| caterers | 100% | 0% | 0% | 100% | 0% |
| **Average** | 66% | 36% | 32% | 28% | 25% |

Whilst this data does not accurately show the importance of the values to each supply chain sector, only how many participants choose to discuss this issue, it generally demonstrates to what degree these issues were or were not on the radar of the composite of actors in each supply chain sector. It also gives some insight into the relative importance of these issues between supply chain sectors. This shows a similar trend to the consumer preferences described earlier in the thesis, even though this is from completely different data sets. Health was the most referred to of the core sustainability values indicating that this value is critical in sustainable supply chain approaches.

It is worth noting that of the nine manufacturing representatives represented, the majority of these were certified organic (66%), hence these figures represent this sub-group more than the other supply chain sectors which were more evenly weighted between organic and conventional, approximately 50/50. Also it is assumed that prosperity is critical to all supply chain actors but because of the method used, participants were not encouraged to focus on this. Hence this data on reference to prosperity as a value is excluded from this table. Consumer data on references to core sustainability values is also not included here. Because consumer data was collected through short structured interviews and the other data collected through semi-structured interviews, consumer data is not considered compatible with this data collected from other supply chain actors for this purpose.

These core sustainability values are discussed in the following sections, supported by empirical data and examples of supporting extant theory.

## 9.2.1 Prosperity

The term prosperity describes the value inherent in all of the supply chain case studies concerning the ability to live a prosperous life. It includes values related to economic sustainability but recognises this is not only about satisfactory income for supply chain actors and affordability for the consumer, although these are core issues. The term prosperity is drawn from comments by the wool broker (eco wool case study) who suggested that:

> *Sustainability should be all legs, and one should be a wool price that allows wool growers to survive and prosper*

It also relates to the ability to recoup costs related to undertaking sustainable practices. As stated by the organic wholesaler in the study, market niches or other measures are required to recoup the costs of certification. Also, prosperity is applicable to a number of scales, including individuals, businesses, supply chains, communities and industries. Adequate scales of operation and appropriate levels of growth have implications at all these scales.

Prosperity also relates to sharing the costs of sustainable environmental and social practices across the supply chain and accounting for environmental and social costs within the food and fibre system. Sharing sustainability costs along the supply chain was discussed but rarely realised by case study participants. Using QA as example, the marketing manager for Woolworths attending Australia 21 Forum (2006) acknowledged that although costs of QA are increasing for farmers, none of the cost of QA falls to the customer. He added that consumers are paying more because of inflation but not due to paying for QA. Producers (including farmers, wholesalers and manufacturers) are bearing the costs of QA and from evidence from the case studies, they are similarly bearing the costs of sustainable production.

Within the concept of prosperity is implied the need to pay farmers appropriately. As stated at the supply chain forum:

> *Farmers need to get more from the consumer or reduce inputs but if they are being sustainable, it may be difficult to reduce inputs.*

Another consumer at the forum noted:

> *We can't consume on price. We need education – need a logo. Consumers are more likely to buy with a logo. If we believe it's sustainable and it costs more… the product has to be seen as better for me and the earth, price will no longer be such an issue.*

The economic theory of cost internalisation or externalisation (Ropke 1994, Massarrat 1997) is useful for explaining the lack of recognition of additional costs of sustainable practice by the post farm gate supply chain actors. It is also a theory that has become mainstream in the area of natural resource management. The concept of externalisation of environmental and social costs is commonly used in natural resource management literature which considers who should pay these costs. AACM (1995:5) states that :

> An externality may be defined as any of the effects of production or consumption which "spill over" such that other parties receive a benefit for which they did not have to pay or incur a cost for which they are not automatically compensated.

Consumers recognised the issues of environmental and social externalities in food and fibre systems. One consumer at the Buygreen conference suggested the use of an 'index factor of how much [the product] has cost the environment' as part of any sustainability claims of the product. This consumer suggested this information would influence people to purchase sustainable produce.

As stated earlier, this forum represented people who were passionate about sustainable food and fibre systems. Results from the consumer survey showed that price was clearly more important to the majority of consumers than ethical values. Affordability was mentioned by consumers as the primary issue in purchase decisions. Other supply chain actors also acknowledged the need to work towards prices that were affordable for consumers.

## 9.2.2 Health

Health emerged as a major concern for all sectors despite this study not actually targeting health related information, confirming that this is a critical issue in the context of sustainability in food and fibre systems.

Leiserowitz and Fernandez (2008:38), in discussing ways to get people to engage with sustainability suggest that emphasizing themes of health and wellness is an effective strategy.

They observe:

> The global environmental crisis is part of a broader set of enormous challenges to human physical and mental health, the health and viability of other species, and planetary health. When individuals develop a life-threatening illness, they often experience extraordinary transformations of the human spirit and values that are rarely toward materialism. Is the current threat to planetary health an analogous situation for humankind? Is the same kind of transformation possible?

Health concerns were primary for consumers interviewed in this study, over-riding concerns related to environment, social and humane issues. However, there was evidence that these issues were strongly inter-related. For example, many consumers when asked about environmental sustainability replied with reference to health, referring to either their own, their family's or the wider community's health. These comments were often related to awareness of chemical residues, pathogen contamination, food additives and also links between soil health and the nutritional values of food. These consumers and also many of the other actors interviewed showed sensitivity to the interaction between human health and environmental health. Participants were generally more tuned to environmental health issues (i.e. the impacts of environment on human health) than issues related to ecological health of the non-human environment.

These responses can be interpreted in two ways. The first is that the participants had limited concern for non-human ecological systems and the second is that they did not see themselves as separate from these and had a more holistic view of health that included the human and non-human. The following response by a consumer at the Food production and consumption symposium, in response to the question – what do these 'sustainable' product's mean to you, demonstrates this link between health and environment.

*Sustainability means health of self and family and sustainability of farming systems*

Consumers expected that 'sustainable' food products would have a 'higher likelihood of better nutrition and better land management' (Consumer, Food Symposium) and also anticipated that they would have to pay more for healthy food.

Consumers were not asked to rank health as one of the ethical purchasing preferences but many consumers included health in their responses to interview questions. As mentioned earlier, it is assumed that health or nutrition would rate higher than ethical values along with price, taste and quality. This assumption is supported by other studies including a EU study of over 14,000 people which showed that whilst price, quality and taste were primary in purchasing decisions, health followed closely behind (Lang and Heasman 2004).

Farmers at the supply chain forum noted that health was an important way into the discourse on environmental sustainability for consumers. David (organic wine) observed these links, suggesting that rather than knee-jerk reactions which lead consumers to want a healthier lifestyle in the short term, a longer more permanent arrangement is needed:

> *We need a critical mass – for example links to cancer can create a critical mass. When women become pregnant they watch what they eat and then take the lad to KFC – short term responses rather than lifestyle changes.*

In terms of attitudes to health by different supply chain sectors, all sectors had concerns related to health but they were most important to the consumers and farmers (and organic retailers) with the exception of food safety which was communicated as essential to all sectors. Lang and Heasman (2004) observe that in food systems, health 'can fall down between the sectors and is not seen as the responsibility of any one group'. They observe that instead, health (referring to both human and environmental) '… ought to be the connecting tissue between and within all the economic sectors' (2004:16) and should be intrinsic to each stage of the production and distribution processes (Lang and Heasman 2004:39).

Lang and Heasman (2004:42) observe health as a growth industry, providing a niche opportunity to address obesity, diabetes and other degenerative diseases that are related to diet. They also observe the increasing importance of diet in terms of world health with around two billion people in the world affected by nutrition either through over or under eating (ibid). They argue that health issues need to be understood in ecological terms and quote the ecological approach to understanding the obesity pandemic used by Egger and Swinburn (1996).

The link between environmental and health issues which clearly emerged through the data in this study requires further exploration in terms of how these values interact. In summary, there was evidence that food supply chain actors need to better incorporate this clearly important health focus in order to meet the expectations and priorities of consumers. .

## 9.2.3 Environmental sustainability

This study had a strong focus on exploring environmental sustainability values held by supply chain actors. Participants were asked about their attitudes to environmental sustainability and actions that they undertook towards this goal as a way of getting information on this as a value.

Farmers presented their definitions of environmental sustainability as if it were intrinsic to their farming systems and not something outside of them. Farmers generally had a sophisticated understanding of environmental sustainability and often related this to environmental indicators such as water quality, biodiversity and soil health.

Warren (organic strawberries) and Peter (conventional milk) both believe they are environmentally and economically sustainable. It is notable that there was a link between environmentally sustainable and price in many of the conversation with farmers. A common sentiment was that even though farmers felt they were environmentally sustainable, they noted that they do not receive or expect to receive a price premium.

Warren (organic strawberries) links health, environmental sustainability and enjoyment into a single package. He suggests that he wants to present this package on his farm through his farm visit plan. Warren is enthusiastic about marketing the environmental benefits of his enterprise for economic benefit and uses information about the environmental management of his farm in his marketing.

Farmers also recognised shortcomings in claiming environmental sustainability. When asked about whether he considered his farm environmentally sustainable, Peter (conventional dairy) provided a reflective response, drawing on another of the case study farmers thoughts shared at the BestFarms training which they had attended the previous day.

> *Yeah, I think so but we've got some question marks. But I think we need to improve what we're doing. But it's a little bit like when yesterday David [organic strawberries] asked the question 'how do I arrive at the first part of it when I don't know the answer at the end'. We don't know what the water quality is that leaves our property so until you know that, you don't know what impact you're having... It's hard to judge, but with our increasing intensity, there's obviously got to be potential for problems. But how much impact we are having it's very hard to judge.*

Environmental sustainability has a different meaning depending on the setting. The Tasmanian based ecowool wool broker couches it in marketing terms. to him 'environment' relates to quality, authenticity, pure and pristine and even local tourism.

Consumers were asked for definitions of environmental sustainability in food and fibre. Consumer definitions of environmental sustainability embraced a wide range of issues.

Their definitions (in their own words) related to packaging (recyclable and no overpackaging), labelling, reducing environmental impact, organic (but organic doesn't necessarily mean sustainable or eco-friendly), better tasting, healthier, no pesticides, freshness, Australian made, ingredients from natural products, quality, unadulterated, a higher likelihood of better nutrition, better land management, located on a separate shelf, certification, fair trade, corporate consciousness and a range of other definitions.

A striking observation is that when consumers were asked about environmental issues, they often answered as if the question related to human health and well being. It was if it was difficult for people to think beyond their own human ecology.

There were also discerning definitions of environmental sustainability provided by consumers such as the following received from two different consumers attending the supply chain forum:

> *Been subject to critical analysis of the supply chain. Aware that products without the label might also have sustainability values. Would have to be if someone looked into it, you could see that the product deserves the tick.*

> *Subjected to research or a test which would show that it has been through a rigorous system to show it is a sustainable business – then it can be self declared.*

Another observation was that environmental sustainability values were articulated by both farmers and consumers in a way that integrated environment with economic sustainability and social sustainability issues. Environmental sustainability appeared to provide somewhat of a catch-all for a range of values. This perhaps explains why it was rated as most important by consumers asked to rank preferencing values, particularly because health was not provided as an option in the list of preferences to rank.

## 9.2.4 Regional renewal

The value 'regional renewal' refers to the motivation expressed particularly by farmer and consumer actors to support functioning farming communities. Because this study focuses on rural agriculture and not peri-urban agriculture, this is related to regional towns and communities located away from capital cities. Farmers and consumers strongly demonstrated values associated with supporting farming communities. A consumer interviewed in the South West town of Dunsborough said the following about supporting local products:

> *Yes it warms the cockles of my heart. I like to support local business. I understand this in a real living sense. I would gravitate towards the product if I know that it has community benefits. There is a new cask wine – it's a nice drop, but not the nicest and is more expensive, but I buy it because it is local.*

In terms of supporting the local community, a consumer interviewed at the BuyGreen conference suggested:

> *From a sustainable perspective, I would be looking for a cue as to how the supply chain supports the local community. I would be surprised if they didn't [referring to display products] but more information would make my life easier.*

The preferencing rating undertaken by consumers indicated that price and environmental sustainability came before choosing local products but it is probably more accurate to say that these values interact with each other. One consumer at the supply chain forum volunteered the different values important to him in different foods, showing how his supporting local values interacted with other ethical issues, taste and price:

> *It depends on the product, e.g. Eggs: free range only, regardless, Milk: WA only (Harvey Fresh) not adulterated, Garlic: Non-Chinese (which means now Argentinean or Mexican), Bread: A bread I like, regardless, Cheese: I buy what I enjoy eating, Fruit: Price (which usually means local, in season).*

The interaction between food and fibre production to consumption systems and rural and regional sustainability issues was visited but not articulated in this study. Issues such as population loss, labour shortages, business closures and diminution of services (both commercial and public) were raised as issues that influence and are influenced by food and fibre systems.

Marsden (1999:299) also argues for the importance of a focus on local and regional support structures in sustainability efforts suggesting that:

> From a sustainability perspective, a focus upon the local and regional is more than simply an attempt to combat and resist global forces: it is the beginning of a process of rebuilding more agro-ecological systems which … integrate space and nature into production processes.

Within the supply chain case studies these values were important to most of the actors, with evidence of the use of elements such as community learning, leadership and innovation known to be important in the building of social capital in rural areas (Courvisanos and Martin 2005).

## 9.2.5 Connectivity

The term 'connectivity' was identified as an adequate description for a set of values that related to altruistic connections between people and the non-human environment including place, naturally occurring environments and farm animals. Leiserowitz and Fernandez (2008:52) discuss the importance of reconnecting people with nature in the context of agriculture. The connectivity value embraces people's sense of connectedness with their environment. Discussed below are three key ways this interconnectedness was expressed by case study participants.

*Animal welfare*

Concerns for animal welfare influenced some of the supply chains. Probably the strongest discourse on animal welfare issues came from Kurt (biodynamic dairy). His concerns for animals went beyond issues relating to living conditions, extending this focus to include behavioural freedom and intrinsic value, issues identified by the organisation Compassion in World Farming (2007). For example, Kurt was considering the pros and cons of allowing calves to stay with their mothers, a radical departure from common dairy practice:

> *One of the reasons I'm going back to putting calves on cows, is so that the cow can raise it as it supposed to be. And then she can teach it how to eat properly and what to eat and when to eat it and how to graze a paddock and where to go and what to do. Same as any parent does for their kids. Whereas when I take the calf away, I can only teach it what I know and it can only get from me what it can get from me. The odd cow goes and hangs over the fence and has a talk to them or gives them a lick, but they miss all that mothering. So then they have to come through all these learning curves, as they go out in the paddock and start to feed, they have got to learn all this. Whereas if they are growing up with a mother, they follow her around and watch what she does. Within three months they know it all. Once you raise the calf and wean it, then it's got to go and learn it, if it learns it. If you just put calves in the paddock on their own, who's going to teach them?*

Consumers also communicated concerns for the well being of animals although animal welfare rated as most or equal important by only 16% of consumers. Those that did care about this issue, often cared very strongly. One consumer noted:

> *Animal welfare is the most important thing for me. I get fired up about this because animals rely on us.*

Animal welfare, where it was an issue, was communicated as a matter related to connectivity rather than one related to the adequacy of standards. It was an emotive issue that people felt rather than intellectualised. Hence it is proposed that animal welfare is best described under the broader value of connectivity.

### Global conscience

Many of the consumers interviewed expressed a sense of global conscience, including priorities such as the following;

> Wellbeing for the planet and all

> Leaving the world in a better state for those yet to enjoy life.

This sentiment of global consciousness included concern about the biophysical as well as concerns over global social equity. Gilg et al (2005) terms the concern with the planet as 'biospherism' and notes that holding this value is one of the characteristics of green consumers.

The importance of having a global conscience was also expressed in the corporate social responsibility material of Nestle.

### Interconnectedness

Some supply chain actors made references to the importance of a sense of interconnectedness in regards to sustainability efforts. An attendee at the Food for Thought forum commented:

> It's a spiritual problem. There is a proportion of people who want connection with the land This should be encouraged..

The importance of interconnectedness or a sense of their place within the wider biosphere was also expressed by a number of case study farmers, generally as an aside, albeit it an important one. Connection with land was expressed by all the case study farmers as discussed earlier in the section on sense of place.

The extension of self awareness to embrace the ecological context is argued as an important step in moving towards a more ecologically sustainable approach and in linking ecosystem viability and community viability (Michaelidou et al. 2002, Cock 1990, Naess 1995). Leiserowitz and Fernandez (2008:38) observe the role of spirituality in engaging people into new ways of being and suggest that it is necessary to 'invoke the language of faith and spirituality'.

They note:

> The discourses of science and policy, while necessary, are not sufficient to motivate mass changes in values and behaviour. The work in world religions and ecology has important contributions to make in this regard. In particular, the language of faith and spirituality can inspire a sense of human embeddedness in living systems. The prevailing language of science too often conveys a sense that the universe is like a machine – a collection of non-living parts operating by natural laws. The sense of an enchanted, awe-inspiring universe and creation can reawaken a commitment to the Earth that the scientific narrative alone tends not to stimulate.

This sense of interconnectedness and understanding that impacts created in one area can have ramifications for other areas has important implications for sustainable food and fibre systems. It is this sense that helps people to realise that their actions do matter and they are empowered to change the worlds in which they exist, including the food and fibre they produce or consumer. This is perhaps best explained by a Perth based consumer who said:

> *If you have a passion for caring for the environment, don't give up. It will be like ripples in a pond and you will influence people, even if it is only your family members.*

## 9.2.6 Social equity

Social equity emerged as an important issue for many of the participants in this study with two main areas of concern. These were issues related to labour availability and remuneration and issues related to managerial freedom and fairness in financial and other business transactions.

Shortage of labour and poor remuneration of farm workers is one of the most critical impediments to social and economic sustainability of farming in Western Australia currently, particularly because the mining boom is attracting many workers who previously would have been available for farm work. The organic wholesaler commented that one measure of sustainability was whether staff stayed around. Alan (conventional strawberries) responded to the question of whether his enterprise was socially sustainable, suggesting:

> *The biggest problem we are going to have is going to be labour. There are opportunities for managing water but there is nothing we can do about labour shortages. We can't control the price we receive so we can't set a price and say, that is what it's costing us.*

Consumers generally did not respond to worker's rights as an important issue and it was not ranked highly in the preference rating undertaken by consumers. They also did not raise issues about farm labour; however, at the time of interviewing, this issue was not on the community radar. In March 2008, Western Australia reported record low unemployment of 2.8%, with local authorities labelling the labour shortage the single largest threat to its economic growth (SBS 2008). *The Australian*, June 21, 2008 reported that the 'chronic labour shortage in the horticulture industry has reached the point where fruit has been left rotting on trees, and vegetables are left in the ground'. Potentially this coverage will raise this issue amongst consumers.

As noted above, the other social equity issue raised by both consumers and farmers were equity issues related to doing business with large corporations. Consumers expressed this concern by ranking small business relatively high in the preference list, being fourth after price, environmentally friendly and local. This anti-corporate sentiment was also expressed by other supply chain actors. The eco-wool broker recognised that the some of the key customers for eco-wool were 'very anti corporate agriculture, intent on connecting the story of farmers and people'. That is, he recognised that marketing based on values associated with small businesses rather than large corporations could be attractive to some.

It was evident that most case study farmers felt that corporate driven agriculture model where the farmer acts as little more than a contractor dis-empowered growers. Other social equity issues raised in the study included intergenerational equity and gender issues.

## 9.3    Transference of sustainability values

The means by which commodities acquire and transform values are considered by a number of food sociology researchers (Friedland 1984, Appadurai 1986, Warde 1992, Dixon 1999).

Of particular note is Friedland (1984), who developed a framework for describing how commodities are transformed through the stages of the supply chain, acquiring different values as they move along the supply chain. He proposed that commodities reflect people's ideas, labour and technological advancements, but also levels of power held and cooperative arrangements (or lack of) between actors in supply chains. Results from assessment of value transfer are represented below with reference to the perceived level of environmental sustainability value transference (Table 10).

