Drivers of organic, biodynamic, and/or sustainable wine production in South Australia

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CONTENTS

ABSTRACT

The increased fear of environmental pollution and damage, especially associated with conventional farming, is advancing the growth of environment friendly farming methods. In that context, similar trends have been seen in the wine sector worldwide. Australia is the fourth largest exporter of wine in terms of value and the Australian wine industry is an important contributor to national economy; more than half of the share in the wine sector comes from South Australia. The research aims to analyse the key drivers of adopting organic, biodynamic and sustainable practices in wine production by South Australian wineries. Six wine regions of South Australia were selected for study: the Barossa Valley; McLaren Vale; the Clare Valley; Eden Valley; Coonawarra and Langhorne Creek. Details of 624 wineries from all six wine regions were recorded through a content analysis of the winery websites. Online questionnaires were sent to 202 wineries and of those, 20 wineries responded. Further telephone interviews were conducted with 10 wineries. Based on these data, it can be stated that the main motivating factors for the adoption of organic, biodynamic or sustainable practices were those of environmental concerns. The decision makers implemented these methods in order to improve the health and the biodiversity of soil, and to embrace chemical-free surroundings thereby resulting in better quality fruit. In addition, the certification of organic, biodynamic and sustainable practices was also studied. Views on the certification of wineries and vineyards were asked of the certification and producer organisations, and of the winemakers, in telephone interviews. Most of the responses suggested that the main driver for certification was economic benefit: that is, national and international recognition as high-quality organic, biodynamic or sustainable producers that make perfectly balanced wines that may attract profit through premium prices and higher sales volumes.

DECLARATION

I certify that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Signed:

Date: 08/12/2017

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1. INTRODUCTION

1.1 Overview and objectives

In the last few decades, various organic production techniques have been adopted by many types of farming enterprises not only to improve the quality of agricultural products to satisfy consumer demands but also to decrease the harmful impact on the environment (Tobolková et al. 2014). The field of organic farming has been explored widely and the diverse amount of research regarding conventional and organic farming can be found in much of the available literature (Coll et al. 2011; Merfield 2002; Rigby & Cáceres 2001; Ponzio, Gangatharan & Neri 2013; Duram 2006; Laureati & Pagliarini 2016). However, that research has focused on the motivations and driving forces behind the adoption of organic, biodynamic or sustainable practices (Fairweather & Campbell 1996). Consequently, there is a gap in the knowledge concerning farmers' decision-making in relation to shifting towards environmentally sustainable practices (Buttel & Gillespie 1988). This thesis focuses on organic viticulture, one of the most rapidly developing sectors in organic agriculture (Tobolková et al. 2014).

Australia is the fourth largest exporter of wine in the global market. The wine industry contributes significantly to the national as well as the regional economy through production, employment, exports, and wine tourism. The wine industry is Australia's fifth largest agriculture export sector and wine worth $1.85 billion is exported annually (AgEconPlus & Gillespie Economics 2015). The main wine regions of Australia are generally in the south-east although the Western Australian wine regions are the exceptions. South Australia has the highest number of wineries in Australia, that is, 706 wineries according to statistical analysis conducted in October 2015 (AgEconPlus & Gillespie Economics 2015). They account for more than half of the total Australian wine grape production. The vast diversity of geography and climate in the state allows a number of grape varieties to be grown.

In last few decades, wine production globally has expanded and the wine-making industry has become highly competitive. Consumers have the choice of a range of wines and consequently wineries have been seeking to differentiate themselves and increase their market share (Bianchi 2015). Globally, output exceeds demand due to overproduction (Wine Institute 2010). Overproduction and competition have led wineries to strive for innovation in winemaking and marketing strategies.

Wine production is one of the world's oldest industries whose environmental issues are unexplored (Christ & Burritt 2013). It is often considered to be 'green', but according a study by Schaltegger and Burritt (2000), vineyards and wine production have impacted the environment. As a result of this concern, the concepts of biodynamic and organic wine production have been recently adopted worldwide by several wineries. Australia is no exception to this global trend.

Organic wines are made from grapes that are organically cultivated; that is, grown without the addition of any synthetic chemicals such as pesticides or additives. Biodynamic wines are produced using enhanced organic practices in which vineyards are considered as an entire ecosystem and astrological and lunar influences on grapes production are included. Environmentally sustainable winemaking refers to the practices which are ecologically sound as well as economically viable and socially responsible (Penfold et al. 2015).

The trends towards organic and related forms of agricultural production globally are significant environmentally and economically in terms of consumer choice and in terms of high quality, healthy food. Yet, research into this general area is limited, and investigations into the wine industry are lagging behind some other agriculture sectors. The fact is that ‘premium food and wine’ from a clean environment is one of the state’s ten economic priorities. Hence, the wine industry is very important to South Australia. It is expected that the case study of South Australian wineries will contribute to both a scholarly endeavour (in the form of the current research thesis and subsequent published paper), and will also feed the framework for policymaking of government agencies such as the Department of Primary Industries and Regions South Australia (PIRSA), and the Wine Institute of Australia to formulate improved environmental policies related to wine production.

The Australian Geographical Indication (GI) divides wine zones and wine regions depending on the geographic origin of their grapes. Wineries for this research were selected from the following GI regions of South Australia: the Barossa and Eden valleys from the Barossa Zone; McLaren Vale and Langhorne Creek from the Fleurieu Zone; the Clare Valley from The Mount Lofty Ranges Zone and the Coonawarra; Mount Benson and Robe from the Limestone Coast Zone. In total, 624 wineries were present in all of the above selected wine regions. From 624 wineries, 98 wineries had converted their vineyards or wineries to organic, biodynamic or sustainable forms of farming. This accounts for approximately 15.7% of all wineries although it varies by regions.

The research attempts to identify key factors of adopting organic, certified organic, biodynamic, certified biodynamic or sustainable farming practice in the vineyards as well as in the wineries. The methodology has used wineries’ websites, as well as questionnaires and interviews with them. This research has also examined the certification processes, bodies, and producers who play active roles in providing certification to the wine industry.

1.2 Research questions

There are two principal research questions:

1. What are the key driving forces which determine selection of organic, biodynamic or environmentally sustainable practices?
2. Why do few wineries certify these practices after adopting them?

2. SUSTAINABLE ENVIRONMENTAL MANAGEMENT IN THE WINE INDUSTRY

2.1 Introduction

The increased global environmental awareness of the need to reduce carbon emissions has meant that all sectors of society and business are required to consider sustainable ways of managing their environments. The impact of agricultural practices and related agro-industries on the environment has been a major focus of research studies. Few industries are considered ‘clean and green’, and viticulture and winemaking fall into that category.

Wine production is one of the world’s oldest industries, yet it is one whose environmental issues are under-researched and is also subject to less regulatory attention (Christ & Burritt, 2013). Nonetheless, several commentators consider it to be ‘eco-friendly’ (Christ & Burritt, 2013). According to Schaltegger and Burritt (2000), wineries, like all types of agriculture, have profound effects on their surroundings. This may be because the wine sector has been committed to promoting sustainable development and there are sustainability initiatives in the wine industry worldwide. For instance, the Certified California Sustainable Winegrowing (CCSW) scheme has been implemented in few wineries of California to promote sustainability in the wine sector. It also focuses on the education and training providers for the continuous improvement in the sustainability program (Zucca, Smith & Mitry 2009; Pomarici, Vecchio & Mariani 2015). In parallel with an increase in wine consumption globally, wineries are receiving more scrutiny from the government, retailers, environmental groups, and consumers (Dodds et al., 2013) Consumers are becoming increasingly aware of a range of ethical, health, and environmental issues, and are showing their concerns and preferences through their purchasing patterns (Connor 2008; Forbes et al. 2009). Simultaneously, and perhaps because of this, growers are also seeking to improve product quality, to decrease their environmental footprint, and to increase their incomes (Penfold et al. 2015b). The growers implement these strategies in order to achieve long-term ecological sustainability and also to meet customer preferences. Farmers in general are seeking alternative sustainable crop production techniques.

The winemaking business has expanded dramatically all over the world in the past two decades. Universally, there is an excess of wine being produced in comparison to its consumption (Wine Institute 2010). This is acceptable by the fact that consumers have a wide range of wine varieties from which to choose (Bianchi 2015), and, hence, the wine industry has become highly competitive. To survive in this competitive market, wine producers have shifted towards innovation production and marketing strategies. Increased demand for organic food produced through organic, sustainable and biodynamic methods of production represent an avenue of innovative production that can be marketed. Viticulture is a very important part of Australia's economy as the nation is the fourth largest exporter of wine to the international market (AgEconPlus &Gillespie Economics 2015). Conversion from chemical-based farming to more sustainable farming requires huge capital investments which include investments in time as conversion requires three years before wine grapes can be certified as organic (Novaes Zilber, Friel & Machado do Nascimento 2010). Duram's (2006) study reported that these three years were difficult for farmers since they could not sell their grapes as organic during this time period even after adopting biodynamic or organic farming. Hence, while the certification process in costly and time-consuming, it is apparent that a few wineries still decide to embark upon it.

2.2 Background

Since the earliest civilisations, the human race has been using plants and animals for food, textiles, and other aspects of their livelihoods. Prior to this, most groups adopted a sedentary rather than nomadic lifestyle which resulted in expansion of agriculture practice

(Kristiansen & Merfield 2006). As early as 1813, it was noted that inorganic mineral fertilisers and pesticides had been introduced to traditional farming methods to achieve higher yields (Merfield 2002). Conventional farming aimed at getting higher crop production through using minimum labour, technologies, machineries and chemicals (Pimentel et al. 2005). After the Agricultural Revolution of the 1840s, modern farming expanded at the expense of long term adverse environmental effects such as carbon dioxide, methane, nitrous oxide, water pollution from chemicals like fertilisers, pesticides, land degradation, salinity, wetland draining, loss of diversity, ecological imbalance, and nutrient losses (Kristiansen & Merfield 2006).

In the search for sustainability, the concept of organic farming emerged and has been adopted in many areas of agriculture and food production (Hill & Macrae 1992). According to Francis and Youngberg (1990), legally codified organic farming has existed since the 1920s. More recently, the concept of biodynamic farming has come to the fore (Paull 2011). Biodynamic farming is one type of organic agriculture method, proposed by Rudolf Steiner in 1924, which attempts to synchronise agricultural production with the biological cycle of nature. Biodynamic and organic agriculture are highly ethical and environmental friendly forms of farming (Paull 2011). The biodynamic method is a holistic approach that attempts to develop resilient farming alongside ecological, economical, and physical sustainability. It assumes the farm is a self-contained organism (an ecosystem) and tries to maintain its flora and fauna. Biodynamic farms rely on the plants and animals to produce natural fertilisers through manuring and composting (Mason 2003). The addition of manures and animal and plant preparations to the soil during crop rotations to enhance the soil organic matter promotes better soil fertility (Madge 2005). This stimulates on-farm nutrient cycling, the biological fixation of nitrogen, compost development, and photosynthesis (Reeve et al. 2005). Under biodynamic practices, it is preferable to plant crops according to the lunar cycle (Diver 1999). ‘Being sustainable’ is often misunderstood and grouped with the organic or the biodynamic. Sustainable farms attempt to reduce their environmental footprint and reduce their energy and water usage (Ponzi, Gangatharan & Neri 2013). Sustainability means continuously pursuing equilibrium between economic, social and environmental variables. Similarly, in the context of wine production, a sustainable vineyard can be defined as a vineyard that is capable of providing economic benefits to farmers along with maintaining its ability of consistent production and bring improvement in quality over time (Santiago-Brown 2014). Sustainability is a broader concept than the biodynamic and organic concepts. Biodynamic and organic are more advanced than environmentally sustainable method (Ponzio, Gangatharan & Neri 2013).

2.3 Organic and Biodynamic Farming

It has been argued that organic farming encompasses the best overall management practices in agriculture (Pimentel et al. 2005; Pimentel, Berardi & Fast 1983). According to the Organic Industry Standards and Certification Committee (year?), organic farms need to apply practices which use renewable resources, conserve energy, soil, and water, and enhance and maintain the environment by avoiding artificial fertilisers or synthetic chemicals. Biodynamic agriculture is an extension of the organic system that looks beyond the exclusion of fertilisers and pesticides. It includes specific additional preparations suggested by Rudolf Steiner which have been backed up by subsequent research and development. Turinek et al. (2009) argued that while the yields are lower within the biodynamic system, it is far more energy efficient than conventional farming as energy consumption is lower (Wheeler & Crisp 2009). Furthermore, there are a number of co-benefits such as lower input costs of materials (around 20% lower than conventional practices due to prohibition of chemicals (Penfold et al. 2015a), a reduction in nitrogen losses, improvement in soil nutrient loads and microbiological conditions due to an increase microbial biomass and microbial and enzymatic activity, increased availability of phosphorus, and enhanced soil carbon sequestration. Although soil content varies according to the season, biodynamic and organic farming improve the soil quality by increasing the availability of nutrients to plants through microbial enzymatic reactions. Biodynamic and organic practices use less energy from fossil fuel and thus reduce carbon dioxide emissions. In this way, they directly influence climate change in a positive way (Leifeld 2012). Indirect benefits include a decrease in soil erosion, reduced water runoff and marked improvements in soil organic matter. Moreover, organic production practices assist to solve the greater issue of chemical residue in food, the environmental fate of agro-chemicals, and the degradation of natural resources: all three have long-term negative consequences on sustainability. Organic and biodynamic vineyards are similar in terms of effects on soils, vine nutrition, vine canopy formation, grape quality, the microbial efficiency of soil, and soil fertility while there are differences in the yield to pruning ratio. That is, biodynamic vines yield to pruning weight ratio is between 4.5 and 5.3 while the same ratio for organic vines is between 6.3 and 6.5 which is slightly overcropped. The ratio between 5 and 6 seems to be most appropriate. Hence, biodynamic vines were better balanced than the organic vines (Reeve et al. 2005; Turinek et al. 2009).

However, organic and biodynamic practices do have some drawbacks. Organic farmers rely on natural solutions to control bugs and weeds which can increase weed problems. Growing legumes for nitrogen fixation can reduce soil moisture levels. Biodynamic farming utilises less energy than conventional farming nevertheless it is more labour intensive. In contrast, Pimentel et al. (2005, p.576) claimed that these farming practices required 35% more labour due to less productivity. More labour is used hauling manual manure and spreading it on fields than in conventional farming. Another constraint is that organic fertilisers are harder to source than non-organic ones. High labour costs and lower yields can make the final product more expensive (Pimentel, Berardi & Fast 1983). Although organic, biodynamic or sustainable practices offer clear environmental and social advantages, the existing literature on wine industry shows variations in results for costs and benefits involved in the adoption of organic, biodynamic or sustainable practices (Pomarici, Vecchio & Mariani 2015; Wheeler & Crisp 2009; Schimmenti et al. 2016).

2.4 Global Wine Industry

Although winemaking is a global business, wines are strongly differentiated by their country of origin (Orth, Lockshin & d'Hauteville 2007). 'Old world' countries such as, Italy, France, Spain, Portugal and Germany account for around 64% share of the wine export market. The remaining 36% of global wine exported from 'new world' producers include Argentina, Australia, Chile, New Zealand, South Africa and the United States. A 5% share of the export market is owned by the United States. Recently, there has been an increase in wine consumption in Asian countries and wine export from 'new world' countries (Banks & Overton 2010). Wine demand in countries such as Italy, Brazil and China is strongly influenced by consumers' preference and lifestyle which then affect types of wines that are made in these countries and exported globally (Anderson 2004).

During the global financial crisis of 2008-09 when almost all industries suffered a decline in business, Atkin, Gilinsky and Newton (2012) stated that winemakers faced financial difficulties due to limited profit margins and a 'hyper-competitive' market (McMillan 2012). Some winemakers implemented an Environmental Management System (EMS) that has sustainability objectives in order to differentiate between them in the global market. The wine industry relies mainly on quality of the product, and this has also pushed winemakers to reduce the environmental impact in vineyards to obtain better fruit. These contexts have become key drivers for initiating organic farming.

The trend to organic winemaking is led by New World producers. In 1992, the first sustainable wine production program was established by Lodi Winegrape Commission in California and sustainable farming practices were introduced into the wine sector (Golino & Ross 2008, p.142). After 13 years of this initiative, six wineries were certified by the

California Code of Sustainable Winegrowing Practices (Warner 2007). A similar program, the Wine Sustainable Policy, was introduced in 1997 in New Zealand (Szolnoki 2013). Since then, New Zealand has maintained its ‘green’ image in the wine industry as well as in its other field of farming (Hughey, Tait & O'Connell 2005; Duarte Alonso 2010). After these two initiatives, many countries set the guidelines for sustainable wine production. In 2000, South Africa produced its first sustainable wines certified by the Integrated Production of Wine Scheme (Klohr, Fleuchaus & Theuvsen 2013). France adopted the sustainable wine concept in 2012 and Australia developed its new certification program in 2009 and was seen as moving rapidly towards organic viticulture (Lockshin 2013; Lockshin, Cohen & Goodman 2008).

Approximately 2.3% of vineyards across the world -approximately 95000 hectares (ha)- had converted to organic by 2007. A significant percentage of these vineyards were in Europe (2.5% of wine production overall in Europe came from organic wineries) (Padel et al. cited in Willer, Yussefi-Menzler & Sorensen 2008). After Europe, the United States and Chile had a high proportion of vineyards with organic or biodynamic practices (Gilinsky et al. 2015; Szolnoki 2013). In the USA, almost 500 ha of vineyards are certified biodynamic. Reeve et al. (2005) found that the most rapid development of biodynamic wines was, however, in Old World countries. France, for example, had approximately 15,000 ha in 1993 (Reeve et al. 2005). In Italy, slightly less than eight per cent of total vineyard area is cultivated by organic practice (Marinari et al. 2006; Eyhorn, Heeb & Weidmann 2003).

Since the 1990’s, trading in organic produce has grown 20% per year (Penfold et al. 2015a). Around 17% of the organic farms in the European Union (EU) are vineyards. The global proportion of organic vineyards increased by three fold between 2004 and 2011: that is 260,000 ha, and accounts for 3.2% of world’s vineyards (Willer & Lernoud 2016). More than 35 million hectares of agricultural land in 164 countries is managed organically by 1.9 million farmers (Penfold et al. 2015a) and more than 4200 farms in 43 countries are certified as biodynamic (Turinek et al. 2009). A large number of wine producers around the world have applied biodynamic methods in their wineries in the past decades which increased popularity of biodynamic wine grape production. Wine producers in California were the first of the new world wine makers, who used organic farming in vineyards in the 1960s (Novaes Zilber, Friel & Machado do Nascimento 2010). The Californian wine grape industry efforts in this area include educating growers formally as well as providing social learning among grape growers through place-based networks of producers (Warner 2007).

The extensive literature on organic production and food quality suggests that organics have less contaminant, higher levels of ascorbic acids, secondary plant metabolites, antioxidants and phenolic metabolites and lower nitrate levels. Organic, biodynamic or sustainable practices can be incorporated in agriculture practices (vineyard), processing (winery) and other practices (distribution and tourism). This is important in the light of Christ and Burritt's (2013) argument that wineries reduce their environmental negative externalities to ensure they are economically and environmentally viable now and into future (Poitras and Donald, 2006).

2.5 Wine Production in Australia

According to recent Australian government data, there are approximately 2,900 wineries presently in Australia. They produce 1.2 billion litres of wine annually, which is worth $5.9 billion gross value (Department of Agriculture and Water Resources 2017). Australia is the fourth largest exporter of wine in the international market, with approximately 60% of output destined for European, North American and Asian markets. It is Australia's sixth largest export industry.

The nation's wine sector includes grape growing, winemaking and wine tourism. It contributes significantly to the economy through employment, domestic sales and export earnings (AgEconPlus & Gillespie Economics 2015). Wine growing and winemaking in Australia have been criticised for being environmentally harmful through their carbon emissions and, like many other wineries worldwide, organic practices are being adopted in the search of sustainable solutions. Overall, organic farming is one of the fastest growing industries in Australia, and in the last decade it has been growing at an annual rate of 14% (Wine Australia 2007).

Most wine regions of Australia are in the southeast and in Western Australia where there the climate is most suitable for grape cultivation. South Australia contributes more than half of the national wine production (ABS 2012-13). Gross wine production by state is indicated in Table 1.

Table 1 Wine production by state, 2012-13

States	Gross wine production('000 L)
New South Wales /Australian Capital Territory	388 733
Victoria	238 874
Queensland	900
South Australia	568 196
Western Australia	43 725
Tasmania	5174
Australia	1,245,601

Source: ABS (2012-2013)

According to the Australian Bureau of Statistics (2015), South Australia produces 54 % of Australia's red wine grapes and 75% of Australia's white wine grapes. Wine export is a major contributor to the Gross Domestic Product (GDP) with 18.5% of the total export coming from wine and beverages. This is higher than other products like grains (8%), metals and metal products (6.5%), food products (5.1%), and sheep & wool (4.7%). Wine export increased from 88.621 litres to 330,686 litres between 1994 and 2003 (ABS 2014-15). There are 18 wine regions with favourable soil and weather for grape growing. Figures 1 and 2 show the different wine regions of South Australia (Halliday 2016).

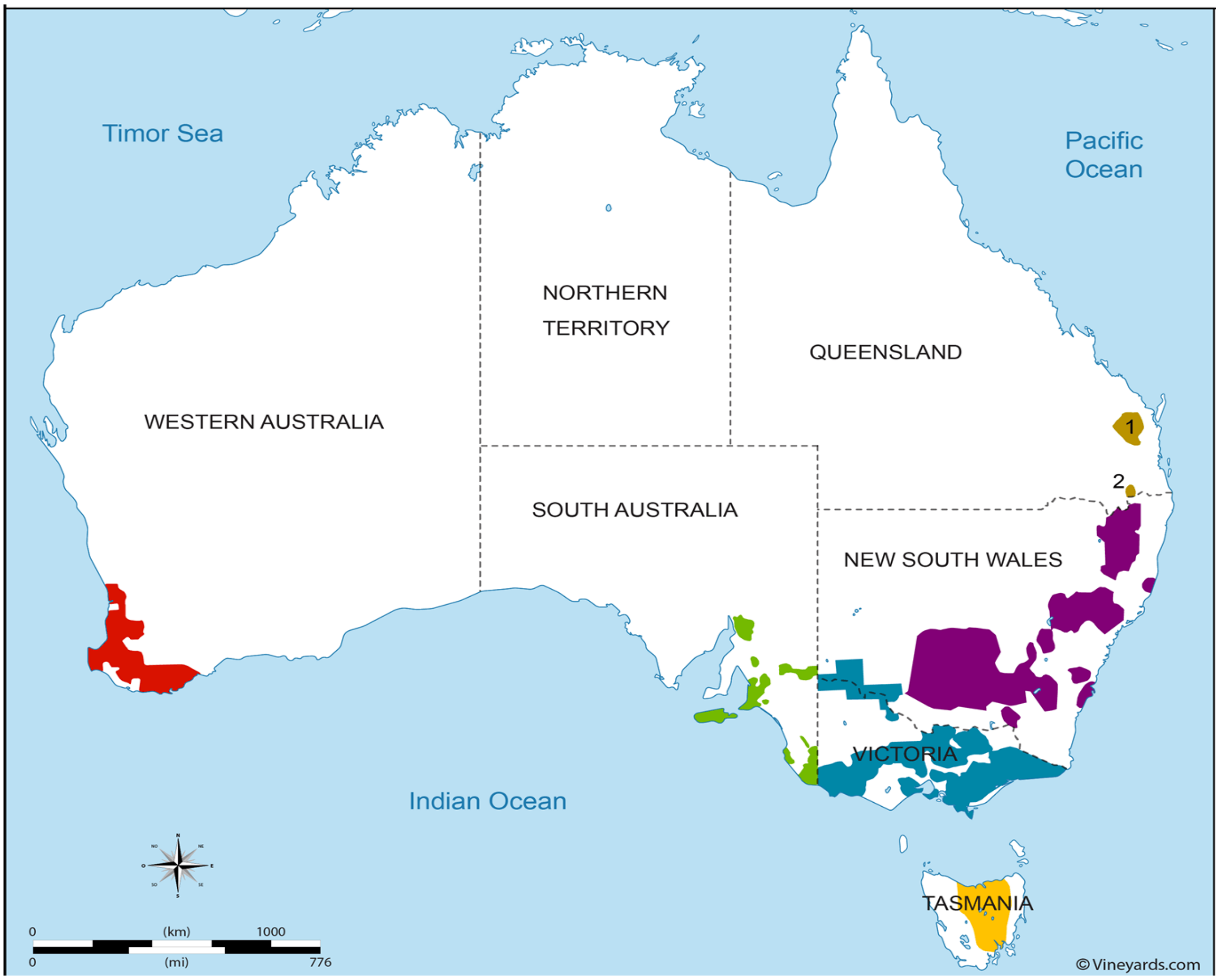

Figure 1 Australian wine region (Australian Wine Vineyard Maps, 2017)

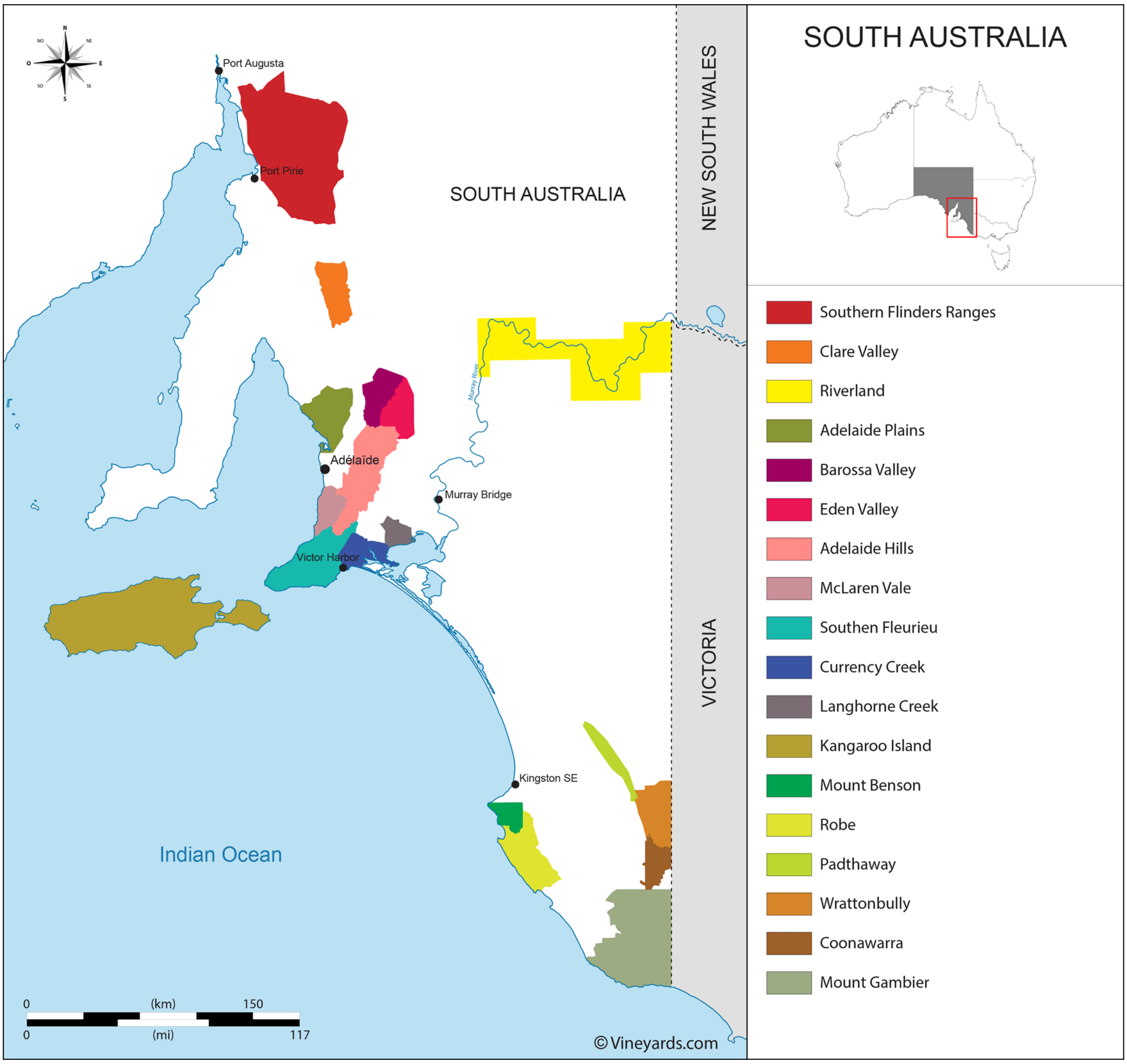

Figure 2 Wine regions of South Australia (Map of South Australia, 2017)

The recent developments in organic wine production have influenced these wineries and their vineyards. A few of them adopt organic practices and the biodynamic system for growing grapes but do not necessarily seek certification while others choose to be environmentally sustainable.

The certification process in Australia is three years in length and is carried out by the Department of Agriculture, Fisheries and Forestry (DAFF) and the Australian Quarantine and Inspection Service (AQIS). Currently, there are seven registered DAFF accredited and AQIS approved certifying bodies in Australia. They are the National Association for Sustainable Agriculture, Australia (NASAA), Organic Food Chain, AUS-QUAL, Australian

Certified Organic (ACO), Bio-Dynamic Research Institute (BDRI), Safe Food Production Queensland (SFQ), Tasmanian Organic Producers (TOP), and Sustainable Australia Wine Growing (SAW). SAW is an initiative developed by the McLaren Vale Grape Wine and Tourism Association (MVGWTA) for training and disseminating knowledge regarding sustainable farming.

There are pre-existing perceptions that wines and winemaking are environmentally friendly. Due to this, wineries face barriers in successfully launching wine. Consumers consider wine to be a ‘natural product’ and thus organic certification may not provide significant marketing advantages as it does for other food products (Sogari, Mora & Menozzi 2016). In spite of these barriers, there is a widespread push to initiate organic practices in vineyards. New Zealand became the first in the world to display the carbon footprint on its label, showing its commitment to being ‘green’ (Smithers 2010).

Although sustainability is not considered as significant by wine consumers and a number of competing organic or related labels confuse consumers, the adoption of organic or sustainable of practices in winegrowing has been seen worldwide (Mariani & Vastola 2015). A number of studies have been performed to analyse the factors influencing sustainable practices in the wine sector. The research of Cordano, Marshall and Silverman (2010), Marshall et al. (2010), Gabzdylova, Raffensperger and Castka (2009), Marshall, Cordano and Silverman (2005) and Silverman, Marshall and Cordano (2005) have all identified drivers to sustainability in wine and other industries. These studies have discussed volunteer, market-driven or government led drivers as strongest motivation for environmental practices in winemaking. The research suggested that development of proper marketing strategies can increase awareness about sustainable wine in consumers.

Previous research by Gabzdylova, Raffensperger and Castka (2009) in New Zealand has stated that internal motivators such as environmental values and personal satisfaction drive sustainability. Pomarici, Vecchio and Mariani (2015) analysed the cost and benefits as drivers of sustainable practices which positively or negatively affect the adoption of sustainable practices in winemaking. In fact, during the transformation to organic or related practices, management, existing regulations, employee welfare and competitive pressures act as stimuli to drive proactive environmental behaviour (Marshall, Cordano & Silverman 2005). Santini, Cavicchi and Casini's study (2013), for example, discussed the managerial issues which can affect the adoption of sustainable practices negatively in winemaking. Silverman, Marshall and Cordano (2005) argued that environmental standard of a particular country or region influenced the environmental performance of wine industry. Marshall et al. (2010) investigated the motivations and barriers towards sustainable practices in the United States and found that Internal drivers are more important than external drivers in deciding whether to adopt organic and sustainable farming practices. Possible factors driving the adoption of a more sustainable stance in farming may include protection of land, social responsibility, and concerns about environment, health and safety of workers (Marshall, Cordano & Silverman 2005; Gabzdylova, Raffensperger & Castka 2009). While the main external drivers include consumer demand; pressure from investors, public and government competition, marketing strategies, and compliance with regulation. Certain strategic drivers should also be considered, such as competitive advantage, market strategies, cost, image of product, quality of product, different identity (Dodds et al. 2013; Pomarici, Amato & Vecchio 2016). For export-oriented countries like New Zealand and South Africa, adopting organic or sustainable practice is a core requirement for export.

The adoption of organic, biodynamic or sustainable practice provides environmental and social benefits. However, it shows mixed results when economic benefits are analysed (Marshall et al., 2010). Gabzdylova, Raffensperger and Castka (2009) asserted that improved product quality is the main benefit of sustainable practices in New Zealand. Improvements in the working environment, and enhanced reputation and image have also been considered to be significant advantages in adopting sustainable farming methods (Dodds et al. 2013; Pullman, Maloni & Dillard 2010; Delmas & Grant 2014). The researchers argued that sustainable farming also reduces legal or regulatory risks and increases operational efficiency. The differentiation strategy is priority for adopting sustainability in Spain's wine industry. Although the adoption of organic or sustainable practices provides marketing benefits and economic gain in the form of premiums, consumers' limited awareness of organic, biodynamic and sustainable wines and their logos can be a barrier and the level of knowledge about the environment and sustainability may attract more consumers (Atkin, Gilinsky & Newton 2012; Delmas & Grant 2014, Pomarici & Vecchio 2014). Recent studies have shown increases in consumer awareness and interest in environmental friendly wines (Klohr, Fleuchaus & Theuvsen 2013; Pomarici & Vecchio 2014; Berghoef & Dodds 2011).

Nonetheless, wines without organic certificatation are also performing well in markets as a generic 'organic' label gives a quality 'gaurantee'. This occurs whether the producer is actually certified or not. It differentiates one brand from another. However, very few wineries actually obtain certification (Dodds et al. 2013). The principal barriers in adoption of such practices to certification are the high cost of the initial investment and the high administration burden. In addition, lack of knowledge and strict organic practice protocol and requirements set by certification agencies are also responsible for a small number of vineyards' and wineries' certification (Hughey, Tait & O'Connell 2005).

2.6 Summary

This paper attempts to explore the idea of global environmental concerns of wineries and key driving forces in converting conventional farms to organic, certified organic, biodynamic or sustainable farms. There is uncertainty about the effectiveness and benefits of these sustainable practices. Few winegrowers believe the economic benefits exceed the cost while others are not agreed. A number of studies have analysed key motivation and drivers of sustainable practices from the perspective of consumers' as well as from producers in the the US, Italy, Spain, and New Zealand. However, limited research has been conduted on South Australian wineries and their adoption of organic, biodynamic or sustainable farming even though it is a hub for wine production. Furthermore,the little literature which does exist only refects sustainable practices and not organic and biodynamic practices. To promote organic, biodynamic or sustainable wine production methods among wine makers and to improve their perception about these practices, the knowledge gap should be addressed. Moreover, to the best of th researcher's knowledge, no study has been performed on certification programs and certification organisation. In this context, the research aims to analyse the key drivers of adopting organic, biodynamic or sustainable wine production in South Australia. It summarises significant findings from a historical background, peer reviewed articles, PhD theses, online research from winery websites and from certification organisations. The study has used online semi-quantitative and qualitative methods for research through questionnaires and telephone interviews.

3. RESEARCH DESIGN AND METHODS

3.1 Introduction

In Chapter 2, literature on the wine industry and forms of sustainable and organic production were reviewed. Moving on to this particular research project, the methods used to obtain the information needed to answer the questions introduced in Chapter 1, are outlined in this section. This study uses both semi-quantitative and qualitative approaches to determine which factors influence and drive the decisions to adopt organic, biodynamic or sustainable practices in wine production in South Australia. Three techniques are used: (i) Content analysis of winery websites; (ii) on-line questionnaires; and (iii) phone interviews.

3.2 Research Design

The research project comprises four stages which are discussed in the following section. Section 3.3 considers the content analysis of the wineries' websites. This is followed by Section 3.4 which outlines the sampling and the distribution of online questionnaires to selected wineries. In Section 3.3, the interviews conducted with wineries are introduced. Section 3.4 describes the interviews with certification bodies and producers. Figure 3 shows the overall research design of the study.