**Table 10: Levels of environmental sustainability value transference in case study supply chains**

| Product | Level of environmental sustainability value transference |
|---|---|
| Biodynamic grains case study | High |
| Organic wine case study | High |
| Organic strawberries case study | High |
| Organic milk products case study | High |
| European Ecowool case study | High |
| Conventional wine case study | Medium |
| Conventional grains case study | Low |
| Conventional milk case study | Low |
| Conventional wool case study | Low |
| Conventional strawberries case study | Low |

In this interpretation, high value transference occurs when all supply chain actors conveyed environmental sustainability as an important influence in their supply chain. Based on the information collected from supply chain actors, environmental sustainability values were not transferred between farmers and consumers in four out of the five conventional supply chains.

Not surprisingly, the certified supply chains showed a much greater ability to transfer environmental sustainability values along the supply chain. This is due to a number of factors including influences from the certification requirements and the regular and formal communication amongst supply chain actors. It is also likely that the creation and sharing of sustainability values is important to the supply chain actors who choose to be involved in certified products (rather than certification being the sole cause of value transfer).

For the bulk conventional products (e.g. grain, wool and milk), sustainability values evident at the farm level were not transferred or shared with other supply chain actors. However, there is some indication that this will change in the near future due to corporate social responsibility pressures on bulk handler and manufacturers, as well as potential market opportunities.

The conventional wine supply chain, the only conventional chain where environmental values were considered to be transferred, was markedly different to the other conventional chains. This was a relatively small business which involved a largely farmer-driven syndicate with strong relationships between supply chain actors.

They had also taken efforts to implement environmental sustainability initiatives, including a state-of-art winery wastewater wetland processing system. They had also formed a partnership with an environmental NGO, as reflected on the label of one of their wines. This example demonstrated that values can be transferred outside of a certified supply chain approach.

Within the case study supply chains, a number of tangible drivers of and impediments to the transfer of sustainability values between producers and consumers were identified. These factors are based on the assessment of characteristics relevant to sustainable supply chains explored in the previous chapter (Chapter 8).

Factors contributing to generation of high sustainability value transference included strong supply chain relationships based on personal contact and shared values, farmer driven and customer-focused approaches and strong environmental and social values held by both farmers and consumers associated with that chain. In summary, the key factors that were shown to enhance the transfer of sustainability values in the supply chains can be broadly categorised under four headings. These are:

1) organisational and regulatory innovation and support including whole of supply chain certification and labelling systems involving a third party assessment,

2) relationships (e.g. marketing, networking, and personal contact) amongst value chain actors,

3) sustainability knowledge, education, awareness and marketing and

4) a range of external and internal financial support strategies.

Drivers and impediments to sustainable supply chains are listed in Table 11, ordered by four key factors identified as important in transfer of sustainability values.

**Table 11: Drivers of and impediments to transfer of sustainability values in case study supply chains**

|  | Drivers of sustainability value transference in case study supply chains | Impediments to sustainability value transference in case study supply chains |
|---|---|---|
| **Certification** | <ul><li>Whole of chain certification</li><li>Efficient transfer of information through documentation requirements</li><li>Accountability demands</li><li>Potential market advantages</li><li></li></ul> | <ul><li>Cost of differentiation and marketing</li><li>Administrative burden</li><li>Lack of suitable environmental or other sustainability certification systems</li></ul> |

| | Drivers of sustainability value transference in case study supply chains | Impediments to sustainability value transference in case study supply chains |
|---|---|---|
| **Relationships** | • Supply chain actor relationships based on shared sustainability values<br>• Trust<br>• Farmer driven approaches<br>• Customer focus | • Lack of relationship between supply chain actors<br>• Competitive relationships between supply chain actors<br>• Restrictive policies imposed by manufacturers and retailers |
| **Knowledge** | • Desire to share information about sustainability (particularly farmers)<br>• Awareness and concern regarding sustainability issues amongst supply actors<br>• Demand for knowledge about sustainability by consumers | • Lack of shared definitions of 'sustainability'<br>• Lack of adequate measures of sustainability |
| **Economic strategies** | • Risk management and financial planning<br>• Natural resource management grants (farm)<br>• Regional development grants (business establishment)<br>• Corporate support of sustainable practices<br>• Value creation and value capture | • Dependency on external drivers<br>• Lack of supply chain focus in industry and other support programs<br>• Insufficient size or growth for financial stability<br>• Lack of market and price signals for sustainable products |

These four factors can act separately or together to transfer sustainability values within supply chains. Given that the certified chains in the study did show better value transference, it is assumed that that the approaches work best in conjunction with certification.

# Chapter 10: Sustainable supply chain intervention framework

The following section outlines characteristics of sustainable supply chains that have emerged through the research study. A conceptual model is proposed to represent the forces and drivers required to develop and maintain sustainable food and fibre supply chains.

## *10.1      Definition of sustainable supply chains*

Definitions of 'sustainable supply chains' in the literature are varied and largely relate to managing the impacts of production and consumption along the supply chain (Woodhead et al. 2006, Cary et al. 2004).

Providing a global perspective on definitions of sustainability particularly relevant for the supply chain context is the definition which was mutually agreed by Sustainable Agriculture Initiative (SAI) founding members; Danone, Nestlé and Unilever:

> Sustainable Agriculture is productive, competitive and efficient while at the same time protecting and improving the natural environment and conditions of the local community.

This study investigated the role of sustainability values in the development of sustainable supply chains, understanding supply chains as a socially constructed phenomenon bound within economic, environmental and social limitations and requirements. The study considered sustainability values held and created within production to consumption of systems, how these might be shared and a range of factors that influence the sharing of these values.

The definition of a sustainable supply chain that has emerged from the study relates to how sustainability values are or are not transferred amongst supply chain actors. Combining both values held and values transferred in the supply chains, the definition for Sustainable Supply Chains that emerged from this research study is:

A sustainable food or fibre product supply chain occurs where supply chain actors adequately manage social and environmental impacts and are **able to create, hold and transfer** environmental, social and economic sustainability values associated with production and consumption along the supply chain, including to consumers.

Importantly, it is recognised that sustainable supply chains must operate within the requirements for economic sustainability and other market requirements (e.g. price, food safety, nutrition, quality assurance, taste and freshness) and standards such as animal welfare standards. Legislative requirements, such as those related to pollution control and the emerging greenhouse and resource accounting legislation, are also a necessary context. For example resource accounting and reporting by food and fibre processors will potentially be required under the proposed Commonwealth Environment and Water Resources Legislation Amendment Bill-National Streamlined Greenhouse and Energy Reporting Bill.

The key focus in this definition is the ability of supply chain actors to create and transfer sustainability values. That is, supply chain actors need to possess values that relate to environmental and social sustainability either in a personal or corporate sense and be willing and adequately resourced to act on these values. Furthermore, there must be mechanisms by which these values can be communicated.

Some similarities in understanding of sustainable supply chains were found in a report from a project undertaken by the Californian based Ecotrust Food and Farms group which considered food sustainability issues. An excerpt from their report (The New Mainstream: A Sustainable Food Agenda for California, 2005) suggests the following definition of sustainable supply chains which is deemed appropriate for also describing sustainable supply chains in the context of this study:

> Sustainable value chains differ from traditional supply chains in terms of control, transparency, distribution of profit, and the very idea of value itself. …Members of the sustainable food industry participate in value chains in a different way. These value chains contain partnerships between all of the players in the chain - meaning that all participants benefit and tend to have a say in the development of the chain. Conventional supply chains limit the concept of value to economic profitability. Sustainable value chains expand the idea of value - to include economic, ecological, and social profitability. Sustainable value chains, in other words, add values and relationships to an otherwise purely price driven equation.

In terms of the case study supply chains, the high sustainability value transference value chains (or 'sustainable supply chains') demonstrated markedly different characteristics from the low transference value chains (or 'conventional supply chains').

The following differences were identified between the two approaches to the food system, drawing on similar findings emerging from the study conducted by Ecotrust (2005).

**Table 12: Comparison between sustainable supply chains and conventional supply chains**

| Sustainable Supply Chains (high sustainability value transference) | Conventional Supply Chains (low sustainability value transference) |
| --- | --- |
| • Strong likelihood of transference of sustainability values between supply chain actors<br>• Farmer as ' director', 'co-director' or 'partner'<br>• Farmers often internalise or partner with marketing and distribution arrangements and clearly understand where their product ends up<br>• Success depends on triple bottom lines<br>• Information (including information on sustainability values) is shared within the chain<br>• Product values include: price, health, taste, regionality, environmental and social sustainability<br>• Focus on premium or niche markets<br>• Focus on reasonable long-term profits and other benefits to supply chain actors and other stakeholders<br>• Relationship with consumers as authentic stakeholder<br>• Consumers as ecological citizens | • Sustainability values held by one supply chain actor are less likely to be transferred to other supply chain actors (e.g. farmers to consumers)<br>• Farmer as 'supplier'<br>• Farmers often externalise marketing and distribution and do not know where the product ends up<br>• Success depends on economic gain<br>• Confidentiality rather than sharing information within the supply chain<br>• Product values relate to price, convenience and consistency<br>• Focus on commodity markets<br>• Focus on maximising short-term profits for shareholders worldwide<br>• Relationships with consumer dependant on willingness to pay<br>• Consumer apathy in relation to social and environmental issues |

In action, the case study supply chains showed a mix of these qualities. It is unlikely that 'perfect' sustainable supply chains exist, which matches comments earlier in this report that consumers with a perfect 'environmental conscience' also do not exist.

## 10.2 Sustainable supply chain intervention framework

The sustainable supply chain intervention framework proposed here contains three main components that influence and drive sustainable supply chains, as demonstrated during the study. These include:

1. **Core sustainability values** that act to drive and inspire the development and ongoing management of sustainable supply chains

   This includes a range of sustainability values that interact positively with economic aspirations and requirements and standards for food safety, quality assurance and animal welfare.

2. **Dimensions of sustainable supply chains** which influence the sustainability values to be created and transferred along the supply chain

   The identified dimensions are key aspects related to sustainability in food and fibre systems. They are based on key themes that emerged through the study in relation to incorporating and transferring environmental and social sustainability values in supply chains. These four dimensions are represented as big-picture goals, incorporating fundamental issues that drive or impede the creation and transfer of sustainability values in supply chains. These dimensions also represent intervention pathways and are outlined in section 10.4.

3. **Sustainable practices** undertaken by each of the value chain actors

   This includes the range of practices undertaken by supply chain actors that improve environmental, economic and social sustainability values within the production-consumption system.

This framework is discussed in detail in the following pages followed by a conceptual design of the proposed Framework (Figure 20).

## 10.3    Core sustainability values

The proposed Sustainable Supply Chains framework considers six core sustainability values that emerged from the study as the broad context for the development of sustainable supply chains (Table 13). These values encapsulate the broad vision of sustainability of the stakeholders concerned. The case study supply chains demonstrated that these sustainability values or ethical aspirations were important in driving the development and implementation of environmental and social sustainability initiatives. These were interpreted from the range of environmental and social sustainability values that supply chain actors were asked to comment on (e.g. price, environment, local, small business, animal welfare, workers' rights and minimal transport) and also from semi structured interview and forum material. Generally these core sustainability values have not been formalised into standards or market requirements (e.g. as for food safety and quality assurance standards). That is, whilst these may be related to emerging market demands, they are generally not market requirements and supply chain actors have the choice to include these values or not include them. These values are discussed in the previous chapter and are listed below in Table 13, along with examples of how they manifest in the case study supply chains.

**Table 13: Core sustainability values-examples from case study supply chains**

**Prosperity**
- Satisfactory income
- Affordability of differentiation strategies
- Market security
- Capital investment security
- Cost efficiency
- Affordability (consumption)
- Adequate growth

**Regional renewal**
- Rural lifestyle choices
- Supporting local businesses
- Supporting local communities
- Intergenerational succession
- Recognising place of origin

**Health**
- Nutrition
- Freshness
- Well-being
- Safety
- Pesticide residue free
- Links between human and ecological health

**Environmental sustainability**
- Sustainable use of resources
- Resource efficiency
- Biodiversity conservation and rehabilitation
- Appropriate waste management
- Renewable energy options
- Recycling

**Social equity**
- Empowerment
- Managerial freedom
- Independence
- Fair returns
- Fair trading arrangements
- Truth in labelling

**Connectivity**
- Interconnectedness
- Connections to land and place
- Connections with and concern for farm animal welfare
- Global conscience

## 10.4    Dimensions of sustainable supply chains

In the proposed Sustainable Supply Chains framework, the term dimension is used to describe key properties that were shown to assist the integration of sustainability values in supply chains These 'dimensions' do not make sustainability happen, but ongoing commitment to and implementation of sustainability initiatives is unlikely in their absence. These dimensions were developed by considering the heuristic model for understanding supply chains detailed in Chapter 8. The bridging concepts identified in that model, that is, the concepts that both reflected system and behavioural properties were used to develop the four dimensions. These bridging concepts of production systems, patterns of interaction, economic sustainability,

Four key dimensions or properties of sustainable supply chains were identified. These represent behaviours, strategies, actions or technologies that were used by the case study participants at individual or systems level to navigate towards sustainable supply chains. It is proposed that through these dimensions sustainable supply chains (according to the definition described earlier) can be differentiated from conventional supply chains.

These four dimensions can operate independently or together to influence food and fibre supply chains to become more environmentally and socially sustainable.

These dimensions can facilitate the creation of a sustainability conscience, or a set of sustainability principles amongst individual actors but also within the entire supply chain system. They are also critical in ensuring sustainability values become embedded in the supply chain system in the long term.

As well as explaining key aspects of sustainable supply chains, the dimensions presented here are also presented as intervention pathways. It is proposed that through implementing the components and intents characterised within these dimensions, the development of supply chains where sustainability values are held and transferred can be supported. Aspects of sustainable supply chains interact and overlap, however it was considered theoretically useful to divide these influences into four dimensions. These are:

1. **Organisational and regulatory innovation including sustainability certification;**
2. **Sustainability education, awareness and marketing;**
3. **Economic sustainability strategies; and**
4. **Relationships, networks and marketing based on sustainability values**

These dimensions are considered below in more detail using examples and issues emerging from the study.

## 10.4.1 Organisational and regulatory innovation

In this discussion, organisational innovation refers to organisational efforts towards incorporation of sustainable practice, as well as marketing and accounting. This refers to strategic planning or management that enhances sustainable supply chain aspects at corporate, government, community or multiple chain actor levels, as compared to innovation at the individual business level. The definition is based on comments by participants about particular strategies that they believe had influenced or could influence the development of and transfer of sustainability values in production to consumption systems. This included efforts at revision of organisational cultures and strategies to better integrate sustainability.

This definition also concurs with Marsden et al. (1999) who suggest that making alternative supply chains more central is encouraged by regulatory systems which are less concerned with centralized top-down policy making. Marsden et al. (1999) propose the ability to develop such regulatory systems will rely upon regulatory and organisational innovation as much as renewed knowledge and adequate economic assets.

Leiserowitz and Fernandez (2008:51) explore the connections between values, policy and behaviour change in the context of developing a new consciousness of social and environmental sustainability. They argue that a mix of culture and politics is needed and rather than focusing on changing values directly, it can be more useful to focus on mechanisms that support new behaviours, which in turn can lead to the creation of new values. They note that the value of policy is that 'it can require changes in behaviour, whether or not citizens and companies currently hold the values that would lead to those behaviours without regulation'. They summarise this concept noting:

> Thus policy and value change need to support each other, creating synergies and positive feedbacks that lead to large-scale changes in human behaviour.

There is a myriad of regulatory controls related to environmental management and protection that affect the different actors in the supply chain. A number of issues related to the broader topic of organisational support and regulation that emerged from the study are outlined in the following discussion.

*Lack of sustainable food and fibre policy direction*

The regulatory environment relating to agricultural systems is changing and in some cases becoming increasingly restrictive. Policy reform relating to water was clearly a concern for the farmers involved in this study. Also, emerging policies relating to clean production are influencing both practice and marketing efforts by the larger manufacturers in the study. However despite some efforts to coordinate regulatory approaches to sustainable food and fibre, the policy environment lacks direction at Commonwealth, state and regional levels. At all levels, governments appear unsure of how to proceed in relation to sustainability in food and fibre industries.

Dovers (2005:106) identifies that often only a limited range of policy implementation instruments are considered in environmental problem solving. This appears to be the case in regards to Australian government efforts at promoting sustainable food and fibre production and consumption. For a start, as discussed earlier, sustainable consumption relating to agricultural products has been ignored by governments in Australia. Also the focus on trialling self–regulating environmental management systems by the Commonwealth government does not appear to have influenced policy in relation to supporting sustainable production. If policy instruments are "messages" that seek to drive change' (Dovers 2005:106), the message from the National EMS Program, is that Commonwealth government can not clearly identify its place in sustainable food and fibre systems. With the exception of the National Heritage Trust (or Caring for Country as of March 2008) with its largely educational and institutional inputs, there has been limited long-term direction setting from the Commonwealth perspective on sustainable production.

The study also found evidence of poor linkages between sustainable land management and sustainable and regional natural resource management efforts. This was clearly evident during the industry consultation by the lack of connection evident between industry and NRM in all industries except for the broadacre industries.

Land management solutions that are still popular with NRM groups are those that work best in broadacre situations. One–off and short term incentives for revegetation, restoration and fencing, one-off seminars on climate change or other issues and trials of different broadacre options like perennial pastures appear to sit more comfortably with NRM groups than long term sustainable production support programs like BestFarms and Harvest Highway (a South West regional food distribution program discussed later) or formal training in natural resource accounting and eco-efficiency for producers.

This is largely influenced by tensions between public and private good which whilst valid, tend to mean that production sustainability issues are often delegated to the 'too hard basket'.

The efforts at sustainable production and consumption being made by Commonwealth and regional NRM agents may qualify as Dover's 'slow and gentle educational programs for large and urgent [problems]' (2005:106). State government has also failed to achieve real traction on the issue of sustainable production. Its Farming for the Future program which aimed at developing a framework for sustainable production has provided an effective forum for discussion but has not gained traction on-ground.

### *Australia is lagging on sustainable food and fibre policies*

There is a clear difference between market demand for sustainable products in Australia and overseas, particularly in the European Union, to the extent where some Australian producers of 'sustainable' products leapfrog the Australian market in preference for established overseas markets, such as with the EU Eco-wool case study. The wide range of overseas government and non-government policies and programs that focus on improving sustainability-related awareness amongst both production and consumer sectors have undoubtedly had an impact. The shift in awareness in Europe and the US is arguably at least partly in reaction to food crises such as the Bovine Spongiform Encephalopathy (BSE) outbreak, which increased consumer awareness of health risks of food (Jin et al. 2004). Such shocks to the food system have not occurred in Australia but policy reasons why this shift is not taking place in Australia also need to be taken into account.

For example, the adequacy of Australian current trade practices law in controlling anti-competitive behaviour by retailers has been criticised (Hoy 2008). Allen Fels, previous chair of the ACCC, recommends changes to the Trade Practices Act to align more with the EU, giving the ACCC stronger powers to intervene quickly in cases of suspected anti-competitive behaviour (Hoy 2008).

Australia lacks policy direction on sustainable consumption and its sustainable production policies are ad-hoc and lack a coordinated supply chains focus. Another impediment to this dimension which was raised was lack of technical support for organic / biodynamic farmers by industry associations and government industry initiatives.

*Need for cross jurisdictional approach*

Based on evidence in this study of interaction between a range of values, there is also strong argument for improved coordination between government departments and ministries. This includes coordination amongst departments responsible for food and fibre including agriculture, health, environment and trade to develop policies that better support sustainable food and fibre systems. As supported by evidence in this study, public health should be central to food policy debates. At Australian Commonwealth government level, food policy currently sits largely within the Commonwealth Department of Agriculture Forestry and Fisheries, by nature of its historical legacy where food production policy was largely concerned with raising productivity. However this needs to be reviewed in the light of changing circumstances. However, evident from consumer responses and export market demands it appears that food (and fibre) policy making needs to move from this primary concern with productivity to a more holistic approach.

*Corporate support for sustainable food and fibre systems*

The aforementioned lack of coordinated policy or action aside, there was still a range of organisational support measures for sustainable supply chains revealed through this study. Potential support for large food and fibre corporations to incorporate sustainability values includes global initiatives such as the Sustainable Agriculture Initiative and the Global Reporting Initiative. Other mechanisms shown to be beneficial in increasing awareness of sustainability include corporate policies on sustainability and the employment of sustainability officers at executive (i.e. influential) levels in downstream manufacturing and retail corporations. Given the strength of the corporate sector, sustainability policies within large food and fibre corporations can be expected to have some influence. Lang and Heasman (2004:126) note:

> Collectively corporate powers have consolidated both internationally and throughout the food supply chain, and it is corporate policy, as much as public policy which is now shaping food policy agendas.

Amongst the case studies considered in this thesis, the efforts by Nestlé who were the downstream purchaser of the conventional milk product represented the most significant corporate sustainability effort. Hans Joehr, Agriculture Production Manager for Nestlé presented company sustainability policies at a forum held in Canberra in October 2007. Having recently joined the Sustainable Agriculture Initiative, the company is facing a number of challenges to addressing sustainability issues associated with different supply chain sectors.

This includes a range of social and environmental issues including environmental management, fair trade and labour issues which they suggest need to be traced and potentially communicated to the consumer. Nestlé's policy of ethical sourcing focused on support programs in under-developed source countries, such as support for schools and hospitals and had not extended to all suppliers.

*Government and NGO support services*

National and state government and non-government organisation sustainability support programs and initiatives played a part in encouraging and supporting sustainable food and fibre systems. This organisational support was critical in providing long-term support for the incorporation of sustainability values in the case study supply chains. Case study supply chain actors noted positive (and negative) influences on capacity to undertake sustainable practices by the following support organisations:

- WA Conservation Council
- Local landcare groups
- Environmental Management Systems support programs (e.g. BestFarms)
- Natural resource management organisations
- Regional development organisations
- Department of Agriculture (industry best practice support, (limited) organic agriculture support and Farming for the Future programs)
- Regional development programs

### 10.4.1.1 Sustainability certification

As an aspect of organisational and regulatory innovation, the use of a formal certification system offers potential for accounting for and recognising efforts towards sustainability along the entire supply chain.

The role of certification in the transfer of sustainability values in the case study supply chains was significant. The organic and EU-Ecowool certified supply chains were generally better able to transfer sustainability values than the supply chains without certification.

The implications of this for the development of additional environmental or sustainability certification systems are mixed. Those operating within the organic certified supply chains generally did not see the need for an additional certification system. However consumers said that they would appreciate a simple 'green tick' or other message associated with products that could assure them that the product met sustainability indicators, as approved by a trusted source.

Whether existing certification schemes (including organic, biodynamic and ISO 1400 series) are adequate or whether a new system or systems are required is a complicated issue which requires further investigation and stakeholder consultation. Rowland et al. (2005) discusses this issue at length and summarise issues for consideration in developing a national environmental certification system including:

- Multi-commodity producers perceive a critical need to avoid the creation of multiple incompatible schemes that duplicate demands on producers' time and energy.
- It is clear that any certification system will need to combine both process and performance standards.
- Any national effort to improve sustainable management of Australia's natural resources must acknowledge the extent of Indigenous custodianship of the land.
- There is potential for improved co-ordination across jurisdictions and landscapes with current barriers to information flows constituting a serious opportunity cost.
- There are scientific issues of reliability of data/information transfers across scales.
- Resourcing and staffing issues are critical.
- The ability to capture data in a consistent manner and promote consistent language is an issue.
- Issues exist around translation of broad-based catchment targets into farm-scale targets and actions including data confidentiality issues.

(Rowland et al. 2005)

The issues of new sustainability certification systems is also considered by Howard and Allen (2006), who propose a range of options including building on existing organic certification schemes or developing entirely new systems.

There are a number of major issues for the development of a new sustainability certification system which have effectively blocked the development of formal system in Australia. There have been multiple efforts at Commonwealth and state government levels and by NGOs and industry stakeholders to develop a discourse on the development of a standard for environmental management of agricultural products. These efforts have led to a proliferation of farm environmental management systems and self assessment tools based on locality (e.g. Blackwood BestFarms, Murray Valley EMS), industry (e.g. Horticulture for Tomorrow, DairySAT, Rice Champions), corporations (e.g. Bega Milk EMS) or a combination of both of these (e.g. King Island EMS, Australian Landcare Management System, Gippsland Beef Enviromeat). Few of these have achieved the role of communicating values to landholders, with Enviromeat being a notable exception. Most of these programs are currently in a vulnerable position with limited funding opportunities available.

*Who should develop sustainability certification systems?*

The question of who the certifying agency should be needs considerable exploration. Supply chain actors in this study clearly articulated that it needs to be a trusted and reputable source but the answer to this question remains effectively unknown after this study, with no clear outcomes emerging on this. Commonwealth and state government and conservation groups were both recommended by participants as likely stewards of such a system, but their potential roles in this were also disputed. Distrust of commercial interests including government was an issue amongst consumers. As stated by Pahl et al. (2006) 'consumers place more trust in environmental groups and government regulators than they do in commercial organisations, even when the latter is an accredited certifier'.

The issue is also related to determining the appropriate scale for an environmental certification scheme. In a survey conducted in 2006, participants involved in the BestFarms program were asked if they would prefer environmental certification of their farm or products to be from a nationally recognised or a regional certification body or other options. Results of this showed that the national scale was most preferred. Results were (40%), regional (20%), both national and regional (10%), doesn't matter (15%) and Blackwood (5%) (Coote et al. 2006).

The question also relates to who should pay for costs of establishing certification systems and who will benefit. When asked about environmental certification of wool, Bede (conventional wool) sums up the big responsibility held by the certifiers, implying that the risks at farm scale to produce what he anticipated as a minimum quantity for market differentiation would have to attract a significant financial reward:

> *Whoever takes it on has got to understand the enormous challenge they are taking on. If I'm going to be regulated I want good money for it. Because to get it up and running is one thing but you would have to be growing 25,000kg to be commercial. To achieve that is huge. If I'm going to be regulated for doing x, y and z, I want good money for it.*

Bede's comments support the finding that at this stage, market forces alone are unlikely to tempt the development of these differentiated sustainability certified lines for bulk commodities. This was shown by the ecowool example which depended on a combination of passion, significant personal financial investment, foresight, risk management, philanthropy and product development subsidisation and a relevant certification system (the EU Ecowool certification) to get establish and maintain this supply chain.

*Assessing the need for a new certification system for 'integrated sustainable agriculture'*

The issue of developing standards which allow environmental or social attribute signalling (or transfer of social and environmental values) for sustainable agriculture products (as opposed to organic products) is considered by Codron et al. (2006). They also observe the lack of collective action of what they term the 'integrated agriculture movement' in the EU to develop standards and communication signals for attributes of products. They also observe the failure to harmonize standards across actors and places in contrast to the well developed abilities of the organic movement to achieve this (Codron et al. 2006:287).

The Australian situation shows a similar trend with the tendency of the 'integrated agriculture movement' to use first and second party certification, where first party implies 'the firm sets its own rules' and second party implies a 'self imposed guidelines shared by firms in a particular sector' (Codron 2006:287). In comparison, they observe that the organic agriculture movement used third and forth party certification, where third party implies an' external, independent group' and fourth party implies 'government or multilateral agencies are among the entities that set guidelines and delegate monitoring to an external independent group'(ibid).

Codron et al. (2006) observe that even though there are some efforts to create common guidelines amongst the integrated agriculture movement in the EU (including the producer driven European Initiative for Sustainable Agriculture (EISA), the retailer driven EUREPGAP, the agro-chemical industry driven European Crop Protection Association (ECPA) and retailer specific programs) 'none of these professional guidelines are communicated directly to the consumer' (2006:289).

Despite the EU's relative advancement in the area of certification systems compared to Australia, Codron et al. (2006) suggest that the influence of government benchmarking or third party certification systems for integrated agriculture (focused on environmental aspects) remains limited. They conclude that at the European Union level, no plan for a European integrated agriculture label has yet been discussed (Codron et al. 2006:289). The need for this coordination is also support by Teisl et al. (2002) who recommended one organization in charge of eco-labelling and a reduced numbers of labels in the US.

As in the example of Australian EMS programs, the outcomes of these efforts to improve environmental management in production generally have not represented a form of environmental attribute signalling which can assist the consumer to identify the environmental and social values of these products (with some notable exception such as Enviromeat).

*Attribute signalling*

Transferring sustainability values held by production actors to consumers requires some form of attribute signalling, or communication of attributes associated with the production process As Codron et al. (2006) suggest, the typical approach to this involves the definition of a standard, the implementation and monitoring of that standard, the enforcement of the standard and finally the communication of the standard to the consumer (2006:287).

Whilst all of the organic farmers used methods to signal organic values to consumers, the idea of signalling other attributes appealed to some of them as an exciting initiative. Warren (organic strawberries) communicated so much passion about his farm and his product, a novel idea was that he could package this passion. When asked if his passion for his farm and product is actually carried through to the consumer he replied:

> *It probably doesn't. I don't know how you would get that. It would be lovely to do that. That's a very interesting and quite an exciting thought actually. No I'm sure it doesn't get there at the moment, because people just buy organic because...they've read that its better for you without the chemicals or else they like the taste of the fruit and they come back for more. But to get the real passion type message across, I'm not sure how you would do that.*

Figure 30 shows how various attribute signalling methods can be used to communicate sustainability attributes in products. Certification is listed first as this is likely to be the most powerful method of communicating product attributes. However there is a range of other methods that may communicate sustainability attributes under certain circumstances including labelling, marketing and telling sustainability stories.

**Figure 30: Transfer of sustainability values through attribute signalling**
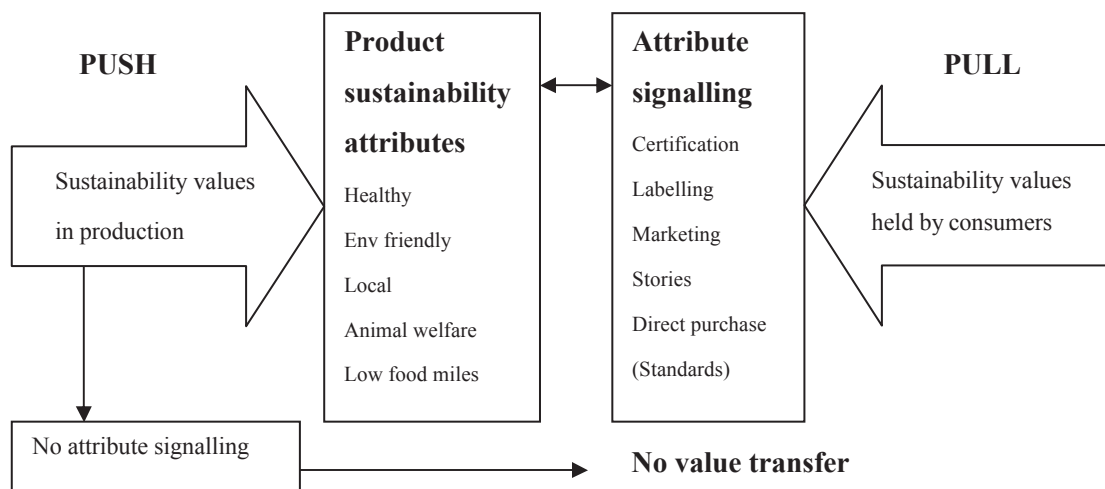
Based on several experimental data sets related to eco-labelling strategies in the US, Teisl et al. (2002) suggest that credibility of labels is increased by contact information and detailed information on the package. Detail is, they suggest, more effective than simple eco-seal (logo) approaches. They suggest that a standard eco-seal makes no difference to consumers. Teisl et al. (2002) concludes that consumers do care about the environmental impacts of production but that current eco-labelling strategies may not be the most effective communication.

Direct purchase from the producers (such as that practiced now by Warren's farm tours) can also be an opportunity to signal the presence of sustainability values. Use of standards such as ISO14001 or even informal standards such as the BestFarms standards are also included as attribute signalling, however this would generally only be effective in combination with one of the other forms of attribute signalling. This system of value transfer using attribute signalling depends on the attribute or value being important to both production and consumption actors. The arrows at the bottom of the diagram indicate the lack of value transfer in the absence of an attribute signalling mechanism.

*Terms of reference for sustainability assurance systems*

Different stakeholders have different opinions on certification systems. Pahl and Sharp (2007) observed that industry groups wanted environmental assurance to be voluntary, whereas consumer and environmental groups required regulations to maximise participation rates or compliance. Some evidence of this was also shown in this study with consumers more referring to standards and third party assessment and industry representatives more referring to BMPs.

Some key issues arising from this study that need to be addressed by stakeholders in the development of potential sustainability certification system (s) are discussed below.

The role of farm EMS within environmental assurance systems is important for justifying claims but needs to be integrated into a product focus. Sustainability accounting and reporting systems are also required at the middle chain stages.

It is apparent that both in existing and potential certification systems, certifying organisations have an important role in building networks and support systems amongst supply chain actors. This is dependant on the presence of active and committed staff and leaders within the certification organisation.

The role of quality assurance efforts as a precursor for environmental and socially sustainable assurance was raised in several of the case studies. This establishes patterns of monitoring and recording that would be applicable to an environmental and social sustainability system. There is also scope to extend existing wholesale, manufacturer and retail QA systems used in product sourcing policies to include environmental assurance.

Supply chain actors in this study, particularly consumers, presented a case for better cooperation between certifying organisations to reduce consumer confusion. Potential amalgamation of certifying organisations to reduce paperwork would also help to facilitate smoother processing for middle chain actors.

An example of a mechanism that works across all of the proposed dimensions but is perhaps most applicable to the certification dimension is the International Social and Environmental Accreditation and Labelling (ISEAL) Alliance Code of Good Practice for Setting Social and Environmental Standards. Compliance with this Code strengthens standards and certification systems with regards to their credibility, relevance and ability to deliver meaningful social and environmental change (ISEAL Alliance 2007). The ISEAL Alliance is developing a range of voluntary standards to support sustainable supply chains such as the Voluntary Carbon Standard (VCS) framework. They are also making efforts to assist business to tailor quality management systems for specific social and environmental certification.

In summary, a range of recommendations emerged from the case study supply chain actors for environmental or sustainability assurance or certification. These have much in common with the list of factors for an 'ideal environmental assurance system' provided by Pahl and Sharp (2007) from which the following criterion are adapted. The sustainability certification system should:

- be applied to the product or product category rather than the process, however the certification of processes may also be required,
- address environmental and social issues at all production and consumption stages
- integrate the environmental, social and animal welfare costs of production with the economic costs of production,
- enable (or at least not impede) the communication or transfer of sustainability values throughout the chain
- integrate with existing certification schemes, quality assurance, food safety and other requirements of markets
- have minimal documentation requirements,
- have an easily recognized mark (or marks) which is certified by a trusted and independent third-party,
- be cost effective and / or allow the expense of implementing this system to be passed on to markets.

Pahl and Sharp (2007) also note some more process-orientated requirements that were not specifically explored in the study, although all of these issues were noted by study participants. These include the importance of equivalence with international standards, the need for a process for continuous improvement, inclusions of minimum environmental performance targets and the need to be transparent (Pahl and Sharp 2007). They also note that the 'ideal' assurance system does not exist (ibid).

It is important to note that the empirical evidence from this study indicates that certification, whilst important is not necessarily a requirement for sustainability value transfer. However attribute signalling does appear to be a requirement of sustainability value transfer.

## 10.4.2    Sustainability knowledge, awareness and marketing

This dimension considers the role of improved awareness and understanding of environmental and social sustainability issues amongst production to consumption systems actors as a mechanism for improving the overall sustainability values within the system. This includes a range of sustainable production and consumption related education, awareness and marketing programs targeted at farmers, corporate business and consumers, but also government and intermediary organisations.

Knowledge and awareness related to how food and fibre can be produced was a key factor in influencing participant's willingness and ability to engage in sustainable practice. This included community knowledge, local knowledge, scientific knowledge and intergenerational knowledge.

Lack of knowledge about sustainability was observed as a key impediment amongst supply chain actors and is also observed by Hanslip et al. (2007), who recorded significant uncertainty amongst landholders in the South West relating to best practice.

Hanslip et al. (2007) propose that there is need for clear information about the relative benefits and costs of natural resource management practices, particularly in relation to how these fit with farming operations. They also note that respondents who had used a private agricultural consultant were more likely to have adopted a range of sustainable practices. Hanslip et al. (2007) also note that access to advice and support appears to be particularly important for practices that deal with new technologies and equipment (ibid).

*Production to consumption systems as knowledge generating systems*

Midgley identifies knowledge generating systems as '.. something which gives rise to the existence of knowledge through its own activity' (2000:76). He explains that using the view of an unfolding and interconnected universe, that it is questionable whether one type of organism or system can independently generate knowledge. Rather he argues that knowledge arises from interaction between these systems. Knowledge from a range of sources, or 'knowledge generating systems' can present rivalries, contradictions and synergies that can better inform interventions (Midgley 2000:77).

This concept of knowledge generation adequately describes the way in which knowledge was built in the more cohesive production to consumption systems considered in this study. Knowledge related to sustainability values was clearly being built as an interactive process between supply chain actors and also wider influences such as organisational intermediaries. An example is the evolution of the Stop the Toad labelling in the conventional wine case study, where this experiment in environmental attribute signalling was tested with the support of the WA Conservation Council, generating knowledge that could be applied to communicating the case study company's environmental attributes.

The model of knowledge generation observed in the supply chains recognises the value of different knowledge sources and types. It is proposed that a range of knowledge sources from different areas (NRM, industry, conservation, farmers and consumers) and different schools of knowledge, (behavioural, organisational, ecological, strategic, marketing and technical) is needed to support the development and sustenance of sustainable supply chains. This point is important because the different areas and schools involved usually tend to act as information silos in the context of food and fibre supply chains. The combining of these types of knowledge may also be referred to as integrative knowledge. Various aspects of these knowledge generating systems and their importance in sustainable supply chains are discussed below.

*Sources of knowledge*

A key source of knowledge for farmers was the local landcare or NRM organisations including the Blackwood Basin Group's BestFarms EMS support program considered in this study. These organisations provided an accessible network where farmers shared information about farm sustainability issues. Information support that provides access to research and other information relating to sustainable food and fibre production, such as that provided by the Commonwealth Land, Water and Wool program, Department of Food and Agriculture and the Productivity Commission were also noted as key supports and influencers.

Farmer-orientated or farmer-led research conducted by organisations such as CSIRO was also noted as beneficial in building knowledge amongst farmers. Extension of research and development related to sustainability by industry associations such as the Wine Stewardship Council's investigation of market demands for sustainability in the wine industry was also a useful source of information on sustainability.

There was a range of Commonwealth and state government funded sustainability education programs mentioned by case study actors such as those delivered by landcare organisations and industry associations (focused on farmers) and sustainable consumption groups or networks (focused on consumers). Most of the government programs related to sustainable food and fibre are focused on farmers (e.g. EMS, industry self assessment tools and farm sustainability programs) and business (e.g. eco-efficiency and waste management programs) with a lack of focus on consumers.

*Marketing*

Marketing sustainability values to consumers is of high importance and entails significant cost. It emerged as the major method of communicating sustainability values that consumers understood, in combination with certification and labelling. Marketing was a key mechanism in communicating of efforts towards sustainability to markets. This included stories on websites and on products as well as active community education efforts. The use of eco-labelling schemes, product endorsement (e.g. by conservation groups) and support for conservation campaigns through a percentage of profits were also useful marketing strategies in raising awareness about the sustainability value of products.