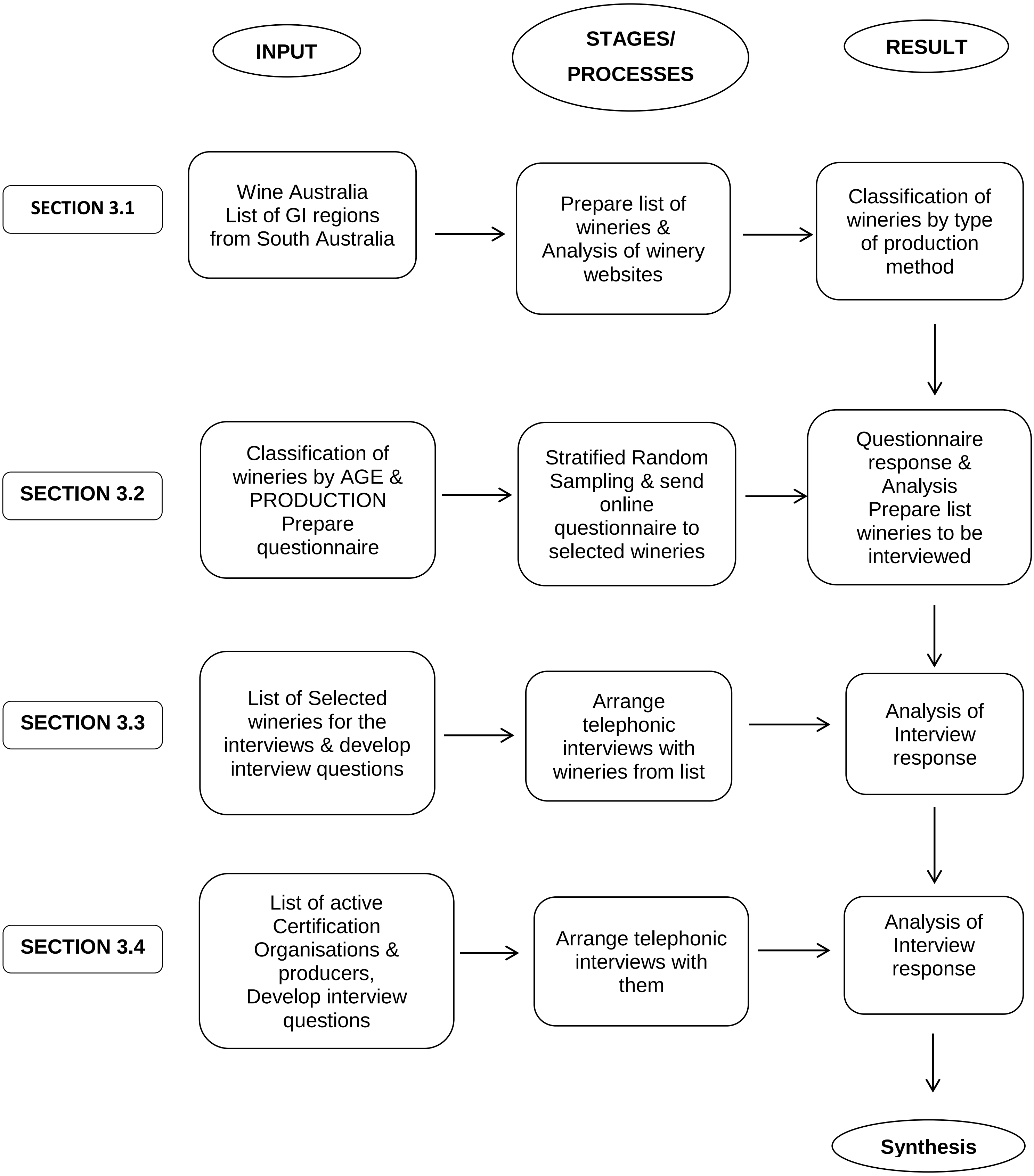

Figure 3 Flow chart of research design

3.3 Analysis of wineries websites

The first analysis undertaken was to obtain information on the nature of all the wineries in the following Geographic Indication (GI) (wine) regions in South Australia. An appellation system named the Australian Geographical Indication (AGI) has been used under Australia's labelling laws which have differentiated the geographical origins of wines since 1960. This registration system is operated by the Australian Grape and Wine Authority (AGWA) (Department of Foreign Affairs and Trade 2017). South Australia has eight GI wine zones: (i) The Barossa Zone; (ii) The Fleurieu Zone; (iii) The Mount Lofty Ranges Zone; (iv)The Far North Zone; (v) The Limestone Coast Zone; (vi) The Lower Murray Zone; (vii) The Peninsulas Zone; and (viii) The South Eastern Australia wine region. Three wine zones of Adelaide Super Zone (Section 1) were selected for this research due to their significant wine production and economic importance: the Barossa Zone, the Fleurieu Zone and the Mount Lofty Ranges Zone. In addition, the Limestone Coast Zone was selected for study due to the *terra rossa* soils developed over limestone which characterise the attributes of the zone.

The Barossa Zone is north of Adelaide and contains 8.8% of the total Australian vineyard planting (13,634 ha of grapes). It has main two wine regions: the Barossa Valley (11,370 ha) and the Eden valley (2264 ha). Both were selected for study in this research. The Fleurieu Zone is located south of Adelaide. It includes Currency Creek, Kangaroo Island, Langhorne Creek, McLaren Vale, and the Southern Fleurieu. McLaren Vale and Langhorne Creek are the oldest of these five wine regions and were registered as an AGI in 1997 and 1998 respectively (Wine Australia 2016) and are examined in this study. The Mount Lofty Ranges Zone comprises the full terrain in the east and north of Adelaide. It has three wine regions: the Adelaide Hills, Adelaide Plains and Clare Valley. The Clare Valley was selected for study and is very well known for the Riesling variety of wines. The Limestone Coast Zone is well known for its soils developed over limestone and is spread out from Adelaide, unlike other three zones studied. It was officially declared as GI in 1999 (Wine Australia 2016). The wine regions with AGI appellation in this zone are Coonawarra, Mount Benson, Mount Gambier, Robe, Padthaway and Wrattonbully. Coonawarra is a newly established wine region, entered as a GI in 2003. It is popular for its 'terra rossa' soil and the Cabernet Sauvignon variety of wines (Wine Australia 2016). Cabernet Sauvignon is one of the world's most widely recognised red wine grape varieties. Along with the Coonawarra, two small wine regions Mount Benson and Robe were also selected from the Limestone Coast Zone. All selected GIs show variation in the proportions of wineries adopting organic, biodynamic, and sustainable practices. They had different international and national profiles and main wine varieties. The variation between these regions might well influence choices about adopting these practices.

The James Halliday Wine Companion online guide (https://www.winecompanion.com.au/) was used initially to retrieve information about wineries in the selected GIs. This wine guide is recognised as the most comprehensive and authoritative wine guide in Australia, but it must be acknowledged at this point that not every winery in a GI is included in this guide.[1] Therefore other sources such as official websites of Wine Australia by the Australian government and the Australian Grape and Wine Authority were consulted to obtain more complete information on wineries in the six GIs (Wine Australia 2016; Department of Foreign Affairs and Trade 2017). The total wineries identified and studied in each wine region are as follows:

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[1] Professor Millington of Flinders University has complied a directory of wineries in McLaren Vale and found that though a very high proportion of wineries in that GI were included in the James Halliday guide, a small number of others were found by visiting McLaren Vale and from other trade directories. However, the effort that would be required to produce a comprehensive list for each of the GIs would be beyond the logistical limitations of this research. Professor Millington provided his comprehensive list of McLaren Vale wineries, presented as a conference paper in 2015 (Millington, AC, Keane, R and Korisamanunu, V (2015) 'What's in a bottle: A geographical analysis of wine labelling in Australia'. Paper presented as at the Association of American Geographers Annual Conference, San Francisco, April 2015).

i) Barossa Valley – 190 wineries
ii) McLaren Vale – 244 wineries
iii) Clare Valley – 72 wineries
iv) Coonawarra – 46 wineries
v) Eden Valley – 38 wineries
vi) Langhorne Creek – 22 wineries
vii) Mount Benson and Robe – 12 wineries

The websites of these 624 wineries were studied and elements of their content analysis were extracted and entered into Microsoft Excel spread sheets. These elements consisted of the name of the winery, year of establishment, area of vineyards, last year's production in cases, locations of the office, vineyards, winemaking unit, cellar door, the email address, contact phone number, and the winemaking philosophy of each winery addressing whether it was conventional, organic, biodynamic or sustainable. The content analyses of these websites were completed on 31 January 2017.

The wineries to be sent questionnaires in each GI were selected as follows. All of the 97 wineries that declared themselves to be organic, biodynamic or sustainable producers (Table 2, Col. 3) were sent questionnaires. A 20% sample of non-organic [2] producers was selected for this research by sending them an online questionnaire. Initially, a larger sample was planned for, but a strong steer from the Flinders University Human Subjects Ethics Committee (discussed in detail in section 3.4) indicated that this would not be feasible, and they advised a 20% sample would be acceptable. Therefore, 105 conventional wineries in total were sampled over the six GIs (Table 2, col.5) and 202 wineries in total were sampled. Following this, a list of certification organisations in South Australia was prepared from the Australian Government Department of Agriculture and Water Resources website which will be discussed in detail in section 3.4.

[2] The term organic is used here to include organic, biodynamic and sustainable.

Table 2 Winery types in the selected wine regions (GIs) and number of wineries that were sent online questionnaires*

GI	Number of conventional wineries	Number of organic, biodynamic, sustainable wineries	% organic, biodynamic, sustainable in GI	20% sample of conventional wineries in GI	Wineries sent online questionnaires (sum of columns 3 and 5)
Barossa Valley	162	28	14.6	32	60
Clare Valley	59	13	18.1	12	25
Coonawarra	34	12	26.1	10	22
Eden Valley	30	8	21.1	10	18
Langhorne creek	16	6	27.3	10	16
McLaren Vale	156	30	13.8	31	61
Mount Benson & Robe	9 +2	1	10	2	0*

*Under the instruction of the Ethics Committee, Mount Benson and Robe were not surveyed. Minor GIs Mount Benson and Robe with a combined sample of 12 wineries were excluded from sampling and analysis.

3.4 Ethical Approval

As this study involved a primary data cull through questionnaire and interviews, human subjects ethics approval was essential to ensure that no party was harmed or suffered adverse impacts from research activities (Cooper & Schindler 2003). Cooper and Schindler (2003) asserted their aims to maintain honesty, integrity and modesty and consider protection from harm, informed consent, the right of privacy and confidentiality, the right of a participant to withdraw at any stage, the use of internal review boards for research proposals and professional codes of ethics. Accordingly, an application was submitted to the Social and Behavioural Research Ethics Committee (SBREC) of Finders University on 6th February, 2017. The application was submitted along with the required documents such as information sheets, letters of introduction and consent forms for wineries and organisations and a Low/Negligible risk assessment form. This study was reviewed as Low/Negligible research. Conditional ethics approval was granted on 3rd March 2017, along with the advice to reduce the size of the sample and remove the consent forms. The committee also asked that a link to the online questionnaire be used to save time and money. In addition, face-to-face interviews were not approved although it was indicated that phone interviews could be used. Final ethics approval (No.7571) was received on 4th April 2017.

3.5 Sampling and administration of questionnaire

3.5.1 Sampling

Once approval had been given, the sampling of wineries was initiated. First, 624 wineries were classified into a 3 by 3 matrix to inform for random stratified sampling. Three ages of winery classes were created:

I. Before 1917 (established over 100 years)

II. 1918 - 1997 (established between 20-99 years)

III. Since 1997 (established in the last 20 years)

Three production classes were also created:

I. Small-scale producers (<5000 cases produced annually)

II. Medium-scale producers - 5000-10000 cases produced annually

III. Large size producers - More than 10000 cases produced annually

The nine cell matrix was prepared depending on the age and production of wineries for sampling in each of the selected wine regions.

Table 3 the nine-cell matrix of winery age and production

Annual production (cases)	**Age of winery (years)**		
	>100	21-100	1-20
<5,000			
5,001-10,000			
>10,001			

The sampling framework in Table 3 was not only used to decide which wineries to sample but was also used to examine the age and size characteristics of wineries in the GIs being researched. This could be used later in explaining differences in adoption of organic, biodynamic and sustainable practice. The results of the analyses of these matrices are presented in Section 4.1.

The matrices for each region with names of the wineries can be found in Appendix B. All of the organic wineries in the six GIs (excluding Robe and Mount Benson) were sent via online questionnaire. The sample of 105 non-organic wineries was made as follows: The numbers of non-organic wineries in each region were summed and the proportion of wineries in each cell was calculated for each GI. This is explained below by taking the example of the Barossa Valley. This GI has 162 non-organic wineries (Table 1). The number of wineries in each age-production class is given in Table 2 and the proportion of the wineries in each age-production class is given in Table 3.

Table 4 Number of non-organic wineries in age-production classes in the Barossa Valley

Annual production (cases)	Age of winery (years)		
	>100	21-100	1-20
<5,000	2	14	71
5,001-10,000	2	6	22
>10,000	3	17	11

Information on age and production for 14 wineries were not available online.

Table 5 Proportions of non-organic wineries in each age-production classes in the Barossa Valley GI

Annual production (cases)	Age of winery (years)		
	>100	21-100	1-20
<5,000	0.01	0.10	0.48
5,001-10,000	0.01	0.04	0.15
>10,000	0.02	0.12	0.07

The 148 non-organic wineries (Table 2) constitute a 0.27 sample of the 554 non-organic wineries across all six GIs in this research project (148/554 = 0.27). This means that forty non-organic wineries from the Barossa Valley need to be selected to send online-questionnaires (148 x 0.27 = 39.9). This number (39.9) is then multiplied by the proportions for each cell given in Table 3 and the number of wineries determined to be sampled (i.e. sent questionnaires) is given in Table 4.

Table 6 Number of non-organic wineries to be selected from each age-production class from Barossa Valley GI before rounding

Annual production (cases)	Age of winery (years)		
	>100	21-100	1-20
<5,000	0.01*40 = 0.4	0.1*40 = 4	0.48*40 = 19.2
5,001-10,000	0.01*40 = 0.4	0.04*40 = 1.6	0.15*40 = 6
>10,000	0.02*40 = 0.8	0.12*40 = 4.8	0.09*40 = 3.6

These numbers are then rounded to whole numbers. If they were equal or greater than 0.5 of a whole number, 2.9 was rounded to 3 and 2.4 was rounded to 2. An exception was made for values <0.9, which were all set to 1. The results of rounding give the following numbers of wineries per age-production class to be sampled (Table 6).

Table 7 Number of non-organic wineries to be selected from each age-production class from Barossa Valley GI after rounding

Annual production (cases)	Age of winery (years)		
	>100	21-100	1-20
<5,000	0	4	19
5,001-10,000	1	2	6
>10,000	1	5	4

The number of non-organic wineries that will actually be sampled will be 42 rather than 40 due to rounding. This was done for all six wine regions researched. For the random element of the random stratified sample, every non-organic winery of each GI was given a sequential number. An online random integer generator (https://www.random.org/integers/) was used for randomly selecting from the sequentially numbered wineries in each GI. Lists of all selected wineries from each region are attached in Appendix D.

3.5.2 Questionnaire

Two hundred and two wineries in total were sent an information sheet and a letter of introduction along with a link for online questionnaire by email. The questionnaire used had 19 closed and open questions which mainly focused on the motivations and barriers to adopting organic, biodynamic or sustainable practice and questions on certification acquired by wineries. The questionnaire also included factual questions such as the year in which the winery adopted organic, biodynamic or sustainable practices (Table 8). The questionnaire was created using 'eSurvey Creator' (https://www.esurveycreator.com/). Only the first question was mandatory. Conventional wineries were asked to complete the first two questions only.

Consent to administer the questionnaire was sought in the initial email sent to the wineries with a link to the questionnaire. These emails were sent to 202 wineries (97 organic and 105 inorganic) on 26th June 2017. After the first email distribution, 11 wineries completed the questionnaire. On 10th July 2017, a reminder email was sent to the wineries that had not responded to the first email. By 27th July 2017, 20 wineries had completed the questionnaire. The online questionnaire survey therefore had a 10% of response rate. Questions listed at the end of questionnaire were to be completed by wineries which showed interest in being interviewed. The response rate for interview participation was high - 50% and 10 wineries were interviewed. These interviews were designed to follow up on the questionnaire and to provide points for discussion.

Table 8 Questionnaire

1. Have you adopted any of the following practices in your winery (please mark accordingly)? *
   I have not adopted

   Organic

   Certified Organic

   Biodynamic

   Certified Biodynamic

   Sustainable

   Certified Sustainable

   Other

   If your winery has not adopted any of the practices, please answer Question 2. If your winery is organic, biodynamic or sustainable please proceed to Question 3.

2. If you have not adopted any of the above practices, please indicate why you have not chosen to be an organic, biodynamic or sustainable winery. When you have answered this question, you will have completed the questionnaire. Please return by clicking FINISH at the end of the questionnaire.

3. In which year did adopt the practices listed below?
   Organic

   Certified Organic

   Biodynamic

   Certified Biodynamic

   Sustainable

   Certified Sustainable

   Other

4. Why did your winery decide to adopt the practices listed in Question 1? Please explain for each of the practices you have adopted.

5. Which growers, producers and/or organic associations does your winery belong too? (List all)

6. Does the winery have certification from any of the above organisations? If YES, please proceed to Question 8. If NO, proceed to Question 7.
   yes

   no

7. What are the reasons that your winery is not certified?

8. Please list the organisations(s) that certify your winery.

9. What were the main reasons for obtaining certification?

10. What effort and resources, beyond fees, were involved in the total conversion and/or certification process? If you can estimate the approximate total cost (AUD) and time (years) of

the conversion process, it would be helpful.

11. Were you successful in attracting any government or other schemes, funds or subsidies to support the certification process? Yes/No? If YES, please name the supporting scheme(s) or fund(s).

12. What environmental, social and/or economic benefits has your winery gained through adopting this particular method vineyard management and wine production?

13. What benefits has your winery gained from certification processes related to organic, biodynamic and/or sustainable status?

14. Has your winery experienced any negative environmental, social and/or economic impacts because of the adoption of organic, biodynamic or sustainable vineyard management and wine production?

15. Has your winery experienced any negative impacts related to any certification processes related to organic, biodynamic or sustainable status? If YES, please explain below.

16. Did you incorporate the adoption of organic, biodynamic, or sustainable practices into a business plan for the winery? If so, at what stage?

17. If you are a certified producer, how does the presence of non-certified wineries in your wine-growing region affect your winery?

18. If you are an organic, biodynamic or sustainable winery, would you be willing to partake in a phone interview with me as a follow up to gain more details on the practices you have adopted? The interview would not take more than 30 minutes and would be scheduled at a time that is convenient to you. If your answer is YES, can you please complete Question 19. There is no need to answer Question 19 if your answer is NO.
    yes

    no

19. Please provide contact details (Name of your winery and phone or e-mail) below so that I can schedule a phone interview.

3.6 Interviews with wineries

The wineries that showed their willingness to be interviewed when they returned their questionnaires were contacted to arrange a time for telephone interview by email. The semi-structured framework of the interviews allowed enough flexibility to provide different information and ideas about organic, biodynamic or sustainable practices in wineries and vineyards to emerge during the conversation. The interviews lasted no longer than 30 minutes. Interviewing started on 1st August 2017 and was completed within a week. This allowed time to analyse the questionnaires response. Telephone interviews often give more frank responses than face-to-face interviews, although the advantage of visiting wineries was lost. The interviews were recorded and hand-written notes were taken. The interview questions for wineries are listed below in Table 9.

Table 9 Questions for winery interviews

1. *If they listed multiple factor in Questionnaire,* What was the key factor or motivation for choosing organic/biodynamic/sustainable practice for winemaking?

2. What are the main obstacles or problems in adopting these more sustainable practices in your
vineyard and how have they changed over time?

3. After shifting towards organic/biodynamic/sustainable methods, have you noticed differences in wine sales (e.g. volume, new subscribers, overall turnover of the winery etc.)?

4. Are you able to charge a premium for organic/biodynamic wines compared to non-organic vineyards in your wine region?

5. Have you included organic/biodynamic status of part of your marketing plans, e.g. in labelling, branding, and attending specific events?

6. Is your entire vineyard and winery organic or are only certain elements organic. For example, do you send your wine to be pressed or bottled by a third party, how do you ensure that is certified as well?

7. Without preservatives like sulphur dioxide, wine may have very short shelf life. So how do you or your consumers manage this?

8. I understand the use of elemental sulphur is allowed in organic or biodynamic wines? What are your opinions on this?

9. I understand Bordeaux Mix or copper solutions are allowed in organic or biodynamic wineries? What are your opinions on this?

10. Are these organic wines suitable for vegans/vegetarians? (animal fining agents like egg, pig bones etc. are used in wines)

3.7 Interviews with certification and producer organisations

A list of certification and active producers' organisations (Table 10) in South Australia was created from the information available on the Department of Agriculture and Water Resources of Australia (2017).

Table 10 Certification and producers' organisations

1.	AUS-QUAL Pty Ltd
2.	Australian Certified Organic (ACO)
3.	Bio-Dynamic Research Institute (BDRI)
4.	NASAA Certified Organic (NCO)
5.	Organic Food Chain (OFC)
6.	SA Primary Industries (PIRSA)
7.	SAW (Sustainable Australia Wine Growing)
8.	Wine Institute of Australia

Table 11 Questions for certification and producer organisation interviews

1. How does your organisation set the standards for certification?
2. Are there any state or national laws that inform certification?
3. What are your organisation's criteria for certifying a winery?
4. How long is the process and what is the cost of certification?
5. After certification, do you ensure that wineries are sticking to organic standards? If so, how?
6. What are the minimum levels of preservatives, pesticides, fungicides or other chemicals in vineyard management and wine production allowed in certified winery by your organisation?

Opinion based questions

1. Do you/your organisation-think that having certification makes any difference in wine sale?
2. Does certified organic wine cost more? Should it cost more?
3. What do you/your organisation think is the main reason that only about 10% of wineries in SA have any kind of certification by an 'organic' organisation?
4. Is organic produce is better than non-organic, or it is just different?

A list of interview questions for certification organisation and producers was prepared with the aim of collecting basic information on certification processes and the organisation's opinion on organic wine production in South Australia (Table 11).

The website of each organisation was analysed before starting the interview process to gain partial answers to some of the questions in Table 11. Contact details were collected at this time. The first six questions in the interviews attempted to elicit information on certification processes and labelling. All certification and producer organisations listed in Table 9 were sent an email to arrange a time for a telephone interview along with an information sheet and a letter of introduction. The interviews started on 5th August 2017. The interviews were recorded and hand written notes were also made.

3.5 Summary

This chapter discussed the research design and methodologies used in the study. It provided details about sampling and the way data were collected. Once all the wineries' responses from the questionnaires were received, the answers were provisionally analysed before interviews with wineries were carried out. Transcripts from the interview recordings were prepared. Certification and producer organisations were interviewed after the wineries. Once again transcripts were made from the recordings of interviews. The results will be presented in Chapter 4 and discussed in Chapter 5.

4. RESULTS

In Chapter 3, all of the methods used for this research were discussed. This chapter summarises the data collected from winery websites, questionnaires and interviews. For the quantitative element of the study, the results are mainly presented graphically and in tables. The summary of the qualitative element is mainly in the form of lists of responses.

4.1 Analysis of winery websites

The websites of 624 wineries were analysed and content analysis provided information about each winery (Appendix 3.2). Wineries were grouped according to their age and production as explained in Chapter 3

4.1.1 Barossa Valley

The results of the website content analysis for wineries in the Barossa Valley show that of the 192 wineries, 28 wineries are organic, biodynamic or sustainable but that only four of them have some form of certification. These wineries were classified in a 3*3(nine) cells according to their age and production. Figure 4 shows the distribution of wineries in the Barossa Valley.

Figure 4 indicates that there are very few 100 year old conventional wineries and only one of these is a small scale organic producer. The majority of wineries in both graphs produce fewer than 5000 cases annually and most of the wineries are younger than 20 years. There are fewer organic, biodynamic or sustainable wineries which have 5001-10000 cases in annual production compared with conventional wineries. There are more <20 year age wineries with organic, biodynamic or sustainable practices compared to conventional wineries. Unlike conventional wineries, organic and related wineries with annual production of 5001-10000 cases are only <20 years old.

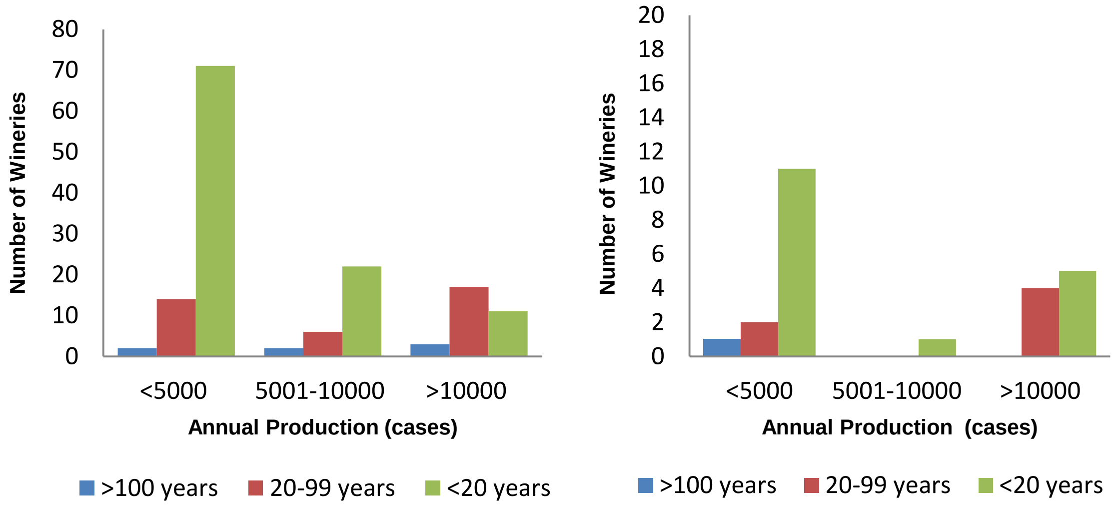

Figure 4 Barossa Valley: winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

4.1.2 McLaren Vale

In McLaren Vale, there are about 186 wineries, 30 of which are organic, biodynamic or sustainable wineries. Only five of these have some form of certification.

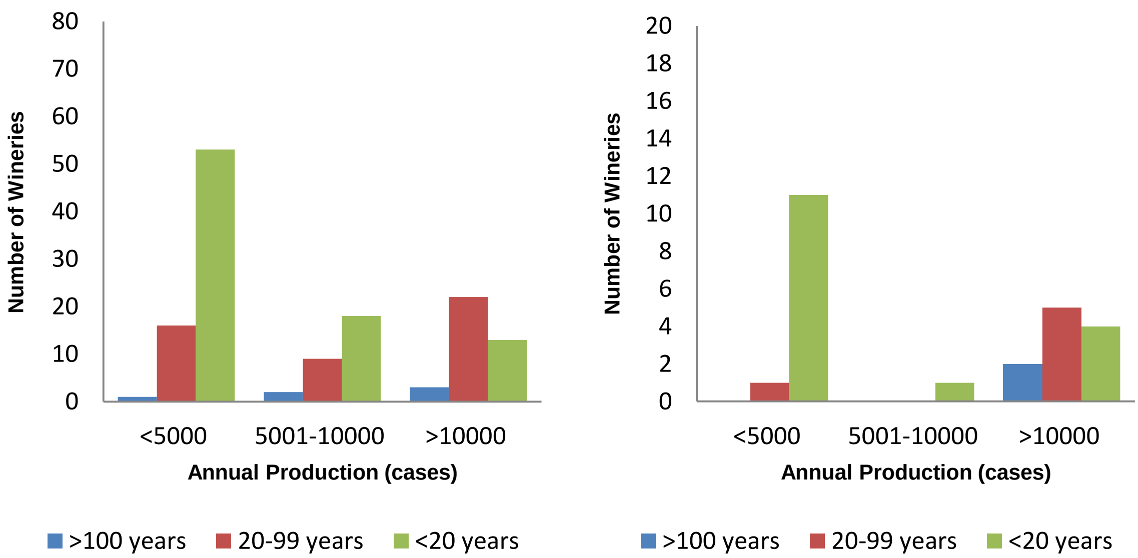

Figure 5 McLaren Vale: winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

Figure 5 demonstrates that both graphs have a majority of wineries with <5000 cases annual production and most of them are <20 years old. Conventional and organic, biodynamic or related wineries with >10000 cases annual wine production are between the age of 20-99. In conventional wineries, more than 100 year old wineries are small (<5000), medium (5001-10000) and large scale producers (>10000) of cases, whereas organic, biodynamic or sustainable wineries of >100 years age are only large scale producers.

4.1.3 Clare Valley

The Clare Valley has 92 wineries with 13 organic, biodynamic or sustainable but only two of these 13 wineries are certified. As per figure 6, both graphs have a majority of wineries with an annual production of <5000 cases. The Clare Valley has only two >100 year old conventional wineries, while no organic, biodynamic or sustainable wineries are older than 100. Conventional wineries with an annual production of >10000 cases are <20 years and 21-99 years old whereas, organic, biodynamic or sustainable wineries with >10000 cases production are only between the age of 21-99. 5001-10000 production in organic practices are only <20 years old and conventional practices have wineries with <20 years and also 21-99 age in the same production group.

4.1.4 Coonawarra

Coonawarra has a total of 46 wineries of which 12 are organic, biodynamic or sustainable. None of them has been certified. As seen in Figure 7, Coonawarra has no wineries >100 years for conventional and organic, biodynamic or sustainable practices. The majority of wineries in both graphs are of <5000 case of annual production and most of them are <20 years old. Organic wineries with 5001-10000 cases and >10000 cases annual production are only between the age of 21-99, whereas conventional wineries with the same production of cases are not only 21-99 age group but also <20 years old.

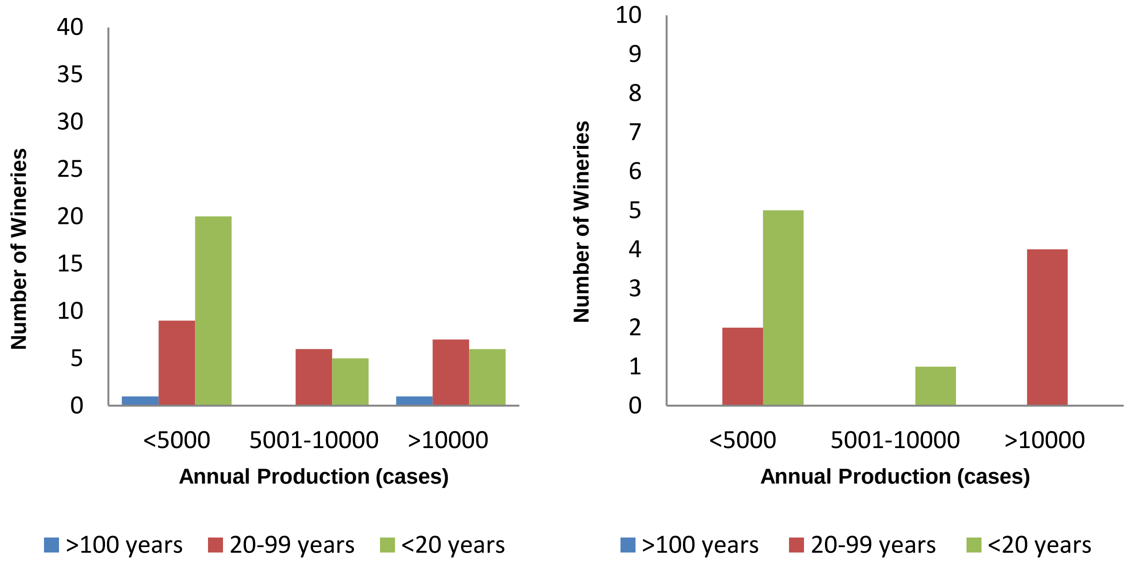

Figure 6 Clare Valley: winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

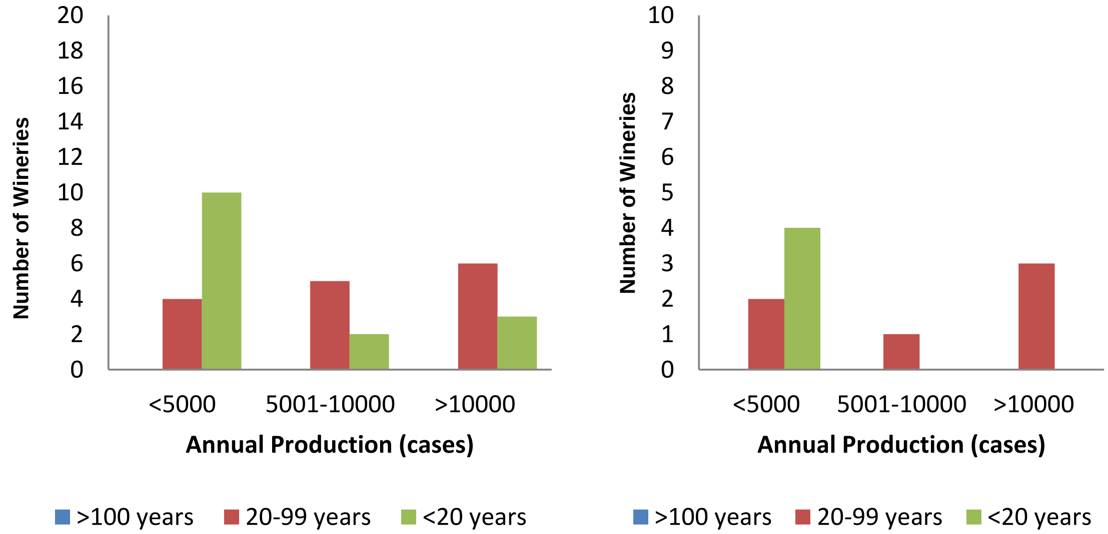

Figure 7 Coonawarra: winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

4.1.5 Eden Valley

Eden Valley has 38 wineries. Eight of these wineries have adopted organic, biodynamic or sustainable practice but only one has been certified.

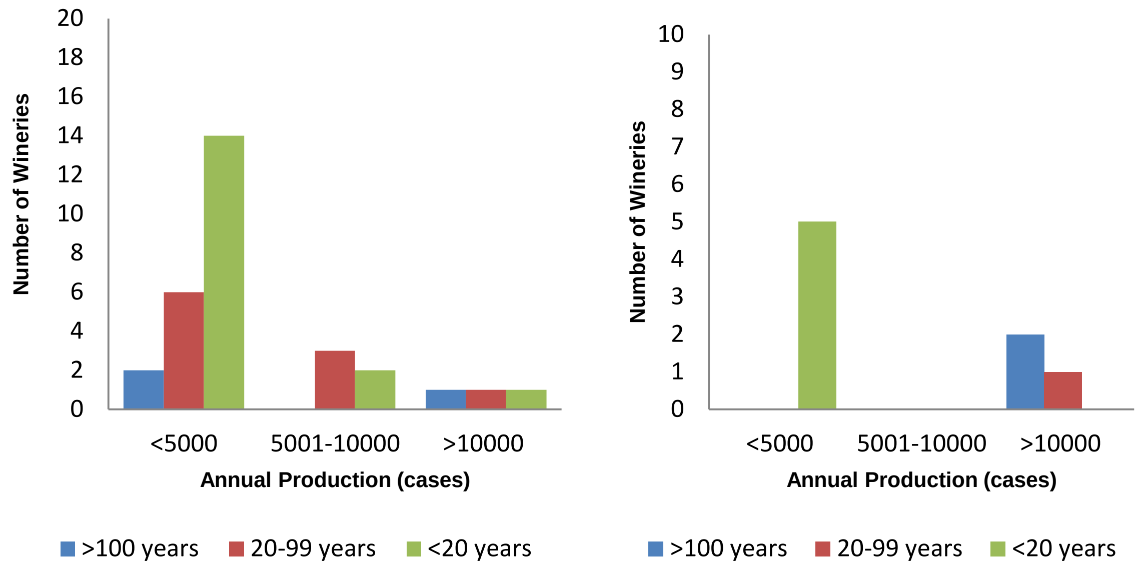

Figure 8 Eden Valley winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

Figure 8 shows that conventional and organic, biodynamic or sustainable wineries mainly have <5000 cases production and most of them are <20 years old. However, organic, biodynamic or sustainable wineries with <5000 cases are only under 20 years unlike conventional wineries which have wineries with all age groups. Conventional wineries with >10000 cases production are from all different age groups while organic, biodynamic or sustainable wineries in this production group are comparatively fewer wineries than conventional and all are above 20 years old. No wineries within the 5001-10000 cases production range are organic, biodynamic or sustainable.

4.1.6 Langhorne Creek

Langhorne Creek is a small wine region with only 22 wineries. Six wineries have adopted organic, biodynamic or sustainable practices, from these only one is certified.

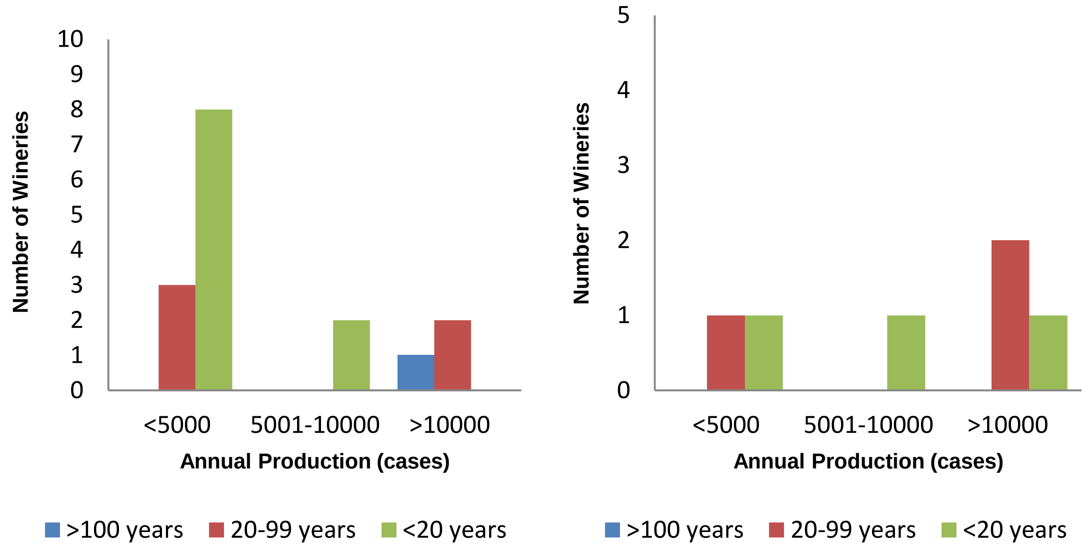

Figure 9 Langhorne Creek: winery distribution by production volume and age of winery (Coventional wineries are on left; organic, biodynamic and sustainable wineries are on right)

Figure 9 indicates that conventional and organic, biodynamic or sustainable wineries with 5001-10000 cases annual production are <20 years also. Most of the conventional wineries produce <5000 cases and from them <20 years wineries are twice than 21-99 year wineries, while organic wineries with <5000 cases production are <20 and 21-99 years with same proportion. None of <100 years old wineries are organic, biodynamic or sustainable. There is only one winery with >100 years and it practises conventional methods with annual production >10000 cases. Organic, biodynamic or sustainable wineries with >10000 cases are more of 21-99 years than <20 years.

4.2 Results of questionnaires

Online questionnaires were distributed among 202 wineries. There was a low response rate of 10% - only 20 wineries participated and returned the questionnaire. It was anticipated that the response rate would be around 20% based on similar surveys carried out in South Australia by other colleagues. However, these were not online questionnaires. Initially, it had been planned to post questionnaires and visit several wineries, however the ethics committee did not approve this approach and insisted upon the online method.

Neither was it approved to conduct more than approximately 200 online questionnaires. The questionnaire was semi-quantitative and had 19 questions (Section 3.2). A summary of responses to each question are provided in this section. The questionnaire started with a general question asking whether the winery had adopted organic, biodynamic or sustainable practices. The results are shown in Figure 10.