Notable in the study was the consumer education value of leading brands using environmental and socially sustainable labelling or other information (e.g. the use of the Landcare symbol by Banrock Station or Uncle Toby's organic Vita-Brits). Also the use of sustainable product guides and lists such as the WA Conservation Wine List discussed in this report and the Sustainable Seafood Guide (Australian Marine Conservation Council 2007) were noted as important in raising awareness of sustainable food consumption options.

New marketing approaches are also needed. David (organic strawberries) suggested that getting TV chefs to talk about health and sustainability might be a useful approach. David suggested:

> *We need to get Jamie and Nigella together with principles of sustainability.*

Raising awareness is required for middle chain actors also. Hans Joehr, Agriculture Production Manager for Nestlé, suggested that training is required for manufacturing related sales people to assist them to better understand and respond to market drivers related to sustainability.

*Organisational intermediaries*

Also noted by study participants was the awareness-raising role of emerging sustainable product marketplaces. This includes virtual marketplaces such as the online service for sourcing organic cotton, The Organic Exchange (2007) and informal and formal discussion and lobby groups (e.g. Carbon Coalition, Safer Agriculture). These are led by a range of groups including consumers, farmers and largely non-government interest groups.

There was also a clear role for lifestyle groups in building awareness and support for sustainable product purchasing, particularly amongst consumer groups such as the Slow Food organisation (http://slowfoodperth.org.au/). Slow Food Perth is developing Slow Food Western Australian producers' and food directory. To be considered for inclusion, producers and processors will have to demonstrate that their products are clean and fair under the Slow Food guidelines. The directory will include restaurants using local clean and fair food and independent grocers who offer it for sale. Slow Food represents a community vision for healthy and environmentally and socially sustainable food. They play an important role and potentially target the policy gaps between health and environment mentioned earlier. Similarly, Lang and Heasman (2004:109) note that the gap in the social role in nutrition has tended to be filled by NGOs or food campaigners rather than scientists and dieticians.

However organisational intermediaries did not emerge as a critical initiating element in sustainable supply chains. There was no compelling evidence that they were fundamental in the creation of sustainable supply chains. The narratives supported the notion that organisational intermediaries are important in supporting sustainable supply chains, but not important in initiating them. However given that resilience is such a fundamental issue in sustainable supply chains, the influence of these organisational intermediaries in keeping the chains going may be critical, albeit very difficult to measure.

*Intellectual property*

Lang and Heasman (2004:40) comment on the way intellectual property is held between gene and other technology-driven food production paradigms where intellectual property is held tightly by corporations, such as the patent on the strawberry plants in the conventional strawberry case study. Farmers can face strict penalties for failing to observe such corporate interllectual property arrangements. Alternatively, knowledge may be more freely shared.  It was noted at the supply chain forum that farmers are generally willing to share information and do not observe intellectual property restrictions as much as other sectors. It was also observed that this sharing is a key factor in achieving sustainable practices.

*Intergenerational knowledge*

Intergenerational sharing of knowledge was not strongly evident in the case study and it was noted by participants at the industry forums that there was indeed an intergenerational knowledge gap in regards to sustainability information. The handover of responsibility for running the farm does not necessarily imply that sustainability values will be handed onto the next generation. Bede's (conventional wool) parents implemented measures towards ecological resilience of the farm including the Ron Watkins system which services dams and troughs around the farm. Even during drought, they have not suffered from water shortages. Bede knows what his father has done to gain ecological knowledge about the farm but doesn't necessarily share that knowledge. As he notes:

> *Dad did a whole geological survey of all the natural underground water. It's probably stuffed in an archive box.*

*Impediments to building sustainability knowledge and awareness*

Impediments to this dimension identified in the study included low consumer 'environmental consciousness' and the lack of national commitment and direction for sustainable food and fibre supply chains. There are also issues of responsibility and cost related to who should be undertaking sustainability education and awareness. In terms of support for sustainable consumption, the aforementioned lack of Australian government policy and action on sustainable consumption demonstrates a lack of unified national consciousness on sustainable consumption issues.

### 10.4.3 Economic sustainability strategies

This dimension considers the range of economic strategies that can support sustainability practices within food and fibre supply chains. Potentially this support can act to shift conventional supply chains to more sustainable supply chains and can also provide more stability to existing sustainable supply chains. Economic sustainability is a requirement of all supply chains sectors to stay in business. This includes the need for profitability and an adequate living wage on the supply side and affordability at the demand side of the value chain. Growth and prosperity are acknowledged as key drivers in sustainable supply chains.

A key issue for sustainable supply chains is whether the costs incurred in developing an ethical product are offset by the revenues generated. Heilbron and Larkin (2006) comment that a key issue for a customer-focused approach is the balance between the costs to create or capture value and the return generated.

Gunningham and Sinclair (2002) suggest a range of economic strategies and incentives related to helping to develop environmental partnerships amongst food and fibre industry players. These include legislative exemption from regulatory requirements; publicity and sanctioned use of a logo; technical assistance; access to R&D; regional and infrastructure development; financial incentives, more rapid depreciation of equipment and tax credits and reduced fees.

A number of these strategies were implemented in the supply chain case studies. All supply chain actors undertook strategies to increase profitability and economic stability. Economic sustainability issues faced by supply chain actors wanting to differentiate on grounds of sustainable production include the need for adequate growth necessary to reach required quotas, high levels of risk taking required in the development and marketing of a new or differentiated product and the need for efficiencies of scale with more than a single producer often required to ensure supply chain stability. Strategies to address economic sustainability issues within the case study supply chains included

- incorporating the costs of sustainability initiatives into the product price;
- shared costs of sustainability across supply chain players;
- value adding and value creation;
- capturing high value markets;
- risk management strategies;
- diversification of products and of markets;
- highly coordinated communication and marketing;
- cooperatives of sustainable farmers supplying to a differentiated supply chain (this was discussed only).

Also, grants and subsidies were important in facilitating shifts to more sustainable systems, particularly amongst farmers and small manufacturing businesses. Sustainable production is currently supported by a wide range of government and non-government grants targeted at the rural landscape and corporate sectors. NRM and Landcare grants were shown to be beneficial to supporting sustainability at the farm level. Regional development grants were shown to benefit mostly the value-adding or manufacturing stage, often allowing farmers to branch into supply chain approaches or assisting existing small manufacturers to build their enterprises. Government subsidised programs such as the Tasmanian government's program of subsidising wool pesticide residue testing also helped supply chain actors to integrate sustainability values into production.

As noted in Gunningham and Sinclair (2002), large commercial retailers, wholesalers or other buyers have the opportunity to drive sustainability agendas because of their dominant market position and their position between upstream suppliers and consumers. As Gunningham and Sinclair (2002) point out, these supply chain actors may be in an ideal position to sponsor environmental sustainability initiatives. This can include the use of price signals for sustainable production and technical advice and support relating to environmental management. This is demonstrated by the eco-wool broker business considered in this study which offered both price signals for low pesticide residue wool and also offered philanthropic business support to aid the development of the case study eco-wool supply chain.

## 10.4.4    Building relationships and networking

Using Checkland's (1985) concept of 'purposeful activity', this study considered relationship maintaining activity alongside the goal orientated activities involved with food and fibre production and consumption. Whilst both of these types of activity clearly are necessary for these supply chains to operate, the relationship maintaining behaviour appears as a critical factor in successful sustainable supply chains.

This dimension considers the importance of relationships between supply chain actors in the development of sustainable supply chains. It concerns the roles different social actors take in influencing commodity systems, including issues relating to balances of power. The process being examined here is the maintaining of relationships between supply chain actors.

It is in this dimension, which mostly strongly focuses on social relations, that the theoretical concepts concerning the systemic aspects of social life (Layder 1998) is mostly aptly placed within the theoretical model. As Layder (1998:90) suggests,

> …there is always some link between system phenomena and the behaviours of people who are subject to their influence.. the primary reference point of these concepts is not social behaviour in and of itself. It is rather the reproduced social relations (and the powers and practices which underpin them) that form the settings and contexts in which social behaviours are enacted.

The importance of relationships and networks in the development of sustainable food and fibre systems has been argued by a number of researchers. Courville (2001) found that the ability to incorporate social and ecological costs depends to a large extent on the strength of the relationships between organizational actors in the trading system. The importance of building relationships and partnerships in voluntary environmental management processes is observed by Gunningham and Sinclair (2002), who suggest that partnerships between actors generate collective learning, increased participation and consensus building.

As in Courville (2001), relationships between organisations and individuals involved in the case study supply chains strongly influenced the resilience of the systems. This included direct relationships between supply chain actors, but also relationships with related organisations including certification organisations, landcare organisations, government agencies and conservation organisations. Relationships with community networks and between families and individuals also influenced the ability of supply chain actors to hold and act on sustainability values.

The value of third party partnerships was demonstrated in the case studies. Certified chains mostly demonstrated active partnerships between supply chain actors and certifying bodies. There was also the example of the WA Conservation Council being involved as an informal environmental assurance partner in both of the wine case studies. Gunningham and Sinclair (2002) discuss the merits of partnerships with third parties including non-government organisations in developing and overseeing voluntary environmental management agreements.

Of critical importance in sustainable supply chains is the relationship between producers and their consumer markets, particularly because of the ability of these relationships to help facilitate market advantage. Initiatives to help build these relationships include forums where supply chain actors can come together to discuss and share sustainability related information and values, such the supply chain forums reported on in this study.

Farmers markets, farmgate selling and programs like the Harvest Highway (http://www.harvesthighway.com.au/) based in South West Western Australia, were beneficial in building relationships between producers and consumers. The Harvest Highway project promotes connection between growers and consumers through promoting local farm produce and regional values.

Champions of related issues including landcare, organic agriculture, sustainable agriculture, regional community development and conservation were also highly influential in building relationships and networks through their leadership roles. A catalytic or mentoring role was demonstrated by many of the farmers in the case studies and also by some actors in other supply chain segments such as the owners of the organic fresh food wholesale business who applied pressure on major supermarkets to increase their organic food quantities. The need to recognise leadership in sustainable product development was also noted by case study actors. This was achieved through awards (e.g. the BestFarms farmer awards), promotion of related products by government or NGO organisations (e.g. government endorsement and sustainable products lists) and reimbursement for time provided in assisting other enterprises to better incorporate sustainability issues in production and supply.

As mentioned earlier, retailer to producer relationships were the most problematic of those considered in this study, particularly in conventional chains. Manufacturers or wholesaler to retail relationships helpful to the transfer of sustainability values were not explored in detail because of the focus of this study on farmers and consumers. However an interesting insight is provided here by the wool broker interviewed who been an influence on establishing the eco-wool chain.

> *Our strategy is that we don't care who does the spinning and combing, we engage with brand companies not retailers. They speak a similar language to the spinners. Brand companies are interested in consumers and engage with consumers like I want to do.*

A summary of strategies relevant to the four proposed Sustainable Supply Chain dimensions that were implemented or envisioned in the case study supply chains are presented in Table 14 overleaf.

**Table 14: Sustainable supply chain dimensions: examples from case study supply chains**

| DIMENSIONS | EXAMPLES FROM CASE STUDIES BY PRODUCTION-CONSUMPTION CHAIN SEGMENT | | | |
|---|---|---|---|---|
| | **Farm** | **Wholesale / manufacture** | **Retail** | **Consumer** |
| **Organisational and regulatory innovation** | • Existing certification schemes<br>• Environmental Management Systems and related support programs<br>• Industry developed environmental stewardship standards (e.g. Wine Stewardship system)<br>• Regulation and self-regulation (e.g. for managing water use, groundwater contamination)<br>• Environmental regulation and self regulation | • Extending QA requirements of farmers to environmental assurance<br>• ISO certification of processing stages<br>• Corporate sustainability standards<br>• Sustainable production regulations<br>• Energy / greenhouse gas accounting | • Retailer sustainability labelling programs<br>• Incorporation of environmental assurance into retailer QA programs<br>• Corporate sustainability standards<br>• Sustainable sourcing policies<br>• Anti-competitive behaviour regulation | • Product stories on product labels<br>• Use of recognisable symbols (e.g., Landcare hands, green tick)<br>• Certification by a trusted organisation<br>• Sustainable consumption policies and incentives |
| **Knowledge** | • Education and awareness for farmers (BMPs, industry programs, EMS, Waterwise etc)<br>• Farmers as educators, involved in wider community education about sustainability<br>• Farm and product sustainability stories | • Employment of sustainability officers in large companies<br>• Source farmer BMP support programs | • Consumer education relating to sustainable consumption (e.g. in-store displays)<br>• Training for sales people<br>• Employment of sustainability officers in large companies<br>• Promoting and marketing sustainability values | • Sustainable Product Guides (e.g. sustainable wine list, Sustainable Seafood Guide)<br>• Consumer education<br>• Farm and factory tours for consumers<br>• Improving food sustainability awareness in public catering (e.g. schools, hospitals) |

| DIMENSIONS | EXAMPLES FROM CASE STUDIES BY PRODUCTION-CONSUMPTION CHAIN SEGMENT | | | |
|---|---|---|---|---|
| | **Farm** | **Wholesale / manufacture** | **Retail** | **Consumer** |
| **Economic strategies** | • Value adding<br>• Ensuring that minimum quotas for sustainable supply chains can be reached<br>• Aggregated supply opportunities for small and mid-sized farmers<br>• Subsidies / grants to support sustainable practice<br>• Subsidies / grants for sustainable product ideas<br>• Financial planning | • Techniques for managing several product lines without wastage<br>• Price signals to reward environmental performance on source farms<br>• Sustainable procurement policies<br>• Improved ability to deal with the cost of small supply lines (e.g. differentiation)<br>• Regional development business grants<br>• Value capture | • Increasing affordability<br>• Sharing economic risk in new sustainable products<br>• Incorporating costs of sustainability into product price<br>• Offsetting costs of sustainability against corporate profits<br>• Value capture | • Buying bulk<br>• Shopping direct (e.g. Farmers markets)<br>• Community Supported Agriculture or internet ordering options (reduces consumer transport costs) |
| **Relationships and networks** | • Building consumer and market relationships (e.g. farm tours, farmers markets etc.)<br>• Building relationships with all supply chain segments | • Locally based decisions (rather than remote head office decisions)<br>• Shared enterprise planning between farmers and manufacturers<br>• Building relationships with all supply chain segments | • Improved relationships with farmers and consumers<br>• Building relationships with all supply chain segments | • Support for sustainable practice through sustainable consumption networks and support communities (e.g. Slow Food)<br>• Building relationships between consumers and producers<br>• Sustainable consumption forums (including on-line) |

# 10.5 Sustainable practices, techniques and innovations

This component of the proposed Sustainable Supply Chain Framework represents sustainable practice that is an outcome of the combination of core sustainability values and sustainable supply chain dimensions. Sustainable practices employed are the outcome of sustainability values held and shared by supply chain actors and standards related to legislation and market requirements. They are also influenced by the four sustainability dimensions discussed in the previous section including the presence or absence of certification schemes, sustainability knowledge held by value chain actors, economic status of individual businesses within the chain and relationships and networks occurring among value chain actors. Sustainable practices and techniques employed by case study supply chain actors included a wide range of examples at farm, wholesale, manufacture and retail stages. Some examples of practices that enhanced sustainability values in the case study supply chains are provided in Table 15.

**Table 15: Sustainable practices: examples from case study supply chains**

| **Farm practice** | <ul><li>Adoption on conventional farms of beneficial practices commonly used on organic farms on (e.g. Integrated Pest Management, composting)</li><li>Responsible use of waste through developing systems or relationships to utilise surplus</li><li>Water and energy efficiency</li><li>Use of renewable energy</li><li>Waste management and recycling</li><li>Biodiversity conservation and enhancement</li><li>Appropriate infrastructure and technology</li></ul> |
|---|---|
| **Wholesale / manufacture sourcing and processing practice** | <ul><li>Sustainable sourcing policies</li><li>Sustainable technologies</li><li>Use of sustainable packaging options (e.g. recycled paper)</li><li>Industry-wide solutions to difficult issues (e.g. disposal of contaminants)</li><li>Cooperative transport arrangements and backfilling in transport</li><li>Regional focus on farms within easy transport range</li><li>Adaptable systems that can move between product lines (enabling differentiation)</li><li>Water and energy efficiency and waste management</li><li>Appropriate infrastructure and technology</li><li>Building regional businesses to support regional development</li></ul> |
| **Retail sourcing and distribution practice** | <ul><li>Sourcing sustainable products</li><li>Increasing convenience for access of sustainable products</li><li>Appropriate presentation of sustainable products by retailers (e.g. providing information with the product</li><li>Water and energy efficiency and waste management</li></ul> |

Consumers also demonstrated a range of sustainable practices relating to how and where they purchased products and how they consumed these products. The most critical practice by consumers in supporting sustainable supply chains related to their purchasing preferences and their ability to create demand for sustainable products through individual and group action.

## 10.6    Synopsis Chapter 10

This chapter presents the second of the conceptual models used to describe sustainable supply chains. The model described in this chapter is an intervention framework, recommending focus areas for intervention and types of interventions that can be used to promote and maintain supply chain approaches to sustainability.

A combination of emergent data and extant theory was used to determine the dimensions of sustainable production to consumption systems, addressing impediments and building on drivers identified in the heuristic model for understanding supply chains described in Chapter 8.

A conceptual diagram of this intervention framework is shown in Figure 31 overleaf, showing the three core components of the framework, the core sustainability values which drive sustainable supply chains, the intervention pathways (shown by arrows) and the practices undertaken by the different supply chain sectors which are the focus for interventions.
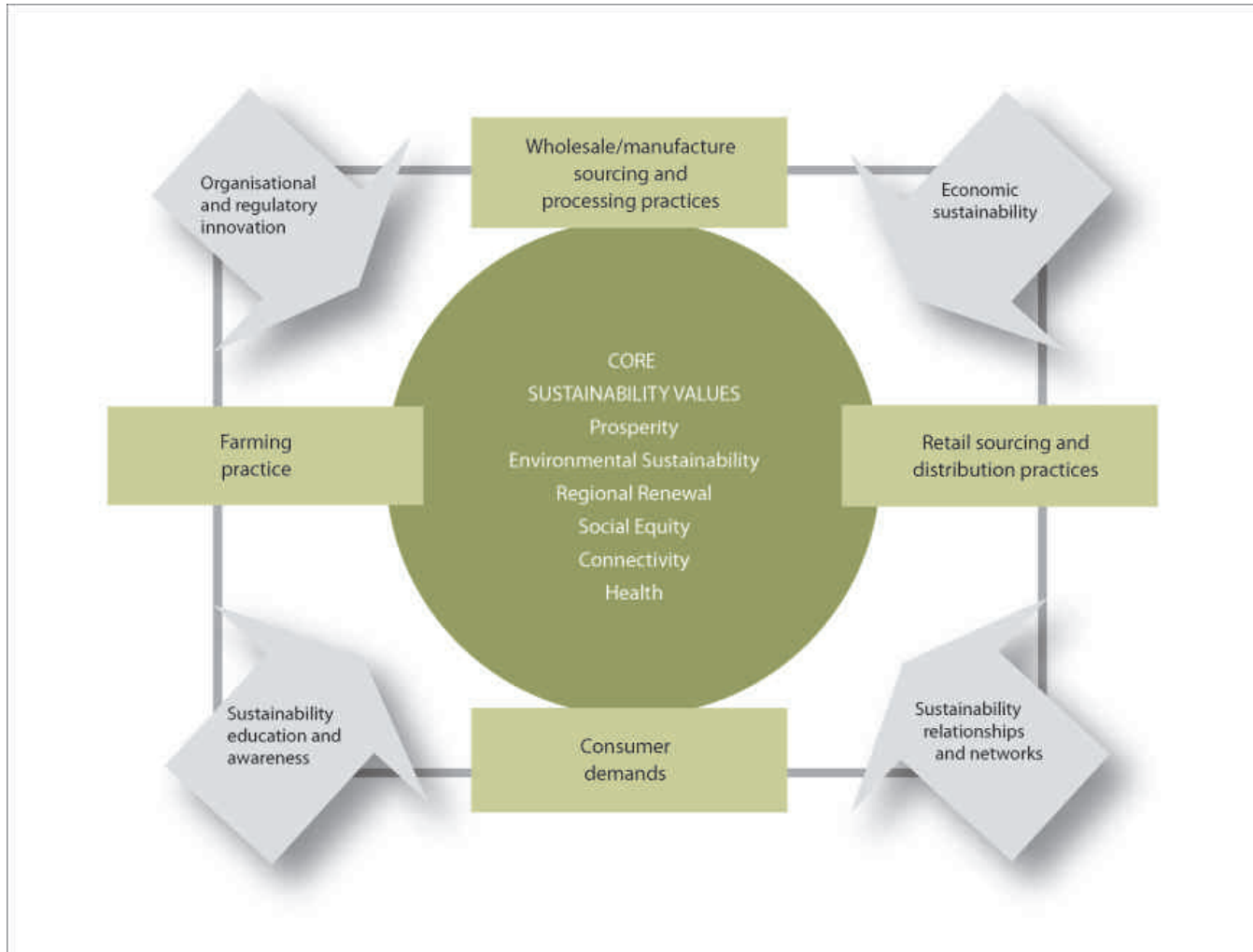
**Figure 31: Sustainable Supply Chain intervention framework: key values, dimensions and practices influencing sustainable supply chain approaches**

# Chapter 11: Synthesis

This concluding chapter covers the contributions and findings of this study in four parts. Firstly, the contribution of the study in identifying important dilemmas for sustainably in food and fibre is outlined. This includes significant impasses that need to be resolved in order to move forward in the development of integrated supply chain approaches to sustainability.

In the second part of this chapter, a summary of the key findings relating to the aims of the study outlined in the introductory chapter is presented. This represents the formal findings of this study in reference to the four stated objectives.

The third part of this chapter builds on these key findings and outlines recommended interventions that have emerged from this study, based on current practices and future visions relevant to facilitating sustainable supply chains.

Finally, concluding remarks which reflect upon the methodology used and consider the overall impact of this study complete the thesis.

## 11.1 Dilemmas for sustainable food and fibre

As well as the targeted outcomes of this study described at the beginning of this thesis, there were a number of dilemmas particularly relevant for the future of sustainable food and fibre that emerged from the study.

These issues emerged as critical or immediate and are difficult or vexed problems that relate to key impediments to food and fibre sustainability approaches in Australia. These issues emerged as a result of the interaction between elements within the systems in this study. As such, the relevance of these issues is applicable to entire production to consumption systems, as well as to the different sectors within these. These are also interconnected in that these issues interact with each other to confound the development of supply chain approaches to sustainability in food and fibre systems. These key dilemmas are explored below.

### 11.1.1 The problem with middle way sustainable agriculture

As described in this thesis, there have been extensive efforts, both in terms of individual farmer effort and wider mobilisation of resources, towards the achievement of more environmentally and socially benign food and fibre production systems. This includes efforts within certified organic agriculture but also efforts by conventional producers including the use of IPM, eco-efficiency, natural resource protection and strategies to limit chemical use.

However, as shown in this study, these efforts are seen by most actors in the supply chain as the preserve of the farm sector rather than something which should be considered across the whole supply chain. This effectively means that these attempts are not acknowledged by the rest of the supply chain. This also implies that the rest of the supply chain can not reward these efforts. In contrast, sustainability efforts at the farm scale are recognised by downstream organic supply chain actors and as this study shows, sustainable farm practice is one of the values that are implicated in the higher prices paid for organic produce.

Despite some differences, both in values held and practices used, between the types of food and fibre production methods considered in this study, there were also commonalities found. It became clear, particularly in the comments by consumers, that there is a place for recognising a middle way approach to sustainable food and fibre production. That is, a system that recognises efforts towards sustainability as a middle way between the conventional productivist and certified organic agriculture approach.

The emergence of this middle way approach is evidenced by the demand by farmers for support of these sustainability approaches like that provided by the BestFarms EMS program. This program has survived five years of the funding uncertainties associated with NRM funding and it's services are now being purchased by state government and industry groups both within WA and interstate. This amongst other indicators discussed in this thesis, show acceptance of and demand for middle way sustainable agriculture approaches by a range of production and consumption actors.

There are a number of dilemmas for this middle way approach that rejects the conventional model of agriculture and also, depending on the perspective, falls short of or rejects the organic agriculture model. This includes the lack of formality or definitions of this type of agriculture and the lack of coordination across this arena. Also many people are wary of the potential for greenwash through such an approach, particulary certified organic supply chain actors.

These dilemmas strongly emerged in this study, evident in the frustrations that some growers felt that their sustainable practice was not recognised by downstream actors and in the confusion expressed by consumers over the range of signals and strategies associated with environmental and social attributes of products. The opportunities to build this middle way sustainable agriculture into whole supply chain approaches and hence develop stronger drivers for the uptake of sustainable farming methods is under-realised. Some of the reasons for this are explored further in the next section.

## 11.1.2     The need for terms of reference

Currently Australia has limited terms of reference for sustainable supply chains. Landcare farming is used as a common terminology amongst the NRM sector and with farmers. Building on the discussion of middle way sustainable agriculture, the term 'integrated agriculture' is also used to refer to sustainable production practices. However, there is a lack of well understood terms of reference for sustainable approaches at whole of supply chain levels, outside of certified systems such as organic and biodynamic systems in Australia or overseas based certification systems such as EU Ecowool.

Lack of such terms of reference, definitions and standards as well as the lack of consolidated government or industry focus is an issue. In Australia, the integrated agriculture approach is emerging from diverse and uncoordinated sources such as farming, NRM and industry interests. To move ahead and use this as a pathway for rewarding supply chain actors for sustainable production, a definition of this approach is needed. With the use of ISO processes generally restricted to larger corporations, there are limited opportunities for small and medium sized businesses to communicate sustainable attributes of products. The lack of standards (and labels) means that there are limited signalling mechanisms to let customers or consumers know if the product has social and environmental attributes.

Recognition of the notion of sustainable supply chain approaches by decision makers in production to consumption systems, including policy makers, is an essential first step towards achieving recognition and reward for sustainable practice.

Whilst naming something as 'sustainable' or more 'sustainable' is fraught with dangers of mis-labelling and mis-representation, this situation already exists. For example the use of words such as natural and environmentally friendly on labels is not regulated in Australia. Explorations into appropriate marketing and ecolabelling relating to Australian circumstances are required, however, this relies on shared acceptance of definitions and standards.

In Australia, it appears that Commonwealth government is hesitant about committing to a role in the development of terms of reference or standards relevant to sustainable production and consumption of food and fibre. State governments are developing terms of reference for management of environmental issues, and to a lesser degree socio-economic issues, within farm production through BMP extension models. Environmental management NGO's and industry organisations are also developing terms of reference and standards to guide voluntary adoption of environmentally and socially responsible production, such as evidenced through the EMS programs considered in this study.

However, terms of reference for food product attributes are being increasingly defined by large food corporations. This was shown in the comments by the retailers in this study who suggested that any environmental assurance system would have to fit within retailer specified assurance programs, and that programs outside of these were unlikely to be recognised. While retailers generally indicated that there would be no price signalling to reward environmentally and socially sustainable practices by growers, this kind of practice could become a new standard which producers have to meet.

This trend of supermarket chains developing process standards to which upstream actors must abide has potential social and ecological implications including production actors absorbing additional costs that might arise from meeting these standards.

The tensions between standards that are developed publicly including government and NGO's and those developed by the private sector including supermarket chains, manufacturers and industry representatives, are related to the different decision making processes and the different interests concerned.

The relative advantages and disadvantages of these approaches needs to be factored into to considerations about what terms of references Australians want for food and fibre sustainability and how these should be created. Based on the findings of this study it is recommended that all stakeholders need to be involved in this process, including coordination of the diverse efforts to develop definitions and standards referred to above.

## 11.1.3 Resolving the issue of economic trade offs

The values represented within sustainable food and fibre production to consumption systems encompass more than purely economic values. The results of this study suggest that trade offs occur in production to consumption systems between economic values and health, environmental, regional development and other values.

The major focus on the success and or failure of market forces to drive sustainable production and consumption is central to much literature on the topic, including the material arising out of the National EMS Program. Outcomes from this study suggest that this issue needs to be more fully examined within a triple bottom line approach, rather than using the lack of market drivers as justification for no action.

Whilst market drivers can be identified, they are limited to sub-populations such as health or environmentally conscious consumers, emerging CSR efforts and some export requirements. Also, these factors compete with a range of issues as supply and demand dictates. Of particular importance is the information that price is nearly always more important than ethical attributes.

The argument regarding lack of market drivers relies upon the current market which externalises environmental and social costs, and so sends misleading price signals. Reliance on market forces for solving environmental and social issues is coming under increasing criticism. An important question in this discourse is whether market forces alone can create environmentally and socially sustainable food and fibre systems. The outcomes of this study suggest that in the short term at least, they can not.

This is not likely to dramatically change in the near future. With increasing food shortage on the agenda, there are two potential implications for the issue of sustainable food systems.

Firstly, if food is in short supply, farmers and other production actors may be able to increase their ability to bargain for adequate terms, which may include better recognition of their sustainability values. Secondly, it is possible that tensions between demand and supply will overwhelm issues of ethical production. That is; markets will accept supply from wherever they can get it. Niche markets are likely to show a different trend to this and it is likely that consumption of 'integrated agriculture' products may follow the trend observed in the rise in organic food consumption. However this is an issue for further futures analysis. The point made here is that market forces are not going to drive food and fibre sustainability entirely despite evidence of increasing trends of demand for sustainable production.

Practicing aspects of the sustainable supply chain intervention framework described in this thesis can potentially address issues of economic trade offs. For example, increasing access to more healthy food could reduce health spending. Developing regional food systems can help build the economic base of rural communities. Providing price signals for environmental management can help protect land and water resources and biodiversity. Empowered and prosperous production actors can lead more fulfilling lives, contributing to the wider community in a range of ways.

In summary, in the absence of market drivers for sustainable food and fibre, intervention can potentially be justified when this market failure has negative impacts on economic, social or environmental sustainability values. At least in the short term, there is a need to develop policies and programs for food and fibre sustainability that interact with economic forces, without disrupting their necessary and beneficial functions. Some level of protection of sustainable production and consumption practices is likely to be required.

## 11.1.4    The sustainability certification quandary

Both advantages and disadvantages were identified in this study regarding the role of certification in advancing supply chain approaches to sustainability. As well as the debate about whether new sustainability certification systems are required in Australia, there has been considerable discourse regarding who should develop these system and what kinds of standards and processes might apply.

As demonstrated in this study, Quality Assurance is a gateway to environmental assurance because it describes a method for measuring and accounting that could potentially be applied to measuring and reporting on environmental and social sustainability issues. Existing agricultural product certification schemes also provide insight into what sustainability certification systems might look like and what they might achieve.

Differences in the capacity to incorporate sustainability values were shown between the certified and non-certified chains explored in this study, providing indications of potential advantages and disadvantages of sustainability certification in the context used in this study.

Market advantages were attributable to having the product certified, but were also related to marketing and product placement. Another benefit for actors in certified chains was being part of a network of support related to the certification system. Also the certification systems explored in this study specified environmental management requirements in addition to requirements related to chemical use, such as set aside areas for conservation, potentially influencing improved sustainability values on farm.

Impediments associated with sustainability certification identified in this study included lack of market drivers and price premiums as mentioned earlier. Lack of critical mass of producers or product within accessible geographic locations to develop a new sustainable supply chains is also an impediment. Also, whilst consumers generally said they would appreciate a green tick or logo, there was little recognition of existing labels or messages. This leads to another difficulty, in that a massive marketing campaign would be needed to gain consumer recognition of sustainability certification branding or labelling.

A key issue to be overcome in a potential sustainability certification scheme is the difficulties and costs of differentiation of sustainably produced food and fibre products by bulk handlers, manufacturing and retail sectors. It is likely that improved economic returns are required to facilitate this cost of differentiation. The costs and additional paperwork required by all supply chain sectors to monitor and account for sustainable practices was also identified by supply chain actors as a serious impediment.

The role of farm environmental management systems in a sustainability certification system was explored. Whilst there are many benefits of farm scale environmental assurance including social networking and building knowledge, this study demonstrates that this intervention method has neither engaged consumers nor middle chain sectors at this stage, with some exceptions.

Farmers are undertaking EMS for a range of reasons but one of the drivers relates to the expectation that EMS will be useful for communicating environmental management efforts to the market. Except in some cases, this is not being realised.

In terms of who actually wants sustainability certification for food and fibre products, supply chain actors in this study appeared to fall into three categories. The first category included actors from certified supply chains who mostly believed that the existing certification systems adequately communicated environmental and social values and there was no further need for additional sustainability assurance processes. The second category included supply chain actors who wanted a simple, easy to understand environmental assurance or certification system like a green tick in addition to current systems. This was particularly relevant to consumers but also put forward by other supply chain actors. The third category included supply chain actors who weren't concerned about sustainability values communicated by certification or any other method and were basically dis-engaged from this discourse.

It is also noted that the evidence from this study suggests that it is attribute signalling rather than certification that is a requirement for sustainability value transfer. However, the importance of certification lies in the information that it is one of the key mechanisms of attribute signalling, although there are also other methods.

These four key dilemmas for sustainable food and fibre (middle way sustainable agriculture, terms of reference, economic trade-offs and certification) converge to make the point that Australian society needs to determine whether sustainable production and consumption is important to our culture and society and if so, determine what is acceptable in regard to these issues. The intervention model proposed in this thesis recognises that there are a myriad of supports that can be used, including direct and indirect support to help address these dilemmas and other barriers to sustainable food and fibre systems. There is an imperative to incorporate the discourses on economic drivers, definitions of sustainable food and fibre systems and appropriate mechanisms to signal sustainability efforts into a wider ethical debate that considers the range of values important to Australian society. The next part of this chapter outlines the key findings of this study which provide direction for resolving these key dilemmas.

## 11.2 Summary of key findings

This thesis sets out with four objectives. These were; to better understand key features that contributed towards the development of sustainable food and fibre production to consumption systems, to explore the presence and transfer of sustainability values along food and fibre supply chains, to consider the role of sustainable consumption as a driver of sustainable food and fibre systems and finally to develop a conceptual framework for supporting sustainable supply chains, including the identification of appropriate intervention pathways. Outcomes according to these objectives are described below.

## 11.2.1 Understanding sustainable supply chain approaches

Through exploring attitudes to sustainability throughout the case study food and fibre supply chains, eight interconnected heuristic fields were determined that describe features of supply chains that are relevant to sustainability approaches. These fields are; ecological systems, production systems, values, motivations, impediments to change, patterns of interaction, commercial sustainability and consumer behaviour. These eight fields emerged from the analysis of data collected from farmers, middle chain actors and consumers. These fields and the tensions and interactions between these them give insight into what drives and impedes sustainability approaches in food and fibre systems.

Together these heuristic fields tell a broad and encapsulating story that is inclusive of a range of issues important to participants instead of a narrow focus on environmental, social and economic sustainability indicators. This reflects the way data was collected and the holistic way in which people told their sustainability stories. This was not an artificial closed ecological and human system that was being studied, these people live in the real world where a range of issues both compete with and enhance sustainability objectives.

This heuristic model describes the 'actual' human activity system in relation to sustainability in food and fibre systems. This was used as the basis for developing the intervention framework or the 'ideal' in regards to incorporating sustainability values in food and fibre systems that is discussed on the following pages.

## 11.2.2      Presence and transfer of sustainability values

Mechanisms that can assist in integrating and transferring sustainability values in food and fibre production and consumption systems were identified. A key outcome of the study was the identification of how sustainability values held by supply chain actors influence (or fail to influence) supply chain dynamics. This can potentially inform the development of production to consumption systems that can better acknowledge and respond to market sustainability requirements and also reward sustainability efforts throughout the supply chain.

The study defined six core sustainability values important to supply chain actors in the context of sustainability. Both production and consumer actors demonstrated values relating to nutrition and wellbeing (health), profitability and financial security (prosperity), protection and enhancement of environmental values (environmental sustainability), support and renewal of regional communities (regional renewal), connections with place and concern for animal welfare issues (connectivity) and fairness and equity in lifestyle and business arrangements (social equity). These are referred to as Core Sustainability Values. This set of values is not intended as a prescriptive list but represents values communicated by production to consumption system actors as important in their sustainability stories.

The presence of these values varied throughout the case study supply chains, with farmers generally leading the way in understanding of and commitment to sustainability values, followed by consumers. These values were transferred along the supply chain in six out of the ten supply chains. The level of transference (or sharing) of sustainability values along food and fibre value chains depended largely on four key factors. These are: 1) organisational and regulatory innovation including formal and informal systems of accountability and certification, 2) levels of knowledge and awareness of sustainability issues amongst value chain actors, 3) economic strategies used to enhance and maintain financial viability and 4) relationships between supply chain actors based on shared sustainability values. These factors were used in the development of a sustainable supply chain intervention model.

## 11.2.3　Sustainable consumption as a sustainability driver

Demand by consumers for sustainable food and fibre can be a driver of sustainable practices at farm and other levels within food and fibre supply chains, although this is only a limited and emergent influence amongst Australian consumers at this stage. The mostly 'green' consumers focused on in this study indicated that whilst price, quality, health and taste issues were primary, they were also interested in other values, particularly environmental sustainability and regional renewal (or local origin) values. That is, all else being equal with these primary attributes, consumers will differentiate between products which signal environmental sustainability, local origin and other ethical values and products that do not signal these attributes.

Access, lifestyle, age, gender and wider social issues were shown to influence consumers' preferences for sustainable products. Conflicting information was presented that suggested that whilst 'green' consumers want sustainability labelling such as a simple green tick, they also showed low recognition of existing labels. Results from the consumer study imply that provision (e.g. of certified or eco-labeled products) alone will not suffice to include consumers as actors in sustainable value chains. Mechanisms of consumer education relating to sustainability and the development of producer-consumer relationships based on trust are also influential in promoting sustainable consumption of food and fibre.

While issues such as access, convenience and trust in sustainability claims are primary, marketing and promotion of green products will also require an understanding of the interaction between sustainable purchasing and lifestyle and wider social pressures.

Inclusion of consumer focused research in this study was critical for understanding potential areas of demand for sustainable products and also how sustainability attributes might be best communicated to consumers. The study showed that consumers need to be brought into the discourse concerning sustainability in food and fibre systems as they have a valuable contribution to make in terms of ideas that will both work for sustainability and for the consumers themselves.

## 11.2.4 Sustainable supply chain intervention framework

The sustainable supply chain intervention framework reorders the elements of the heuristic supply chain model in a way that explains the key areas for intervention. The framework includes three components. The first component is the core sustainability values which motivate the development of sustainable supply chains. The second component represents the four types of intervention recommended. The third component represents the focus of the interventions which are the practices used by supply chain actors including farming and manufacturing practices, retail sourcing and distribution practices and consumer demand.

The four intervention pathways proposed for supporting sustainability in food and fibre systems relate to the impediments and drivers to sustainablity transfer that were determined. These are organisational and regulatory innovation, building knowledge related to sustainability, creating relationships and networks that facilitate integration of sustainability values and strategies to support economic sustainability.

Organisational and regulatory innovation is a key factor in the development and maintenance of sustainable supply chains including the development of integrated policy approaches that encourage and protect sustainable practices. Legislative and other accountability requirements are also drivers. Also important were corporate, government, NGO and industry initiatives that support sustainability objectives. The benefits of certification as an organisational innovation, include the marketing benefits of third party endorsement and support and networking for sustainable practices through the associated certification agency.