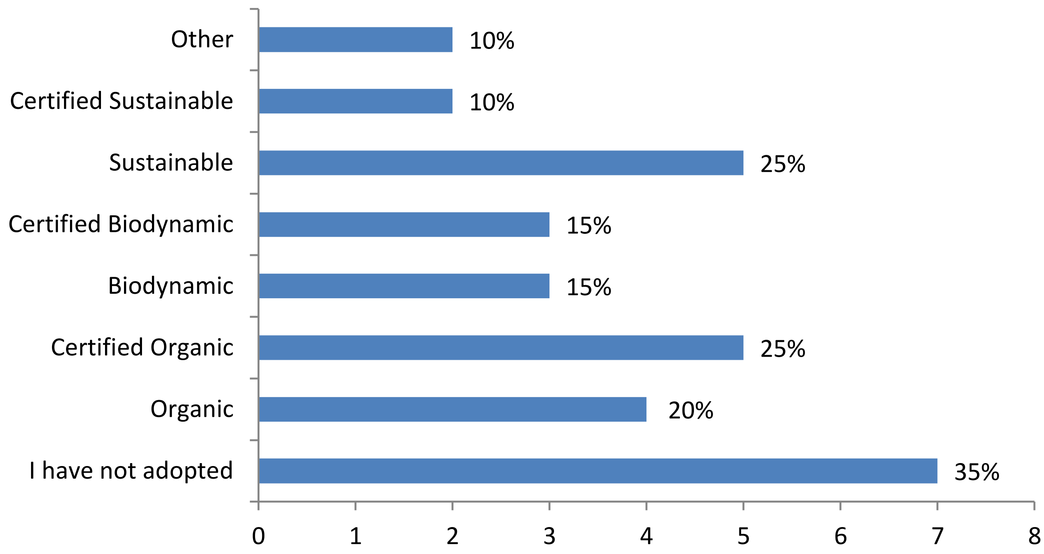

Figure 10 Number of participant wineries that have adopted organic, biodynamic or sustainable practices

Figure 10 indicates that seven wineries had not adopted organic, biodynamic or sustainable practices. The remainder of the wineries adopted between one, two or all three production methods. One winery adopted all organic, biodynamic and sustainable practices in the vineyard, but interestingly it had no certification. One adopted organic and sustainable methods and another adopted certified organic and certified biodynamic methods. A fourth winery was farming using biodynamic and sustainable practices, while a fifth winery was only certified organic. One declared itself sustainable. It is clear from this diversity of practices that there is no preferred pathway to adopting them.

Question 2 was only asked of non-organic producers and probed their reasons for not adopting organic, biodynamic or sustainable practices. Different reasons were given by the seven conventional wineries that responded. Figure 11 shows the reasons given and again no dominant reason is highlighted.

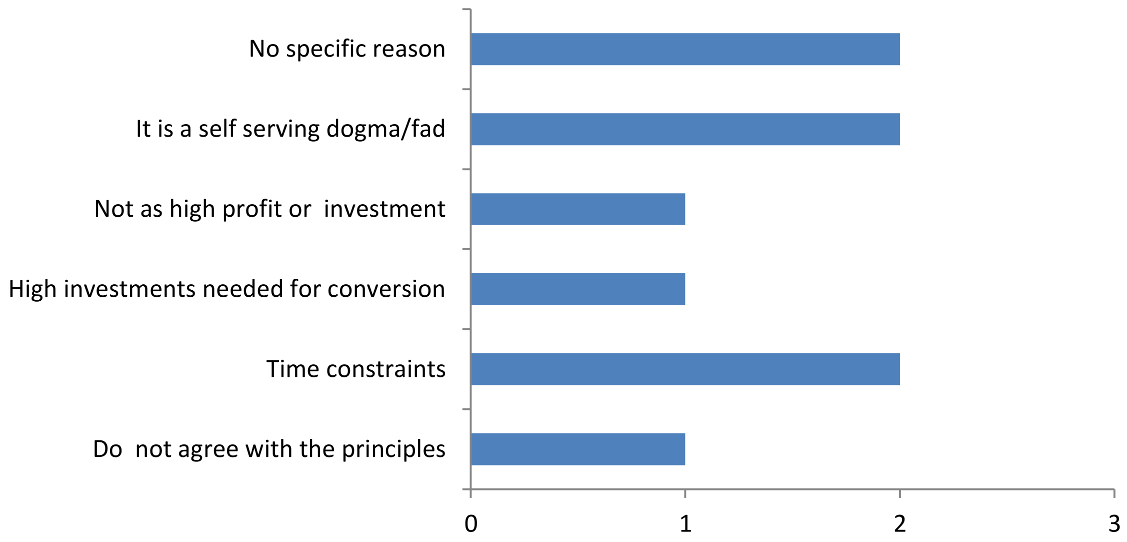

Figure 11 Reasons for not adopting organic, biodynamic or sustainable practices

The third question asked wineries when they adopted organic, biodynamic or sustainable practice (Figure 12).

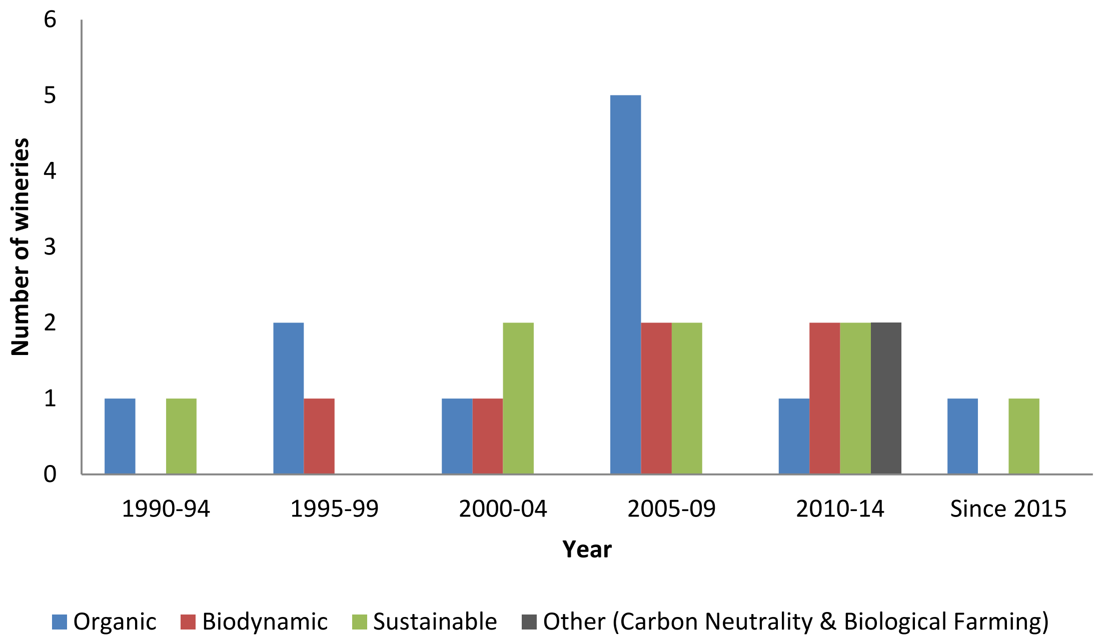

Figure 12 Year of adoption of organic, biodynamic or sustainable practices

Only nine wineries had adopted any of these practices between 1990 and 2004. In the last 10 years, 16 wineries adopted these practices. Five of these wineries went organic between 2005 and 2009. It is clear from Figure 12 that adoption of such sustainable practices has increased over time. In addition to organic, biodynamic and sustainable practices, other sustainable methods have also been adopted such as carbon neutral and biological farming.

Question 4 aimed at elucidating the motivations behind adoption of organic, biodynamic or sustainable practices. Figure 13 shows responses from 13 wineries.

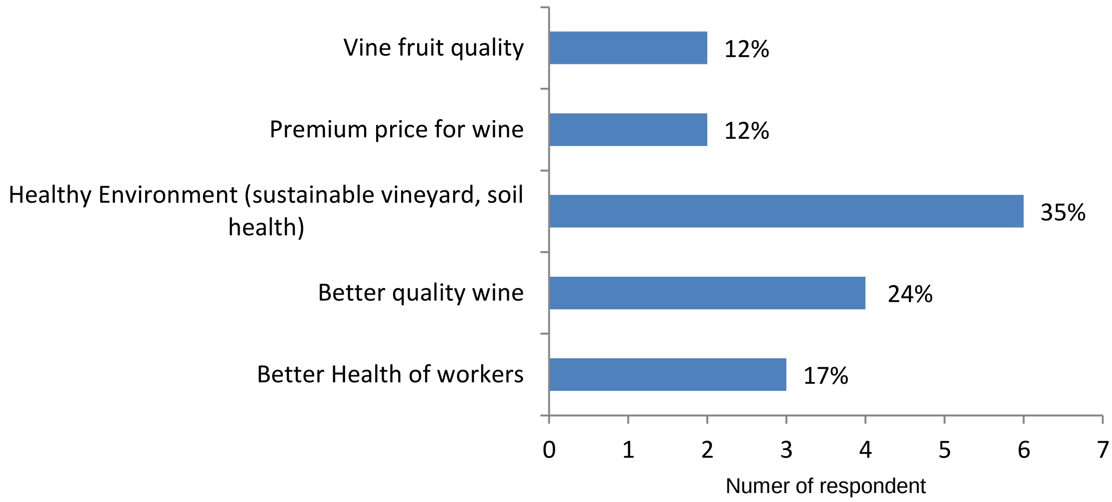

Figure 13 Reason for adopting organic, biodynamic or sustainable practice

The main reasons for adopting any of these three practices is due to the health of the environment. In addition to this, soil health and sustainability of the vineyard were maintained. Healthy soil gives superior quality grapes and better quality wines. Spraying herbicides leads to poor soil quality. Avoiding chemicals in vineyards maintains biodiversity in soil and healthy microbial population which, in turn, gives better wine, better health for workers, and a sustainable future. Another most important concern was the health of workers in the vineyard.

In the fifth question, wineries were asked to provide details about the grower, producer or organic associations to which they belong. These associations are listed in Table 12.

Table 12 Grower, Producer or organic associations

Association name	Number of wineries belonging to the association
Australian Certified Organic	7
Barossa Wine Growers Association	5
SAW (Sustainable Australia Winegrowing)	4
Winemakers' Federation of Australia (WFA)	2
Biodynamic Agriculture Australia	3
South Australian Wine industry Association (SAWIA)	2
National Association for Sustainable Agriculture, Australia (NASAA)	2
Biological Farmers of Australia	1
Coonawarra Vignerons	1
Langhorne Creek grape and wine association	1
Entwine Australia	1
Canopy	1
Phylloxera Board	1
Eperosa	1
Head Wines	1
Ruggabellus	1
Wine Australia	1

The next question asked the wineries if they were certified organic, biodynamic or sustainable. While 13 participants adopted organic, biodynamic or sustainable practices, only six wineries obtained certification.

Questions 7 and 9 asked the reasons for obtaining and or for not obtaining certifications. Question 7 was answered by nine wineries from which six were certified. Question 9 was answered by seven non-certified wineries respectively (Table 13).

Table 13 Combined answers of questions 7 and 9

Reasons for obtaining certification (7 participants)	Reasons for NOT obtaining certification (9 participants)
• Proof of genuine commitment to organic/biodynamic practices • Sales or promotional purposes • Building customer trust and confidence to buy products • Validation and integrity of the organic and biodynamic process • Validation of the process and surety of meeting international standards for overseas customers	• Do not agree with principles • Quantity of paperwork required • Complexity and expense • Extra effort required to maintain certification • Efforts to obtain certification were in excess of the value gained • Hard to control weeds. • No certification available for biological farming and other practices

In Question 8, wineries were asked to give the names of the certification organisation with which they are certified. Only the six certified wineries responded to this question (Table 14).

Table 14 Wineries and their certification organisation

Wineries	Certification Organisation	Certification
Winery 1	Australian Certified Organic (ACO)	Certified Organic (2005)
	Environment Protection Authority (EPA)	Certified Biodynamic (2005)
	National Association for Sustainable Agriculture Australia (NASAA)	Certified Sustainable (1990)
	BFA (Biological Farmers of Australia)	
	USDA	
Winery 2	National Association for Sustainable Agriculture Australia (NASAA)	Certified Organic (2005)
		Carbon Neutral (2011)
	Canopy	
Winery 4	Organics Australia	Organic (2006)
		Certified Organic (2017)
Winery 11	Australian Certified Organic (ACO)	Certified Organic (2011)
	SAW (Sustainable Australia Winegrowing)	Certified Biodynamic(2011)
		Sustainable (2012)
Winery 15	Australian Certified Organic (ACO)	Certified Organic (1993)
Winery 17	Australian Certified Organic (ACO)	Certified Organic (1997)
		Certified Biodynamic(2004)

Next wineries were asked to provide details about the time and the costs involved in getting certification in question ten. Question 11 was designed to gain information about available government schemes and funds for supporting certification process. Only two of ten respondents were successful in receiving funds. One of them is a certified organic winery while another is non-certified organic, biodynamic and sustainable winery.

Table 15 Conversion time and cost for obtaining certification

Wineries	Conversion time (years)	Cost (AUD)
Winery 1	3 to 6 years to establish	NA
Winery 2	3 years (certified organic and carbon neutral)	Many thousands dollar
Winery 4	3 years	$1200 – Organic Australia $1500/acre management & labour
Winery 11	3 years Year 1 – Pre conversion Year 2 – In conversion Year 3 – In conversion End of year 3 - certified	$50,000 – for weed control equipment
Winery 14	Already certified when bought	$15,000/year – to maintain certification loss of $40,000 crops
Winery 16	3 years	$100,000 – specialised equipment

Table 16 Government funds, subsidies and schemes received by wineries

Wineries	Type of winery	Subsidies, Schemes or Funds received
Winery 1	Certified Organic, certified biodynamic, certified sustainable	None
Winery 2	Certified organic, carbon neutral	None
Winery 4	Organic	R & D grant and Export grant
Winery 11	Certified organic, certified biodynamic	None
Winery 13	Organic, biodynamic, sustainable	Bush bids grant of $6000/year for weed removal from 73 ha conversion land over 10 years
Winery 15	Certified organic	None
Winery 16	Biodynamic, sustainable	None
Winery 17	Certified organic, certified biodynamic	None
Winery 18	Organic, biodynamic	None
Winery 19	Organic, biodynamic, sustainable	None

Question 12 dealt with the environmental, social and economic benefits gained from adopting organic, biodynamic or sustainable practices. 13 wineries attempted the question. The main benefits that winemakers stated they perceived were environmental benefits, with the principal advantage being yielding better quality grapes and wine. Other benefits included healthy vineyards, improved soil health, improvement and maintenance of biodiversity in vineyards. Economic benefits cited included international recognition, higher sales volume, higher prices, and more customers. The only social benefit cited was the health of farm labourers and workers who were happy to work in a chemical free environment (Table 17).

Question 14 required the wineries to identify any negative impacts they faced in adopting organic, biodynamic or sustainable practices. The only negative environmental impact that was cited was that some parts of vineyards could become overly fertile. No negative social impacts were identified, however, certain economic impacts were identified such as lack of consideration by certain people of biodynamic farming as credible, few older male drinkers considered organic wine inferior to conventional wine, several wine lovers confused these production methods with the role of sulphur in winemaking (without addition of sulphur wine will not mature), certain consumers preferred a ‘No chemicals or pesticides’ label rather than an ‘organic’ label.

Table 17 Benefits of adopting organic, biodynamic and sustainable wine production

Environmental, social and/or economic benefits of ORG/BD/SUS wine production	
Positive impacts	**Respondent wineries**
Environmental Benefits	
Better quality grapes and wines	5 (38%)
Healthy sustainable vineyards	3 (23%)
Improved soil health	2 (16%)
Richer vineyard biodiversity	1 (8%)
Health of workers	1 (8%)
Economic Benefits	
International and national recognition as a leading wine producer	3 (23%)
Increase in sales and marketing advantage	2(16%)
Attracting more customers due to certification	1 (8%)
High price due to organic premium	1 (8%)
Social Benefit	
Health of worker -workers are happier to work on chemical free farms	2 (16%)

In questions 13 and 15, the positive and negative aspects of certification were identified. Eleven wineries answered question 13 (positive impacts) from which three wineries said it was a non-applicable question as they were not from certified organic producers (they had answered the question in error). Nine wineries answered question 15 (negative impacts) with five wineries answering that there was no negative aspect of being certified and two wineries said the question was non-applicable (Table 17).

Table 18 Positive and negative side of certification process

Positive aspects	Negative aspects
• Customers trust our product as genuine and authentic (3 wineries) • Financial benefit – improved sale and fair price (2 wineries) • Awards for international recognition of our environment management and vineyard (2 winery) • Better wines – lower pH and higher retained acid (1 winery)	• Recording and reporting work load is high (1 winery) • Few customers consider organic wine inferior to conventional wine, hence there is no economic advantage (1 winery)

Question 16 considered the incorporation of organic, biodynamic or sustainable production practices into the business plans of the wineries. From 11 respondents to this question, six wineries have incorporated these practices into their business plans. Five of these wineries have involved organic, biodynamic or sustainable practices in their business plans from the very early stages, such as establishing a protocol for a sustainable vineyard. They consider these practices as marketing tools in their planning and a very important aspect in the economic management of their business. The winery that did not use this type of business planning from the outset had bought an organic vineyard and they adapted their business plan around that.

Question 17 sought the opinions of certified producers about how non-certified producers in their wine growing region affected their winery. Ten wineries responded to this question. Two said it was a non-applicable question as they were not from organic producers (that is, they answered the question in error). None cited any economic impacts on their wineries but three wineries were concerned about the environmental impact on their vineyards from neighbouring non-organic producers. This issue was related to the spray drift of pesticides and other agro-chemicals, especially spray drift from acre broad cropping. The specific concern is that residue from sprays may contaminate their wines and that certification could be compromised. One winery shared a beneficial relationship with a neighbouring winemaker who was aware of their certification and thus only sprayed when appropriate. Another four wineries stated that there were no problems between both certified and non-certified wine producers. Another winery, a single estate vineyard, said that its production process had negligible effects from non-certified producers.

Questions 18 and 19 asked about wineries' willingness to be interviewed on telephone and requested the contact details of interested wineries.

4.3 Interviews with wineries

Eleven wineries expressed a willingness to be interviewed by telephone (Table 19). The questions for the semi-structured interviews with wineries were built around those having already been introduced in Section 3.3.

In terms of the key motivation to adopt organic, biodynamic or sustainable practices, half of the interviewees said their winery had chosen this pathway to enhance and protect the natural environment and to achieve land sustainability. A related motivating factor noted by interviewees was the maintenance of soil health and soil quality. Three wineries argued that health aspects such as eliminating synthetic and poisonous chemicals (reducing cost of chemicals) and protecting workers' health were the key motivations.

Question 2 requested whether there had been any obstacles faced by wineries in their use of organic, biodynamic or sustainable practices. A large number of hurdles were described by winemakers as obstacles they had faced. Due to the elimination of herbicides, weed control had been a problem which required mechanical removal without significantly disturbing soil or manual removal.

Table 19 Wineries for interviews

Wineries that expressed interest in being interviewed	Annual Production and Vineyard size	Location	Year established	Wine production type	Certification type
Winery 2 Temple bruer	18000/ 56 ha	Langhorne Creek	1980	Organic Carbon Neutral	Certified Organic
Winery 4	10000/ 9 ha	Coonawarra	1988	Organic	No
Winery 7	28000/ 90 ha	Barossa Valley	1955	Biological Farming	No
Winery 11	15000/ 89.3ha	McLaren Vale	2000	Organic Biodynamic	Certified ORG & BD
Winery 12	5000/ 9 ha	Coonawarra	2001	Sustainable	No
Winery 13	30000/ 121.72 ha	Eden Valley	1868	Organic Biodynamic Sustainable	Certified Sustainable
Winery 15	2200/ 6.5 ha	Barossa Valley	2007	Organic	Certified Organic
Winery 16	3000/ 6 ha	McLaren Vale	1976	Biodynamic Sustainable	No
Winery 17	15000/ 48 ha	Barossa Valley	1999	Organic Biodynamic	Certified ORG & BD
Winery 18		Eden Valley		Organic	Certified organic
Winery 19	5000/ 39.17 ha	Barossa Valley	1998	Organic Biodynamic sustainable	No

The removal of weeds led to two further obstacles. Firstly, the need to invest in specialised equipment to control weeds mechanically. Secondly, extra manual labour was required to be employed for weeding as was the application of fungicide in very minute quantities to remove thin grass. Other obstacles included problems with fungal diseases and insect outbreaks during bad weather and the lack of knowledge of a few winemakers about proper implementation of organic and sustainable practices which led to lower yield or poor quality grapes. During biodynamic practices, the vineyard is converted to one ecosystem and during this conversion certain species of bugs are removed. These good bugs eat larvae which feed on grapes and destroy them.

One line of questioning was aimed at analysing the link between organic, biodynamic or sustainable production and wine sale in terms of volume, new subscribers, and overall turnover. Most of the wineries interviewed said there had been no significant change in wine sales. However, they stated that the organic brand had attracted more visitors and customers to wineries. The winemakers believed that it was because of the philosophical approach rather than marketing. Only one winery, however, noticed a higher sales volume after adopting sustainable practices. The explanation given by that winery was that organic vineyard management maintained a perfect mineral balance in the soil which yielded better quality fruit and better wine. This organic wine attracted more customers and created more profit.

When asked about charging a premium on organic, biodynamic or sustainable wines compared to non-organic wines in their wine regions, only three wineries said they did so. However, one of them said they had noticed a drop in sales due to the higher price. One winemaker explained that a complex wine in terms of mineral elements, grape varieties, different yeasts and flavours attracted more of a premium than simple wines and producers of simple organic wines could not charge a premium.

With the exception of three wineries, all wineries used labelling and branding related to their organic, biodynamic and sustainable processes in their marketing plan. Several of them, however, believed that labelling was only a minor part of marketing. Most winemakers said that first and foremost marketing was around the taste of the wine.

Wineries were asked whether their vineyard and winery were both organic and/or certified, or if only certain elements were organic and/or certified. Eight wineries had both an organic vineyard and an organic winery, six of these were certified. Two wineries contracted out the processing of their organically grown grapes; however, in doing so, they also ensured that the winemaker and the bottler had their own certifications.

Three questions led to discussions about chemicals used in wine production. Sulphur dioxide is normally used in winemaking in Australia. It removes oxygen from wines and the resulting anaerobic conditions kill bacteria. Thus, it slows down the aging process. The addition of preservatives like sulphur may not be permitted in organic or certified organic wines, so how wineries managed the short life of wines without sulphur was discussed. Most wineries admitted that they added sulphur in low amounts. One winery believed that sulphur dioxide was a natural product and therefore was allowed under certification. Another winery stated that they added organic sulphur in amounts ranging from 80 to 100 ppm amount. Accordingly, if the winery was clean and contamination free, only minute amounts of sulphur were required. Another winery claimed that they had been making preservative free wines for 11 years and their shelf life had not been affected, as only the taste was different. A further winery produced two different wines and they advised consumers to drink their preservative free wines within 1-2 years. The rest of the wineries believed that sulphur played no role with the aging of wine.

The winemakers were asked about using elemental sulphur in organic or biodynamic wines. According to all the wineries, the use of elemental sulphur in vineyards was harmless except for people who were very sensitive to sulphur dioxide. They argued that sulphur should be allowed in organic or biodynamic wines as it was one of the few available options to control vineyard diseases. It was used in very small amounts (red wine -100 ppm / white wine -150 ppm). One winemaker noted that consumers confused organic and sulphur-free wines. Organic wines were not necessarily free from sulphur.

Wineries were also asked about the use of Bordeaux mix or other copper solutions. Copper helps to retain colour, remove bad smells, and importantly it kills bacteria and fungi. A range of different responses were received. One winery stated that copper sulphate was banned in organic wine production according to Australian Standards, while others argued that organic wines allowed copper but in lower quantities. Four more wineries also agreed that copper fungicides including Bordeaux mix could be used occasionally in exceptional conditions such as in the wet, high disease season. One winemaker explained that in France the use of copper, where it had been used over a long time, had led to blue colour tinge in soils. It was also argued that there was no issue in using copper in concentrations that did not accumulate in the soil and disturb the biodiversity. The carbon neutral winery had carbon credits and was able to use a copper solution as they had carbon credits but in small amounts. Two wineries used alternative certified organic products outlined in the guidelines of the certification organisation while another winemaker said the soil had a perfect balance of copper in an organic or biodynamic vineyard and no addition was required. A few of the wineries kept copper plugs in wine which improved the taste and colour by releasing a very low amount of copper into the wine.

The use of animal fining agents like eggs and pig bones was a concern for vegans and vegetarians. Such fining agents remove suspended organic or protein particles from wine.

Natural alternatives to animal fining agents were used by all winery interviewees who stated that all of their wines were vegan and vegetarian friendly.

4.4 Interviews with Certification and Producer Organisations

Eight certification and producer organisations were approached for interviews (Section 3.4). AUS-QUAL Pty Ltd, Australian Certified Organic (ACO), the Bio-Dynamic Research Institute (BDRI), and Organic Food Chain (OFC) showed no interest in participating in the research despite a number of requests. The Wine Institute of Australia indicated its willingness although despite repeated attempts to schedule interviews, none of their representatives was available due to their time constraints. SA Primary Industries (PIRSA), NASAA Certified Organic (NCO) and SAW (Sustainable Australia Wine Growing) were interviewed.

1) SAW (Sustainable Australia Winegrowing)
   SAW is a sustainability program, not an organic or biodynamic program and therefore does not provide organic or biodynamic certification. Therefore, their interview focused on sustainable wine production.

2) NASAA (The National Association for Sustainable Agriculture, Australia)
   NASAA develops and maintains organic standards, supports organic, biodynamic and sustainable practices, and provides certifications. It is not regulated by government, rather it is an independent organisation.

3) PIRSA (SA Primary Industries and Regions)
   This is the state government agency for economic development. In the context of this research, it mainly focuses on delivering the Government’s premium food and wine target; that is, food and wine produced in a clean environment which is exported around the world. PIRSA does not provide any form of certification.

SAW and NASAA were asked how they set the standards for certification. SAW uses a workbook with questions set by a working group of qualified and experienced industry representatives which are then reviewed by government and academic experts. These questions are weighted. NASAA set these standards 30 years ago based on IFOAM (International Federation of Organic Agriculture Movements), an internationally applicable organic standard that can be used directly for certification. It set NASAA's organic and biodynamic standards and a NASAA trader standard. Both mentioned that Australia does not have a government regulated market for wines like China, Taiwan, Korea and Canada do, as there is no legislation for certification, only regulations.

The primary phase of the SAW program is the collection of data by the winery as in a self-assessment Workbook. The workbook must be completed during a data collection period of one year. Members must also provide SAW with an annual spray diary for the vineyard area being certified. The certification of a member involves the verification by an accredited third party of the data provided together with the member's self-assessment scores according to the Workbooks.

Table 20 Four certification categories in SAW

Category	Upper Limit	Lower Limit
Red	<25%	> 0%
Yellow	<= 50%	> 25%
Green	<= 75%	>50%
Blue	<= 100%	> 75%

McLaren Vale's sustainability scheme includes a triple-bottom approach which recognises the interrelationship between environmental, economical, and social aspects to future sustainability. Elements of the approach are: (1) assessment over time; (2) grower sustainability levels identified on a continuum and not on a pass/fail basis; (3) the assessment and reporting system must be useful for the grower to understand their sustainability status and be able to improve upon it. There are four certification categories: (1) RED - needs attention (2) YELLOW - good (3) GREEN - very good and (4) BLUE - excellent. The content of the assessment is also updated annually to account for advancements in viticulture (knowledge, information, and technology). There are certain criteria to be eligible for certification: members must achieve a total score in the score band for that category and achieve a score in each chapter of the workbook which is not less than one category below the overall category.

The SAW program is designed to be used by vineyards at any stage in the implementation of the sustainability program. Certification can be terminated if the Certifier finds that:

(a) any grapes, subject of certification have residues above those recommended by the Australian Wine Research Institute for any agro-chemical registered for use in Australian viticulture;
(b) residues or chemicals which are not permitted appear on any grapes
(c) the use of any agro-chemicals that are permitted exceed the allowable limit;
(d) any environmental harm has occurred or may occur as a result of viticulture practices in vineyard or winemaking facilities

NASAA has different criteria for different products. In the case of wine, checks are made against EU requirements and NASAA standards, for instance, which certified additives are allowed and in what quantity. Wines have to be at least 95% organic though up to 5 % of other ingredients are allowed as per the NASAA organic certification guidebook. NASAA is very strict on not allowing genetically modified organisms (GMO) plants and animals in the vineyards.

The time and cost of certification was an issue raised by wineries in the questionnaires. SAW gives members two months to fill in their workbook. An audit takes between 1-3 hours and requires approximately one working day of preparation. Membership to the Sustainable Australia Winegrowing Program costs USD 50 per annum. Certification requires members to be audited every 3 years and each audit costs approximately $500.

The NASAA certification process takes three years. The first year is the pre-conversion phase and the subsequent two years are called the ‘in conversion’ of certifying phase. After this, the winery or vineyard is certified. The cost approximately is USD 2000 in applying for certification after which there is an annual fee of USD 1000 and an inspection each year. The cost may vary with each certification and producer organisation. PIRSA and NASAA argued that the prices for organic certification are fair as it requires a great deal of effort, investment, and commitment to retain and abide by the organic standards.

SAW and NASAA were asked how they ensure wineries maintain the standards. Both organisations stated that they asked their members to fill in a self-assessment workbook annually and submit it with an annual spray diary for the certified vineyard area before inspection. Licenses need to be renewed or not each year by audit and undertake an annual inspection of the vineyard or winery by an authorised person. Details about additives and standard are provided in Appendix F.

All three organisations interviewed were asked about the role of certification in making a difference to wine sales. The representative from PIRSA believed that there were no significant differences due to certification, whereas SAW and NASAA claimed sales increased by supporting in market excess and a premium was able to be charged to customers that bought these wines as they were attracted to organic certified products that they trusted.

The question was raised concerning why only approximately 10% of wineries had been certified based on the analysis of the winery websites. NASAA noted that while this was only 10% now, there had been an increase in applications for certification and consumer demand for organic food had also been increasing. PIRSA was more sanguine arguing that as the certification does not necessarily lead to increased sales or profit, the motivation of some wineries to become certified was compromised. In the opinion of the representatives from PIRSA and NASAA, organic wines do not taste different to conventional wines and they do not generally provide an economic competitive advantage over conventional wines. Therefore, they argued that it wa for some kind of moral reasons in terms of saving the environment that led wineries to adopt these practices.

4.5 Summary

This chapter has summarised the results from the survey of websites, online questionnaires and telephone interviews with wineries and certification and producer organisations. The following chapter analyses these data.

5. ANALYSIS AND DISCUSSION

Through the use of online questionnaires and interviews, this research investigated the key drivers for adoption of organic, biodynamic and sustainable practices and analysed the motivation of wineries to be certified for their sustainable and related practices. Websites of 624 wineries (Halliday 2016) were analysed and an empirical study was conducted using an online questionnaire (20 responses) from six wine regions, and telephone interviews with 10 wineries. Seven certification and producer organisations were approached and three were interviewed. The results of the content analysis of winery websites, the online questionnaire responses, and interviews were described in Chapter 4. The results will be analysed in this chapter which has four sections: analysis of websites; online questionnaires; interviews with wineries; and interviews with certification organisations.

5.1 Analysis of winery websites

The online content of websites was analysed from theoretical perspectives identified from the existing literature. Content analysis provides general information of winery size, age, production level and winemaking philosophy. Figures 4 to 9 show a classification of wineries in each wine region according to their age and annual production.

Tolley S (2005) analysed Australian wineries and observed during his studies on regional branding that there was a clear difference in the wine produced from different regions. He also suggested that climate and geography of particular region affected the property of wines and created unique wines. The Barossa Valley, Eden Valley, Clare Valley and McLaren Vale wine regions of South Australia have warm climates while weather in the Coonawarra and Langhorne Creek is comparatively cooler (Ling & Lockshin 2003; Halliday 2016). According to the content analysis of the wineries, all the regions with a similar climate or soil property have a similar distribution of wineries. The Barossa and McLaren

Vale are the largest wine regions of the six study areas. McLaren Vale contributes 1.4% to national GDP which is very high than the combined contribution of the Barossa and Eden Valleys of 0.2% to GDP (ABS 2012-13). The Coonawarra also contributes the same to national GDP. Langhorne Creek and Clare Valley have the lowest share of 0.1% to national GDP.

The Barossa Valley is one of the oldest and most historic wine regions of South Australia. It was registered as GI in 1997 (Wine Australia 2016). It had a seven per cent share of the vineyard area in Australia at the end of the last decade (Hoffmann 2009). It was developed as an agricultural and viticultural region by the German settlements as long ago as in 1842 although alcohol sale and use was opposed by English Protestants (Tolley JH 2005). The first commercial vineyard there was established in Jacob's Creek in 1847 (Tolley JH 2005). The Barossa Valley has been a tourist attraction for visitors due to the range of wines, and wineries have undergone evaluation and experimentation in making various wines using different varieties of grapes. Recently, the trend has been observed in experimenting with the grape growing and winemaking style. Winemakers have become innovative with traditional wines by using organic and biodynamic farming. It is one of the oldest and most reputable regions for wine in South Australia. The content analysis of winery websites of this region can be found in Appendix A1. For both conventional and organic, wineries that are less than 20 years old and are small scale (producing less than 5000 cases of wine annually) dominate this region which is somewhat surprising, as it is very old (Figure 4). In fact, only 11 conventional wineries and one organic winery are more than 100 years old (Appendices B1, C1). Barossa Valley and McLaren Vale have comparatively more wineries than other four wine regions, producing more than 10000 cases of wine annually.

Like the Barossa Valley, McLaren Vale is an old and extensive wine region dating back to 1838. It was officially declared as GI in 1997 (Wine Australia 2016). Around 7500 ha of the area is vineyard, with 244 wineries and vineyards (ABS 2015; Halliday 2016). Figure 5 presents content analysis of 186 wine producers with their age and annual production (186 of the 244 wineries have online available information for age and production of wineries of this region). Conventional and organic, biodynamic or stainable wineries are less than 20 years old and are small scale producing less than 5000 cases per year. Barossa Valley and McLaren Vale have almost similar distribution of conventional and organic, biodynamic or sustainable wineries (Appendices A2, B2, C2).

Another old region of South Australia is the Eden Valley with history dating back to 1847. Eden Valley is adjacent to the Barossa Valley and while it is in the Barossa wine zone, it is not as large as it has only 38 wineries. A maximum number of wineries are small scale producers irrespective of their age (Figure 8). Eden Valley has 21% of 38 wineries with organic, biodynamic or sustainable practices which is higher than the Barossa Valley (Appendix A5). This region has a tendency more towards sustainability. This may be because wineries with small production and smaller vineyards are easy and less risky to convert into organic or biodynamic (Appendices B5, C5). Traditional grape growers of this region are making moves towards protecting the environment.

The Coonawarra wine region has been under wine production for not more than 100 years. There are no 100 year old wineries (See Figure 7). The Coonawarra is known for its internationally recognised *terra rossa* unique soil, which has a high iron concentration. A mixture of small, medium and large scale wine producers are found in Coonawarra (Appendices B4, C4). Being a new region, it has more organic, biodynamic and sustainable wineries than other selected wine regions of this project; there are 12 (26.1%) of 46 wineries (Appendix A4). One quarter of total wineries are organic, biodynamic or sustainable, which is the second highest amongst all six selected wine regions. However, none of the organic, biodynamic or sustainable wineries is certified.

Similarly, Langhorne Creek is a new wine region with only one 100 year old traditional winery. This region has the highest proportion of organic, biodynamic or sustainable wineries at approximately 27.3% (Appendix A6). Six out of 22 wineries have adopted sustainable or related practices with there being one certified winery. Although it is the third largest grape growing region with unique wine varieties and has expanded widely in the last decade, Langhorne creek is relatively unknown compared with other South Australian wine regions. Even after having relatively fewer wineries, it produces a large volume of wine (Appendix B6). Langhorne Creek and Coonawarra share similar distribution of wineries when they are classified on bases of age and production (Appendix C6).

The Clare Valley is located in the north of Adelaide and is well known for the finest Riesling. Its first vineyard was planted in the 1840s. There is a combination of traditional producers and new winemakers who adopted and experimented with a new approach to winemaking. Of the 72 wineries, 18.1% are organic, biodynamic or sustainable with no 100 year old winery and only two with certification (Appendices A4, B4, C4). For conventional wineries only two were established less than 100 years ago. This region has a balance of small, mid and large scale wine producers.

It is clear that the distribution of the number of organic, biodynamic and sustainable wineries depends on the size of the wine region (number of wineries, not area) and how old the region is. Organic grape growing is more common in smaller than in larger wine regions (Kallas, Serra & Gil 2009). In this study, organic, biodynamic and sustainable wine production is more prevalent in wine regions with fewer than 50 wineries such as Langhorne Creek (27.3%), Coonawarra (26.1%) and Eden Valley (21.1%). Moreover, Langhorne Creek and the Coonawarra have no organic, biodynamic or sustainable wineries older than 100 (Figure 9), while Eden Valley has two wineries from the 1840s which are organic and biodynamic. Older and larger wine regions with more than 50 wineries such as the Barossa Valley, McLaren Vale and the Clare Valley have a relatively low proportion of organic, biodynamic or sustainable wineries (Figure 6). However, unlike smaller wine regions, the Barossa and Clare Valleys and McLaren Vale have comparatively more 100 year old organic, biodynamic or sustainable wineries. In addition, the age of the winery also affects preference of adopting organic and related practices. Older wineries are less likely to adopt organic practice than 20 year old wineries. This is because environmental degradation has only become an issue since the 1990s and since that time, a shift to organic, biodynamic or sustainable methods has been prevalent. Organic wine production in winemaking gives not only environmental benefits but also a competitive advantage through innovation which helps young wineries to step into the market and compete with already existing wineries. (Conto et al. 2016)

These trends are not apparent in certification. More wineries in large wine regions have opted for certification. The Barossa Valley and McLaren Vale, for example, have more certified organic, biodynamic or sustainable wineries than any other study region; there are four in the Barossa Valley and five in McLaren Vale, whereas, small wine regions such as Eden Valley and Langhorne Creek have only one certified winery each and Coonawarra has no certified winery at all.

There is a wide range in annual winery production but no strong association between the volume produced and the shift towards sustainable and related practices that is evident. However, it can be stated from results that wineries with an annual wine production of fewer than 5000 cases tend to adopt organic, biodynamic or sustainable practices compared with wineries with a large annual production (Appendices B1, B2, B3, B4, B5, B6). It is also evident from results in Section 4.2 that conversion of conventional wineries to organic or related practices require huge capital and labour investment and the conversion time is also up to three years. Additionally, conversion requires a high level of managerial knowledge to protect vines from pests and diseases without using any external herbicide or pesticide (McIntyre et al. 2009). Lower input at each step of winemaking also endangers the wine and increases the risk of yield loss. Hence, prevention such as temperature control and caution concerning microbial contamination are crucial in organic wine production (Trioli & Hofmann 2009). As a result, it is easier for small wine producers to adopt organic or related practices than wineries with large annual production. One variable for which data was not gained was the size of the vineyard. Many wineries do not list the area of their vineyard on their websites. A further complicating factor in obtaining these data is that many conventional and organic wineries buy grapes from other vineyards, often in addition to growing their own. This may be an important factor in deciding to adopt one of these pathways as vineyard size will reflect the level of investment and effort required. This might be the reason that smaller, young wineries have adopted these three practices. Existing literature suggests that the size of the vineyard has an indirect impact on a shift to organic viticulture (Boncinelli, Riccioli & Casini 2017; Padel 2001; Trioli & Hofmann 2009).

5.2 Adoption of organic, biodynamic and sustainable practices

An online questionnaire was sent to 202 wineries to elicit information on the adoption of organic, biodynamic and sustainable practices and 20 wineries responded. The responses were presented in Chapter 4 (full responses are attached in Appendix E). The response rate was only 10%. The key themes are analysed in each section below.

5.2.1 Motivations for adopting of organic, biodynamic or sustainable practices

Thirty five per cent of wineries have not adopted any of these practices. The remainders has adopted a range of practices such as organic, certified organic, biodynamic, certified biodynamic, sustainable, certified sustainable, biological farming and carbon neutral production methods. Many respondent wineries have adopted more than one of the above practices and a few have implemented all organic, biodynamic and sustainable practices. There are two different aspects to analysing the responses to adoption.

One question attempted to understand the reasons that inspired winemakers to start organic, biodynamic or sustainable wine production methods. Key drivers for motivating them to adopt these three sustainable practices were environmental factors. Soil health is a key component of environmental health. None of the wineries from Clare Valley has been interviewed. Winemakers from Barossa Valley, McLaren Vale, Coonawarra, and Eden Valley are mainly concerned with the soil quality of their vineyards. Several wineries of Barossa Valley believe that avoiding chemical inputs in organic practice improves soil quality by maintaining mineral balance which is beneficial in producing healthy fruit. Similarly, winemakers from Eden Valley and Coonawarra stated that addition of the use of organic preparations like compost and manure instead of fertilisers, increases organic matter in the soil and improves its water holding capacity. The wineries of McLaren Vale also hold opinion that organic or related practices help to maintain rich biodiversity in soil. Microbial population enhances soil fertility and conserves it for future by maintaining soil health. Winemakers were concerned more about the environment of their vineyard and winery which included better vineyard health and a healthy soil. Another factor for motivating winemakers to step into organic practices is to gain a better quality fruit and therefore wines. Healthy soil yields better quality fruit which ultimately results in better wines. Barossa Valley, Eden Valley and McLaren Vale have made a large contribution to the national wine production. Wineries from these wine regions aim to achieve a higher quality fruit and superior final product to compete with other wines in market. They believe that the fruit is not overly fertile without fertilisers and is more concentrated which would result into wines with higher retained acids and balanced minerals. Conversely, Kallas, Serra and Gil’s (2009) research stated that organic farming adoption was determined by both non-economic factors such as attitude and opinion of growers, and by economic factors such as market prices and profit making. A few other studies have analysed adoption decisions and also found the influence of both types of factors (Burton, Rigby & Young 1999; Rigby, Young & Burton 2001; Rigby & Cáceres 2001). Farmers' attitudes and preferences towards the environment play a significant part in the adoption of organic or related practices (Ajzen & Fishbein, 1977; Burton, Rigby & Young 1999).

The second question in analysing the responses studied the results of adopting organic, biodynamic or sustainable practices which were able to inspire other winemakers in aiming for sustainability. In addition to such environmental benefits, other benefits are also achieved through being organic, biodynamic or sustainable. Organic and biodynamic practices maintain mineral balance in the soil and enrich biodiversity which help in yielding better quality fruit (Provost & Pedneault 2016) and ultimately provide quality wine. High quality wine increases sales and profit. Thus, a major driving force is the environmental benefit which helps to gain economic advantage (Kallas, Serra & Gil 2009; Gabzdylova, Raffensperger & Castka 2009).

In this study, winemakers considered economic benefits as the second most important motivation for adopting organic or related practices. Gaining international or national recognition as a leading wine producer is the primary factor as this also translates into high sales and the high price of wine due to premiums and marketing advantages which, in turn, attract more customers. However, according to research of Delmas and Grant (2014), eco-labeling does not help to achieve price premium.

Organic and related practices are also socially sustainable. Working in a chemical free environment leads to better health of the workers and labourers who are happy and satisfied to working in a healthy environment. These findings are supported by the study of Lundqvist (2000) which stated that much satisfaction and relief are seen in workers in their work environment as they do not have to deal with pesticide or fertilisers. This was the main positive aspect of organic farming. Coonawarra and Langhorne Creek winemakers give importance to social benefits and are more concerned about the health of workers as well as their consumers. Workers feel safe and happy as they are not exposed to herbicides and pesticide sprays and as such, chemical free fruit is healthy. They stated that fruit without any chemical spray is natural and healthy for consumers. In addition, winemakers from Coonawarra region remarked that the cost of chemicals was lower which increased profitability as well through higher prices of organic wines. To support social sustainability through organic or sustainable methods, the incorporation of social standards into organic certification criteria were introduced in California (Getz, Brown & Shreck 2008). However, it was argued that environmental, economic and social sustainability were only possible if the change was implemented at farming, production and packaging levels (Shreck, Getz & Feenstra 2006). As evidenced by this research, a majority of wineries are adopting sustainable practices rather than organic or biodynamic practices. The reason for this was provided by a winemaker in Coonawarra region. It was argued that sustainable practices provided flexibility to use non-organic practices during periods prone to disease that can affect fruit quality.

Several other factors are studied in existing literatures. For instance, farmers' age, skills and the level of knowledge about sustainability also affect the decision of organic viticulture (Boncinelli, Riccioli & Casini 2017; Boncinelli et al. 2017). This factor was not studied in this research due to time constraints. According to Läpple (2010), gender also has a minor impact on adoption of sustainable practices. Women are less likely to involve themselves in organic or sustainable viticulture. This was not included in this study.

5.2.2 Barriers for adoption of organic, biodynamic or sustainable practice

This section will discuss two negative aspects of adopting organic, biodynamic or sustainable practices. One part analyses the reason conventional wineries have not adopted organic, biodynamic or sustainable practices while the other explains the negative impacts faced by wineries who have already adopted these practices.

The main barriers in adopting organic, biodynamic or sustainable practices are time and financial constraints such as the time and cost required for conversion, a process which is tedious and time-consuming. Wineries form Eden Valley, McLaren Vale, and Clare Valley consider them as main constraints. Substantial investments are required in order to convert conventional vineyards to organic or related vineyard and also for the specialised equipment needed. Additionally, organic, biodynamic and organic practices are labour intensive processes which increase the overall cost of production (Cranfield, Henson & Holliday 2010). In addition, Cranfield, Henson and Holliday (2010) also stated that lack of support from the government and organisations or farm workers create problems during transition and negatively affect the adoption of organic and related practices. Lack of physical and financial capital also acts as a barrier in conversion to organic methods (Siepmann 2016). Conversion of conventional vineyards or wineries to organic practices requires three consecutive years and wineries cannot sell the wine as organic until three years after the conversion process.

After the adoption of these practices, a few negative impacts were observed by wine producers. Only one environmental impact reported so far was the overly fertile vine in a few vineyards and weeds due to avoiding the use of herbicides and pesticides. These findings are partially similar to the research of Lundqvist (2000). This study also considers increased work load as a main negative output of organic farming. Weed control requires extra manual and machine operated work. Wine makers from Eden Valley complain about the same. Weeds like couch and prairie grass create great problems during seasonal variations. Organic and related production methods increase labour costs and reduce yields. Reduction in overall crop production is considered a negative impact of organic or related practices by winemakers in McLaren Vale. A similar problem has been faced by wineries in Coonawarra, especially during seasonal variation when diseases are encountered. Apart from this, one of the problems with adopting sustainable and related practices is the limited awareness of wine drinkers about these practices. They consider biodynamic or organic wines inferior to conventional wines. However, Scott (2007) stated that there is a high consumer awareness regarding organic wines although it does not result in significant purchase demand. Similarly, wineries of Barossa Valley believed that the confusion among consumers regarding organic wines may decrease wine sales. There is a mismatch of consumers' preference and their decision to purchase (Forbes et al. 2009). It has been found that eco-labels such as 'chemical-free', 'no preservatives', 'organic', 'biodynamic', 'sustainable' or 'environmental friendly' do not promote wine sales (Saunders, Allison & Wreford 2004). Wine consumers have misconceptions about the use of sulphur in organic wines which affects wine sales. Iland, Gago and Humphrys (2002) stated that organic wines have half the sulphur concentration than other wines have. Sulphur is used in wine for removing oxygen so that the wine-aging process slows. Nevertheless, customers have become confused with its use and believe that wine without or minimum sulphur will not age and will be of poor quality. This finding is similar to that in the study of Clark (2013).

A few wine consumers have more liking towards label of 'no chemicals or pesticides' than 'organic'. In contrast, the survey conducted in UK argued that consumers perceive 'organic farming' labels similar to the 'absence of growth hormones' and 'product naturally grown' (Hutchins & Greenhalgh 1997). However, another UK study suggested that there was a difference in the understanding of organic and non-organic product buyers (Hill & Lynchehaun 2002). Labels can be used interchangeably but they all suggest that a product is healthy and naturally grown; hence, using different labels does not make any difference to the sale of wine (Yiridoe, Bonti-Ankomah & Martin 2005).

The result of this research indicates that in certified wineries, small-scale producers and organic, biodynamic or sustainable wineries focus more on environmental and sustainability, whereas large-scale wineries take economic and social benefits into account. Moreover, biodynamic wineries emphasise environmental concern while organic wineries are more concerned about economic and social factors. All of these factors serve as barriers to the adoption of organic, biodynamic or sustainable practices in wine production.

5.3 Certification of organic, biodynamic or sustainable wine production

According to the results of the online questionnaires, interviews with wineries and with certification organisations, the certification process has a very important role in organic, biodynamic or sustainable wine production. It is clear that not all organic, biodynamic or sustainable wineries are embracing certification for their practices although all organic, biodynamic and sustainable respondent wineries are members of one or more organic associations or growers or producers such as Australian Certified Organic (ACO), the Barossa Wine Growers Association (BWGA), Sustainable Australian Winegrowing (SAW), the Winemakers' Federation of Australia (WFA), Biodynamic Agriculture Australia, the South Australian Wine industry Association (SAWIA), the National Association for Sustainable Agriculture Australia (NASAA), Biological Farmers of Australia, Coonawarra Vignerons, Langhorne Creek grape, Entwine Australia, Canopy, Phylloxera Board, Eperosa, Head Wines, Ruggabellus, and Wine Australia. More than half of organic, biodynamic or sustainable respondent wineries, 13 wineries, are members of ACO. BWGA has four and SAW has five winery members. Membership numbers of wineries have dropped from national or international wine associations to regional wine associations, and to state wine associations with the exception of NASAA, BFA and SAWIA. This result should not be considered authentic as only 14 wineries from 202 wineries responded to this particular question. Certain arguments are posed by participant winemakers in favour of and against certification.

5.3.1 Motivations for obtaining certifications of organic, biodynamic or sustainable practice

A key driver is to have recognition as organic, biodynamic or sustainable producers at both national and international level. To be certified from a certification organisation is to validate the integrity of the organic and biodynamic process to meet national and international standard (Lohr 1998). One winery in McLaren Vale agrees and believes that this can raise annual sales and that labels can be used in promotional events. This serves as proof of the genuine commitment of the winery towards sustainability and the production of authentic wines (Renard 2005). Similarly, the winemakers of Coonawarra, Langhorne Creek and Barossa Valley believed that certification provides a marketing advantage by this proof of commitment and genuine product. However, there is very little recognition of biodynamic certification compared to organic and sustainable certification (Delmas & Grant 2008). This attracts more customers and increases sale. Packaging and labels of wine bottles undoubtedly play an important role in wine promotion and consumption and also influence direct marketing (Thomas 2000). This certification ensures the quality warranty which is trusted by consumers and the economic advantage as consumers show their willingness to pay (Van Ittersum et al. 2007; Rocchi & Stefani 2006; Skuras & Vakrou 2002; Janssen & Hamm 2012). Wineries can label their wines as 'certified organic' after gaining certification, biodynamic or sustainable and can subsequently request a premium price for their organic wines. Eco-labels do not attract premiums while certification leads to a price premium however (Delmas & Grant 2014). Conversely, it is argued that certification is relatively recent and still lacks positive recognition from consumers. Interestingly, a few certified wineries are not using organic or related labels for marketing purposes. This indicates that the potential benefits of certification are not only linked with labelling (Delmas & Grant 2008). Similar results were found after adoption of these practices. Winemakers observed improved sales and high prices for wine after being certified (Pomarici & Vecchio 2014). To summarise, the key motivation for certification is recognition, while the main advantage of being certified is financial benefits (through sale and premium price) which can motivate many other wineries to get certified. All certified wineries from Barossa Valley, McLaren Vale, Clare Valley, Coonawarra, Eden Valley and Langhorne Creek have incorporated these practices into their business and marketing plan which shows its importance for economic management.

As can be seen in Table 14, six respondent wineries are certified and they are member of organisations; ACO, NASAA, Organics Australia, SA, BFA, USDA and Canopy. Four of six participants are certified through ACO, however, ACO was not interested in the interview process. Due to the limited participants from these certification organisations, it was not possible to investigate the positions on the certification process from both perspectives.

5.3.2 Barriers for getting certifications of organic, biodynamic or sustainable practice

In spite of having many advantages of being certified, an average of only 15% of South Australian wineries applies for certification. The key reason for avoiding certification is due to its complexity and expense. Much paper work and heavier data entry are involved in the process (Barrett et al. 2001). Furthermore, it takes around three years to get certificated after applying and six years to prepare the vineyard for organic, biodynamic or sustainable practices. The winery has to bare huge transition costs up to three years without one of the main benefits of certification which is a price premium (Blackman & Naranjo 2012). To add to this, there is a great deal of extra effort to maintain the protocol and handling plan as guided by the certification authority. An additional cost is required to keep renewing the certificate and maintaining the relevant vineyard and winery conditions (Hansen 2007). Additional significant cost is that of annual monitoring and reporting which serve as a barrier to the use of these practices. Eden Valley winemaker reported that maintaining the certification was extremely difficult. Several winemakers believed that the cost and time for certification were high, a factor which outweighed the financial benefits of being certified.

Another barrier could be very limited or negligible availability of government funds, schemes or subsidies to support this organic certification process. Subsidies encourage organic agriculture, however, Lohr (1998) suggested that services such as access to market output, substitute payment options, and cost-sharing plans are more helpful in the conversion process than subsidies. This research found that the public incentives actually play a positive role for the adoption of these practices, however, the effect is 0.07% only (Boncinelli, Riccioli & Casini 2017). The unavailability of such incentives leads to less adoption of these three practices. The government should promote the programs that encourage wineries to take sustainable practices (Dodds et al. 2013). Only one certified organic winery from Coonawarra has received a research and development grant and an export grant from all participants. There is one conventional winery that was successful in receiving a Bushbids grant of $6000 per year for weed removal which is great problem in organic or biodynamic vineyards. Bushbids is a biodiversity stewardship program in the eastern Mount Lofty Ranges of South Australia. In sum, it can be said that certification is mainly linked to economic benefits rather than environmental benefits.

5.4 Pricing and marketing

Pricing and marketing are very important factors when it comes to organic, biodynamic or sustainable wineries. During the shift towards sustainability, winemakers have to adopt a completely new technique and make their presence known in the new market. It is assumed that certified and even non-certified organic, biodynamic or sustainable wines can sell their wine at premium prices (Waldrop & Mccluskey 2016). However, empirical investigation shows mixed results from respondents on prices of wine. Most of the participant wineries were concerned about environmental problems and this was the main reason for implementing sustainable and related practices. Hence, most wineries do not raise prices for their wines. Only a handful of wineries that have included organic, biodynamic or sustainable practices in their business and marketing plans and are charging premium prices for wine. After country of origin, consumers believe the price of wine to be the next most important factor when purchasing wines. They tend to prefer high quality low price wine compared to high priced organic wine (Mann, Ferjani & Reissig 2012). Some wineries use labels and arrange events for promotion of their wines which attract more customers. A key driving force for the adoption of sustainable and related practice for such wineries are economic factors which include competitive advantage and high sales instead of premium price (Flint & Golicic 2009). Results show that certified wineries are more often using certification labels in marketing and sell their wines at premium prices than non-certified organic, biodynamic or sustainable wineries. Non-certified wineries use these practices in vineyard management while certified wineries use them for economic management.

From the view point of certification organisations, there is an increasing trend to become certified for sustainable and related farming methods in the wine sector. All participant organisations stated that certified wines come with premium prices, as they are investing capital and effort into getting and maintaining certification. There is a discrepancy in opinion regarding certified wine from the perspective of wineries and certification organisations. Few wineries believe that certified wines taste better and are healthier (Delmas, Gergaud & Lim 2016). This misconception was clarified by the certification organisations. The certified wines are highly controlled wines with ‘perfect’ mix of various minerals. As wine is alcohol, it cannot be declared as healthy, but certified wines are considered better than conventional wines as they do not add GMO and other non-certified ingredients. Labels of certification do not indicate that the product is better but it is about 'principle' labelling which make it clear to consumers that this wine is produced with the least harm to environment. In summary, it is mainly the protection of the environment and doing the least harm to the environment that is at the centre of all such practices.

5.5 Summary

The analysis of results suggests that the key driving factor influencing adoption of organic, biodynamic or sustainable wine production methods is the environmental concern of winemakers. This is more due to the ethical and philosophical reasons. However, further studies may be required to differentiate between driving forces behind adopting any of organic, biodynamic or sustainable practices. It might vary with organic winemaking, biodynamic winemaking or sustainable winemaking. There are two new unique practices adopted by two wineries - biological farming and carbon neutrality. The willingness of wineries to apply for certification of any of these three practices is mainly influenced by economic factors.

6. CONCLUSION

6.1 Introduction

The research questions reported in this thesis focus on the key drivers of organic, biodynamic or sustainable wine production and the factors that have affected decisions by wineries to opt for certification in six wine regions in South Australia. Empirical data and opinions were collected through a content analysis of websites, an online questionnaire and telephone interviews. The data collected were contextualised using relevant research literature. The concluding chapter is structured around the research questions introduced in Chapter 1 (Section 6.2 and 6.3), then proceeds to discuss research limitations (Section 6.4), and to make recommendations for future research (Section 6.5)

6.2 What are the key driving factors affecting adoption of organic, biodynamic or sustainable practices

A range of responses were received which identified the key drivers for adopting sustainable and related organic practices. The main drivers appear to be either environmental, economic, or a combination of both. Environmental concerns play important roles in the decision-making of winemakers concerning sustainable and related organic practices. The key driver appears to be the desire to maintain a healthy environment in terms of a sustainable vineyard with a rich biodiversity and good soil health. It can be argued that this is an internal driver or is linked to the social responsibilities of winemakers towards the environment in which they are living. It is clear that internal factors such as social responsibilities are stronger than external drivers (for example, consumer demand and competition from other wineries) when deciding whether to adopt organic practices or not. This is in line with Fisher’s (1989) research in New Zealand which indicates that the primary motivations were environmental concerns, health of the soil, and satisfaction (Fisher 1989). Key concerns identified in the research that hinder adoption are mainly financial and technical. Scully's (1993) found similar concerns about organic, biodynamic or sustainable farming among conventional farmers.

6.3 Wineries' decisions to obtaining sustainable or organic certification

Only six wineries have been certified for their sustainable or organic practices (according to the questionnaire responses of 20 wineries). They were clear that certification gives international recognition, a price premium, and customer trust that the wine is genuine and authentic. High levels of data entry and paperwork were considered to be the main drawback with certification. Even considering the benefits, few wineries have been certified. Maintaining the protocol and handling plans laid out by certification organisations appear to be further issues.

Unlike key drivers for adopting sustainable and organic practices, the main factors affecting decisions by wineries to be certified are more economic than environmental. This is due to the fact that economic considerations constitute very important components of the marketing plans. Certified organic, biodynamic or sustainable wineries are able to sell wines at premium prices, sale volumes are high, and the wineries gain more new customers. In addition, they are eligible to export their products with organic labels.

6.4 Research limitations

This research had several limitations. The first was the disappointingly low response rate from the online questionnaire. Not even all of the wineries who had adopted organic, biodynamic or sustainable practices participated in survey. Hence, the information and opinions of those who responded may have been influenced by the small sample. In particular, the limited number of participants in the research did not provide evidence of significant differences in motivations between certified or non-certified organic, biodynamic or sustainable wineries which were not between wine regions. The telephone interviews helped to gain some clarification of these points.

The research was arguably aimed at too many wine regions in the state. Limiting the regions covered to just one or two might have been a more prudent strategy. Moreover, no specific care was taken to control for the differences in the views of the individual respondents who completed the survey. An individual's interpretation may influence how the company or winery was represented.

6.5 Suggestions for future research

This study provides a framework for future studies and would be applicable to all wine growing regions. In relation to further research and to more accurately represent the situation across South Australian wineries, the target for future studies should be to include all wine regions although this might be done more comprehensively by researching one region at a time. An extension of a strata-based study would be to collect data from wineries in other states and countries. This would be necessary to understand sustainable and related practices in the wine industry nationally and globally. As Szolnoki (2013) states, this could be a significant ultimate objective; that every country, as well as every winery, has different opinions of sustainable and related practices in vineyard management and winemaking.

Such research would help to identify more factors influencing the adoption of organic, biodynamic or sustainable practices. This in turn would enable location-based factors which may affect decision-making in particular wine regions by wine makers to be separated out from factors that are similar across the world. It would also provide insights into the impact of regional or national factors.

There might also be differences in various types certified wines, for example, certified organic, certified biodynamic or certified sustainable wines in terms of qualities produced, sales volumes and prices. This particular aspect was lacking in this research, and future research should analyse this.

The thesis has provided further context into the motivations of small, medium and large wineries to undertake sustainable and related practices and has differentiated driving factors such as internal and external factors (Chapter 5). In future studies, detailed analysis of strategic or market drivers of organic, biodynamic or sustainable wine production could be performed in South Australia, similar to the research carried out by Dodds et al. (2013) in New Zealand. A further extension of this could be performed in the context of consumers' opinions relating to organic, biodynamic or sustainable wine production and wines.

APPENDIX A WINERIES: NAME, CONTACT DETAILS, PRODUCTION METHODS

A1 Wineries of Barossa Valley

Company	ORG/BD/SUS	Year	phone no.	email	Web
1847 | Yaldara Wines	Sus	1996	08 8524 0200, +61 437 804 501	wineroom@1847wines.com, msimounds@1847wines.com, bwyld@1847wines.com	www.1847wines.com
Andrew Seppelt Wines		2001	(08) 8562 8373		www.andrewseppelt.com
Atze's Corner Wines		2005	0407 621 989	andy@atzescornerwines.com.au	www.atzescornerwines.com.au
Auswan Creek		2008	(02) 8203 2239	info@auswancreek.com.au	www.auswancreek.com.au
Ballycroft Vineyard Cellars	SUS	2005	0488 638 488	sales@ballycroft.com	www.ballycroft.com
Balthazar of the Barossa		1999	(08) 8562 2949, +61 417 800 731	anita@balthazarbarossa.com	www.balthazarbarossa.com
Barossa Settlers		1983	(08) 8524 4017		NA
Barossa Valley Estate		1985	(08) 8568 6900	info@barossavalleyestate.com	www.bve.com.au

Basedow Wines		1896	0418 847 400	richardbasedow@basedow.com.au	www.basedow.com.au
Beer Brothers		1997	(08) 8562 4477, (03) 9572 4267, (08) 8563 0204	info@maggiebeer.com.au, farmshop@maggiebeer.com.au	www.maggiebeer.com.au
Biscay Wines		1998	(08) 8563 0297		NA
Black Spade Wines		2004	0411 106 911		www.blackspade.com.au
Blaxland Vineyards		1995	(08) 8304 8879	winesales@blaxvin.com.au, vineyards@blaxvin.com.au	www.blaxwine.com.au
Burge Family Winemakers		1928	(08) 8524 4644	draycott@burgefamily.com.au	www.burgefamily.com.au
Caillard Wine		2008	0433 272 912	bobby@caillardwine.com	www.caillardwine.com
Chaffey Bros Wine Co		2008	0417 565 511,(08) 8112 4200	info@tasteedenvalley.com.au, info@chaffeybros.com	www.chaffeybros.com
Charles Cimicky		1972	(08) 8524 4025	NA	www.charlescimickywines.com.a u
Charles Melton		1984	(08) 8563 3606	NA	www.charlesmeltonwines.com.au

Chateau Barrosa		1999	(08) 8524 4923	NA	www.chateaubarrosa.com.au
Chateau Dorrien		1985	(08) 8562 2850	sales@chateaudorrien.com.au	www.chateaudorrien.com.au
Chateau Tanunda		1890	(08) 8563 3888	info@chateautanunda.com	www.chateautanunda.com
Cirillo Wines		2003	0408 803 447	NA	NA
Clancy Fuller		1996	(08) 8563 0080		www.clancyfuller.com.au
Cooper Burns		2004	(08) 8562 2865	enquiry@cooperburns.com.au	www.cooperburns.com.au
Craneford		1978	(08) 8564 0003, +61 8 8410 7000	cellardoor@cranefordwines.com, admin@cranefordwines.com	www.cranefordwines.com
Creed of Barossa		2005	(08) 8524 4268		www.creedwines.com
Curator Wine Company		2015	0411 861 604, +61 8 8563 3803	wine@curatorwineco.com.au	www.curatorwineco.com.au
David Franz		1998	0419 807 468	davelehmann@david-franz.com	www.david-franz.com
Deisen		2001	0413 362 963		www.deisen.com.au
Dell'uva Wines		2014	(08) 8525 2245, 0407 976 157		www.delluvawines.com.au

Deonte Wines		2012	(03) 9819 4890	info@deontewines.com.au	www.deontewines.com.au
Diggers Bluff		1998	0417 087 566, (08) 8563 1510,08 8563 0080	diggersbluff@bigpond.com	www.diggersbluff.com
Dirt Road Vignerons		2005	(08) 8563 4043		NA
Dolan Family Wines		2007	0438 816 034		www.dolanfamilywines.com.au
Domain Barossa		2002	(08) 8563 2170		www.domainbarossa.com
Domain Day		2000	(08) 8524 6224		www.domainday.com.au
Dorrien Estate		1982	(08) 8561 2200, 1800 500 260	enquiries@cellarmasters.com.au, wine.plans@cellarmasters.com.au	www.cellarmasters.com.au
Dutschke Wines		1998	(08) 8524 5485	theshed@dutschkewines.com	www.dutschkewines.com
Earthworks Wines		2003	(08) 8561 3200	info@earthworkswines.com	www.earthworkswines.com
Elderton	SUS	1982	(08) 8568 7878	elderton@eldertonwines.com.au.	www.eldertonwines.com.au
Epsilon		2004	0417 871 951	southerns@epsilonwines.com.au	www.epsilonwines.com.au
Evans Wines		1973	0417 442 768		www.evanswine.com

Final Cut Wines		2004	(02) 9690 0286	info@finalcutwines.com	www.finalcutwines.com
First Drop Wines		2005	(08) 8562 3324, +61 420971209, +61 417844284	matt@firstdropwines.com, john@firstdropwines.com	www.firstdropwines.com
Gibson		1996	(08) 8562 3193, 08 8562 4224, 0438 511 027, 0448 885 606	sales@gibsonwines.com.au, rob.gibson@gibsonwines.com.au,cmoore@gibsonwines.com.au	www.gibsonwines.com.au
Glaetzer Wines		1996	(08) 8563 0947	admin@glaetzer.com	www.glaetzer.com
Glen Eldon Wines		1997	(08) 85632771, 1 300 653 773	info@gleneldonwines.com.au	www.gleneldonwines.com.au
Glenfell		2008	(03) 9629 8850		www.glenfell.com.au
Gnadenfrei Estate		1979	(08) 8562 2522		www.treetopsbnb.com.au
God's Hill Wines		1998	0412 836 004, (08) 8336 9990, 0408 808 150	felice@godshillwines.com	www.godshillwines.com
Gomersal Wines		1887	(08) 8563 3611	info@gomersalwines.com.au	www.gomersalwines.com.au

Gordon Sunter Wines		1982	(08) 8563 2349		
Grant Burge		1988	1800 088 711	customers@grantburgewines.com.au	www.grantburgewines.com.au
Greenock Creek Wines		1978	(08) 8562 8103	info@greenockcreekwines.com.au	http://www.greenockcreekwines.com.au/
Greenock Estate		1948	(08) 6365 5822		www.gewines.com
Grocke Wines	ORG	2005	+61 428 111 121	info@eperosa.com.au	www.eperosa.com.au
Groom		1997	(08) 8563 1101	jeanette@groomwines.com	www.groomwines.com
Gumpara Wines		1999	0419 624 559	gumpara@bigpond.net.au	www.gumparawines.net.au
Haan Wines	SUS	1993	(08) 8562 4590	winebiz@ozemail.com.au	www.haanwines.com.au
Hamilton's Ewell Vineyards	SUS	1837	(08) 8231 0088, 0412 842 359		www.hamiltonewell.com.au
Harbord Wines		2003	(08) 8562 2598	roger@harbordwines.com.au	www.harbordwines.com.au
Hare's Chase		1998	(08) 8277 3506	info@hareschase.com.au	www.hareschase.com
Hart of the Barossa	certified ORG, SUS	2007	0412 586 006	alisa@hartofthebarossa.com.au	www.hartofthebarossa.com.au

Head Wines	ORG, BD, SUS	2006	0413 114 233	alex@headwines.com.au	www.headwines.com.au
Heidenreich Estate		1998	(08) 8563 2644, 0417 632 600	admin@heidenreichvineyards.com.au	www.heidenreichvineyards.com.au
Hemera Estate		1999	(08) 8524 4033, 0411 316 267	cellar@hemeraestate.com.au, sharyn@hemeraestate.com.au	www.hemeraestate.com.au
Henry Holmes Wines	ORG, SUS	1998	(08) 8563 2059, 0408 835 700	woodbridgefarm@bigpond.com, will@woodbridgefarm.com	www.woodbridgefarm.com
Hentley Farm Wines	SUS	1999	(08) 8562 8427, +61 8 8333 0241	info@hentleyfarm.com.au	www.hentleyfarm.com.au
Heritage Wines		1984	(08) 8562 2880	enquiries@heritagewinery.com.au	www.heritagewinery.com.au
Hobbs of Barossa Ranges	ORG, BD, SUS	1998	0427 177 740/41	cellardoor@hobbsvintners.com.au	www.hobbsvintners.com.au
Hoklas Family Vineyard		2004	(08) 8524 9006, 0419 829 116	wine@hoklaswines.com.au	www.hoklaswines.com.au
Izway Wines		2002	0423 040 385		
Jacob's Creek	SUS	1973	(08) 8521 3000		www.jacobscreek.com

JaJa		2003	0411 106 652	wine@jaja.com.au	www.jaja.com.au
Jamabro Wines		2003	0437 633 575		www.jamabro.com.au
jb Wines		2005	0408 794 389, +61 438204426	lenore@jbwines.com	www.jbwines.com
Jenke Vineyards		1989	(08) 8524 4154		
John Duval Wines		2003	(08) 8562 2266, +61 8 8112 4210	john@johnduvalwines.com , negaus@negociants.com	www.johnduvalwines.com
Kabminye Wines		2001	(08) 8563 0889	cellardoor@kabminye.com, wine@kabminye.com	www.kabminye.com
Kaesler Wines	SUS	1990	(08) 8562 4488	ksales@kaesler.com.au	www.kaesler.com.au
Kalleske	certified ORG, BD	1999	(08) 8563 4000, 08 8373 3010	office@kalleske.com, wine@kalleske.com, admin@porterandco.com.au	www.kalleske.com
Kassebaum Wines		2003	(08) 8562 2731		
Kellermeister		1976	(08) 8524 4303	cellardoor@kellermeister.com.au, sales@kellermeister.com.au	www.kellermeister.com.au

Kies Family Wines		1969	(08) 8524 4110	sales@kieswines.com.au, cellardoor@kieswines.com.au	www.kieswines.com.au
Kurtz Family Vineyards		1996	0418 810 982, 08 85 643 217		www.kurtzfamilyvineyards.com.au
Lambert Estate		1986	+61 (8) 8564 2222	sales@lambertestate.com	www.lambertestate.com.au
Landhaus Estate		2002	(08) 8353 8442, 0418 836 305 ,0417 800 759	landhaus@bigpond.net.au, kanejau@bigpond.net.au	www.landhauswines.com.au
Langmeil Winery		1996	(08) 8563 2595	info@langmeilwinery.com.au, tyson@langmeilwinery.com.au	www.langmeilwinery.com.au
Lanz Vineyards		1998	0417 858 967	marianne.herren.lanz@lanzvineyards.com	www.lanzvineyards.com
LanzThomson Vineyard		1998	(08) 8524 9227		www.lanzthomson.com
Laughing Jack	SUS	1999	(08) 8562 3878	briony@laughingjackwines.com	www.laughingjackwines.com.au
Liebich Wein		1992	(08) 8524 4543	info@liebichwein.com.au	www.liebichwein.com.au
Lienert of Mecklenburg		2001	(08) 8524 9062		

Limb Vineyards		1997	0419 846 549		
Linfield Road Wines		2002	(08) 8524 7355		www.linfieldroadwines.com
Loan Wines		2001	(08) 8563 2612		www.loanwines.com.au
Lou Miranda Estate		2005	(08) 8524 4537	Lou@LouMirandaEstate.com.au	www.loumirandaestate.com.au
Lunar Wines		2004	0427 186 295		www.lunarwines.com.au
Mad Dog Wines		1999	(08) 8563 2758		www.maddogwines.com
Magpie Estate		1993	(08) 8562 3300	info@magpieestate.com	www.magpieestate.com
Mardia Wines		1987	(08) 8563 1520		
Massena Vineyards	SUS	2000	(08) 8564 3037	JAYSEN@MASSENA.COM.AU	www.massena.com.au
Maverick Wines	ORG, Certified BD	2004	(08) 8563 3551	ronald@maverickwines.com.au	www.maverickwines.com.au
McGuigan Wines (Barossa Valley)		1947	(08) 8524 0225, +61 (0)2 4998 4111	hunter@mcguiganwines.com.au	www.mcguiganwines.com.au
Mengler View Wines		1995	(08) 8563 2217		www.faith.sa.edu.au
Milhinch Wines		2003	0412 455 553, +61 8 85634003		www.seizetheday.net.au

Moorooroo Park Vineyards		2000	(08) 8563 0422, 0439 828 300, 08 8563 1148	sales@moorooroopark.com.au	www.moorooroopark.com.au
Moppa Wilton Vineyards		2004	0408 821 657		
Murray Street Vineyards	ORG	2001	(08) 8562 8373, +61 (0) 438 818 714	craig@murraystreet.com.au, tastingroom@murraystreet.com.au, paul@murraystreet.com.au, wine@murraystreet.com.au	www.murraystreet.com.au
Muster Wine Co		2007	0430 360 350, 0423 262 387, 0430 360 650	craig@musterwineco.com.au	www.musterwineco.com.au, david@musterwineco.com.au, admin@musterwineco.com.au
Neil Hahn Wines		1885	(08) 8562 3002	sales@hahnbarossa.com	www.hahnbarossa.com
Normans		1853	(08) 8524 5030	info@normanswines.com	www.normanswines.com
Nurihannam Wines		1992	(08) 8562 2022		
One Lonely Barrel		2010	0413 271 241		www.onelonelybarrel.com.au
Orlando	SUS	1847	(08) 8521 3111		www.pernod-ricard-winemakers.com

Outlaw Wines		2005	0407 471 772		www.outlawwines.com.au
Parous		2010	0437 159 858	matt@parous.com.au	www.parous.com.au
Paulmara Estates		1999	0417 895 138	mara@paulmara.com.au	www.paulmara.com.au
Penfolds		1844	(08) 8568 8408		www.penfolds.com
Peter Lehmann		1979	(08) 8565 9555, 08 8565 9595	cellar.door@peterlehmannwines.com, plw@peterlehmannwines.com	www.peterlehmannwines.com
Pindarie	SUS	2005	(08) 8524 9019	pindarie@pindarie.com.au	www.pindarie.com.au
Possum Creek Vineyards		1978	(08) 8541 0800		
Purple Hands Wines		2006	0407 617 635, 0401 988 185	sales@purplehandswines.com.au	www.purplehandswines.com.au
Quattro Mano		2006	0430 647 470, 0419 198 963, 0438 816 934		www.quattromano.com.au
RBJ		1991	(08) 8563 0080, +61 8 8564 3233	contact@chrisringland.com	www.rbjwines.com
Red Art | Rojomoma		2004	0421 272 336	redart@rojomoma.com.au	www.rojomoma.com.au