Building knowledge related to sustainability amongst production to consumption system actors is an important dimension for sustainable supply chains. Drivers related to this include the desire among supply chain actors to share information about sustainability (particularly farmers) and the demand for knowledge about sustainability by 'green' consumers. Impediments to be addressed included the lack of shared definitions of 'sustainability' and the lack of adequate measures of sustainability. Also the low consumer 'environmental consciousness' is identified is a key impediment to be overcome, as well as issues of responsibility and cost related to who should be undertaking these education and awareness activities.

Approaches where farmers act as partners (and not just suppliers) and customer focused approaches were key factors in the development of relationships that supported sustainable supply chain approaches. Impediments included the lack of relationship or competitive relationships between supply chain actors. Restrictive policies imposed by manufacturers and retailers that discourage sustainable practices were also noted as an impediment to be overcome.

A range of economic sustainability strategies were also important in supporting sustainable supply chain approaches. Natural resource management and regional development grants and corporate philanthropy to support sustainable practices or sustainable product development also acted as key economic drivers. Importantly, a range of value creation and value capture opportunities were essential in achieving returns that could assist in financing sustainable practices. Impediments to be addressed related dependency on external drivers, lack of supply chain focus in industry and other sustainability support programs, insufficient size or growth for financial stability and the lack of market and price signals to support the cost of differentiation on sustainability grounds.

Strategies and actions that emerged from the study relevant to these four intervention pathways are discussed in the next section.

## 11.3 Recommended interventions

This study identified key elements of sustainable supply chains. This information can act to inform policies and programs targeted at the development and maintenance of sustainable supply chains through appropriate interventions. Recommended interventions are ordered by the four sustainable supply chain intervention pathways. This is prefaced by recommendations for interventions that cut across these four dimensions to develop an over-arching supportive infrastructure for enhancement of sustainable supply chain approaches. These recommendations are applicable to government, industry and community based organisations at all scales, depending on the particular scope of each recommendation.

## 11.3.1 Creating a supportive infrastructure

The recommendations arising from this study include a range of interventions that relate to the development of a supportive infrastructure for sustainable supply chains including different mixes of policy instruments and tools that could be applied in an integrated approach, combining both supply and demand. Recommendations relating to this include the following:

1. A supportive infrastructure for sustainable supply chains should be developed through a combined industry and government approach, including an appropriate policy and regulatory framework.

2. The framework proposed in this thesis should be used in stakeholder planning processes to identify potential initiatives to support sustainable production and consumption. Roles and responsibilities at national, state, regional, local and supply chain scales should also be identified. Stakeholders should also be engaged in refining the intervention framework including clarifying the proposed sustainability values and dimensions. Appropriate indicators of sustainable supply chains should also be defined.

3. Ongoing research related to implementation of sustainable food and fibre production and consumption systems in Australia should be conducted. This includes assessing the application of approaches being used in other countries, such as the sustainable production and consumption approaches emerging from the EU.

4. Initiatives relating to improving environmental and social sustainability values in food and fibre production and consumption should target all supply chain sectors. This includes focusing on key players in the manufacture and retail sectors which have the potential to drive sustainability agendas, thereby influencing both farmers and consumers. Efforts in Australia relating to promoting sustainable consumption should also be increased.

## 11.3.2 Formalising commitments to sustainability through organisational and policy innovation

There is considerable scope for improving uptake of sustainable production and consumption practices through organisational and policy support and through self-regulated and regulated mechanisms. Whilst it is clear that further investigation into the potential role of sustainability certification systems is required, this study demonstrated the benefit of 'joining the dots' between sustainability initiatives and aspirations within existing supply chains through the use of certification. Certification was demonstrated as an important intervention mechanism in facilitating sustainable food and fibre supply chains, but this requires greater stakeholder consideration.

1. Improve coordination of food and fibre policy development and implementation including across government departments and ministerial jurisdictions including health, agriculture, environment and trade.

2. Support the development of industry driven and corporate sustainability approaches.

3. Expand the use of voluntary policies and programs (such as the Global Sustainable Agriculture Initiative) to encourage manufacturer and retailer sustainable procurement policies and local application of these policies in Australia.

4. Consider the potential of national or other sustainability certification systems within the context of the other 'dimensions' of sustainable food and fibre identified in this thesis. The relative disadvantages of certification also need to be considered in combination with consideration of other methods of environmental and social attribute signalling.

5. Subject to further consultation with stakeholders on the requirements for a sustainability certification system or systems in Australia, the product rather than the farm or factory should be the focus of the potential sustainability certification system(s). The system should be applied to the entire supply chain of the product although systems to certify farms and other production processes (e.g. EMS) are likely to be required. These would be recognised within the product certification process.

6. Any sustainability certification or assurance system developed should integrate with existing certification schemes, have minimal documentation requirements, have an easily recognized mark which is certified by an independent third-party body, be easily integrated with quality and safety requirements and be cost effective.

7. Environmental sustainability, social equity and animal welfare issues should be integrated into the sustainability certification system(s), rather than a system that focuses on environmental sustainability alone. These components may present as different modules.

### 11.3.3 Increasing knowledge about sustainability through education and marketing

A range of sustainable production and consumption related education, awareness and marketing programs targeted at farmers, corporate business and consumers were highlighted as key influencers of sustainable practice in the case studies examined. This included programs delivered though local landcare or NRM organisations, EMS support and training programs and participatory approaches and extension by government and non-government, research and industry organisations. Sustainability education and awareness raising by consumer groups and lifestyle networks was also important in raising awareness of sustainable consumption options. Related interventions in this area include the following:

1. Continue and enhance Commonwealth, state government, industry and NRM organisation supported education and awareness programs targeting sustainable practices on farms, ensuring that these programs recognise the wider context of the supply chain.

2. Support non-government organisations such as landcare organisations and industry associations (focused on farmers) and sustainable consumption groups or networks (focused on consumers) to undertake sustainability education, awareness and marketing activities.

3. Develop education and marketing programs that raise awareness of sustainable consumption options for consumers and motivate consumer action including the use of sustainable product guides and lists and virtual sustainable product marketplaces.

### 11.3.4 Building relationships and networks to support sustainable practice

The ability to incorporate social and environmental sustainability values was partly dependent on the strength of the relationships between actors in the production to consumption system. This included direct relationships between supply chain actors but also relationships with related organisations including certification, landcare, government, industry and conservation

organisations. Interventions related to building relationships to support sustainable practice include the following.

1. Promote information exchange and sharing among existing sustainability initiatives and projects and enable better linkages between sustainability initiatives at farm, wholesale, manufacturing and retail stages.

2. Promote enhanced cooperation among stakeholders including government, agricultural industry and corporate interests, regulatory bodies, conservation organisations and consumer interest groups to achieve a greater sustainability focus in the food and fibre industry.

3. Encourage initiatives to build relationships between supply chain actors based on shared sustainability values such as forums where supply chain actors can share sustainability-related information.

4. Build relationships between producers and consumers through farm and factory tours, product stories, farmers markets, Community Supported Agriculture and other methods.

5. Recognise and build on the value of sustainable lifestyle community networking in supporting sustainable practice (particularly sustainable consumption).

## 11.3.5    Implementing economic sustainability strategies

Efforts related to incorporating environmental and social sustainability initiatives in production processes may need greater economic support to generate more sustainable supply chains in Australia. Considerable financial and emotional stress can be faced by individuals who implement these initiatives. Increased costs include those associated with integrating new or improved practices and technologies, costs of differentiation and the potential for considerable increases in the costs of marketing. The following interventions are recommended to address these issues:

1. Promote greater transparency on the costs, benefits and financial impacts of diverse sustainability approaches at all supply chain stages and identify price structures for food and fibre products that internalise environment and social costs and benefits.

2. Reward farmers for conservation services within food and fibre production systems including through the use of financial incentives or grants.

3. Support regional community development and provision and maintenance of regional infrastructure through grants, subsidies or other economic support.

4. Provide opportunities for sustainable production to be profitable including policies and instruments that ensure equity and viable profit margins for all actors in the supply chain, balancing financial inequities between supply chain sectors.

5. Support risk-taking related to development of more sustainable food and fibre supply chains. This may include new market seeding support, tax relief options, subsidies for sustainable production, support for research and development and better access to related market, technology or other information.

6. Encourage support of sustainable practices on farm by large manufacturing and retail companies. This may involve these companies providing assistance through logistic and financial support on source farms, including the use of price signals.

7. Continue and enhance eco-efficiency and other sustainability initiatives targeted at manufacturing and retail sectors.

8. Address labour shortages in agriculture through training and study opportunities, revising policies and programs related to migration and seasonal jobs and enabling businesses to improve working environments to attract and retain staff.

9. Develop programs that support food equity allowing low income consumers to access food with the values that are important to them, ensuring that products with health, environmental sustainability, local, animal welfare and other attributes important to consumers are not just available to wealthier consumers.

These interventions are specific actions that can be undertaken by different stakeholders involved in food and fibre production to consumption systems. In the next part of this chapter, these interventions are considered through general concluding statements regarding making a difference in the area of sustainability in food and fibre systems.

## 11.4 Making a difference

As well as the four study objectives, this study set out with five terms of reference (or orienting concepts) set out in the introductory chapter. These included contributing to change, involving stakeholders in the research effort using a participatory model, telling the stories of people involved using the vehicle of product narratives, better understanding the systemic nature of food and fibre production and consumption and exploring alternatives to the dominant paradigm of productivist agriculture.

An important driver of this study was to make a difference in the context of sustainable food and fibre. Midgley's (2000) three pillars of systemic intervention were realised in this study. That is, there was significant reflection on the boundaries of the system in question (the first pillar), choices were made between theories and methods which best guided action (the second pillar) and there was significant effort in taking action for improvement through the development of an intervention framework (the third pillar).

Providing some clarity out of the confusion of ideas that surround this issue was a key objective of this study. The two conceptual models, the first for understanding and the second for intervening in sustainable supply chains provide this clarity by gathering and ordering relevant information through systems analysis.

Whilst difficult to quantify, it is suggested that the action of researching this topic gave sustainability in food and fibre a louder voice amongst participants. That is, existing attitudes and ideas were given a voice and a stronger presence.

Another objective of this study was to create benefits to the participants involved. Benefits of this research potentially included the strengthening of the supply chain thorough increased awareness of the role of players within the chain. That is, producers know more about who is consuming their products and the consumers know more about how their products are made. As for other examples of research conducted into agricultural product life cycles, this study has potentially proved beneficial for participants because it reveals areas of improvement. A number of participants commented that through the process of being involved in this study, new ideas and perspectives were raised for them.

## 11.4.1    Methodological suitability

As Midgley (2000:77) suggests, 'a plurality of theories ultimately generates more insights for intervention than one position alone'. This study used adaptive theory within the wider objective of systemic intervention to consolidate information which was also influenced by systems thinking and the use of narrative.

This study drew on a wide range of sources of empirical information including semi-structured interviews with supply chain actors, structured interviews with consumers, forums with key representatives from the case study commodity industries and a supply chain forum. It also drew on information from wider sources that were accessible to the researcher including national forums and working groups considering the topic of environmental certification. This variety of information sources allowed themes to be considered from a number of angles. Adaptive theory was used to coordinate these sources of information into themes and concepts useful in explaining the drivers and impediments to food and fibre sustainability as well as potential interventions.

The strength of the methodological approach was supported by confirmation of major themes across these different information sources. Evidence of theoretical saturation was confirmed through the forum outcomes. For example, the supply chain forum was run as an open forum where the participants set the agenda and they often confirmed and articulated similar material that had emerged from interviews. This saturation gave confidence that the core concepts identified were rigorous and correct in describing the pertinent issues.

The method used in studying two examples of each of the major commodities in the catchment was theoretically useful. This provided a vantage point from which to observe the whole industry infrastructure of that commodity type. For example, a glimpse into the world of strawberry production was given by studying an organic and conventional example and this enabled capture of values and issues that were symptomatic of the whole horticultural industry, whilst being personalised by the particular case studies. The comphrehensive understanding of sustainability issues in each commodity group was aided by the use of forums targeting the key industries considered in this study. Outcomes of the different theoretical approaches used within the methodology of this study are explored further below.

## 11.4.2 Understanding supply chains as systems

Interviewing actors within entire production to consumption systems provided information on the systemic aspects of food and fibre production and consumption as well as the wider settings and contexts in which sustainability values were developed (or not developed). This holistic approach which considered interactions from farmer to consumer provided new insights as to what is driving and impeding efforts at sustainability in food and fibre systems, as compared to looking at individual sectors.

Considering the system rather than the individual sectors also gave some indication of how pressures on one supply chain sector can translate across the system. As theories relating to sustainable production and consumption behaviour emerged from one part of the system, these were incorporated into the enquiries relevant to other parts of the system. For example, the consumer questionnaire evolved from material collected from upstream supply chain actors. This ensured an iterative approach that captured issues across production to consumption systems.

The usefulness of the production to consumption system (Courville 2001) to define the complex and interactive human activity systems involved was demonstrated by the improved understanding of systemic influences outlined in this thesis. The use of this systemic approach has also enabled the articulation of new problem definition for the complex issue of incorporating sustainability in food and fibre systems. This new problem definition points to the systemic influences rather than the limited focus on the management practices of farmers or other individual supply chain sectors.

Outcomes of the study confirm the prevailing assumption that guided the methodology of this investigation which is that improvements in food and fibre sustainability require a systems approach that involves all participants in the system.

### 11.4.3 Developing shared knowledge through participation

One of the orienting concepts of this thesis related to the desire to collaboratively evolve locally relevant knowledge. The degree to which this objective was met through the study is best shown by the forum outcomes. People involved in these forums actively participated and many commented that these opportunities were unique both in terms of the subject matter and the mix of audience. The most engaged group were those attending the supply chain forum and discussions about this forum continued via email for sometime after the forum, mostly relating to what the next steps could be to build on the enthusiasm and interest created by the forum.

Also, the method of semi-structured interviews and open forums allowed the participants to set the agenda within the broad framework of sustainable food and fibre, ensuring active participation.

An issue, however, with the participatory model is consultation fatigue, well known in NRM circles and the need to limit participation to levels that are manageable for participants. One of the participants in the study did reach participation fatigue. He was involved as a key farmer interviewee and attended the industry forum and supply chain forum. This was on top of an already exhaustive schedule of community and industry involvement. Whilst he commented that the supply chain forum was very worthwhile to him, after the industry forum, at which he was one of the major contributors, he suggested that he had done his bit and contributed enough. During his interview, he had previously mentioned that he had issues with contributing without due returns for his efforts.

Over 200 people were involved in this study and negative feedback was only received from this one individual. However, numbers of contented participants is not necessarily an indicator of successful participation. It is proposed that the success of the participatory approach is shown through the incorporation of a comprehensive range of issues reflecting the diversity of participants, as detailed in this thesis.

## 11.4.4      Reflection on boundaries

As Midgley (2000:129) states '…systemic intervention is purposeful action by an agent to create change in relation to reflection on boundaries'. One of the aims of this study was to better understand the wider social network implicated in food and fibre systems beyond the farm scale. This was achieved through a constant process of reflecting on boundaries throughout the study, effectively expanding knowledge through the inclusion of different sources and stakeholders to better explain social phenomena observed in production to consumption systems.

The need to include perspectives from participants outside of the original boundary became evident as the research progressed. For example, it was considered necessary to locate the case study food and fibre supply chains within the larger context of the industries with which they were associated. The industry forums allowed a new interpretation of many of the aspirational views expressed in interviews through a perspective that largely focused on the economic viability of these industries.

Additions to the original stakeholder boundary also included perspectives from intermediary organisations (e.g. conservation and food lifestyle organisations) and other actors including caterers. These were incorporated by the addition of the supply chain forum to the data collection methods.

Midgley's (2000) boundary critique provides a useful tool for examining the different elements arising from different stakeholders and the apportioning of different values to those elements. The study demonstrated that there was significant overlap between consumer and farmer issues but much less between middle chain actors and consumers or farmers.

There was also compatibility between sectors in terms of what they believed were the important issues for sustainability. Health emerged as the most important issue for all sectors concerned. Farmers and consumers shared concerns over health, environmental sustainability, animal welfare, regional sustainability issues and taste. Issues important to farmers, but not necessarily consumers included profitability, land and water sustainability, biodiversity and social equity in terms of workers rights (including managerial control and fair business dealings).

Generally farmers were tuned into consumer issues however issues that were important for consumers but less so for farmers included availability, accessibility and affordability of products. Farmers and middle chain actors shared concerns regarding quality assurance and transport efficiency.

Industry, government and NGO organisations concerned with environmental management in agriculture almost exclusively targeted the farm stage of production and were concerned with best practice standards, resource efficiency and industry scale viability issues. Concern with these issues was not shared with middle chain or consumer sectors although the concern over duty of care and industry viability was shared between these organisations and farmers.

NGO's involved in raising consciousness about sustainable consumption recognised the value of linking farmers and consumers and shared concerns with both of these sectors focusing largely on ethical values or as defined in this study, the core sustainability values.

Using this analysis of boundaries, it can also be seen that the core sustainability values were important for farmers and consumers and less so for manufacuters and retailers. This, amongst other causative effects, explains the reason for the marginalisation of the issues related to ethical production and consumption in food and fibre systems. Discourses concerning these sustainability values are generally not seen as relevant by the institutions who essentially wield much of the control. The difference in views and values between production to consumption system participants revealed in this study has implications for the intervention agenda and where interventions are best targeted.

## 11.4.5    Sustainability narratives

The product narratives gave insight into the construction and maintenance of the social world of food and fibre production to consumption systems. Telling the sustainability stories of the ten selected product lines enabled a focus on the social experience of sustainable food and fibre systems. This assisted in understanding the factors that shape the life trajectories of individuals involved in each supply chain and to better understand contributions of these factors to sustainable supply chain approaches. The product narratives were useful in communicating the three facets of narrative, the temporal, meaningful and social elements.

This included capturing changes over time which included one of the supply chains going out of business as well as new developments in others that aided sustainability objectives. The narrative form also helped in identifying the reasons behind these changes. The communication of information and themes that were meaningful was facilitated by encouraging people to tell their sustainability stories in their own way through the use of semi-structured interviews and open forums. Social elements captured through the product narratives include importantly, the interactions that make up the collective human stories involved in each of case study products.

## 11.4.6    The future of sustainable food and fibre systems

This study used a regional context to explore the implications of changing circumstances impacting on sustainability in food and fibre production to consumption systems. This includes the decreasing availability of resources and increasing demand for incorporation of sustainability values in food and fibre products, although Australia is lagging in this regard compared to some other countries. The patterns and processes occurring in the ten production to consumption systems explored in this study have implications and lessons for future efforts at creating sustainable food and fibre systems in a range of ecological and socio-economic contexts.

The findings demonstrate how supply chain actors can accept the dominant paradigms of production to consumption systems, or they can respond by co-creating new systems which better incorporate their sustainability values. Achieving this requires the use of unique mixes of interventions, relationships and formal and informal arrangements which offer opportunities for resistance to dominant food systems (whether or not this is an explicit objective). This allows supply chain actors to engage in food and fibre systems according to their particular sustainability values.

Whilst this study recommends practices and processes to facilitate sustainable supply chains, it is also acknowledged that 'sustainable supply chains' are unlikely to exist in perfect form. Discourses concerning visions for sustainable food and fibre systems revealed both commonalities and differences by those involved, with different ideas of how to address the range of issues involved emerging from different supply chain sectors, as well as from the intermediary organisations. Revealed as important is the recognition that sustainability in food and fibre systems is a shared responsibility.