Richmond Grove		1983	(08) 8563 7303, 1300 363 153	info@richmondgrove.com.au	www.richmondgrovewines.com
Rockford		1984	(08) 8563 2720	info.contact@rockfordwines.com.au	www.rockfordwines.com.au
Rocland Estate		2000	(08) 8562 2142		www.roclandestate.com
Roehr		1995	(08) 8565 6242		
Roennfeldt Wines		2005	0411 180 960		
Rogers Rufus		2009	(08) 8561 5200, +61 0(8) 8561 3566	info@rogersandrufus.com	www.rogersandrufus.com
Rohrlach Family Wines		2000	(08) 8562 4121		www.rohrlachfamilywines.com.au
Rolf Binder		1955	(08) 8562 3300	info@rolfbinder.com, wineclub@rolfbinder.com, accounts@rolfbinder.com	www.rolfbinder.com
Rosedale Wines		2006	(08) 8330 3850		www.rosedalewines.com.au
Rosenvale Wines		1999	0407 390 788, 0885623533	infor@rosenvale.com.au	www.rosenvale.com.au

Ruggabellus		2009	0412 773 536	abel@ruggabellus.com.au, emma@ruggabellus.com.au	www.ruggabellus.com.au
Rusden Wines		1998	(08) 8563 2976, 0432249929, 0417837422	enquiries@rusdenwines.com.au, craig@rusdenwines.com.au	www.rusdenwines.com.au
Russell Wines		2001	(08) 8564 2511		www.russellwines.com.au
Saltram		1859	(08) 8561 0200	cellardoor@saltramwines.com.au	www.saltramwines.com.au
Schild Estate Wines		1998	(08) 8524 5560	purebarossa@schildestate.com.au	www.schildestate.com.au
Schiller Vineyards		1864	08) 8562 1258		www.schillervineyards.com.au
Schubert Estate		2000	(08) 8562 3375, 08 84311457		www.schubertestate.com
Schulz Vignerons		2003	(08) 8565 6257		
Schwarz Wine Company		2001	0417 881 923	info@schwarzwineco.com.au	www.schwarzwineco.com.au
Seabrook Wines		2004	0427 224 353	INFO@SEABROOKWINES.COM.AU	www.seabrookwines.com.au
Seppeltsfield		1851	(08) 8568 6200		www.seppeltsfield.com.au
Sheep's Back		2001	(03) 9696 7018		

Shiralee Wines		2001	(08) 8564 2799		
Sieber Road Wines		1999	(08) 8562 8038	sieberwines@bigpond.com	www.sieberwines.com
Simpatico Wines		2008	(08) 8561 1222, +61 412 190 885, +61 413 488 913	Priscilla.hay@simpaticowines.com.au	www.simpaticowines.com.au
Six Gates		1998	0422 030 303, +61 8333 3103	mail@6gates.com.au	www.6gates.com.au
Small Gully Wines		1999	0403 472 332	SALES@SMALLGULLYWINES.COM.AU, admin@australianwineagencies.com.au	www.smallgullywines.com.au
Smallfry Wines	certified ORG & BD	2005	(08) 8564 2182, +61 0412 153 243, +61 413 011 697	info@smallfrywines.com.au	www.smallfrywines.com.au
Soul Growers		1998	0410 505 590	tom@soulgrowers.com	www.soulgrowers.com
Spinifex		2001	(08) 8564 2059, 0408 695 654, 0408 881 852	info@spinifexwines.com.au	www.spinifexwines.com.au
St John's Road		2002	(08) 8362 8622, (08)	grapes@stjohnsroad.com,	www.stjohnsroad.com,

			8363 4232	msawyer@auscraftwine.com.au	www.auscraftwine.com.au
Steinborner Family Vineyards	SUS	2000	0414 474 708, 0405 103 156	info@sfvineyards.com.au	www.sfvineyards.com.au
Stonewell Vineyards		1965	(08) 8563 3624		www.stonewell.com.au
Tait		1994	(08) 8524 5000	tait@taitwines.com.au	www.taitwines.com.au
TeAro Estate	ORG, SUS	2001	(08) 8524 6860	info@tearoestate.com	www.tearoestate.com
Teusner		2001	(08) 8562 4147	info@teusner.com.au	www.teusner.com.au
The Colonial Estate		2002	(08) 8524 5030	info@colonialwinecompany.com.au	www.colonialwinecompany.com.au
The Grapes of Ross		2006	(08) 8524 4214	dianne@grapesofross.com.au	www.grapesofross.com.au
The Standish Wine Company		1999	(08) 8564 3634		www.standishwineco.com
The Willows Vineyard		1989	(08) 8562 1080		www.thewillowsvineyard.com.au
Thorn-Clarke Wines	SUS	1987	(08) 8564 3036, 0438 335 510	thornclarke@thornclarke.com.au, bchapman@thornclarke.com.au	www.thornclarkewines.com.au
Tim Smith Wines		2002	0416 396 730		www.timsmithwines.com.au

Tonic Estate		2007	(08) 8338 8666		www.tonicestate.com.au
Torbreck Vintners	ORG	1994	(08) 8562 4155	craig@torbreck.com, stuart@torbreck.com	www.torbreck.com
Trevor Jones Fine Wines		1998	0417 869 981, 0419 841 615	mandyjones@internode.on.net,	www.trevorjonesfinewines.com.au
Troll Creek Wines		1998	(08) 8563 2961	jjhage@bigpond.com	www.trollcreek.com
Tscharke	ORG	2001	0438 628 178, +61 (08) 8562 4922	info@tscharke.com.au	www.tscharke.com.au
Turkey Flat		1990	(08) 8563 2851	info@turkeyflat.com.au	www.turkeyflat.com.au
Tweedies Gully Wines		1996	0413 583 742, (08)8295 3692	tweediesgwinery@senet.com.au	www.tweediesgullywinery.com.au/
Two Way Range		2001	(08) 8563 0245		www.twowayrange.com
Two Hands Wines		2000	(08) 8562 4566		www.twohandswines.com
Veronique		2004	(08) 8565 3214, 0418 139 383	info@veroniquewines.com.au	www.veroniquewines.com.au
Viking Wines		1994	(07) 4125 4368,		www.vikingwines.com

			0417 795356		
Villa Tinto		2001	(08) 8563 3044		www.villatinto.com.au
Vinecrest		1999	(08) 8563 0111		www.vinecrest.com.au
Westlake Vineyards	SUS	1999	0428 656 208		www.westlakevineyards.com.au
Whistler Wines		1999	(08) 8562 4942, +61 430 190 360	cellardoor@whistlerwines.com, josh@whistlerwines.com	www.whistlerwines.com
Whitechapel Wines		1997	0438 822 409	admin@whitechapelwines.com.au	www.whitechapelwines.com.au
Winter Creek Wine		2000	0427 246 382		www.wintercreekwine.com.au
Wolf Blass		1966	(08) 8568 7311		www.wolfblasswines.com
Yelland Papps		2005	(08) 8562 3510,0408 250 005, 0408 628 494	sales@yellandandpapps.com	www.yellandandpapps.com
Z Wine		1999	0422 802 220, 0411 447 986	kristen@zwine.com.au, janelle@zwine.com.au, kristen@zwine.com.au, kristen@zwine.com.au	www.zwine.com.au
Woods Crampton		2010	0417 670 655, +61	sales@fourthwavewine.com.au,	www.woods-crampton.com.au

			411 742 244	chanda@chace.com.au	
Zitta Wines		2004	0419 819 414		www.zitta.com.au

A2 Wineries of McLaren vale

Company	ORG/BD/SUS	Year	phone no.	email	Web
2 Mates	sus	1996	08 8524 0200, +61 437 804 501	wineroom@1847wines.com, msimounds@1847wines.com, bwyld@1847wines.com	www.1847wines.com
67 Kays Road [Waywood Wines]		2001	(08) 8562 8373		www.andrewseppelt.com
Accolade Wines World HQ		2005	0407 621 989	andy@atzescornerwines.com.au	www.atzescornerwines.com.au
Accolade Wines (Hardy)		2008	(02) 8203 2239	info@auswancreek.com.au	www.auswancreek.com.au
Adelaide Vineyard (ITA)	SUS	2005	0488 638 488	sales@ballycroft.com	www.ballycroft.com
Aldinga Bay Wines		1999	(08) 8562 2949, +61 417 800 731	anita@balthazarbarossa.com	www.balthazarbarossa.com
Alpha Box and Dice		1983	(08) 8524 4017		NA
Amicus		1985	(08) 8568 6900	info@barossavalleyestate.com	www.bve.com.au

Andrew Garrett (Fosters)		1896	0418 847 400	richardbasedow@basedow.com.au	www.basedow.com.au
Andrew Garrett (Fosters)		1997	(08) 8562 4477, (03) 9572 4267, (08) 8563 0204	info@maggiebeer.com.au, farmshop@maggiebeer.com.au	www.maggiebeer.com.au
Angove Wines (OLD)		1998	(08) 8563 0297		NA
Angove Family Winemakers		2004	0411 106 911		www.blackspade.com.au
Angove Winery		1995	(08) 8304 8879	winesales@blaxvin.com.au, vineyards@blaxvin.com.au	www.blaxwine.com.au
Aramis Wines		1928	(08) 8524 4644	draycott@burgefamily.com.au	www.burgefamily.com.au
Arakoon Wines		2008	0433 272 912	bobby@caillardwine.com	www.caillardwine.com
Australian Boutique Premium Wines		2008	0417 565 511,(08) 8112 4200	info@tasteedenvalley.com.au, info@chaffeybros.com	www.chaffeybros.com
Beach Road Wines		1972	(08) 8524 4025	NA	www.charlescimickywines.com.au
Battle of Bosworth Wines		1984	(08) 8563 3606	NA	www.charlesmeltonwines.com.au

Bekkers		1999	(08) 8524 4923	NA	www.chateaubarrosa.com.au
Bella Cosa [on sale, Jan 2015]		1985	(08) 8562 2850	sales@chateaudorrien.com.au	www.chateaudorrien.com.au
Belle Vue Estate		1890	(08) 8563 3888	info@chateautanunda.com	www.chateautanunda.com
Bent Creek Wines (ITA)		2003	0408 803 447	NA	NA
Bent Creek Wines		1996	(08) 8563 0080		www.clancyfuller.com.au
Blackbilly Wines (Adelaide Winemakers)		2004	(08) 8562 2865	enquiry@cooperburns.com.au	www.cooperburns.com.au
Blackbilly Wines (Adelaide Winemakers)		1978	(08) 8564 0003, +61 8 8410 7000	cellardoor@cranefordwines.com, admin@cranefordwines.com	www.cranefordwines.com
Blown Away		2005	(08) 8524 4268		www.creedwines.com
Beresford Wines		2015	0411 861 604, +61 8 8563 3803	wine@curatorwineco.com.au	www.curatorwineco.com.au
Beresford Wines		1998	0419 807 468	davelehmann@david-franz.com	www.david-franz.com

Beresford Wines		2001	0413 362 963		www.deisen.com.au
Beresford Wines		2014	(08) 8525 2245, 0407 976 157		www.delluvawines.com.au
Berefesrd Wines		2012	(03) 9819 4890	info@deontewines.com.au	www.deontewines.com.au
Brackenwood Wines		1998	0417 087 566, (08) 8563 1510,08 8563 0080	diggersbluff@bigpond.com	www.diggersbluff.com
Brackenwood Wines		2005	(08) 8563 4043		NA
Brackenwood Wines		2007	0438 816 034		www.dolanfamilywines.com.au
Brash Higgins		2002	(08) 8563 2170		www.domainbarossa.com
Braydun Wines		2000	(08) 8524 6224		www.domainday.com.au
Brick Kiln		1982	(08) 8561 2200, 1800 500 260	enquiries@cellarmasters.com.au, wine.plans@cellarmasters.com.au	www.cellarmasters.com.au
Brick Kiln		1998	(08) 8524 5485	theshed@dutschkewines.com	www.dutschkewines.com
Brini Estates (ITA)		2003	(08) 8561 3200	info@earthworkswines.com	www.earthworkswines.com
Brookman Wines (ITA)	SUS	1982	(08) 8568 7878	elderton@eldertonwines.com.au.	www.eldertonwines.com.au

Burton Premium Wines		2004	0417 871 951	southerns@epsilonwines.com.au	www.epsilonwines.com.au
Burton Premium Wines		1973	0417 442 768		www.evanswine.com
Cape Barren Wines		2004	(02) 9690 0286	info@finalcutwines.com	www.finalcutwines.com
Cascabel		2005	(08) 8562 3324, +61 420971209, +61 417844284	matt@firstdropwines.com, john@firstdropwines.com	www.firstdropwines.com
Chalk Hill Wines		1996	(08) 8562 3193, 08 8562 4224, 0438 511 027, 0448 885 606	sales@gibsonwines.com.au, rob.gibson@gibsonwines.com.au,cmoore@gibsonwines.com.au	www.gibsonwines.com.au
Chapel Hill		1996	(08) 8563 0947	admin@glaetzer.com	www.glaetzer.com
Charlatan Wines		1997	(08) 85632771, 1 300 653 773	info@gleneldonwines.com.au	www.gleneldonwines.com.au
Chateau Reynella Accolade)		2008	(03) 9629 8850		www.glenfell.com.au
Clarence Hill Wines		1979	(08) 8562 2522		www.treetopsbnb.com.au
Clarendon Hill Wines		1998	0412 836 004, (08) 8336 9990, 0408 808	felice@godshillwines.com	www.godshillwines.com

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Clarendon Hill Wines		1887	(08) 8563 3611	info@gomersalwines.com.au	www.gomersalwines.com.au
Classic McLaren Wines [Mollydooker]		1982	(08) 8563 2349		
Coates Wines		1988	1800 088 711	customers@grantburgewines.com.au	www.grantburgewines.com.au
Coates Wines		1978	(08) 8562 8103	info@greenockcreekwines.com.au	http://www.greenockcreekwines.com.au/
Colville Eastate		1948	(08) 6365 5822		www.gewines.com
Conte Wines	ORG	2005	+61 428 111 121	info@eperosa.com.au	www.eperosa.com.au
Coriole Vineyards		1997	(08) 8563 1101	jeanette@groomwines.com	www.groomwines.com
Cradle of Hills		1999	0419 624 559	gumpara@bigpond.net.au	www.gumparawines.net.au
Curtis Family Vineyards	SUS	1993	(08) 8562 4590	winebiz@ozemail.com.au	www.haanwines.com.au
Dandelion Vineyards	SUS	1837	(08) 8231 0088, 0412 842 359		www.hamiltonewell.com.au
d'Arenberg		2003	(08) 8562 2598	roger@harbordwines.com.au	www.harbordwines.com.au

De Fabio		1998	(08) 8277 3506	info@hareschase.com.au	www.hareschase.com
De Lisio	certified ORG, SUS	2007	0412 586 006	alisa@hartofthebarossa.com.au	www.hartofthebarossa.com.au
Dennis Wines	ORG, BD, SUS	2006	0413 114 233	alex@headwines.com.au	www.headwines.com.au
Dennis Wines (same as above)		1998	(08) 8563 2644, 0417 632 600	admin@heidenreichvineyards.com.au	www.heidenreichvineyards.com.au
Doc Adams		1999	(08) 8524 4033, 0411 316 267	cellar@hemeraestate.com.au, sharyn@hemeraestate.com.au	www.hemeraestate.com.au
Dodgy Brothers	ORG, SUS	1998	(08) 8563 2059, 0408 835 700	woodbridgefarm@bigpond.com, will@woodbridgefarm.com	www.woodbridgefarm.com
Dog Ridge	SUS	1999	(08) 8562 8427, +61 8 8333 0241	info@hentleyfarm.com.au	www.hentleyfarm.com.au
Dowie Doole Wines		1984	(08) 8562 2880	enquiries@heritagewinery.com.au	www.heritagewinery.com.au
Ducks in a Row Winemakers	ORG, BD, SUS	1998	0427 177 740/41	cellardoor@hobbsvintners.com.au	www.hobbsvintners.com.au
Dyson Wines		2004	(08) 8524 9006, 0419 829 116	wine@hoklaswines.com.au	www.hoklaswines.com.au

Ekhidna Wines		2002	0423 040 385		
Ekhidna Wines	SUS	1973	(08) 8521 3000		www.jacobscreek.com
Fern Hill Estate [James 'empire']		2003	0411 106 652	wine@jaja.com.au	www.jaja.com.au
Fern Hill wines [James 'empire']		2003	0437 633 575		www.jamabro.com.au
Five Geese		2005	0408 794 389, +61 438204426	lenore@jbwines.com	www.jbwines.com
Foggo Wines		1989	(08) 8524 4154		
Fox Creek Wines		2003	(08) 8562 2266, +61 8 8112 4210	john@johnduvalwines.com , negaus@negociants.com	www.johnduvalwines.com
Fox Creek Wines		2001	(08) 8563 0889	cellardoor@kabminye.com, wine@kabminye.com	www.kabminye.com
Geddes Wines	SUS	1990	(08) 8562 4488	ksales@kaesler.com.au	www.kaesler.com.au
Gemtree Wines	certified ORG, BD	1999	(08) 8563 4000, 08 8373 3010	office@kalleske.com, wine@kalleske.com, admin@porterandco.com.au	www.kalleske.com

Gemtree Wines		2003	(08) 8562 2731		
Genders Winery		1976	(08) 8524 4303	cellardoor@kellermeister.com.au, sales@kellermeister.com.au	www.kellermeister.com.au
Geoff Merrill Wines		1969	(08) 8524 4110	sales@kieswines.com.au, cellardoor@kieswines.com.au	www.kieswines.com.au
Gilligan		1996	0418 810 982, 08 85 643 217		www.kurtzfamilyvineyards.com.au
Graham Stevens Wines		1986	+61 (8) 8564 2222	sales@lambertestate.com	www.lambertestate.com.au
Grancari Estates		2002	(08) 8353 8442, 0418 836 305 ,0417 800 759	landhaus@bigpond.net.au, kanejau@bigpond.net.au	www.landhauswines.com.au
Grancari Wines		1996	(08) 8563 2595	info@langmeilwinery.com.au, tyson@langmeilwinery.com.au	www.langmeilwinery.com.au
Halifax Wines		1998	0417 858 967	marianne.herren.lanz@lanzvineyards.com	www.lanzvineyards.com
Haselgrove		1998	(08) 8524 9227		www.lanzthomson.com

Hastwell & Lightfoot Vineyard	SUS	1999	(08) 8562 3878	briony@laughingjackwines.com	www.laughingjackwines.com.au
Hawker Gate Wines		1992	(08) 8524 4543	info@liebichwein.com.au	www.liebichwein.com.au
Hills View		2001	(08) 8524 9062		
Hills View		1997	0419 846 549		
Hither and Yon		2002	(08) 8524 7355		www.linfieldroadwines.com
Hoffman's Wines		2001	(08) 8563 2612		www.loanwines.com.au
Horndale Winery		2005	(08) 8524 4537	Lou@LouMirandaEstate.com.au	www.loumirandaestate.com.au
Hugh Hamilton		2004	0427 186 295		www.lunarwines.com.au
Hugo Winery		1999	(08) 8563 2758		www.maddogwines.com
Ingoldby [Accolade/Hardys]		1993	(08) 8562 3300	info@magpieestate.com	www.magpieestate.com
Inkwell		1987	(08) 8563 1520		
J ans J Wines	SUS	2000	(08) 8564 3037	JAYSEN@MASSENA.COM.AU	www.massena.com.au
J and J Wines	ORG, Certified BD	2004	(08) 8563 3551	ronald@maverickwines.com.au	www.maverickwines.com.au

James Haselgrove [Adelaide Winemakers]		1947	(08) 8524 0225, +61 (0)2 4998 4111	hunter@mcguiganwines.com.au	www.mcguiganwines.com.au
K1 Geoff Hardy Wines		1995	(08) 8563 2217		www.faith.sa.edu.au
Kangarilla Road		2003	0412 455 553, +61 8 85634003		www.seizetheday.net.au
Kay Brothers Pty		2000	(08) 8563 0422, 0439 828 300, 08 8563 1148	sales@moorooroopark.com.au	www.moorooroopark.com.au
Kimber Wines		2004	0408 821 657		
KJB Wine Group	ORG	2001	(08) 8562 8373, +61 (0) 438 818 714	craig@murraystreet.com.au, tastingroom@murraystreet.com.au, paul@murraystreet.com.au, wine@murraystreet.com.au	www.murraystreet.com.au
Koltz		2007	0430 360 350, 0423 262 387, 0430 360 650	craig@musterwineco.com.au	www.musterwineco.com.au, david@musterwineco.com.au, admin@musterwineco.com.au
La Curio		1885	(08) 8562 3002	sales@hahnbarossa.com	www.hahnbarossa.com

Lavina Wines		1853	(08) 8524 5030	info@normanswines.com	www.normanswines.com
Lazy Ballerina		1992	(08) 8562 2022		
Leconfield		2010	0413 271 241		www.onelonelybarrel.com.au
Linda Domas Wines	SUS	1847	(08) 8521 3111		www.pernod-ricard-winemakers.com
Lino Ramble		2005	0407 471 772		www.outlawwines.com.au
Lloyd Brothers		2010	0437 159 858	matt@parous.com.au	www.parous.com.au
Loom Wine		1999	0417 895 138	mara@paulmara.com.au	www.paulmara.com.au
Maglieri of McLaren Vale [=Serafinos]		1844	(08) 8568 8408		www.penfolds.com
Magpie Springs		1979	(08) 8565 9555, 08 8565 9595	cellar.door@peterlehmannwines.com, plw@peterlehmannwines.com	www.peterlehmannwines.com
Mandelle Estate	SUS	2005	(08) 8524 9019	pindarie@pindarie.com.au	www.pindarie.com.au
Marienberg/Fern Hill Estate		1978	(08) 8541 0800		
Marius Wines		2006	0407 617 635, 0401	sales@purplehandswines.com.au	www.purplehandswines.com.au

			988 185		
Maximus Wines		2006	0430 647 470, 0419 198 963, 0438 816 934		www.quattromano.com.au
Maximus Wines		1991	(08) 8563 0080, +61 8 8564 3233	contact@chrisringland.com	www.rbjwines.com
Maxwell		2004	0421 272 336	redart@rojomoma.com.au	www.rojomoma.com.au
McLaren Ridge Estate		1983	(08) 8563 7303, 1300 363 153	info@richmondgrove.com.au	www.richmondgrovewines.com
McLaren Vale III Associates		1984	(08) 8563 2720	info.contact@rockfordwines.com.au	www.rockfordwines.com.au
Thicker than Water Wines		2000	(08) 8562 2142		www.roclandestate.com
McLaren Vale Wine Co		1995	(08) 8565 6242		
McLaren Vale Wine Co		2005	0411 180 960		
McLaren Vale Winemakers		2009	(08) 8561 5200, +61 0(8) 8561 3566	info@rogersandrufus.com	www.rogersandrufus.com

Merrivale Winery		2000	(08) 8562 4121		www.rohrlachfamilywines.com.au
Middlebrook Wines		1955	(08) 8562 3300	info@rolfbinder.com, wineclub@rolfbinder.com, accounts@rolfbinder.com	www.rolfbinder.com
Minko Wines		2006	(08) 8330 3850		www.rosedalewines.com.au
Minnow Creek		1999	0407 390 788, 0885623533	infor@rosenvale.com.au	www.rosenvale.com.au
Mollydooker Wines		2009	0412 773 536	abel@ruggabellus.com.au, emma@ruggabellus.com.au	www.ruggabellus.com.au
Mitolo Wines		1998	(08) 8563 2976, 0432249929, 0417837422	enquiries@rusdenwines.com.au, craig@rusdenwines.com.au	www.rusdenwines.com.au
Morgan Simpson		2001	(08) 8564 2511		www.russellwines.com.au
Morgan Simpson		1859	(08) 8561 0200	cellardoor@saltramwines.com.au	www.saltramwines.com.au
Nardone Baker Wines		1998	(08) 8524 5560	purebarossa@schildestate.com.au	www.schildestate.com.au
Nashwauk (part of Barossa based)		1864	08) 8562 1258		www.schillervineyards.com.au

Neighbours Vineyards		2000	(08) 8562 3375, 08 84311457		www.schubertestate.com
Neighbours Vineyards		2003	(08) 8565 6257		
Neighbours Vineyards		2001	0417 881 923	info@schwarzwineco.com.au	www.schwarzwineco.com.au
Nicklebray Vineyards		2004	0427 224 353	INFO@SEABROOKWINES.COM.AU	www.seabrookwines.com.au
Noon Winery		1851	(08) 8568 6200		www.seppeltsfield.com.au
Oliverhill Wines		2001	(03) 9696 7018		
Olivers Taranga Vineyards		2001	(08) 8564 2799		
Oxenberry Farm Wines (Scarpantoni) ITA		1999	(08) 8562 8038	sieberwines@bigpond.com	www.sieberwines.com
Paper Eagle Wines (same as Ekhidna)		2008	(08) 8561 1222, +61 412 190 885, +61 413 488 913	Priscilla.hay@simpaticowines.com.au	www.simpaticowines.com.au
Paper Eagle Wines		1998	0422 030 303, +61 8333 3103	mail@6gates.com.au	www.6gates.com.au
Parri Estate		1999	0403 472 332	SALES@SMALLGULLYWINES.COM.AU,	www.smallgullywines.com.au

				admin@australianwineagencies.com.au	
Parri Estate	certified ORG & BD	2005	(08) 8564 2182, +61 0412 153 243, +61 413 011 697	info@smallfrywines.com.au	www.smallfrywines.com.au
Patritti Wines		1998	0410 505 590	tom@soulgrowers.com	www.soulgrowers.com
Paxton Wines		2001	(08) 8564 2059, 0408 695 654, 0408 881 852	info@spinifexwines.com.au	www.spinifexwines.com.au
Pende Valde		2002	(08) 8362 8622, (08) 8363 4232	grapes@stjohnsroad.com, msawyer@auscraftwine.com.au	www.stjohnsroad.com, www.auscraftwine.com.au
Pennys Hill Wines	SUS	2000	0414 474 708, 0405 103 156	info@sfvineyards.com.au	www.sfvineyards.com.au
Petaringa Wines		1965	(08) 8563 3624		www.stonewell.com.au
Pirramimma		1994	(08) 8524 5000	tait@taitwines.com.au	www.taitwines.com.au
Possums Wines	ORG, SUS	2001	(08) 8524 6860	info@tearoestate.com	www.tearoestate.com
Potters Clay Vineyard		2001	(08) 8562 4147	info@teusner.com.au	www.teusner.com.au

Prime Premium Wines		2002	(08) 8524 5030	info@colonialwinecompany.com.au	www.colonialwinecompany.com.au
Primo Estate		2006	(08) 8524 4214	dianne@grapesofross.com.au	www.grapesofross.com.au
Primo Estate		1999	(08) 8564 3634		www.standishwineco.com
Redheads Studio		1989	(08) 8562 1080		www.thewillowsvineyard.com.au
Renards Folly	SUS	1987	(08) 8564 3036, 0438 335 510	thornclarke@thornclarke.com.au, bchapman@thornclarke.com.au	www.thornclarkewines.com.au
RockBare		2002	0416 396 730		www.timsmithwines.com.au
Rosemount Wines		2007	(08) 8338 8666		www.tonicestate.com.au
Rosemount Wines	ORG	1994	(08) 8562 4155	craig@torbreck.com, stuart@torbreck.com	www.torbreck.com
Rudderless		1998	0417 869 981, 0419 841 615	mandyjones@internode.on.net,	www.trevorjonesfinewines.com.au
Rusty Mutt		1998	(08) 8563 2961	jjhage@bigpond.com	www.trollcreek.com
Sabella Winery	ORG	2001	0438 628 178, +61 (08) 8562 4922	info@tscharke.com.au	www.tscharke.com.au
Samuels Gorge		1990	(08) 8563 2851	info@turkeyflat.com.au	www.turkeyflat.com.au

Saunders Spring		1996	0413 583 742, (08)8295 3692	tweediesgwinery@senet.com.au	www.tweediesgullywinery.com.au/
SC Pannell		2001	(08) 8563 0245		www.twowayrange.com
Scarpatoni		2000	(08) 8562 4566		www.twohandswines.com
Semprevino		2004	(08) 8565 3214, 0418 139 383	info@veroniquewines.com.au	www.veroniquewines.com.au
Serafino Wines		1994	(07) 4125 4368, 0417 795356		www.vikingwines.com
Settlement Wines		2001	(08) 8563 3044		www.villatinto.com.au
Shingleback Wines		1999	(08) 8563 0111		www.vinecrest.com.au
Shingelback Wines	SUS	1999	0428 656 208		www.westlakevineyards.com.au
Shirvington		1999	(08) 8562 4942, +61 430 190 360	cellardoor@whistlerwines.com, josh@whistlerwines.com	www.whistlerwines.com
Shottesbrooke		1997	0438 822 409	admin@whitechapelwines.com.au	www.whitechapelwines.com.au
Simon Hackett Wines		2000	0427 246 382		www.wintercreekwine.com.au
Simon Hackett		1966	(08) 8568 7311		www.wolfblasswines.com

Simply Organoleptic		2005	(08) 8562 3510,0408 250 005, 0408 628 494	sales@yellandandpapps.com	www.yellandandpapps.com
Southpaw Vineyard		1999	0422 802 220, 0411 447 986	kristen@zwine.com.au, janelle@zwine.com.au, kristen@zwine.com.au, kristen@zwine.com.au	www.zwine.com.au
Southpaw Vineyard		2010	0417 670 655, +61 411 742 244	sales@fourthwavewine.com.au, chanda@chace.com.au	www.woods-crampton.com.au
Skin Deep		2004	0419 819 414		www.zitta.com.au

A3 Wineries of Clare Valley

Company	ORG/BD/SUS	Year	phone no.	email	Web
Adelina Wines	BD	2002	(08) 8842 1549	INFO@ADELINA.COM.AU	http://adelina.com.au/
Annie's Lane		1851	(08) 8843 2320		www.annieslane.com.au
Andrew Miller Wines		2010	0412 569 445		www.andrewmillerwines.com.au
Atlas Wines		2008	0419 847 491	office@atlaswines.com.au	www.atlaswines.com.au
Brian Barry Wines		1977	(08) 8363 6211		www.brianbarrywines.com.au
Cardinham Estate		1981	(08) 8842 1944		www.cardinham.com
Clare Wine Co		2008	(08) 8562 4488		www.clarewineco.com.au
Claymore Wines		1998	(08) 8843 0200		http://www.claymorewines.com.au/events.cfm
Clos Clare		1993	(08) 8843 0161		http://closclare.com.au/
Crabtree Watervale Wines		1979	(08) 8843 0069		http://www.crabtreewines.com.au
Eldredge		1993	(08) 8842 3086	bluechip@eldredge.com.au	www.eldredge.com.au
Eyre Creek		1998	0418 818 400		www.eyrecreekwines.com.au
Fireblock		1926	(02) 6554 2193,(02)		NA

			9144 1925		
Gaelic Cemetery Wines		2005	08) 8843 4370, Ben Barletta 0402 114 808 - Mario Barletta on 0419 819358	ben@ausdomwines.com.au, mario@ausdomwines.com.au	www.gaelic-cemeterywines.com
Good Catholic Girl Wines		2005	0419 822 909		www.goodcatholicgirl.com.au
Greg Cooley Wines		2002	(08) 8843 4284	gregcooleywines@dodo.com.au	www.gregcooleywines.com.au
Grosset	certified ORG	1981	(08) 8849 2175		www.grosset.com.au
Heaslip Wines	ORG	2005	0430 177 588	contact@heaslipwines.com.au	www.heaslipwines.com.au
Inchiquin Wines		1998	(08) 8843 4210,0429 307 531,08 8842 1292	stephen.mcinerney@gmail.com	NA
Inghams Skilly Ridge Wines		1994	0418 423 998	inghams@skillyridge.com.au, inghams@rbe.net.au	NA
Jeanneret Wines		1992	08 8346 9111, (08) 8843 4308		http://jeanneretwines.com/
Jenner You		2009	0429 697 323		www.ajwines.com.au
Jim Barry Wines		1959	(08) 8842 2261		www.jimbarry.com
Kilikanoon		1997	(08) 8843 4206, +61 8 8849 2356, (08) 8843 4377	admin@kilikanoon.com.au, cellardoor@kilikanoon.com.au	www.kilikanoon.com.au

Kirrihill Wines		1998	(08) 8842 4087, David Pike / 0448 330 243	cellardoor@kirrihillwines.com.au, dpike@kirrihillwines.com.au	www.kirrihillwines.com.au
Knappstein		1878, (1969)	(08) 8841 2100		www.knappstein.com.au
Koonowla Wines	BD	1997	(08) 8849 2270		www.koonowla.com
Last Word Wines		2009	0458 434 000		www.lastwordwines.com NA
Leasingham		1893	1800 088 711	customers@leasingham-ines.com.au, sales@hancocks.co.nz	www.leasingham-wines.com.au
Little Brampton Wines		2001	(08) 8843 4201		www.littlebramptonwines.com.au
Matchbox Wine Co.		2012	0403 773 871, (0) 432 925 895		www.matchboxwine.com
Matriarch Rogue		2014	0419 901 892		www.matriarchandrogue.com.au
Mercuri Estate		2015	(08) 8842 3081, +61 8 8261 9111	cellardoor@mercuriestate.com	www.mercuriestate.com
Mintaro Wines		1984	(08) 8843 9150, Maris - 0414 314 084	sales@mintarowines.com.au, davemintarowines@gmail.com	www.mintarowines.com.au
Mitchell	ORG, BD, SUS	1975	(08) 8843 4258	info@mitchellwines.com	www.mitchellwines.com
Mocandunda Wines		1998	0423 670 946, 0418 819 995	sales@mocandundavineyards.com.au, admin@mocandundavineyards.com.au	www.mocandundavineyards.com.au
Mount Horrocks	certified ORG	1982	(08) 8849 2243		www.mounthorrocks.com

Mr Mick		2011	(08) 8842 2555	info@mrmick.com.au	www.mrmick.com.au
Mt Surmon Wines	SUS	1995	0438 421 250		www.mtsurmon.com.au
Neagles Rock Wines		1997	0407 391 109		www.neaglesrock.com
O'Leary Walker Wines		2001	(08) 8843 0022		www.olearywalkerwines.com
Olssens of Watervale		1994	(08) 8843 0065		NA
Paul Morris	ORG, SUS	2014	0427 885 321		www.paulmorriswines.com.au
Paulett		1983	(08) 8843 4328		www.paulettwines.com.au
Pearson Vineyards		1993	(08) 8843 4234	pearson@capri.net.au	NA
Penna Lane Wines		1998	Cellar Door:08 8843 4033Peter Treloar:0403 462 431	pennalanewines@bigpond.com	www.pennalanewines.com.au
Pikes	ORG, SUS	1984	(08) 8843 4370, 0410 952717	Peter@pikeswines.com.au, cellardoor@pikeswines.com.au	www.pikeswines.com.au
Pycnantha Hill Estate		1997	(08) 8842 2137	jim@pycnanthahill.com.au	www.pycnanthahill.com.au (NW)
Reillys Wines		1994	(08) 8843 9013		www.reillyswines.com.au
Rhythm Stick Wines		2007	(08) 8843 4325		www.rhythmstickwines.com.au
Rieslingfreak		2009	(08) 8563 3963		www.rieslingfreak.com
Rise Vineyards		2009	0419 844 238, grant norman : 0419 844	grant@risevineyards.com.au ,	www.risevineyards.com.au

			238, matt mcculloch : 0400 777 719	matt@risevineyards.com.au	
Robertson of Clare		2004	(02) 9499 6002		www.rocwines.com.au
Rockridge Estate		2007	(08) 8358 0480	sales@rockridgewines.com.au.	www.rockridgewines.com.au
Seraph's Crossing		2006	0412 132 549		www.seraphscrossing.com.au (NW)
Sevenhill Cellars		1851	(08) 8843 4222	orders@sevenhill.com.au, cellardoor@sevenhill.com.au	www.sevenhill.com.au
Shut the Gate Wines		2013	0488 243 200	richard@shutthegate.com.au	
Skillogalee		1970	(08) 8843 4311	info@skillogalee.com.au	www.skillogalee.com.au
Stephen John Wines		1994	(08) 8843 0105	sjwines@bigpond.com	www.stephenjohnwines.com (NW)
Steve Wiblin's Erin Eyes		2009	(08) 8843 0023		www.erineyes.com.au
Stone Bridge Wines		2005	(08) 8843 4143	stonebridgewines@bigpond.com	http://www.stonebridgewines.com.au
Stringy Brae of Sevenhill		1991	(08) 8843 4313	hannah@stringybrae.com.au	www.stringybrae.com.au
Sussex Squire Wines	ORG	2014	0458 141 169		www.sussexsquire.com.au
Talbots Block Wines		2011	0402 649 979		www.talbotsblock.com.au
Taylors	ORG, SUS	1969	(08) 8849 1111		www.taylorswines.com.au
Tim Adams			(08) 8842 2429	info@timadamswines.com.au	www.timadamswines.com.au

Tim Gramp		1990	(08) 8344 4079, 0417 890 502(08) 8843 0199	timgramp@timgrampwines.com.au	www.timgrampwines.com.au
Tim McNeil Wines		2004	(08) 8843 0040, 0488 711887		www.timmcneilwines.com.au
Wendouree		1895	(08) 8842 2896		NA, http://www.classic.com.au/wizard/Wendouree.htm
Wilson Vineyard		1974	(08) 8843 4310, 0403 312 149, 0407 615 724,0458 141 169	daniel@wilsonvineyard.com.au, tamara@wilsonvineyard.com.au, mark@wilsonvineyard.com.au	www.wilsonvineyard.com.au
Wines by KT	BD, SUS	2006	0419 855 500	kt@winesbykt.com	www.winesbykt.com
Wykari Wines		2006	08) 8842 1841, 0427 005 494	wykariwines@bigpond.com	www.wykariwines.com.au

A4 Wineries of Coonawarra

Company	ORG/BD/SUS	Year	phone no.	email	Web
Balnaves of Coonawarra		1975	(08) 8737 2946	kirsty.balnaves@balnaves.com.au	www.balnaves.com.au
Banks Thargo Wines		1980	0408 828 124	info@banksthargo.com.au	www.banksthargo.com.au
Bellwether	ORG	2009	0417 080 945	sue@glenroywinemakers.com.au	www.bellwetherwines.com.au
Bowen Estate		1972	(08) 8737 2229	bowen@bowenestate.com.au	www.bowenestate.com.au
Brand's Laira Coonawarra		1966	(08) 8736 3260		www.brandslaira.com.au (NW)
Bundalong Coonawarra		1990	0419 815 925	contact@bundalongcoonawarra.com.au	www.bundalongcoonawarra.com.au
Cricket Flat	SUS	1996	0419 730 047		www.cricketflat.com.au
DiGiorgio Family Wines		1998	(08) 8736 3222, 0428 854 386	dfw@digiorgio.com.au	www.digiorgio.com.au
Ey Estate		1989	(08) 8739 3063, 08 8739 3012	eyland@bigpond.com	www.eyestatewines.com
Flint's of Coonawarra		2001	(08) 8736 5046, 0413 992 649	flints@flintsofcoonawarra.com.au	www.flintsofcoonawarra.com.au

Highbank	BD	1996	1800 653 311, +61 8 8736 3311		www.highbank.com.au
Hoggies Estate Wines		1996	(08) 8736 3268	gavin@hoggieswine.com	www.hoggieswine.com
Hollick		1983	(08) 8737 2318	admin@hollick.com	www.hollick.com
Hundred of Comaum		1999	0438 005 051, 08-87373350	sales@hundredofcomaum.com.au	www.hundredofcomaum.com.au
Jack Estate		2011	(08) 8736 3130	admin@coonawarrajack.com	www.jackestate.com
Jamiesons Run		1987	1300 651 650, +61 3 8533 3000, +1 707 259 4500		www.jamiesonsrun.com.au
Jim Brand Wines		2000	(08) 8736 3252	contact@jimbrandwines.com.au	www.jimbrandwines.com.au
Katnook Coonawarra	SUS	1979	(08) 8737 0300	katnook@wingara.com.au	www.katnookestate.com.au
Kidman Wines		1984	(08) 8736 5071		www.kidmanwines.com.au
Koonara	ORG	1988	(08) 8737 3222	wine@koonara.com	www.koonara.com
Ladbroke Grove		1982	(08) 8737 3777	ladbrokegrove@bigpond.com	www.ladbrokegrove.com.au
Lawrence Victor Estate		1994	(08) 8739 7276		www.lawrencevictorestate.com.au
Leconfield		1974	(08) 8737 2326	slinden@leconfieldwines.com,	www.leconfieldwines.com

				kmarcus@leconfieldwines.com	
Lindeman's (Coonawarra)		1965	1300 651 650	function@lindemans.com	www.lindemans.com
Majella		1969	(08) 8736 3055	prof@majellawines.com.au, tony@majellawines.com.au, bruce@majellawines.com.au	www.majellawines.com.au
Murdock		1998	(08) 8737 3700		www.murdockwines.com (NW)
Ottelia	ORG	2001	0409 836 298, 08 8736 3170	hello@ottelia.com.au	www.ottelia.com.au
Penley Estate		1988	(08) 8736 3211, +61 (8) 8297 4220	penley@penley.com.au	www.penley.com.au
Patrick of Coonawarra	ORG	2004	(08) 8737 3687	sales@patrickofcoonawarra.com	www.patrickofcoonawarra.com.au
Parker Coonawarra Estate	ORG	1985	(08) 8737 3525	jhesketh@wdwines.com.au, dwyman@wdwines.com.au, plehmann@wdwines.com.au, info@parkercoonawarraestate.com.au	www.parkercoonawarraestate.com.au
Peter Douglas Wines		2007	(03) 9646 6666		www.peterdouglaswines.com.au (NW)

Raidis Estate	SUS	2006	(08) 8737 2966, 0417 834 195, 0419 805 845	steven@raidis.com.au, sales@raidis.com.au, emma@raidis.com.au	www.raidis.com.au
Punters Corner		1988	(08) 8737 2007		www.punterscorner.com.au
Redman		1966	(08) 8736 3331	wines@redman.com.au, wineco@wineco.com.au, admin@poterandco.com.au	www.redman.com.au
Reschke Wines	ORG	1998	(08) 8239 0500, +61 (8) 8736 3333	info@reschke.com.au	www.reschke.com.au
Rymill Coonawarra	SUS	1972	(08) 8736 5001	winery@rymill.com.au	www.rymill.com.au
Terramore Wines		2009	(08) 8736 5139	phil@terramorewines.com.au	www.terramorewines.com.au
The Blok Estate		1999	(08) 8737 2734		www.blok.com.au
The Poplars Wines		2004	0417 832 003, 0417 816 075	info@goldwinesales.com.au, sales@goldwinesales.com.au , accounts@goldwinesales.com.au	www.goldwinesales.com.au
The Roy Kidman Wine Co		2003	0417 878 933, 0417 800 035	sales@roykidman.com.au, tim@roykidman.com.au, philip@roykidman.com.au	www.roykidman.com.au

Watson Wine Group		1997	(08) 8338 3200		www.rexwatsonwines.com (NW)
Whistle Post		2012	0408 708 093, 0404 19 19 19	info@whistlepost.com.au	www.whistlepost.com.au
Wood Block Wines		2009	0417 878 933		www.woodblockwines.com.au (NW)
Wynns Coonawarra Estate		1897	(08) 8736 2225		www.wynns.com.au
Yalumba The Menzies (Coonawarra)	SUS	2002	(08) 8737 3603, 8 8561 3200	info@yalumba.com, media@yalumba.com, wineroom@yalumba.com	www.yalumba.com
Zema Estate		1982	(08) 8736 3219	zemaestate@zema.com.au	www.zema.com.au

A5 Wineries of Eden Valley

Company	ORG/BD/SUS	Year	phone no.	email	Web
Barossa Cottage Wines		1990	(08) 8562 3212		www.barossawines.com.au (NW)
Blue Rock Wines	ORG	2005	0419 817 017,		www.bluerockwines.com.au
Brockenchack		2007	(07) 5458 7700, 0418 986 289	info@brockenchack.com.au, info@tasteedenvalley.com.au	www.brockenchack.com.au
Eden Hall	SUS	2002	0400 991 968	info@tasteedenvalley.com.au, tasteedenvalley.com.au	www.edenhall.com.au
Eden Valley Wines		2003	(08) 8562 4590	bberton@bertonvineyards.com.au, contactus@edenvalleywines.com.au	www.edenvalleywines.com.au
Edenmae Estate Wines	SUS	2007	0409 493 407, +61 8 8568 2098	wine@edenmae.com.au	www.edenmae.com.au
Fernfield Wines	SUS	2002	0402 788 526	scott@fernfieldwines.com.au	www.fernfieldwines.com.au
Flaxman Wines		2005	0411 668 949, 0459 323 380	info@flaxmanwines.com.au,	www.flaxmanwines.com.au
Forbes Forbes		2008	(08) 8568 2709	sales@forbeswine.com.au	www.forbeswine.com.au
Gatt Wines		1972	(08) 8564 1166	sales@gattwines.com ,	www.gattwines.com

				info@gattwines.com	
GOODchild Wines		2005	0459 096 079		NA
Hartz Barn Wines		1997	0408 857 347, 08 8563 9002	david@hartzbarnwines.com.au, penny@hartzbarnwines.com.au	www.hartzbarnwines.com.au
Haslemere Wines		2014	(08) 8564 1314		www.haslemerewines.com (NW)
Heathvale		1987	(08) 8564 8248, 0407 600 487	trevor.march@heathvale.com	www.heathvale.com, www.tasteedenvalley.com.au
Heggies Vineyard	SUS	1971	(08) 8561 3200	info@heggiesvineyard.com	www.heggiesvineyard.com
Henschke		1868	(08) 8564 8223	info@henschke.com.au	www.henschke.com.au
Hill-Smith Estate		1979	(08) 8561 3200	info@hillsmithestate.com	www.hillsmithestate.com
Hutton Vale Farm		1960	(08) 8564 8270	enquiries@huttonvale.com	www.huttonvale.com
Irvine		1983	(08) 8564 1046, 0400 797 523	info@tasteedenvalley.com.au, andrewt@domwineship.com.au	www.irvinewines.com.au
Karra Yerta Wines		2006	0438 870 178	info@karrayertawines.com.au	www.karrayertawines.com.au
Lonely Vineyard		2008	0413 481 163	sales@lonelyvineyard.com.au	www.lonelyvineyard.com.au

McLean's Farm		2001	(08) 8564 3340		www.mcleansfarm.com (NW)
Mountadam Vineyards		1972	0427 089 836, 0439 791 327	office@mountadam.com.au, james@mountadam.com.au	www.mountadam.com.au
Penrice Estate Wines		2005	(08) 8564 2935		www.penriceestatewines.com.au (NW)
Peter Seppelt		1981	(08) 8568 2452	roz@peterseppeltwines.com.au	www.peterseppeltwines.com.au
Pewsey Vale	Certified ORG, BD	1847	(08) 8561 3200	info@pewseyvale.com	www.pewseyvale.com
Poonawatta		1880	(08) 8565 3248, 0400 188080	info@poonawatta.com	www.poonawatta.com
Poverty Hill Wines		2002	(08) 8568 2220, 0437 145 542	wines@povertyhillwines.com.au, povertyhillwines@ozemail.com.au	www.povertyhillwines.com.au
Radford Wines	BD, SUS	2003	(08) 8565 3256, 0412 353 446		www.radfordwines.com
Rileys of Eden Valley		2006	(08) 8564 1029, 0424 792 785, 0432 272 803	peter@rileysofedenvalley.com.au, terry@rileysofedenvalley.com.au, jan@rileysofedenvalley.com.au	www.rileysofedenvalley.com.au
Robert Johnson Vineyards		1997	(08) 8359 2600, 0402266334	robert@robertjohnsonvineyards.com.au	www.robertjohnsonvineyards.com.au

Sorby Adams Wines		2004	(08) 8564 2993,	info@sorbyadamswines.com	www.sorbyadamswines.com
Springton Hills Wines		2001	(08) 8337 7905, (0) 0400 334 435	john@springtonhillswines.com.au	www.springtonhillswines.com.au
Stage Door Wine Co		2013	0400 991 968		www.stagedoorwineco.com.au
Tin Shed Wines		1998	(08) 8563 3669	info@tinshedwines.com	www.tinshedwines.com
Torzi Matthews Vintners		1996	0412 323 486	info@torzimatthews.com.au	www.torzimatthews.com.au
Wroxton Wines		1995	(08) 8565 3227, 0439 653 312	info@wroxton.com.au	www.wroxton.com.au
Yalumba	SUS	1849	(08) 8561 3200	media@yalumba.com, wineroom@yalumba.com	www.yalumba.com

A6 Wineries of Langhorne creek

Company	ORG/BD/SUS	Year	phone no.	email	Web
Angas Plains Estate		1994	(08) 8537 3159, (08) 8537 3159		www.angasplainswines.com.au
Ben Potts Wines		2002	(08) 8537 3029, 08 85373441		www.benpottswines.com.au, www.thewinehouse.com.au
Bleasdale Vineyards		1850	(08) 8537 4000, +61 8 8537 4000	cellardoor@bleasdale.com.au	www.bleasdale.com.au
Bremer River Vineyards		1990	0408 844 487, 08 8537 3032		NA
Bremerton Wines	SUS	1988	(08) 8537 3093		www.bremerton.com.au
Brothers in Arms	ORG, SUS	1998	(08) 8537 3182, +61 (0) 418 891 573	admin@brothersinarms.com.au, guy@brothersinarms.com.au, winery@brothersinarms.com.au	www.brothersinarms.com.au
Cleggett Wines		2000	(08) 8537 3133, +61 8 8537 3133	info@cleggettwines.com.au	www.cleggettwines.com.au
Gipsie Jack Wine Co		2004	(08) 8537 3029	info@thewinehouse.com.au	www.gipsiejack.com.au
Heartland Wines		2001	(08) 8333 1363	admin@heartlandwines.com.au	www.heartlandwines.com.au

John's Blend		1974	(08) 8562 1820	info@johnsblend.com.au	www.johnsblend.com.au
Karanto Vineyards	SUS	2002	(08) 8537 3106, 0409373106	wine@karanto.com.au	www.karanto.com.au
Killibinbin		1997	(08) 85373382		www.killibinbin.com.au, https://www.brothersinarms.com.au/wines/killibinbin/
Kimbolton Wines		1998	(08) 8537 3359, 0417 382 605	sales@kimboltonwines.com.au	www.kimboltonwines.com.au
Lake Breeze Wines		1987	(08) 8537 3017	wines@lakebreeze.com.au	www.lakebreeze.com.au
Oddfellows Wines	SUS	1997	(08) 8537 3326	wine@oddfellowswines.com.au	www.oddfellowswines.com.au
Old Mill Estate Wines		2003	(08) 8537 3006	oldmillestatewines@bigpond.com	www.oldmillestatewines.com.au
Raydon Estate		1999	(08) 8537 3158		NA
Rusticana		1998	(08) 8537 3086		www.rusticanawines.com.au
Shearer's Hill		2005	(08) 8536 4573		
Step Rd Winery		1985	(08) 8300 0900, +61 8 8537 3342, +61 8 8182 1890	info@steprd.com.au, Simon.sparrow@vok.com.au	www.steprd.com

Temple Bruer	ORG, SUS, CARBON NEUTRAL	1980	(08) 8537 0203		www.templebruer.com.au
Wenzel Family Wines		2000	(08) 8537 3035, 0438 600 121	info@langhornecreek.com	www.langhornewine.com.au

APPENDIX B CLASSIFICATION OF WINERIES BY AGE AND PRODUCTION

B1 Classification of wineries in Barossa Valley

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Less than 5000	**Hamilton's Ewell Vineyards(5000/202)**, Neil Hahn Wines(3000/45.68), Schiller Vineyards(300/72.55)	Burge Family Winemakers(3500/10), Clancy Fuller(500/5.5), Diggers Bluff(1000/1.9), Gnadenfrei Estate(450/NA), **Haan Wines(3500/16.3)**, Kurtz Family Vineyards(1800/15.04), **Lanz Vineyards(800/16)**, LanzThomson Vineyard(1300/NA), Liebich Wein(3000/11.93), Mardia Wines(200/NA), Mengler View Wines(2000/1), Possum Creek Vineyards(360/23.5), RBJ(200/2), Tweedies Gully Wines(500/7), Viking Wines(1500/10), Heritage Wines(4000/8.3)	Andrew Seppelt Wines(275/NA), Atze's Corner Wines(2000/30), **Ballycroft Vineyard and Cellars(300/3.5),** Balthazar of the Barossa(1000/24.93), Beer Brothers(600/11), Biscay Wines(800/11), Black Spade Wines(200/0.5), Caillard Wine(850/NA), Cirillo Wines(600/6) Cooper Burns(2000/NA), Curator Wine Company(600/8), Deisen(1200/NA), Dell'uva Wines(1500/20), Dirt Road Vignerons(200/11.6), Dolan Family Wines(1000/NA), Domain Barossa(3800/NA), Epsilon(3000/22), Final Cut Wines(4000/NA), Glenfell(500/3), God's Hill Wines(1000/12), **Grocke Wines(2000/8.75)**, Groom(2300/27.8), Gumpara Wines(500/21.53), **Hart of the Barossa(2200/6.5), Henry Holmes Wines(2000/33), Hobbs of Barossa Ranges(1100/6.22)** Kassebaum Wines(400/6.9),

			Laughing Jack(3000/38.88), Lienert of Mecklenburg(530/NA), Linfield Road Wines(2500/19), Loan Wines(1200/8.2), Lunar Wines(600/NA), Mad Dog Wines(500/35) **Massena Vineyards(3000/4),** Milhinch Wines(1200/4), Moorooroo Park Vineyards(2000/1.25), Moppa Wilton Vineyards(250/42), Muster Wine Co(2500/NA), One Lonely Barrel(250/NA), Outlaw Wines(150/2.8), Parous(2500/NA), **Pindarie(5000/32.4),** Paulmara Estates(275/12.8), Purple Hands Wines(2500/14), Quattro Mano(2500/3.8), Red Art | Rojomoma(400/5.4), Roennfeldt Wines(350/25.25), Rohrlach Family Wines(1000/160.6), Rosenvale Wines(3000/100), Ruggabellus(1000/NA), Russell Wines(4000/32.47), Schubert Estate(4000/14), Schulz Vignerons(500/58.5), Schwarz Wine Company(3500/NA), Seabrook Wines(1200/10), Sheep's Back(3000/4), Sieber Road Wines(4500/18), Six Gates(4000/12), **Smallfry Wines(1500/27)-certified**, Steinborner Family Vineyards((2000/12), **TeAro Estate(2000/58.2),** The Grapes of Ross(2000/NA),

			The Standish Wine Company(800/NA), Tonic Estate(178/NA), Trevor Jones Fine Wines(4000/5), Troll Creek Wines(300/35), Two Way Range(200/30), Two Way Range(2000/NA), **Westlake Vineyards(500/36.2)**, Whitechapel Wines(950/NA), Winter Creek Wine(300/3), Yelland Papps(4000/10) Zitta Wines(3000/26.3), Harbord Wines(3000) Heidenreich Estate(2000/47.3) Hobbs of Barossa Ranges(1100/6.22) Hoklas Family Vineyard(120/1) Izway Wines(800), JaJa(500), Jamabro Wines(500/20.4), jb Wines(700/18) Kabminye Wines(1500/1.5)

5000-10000	Basedow Wines(5000/214), Gomersal Wines(8500/20)	Greenock Creek Wines(5000/17), Kies Family Wines(5000/30), Lambert Estate(10000/40), Magpie Estate(7000/NA), McGuigan Wines(5000/NA), Seppeltsfield(10000/100)	Chaffey Bros Wine Co(7000/NA), Creed of Barossa(5000/NA), David Franz(5000/39.17), Deonte Wines(10000/NA), Domain Day(8000/15.5), Dutschke Wines(6000/15), Earthworks Wines(10000/15), First Drop Wines(10000/NA), Glen Eldon Wines(6000/50), Landhaus Estate(10000/1), Rusden Wines(6000/16), Simpatico Wines(10000/13), Soul Growers(5000/4.85), Spinifex(6000/NA), The Willows Vineyard(6500/42.74), Tim Smith Wines(5000/1), **Tscharke(5000/28),** Vinecrest(10000/NA), Whistler Wines(5000/14.5), Woods Crampton(10000/NA), Hare's Chase(5000/16.5), Jenke Vineyards(8000/46) John Duval Wines(7000)

More than 10000	Chateau Tanunda(130000/100), Normans(50000/NA), Saltram(15000/NA)	**1847 | Yaldara Wines(50000/53.9),** Barossa Valley Estate(141500/150.67), Blaxland Vineyards(15000/675), Charles Cimicky(20000/25), Charles Melton(15000/32.6), Chateau Dorrien(20000/28), Craneford(50000/NA), Dorrien Estate(1 million/NA), **Elderton(45000/75)**, Evans Wines(15000/24.28), Gibson(10000/14.2), Glaetzer Wines(15000/20), Grant Burge(400000/356), Kellermeister(30000/20), Langmeil Winery(45000/31.4), Peter Lehmann(750000/NA), Rolf Binder(39500/110), Tait(11000/5), **Thorn-Clarke Wines(80000/268), Torbreck Vintners(70000/86),** Turkey Flat(20000/47.83) **Kaesler Wines(20000/50)**	Auswan Creek(30000/12), **Kalleske(15000/48)-ORG/BD**, **Head wines(5000/7.5) , Hentley Farm Wines(15000/38.21)** Lou Miranda Estate(20000/23.29), **Murray Street Vineyards(20000/50), Maverick Wines(12000/61.7)**,-org Rocland Estate(20000/6), Rosedale Wines(40000/NA), Schild Estate Wines(40000/163), St John's Road(20000/20), Teusner(15000/NA), The Colonial Estate(25000/39.85), Two Hands Wines(50000/15), Z Wine(5500/1), Hemera Estate(15000/44)
	Greenock Estate(NFP/NA), **Orlando(NFP/1600),** Penfolds(NFP/NA)	**Jacob's Creek(1600 HEC)** Barossa Settlers(NA/NA), Chateau Barrosa(NA/NA), Gordon Sunter Wines(NA/NA), Nurihannam Wines(NA/NA), Richmond Grove(NFP/NA), Rockford(NFP/NA), Roehr(NFP/NA), Small Gully Wines(NA/66) Stonewell Vineyards(NA/50), Wolf Blass(NFP/NA)	Limb Vineyards(NA/NA), Rogers Rufus(NFP/NA), Shiralee Wines(NA/NA), Villa Tinto(NFP/NA)
	Sustainable		
	Organic/certified ORG		
	Biodynamic		

B3 Classification of wineries in McLaren Vale

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Less than 5000	Horndalecc(1350/0.4)	Dyson Wines(2500/6), Hastwell Lightfoot(4500/16), Hoffmann's(2500/4), James Haselgrove Wines(1500/300), Kimber Wines(350/NA), Koltz(2000/NA), Maglieri of McLaren Vale(4000/10), Marienberg | Fern Hill Estate(4000/NA), Marius Wines(800/8.1), Neighbours Vineyards(500/NA), Noon Winery(3000/6), Settlement Wines(3500), Shirvington(950/23.8), Sylvan Springs(3400/35.34) Ulithorne(2500/7.2), Wirilda Creek(1000) **Noon Winery(3000/6)**	2 Mates(500/NA), Ambush Hill(200/5.5), **Amicus(2000/NA)**, Arakoon(3500/3.5), Bekkers(500/5.5), Bellevue Estate(1000/4), Bondar Wines(500/11), **Brash Higgins(3000/7),** Braydun Hill Vineyard(2000/4.5), Brick Kiln(1500/8), Brini Estate Wines(4000/16.4), Brookman Wines(2000/25), Burton Premium Wines(3000/NA), **Cascabel(2500/4.9),** Charlatan Wines(350/NA), Coates Wines(2500/NA), Colville Estate(130/NA), Conte Estate Wines(1200/23) **cradle of hills(1000/6.88)**, Dodgy Brothers(2000/NA), Ducks in a Row Winemakers(1200/NA), Foggo Wines(3500/NA), Geddes Wines(1800/NA), Gilligan(1000/5.74), **Grancari Estate Wines(3000/6)**, Green Road Wines(350/0.9), Halifax Wines(1000/4), Hancock Hancock(2400/8.09), Hawkers Gate(500/NA), **Inkwell(2000/12),** La Curio(1500/NA), KJB Wine Group(550/NA), **La Curio(1500/NA),** Lazy Ballerina(800/NA), Lino Ramble(2000/NA), Little Creek

			Wines(60/NA), Lost Buoy Wines(1500/18.5), **Maximus Wines(2000/1.82)**, Minnow Creek(1800/NA), Morgan Simpson(1200/20.9), Noogoora(2000/Na), Old Oval Estate(1000/6), Prime Premium Wines(200/4.1), Rusty Mutt(800), Renards Folly(3000/NA), Samuel's Gorge(3500/10), Rudderless(450/2), Saunders Springs Vineyard(2250/4.4), Semprevino(2500), Southpaw Vineyard(700/NA), Springs Hill Vineyard(1000/17.1), St Brioc Wines(250), The Old Faithful Estate(2000/5), Thomas Vineyard Estate(1000/5.26), Three Dark Horses(1500/), Tilly Devine Wines(900), Vigna Bottin(800/16), WayWood Wines(1500), Willunga Creek Wines(4000/7.2), Zerella Wines(2000/58), Zimmermann Wine(1000/6.5) **Brackenwood Wines(1500/7.6)** **J & J Wines(5000/5.5)** **Rusty Mutt(800)**

5000-10000	Kay Brothers Amery Vineyards(10000/22), Olivers Taranga Vineyards(8000/85.42),	Classic McLaren Wines(7100/NA), Curtis Family Vineyards(10000/NA), Di Fabio Estate(6000/38.91), DogRidge Wine Company(10000/56), Fern Hill Estate(5000/NA), Hugo(8000/25), Oliverhill(5000/13), Potters Clay Vineyards(10000/96), Wayne Thomas Wines(5000)	Bent Creek(5000/NA), Conte Estate Wines(5000/50), De Lisio Wines(7500/NA), Dennis(5000/22), Doc Adams(5000/27), Ekhidna(8000/NA), Five Geese(5000/28), Hickinbotham Clarendon Vineyard(5000/68.8), Hither Yon(5000/90), Linda Domas Wines(5000NA), Lloyd Brothers(5000/38), Long Yarn Wines(10000/12), McLaren Ridge Estate(5000/6), Nashwauk(5000/20), Possums Vineyard(8000/44.8), Sabella Vineyards(7000/44.5), Skin Deep Wines(6000), Willunga 100 Wines(9500) **Hither Yon(5000/90)**

More than 10000	Pirramimma(50000/91.5), Tatachilla(43000/12.4), **Wirra Wirra(180000/31.31)** Woodstock(22000/18.41) **Angove Wines(OLD)(1 milions)**	Andrew Garrett(170000/NA), Beresford Estates(30000/28), Beresford Wines(30000/28), Chalk Hill(20000/89), **Chapel Hill(60000/44),** Clarendon Hills(15000/63), **Coriole(32000/48.5)**, **d'Arenberg(270000/197.2)**, DOWIE DOOLE(25000/44.35), Fox Creek Wines(35000/21), Geoff Merrill Wines(55000/45), Haselgrove Wines(40000/9.7), Hugh Hamilton Wines(20000/21.14), Ingoldby(48000/37), Maxwell Wines(24000/40), Penny's Hill(85000/44), Primo Estate(30000/34), Richard Hamilton(25000/71.6), Scarpantoni Estate(37000/40) Shingleback(160000/120), Shottesbrooke(12000/30.64), Simon Hackett(15000), Vasarelli Wines(18000/33), Walter Clappis Wine Co(15000/35) **Battle of Bosworth Wines(15000/80)** **Paxton(23500/82.7)**	Aramis Vineyards(12000/26), Cape Barren Wines(11400/16.5), **Gemtree Wines(90000/138.47)**, **Kangarilla Road Vineyard(65000/14),** Lavina Wines(15000/2.5), McLaren Vale III Associates(12000/34), Mitolo Wines(40000/NA), Mr Riggs Wine Company(20000/7.5), Nardone Baker Wines(70000/NA), S.C.Pannell Wines(15000/22), Rockbare | Mojo(13000/29), Serafino Wines(30000/100), Vinrock(13000/30), **Yangarra Estate Vineyard(15000/89.3)**, Zonte's Footstep(20000/214.72) **Mr. Riggs(20000/7.5)** **Kangarilla Road Vineyard(65000/14)**
	Pende Valde Hardys(NFP/NA) Rosemount Estate, Tinlins Tintara	**Mongrel Hill Vineyards** Aldinga Bay Winery(NA), Middlebrook Estate Tapestry Torresan Estate	**Alpha Box and Dice** **Hedonist Wines** **Spring Seed Wines - certified** **Davey Estate vineyard** **The Omensetter Vineyard** Blown Away(NA), Dandelion Vineyards(NFP/124.2), Hills View Vineyards(NA), The Wine Doctor Thorpe Wines
	Sustainable		
	Organic/certified ORG		
	Biodynamic		

B3 Classification of wineries in Clare Valley

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Less than 5000	Wendouree(2000/12)	Brian Barry Wines(1500/25.5), Clos Clare(700/2), Fireblock(3000/6), Inghams Skilly Ridge Wines(3000/25), Mintaro Wines(2500/10), **Mount Horrocks(2500/9.4)**, **Mt Surmon Wines(800/0.5)**, Olssens of Watervale(3000/31.6), Pearson Vineyards(700/2.2), Stringy Brae of Sevenhill(2200/5), Wilson Vineyard(3000/11.9)	**Adelina Wines(400/NA)**, Andrew Miller Wines(2500/90.55), Atlas Wines(3000/8), Eyre Creek(2500/2.9), Gaelic Cemetery Wines(1500/6.5), Good Catholic Girl Wines(460/1), Greg Cooley Wines(3000/NA), **Heaslip Wines(600/5)**, Jenner You(1000/5), Little Brampton Wines(400/10), Matchbox Wine Co.(1500/NA), Matriarch Rogue(800/NA), Neagles Rock Wines(3000/17), **Paul Morris(500/NA)**, Penna Lane Wines(4500/4.37), Rhythm Stick Wines(1060/1.62), Rise Vineyards(1500/NA), Pycnantha Hill Estate(800/2), Seraph's Crossing(450/5), Talbots Block Wines(800/5), **Sussex Squire Wines(900/6),** Steve Wiblin's Erin Eyes(2200/NA), Tim McNeil Wines(1500/2), **Wines by KT(1400/NA)**, Woodvale(3000/7), Wykari Wines(1200/20)
5000-10000		Cardinham Estate(5000/52.6), Clare Wine Co(5000/30.5), Crabtree Watervale Wines(6000/13.2), Eldredge(8000/20.9), Stephen John Wines(5000/5), Tim Gramp(6000/16)	**Koonowla Wines(5000/48.77)**, Last Word Wines(7000/110), Mercuri Estate(5000/NA), Rieslingfreak(5000/35), Shut the Gate Wines(5000/NA), Stone Bridge Wines(6000/29)

More than 10000	Sevenhill Cellars(25000/95.8)	**Grosset(11000/22.2)**, Jeanneret Wines(12000/6), Jim Barry Wines(80000/249), Knappstein(40000/114), **Mitchell(30000/75)-ORG**, **Paulett(15000/41.9)**, **Pikes(35000/73),** Reillys Wines(25000/115), Skillogalee(15000/50.3), **Taylors(250000/400)**, Tim Adams(60000/145)	Claymore Wines(15000/27), Kilikanoon(80000/330), Kirrihill Wines(30000/NA), Mr Mick(30000/NA), O'Leary Walker Wines(20000/35), Rockridge Estate(5000/40)
	Annie's Lane(NFP/NA), Leasingham(NFP/NA)		Inchiquin Wines(NA/NA), Mocandunda Wines(NA/NA), Robertson of Clare(NFP/NA)
	Sustainable		
	Organic/certified ORG		
	Biodynamic		

B4 Classification of wineries in Coonawarra

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Less than 5000		Banks Thargo Wines(2000/23.6), Bundalong Coonawarra(900/65), **Cricket Flat(300/34)**, **Highbank(2000/4),** Lawrence Victor Estate(1500/NA), Murdock(4500/24.7)	**Bellwether(2000/NA),** Flint's of Coonawarra(2000/84), Hundred of Comaum(4000/9.6), Jim Brand Wines(3000/9.5), **Ottelia(5000/9)**, **Patrick of Coonawarra(5000/79.5)**, Peter Douglas Wines(1500/NA), **Raidis Estate(4500/24.29)**, Terramore Wines(4000/38), The Blok Estate(2500/1), The Roy Kidman Wine Co(5000/55.9), Whistle Post(5000/63), Wood Block Wines(3500/34.45), Yalumba The Menzies (Coonawarra)(5000/29)
5000-10000		Balnaves of Coonawarra(9000/74.33), Hoggies Estate Wines(10000/27.5), Kidman Wines(6000/17.2), **Koonara(8000/9)**, Ladbroke Grove(6000/33),Punters Corner(7000/25.43)	Jack Estate(9000/221), The Poplars Wines(7000/4)
More than 10000		Bowen Estate(12000/33), Hollick(4000/87), **Katnook Coonawarra(90000/198)**, Leconfield(25000/43.7), Majella(25000/55), **Parker Coonawarra Estate(30000/20)**, Penley Estate(35000/111), Redman(18000/34), **Rymill Coonawarra(40000/144), Yalumba The Menzies (Coonawarra)(20000/61)**	DiGiorgio Family Wines(25000/253.53), Reschke Wines(25000/155), Watson Wine Group(100000/347)

	Wynns Coonawarra Estate(NFP/NA)	Brand's Laira Coonawarra(NFP/278), Ey Estate(NA), Jamiesons Run(NFP/NA), Lindeman's (Coonawarra)(NFP/NA)	
	Sustainable		
	Organic/certified ORG		
	Biodynamic		

B5 Classification of wineries in Eden Vale

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Less than 5000	Barossa Cottage Wines(NA), Poonawatta(1800/3.6)	Hartz Barn Wines (1600/11.5), Heathvale(600/10), Hutton Vale Farm(600/27), Peter Seppelt(500/9), Torzi Matthews Vintners(3000/10), Wroxton Wines(60/37.3)	**Blue Rock Wines (4000/15)**, Brockenchack(4000/16), **Eden Hall(2000/32.3)**, Eden Valley Wines(500/NA), **Edenmae Estate Wines (1800/12)**, **Fernfield Wines (1500/0.7)**, Flaxman Wines (1500/2), Forbes Forbes (400/5), GOODchild Wines (200/19.16), Haslemere Wines (1240/58.7), Karra Yerta Wines(400/1.92), Lonely Vineyard(400/1.5), Penrice Estate Wines(1000/4), **Radford Wines(2000/4.2)**, Rileys of Eden Valley(2000/12.37), Robert Johnson Vineyards(3000/3.8), Springton Hills Wines(2000/6.5), Stage Door Wine Co(2500/NA),Tin Shed Wines(3000/NA)
5000-10000		Gatt Wines (8000/53.35), Hill-Smith Estate(5000/12), Irvine(8000/80)	McLean's Farm(6000/5.3), Poverty Hill Wines(5000/29)
More than 10000	Henschke(30000/121.72), **Pewsey Vale(20000/65)**, **Yalumba(930000/180)**	**Heggies Vineyard(15000/62)**, Mountadam Vineyards(15000/80)	Sorby Adams Wines(15000/11.65)

B6 Classification of wineries in Langhorne creek

Size of Winery (Cases Produced)	When established		
	Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Less than 5000		Angas Plains Estate (3000/15.2), Bremer River Vineyards (400/25), John's Blend(2200/23), **Oddfellows Wines (2500/46.1)**	Ben potts (800), Cleggett Wines(1500/74.86), Killibinbin(3500/10) **Karanto Vineyards(1500/43.5)**, Kimbolton Wines (1500/55.4), Old Mill Estate Wines 2500/18.22), Raydon Estate (1200), Rusticana (1500/9.8), Wenzel Family Wines (460/53)
5000-10000			**Brothers in Arms (25000/85)**, Gipsie Jack Wine Co(7000), Shearer's Hill (7000/360)
More than 10000	Bleasdale Vineyards (100000/49)	**Bremerton Wines (30000/120)**, Lake Breeze Wines (20000/90), Step Rd Winery (40000/27.59), Temple Bruer (18000/56)	**Heartland Wines(50000/200)**
	Sustainable		
	Organic/certified ORG		

APPENDIX C DISTRIBUTION OF WINERIES IN WINE REGIONS

C1 Barossa Valley

Table C1a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	2 (66.66%)	14 (87.5%)	71 (86.6%)
	5000-10000	2 (100%)	6 (100%)	22 (95.7%)
	More than 10000	3 (100%)	17 (81%)	11 (68.8%)

Source: Khokhar 2017

Table C1b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	1 (33.33%)	2 (12.5%)	11 (13.4%)
	5000-10000	0 (0%)	0 (0%)	1 (4.3%)
	More than 10000	0 (0%)	4 (19%)	5 (31.2%)

Source: Khokhar 2017

C2 McLaren vale

Table C2a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Production	Less than 5000	1(100%)	16(94.1%)	53(82.8%)
	5000-10000	2(100%)	9(100%)	18(94.7%)
	More than 10000	3(60%)	22(81.5%)	13(76.5%)

Source: Khokhar 2017

Table C2b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Production	Less than 5000	0(0%)	1(5.9%)	11(17.2%)
	5000-10000	0(0%)	0(0%)	1(5.26%)
	More than 10000	2(40%)	5(18.5%)	4(23.5%)

Source: Khokhar 2017

C3 Clare valley

Table C3a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Production	Less than 5000	1(100%)	9(81.8%)	20(80%)
	5000-10000	0(0%)	6(100%)	5(82.3%)
	More than 10000	1(100%)	7(63.6%)	6(100%)

Source: Khokhar 2017

Table C3b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	1918-1997	Since 1997 (before 20 years)
Production	Less than 5000	0(0%)	2(18.2%)	5(20%)
	5000-10000	0(0%)	0(0%)	1(17.7%)
	More than 10000	0(0%)	4(36.4%)	0(0%)

Source: Khokhar 2017

C4 Coonawarra

Table C4a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	0(0%)	4(66.7%)	10(79.4%)
	5000-10000	0(0%)	5(82.3%)	2(100%)
	More than 10000	0(0%)	6(66.7%)	3(100%)

Source: Khokhar 2017

Table C4b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	0(0%)	2(33.3%)	4(28.6%)
	5000-10000	0(0%)	1(17.7%)	0(0%)
	More than 10000	0(0%)	3(33.3%)	0(0%)

Source: Khokhar 2017

C5 Eden Valley

Table C5a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	2(100%)	6(100%)	14(73.7%)
	5000-10000	0(0%)	3(100%)	2(100%)
	More than 10000	1(33.3%)	1(50%)	1(100%)

Source: Khokhar 2017

Table C5b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	0(0%)	0(0%)	5(26.3%)
	5000-10000	0(0%)	0(0%)	0(0%)
	More than 10000	2(66.7%)	1(50%)	0(0%)

Source: Khokhar 2017

C6 Langhorne creek

Table C6a: Conventional wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	0(0%)	3(75%)	8(88.9%)
	5000-10000	0(0%)	0(0%)	2(66.7%)
	More than 10000	1(100%)	2(50%)	0(0%)

Source: Khokhar 2017

Table C6b: Organic/biodynamic/sustainable wineries

Size of Winery (Cases Produced)		AGE		
		Before 1917 (100 years)	**1918-1997**	**Since 1997 (before 20 years)**
Production	**Less than 5000**	0(0%)	1(25%)	1(11.1%)
	5000-10000	0(0%)	0(0%)	1(33.3%)
	More than 10000	0(0%)	2(50%)	1(100%)