Also revealed as critical in sustainable supply chains is the transfer of sustainability values between farm to consumer. This can occur through attribute signalling via a number of methods including certification, labelling, marketing, product sustainability narratives and direct purchase. However this transfer of values between farm and consumer often relies on middle chain actors. It was these middle chain actors, particularly in conventional (non-certified) chains that are shown in this study to be the least interested in environmental and social sustainability issues of all the supply chain sectors, with some notable exceptions. This study reveals the middle chain sectors as an important focus area for future interventions which has often been excluded in the development of policy related to agricultural sustainability.

However interventions to promote and facilitate more sustainable food and fibre systems should not only target this issue in isolation. Interventions need to be developed and implemented in recognition of the systemic nature of production to consumption systems, with consideration of all sectors and relevant intermediary organisations. The intervention framework proposed in this thesis provides a range of transformational scenarios that could be used to improve incorporation and transfer of sustainability values in future food and fibre systems.

# REFERENCES

AACM (1995). <u>Natural Resource Economics Workshop Notes and Resource Material</u>. AACM International, Adelaide.

ABARE (2001). <u>Australian Farm Surveys Report 2001</u>. Australian Bureau of Agricultural and Resource Economics, Canberra.

ABARE (2007). 2007 Commodities: natural fibres: outlook for wool and cotton, Australian Bureau of Agricultural and Resource Economics [URL: http://www.abareconomics. com/ interactive / ac_mar07/htm/ fibres.htm]. 2007.

Allen Consulting (2004). <u>Environmental Sustainability in the Australian Food Industry: The Commercial Opportunities</u>. National Food Industry Strategy Limited, Canberra.

Allison H. and Hobbs R. (2006). <u>Science and Policy in Natural Resource Management: Understanding System Complexity</u>. Cambridge University Press, Cambridge.

Appadurai A. (1986). Introduction: Commodities and the politics of value. <u>The Social Life of Things</u>. ed A. Appadurai. Cambridge University Press**:** Cambridge, pp.3-63.

Arce A. and Marsden T. (1993). "The Social Construction of International Food: A New Research Agenda." <u>Economic Geography</u>  **69**: 293-311.

Arnstein S. (1969). "A ladder of citizen participation." <u>American Institute of Planners Journal</u> (July): 216-224.

Australian Bureau of Statistics (2005). Population by Age and Sex, Western Australia [URL: http://www.abs.gov.au/ausstats/abs@.nsf/mf/3235.5.55.001]. **2007**.

Australian Bureau of Statistics (2006). Household Expenditure Survey, Australia: Summary of Results, 2003-04 [URL:http://www.abs.gov.au/Ausstats/abs@.nsf/Latestproducts /6530.0Main%20Features32003-04%20(Reissue)].

Australian Bureau of Statistics (2008). Water Use on Australian Farms 2005-06 [URL:http://www.abs.gov.au:80/AUSSTATS/abs@.nsf/DetailsPage/4618.02005-06?Open Document]. **2008**.

Australian Farm Institute (2005). Australia's Farm-dependent economy: analysis of the role of agriculture in the Australian economy. Australian Farm Institute, Surry Hills, New South Wales.

Australian Food and Grocery Council (2003). Environment Report 2003. Australian Food and Grocery Council, Canberra.

Australian Marine Conservation Society (2007). Australia's Sustainable Seafood Guide, Expanded Edition. Australian Marine Conservation Society, Manly, QLD.

Australian Wine and Brandy Corporation and the Winemakers' Federation of Australia (2006). Sustaining Success: Australian Wine Industry Environment Strategy. [URL: http://www.wfa.org.au/files/what_we_do/Sustaining_Success.pdf] **2009**

Australian Wine and Brandy Corporation and the Winemakers' Federation of Australia (2007). Wine Australia: Directions to 2025. [URL: http://www.wineaustralia.com/australia/LinkClick.aspx? fileticket=QsfzgT21xhE%3d&tabid=3529] **2009**

Backshal P. (2000). Environmental Accreditation System Market Analysis Project. Western Australian Department of Agriculture, Perth.

Barr N.F and Cary J.W. (2000). Influencing Improved Natural Resource Management on Farms: A guide to understanding factors influencing the adoption of sustainable resource practices . Bureau of Rural Sciences, Canberra.

Barr N.F. and Cary J.W (1992). Greening a Brown Land: The Australian search for sustainable land use. MacMillan, Melbourne.

Barstow C. (2002). The Eco-foods Guide. New Society Publishers, British Columbia, Canada.

Batt P., Noonan J. and Kenyon P. (2006). Global trends analysis of food safety and quality systems for the Australian food industry. Curtin University of Technology, Perth.

Bell S. and Morse S. (2000). Sustainability Indicators: measuring the immeasurable. Earthscan, London.

Bentley M, Fien J and Neil C (2004). Sustainable Consumption: Young Australians as Agents of Change. National Youth Affairs Research Scheme, Australian Government Department of Family and Community Services, Canberra.

Bentley M. (2004). Tracking Progress Implementing Sustainable Consumption Policies: A global review of the implementation of the United Nations Guidelines for Consumer Protection. UNEP/Earthprint, New York.

Biological Farmers of Australia (2004). Organic Annual Report 2004 [URL: http://www.bfa.com.au/_files/Organic_Annual2004_Take2.pdf]. **2007**.

Blackwood Basin Group (1999). Landholder Attitudes to Landcare in the Blackwood Basin. Blackwood Basin Group, Boyup Brook, Western Australia.

Blackwood Basin Group (2000). Blackwood Basin Group Business Plan: 2000 and Beyond. Blackwood Basin Group, Boyup Brook, WA.

Blackwood Basin Group (2001). Blackwood Basin Landcare Census. Blackwood Basin Group, Boyup Brook, Western Australia.

Boland A., Bewsell D. and Kaine G. (2005). "Adoption of sustainable irrigation management practices by stone and pome fruit growers in the Goulburn/Murray Valleys, Australia." Irrigation Science (2005).

Bowman S. and Ruprecht J. (2000). Blackwood River Catchment Flood Risk Study. Surface Water Hydrology Report Series, Report No SWH 29,. Perth, Water and Rivers Commission.

Brand DNA (2005). <u>King Island Pilot Project Quantitative Research Findings</u>. King Island Natural Resource Management Group, Hobart.

Brandt, J.C. (2003). <u>Sustainable Consumption and the Role of Ecolabelling.</u> Conference on Future of Ecolabelling in Australia, Canberra, Australia

Brickley C. (2002). <u>Extending eco-label standards to include soil and water quality: the Protected Harvest approach</u>. Conference on Ecolabels and the Greening of the Food Market, Boston MA.

Bruntland G. (1987). <u>Our common future: The World Commission on Environment and Development</u>. Oxford University Press., Oxford.

Cary J. (1993). "The nature of symbolic beliefs and environmental behaviour in a rural setting." <u>Environment & Behaviour</u> **25**: 555-576.

Cary J., Bhaskaran S. and Polonsky M. (2004). Green Marketing and EMS, Assessing the potential influence on EMS development in Fresh Food Chains. <u>RIRDC Publication 04/175</u>. Canberra, Rural Industries Research and Development Corporation.

Center for Global Development (2007). <u>Commitment to Development Index 2007</u>. Center for Global Development, Washington DC.

Challies E. (2008). "Commodity Chains, Rural Development and the Global Agri-food System." <u>Geography Compass</u> **2**(2): 375–394.

Charmaz K. (2006). <u>Constructing grounded theory: A practical guide through qualitative analysis</u>. Sage Publications, Thousand Oaks, California.

Checkland P. (1985). "From Optimizing to Learning: A Development of Systems Thinking for the 1990s." <u>Journal of the Operational Research Society</u> **36**(9): 757-767.

Checkland P. (1999). <u>Systems Thinking, Systems Practice</u>. Wiley, London.

Chesson, J. (2006). <u>Sustainability Indicators</u>. Bureau of Rural Sciences, Canberra.

Clayton A. and Radcliffe N. (1996). Sustainability, a systems approach. James & James/Earthscan.

Cock P. (1990). Values for sustainability: the necessity of transcendence and sacred realms. Fundamental Questions Paper No 5. Centre for Resource and Environmental Studies, Australian National University: Canberra.

Cocklin C. and Alston M. (2003). Community sustainability in Rural Australia: A question of capital? Academy of the Social Sciences in Australia, Wagga Wagga NSW.

Codron J., Siriex L. and Reardon T. (2006). "Social and environmental attributes of food products in an emerging mass market: Challenges of signalling and consumer perception, with European illustrations." Agriculture and Human Values  23(283-297).

Compassion in World Farming (2007). Ethics and Animal Farming: A Web-based interactive exercise [URL:http://www.ciwf.org/education/ethics.html]. 2007.

Coote L., Ecker S., Kershaw C. and Martin K. (2006). BestFarms Final Report. Blackwood Basin Group, Boyup Brook.

Corish P. (2006). Creating our Future: agriculture and food policy for the next generation. ABARE Agriculture and Food Policy Reference Group, Canberra.

Costanza R. (1991). Ecological Economics: The Science and Management of Sustainability. Columbia Univ. Press., New York.

Courville S. (2001). Not Just Trade, steps toward incorporating social and ecological costs into international trade. Lessons learnt from 'better case' studies of coffee production-to-consumption systems. School of Resources, Environment & Society. Canberra, Australian National University.

Courvisanos J. and Martin J. (2005). Developing Policy for Australia's Small Towns: From Anthropology to Sustainability. 2nd Future of Australia's Country Towns Conference, Bendigo.

Cullen P. (2007). Presentation on Implications of Climate Change. Climate Change Seminar, Gunning, NSW.

Czarniawska B (1998). A Narrative Approach to Organisation Studies. Sage Publications, Thousand Oaks, California.

Darnton A. (2004). Driving Public Behaviours for Sustainable Lifestyles. Department of Environment Food and Rural Affairs (United Kingdom).

Davis P. (2003). The Changing Face of Agriculture in Australia and Victoria, Rural Press Club of Victoria.

DEFRA (2006). Food Industry Sustainability Strategy. Department of Environment Food and Rural Affairs (DEFRA), London.

Deni Greene Consulting Services (1996). More with Less - Initiatives to promote sustainable consumption. Environmental Economics Research Paper No.3. Australian Consumers Association and National Key Centre for Design, RMIT for the Department of the Environment, Sport and Territories Commonwealth of Australia.

Department of Agriculture Western Australia (2003). Natural Resource Management Issues: South West Region. Department of Agriculture, Western Australia.

Department of Agriculture Western Australia (2006). Sustainability Issues for Agriculture in Western Australia. Department of Agriculture, Western Australia.

Department of Food and Agriculture Western Australia (DAFWA) (2007). The land is in your hands: a practical guide for owners of small rural landholdings in Western Australia Perth.

Dietz T., Kalof L. and Stern P. (2002). "Gender, values and environmentalism." Social Science Quarterly  83 i1(12): 353.

Dixon J. (1999). "A cultural economy model for studying food systems." Agriculture and Human Values **16**: 151-160.

Dovers S. (2005). Environment and Sustainability Policy: Creation Implementation and Evaluation. The Federation Press, Leichhardt, New South Wales.

Ecker S., Karafilis A. and Taylor R. (2001). "Challenges of the Blackwood Basin." Water Science and Technology Journal **43**(9).

Ecker S. and Coote L. (2005). "BestFarms - An integrated approach to environmentally sustainable farming." Australasian Journal of Environmental Management: 12: 215-220.

Ecotrust (2005). The New Mainstream: A Sustainable Food Agenda for California, Ecotrust group.

Elliot J. (2005). Using Narrative in Social Research, Qualitative and Quantitative Approaches. Sage Publications, Thousand Oaks, California.

Environment Australia (2003). Triple Bottom Line reporting in Australia: a guide to reporting against environmental indicators. Australian Government Department of the Environment and Heritage, Canberra.

Environmental Management Systems Working Group (2001). Proposed Framework for the Development of Environmental Management Systems in Agriculture. Department of Agriculture Forestry and Fisheries, Canberra.

Environmental Protection Authority (2007). State of the Environment Report, 2007. Environmental Protection Authority (EPA), Perth.

European Commission (2004). Welcome to the Commission's web pages on Integrated Product Policy. [URL: http://europa.eu.int/comm/environment/ipp/home.htm]. **2007**.

Fenton D., MacGregor C. and Cary J. (2000). Framework for Review of Capacity and Motivation for Change to Sustainable Management Practices. Bureau of Rural Sciences, Canberra.

Fine B. and Leopold E. (1993). The World of Consumption. Routledge, London.

Flyvbjerg B. (2001). Making Social Science Matter: Why Social Inquiry Fails and How it Can Succeed Again. Cambridge University Press.

Foran B. (2005). Balancing Act: A triple bottom line analysis of 135 sectors of the Australian economy. CSIRO, University of Sydney, Sydney.

Friedland W. (1984). "Commodity Systems Analysis: An approach to the sociology of agriculture." Research in Rural Sociology and Development **1**: 221-235.

Friedland W. (2001). "Reprise on Commodity Systems Methodology." International Journal of Sociology of Agriculture and Food **9**: 82-103.

George R., Clarke C., Hatton T. and Reggiani P. (1999). The effect of recharge management on the extent of dryland salinity in Western Australia: A summary of modeling study prepared for the State Salinity Council. State Salinity Council, Perth.

Giddens A. (1974). Positivism and Sociology. Heinmann Educational Books, London.

Gilbert N. (1993). Researching Social Life. Sage Publications, Thousand Oaks, California.

Gilg A., Barr S. and Ford N. (2005). "Green consumption or sustainable lifestyles? Identifying the sustainable consumer." Futures **37**: 481–504.

Glaser B. G. (1978). Theoretical Sensitivity: Advances in the Methodology of Grounded Theory. The Sociology Press, Mill Valley, CA.

Goodman D. (2002). "Rethinking Food Production-Consumption: Integrative Perspectives." Sociologica Ruralis **42**(4): 271-277.

Gordy L. (2002). Differential Importance of Ecolabel Criteria to Consumers. Conference on Ecolabels and the Greening of the Food Market, Boston MA.

Government of Western Australia (2007). State Water Plan 2007 Perth.

Gray I. and Lawrence G. (2001). A future for regional Australia: Escaping global misfortune. Cambridge University Press, Cambridge.

Gunningham N. and Sinclair D. (2002). Environmental Partnerships: Combining sustainability and commercial advantage in the agriculture sector. RIRDC Publication No 02/004, Rural Industries Research and Development Corporation, Canberra.

Hall J. (2000). "Environmental supply chain dynamics." Journal of Cleaner Production **8**: pp. 455 to 471.

Hanslip M., Kancans R., Maguire B. and Byron I. (2007). Social and Economic Data for Regional Natural Resource Management in Western Australia's South West Catchment: Results of the 2006 Landholder Survey. Bureau of Rural Sciences, Canberra.

Hatton T., Ruprecht J. and George R. (2003). "Preclearing hydrology of the Western Australian wheatbelt: target for the future." Plant and Soil **257**: 341-356.

Hayward C., Simpson L. and Wood L. (2004). "Still left out in the cold: problematising participatory research and development." Sociologica Ruralis **44**(1): 95-108.

Heilbron S. and Larkin J. (2006). Enhancing the Customer Focus of Australian Agriculture. Prepared for the Australian Farm Institute, Elders Australia Ltd and National Food Industry Strategy Ltd, Surry Hills, New South Wales.

Hin-Gee Pty Ltd (1995). Annutriculture: The Natural Path to Increased Profits. Victor Harbour, SA, Hin-Gee (Rural) Pty Ltd.

Holloway L., Kneafsey M., Venn L., Cox R., Dowler E. and Tuomainen H. (2007). "Possible Food Economies: a Methodological Framework for Exploring Food Production–Consumption Relationships." Sociologia Ruralis **47**(1).

Howard P. and Allen P. (2006). "Beyond Organic: consumer interest in new labelling schemes in the Central Coast of California." International Journal of Consumer Studies **30**(5, September 2006): 449-451.

Hoy G. (2008). ACCC warn against petrol coupons. ABC 7.30 Report, 8 May 2008. [http://www.abc.net.au/7.30/content/2007/s2239432.htm].

HRDC & NLWRA (2001). Horticulture productivity and production. Joint publication of the Horticulture Research and Development Corporation and the National Land and Water Resource Audit, Canberra.

Huisman R., Murphet J. and Dunn A. (2005). Narrative and Media. Cambridge University Press, Cambridge.

Indian Ocean Climate Initiative (2002). Climate variability and change in south west Western Australia. Indian Ocean Climate Initiative, Perth.

International Institute for Sustainable Development (2007). Sustainable Commodity Initiative [URL:http://www.iisd.org/markets/sci/].

ISEAL Alliance (2007). ISEAL Alliance Members Commended by Richard Howitt, MEP for Compliance with Code of Good Practice. [URL:http://www.isealalliance.org/index.cfm?fuseaction= Feature.showFeature&CategoryID=39&FeatureID=131]. **2007**.

ISEAL Alliance (2007). Voluntary Carbon Standard Framework [URL: http://www.isea lalliance.org/index.cfm?fuseaction=Feature.showFeature&CategoryID=39&FeatureID= 141]. **2007**.

Jin H. J., Skripnitchenko A. and Koo W. (2004). The Effects of the BSE Outbreak in the United States on the Beef and Cattle Industry. Department of Agribusiness and Applied Economics, North Dakota State University, Fargo.

Keen, M., Brown V. A. and R., D. (2005). <u>Social learning for Environmental Management: towards a sustainable future</u>. Earthscan, London.

Konefal J., Mascarenhas M. and Hatanaka M. (2005). "Governance in the global agro-food system: Backlighting the role of transnational supermarket chains." <u>Agriculture and Human Values</u> **22**: 291-302.

Lang T. and Heasman M. (2004). <u>Food Wars, The Global Battle for Mouths, Minds and Markets</u>. Earthscan, London.

Larsen K., Ryan C. and Abraham A.B. (2008). Sustainable and Secure Food Systems for Victoria: What do we know? What do we need to know? <u>VEIL Research Report No.1</u>. Melbourne, Victorian Eco-Innovation Lab (VEIL) Australian Centre for Science, Innovation and Society, University of Melbourne.

Layder D. (1993). <u>New Strategies in Social Research</u>. Polity Press, Cambridge.

Layder D. (1997). <u>Modern Social Theory, Key debates and new direction</u>. University of Leicester Press.

Layder D. (1998). <u>Sociological Practice: Linking Theory and Social Research</u>. Sage Publications, Thousand Oaks, California.

Leiserowitz A. and Fernandez L. (2008). <u>Toward a new consciousness: values to sustain human and natural communities: A Synthesis of Insights and Recommendations from the 2007 Yale F&ES Conference</u>. 2007 Yale Forestry & Environmental Studies Conference, Yale School of Forestry & Environmental Studies.

Lockie S. and Kitto S. (2000). "Beyond the Farm Gate: production-consumption networks and agri-food research." <u>Sociologia Ruralis</u> **40**(1): 3-19.

Lockie S. and Pritchard B. (2001). <u>Linking Production, Consumption and Environment in Agri Food Research</u>. Centre for Social Science Research, Central Queensland University, Rockhampton, QLD.

Longworth J. and James C. (2004). EcoRange: Market-orientated Environmental Certification for Rangeland Pastoral Industries. Report 5 Australian environment group survey. RIRDC Publication 04/016. Canberra, Rural Industries Research and Development Corporation.

Love C. (2005). Natural Resource challenges facing Australian Agriculture. Australian Farm Institute Strategic Roundtable Conference Proceedings, Rural Resources Group Pty Ltd.

Liao, B and Martin, P. (2009) Farm innovation in the broadacre and dairy industries, 2006-07 to 2007-08, ABARE research report 09.16, Canberra.[URL: http://www.abare.gov.au/publications html/crops/crops_09/FarmInnovation.pdf] 2009

MacNamara K. and Pahl L. (2003). EcoRange: Market-Oriented Environmental Certification for Rangeland Pastoral Industries Reports 1-7. Rural Industries Research and Development Corporation, Canberra.