Source: Khokhar 2017

APPENDIX D SAMPLE OF WINERIES FOR SURVEY

D1 Barossa Valley

Table D1: Sample of Barossa Valley wineries

Organic – 28	Conventional/traditional - 32
	Neil Hahn Wines
1847 | Yaldara Wines	Schiller Vineyards
Ballycroft Vineyard Cellars	Chateau Tanunda
Elderton	Normans
Grocke Wines	Basedow Wines
Haan Wines	Gomersal Wines
Hamilton's Ewell Vineyards	Greenock Creek Wines
Hart of the Barossa	Magpie Estate
Head Wines	Possum Creek Vineyards
Henry Holmes Wines	LanzThomson Vineyard
Hentley Farm Wines	Heritage Wines
Hobbs of Barossa Ranges	Possum Creek Vineyards
Jacob's Creek	Barossa Valley Estate
Kaesler Wines	Charles Cimicky
Kalleske	Dorrien Estate
Lanz Vineyards	Grant Burge
Laughing Jack	Hemera Estate
Massena Vineyards	The Colonial Estate
Maverick Wines	David Franz
Murray Street Vineyards	Earthworks Wines
Orlando	The Willows Vineyard
Pindarie	Woods Crampton
Smallfry Wines	Cirillo Wines
Steinborner Family Vineyards	Dolan Family Wines
TeAro Estate	Black Spade Wines
Thorn-Clarke Wines	Moppa Wilton Vineyards
Torbreck Vintners	Kassebaum Wines
Tscharke	Kabminye Wines
Westlake Vineyards	Hobbs of Barossa Ranges
	Schubert Estate
	Red Art | Rojomoma
	Rohrlach Family Wines

D2 McLaren Vale

Table D2: Sample of McLaren Vale wineries

Organic – 30	Conventional/traditional – 46
Alpha Box and Dice	Horndalecc
Amicus	Kay Brothers Amery Vineyards
Angove Wines (OLD)	Olivers Taranga Vineyards
Battle of Bosworth Wines	Pirramimma
Brackenwood Wines	Tatachilla
Brash Higgins	Woodstock
Cascabel	Hastwell Lightfoot
Cradle of Hills	James Haselgrove Wines
d'Arenberg	Neighbours Vineyards
J ans J Wines	Ulithorne
La Curio	Di Fabio Estate
Paxton Wines	DogRidge Wine Company
Rusty Mutt	Potters Clay Vineyards
Mongrel Hill Vineyards	Walter Clappis Wine Co
Yangarra Estate Vineyard	Simon Hackett
Gemtree wines	Scarpantoni Estate
Spring Seed Wines co	Ingoldby
Me. Riggs	Andrew Garrett
Hedonist Wines	Zonte's Footstep
Noon wineries	Aramis Vineyards
Wirra Wirra	Mitolo Wines
Kangarilla Road Vineyard & Winery	Conte Estate Wines
Maximus	Doc Adams
Coriole	Hickinbotham Clarendon Vineyard
Grancari Estate Wines	Possums Vineyard
Chapel Hill	Willunga 100 Wines
HITHER & YON	Zonte's Footstep
Davey Estate vineyard	Nardone Baker Wines
The Omensetter Vineyard	Mitolo Wines
Inkwell	Bekkers
	Braydun Hill Vineyard
	Brini Estate Wines
	Zerella Wines
	Willunga Creek Wines
	The Old Faithful Estate
	Penny's Hill
	Saunders Springs Vineyard
	Samuel's Gorge
	Noogoora
	Geoff Merrill Wines
	Morgan Simpson
	Lost Buoy Wines
	McLaren Vale III Associates
	Cape Barren Wine
	Maxwell Wines
	Settlement Wines

D3 Clare Valley

Table D3: Sample of Clare Valley wineries

Organic – 13	Conventional/traditional - 13
Adelina Wines	Wendouree
Grosset	Brian Barry Wines
Heaslip Wines	Stringy Brae of Sevenhill
Koonowla Wines	Sevenhill Cellars
Mitchell	Crabtree Watervale Wines
Mount Horrocks	Jeanneret Wines
Mt Surmon Wines	Reillys Wines
Paul Morris	Matriarch Rogue
Paulett	Neagles Rock Wines
Pikes	Pycnantha Hill Estate
Sussex Squire Wines	Tim McNeil Wines
Taylors	Last Word Wines
Wines by KT	Mr Mick

D4 Coonawarra

Table D4: Sample of Coonawarra wineries

Organic – 12	Conventional/traditional - 12
Bellwether	Balnaves of Coonawarra
Cricket Flat	Punters Corner
Highbank	Jack Estate
Katnook Coonawarra	The Poplars Wines
Koonara	Bowen Estate
Ottelia	Redman
Patrick of Coonawarra	Murdock
Parker Coonawarra Estate	Jim Brand Wines
Raidis Estate	Peter Douglas Wines
Reschke Wines	The Roy Kidman Wine Co
Rymill Coonawarra	Yalumba The Menzies
Yalumba The Menzies	Reschke Wines

D5 Eden valley

Table D5: Sample of Eden Valley

Organic – 8	Conventional/traditional - 11
Blue Rock Wines	Poonawatta
Eden Hall	Henschke
Edenmae Estate Wines	Hutton Vale Farm
Fernfield Wines	Sorby Adams Wines
Heggies Vineyard	Torzi Matthews Vintners
Pewsey Vale	McLean's Farm
Radford Wines	Mountadam Vineyards
Yalumba	Rileys of Eden Valley
	Irvine
	Tin Shed Wines
	Brockenchack

D6 Langhorne creek

Table D6: Sample of Langhorne Creek wineries

Organic – 6	Conventional/traditional - 10
Bremerton Wines	Bleasdale Vineyards
Brothers in Arms	Bremer River Vineyards
Heartland Wines	Lake Breeze Wines
Karanto Vineyards	Step Rd Winery
Oddfellows Wines	Ben potts
Temple Bruer	Cleggett Wines
	Kimbolton Wines
	Gipsie Jack Wine Co
	Shearer's Hill
	Wenzel Family Wines

APPENDIX E QUESTIONNAIRE RESPONSES OF WINERIES

The drivers of biodynamic, organic and sustainable wine production in South Australia

1. 1. Have you adopted any of the following practises in your winery (please mark accordingly)? *

Number of participants: 20

7 (35.0%): I have not adopted

4 (20.0%): Organic

5 (25.0%): Certified Organic

3 (15.0%): Biodynamic

3 (15.0%): Certified Biodynamic

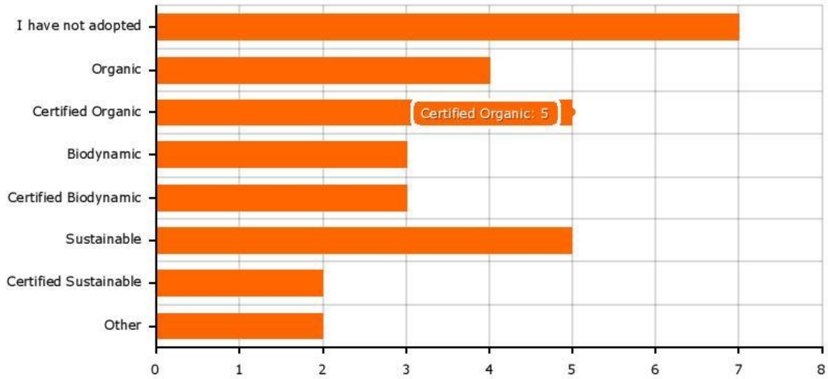
5 (25.0%): Sustainable

2 (10.0%): Certified Sustainable

2 (10.0%): Other

Answer(s) from the additional field:

- Biological Farming
- carbon neutrality



2. 2. If you have not adopted any of the above practices, please indicate why you have not chosen to be an organic, biodynamic or sustainable winery. When you have answered this question you will have completed the questionnaire. Please return by clicking DONE at the end of the questionnaire. Thank you for participating in this survey.

Number of participants: 9

- Don't agree with all of the principles
- Just to note; we have a winery and also a vineyard. Biodynamics/organics is usually more relevant to the vineyard side of things because it relates to the growing of the grapes where as the winery side is more about the processing.
- We choose to adopt best practice, which is usually a sustainable model using low chemical, traditional vineyard and winemaking practices. It is not in our business plan to use our practice as a marketing tool (ie organic, biodynamic, etc.) as for us this will usually exclude best practice at some point in time. Having said that we have a strong commitment to good environmental and sustainable management both in the the vineyard and our winemaking process.
- why would we. It's just a fad.
- Time has been the issue however I agree with it in principle.
- We practice Biological Farming on the principals for Garry Zimmer
- I have a severe allergic reaction to self serving dogma.
- time to convert over and as we purchase fruit from grape growers (we do not have our own vineyards) if the fruit is not certified organic, biodynamic there is no point to make the wine under those conditions as it can not be marketed as being that way
- We have not been able to establish an economic justification for the introduction of these programs. Wines that are produced organically, etc. are unable to command a price advantage in market and there is increased risk in wine quality/production as well as higher production costs.

3. **3. In which year did adopt the practices listed below?**

Number of participants: 13

	1. column
Organic	- 2002 - 2008 - 2005 - 2006
Certified Organic	- 1997 - 1993 - 2009 - 2011 - 2017 - 1995 - 2005
Biodynamic	- 2014 - using BD preparations since 1996 - 2005
Certified Biodynamic	- 2004 - 2011 - 2005
Sustainable	- 2002 - 2008 - around 2012 - 2006 - 2016 - 2000 - 2012
Certified Sustainable	- 1990
Other	- 2010 - carbon neutral 2011

4. **4. Why did your winery decide to adopt the practices listed in Question 1? Please explain for each of the practices you have adopted.**

Number of participants: 13

- The reason/ philosophy behind adopting for each is the same: it gives me healthier vines which in turn makes better wine and as we live amongst the estate vineyards gives me ha healthier environment for my family to live in.
- I thought my soil health was poor due to herbicides, and I also felt sick every time that I had been on the spray unit spraying synthetic chemicals. Then I also became enlightened to the idea that biodiversity in soil health and microbial populations can lead to a better wine quality outcome, better operator health (mine) and a sustainable future for the vineyard
- Certified Organic - better environmentally, health-wise and quality.
  Certified Biodynamic - better for soil and quality.
- Re BD: Before my husband took over his family winery he had worked with grapes from a BD vineyard and the fruit seemed superior to grapes from conventional vineyards.
  Re Sustainability: McLaren Vale Grape Wine & Tourism Association has been working towards a sustainability program for 10 years or more (its now called Sustainable Australia Winegrowing - SAW) and we wanted to become a part of that to support our region and help growers become more thoughtful farmers. SAW relates to your vineyard, it has not yet progressed to capture the winery practices but will hopefully be capable of that in the future.
- It was already certified organic when we purchased in 2009. However, it's a key reason we purchased. We felt the Barossa was under represented in this differentiating factor and that it was a growing market - ie faster than system growth. We also didn't want our children running around a vineyard just having been sprayed with pesticides, herbicides and systemic fungicides. Whilst the cost to produce is higher, we believed we could obtain a premium price to compensate for lower yields.
- Everything we do is to produce a better wine.
- After trialling straw mulches undervine in the 90's I realised we could manage weed control without using herbicides. I was already using an organic fungicide spray program successfully so we were audited in 2009 but withdrew in 2011 due to very wet conditions. We have since managed over 50% of our vineyards organically and the remainder mostly organic with the odd conventional fungicide, depending on the season.
  Soil health was a major concern, particularly with the dry grown vineyards that are quite old. The addition of compost undervine increased the organic matter in the soil significantly and a 3 year cycle of 30% of the vineyard was mulched with compost and straw. The biodynamic method of compost production using our vintage waste of stalks and skins proved to be very successful but we could not produce enough to cover 35ha. We bought in green waste organic compost to supplement the requirements. The addition of soil preparations during Spring also helped add microorganisms to the soil, part of which I produce myself (cow pit peat). The Antipodean Astrocalendar is a very useful tool for predicting weather patterns and times of moisture - particularly good for working out spray programmes, planting times, etc.
  When we pulled out of organic certification it was very disappointing not to be able to tell our customers and market what we were doing to look after our land. When the Sustainable Australia Winegrowing system came into being, it was a vehicle to explain the many facets of how we care for our land from soil and pest management to waste management to land conservation and revegetation. The SAW system contains far more recognition for the responsible caretaking of our land than the previous 2 certification programs.
- Biodynamic and organic are worthy practices but there is an exposure in certain years to crop loss and | compromised fruit quality due to disease. Our minimal input | sustainable viticulture allows us pursue a largely organic practice|s but with ability to use non organic practices if disease pressure will potentially compromise fruit quality. All of this said, we have managed our vineyards for many years without having to use non organic practices.
- To increase fruit quality and show the true varietal expression of the site.
- Simple philosophy of adopting the best practices of Normal, Biodyamic and Organic farming with an emphasis on the health and balance of the soil - without being based on fertility
- To increase profitability, decrease costs and improve quality.
  For every 1% humus I can put back into the soil it increases the water retention pre Ha by 170,000 litres in the soil. Also, if we can achieve 25 worms per shovel, it equates to 300 tonnes of worm castings per Ha. Worm castings contain 7x more Phosphorus, 10x more potassium, 5x more nitrogen, 3x more Magnesium and 1.5x more calcium than the surrounding soil (Source: Graham Strait, founder of Nutri-Tech). Plus compost 4xfaster than normal composting.

  Balancing the vineyard, increasing good fungis, and getting Ph in the plant at 6.4 means no disease pressure, so less to no sprays.
- 1. Organics - my wife and I were both Chemists, and this decision was made for alturistic reasons only , we did not want our customers ingesting synthetic chemicals.

  2. Carbon Neutral -We thought all businesses should be carbon neutral, and eventually will be forced to. We would rather jump than be pushed
- Sustainability has always been a focus as maintaining our vineyards for another 168 + years is the goal. By extension, where possible Organic and Biodynamic practices have been implemented. Sites are chosen based on the ability to be sustainable as well as Organic and Biodynamic.

5. **5. Which growers, producers and/or organic associations does your winery belong too? (List all).**

Number of participants: 14

- Barossa Wine growers Assn
  WFA
  Phylloxera Board
- BWGA
- BGWA
  SAW
  Eperosa
  Head Wines
  Ruggabellis
- Australian Certified Organic
  Barossa Grape and Wine Association
  Biodynamic Agriculture Australia
- SAW. BD Agriculture Association but we are not BD certified.
- ACO
- none
- We now belong to Australian Organic, Biodynamic Agriculture Australia and the SAW group
- None
- Australian Certified Organic (ACO)

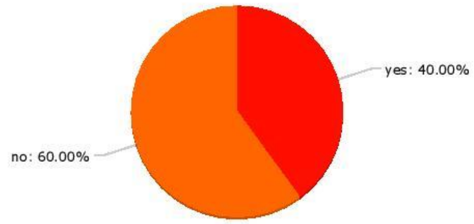
  Sustainable Winegrowing Australia. (SAW)
- Organics Australia
  Coonaawarra Vignerons
  Wine Australia
  SAWIA
- South Australian Wine industry Association
  Winemakers' Federation of Australia
  Barossa Grapegrowers and Winemakers Association
- SAWIA, Langhorne Creek grape and wine, NASAA, Canopy
- ACO, EntWine, NASAA, BFA

6. **6. Does the winery have certification from any of the above organisations? If YES, please proceed to Question 8. If NO, proceed to Question 7.**

Number of participants: 15

6 (40.0%): yes

9 (60.0%): no



7. **7. What are the reasons that your winery is not certified?**

Number of participants: 9

- Don't agree with principles
- Hate paperwork
  Don't do it to 'sell wine' to hipsters but for the reasons stated in #4
- It seems like another layer of complexity and another bunch of people to pay money to, for not actually changing anything physically at the vineyard.
  I do not intend to base my marketing on a certifying organisations reputation, but rather on what our actual practices are
- It's a lot of extra work to maintain certification however we may seek certification in the future.
- I dont see any value in it.
- With the variations in the seasons and Powdery Mildew pressure, and some hard-to-control weeds such as couch and prairie grass, we have not been able to go completely organic and therefore cannot become biodynamically certified.
- This is pretty much answered in Q4.
- There is none for our practice
- Refer answer to question 2

8. **8. Please list the organisations(s) that certify your winery.**

Number of participants: 8

- NA
- NA
- Australian Certified Organic
- ACO
- Australian Certified Organic (ACO)
- Organics Australia
- NASAA, Canopy
- ACO
  EPA
  NASAA
  BFA
  USDA

9. **9. What were the main reasons for obtaining certification?**

Number of participants: 9

- NA
- NA
- Proof of genuine commitment to organic/biodynamic practices.
- For sales/promotional purposes, at the moment we are not practicing Sustainability or BD for those reasons.
- You are either organic and independently audited as such to give consumers confidence, or you really can't make the claim - ie who's watching over to ensure you meet the standards.
- Validation and Integrity of the Organic and Biodynamic process
- to prove we have been organic.
- You can believe what I say (and here is the proof)
- To be audited by a third party to ensure that we are doing exactly what we say we do. Also important for overseas customers to ensure we meet international standards.

10. **10. What effort and resources, beyond fees, were involved in the total conversion and/or certification process? If you can estimate the approximate total cost (AUD) and time (years) of the conversion process, it would be helpful.**

Number of participants: 9

- NA
- NA
- 3 years conversion.
  ~$100,000 in specialised equipment.
- na
- Was already certified. However, it would add around $15,000 a year to be certified minimum plus the loss of yield is probably $40,000. Expensive.
- Purchasing of specialized under vine weed control equipment. Approx $50,000 in capital.

  Year 1 - Preconversion
  Year 2 - In Conversion
  Year 3 - In Conversion
  End of year 3 - Certified.
- 3 Years to convert, $1200 for Organics Australia, but other than that, it SAVES me money in the vineyard. We average $1500 an Acre management costs, including all labour and picking.
- The amount of time is huge , for Organic certification say 3 months, Carbon neutral certification also 3 months I don't know the total cost, but it would run to many thousands of $
- 3 year conversion process for a developed vineyard, 6 years to establish from start.

11. **11. Were you successful in attracting any government or other schemes, funds or subsidies to support the certification process? Yes/No ? If YES, please name the supporting scheme(s) or fund(s).**

Number of participants: 10

- NA
- No
- No
- na
- NO!
- No
  We had a BushBids grant of $6,000/year to remove weeds from 73ha of conservation land over 10 years.
- No.
- Yes - R&D Grant
  Export Grant
- No
- No

12. **12. What environmental, social and/or economic benefits has your winery gained through adopting this particular method of vineyard management and wine production?**

Number of participants: 13

- Healthy sustainable vineyards that produce magnificent grapes which in turn make awesome wine.
- We are able to sell our wines at a premium, which offsets the lower production yields you can expect when you grow quasi-organically
- Recognised for true environmental sustainability.
  Benefit in making better quality wine.
  Benefit in recognised as Barossa's and one of Australia's leading biodynamic/organic wine producers.
- We feel that our main benefit with SAW & BD is environmental. We have a long term view of farming and would like our regional farming practices to be even better in the future, SAW has the ability to be adapted to other regions and farming practices.
- Has lead to sales, but probably not to the extent or premium to justify vs conventional. We get lots of people looking us up when touring the Barossa due to certification and appears to be growing.
- We believe we are producing better wines each year.
- Our soil health has increased significantly - up to 3.2% Organic Matter, better nutrition as evidenced from petiole analyses, better soil moisture holding capacity (an extension of 4-6 weeks soil moisture going into summer with straw mulch), less stress and better fruit quality. This translates into better wine and better retail prices.
  We have planted local native species in the vineyard rows (native grasses) and on the headlands (Bursaria spinosa) to attract beneficial insects, and have been regenerating over 40ha of bushland within the vineyard boundaries.
- I think that sustainable viticulture | agriculture is better understood now than in the past. We do make a point of promoting ourselves as using sustainable viticulture practices and I think there are benefits from this.
- Beneficial environmentally as we are minimizing the amount of synthetic petrochemicals being applied.
  Greater biodiversity throughout our vineyard and surrounds.
- better balanced soil without being over fertile allowing us to continue to make full bodied wines. Please note that overly fertile vines will never give you concentracte fruit
- We only spray 4 times a year, and we hope to get this down to 3 x a year through better use of fertigation and removal of Copper Sulphate sprays. Plus no dangerous chemichals sprayed near my house, no pesticide sprays (Not even organic ones), and a healthier crop.
- Our workers very much like working here. Economic benefits are huge, particularly marketing advantage.
- International recognition as a market leader in the field.

13. **13. What benefits has your winery gained from certification processes related to organic, biodynamic and/or sustainable status?**

Number of participants: 11

- NA
- NA
- Customers know that we are genuine/authentic by being certified and can totally trust our product.
- na
- Per above.
- Although we are no longer certified, we are often held up as a positive example in the wine industry and we have won a couple of awards in recognition of our environmental management.
- Little financial benefit as being certified does not necessarily attract higher prices for either grapes or finished wine.
- more balance vine - lower PH and higher retained acid
- kudos, increase trust in the brand.
- We can sell all the wine we make, at a fair price
- International recognition as a market leader in the field and improved sales.

14. **14. Has your winery experienced any negative environmental, social and/or economic impacts because of the adoption of organic, biodynamic or sustainable vineyard management and wine production?**

Number of participants: 11

- Nope
- No
- No.
- At first people regarded BD as not being credible, some still do. There have been no negative environmental impacts so far.
- There is sometimes a perception by older male drinkers that organic must be "inferior" to "conventional" and others believe the wine won't age (they confuse natural/sulphur free with organic).
- No
- No
- some areas of overly fertile vines
- None. That said, consumers are more open to us saying "No Chemicals or Pesticides" than "organic".
- no
- No.

15. **15. Has your winery experienced any negative impacts related to any certification processes related to organic, biodynamic or sustainable status? If YES, please explain below.**

Number of participants: 9

- NA
- NA
- No.
- na
- Per above.
- No, just a heavier load of data entry
- No
- No
- No.

16. **16. Did you incorporate the adoption of organic, biodynamic or sustainable practices into a business plan for the winery? If so, at what stage?**

Number of participants: 11

- No
- Yes. It is core to our vineyard philosophy and it underpins our marketing story
- Yes, from day 1.
- No, we were confident that we were going to follow BD principles in the vineyard before taking over the winery and our participation in SAW just evolved in because we knew that it was a responsible thing to be involved in.
- No, was already organic so we built our business plan from this - ie prior to purchase, our grapes went to conventional wineries and mixed in with non organic. When we purchased the vineyard we put it all into our own branded wine.
- No, it has been seamlessly integrated as management techniques changed, new machinery was acquired and vineyard managers became more computer-literate
- No
- No
- yes - important in our economic management
- yes, early
- Yes right at the beginning of the process to establish our protocols for sustainable vineyards.

17. **17. If you are a certified producer, how does the presence of non-certified wineries in your wine-growing region affect your winery?**

Number of participants: 10

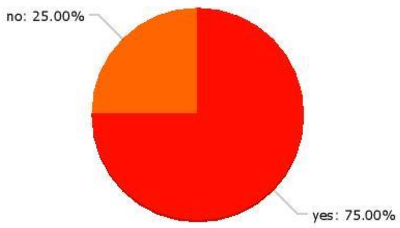
- NA
- NA
- Neighbours are aware and respect our practices and only spray, etc when appropriate.
  We have certain buffer areas between our vineyard and neighbours as required.
- na. However if we were certified and many others weren't we would be pleased that more farmers in our region were practicing BD/organics/sustainability for the future of our environment. Hopefully the non certified producers would make it clear that they were practicing but not certified.
- Creates questions from consumers about how we keep inputs out from our vineyard when we have neighbours who grow with chemicals. Other than that, the fact there are very few certified organic wineries helps us - we have a point of difference.
- Spray drift particularly from broadacre cropping is a huge problem for us and we just hope that residues don't occur in our wines.
- Very little affect on our operation due to being a single estate vineyard.
- not at all, but I would love more to be organic, so happy to share all info about it.
- we ignore them
- No problems as we produce both certified and non certified wines.

18. **18. If you are an organic, biodynamic or sustainable winery, would you be willing to partake in a phone interview with me as a follow up to gain more details on the practices you have adopted? The interview would not take more than 30 minutes and would be scheduled at a time that is convenient to you.**
If your answer is YES, can you please complete Question 19. There is no need to answer Question 19 if your answer is NO.

Number of participants: 12

9 (75.0%): yes

3 (25.0%): no



19. **19. Please provide contact details (Name of your winery and phone or e-mail) below so that I can schedule a phone interview.**

Number of participants: 11

- david Franz
  0419807468
  davelehmann@david-franz.com
  Please email or text to arrange a time to chat.
- Max & Me
  phil@maxandme.com.au
- Troy Kalleske
  Kalleske Wines
  0409 339 599
- Raegan Noon, Noon Winery McLaren Vale. ph 8323 8290
- Michael Hart
  Hart of the Barossa
  0408 200 803
- Henschke Cellars
  85 648 223
  prue@henschke.com.au
- John Innes
  Ottelia (J & M Innes P/L)
  0409 836 289
- Michael Lane
  Yangarra Esate Vineyard
  michael.lane@yangarra.com
- rolf binder 08 85623300
- Dru Reschke
  Koonara Wines
  0408101177
- David Bruer, Temple Bruer Wines PL, 0412 246 178 email enquiries@templebruer.com.au

APPENDIX F NASAA ORGANIC & BIODYNAMIC STANDARD

Document of NASAA is provided along with this thesis.

REFERENCE LIST

Australian Bureau of Statistics (ABS) 2012-13, *Australian wine and grape industry, 2012-13,* cat no*. 1329.0,* Australian Bureau of Statistics, Canberra.

Australian Bureau of Statistics (ABS) 2014-15, *Vineyards,Australia, 2014-15,* cat no*. 1329.0.55.002,* Australian Bureau of Statistics, Canberra.

AgEconPlus &Gillespie Economics 2015, *Economic Contribution of the Australian Wine Sector*, report 18 December 2015, Australian Grape and Wine Authority, viewed December 2016 Available: <https://www.wineaustralia.com/en/~/media/0000Industry%20Site/Documents/News%20and%20Media/News/Media%2>.

Ajzen, I & Fishbein, M 1977, 'Attitude-behavior relations: a theoretical analysis and review of empirical research', *Psychological Bulletin,* vol. 84**,** 888.

Anderson, K 2004, *The world's wine markets: Globalization at work*, Edward Elgar Publishing, Cheltenham, U.K.

Atkin, T, Gilinsky Jr, A & Newton, SK 2012, 'Environmental strategy: does it lead to competitive advantage in the US wine industry?', *International Journal of Wine Business Research,* vol. 24**,** pp. 115-133.

Wine Australia (2007) Directions to 2025: An Industry Strategy for Sustainable Success (Adelaide: Wine Australia)

Banks, G & Overton, J 2010, 'Old world, new world, third world? Reconceptualising the worlds of wine', *Journal of Wine Research,* vol. 21**,** pp. 57-75.

Barrett, HR, Browne, A, Harris, P & Cadoret, K 2001, 'Smallholder farmers and organic certification: accessing the EU market from the developing world', *Biological Agriculture & Horticulture,* vol. 19**,** pp. 183-199.

Berghoef, N & Dodds, R 2011, 'Potential for sustainability eco-labeling in Ontario's wine industry', *International Journal of Wine Business Research,* vol. 23**,** pp. 298-317.

Bianchi, C 2015, 'Consumer brand loyalty in the Chilean wine industry,' *Journal of Food Products Marketing,* vol. 21**,** pp. 442-460.

Blackman, A & Naranjo, MA 2012, 'Does eco-certification have environmental benefits? Organic coffee in Costa Rica', *Ecological Economics,* vol. 83**,** pp. 58-66.

Boncinelli, F, Bartolini, F, Casini, L & Brunori, G 2017a, 'On farm non-agricultural activities: geographical determinants of diversification and intensification strategy', *Letters in Spatial and Resource Sciences,* vol. 10**,** pp. 17-29.

Boncinelli, F, Riccioli, F & Casini, L 2017, 'Spatial structure of organic viticulture: evidence from Chianti (Italy)', *New Medit: Mediterranean Journal Of Economics, Agriculture And Environment= Revue Méditerranéenne D'economie, Agriculture Et Environment,* vol. 16**,** pp. 55-63.

Burton, M, Rigby, D & Young, T 1999, 'Analysis of the determinants of adoption of organic horticultural techniques in the UK', *Journal of Agricultural Economics,* vol. 50**,** pp. 47-63.

Buttel, FH & Gillespie, GW 1988, ‘Preferences for crop production practices among conventional and alternative farmers’, *American Journal of Alternative Agriculture,* vol. 3**,** pp. 11-17.

Christ, KL & Burritt, RL 2013, ‘Critical environmental concerns in wine production: an integrative review’, *Journal of Cleaner Production,* vol. 53**,** pp. 232-242.

Clark, V 2013, ‘Is green wine just a red herring?: wine’. *South African Food Review,* vol. 40**,** pp. 29-30.

Coll, P, Le Cadre, E, Blanchart, E, Hinsinger, P & Villenave, C 2011, ‘Organic viticulture and soil quality: a long-term study in Southern France’, *Applied Soil Ecology,* vol. 50**,** pp. 37-44.

Connor, D 2008, ‘Organic agriculture cannot feed the world’, *Field Crops Research,* vol. 106**,** pp. 187-190.

Conto, SMD, Júnior, A, Valle, JA & Vaccaro, GLR 2016, ‘Innovation as a competitive advantage issue: a cooperative study on an organic juice and wine producer’, *Gestão & Produção,* vol. 23**,** pp. 397-407.

Cooper, D & Schindler, P 2003, *Business research methods*, 8th edn, McGrawHill: New York.

Cordano, M, Marshall, RS & Silverman, M 2010, ‘How do small and medium enterprises go “green”? A study of environmental management programs in the US wine industry’, *Journal of Business Ethics,* vol. 92**,** pp. 463-478.

Cranfield, J, Henson, S & Holliday, J 2010, ‘The motives, benefits, and problems of conversion to organic production’, *Agriculture and Human Values,* vol. 27**,** pp. 291-306.

Delmas, M.A., Grant, L.E., 2008. Eco-labeling Strategies: the Eco-premium Puzzle in the Wine Industry. Working Paper No. 13. AAWE-American Association of Wine Economists. Available at: http://www.wine-economics.org/workingpapers/ AAWE_WP13.pdf (accessed 12 December 2016)

Delmas, MA & Grant, LE 2014, ‘Eco-labeling strategies and price-premium: the wine industry puzzle’, *Business & Society,* vol. 53**,** pp. 6-44.

Delmas, MA, Gergaud, O & Lim, J 2016, ‘Does organic wine taste better? An analysis of experts' ratings’, *Journal of Wine Economics,* vol. 11**,** pp. 329-354.

Department of Agriculture and Water Resources 2017, *Agriculture, Farming and Food,* viewed 18 September 2017, <http://www.agriculture.gov.au/>

Department of Foreign Affairs and Trade 2017, *Registration of Geographical Indications in Australia,* viewed 5 March 2017, <http://dfat.gov.au/pages/default.aspx>.

Diver, S. (1999). Biodynamics farming & compost preparation. ATTRA (Appropriate Technology Transfer for Rural Areas) Publication #IP137.

Dodds, R, Graci, S, Ko, S & Walker, L 2013, ‘What drives environmental sustainability in the New Zealand wine industry? An examination of driving factors and practices’, *International Journal of Wine Business Research,* vol. 25**,** pp. 164-184.

Duarte Alonso, A 2010, ‘How “green” are small wineries? Western Australia's case’, *British Food Journal,* vol. 112**,** pp. 155-170.

Duram, L. 2006, ‘‘Organic farmers: opportunities, realities and barriers’’, Technology, and Research Symposium, Washington, DC, October 2-7, 2005.

AgEconPlus & Gillespie Economics, 2015, *Economic Contribution of the Australian Wine Sector,* Australian Grape and Wine Authority, Australia.

Eyhorn, F, Heeb, M & Weidmann, G 2003, IFOAM training manual for organic agriculture in the tropics. *Bonn, Germany: International Federation of Organic Agriculture Movements (IFOAM)*.

Fairweather, J. R. and H. Campbell (1996). “The decision making of organic and conventional agricultural producers.” Research Report No. 233. Agribusiness and Economics Research Unit, Lincoln University, Canterbury, New Zealand

Fisher, P 1989, *Barriers to the adoption of organic farming in Canterbury,* Lincoln College, University of Canterbury, New Zealand.

Flint, DJ & Golicic, SL 2009, ‘Searching for competitive advantage through sustainability: a qualitative study in the New Zealand wine industry’, *International Journal of Physical Distribution & Logistics Management,* vol. 39**,** pp. 841-860.

Forbes, SL, Cohen, DA, Cullen, R, Wratten, SD & Fountain, J 2009, ‘Consumer attitudes regarding environmentally sustainable wine: an exploratory study of the New Zealand marketplace’, *Journal of Cleaner Production,* vol. 17, pp. 1195-1199.

Francis, C & Youngberg, G 1990, Sustainable agriculture-an overview. Wiley & Sons, Inc., New York, NY.

Gabzdylova, B, Raffensperger, JF & Castka, P 2009, ‘Sustainability in the New Zealand wine industry: drivers, stakeholders and practices’, *Journal of Cleaner Production,* vol. 17**,** pp. 992-998.

Getz, C, Brown, S & Shreck, A 2008, ‘Class politics and agricultural exceptionalism in California's organic agriculture movement’, *Politics & Society,* vol. 36**,** pp. 478-507.

Gilinsky Jr, A, Newton, SK, Atkin, TS, Santini, C, Cavicchi, A, Casas, AR & Huertas, R 2015, ‘Perceived efficacy of sustainability strategies in the US, Italian, and Spanish wine industries: a comparative study’, *International Journal of Wine Business Research,* vol. 27**,** pp. 164-181.

Golino, D & Ross, K 2008, ‘Wine grapes go green: the sustainable viticulture story’, *California Agriculture,* vol. 62**,** pp. 125-126.

Halliday, J. (2006) Australia & New Zealand Wine Companion.(Harper Collins Publishers: Pymble, NSW)

Halliday, J 2016, *Wine Atlas of Australia*, University of California Press, Oakland, California

Hansen, A 2007. The Ecotourism Industry and the Sustainable Tourism EcoCertification Program (STEP), University of California, San Diego.

Hill, H & Lynchehaun, F 2002, ‘Organic milk: attitudes and consumption patterns’, *British Food Journal,* vol. 104**,** pp. 526-542.

Hill, SB & Macrae, RJ 1992, ‘Organic farming in Canada’, *Agriculture, Ecosystems & Environment,* vol. 39**,** pp. 71-84.

Hoffmann, A 2009, *The Barossa Grower Guide.* Accessed on 5 August 2016 <*http://www.barossa.com/uploads/214/barossagrowersguide.pdf*>

Hughey, KF, Tait, SV & O'Connell, MJ 2005,' Qualitative evaluation of three "environmental management systems" in the New Zealand wine industry, *Journal of Cleaner Production,* vol. 13**,** pp. 1175-1187.

Hutchins, RK & Greenhalgh, L 1997, 'Organic confusion: sustaining competitive advantage', *British Food Journal,* vol. 99**,** pp. 336-338.

Iland, P, Gago, P & Humphrys, R 2002, *Australian wine: styles and tastes*, Patrick Iland Wine Promotions Adelaide, Australia.

Janssen, M & Hamm, U 2012, 'Product labelling in the market for organic food: consumer preferences and willingness-to-pay for different organic certification logos', *Food quality and preference,* vol. 25, pp. 9-22.

Kallas, Z, Serra, T &Gil, J 2009, 'Farmers' objective as determinant factor of organic farming adoption. Paper presented at the 13th EAAE seminar', A resilient European food industry and food chain in a challenging world, Chania, Crete, Greece.

Klohr, B, Fleuchaus, R & Theuvsen, L 2013, 'Sustainability: Implementation programs and communication in the leading wine producing countries', *Proceedings of the 7th International Conference of the Academy of Wine Business Research (AWBR)*, 12-15 June, St. Catharines, ON, Canada, 2013, pp.3-4 .

Kristiansen, P & Merfield, C 2006, 'Overview of organic agriculture', *Organic Agriculture: A Global Perspective*. (Eds P Kristiansen, A Taji, J Reganold) p. 449. CSIRO Publishing: Collingwood Victoria, Australia.

Läpple, D 2010, 'Adoption and abandonment of organic farming: an empirical investigation of the Irish drystock sector', *Journal of Agricultural Economics,* vol. 61**,** pp. 697-714.

Laureati, M & Pagliarini, E 2016, 'Sustainability and Organic Wine Production', in MV Moreno-Arribas & B Bartolomé Suáldea (eds) *Wine Safety, Consumer Preference, and Human Health,* Cham: Springer International Publishing, pp. 183-199.

Leifeld, J 2012, 'How sustainable is organic farming?' *Agriculture, Ecosystems & Environment,* vol. 150**,** pp. 121-122.

Ling, B-H & Lockshin, L 2003, 'Components of wine prices for Australian wine: how winery reputation, wine quality, region, vintage, and winery size contribute to the price of varietal wines', *Australasian Marketing Journal,* vol. 11**,** pp. 19-32.

Lockshin, L 2013, 'Future opportunities and challenges for the South Australian wine industry: an interview with John Angove', *Wine Economics and Policy,* vol. 2, pp. 50-54.

Lockshin, L, Cohen, E & Goodman, S 2008, 'Overcoming measurement errors: segmenting wine consumers across 11 countries', *Wine Industry Journal,* vol. 24**,** pp. 46-51.

Lohr, L 1998, 'Implications of organic certification for market structure and trade', *American Journal of Agricultural Economics,* vol. 80**,** pp. 1125-1129.

Lundqvist, P, 2000, 'Ergonomics in organic farming'. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 2000. Sage CA: Los Angeles, CA, pp. 655-657.

Madge, D 2005, *Best practices for organic wine grape production*. Grape Wine Research and Development Corporation, Canberra.

Mann, S, Ferjani, A & Reissig, L 2012, 'What matters to consumers of organic wine?', *British Food Journal,* vol. 114**,** pp. 272-284.

Mariani, A & Vastola, A 2015, 'Sustainable winegrowing: current perspectives', *International Journal of Wine Research,* vol. 7**,** pp. 37-48.

Marinari, S, Mancinelli, R, Campiglia, E & Grego, S 2006, 'Chemical and biological indicators of soil quality in organic and conventional farming systems in Central Italy', *Ecological Indicators,* vol. 6**,** pp. 701-711.

Marshall, RS, Akoorie, ME, Hamann, R & Sinha, P 2010, 'Environmental practices in the wine industry: an empirical application of the theory of reasoned action and stakeholder theory in the United States and New Zealand', *Journal of World Business,* vol. 45, pp. 405-414.