Marsden T., Murdoch J. and Morgan K. (1999). "Sustainable Agriculture, Food Supply Chains and Regional Development. Editorial Introduction." International Planning Studies 4(3): 295-301.

Massarrat M. (1997). "Sustainability through cost internalisation: Theoretical rudiments for the analysis and reform of global structures." Ecological Economics 22: 29-39.

Maxwell A. (1996). Qualitative Research Design, An Interactive Approach. Sage Publications, Thousands Oaks, California.

Mech T. and Young M. (2001). VEMA's: Designing Voluntary Environmental Management Arrangements to Improve Natural Resource Management in Agriculture and Allied Rural Industries. Rural Industries Research and Development Corporation, Canberra.

Michaelidou M., Decker D. and Lassoie J. (2002). "The interdependence of Ecosystems and Community Viability: A theoretical Framework to Guide Research and Application." Society and Natural Resources 15: 599 -616.

Midgley G. (2000). <u>Systemic Intervention: Philosphy, Methodology, and Practice.</u> Kluewer
      Academic / Plenum Publishers, New York, New York.

Mikkelsen B. (1995). <u>Methods for development work and research: a guide for practitioners</u>.
      New Delhi and Thousand Oaks, SAGE publications, Thousand Oaks, California.

Morey D. and Miller S. (2004). <u>The Underdog Advantage: Using the Power of Insurgent</u>
      <u>Strategy to Put Your Business on Top</u>. McGraw Hill Co, United States.

Morse J. and Richards L. (2002). <u>Read me first for a users guide to qualitative methods</u>. Sage
      Publications, Thousand Oaks, California.

Naess A. (1995). Self -realization, an ecological approach to being in the world. <u>Deep Ecology</u>
      <u>for the 21st Century. Readings on the Philosophy and Practice of the New</u>
      <u>Environmentalism</u>. Sessions G. Random House**,** United States.

National Land and Water Resources Audit (2001). <u>Australian Agriculture Assessment 2001</u>.
      National Land and Water Resources Audit, Canberra.

National Water Commission (2005). Australian Water Resources 2005
      [URL:http://www.water.gov.au/WaterUse/Agriculturalwateruse/index.aspx?Menu=Lev
      el1_4_4]. **2008**.

OECD Environment Programme (2002). <u>Towards Sustainable Household Consumption: Trends</u>
      <u>and Policies in OECD Countries</u>. Organisation for Economic Cooperation and
      Development, Paris.

O'Keefe M. (2003). Value Chain Awareness: Workshop Notes. National Food Industry
      Strategy, Canberra.

OMAFA (2008) Canada-Ontario Environmental Farm Plan [URL: http://www.omafra.gov.on.
ca/english/environment/efp/efp.htm] **2008**

Organic Exchange (2007). Organic Exchange: a unique resource for those interested in organic cotton [URL:http://www.organicexchange.org/index.htm]. **2007**.

Owen L., Seaman H. and Prince S. (2007). Public Understanding of Sustainable Consumption of Food: A report to the Department for Environment, Food and Rural Affairs. Department for Environment, Food and Rural Affairs (UK), London.

Pahl L. (2003). EcoRange: Market-Oriented Environmental Certification for Rangeland Pastoral Industries 1. Project overview. RIRDC, Canberra.

Pahl L. and Macnamara K. (2003). EcoRange: Market-Oriented Environmental Certification for Rangeland Pastoral Industries 3. Australian consumer survey. RIRDC, Canberra.

Pahl L., Sallur N., Weier L. and A., B. (2006). On-Farm EMS and Environmental Labelling in the Pastoral Industries - Final Report. The Australian Government Department of Agriculture, Fisheries and Forestry National EMS Pilot Program.

Pahl L. and Sharp R. (2007). "Stakeholder expectations for environmental assurance in agriculture: lessons from the pastoral industry." Australian Journal of Experimental Agriculture **47**: 260–272.

Patterson G. (2001). What is "EMS"?. Unpublished Paper. Perth, Agriculture Western Australia.

Patton M. Q. (2001). Qualitative Research Methods and Evaluation Methods, Third Edition. Sage Publications, Thousand Oaks, California.

Pearson D. (2003). Organic fresh fruit and vegetable purchases: Buyer's selection of retail outlet and evaluation of individual products. Faculty of Economics, Business and Law. University of New England, Armidale, New South Wales.

Peel Harvey Catchment Council (2007). Understanding, Quantifying & Demonstrating the Likely Local Effects of Climate Change & Variability in the Peel-Harvey Catchment. Peel Harvey Catchment Council, Bunbury, WA.

PETA (2007). Save the Sheep, People for the Ethical Treatment of Animals [URL: http://www.savethesheep.com/]. **2007**.

Pollan M. (2006). The Omnivore's Dilemma: A Natural History of Four Meals. Penguin Press, London.

Porter M. (1985). Competitive advantage: creating and sustaining superior performance. Simon & Schuster, New York.

Productivity Commission (2005). Trends in Australian Agriculture. Australian Government Productivity Commission, Canberra.

Ritchie J. and Lewis J. (2003). Qualitative research practice: a guide for social science students and researchers. Sage Publications, Thousand Oaks, California.

Roberts K. (2004). Evaluation of Consumer survey, Gippsland beef and lamb EMS. Gippsland Natural Pty Ltd, Melbourne.

Rogers G. and Alexander A. (2000). A Survey on Environmental Management of Bonlac Dairy Farms. Bonlac Foods Ltd, Melbourne.

Ropke I. (1994). "Trade, development and sustainability - a critical assessment of the 'free trade dogma'." Ecological Economics **9**: 13-22.

Rowland P. (2005). Outline of Current Research & Development for Environmental Management Systems - A RIRDC Sponsored Report. Rural Industries Research and Development Corporation, Canberra.

Rowland P., Waller M., Gorrie G. and Douglas B. (2005). Towards a National Approach to Certification and Information Management in Australian Agriculture, Australia 21 Draft Options Paper. Australia 21, Canberra.

SBS (2008). Labour Pains: 17 June 2008. Insight, SBS. [http://news.sbs.com.au/insight/labour
_pains_549242].

SCA (1991). Sustainable Agriculture, Standing Committee on Agriculture Technical report no.
36. CSIRO Publishing, Melbourne.

SCARM (1998). Sustainable Agriculture: Assessing Australia's Recent Performance. Standing
Committee on Agriculture and Resource Management, Canberra.

Sears A. (2007). What is a Locavore or Localvore Anyway? Concerns About Economics,
Health, Sustainable Agriculture, and the Environment Spur a Trend Toward Eating
Local Foods. [URL: http://www.associatedcontent.com/article/288684/what_is_a_
locavore_or_localvore_anyway.html?cat=22]. **2008**.

Seyfang G. (2006). "Ecological citizenship and sustainable consumption: Examining local
organic food networks." Journal of rural studies. **22**(4): 383-395.

Singer P. and Mason J. (2006). The ethics of what we eat. The Text Publishing Company,
Melbourne.

South West Catchments Council (2005). South West Regional Strategy. South West
Catchments Council, Bunbury.

Southerton D., Warde A. and Hand M. (2004). The limited autonomy of the consumer:
implications for sustainable consumption. Sustainable Consumption: The Implications
of Changing Infrastructures of Provision. Southerton D, VanVliet B and Chappells H.
Edward Elgar Publishing**:** Massachusetts, USA.

Spencer S. and Kneebone M. (2007). FoodMap: A comparative analysis of Australian food
distribution channels. Australian Government Department of Agriculture, Fisheries and
Forestry, Canberra.

Stern P. C. and Dietz T. (1994). "The value basis of environmental concern." Journal of Social
Issues  **50**: 65-84.

Strauss A. (1987). Qualitative Analysis for Social Scientists. Cambridge University Press, Cambridge.

Strauss A. and Corbin J. (1998). Basics of Qualitative Research Techniques and Procedures for Developing Grounded Theory, Second Edition. Sage Publications, Thousand Oaks, California.

Sustainable Agriculture Initiative (2007). Australia joins global sustainable agriculture initiative, Sustainable Agriculture Initiative [URL: http://www.saiplatform.org/about-us/news-facts/in-the-press/releases/SAI-Platform-Australia-1May2007.pdf]. **2007**.

Swatton S. and O'Callaghan J. (1999). "The experience of healing stories in the life narrative: A grounded theory." Counselling Psychology Quarterly **12**(4): 413-430.

Sydney Markets (2007). Sydney Markets sets a new benchmark for waste management. Sydney Markets Leader. **Autumn 2008**.

Teisl M., Roe B. and Levy A. (2002). Ecolabeling: What does consumer science tell us about which strategies work? Conference on Ecolabels and the Greening of the Food Market, Boston MA.

The Land (2006). City Slickers Love it Farm Fresh. The Land 14 Dec 2006.

Thompson G. (2001). Supply Chain Management: Building partnerships and alliances in international food and agribusiness. RIRDC Publication No 01/31. Rural Industries Research and Development Corporation, Canberra.

Toyne P., Cowell C. and Mech T. (2004). Marketing agricultural sustainability: Driving environmental improvement with marketplace benefits from environmental labelling. Publication No 04/050. Rural Industries Research and Development Corporation, Canberra.

United Nations Environment Programme (2002). Implementing the 10-Year Framework of Programmes on Sustainable Consumption and Production. Briefing Note. United

Nations Environment Programme, New York.

United Nations Environment Programme (2003). Second Asia-Pacific Expert Meeting on Promoting Sustainable Consumption and Production. Background Paper. United Nations Environment Programme, Seoul, Republic of Korea.

URS (2001). Baseline survey of attitudes, values and behaviour in the South West Region of Western Australia. Department of Agriculture, Western Australia.

URS (2005). EMS National Pilot Program Mid-Term Report. Australian Government Department of Agriculture, Fisheries and Forestry, Canberra.

Van der Ploeg J. D. and Frouws J. (1999). "On power and weakness, capacity and impotence: Rigidity and flexibility in food chains." International Planning Studies. 4(3): 333-348.

Vanclay F. and Lawrence G. (1995). The environmental imperative: eco-social concerns for Australian agriculture. Central Queensland University Press, Rockhampton.

Vermeir I. and Verbeke I. (2006). "Sustainable Food Consumption: Exploring the Consumer "Attitude - Behavioural Intention" Gap." Journal of Agricultural and Environmental Ethics 19( 2): 169-194.

WA Conservation Council (2004). Oil: Living with Less. WA Conservation Council, Perth.

Warde A. (1992). Notes on the relationship between production and consumption. Consumption and Class: Divisions and Change. eds R Burrows and C Marsh. Macmillan: London, pp.15-32

Watts M. C. and Suter H. (2005). A Role for Organic Farming in Sustainable Rural Landscapes. Australian Conservation Foundation Newsletter.

Williams J. and Saunders D. (2002). Land Use and Natural Ecosystems: A Revolution in Land Use is the Key to a Sustainable Landscape. CSIRO, Canberra.

Woodhead A., Quirk R., Cunningham, Malcolm G. and Lamb B. (2006). Sugar Link: Towards a Sustainable Sugar Supply Chain. Bureau of Rural Sciences, Canberra.

Wright, D, W. (1999). Turning Over a New Leaf: Socio-Economic and PoliticalTransformations in the Burley Tobacco Commodity System. Lexington, Kentucky University of Kentucky, Department of Sociology PhD dissertation.

# Appendix 1: Industry forum summaries

## Broadacre dryland industries

This forum included representatives from dryland broadacre enterprises including grains, wool, beef, sheep and even yabby farming. In most cases, farms will have a mix of these activities. While the broadacre areas in the South West are similar to those elsewhere in the wheatbelt and Great Southern, some distinctive features are evident. Diversification in production is increasing, the climate offers both advantages and disadvantages, and there are large population centres within easy reach. Salinity risk is higher than in other areas. Whilst the success of perennials is limited by climate, work on suitability of a range of perennial pastures is progressing through DAFWA and other initiatives with some temperate varieties showing good potential.

To progress sustainable agriculture forum participants suggested that the long-term trend of less people on more land needs to be reversed towards more people on less land. This will require development of a much wider range of land uses, such as carbon farming, saline land farming, eco-tourism and added value production. This involves a move from low margin commodity products towards high value niche products. One means will be to generate more economic value from the water in the landscape, and fully integrate production with NRM. This will involve moving away from the old understanding of 'landcare' as a separate (and reactive) activity to integrating landcare principles into production agriculture.

The importance of off-farm investments to ensure sustainability of farm businesses was also noted, as was a need to appreciate the diversity of abilities in the people. Aboriginal people, women, young people and minority cultures have significant contributions that are often under realised.

The drivers of change are internal (lifestyle related factors, risk behaviour) and external (market forces). It follows then that changes have occurred in response to market forces. The operating environment is well developed to support change activities with sound networks, good information transfer and relatively compatible values and aspirations held within the community (e.g. as compared to the more diverse values and aspirations held

in the highly populated coastal areas). It was suggested that more can be done with government, community and industry production groups and knowledge brokers in agri-business. While Natural Resource Management Officers (NRMOs) believe that they are having a beneficial impact in behaviour change, succession planning is needed in NRM services.

Sustainable agriculture in the broadacre industries is challenged by negative perceptions about careers in farming, information overload, NRMO availability, the lack of market rewards for sustainability, and low engagement between NRM and agribusiness. The latter point is important given the high use of consultant services by WA farmers.

The indicators of change include greater diversity in production, more high value products, more (and greater diversity of) people involved, higher resource use efficiency, increased education levels and increased migration to the bush.

## Dairy industry

The dairy industry in the South West is on the cusp. The industry is also in the process of changes resulting from deregulation in 2001 and the associated low milk process in the period from then up until a recent improvement in returns in late 2007. Despite some natural advantages, additional production is required to ensure industry scale sustainability, but competition for land and water, difficulties with labour, and low numbers of young people entering the industry are inhibiting expansion. A sizable component of the industry is farming 'real estate' and hence using resources inefficiently. High land prices are limiting farm expansion, reducing the profitability of current farming operations. Further, there are several competing processing factories and significant inefficiencies in transport arrangements.

The most significant natural resource factor impacting on the industry is water availability and water reform.

There do not appear to be easy answers. Some creative thinking and some external support is required for different business structures (e.g. sharefarming) in the industry, and to create the 'space', the external investment, and the human resources to allow the industry to grow. Local onground support by local coordinators such as the Dairying for Tomorrow coordinator is essential to motivate and support change.

The on-farm sustainability issues facing the industry are straightforward and are being addressed. The issues are largely associated with nutrient and water management. There are win-win opportunities, such as reducing nutrient loss off farm and viewing effluent as an asset, not waste. Farmers know the issues, and have access to advice and support through a range of programs. However, on farm investment in changed management systems is limited given that dairy businesses are still recovering from a period of very low milk prices. Sophisticated management systems (such as effluent systems) are prone to breakdown and farmers were sometimes reluctant to invest in back-up and contingency infrastructure without first experiencing/suffering a serious mishap. Experiences from the DairyCatch program in the South West region have demonstrated that implementing changes to existing farm designs can be quite challenging, especially when the indicated upgrade is worth more than the entire existing shed.

It was proposed that a period of higher returns is required to address these key issues. Improving the image of the industry will help in securing its 'licence to operate' and in attracting capital and human resources.

Indicators of change are water use efficiency, the size and demographics of the industry, the number of operational nutrient management systems, the economic value of the export industry, increased separation of land and capital from operation of the business (e.g. increased sharefarming), increase in WA annual milk production (particularly by new farms in non-traditional farming areas) and labour supply meeting demand.

## Horticultural industries

Most of the WA horticulture industry is located in the South West, in particular the wine industry which is the highest value component in the overall horticultural sector. It is also a sophisticated industry with highly skilled management.

The environmental issues facing horticulture are largely related to water use efficiency and nutrient management, especially on sandy soils. These are production as well as NRM issues and improvements in both aspects will have economic and environmental benefits. However, ageing infrastructure, and the capital cost of new and more efficient equipment is a barrier to change. Further there has been limited strategic engagement by NRM groups with horticulture in the South West.

Structurally, the industry is changing, with economic forces leading to fewer and larger operations including corporate ventures, with some of the smaller businesses becoming 'lifestyle operations'. Some sectors are in retirement mode, especially in the pome and stone fruits industries.

Because the industry has a strong value-added component, there has been greater activity in developing and adopting best management practices (BMPs) and quality assurance (QA) systems, although the uptake of the latter is inhibited by cost, and the lack of an economic driver.

Related trends in research, development and extension include the Waterwise program (including real-time weather information), increased investment in food technology (including 'food as medicine'), development of farming systems that combine complementary land uses (e.g. combining dairy and potatoes), niche marketing of branded products, and the use of Integrated Pest Management (IPM). In general, the R&D has been well designed and targeted through Horticulture Australia Limited (HAL). Some participants suggested that further investment is needed in research, development and extension in areas not yet picked up by industry, such as composting, organic production, management of point source pollution and new industries. Additional work is required in supply chain management to address blockages.

Horticulture tends to operate as several self-contained industries in organisation, in R&D and in supply chain management. Targets are set at industry level. There is good industry leadership in many sectors, and some sectors have developed good partnership models with Research and Development Corporations, universities and the Department of Agriculture and Food. Conversely, there are some issues with how the industries allocate funding, and some misguided investment.

Other factors affecting the industry's potential to grow are: land use planning mechanisms that inhibit land availability for horticulture, inappropriate uses on prime horticultural land (e.g. pines, hobby farms, housing developments), water availability in some (but not all) areas, and the high capital investment required for state of the art irrigation equipment.Determining indicators of change in this industry requires firstly an establishment of baseline data.

# Wine industry

Attendees at the viticulture forum explored issues which are becoming increasingly important for the wine industry including land and water management, marketing, labelling and corporate social responsibility. Issues raised included water efficiency, the image of the industry, waste management and issues of growth in the industry. The discussion at this forum showed that a pro-active approach to demands for sustainability is preferred. Wine production sustainability issues raised at the forum are summarised below:

The wine industry is well-organised, highly educated, business-oriented, open to ideas if they are beneficial, sophisticated in operation, and is working to address sustainability challenges. The issues to be addressed are well known and include water efficiency, the image of the industry, waste management and issues of growth in the industry.

Sustainability was seen as a problem of perception and an information management issue. Product differentiation strategies by processors and retailers were seen as key drivers as was place of origin labelling for the South West, as people trust in the safety associated with this area. Participants felt that red flags are being seen clearly for the wine industry with EMS style compliance likely to be needed (i.e. proof of environmental sustainability).

Impediments to more sustainable wine production include the issue of producers struggling with too many demands. It was proposed that industry wide coordination of sustainability demands on producers is required. Producers also need evidence of pull (i.e. demand for sustainability) in the market in order to act. It was also suggested that change in the industry needs a trigger (e.g. climate change or development of wine industry sustainability standards). Also; the demand for sustainability is market specific (e.g. the German and UK markets are demanding sustainable practices in wine production). It was also noted that a whole of supply chain approach to sustainability was required and is also achievable in the wine industry

There is limited data available to assess justifiable water use for viticulture in the South West. Benchmarking is needed to determine sustainable water use criteria. Other environmental issues discussed included use of pesticides, weeds, biodiversity, pests and soil acidity.

Through industry groups, particularly the Wine Federation of Australia's Wine Stewardship Program, best practices and standards are being developed. According to forum participants, there is a place for a 'Wine Stewardship' approach as in the Marine Stewardship Council, and associated certification.

The industry needs this capacity to define, measure and report levels of environmental performance. In establishing these standards, there are tensions in defining what is sustainability (e.g. organic vs. other definitions) and how the industry will be engaged in standard setting (i.e. voluntary or compulsory). The industry needs to know what the sustainability indicators are, and can then organise itself to deliver through industry associations and organisation..

The indicators of change proposed by participants related to community sustainability, and measurable triple bottom line indicators that are important to people in the industry. In summary, there is awareness that wine production industry in the South West needs to embrace sustainability although the means of enacting and demonstrating this are not yet decided.