Marshall, RS, Cordano, M & Silverman, M 2005, 'Exploring individual and institutional drivers of proactive environmentalism in the US wine industry', *Business Strategy and the Environment,* vol. 14**,** pp. 92-109.

Mason, J 2003, *Sustainable agriculture*, Landlinks Press, Victoria.

McIntyre, B, Herren, H, Wakhungu, J & Watson, R 2009, International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), Global Report, Washington.

McMillan, R 2012, *State of the Wine Industry 2012-2013,* Silicon Valley Wine Report 2017, Silicon Valley Bank,viewed 20 March 2017, <https://www.svb.com/wine-report/>

Merfield, CN 2002. *Organic weed management: a practical guide*, Lincoln University, Canterbury, New Zealand.

Novaes Zilber, S, Friel, D & Machado do Nascimento, LF 2010, 'Organic wine production: the case of Bodega Colomé in Argentina', *International Journal of Wine Business Research,* vol. 22**,** pp. 164-177.

Orth, UR, Lockshin, L & d'Hauteville, F 2007, 'The global wine business as a research field', *International Journal of Wine Business Research,* vol. 19**,** pp. 5-13.

Padel, S 2001, 'Conversion to organic farming: a typical example of the diffusion of an innovation?' *Sociologia ruralis,* vol. 41**,** pp. 40-61.

Padel, SA, Jasinska A, Rippin M & Schaack, D 2008, 'The European market for organic food in 2006', *In The world of organic agriculture—Statistics and emerging trends 2008*, eds., H. Willer, M. Yussefi-Menzler, and N. Sorensen, 131-39. London: Earthscan.

Paull, J 2011, Attending the First Organic Agriculture Course: Rudolf Steiner's Agriculture Course at Koberwitz, 1924', *European Journal of Social Sciences*, vol. 21, no. 1, pp. 64-70.

Penfold, C, Johnston, L, Marschner, P, Bastian, S & Collins, C 2015a, 'The relative sustainability of organic, biodynamic and conventional viticulture: Part 1: Soil health', *Australian and New Zealand Grapegrower and Winemaker***,** vol. 616, pp.40-45 .

Penfold, C, Johnston, L, Marschner, P, Bastian, S & Collins, C 2015b, 'The relative sustainability of organic, biodynamic and conventional viticulture: Part 2: Vine health and grape yields. *Australian and New Zealand Grapegrower and Winemaker***,** vol. 617, pp.58-64

Pimentel, D, Berardi, G & Fast, S 1983, 'Energy efficiency of farming systems: organic and conventional agriculture', *Agriculture, Ecosystems & Environment,* vol. 9**,** pp. 359-372.

Pimentel, D, Hepperly, P, Hanson, J, Douds, D & Seidel, R 2005, 'Environmental, energetic, and economic comparisons of organic and conventional farming systems', *BioScience,* vol. 55**,** pp. 573-582.

Poitras, L & Donald, G 2006, 'Sustainable wine tourism: yhe host community perspective', *Journal of Sustainable Tourism,* vol. 14**,** pp. 425-448.

Pomarici, E & Vecchio, R 2014, 'Millennial generation attitudes to sustainable wine: an exploratory study on Italian consumers', *Journal of Cleaner Production,* vol. 66**,** pp. 537-545.

Pomarici, E, Amato, M & Vecchio, R 2016, 'Environmental friendly wines: a consumer segmentation study', *Agriculture and Agricultural Science Procedia,* vol. 8**,** pp. 534-541.

Pomarici, E, Vecchio, R & Mariani, A 2015, 'Wineries' perception of sustainability costs and benefits: an exploratory study in California', *Sustainability,* vol. 7**,** pp. 16164-16174.

Ponzio, C, Gangatharan, R & Neri, D 2013, 'Organic and biodynamic agriculture: a review in relation to sustainability', *International Journal of Plant & Soil Science,* vol. 2**,** pp. 95-110.

Provost, C & Pedneault, K 2016, 'The organic vineyard as a balanced ecosystem: Improved organic grape management and impacts on wine quality', *Scientia Horticulturae,* vol. 208**,** pp. 43-56.

Pullman, ME, Maloni, MJ & Dillard, J 2010, 'Sustainability practices in food supply chains: how is wine different?' *Journal of Wine Research,* vol. 21**,** pp. 35-56.

Reeve, JR, Carpenter-Boggs, L, Reganold, JP, York, AL, Mcgourty, G & Mccloskey, LP 2005, 'Soil and winegrape quality in biodynamically and organically managed vineyards', *American Journal Of Enology And Viticulture,* vol. 56**,** pp. 367-376.

Renard, M-C 2005, 'Quality certification, regulation and power in fair trade', *Journal of Rural Studies,* vol. 21**,** pp. 419-431.

Rigby, D & Cáceres, D. 2001. Organic farming and the sustainability of agricultural systems. *Agricultural systems,* 68**,** 21-40.

Rigby, D, Young, T & Burton, M 2001, 'The development of and prospects for organic farming in the UK', *Food Policy,* vol. 26**,** pp. 599-613.

Rocchi, B & Stefani, G 2006, 'Consumers' perception of wine packaging: a case study', *International Journal of Wine Marketing,* vol. 18**,** pp. 33-44.

Santiago-Brown, I 2014, '*Sustainability assessment in wine grape growing',*PhD thesis, the University of Adelaide, Adelaide.

Santini, C, Cavicchi, A & Casini, L 2013, 'Sustainability in the wine industry: key questions and research trends', *Agricultural and Food Economics,* vol. 1**,** pp. 9.

Saunders, C, Allison, G & Wreford, A 2004, ‘Food market and trade risks’, *Background report prepared for the Parliamentary Commissioner for the Environment,* Wellington, New Zealand.

Schaltegger, S & Burritt, R 2000, *Contemporary environmental accounting: issues, concepts and practice*, Greenleaf Publishing, Sheffield, UK

Schimmenti, E, Migliore, G, Di Franco, CP & Borsellino, V 2016, ‘Is there sustainable entrepreneurship in the wine industry? Exploring Sicilian wineries participating in the SOStain program’, *Wine Economics and Policy,* vol. 5**,** pp. 14-23.

Scott, J 2007, ‘The impact of ethical consumers for Australian wine’, *Australian and New Zealand Wine Industry Journal,* vol. 22**,** pp. 40-44.

Scully, C.M. (1993), Report to Wattie Frozen Foods: Attitudes to, and Awareness of, Organic Farming. AERU Confidential Report, Lincoln Unviersity, New Zealand.

Shreck, A, Getz, C & Feenstra, G 2006, ‘Social sustainability, farm labor, and organic agriculture: findings from an exploratory analysis’, *Agriculture and Human Values,* vol. 23**,** pp. 439-449.

Siepmann, L 2016, Winegrowers’ motives and barriers to convert to organic farming in Pfalz and Rheinhessen, Germany (Masters Thesis), Uppsala University, Uppsala, Sweden.

Silverman, M, Marshall, RS & Cordano, M 2005, ‘The greening of the California wine industry: implications for regulators and industry associations’, *Journal of Wine Research,* vol.16**,** pp. 151-169.

Skuras, D & Vakrou, A 2002, ‘Consumers’ willingness to pay for origin labelled wine: a Greek case study’, *British Food Journal,* vol. 104**,** pp. 898-912.

Smithers, R 2010, ‘New Zealand wine first in world to come with carbon footprint label’, *The Guardian,* viewed 3 November 2016 <http://www.guardian.co.uk/environment/2010/nov/02/new-zealand-wine-carbon-footprint>.

Sogari, G, Mora, C & Menozzi, D 2016, ‘Factors driving sustainable choice: the case of wine’, *British Food Journal,* vol. 118**,** pp. 632-646.

Szolnoki, G 2013, ‘A cross-national comparison of sustainability in the wine industry’, *Journal of Cleaner Production,* vol. 53**,** pp. 243-251.

Thomas, A 2000, ‘Elements influencing wine purchasing: a New Zealand view’, *International Journal of Wine Marketing,* vol. 12**,** pp. 47-62.

Tobolková, B, Polovka, M, Belajová, E, Koreňovská, M & Suhaj, M 2014, ‘Possibilities of organic and conventional wines differentiation on the basis of multivariate analysis of their characteristics’ (EPR, UV–Vis, HPLC and AAS study), *European Food Research and Technology,* vol. 239**,** pp. 441-451.

Tolley, JH 2005, ‘Gustav got the winery and Sophie got the soup tureen’: the contribution of women to the Barossa Valley Wine industry, 1836–2003’, *History Australia,* vol. 2**,** no. 86, pp.81-88.

Tolley, S 2005, ‘Regionality issue crops up again’, *Australian and New Zealand Wine Industry Journal,* vol. 20**,** no. 2, pp 44.

Trioli, G & Hofmann, U 2009, ‘Code of good organic viticulture and wine-making’, *ECOVIN-Federal Association of Organic Wine-Producer*, Worm-serstrasse, 162, p.55276.

Turinek, M, Grobelnik-Mlakar, S, Bavec, M & Bavec, F 2009, ‘Biodynamic agriculture research progress and priorities’, *Renewable Agriculture And Food Systems,* vol. 24**,** pp. 146-154.

Van Ittersum, K, Meulenberg, MT, Van Trijp, H & Candel, MJ 2007, ‘Consumers’ appreciation of regional certification labels: a Pan-European study’, *Journal of Agricultural Economics,* vol. 58**,** pp. 1-23.

Waldrop, M & Mccluskey, J 2016, Impact of organic, sustainable, and biodynamic wine makingwinemaking practices on wine prices, 2016 Annual Meeting, July 31-August 2, 2016, Boston, Massachusetts, 2016. Agricultural and Applied Economics Association.

Warner, KD 2007, ‘The quality of sustainability: agroecological partnerships and the geographic branding of California winegrapes’, *Journal of Rural Studies,* vol. 23**,** pp. 142-155.

Wheeler, S.A., and Crisp, P., 2009. ‘Evaluating a range of the benefits and costs of organic and conventional production in a Clare Valley Vineyard in South Australia’. Available: www.adelaide.edu.au/cies/research/wine/pubs/Wheeler_WCO210.pdf

Willer, H & Lernoud, J 2016, *The world of organic agriculture. Statistics and emerging trends 2016*, Research Institute of Organic Agriculture (FiBL) Frick and IFOAM - Organics International, Bonn.

Wine Australia 2016, Australian Government, Australian Grape and Wine Authority, viewed on 2 July 2016, <https://www.wineaustralia.com>

Wine Institute, 2010. *World wine production by country,* viewed November 2016, <https://www.wineinstitute.org/files/2010_World_Wine_Production_by_Country.pdf>.

Yiridoe, EK, Bonti-Ankomah, S & Martin, RC 2005, ‘Comparison of consumer perceptions and preference toward organic versus conventionally produced foods: a review and update of the literature’, *Renewable Agriculture and Food Systems,* vol. 20**,** pp. 193-205.

Zucca, G, Smith, DE & Mitry, DJ 2009, ‘Sustainable viticulture and winery practices in California: what is it, and do customers care’, *International Journal of Wine Research,* vol. 2**,** pp. 189-194.

National Association for Sustainable Agriculture Australia Limited

NASAA ORGANIC & BIODYNAMIC STANDARD

Printed December 2004, amended 6 February, 2012, amended February 2016

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FOREWORD

It is now some 29 years since the founding members of NASAA set out a framework for producers of organic foods. The work done by that small group resulted in organic products becoming more widely accepted on the domestic and overseas markets. Importantly, that early acceptance of products was only made possible because standards were in place to substantiate the organic claims.

In more recent years a number of governments and economic blocs around the world have introduced rules for products bearing "organic" descriptors. Yet defining organics is an issue that remains contentious both in a legal sense and in potential risks to the long-term credibility of the Australian industry.

Throughout this time, the organic industry has remained steadfast in its aim to provide comprehensive and practical standards for those working within sustainable agroecosystems. This commitment has resulted in world-wide recognition of Australian organic products. It has also resulted in recognition of the wealth of expertise in the design and management of organic systems within organisations such as NASAA.

The organic industry has been a pacesetter in many areas that are at the forefront of food standards and food control. The industry established the first whole-of-production standards for food, fibre and essential oils including harvesting, storage, handling, processing and marketing. All stages were pegged to verification and regular inspection in order to provide consumer protection. Significantly, identification of the certified producer on products provided a reliable trace-back system well before this system was suggested by any other industry. Product traceability is only today being discussed by international fora in response to consumer concerns about the safety and integrity of the food supply.

This revised standard will be welcomed by NASAA certified operators and by newcomers to the organic industry. It builds on the fundamental principles of organic production as set out by the NASAA founders and incorporates the developments and dynamics of organic management systems as they exist today. The standard also reinforces NASAA's long-term allegiance to influencing the impact of agriculture on the environment and on natural biodiversity.

The revised standard is clear and well presented with useful explanatory notes. It should ensure that NASAA remains a significant player in this field at the national and international levels.

Ruth Lovisolo

Chair
Working Group on Organic Foods of the UN FAO/WHO Codex Alimentarius Commission
1992-2003

ACKNOWLEDGMENT

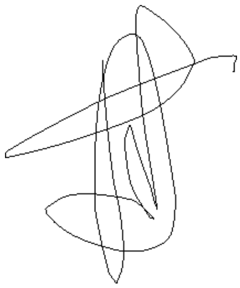
In December 2004, NASAA first introduced an integrated Organic Standard, incorporating the previously separate primary production and processing Standards. Since then, the Standard has undergone several revisions in response to, and in recognition of, continuing research and development in the Australian and wider international organic industry.

It is my pleasure therefore to introduce the latest revision of the NASAA Organic Standard which reflects changes to Edition 3.6 of the National Standard for Organic and Biodynamic Produce and incorporates the launch of the new NASAA Health and Beauty Care Products Standard.

NASAA has developed its Health & Beauty Standard to provide consumers with an independent verification system for the use of the word ‘organic’ in relation to this group of consumables. This Standard will provide consumers with assurance of the organic integrity of the product.

The development of a Standard such as this is the product of input from the entire NASAA family. While it has been the members of NASAA’s Standards Committee who have worked directly on the Standard, input has come from members of NASAA’s Inspection Review Committee, Certification and other staff, inspectors, and certified operators themselves. I warmly thank members of NASAA Committees, staff and operators and acknowledge the effort they have made to ensure that this edition sets a new standard of excellence in the writing and elaboration of organic principles, recommendations, standards and standards derogation.

This NASAA Standard is not cast in stone but is an organic, living and dynamic document. A thorough review of this Standard is anticipated, with a new edition expected to be released in August 2008. Submissions regarding amendments to this Organic Standard are welcomed, and these should be sent to the Secretary of the Committee for consideration.



ROD MAY
Chair

INTRODUCTION

The National Association for Sustainable Agriculture, Australia Limited (NASAA) is an international association of organic operators. The operators endeavour to use sustainable organic agricultural practices, which maintain a balance of productivity with low impact on the environment, thus preserving the ecological quality of the land for future use.

This Standard comprises four sections. They outline the:

- **GENERAL PRINCIPLES** behind the architecture of organic agriculture and include a range of
- **RECOMMENDATIONS** which should be put into place where appropriate.

These two sections are clearly identified, but unlike the numbered standards, are not subject to inspection and compliance. The recommendations could, if deemed appropriate, become standards in future revisions.

- **STANDARDS** are the minimum requirements which must be met, and the
- **DEROGATIONS** represent possible exceptions to a standard and the specific conditions under which they may be authorised.

This Standard also outlines the practices and materials that are allowed, restricted or prohibited for use in order to be certified by NASAA. They define the minimum conditions for certification under NASAA's organic certification program, which is accredited jointly by Department of Agriculture (DoA) and IFOAM.

Requirements, recommendations and practices referred to in this Standard do not take precedence over and must not lead to the contravention of state, national or international law. It is the responsibility of the operator to acquaint themselves with relevant laws and regulations.

Amendments to this Standard are effective immediately for new applicants to the NASAA Certification Program. For existing licensees, amendments become effective six (6) months from the date of publication. All licensees will be notified in writing by either an amendment sheet describing the changes to the existing Standard, or by the receipt of a copy of the reprinted Standard in the case of a major revision.

This Standard is subject to continuous upgrading and amendment. Written submissions regarding possible changes are welcomed.

SECTION ONE – GENERAL

1.1 DEFINITIONS

- **Accreditor:** a body such as Department of Agriculture (DoA) or IFOAM which accredits to provide certification services under defined conditions.
- **Activator:** additives to the compost pile which contain a nitrogen source or sugars. Their purpose is to increase microbial activity**.**
- **Agro-ecosystem:** the ecological farming system within which production takes place.
- **Anaerobic Compost:** composting methods without the use of atmospheric oxygen.
- **Anti Microbial Agents:** ingredients that prevent or retard microbial growth and thus protect cosmetic products from spoilage.
- **Appeal:** request by an operator for reconsideration of any decision made in relation to their certification. Appeals must be submitted in writing within 30 days of a determination being made.
- **Aquatic:** in or around water.
- **Aquaculture cohort:** a group of fish generated during the same spawning season and born during the same time period.
- **Biodegradable:** subject to biological decomposition into simpler biochemical or chemical components.
- **Biodiversity:** the variety of life forms and ecosystem types on Earth. Includes genetic diversity (ie. diversity within species), species diversity (ie. the number and variety of species) and ecosystem diversity (total number of ecosystem types).
- **Biodynamic:** (BD) production system based upon principles and preparations established by Rudolf Steiner.
- **Buffer Zone:** a clearly defined and identifiable boundary area bordering an organic production site that is established to limit application of, or contact with, prohibited substances from an adjacent area.
- **Certified:** to have been inspected and licensed in accordance with this Standard.
- **Certification:** means the acceptance of an operator's conformity to this Standard as verified through inspection and audit.
- **Certification Transference:** the acceptance of another certification body, to enable the use of products thereby certified in goods to be labelled with reference to the NASAA label. This process requires review of all accreditation documentation, standards and other procedures involved in the certification process to determine equivalence, and acceptability.
- **Compost:** the product of a managed process through which micro-organisms break down plant and animal materials into a more available form suitable for application to the soil.
- **Contamination:** Contact of organic crops, animals, land or products with any substance that would compromise the organic integrity.
- **Conventional:** farming that relies on synthetic inputs and is not operated organically (ie. any system not compliant with the principles outlined in this Standard).
- **Co-processor:** an entity that is subcontracted by a certified operator to undertake a service such as packing, storage, processing etc. The co-processor is not certified in their own right and therefore may not use the NASAA label (except where it is involved on containers or packaging of the licensee's product) or hold itself out as certified.
- **Crop Rotation:** the practice of alternating the species or families of annual and/or biennial crops grown on a specific field. Perennial cropping systems employ means such as alley cropping, intercropping and hedgerows to introduce biological diversity in lieu of crop rotation.
- **Cultural Management:** methods used to enhance crop health and minimise weed, pest or disease problems without the use of substances; examples include the selection of appropriate varieties and planting sites; proper timing and density of planting; cover crops, resistant varieties; crop rotation; integrated pest management.

- **Decertification:** the partial or total withdrawal of certification
- **Deferral:** a period in which operators request postponement of certification as a result of changes in operation. Deferral is not automatically granted. During deferral the operator must continue to demonstrate adherence to this Standard and no sales can be made with reference certification.
- **Detectable Residue:** the amount or presence of chemical residue or sample component that can be reliably observed or found in the sample matrix by current approved analytical methodology.
- **Direct Source Organism:** the specific plant, animal or microbe that produces a given input or ingredient or that gives rise to a secondary or indirect organism that produces an input or ingredient.
- **Emulsifier:** a substance which can be used to produce an emulsion out of two liquids that normally cannot be mixed together (such as oil and water). Emulsifiers are used in health and beauty care products.
- **Eutrophication:** the enrichment of water by nutrients especially compounds of nitrogen and phosphorus, causing an accelerated growth of algae and higher forms of plant life to produce an undesirable disturbance to the balance of organisms and the quality of the water concerned.
- **Exception:** permission granted to an operator to be excluded from the need to comply with normal requirements of this Standard. Exceptions are granted on the basis of clear criteria, with clear justification and for a limited time period only.
- **Export Certificate:** mandatory documents issued to confirm that export goods claiming to be organic are certified by an Department of Agriculture (DoA) accredited certification organisation.
- **Fallow:** cultivated land that is not seeded.
- **Farm Unit:** a farm with clear physical and legal boundaries.
- **Feed Ration:** feed allowance for an animal in any given period of a day or longer.
- **Feed Supplement:** component added to correct or overcome a deficiency or to prevent the development of a deficiency.
- **Fertigation:** the application of nutrients through irrigation systems.
- **Food Additive:** an enrichment, supplement or other substance which can be added to a foodstuff to affect its keeping quality, consistency, colour, taste, smell or other technical property.
- **Food Ingredient:** substances, including additives used in the preparation of products for human consumption that are still present, albeit in a modified form, in the final product.
- **Genetic Engineering:** genetic engineering is a set of techniques from molecular biology (such as recombinant DNA) by which the genetic material of plants, animals, micro-organisms, cells and other biological units are altered in ways or with results that could not be obtained by methods of natural mating and reproduction or natural recombination. Techniques of genetic modification include, but are not limited to: recombinant DNA, cell fusion, micro and macro injection, encapsulation, gene deletion and doubling. Genetically engineered organisms do not include organisms resulting from techniques such as conjugation, transduction and natural hybridisation.
- **Green Manure:** a crop that is produced for the purpose of soil improvement and may be mulched or incorporated into the soil.
- **HACCP:** stands for Hazard Analysis Critical Control Points and refers to the systematic process of analysis of potential hazards and actions for remedy in the production system.
- **Handling, Processing and Preparation:** includes the operations of manufacturing, preserving, milling, slaughtering, storing, packing and handling of agricultural products of organic origin and also alterations made to the labelling concerning the presentation of the organic production method.
- **Homoeopathic Treatment:** treatment of disease based on administration of remedies prepared through successive dilutions of a substance that in larger amounts produces symptoms in healthy subjects similar to those of the disease itself.

- **Humus:** decomposed tissue of plant and animal materials. The original tissues contain a wide range of organic compounds, which typically decompose at different rates.
- **Inert Ingredient:** any substance (or group of substances with similar chemical structures) other than an active ingredient which is intentionally included in any pesticide product.
- **Ingredient:** any substance used in the preparation of an agricultural product that is still present in the final commercial product as consumed. Where a product is composed of sub-ingredients, such sub-ingredients shall be considered in the final calculation of organic content of the finished product.
- **Input:** any product or material applied or used in the course of production.
- **Inspection:** a process used to verify compliance with this Standard.
- **Inspector:** any person deemed appropriately qualified who is contracted or used by NASAA to conduct inspections for certification purposes.
- **Integrated Pest Management (IPM):** an integration of any or all methods of pest management approved under this Standard which may include chemical, mechanical or biological techniques.
- **In Conversion:** a production system which has adhered to this Standard for a minimum of one year and which has been certified as such but which does not yet fully qualify as organic or biodynamic.
- **Ionising Radiation (Irradiation):** high energy emissions from radio-nucleotides which are capable of altering a product's molecular structure, used for the purpose of controlling microbial contaminants, pathogens, parasites and pests in products (generally food), preserving products or inhibiting physiological processes such as sprouting or ripening. Under this Standard, irradiation does not include low-level radiation sources such as the use of X-rays for foreign body detection.
- **Labelling:** any words, particulars, trademarks, brand names, names of certifying organisations, pictorial matter or symbols appearing on any packaging, document, notice, label board or collar accompanying or referring to a product specified in this Standard.
- **Licensee:** the person legally responsible for maintaining compliance to this Standard.
- **Maximum Permissible Concentration (MPC):** maximum concentrations of given substances (heavy metals) allowed in foods as defined by Standard 1.4.2 under Food Standards Australia and New Zealand (FSANZ).
- **Maximum Limit (ML):** maximum residues of given substances, such as agrichemicals allowed on foods as set by Food Standards Australia and New Zealand (FSANZ) under Standard 1.4.1. Previously referred to as Maximum Residue Limits (MRL). Where there is no specified limit for a particular chemical substance for a specified product there is zero tolerance for the particular chemical.
- **Mulch:** any substance spread or allowed to remain on the soil surface to conserve soil moisture and shield soil particles from the erosive forces of raindrops and run-off.
- **Nanotechnology:** the engineering of functional systems at the molecular scale. These functional systems (materials or devices) are either constructed from the chemically induced self-assembly of molecular components or by machines which manufacture at the molecular level.
- **Natural:** existing or formed by nature; not artificial.
- **Non Agricultural Product:** a substance that is not a product of agriculture, such as a mineral or a bacterial culture, salt and water that is used as an ingredient in an agricultural product.
- **On-farm Processing:** where processing occurs on-farm for the sole use of the grower and/or for one other producer, it is referred to as on-farm processing. Examples are dehydrating, cleaning, de-hulling, packing, storing and grading. If processing more than one other producer's product, the on-farm facility shall be certified in its own right for processing.
- **Operator:** the individual responsible for the conduct of the operation who may or may not be the person licensed to use the NASAA Label.

- **Organic:** a labelling term that refers to an agricultural product produced in accordance with the NASAA Standard.
- **Organic Management Plan (OMP):** a written document designed to help certified operators achieve best practice farm management through documenting current and future management practices. The plan is a flexible tool for good farm management and provides an important means of assessing compliance with this Standard. An inherent aspect of an OMP is ongoing monitoring of all aspects of the organic farming system.
- **Organic Matter (OM):** that fraction of the soil that includes plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesised by the soil population.
- **Organic Quality Management System:** means the system deployed by an operator that documents and demonstrates that operator's capacity to comply with this Standard.
- **Parallel Production:** producing the same product organically and conventionally by the same operator or producing Organic and In Conversion product on the same property or by the same operator.
- **Pasture:** Land used for livestock grazing that is managed to provide feed value and maintain or improve soil, water, and vegetative resources
- **Primary Ecosystem:** Pristine and anthropogenically undisturbed ecosystems.
- **Principal Display Panel:** means the panel on packaging which identifies the primary or advertised description of the product.
- **Potable Water:** as defined by the National Health and Medical Research Council under the Australian drinking water guidelines (ie suitable for drinking).
- **Precedent:** a certification decision concerning a new situation or set of circumstances that may serve to guide future decision. Precedents are normally developed in consultation with the Standards Committee when the situation is not covered by this Standard.
- **Preservative:** a substance incorporated to prevent growth of micro-organisms (refer to anti microbial agents).
- **Processing Aid:** substances intentionally added to food for use in the processing of raw materials, food or food ingredients in order to fulfil an essential technological purpose during treatment or processing. Their use may result in their unavoidable presence in the final product.
- **Product Acceptance:** the acceptance of a product, or ingredient, certified by another certification body to be used in a final product certified to this Standard.
- **Production or Processing Unit:** an enterprise, or portion thereof, that produces a product or food under specific organic management practices as inspected.
- **Prohibited:** substances that are not permitted under this Standard. The NASAA Organic Standard is "positive" therefore unless a substance is listed as being permitted, it is not permitted.
- **Raw Material:** the original plant or animal material used in health and beauty care products to produce therapeutic or functional ingredients by extraction or other permitted processes.
- **Residue Testing:** an official or validated analytical procedure that detects, identifies, and measures the presence of chemical substances, their metabolites, or degradation products in or on raw or processed agricultural products.
- **Restricted:** practices and materials that can be implemented subject to stated provisos.
- **Sanctions:** measures taken against certified operators who have failed to comply with this Standard or other requirements of the certification body.
- **Sewage Sludge:** a solid, semisolid, or liquid waste generated from human or industrial activity.
- **Soil and Water Quality:** observable indicators of the physical, chemical, or biological condition of soil and water, including the presence of environmental contaminants.

- **Surfactant:** a material that can greatly reduce the surface tension of water when used in very low concentrations. Surfactants contribute to the foaming and lathering properties of health and beauty care products.
- **Suspension:** A period during which an operator must provide verification of compliance with this standard following notification of non-compliance with any section of this standard. During this period an operator must not sell produce with reference to certification.
- **Synthetic:** produced by artificial processes and not the ordinary processes of nature.
- **Termination:** The complete cancellation of the NCO contract.
- **Therapeutic Good:** broadly defined as any good which is represented in any way to be, or likely to be taken to be for therapeutic use, unless specifically excluded or included under Section 7 of the Therapeutic Goods Act 1989. For the purposes of evaluation and assessment, a therapeutic good is a product for use in humans that is used in connection with:
- preventing, diagnosing, curing or alleviating a disease, ailment, defect or injury
- influencing inhibiting or modifying a physiological process
- testing the susceptibility of persons to a disease or ailment
- influencing, controlling or preventing conception
- testing for pregnancy, or
- replacement or modification of parts of the anatomy
- **Wild Harvest:** the production and harvesting of wild or naturally occurring foods and fibres.
- **Yearly Summary:** documentation to be completed by all certified operators at the end of the financial year to record their activities, including inputs, sales and projected sales.

1.2 ACRONYMS

- **APVMA:** (formerly NRA) Australian Pesticide and Veterinary Medicines Authority
- **BAA:** Biodynamic Agriculture Australia
- **CCA:** Copper, Chromium, Arsenate treated timber
- **DoA** : Department of Agriculture
- **EIS:** Environmental Impact Statement
- **EMS:** Environmental Management System
- **FSANZ:** (formerly ANZFA) Food Standards Australia and New Zealand
- **GE:** Genetic Engineering
- **GMO:** Genetically Modified Organism
- **HACCP:** Hazard Analysis Critical Control Points
- **IBS:** IFOAM Basic Standard
- **IFOAM:** International Federation of Organic Agriculture Movements
- **ILO:** International Labour Organisation
- **IPM:** Integrated Pest Management
- **ML:** Maximum Limit
- **NASAA:** National Association for Sustainable Agriculture Australia
- **NATA:** National Association of Testing Authorities
- **OC:** Organochlorines
- **OMP:** Organic Management Plan
- **OP:** Organophosphates
- **PPM:** Parts Per Million (equivalent to mg/kg)
- **QA:** Quality Assurance
- **RIRDC:** Rural Industries Research and Development Corporation
- **WHO:** World Health Organisation

1.3 PURPOSE

Certification is a total quality management system developed for organic production. Certification allows the operator, who is inspected and approved, to advertise and label their produce/products as meeting the NASAA Organic Standard.

1.4 AIMS AND PRINCIPLES

Organic agriculture is a holistic system built upon natural ecological processes. It values the welfare of both the producer and the consumer of organic food and fibre products, and is committed to conserving natural resources for the benefit of all future generations. Healthy soil is the prerequisite for healthy plants, animals and products. The maintenance of soil health by ecologically sound means is at the heart of organic production systems and consequently production systems not based on soil (eg hydroponic systems) are not acceptable under this Standard. The aims of organic agriculture are:

- To produce optimal quantities of food and fibre compatible with human and environmental needs;
- To produce food of high nutritional value;
- To work within natural systems in ways which enhance those systems;
- To maintain and increase long term productivity of soil;
- To promote wise use of land, water and vegetation and minimise off farm effects of agriculture on aquatic and terrestrial systems;
- To foster local and regional production and distribution;
- To use renewable resources as much as possible;
- To maintain and increase long-term fertility and biological activity of soils using locally adapted cultural, biological and mechanical methods as opposed to input reliance;
- To maintain and encourage agricultural and natural biodiversity on the farm and surrounds through sustainable production systems and protection of plant and wildlife habitats;
- To provide balanced nutrients, optimise opportunities to cycle nutrients within the farm, to recycle nutrients and energy that leave the farm or other farms in food and fibre products that are not consumed (ie organic waste containing energy and nutrients), with the aim of feeding the soil ecosystem;
- To provide livestock with conditions which satisfy their behavioural and physiological needs;
- To maintain or increase as appropriate the genetic diversity of domesticated and native plants, animals and other organisms on the farm (this precludes the use of Genetic Engineering);
- To allow everyone involved in organic production a quality of life to cover their basic needs and obtain adequate return and satisfaction from their work, including a safe working environment;
- To progress towards an entire organic production chain, which is both socially just and ecologically responsible; and
- To recognise the importance of and protect and learn from, indigenous knowledgeand traditional farming systems.

SECTION TWO – GENERAL CERTIFICATION REQUIREMENTS

2.1 CONVERSION TO ORGANIC

GENERAL PRINCIPLES

Making the changes that take a property from conventional production to organic certification usually involves changes to management practices implemented over a period of time to achieve a sustainable agro ecosystem. Such changes to management practices focus on the development of preventative management strategies to reduce the reliance on inputs, and the implementation of monitoring systems to evaluate farming activities on an ongoing basis. This process is known as converting to organic, and the first level of certification where a label can be used is called "In Conversion to Organic". Part of the farm may be converted to begin with, provided there is an outline of how the whole farm will be gradually converted to organic production.

STANDARD

2.1.1 For the 1st year of certification the operator will be certified as In-Conversion before being considered as eligible for an upgrade to Organic status.

2.1.2 The operator will be required to demonstrate through their records that they have complied with the relevant sections of this Standard for at least 12 months to be eligible for In-Conversion status.

2.1.3 The conversion period may be extended depending on conditions such as, past use of the land, management capacity of the operator and environmental factors.

2.2 ORGANIC CERTIFICATION

GENERAL PRINCIPLES

Organic certification is achieved when an operator can demonstrate that they have achieved a farming system that is compliant with the relevant sections of this Standard. Organic production systems require an ongoing commitment to organic production practices.

STANDARD

2.2.1 Certification as Organic may be achieved only after there is demonstrated compliance, through inspection and records, with all relevant sections of this Standard for a minimum of 3 years, and 1st year In-Conversion to Organic requirements have been fulfilled. (See Section 2.1 above).

DEROGATION

Exceptions to the requirement for obtaining organic certification as defined in section 2.1 and 2.2 above may only be made if the following circumstances apply to the operator or operation:

- *If a farm is previously certified organic by Department of Agriculture (DoA) approved certification organisation at the beginning of the applicant's ownership and management at the time of the land acquisition;*
- *If a new entrant to certification has a verifiable recorded history of events which demonstrates that the farm has a total of at least 3 years of organic management. Such indicator events must include <u>all</u> of the following:*
    - *Detailed Organic Management Plan of inputs and practices;*
    - *Comprehensive approved soil nutrient and contamination testing with demonstrable amelioration of soil deficiencies;*
    - *A demonstration of functional plant and animal biodiversity development; and*
    - *a demonstrated land steward ship ethic/history of high level of organic management.*

    OR
    - *If the applicant operates a defined landless system such as honey, mushrooms, greenhouse or other specific systems (refer to Section 5.5 below).*

OR

- *If the applicant practices traditional agriculture and both the common practices and the individual operation can be shown to have complied with the requirements of this Standard for a minimum of three years.*

2.3 ORGANIC MANAGEMENT PLAN (OMP)

GENERAL PRINCIPLES

The Organic Management Plan is the first step in the certification process, and outlines current management as well as projected future production activities which pertain to this Standard. New operators entering the certification scheme fill in the Organic Management Plan questionnaire at application. This questionnaire serves as the basis for the operator's Organic Management Plan, which may require elaboration to address significant risks or hazards associated with maintaining certification. The plan outlines procedures for reducing or eliminating such risks, and identifying opportunities to achieve the objectives of organic aims and principles. It describes the method of monitoring these procedures and resultant performances to ensure ongoing compliance to this Standard.

For split operations, the documented plan and map of the property describes how the farm will be converted fully to organic and the time frame for implementation.

STANDARDS

2.3.1 Each operator must provide an OMP which includes a history of each paddock, a description of the operating conditions and an explanation of how each of the following points will be addressed and monitored (where applicable):

- Soil management
- Fertility management
- Soil erosion, with particular attention to active gully erosion and riparian areas
- Crop rotations
- Weed management
- Pest management
- Disease management
- Windbreaks and buffer zones
- Biodiversity
- Animal health
- Water management
- Post-harvest management
- Documentation

2.3.2 The application questionnaire will serve as the basis for the OMP and must be completed prior to an initial inspection being conducted

2.3.3 Each year at the time of inspection certified operators shall complete an OMP Update form to identify any changes to the management of their activities.

2.4 FARM MAP

GENERAL PRINCIPLES

The farm map identifies the parts of the property that are to be certified and the products that will be produced in those areas. Each paddock or production area is identified on the map with a name or a numbering system that can be related to information and records that are kept by the operator.

The farm map is suitably scaled and shows all neighbouring activities, all relevant environmental aspects and contamination risks. Boundaries shown on the map are recognisable on the ground (eg. fences, tree lines, dams, gullies etc).

STANDARD

2.4.1 The operator shall keep an up to date scaled map of the farm, based on legal title that clearly shows paddocks, buildings boundaries and neighbouring activities,dams and water courses.

2.5 RECORDS

GENERAL PRINCIPLES

The operator is to maintain records that enable the inspector toscrutinise the products and processes that are used on the property. Records are the most acceptable and consistent way of supporting the operator's organic production and handling claims and provide the basis for ongoing monitoring of management strategies. Suitable records include details regarding the following:

Farm Map: (refer to Section 2.5 above)

Input Records: Operators record the source, brand name (if any), amount, location and date of application of all materials applied (eg, fertility and pest/disease inputs), purchased stock, animal treatments, feed-stuffs to all paddocks, animals, production areas, irrigation water, post harvest rinse water, and seed. In addition, all receipts for inputs must be maintained and made available at inspections.

Harvest Records: Harvest records include the crop, paddock identification, date of harvest, and quantity harvested. In some cases, sales records may be the equivalent of harvest records if produce is harvested and sold within a short period of time.

Sales Records: must include the date of sale, the crop, the amount sold and the paddock identification. All sales invoices for organic product contain the operator's name, registration number and level of certification as well as the consignee and date. Where an invoice lists both certified and non-certified products, each product is clearly identified. Completed consignment notes accompany all product sales. Sales documentation refer to certification of the product and the level of the product whether organic or in conversion.

Audit Trail: Certification requires detailed documentation in order to provide an audit trail, which enables the tracking of produce to the certified farm or paddock and describes the processes and products used in the course of production. A complete audit trail is made up of documents such as input records, harvest records, transport documents, storage invoices and sales records that track the crop from a specific paddock (and its production practices) to sales.

Other Records: Operators keep a farm diary which records farm activities like soil preparation, green manure, rotations, livestock records, equipment clean down records, records of buffer zone harvests, and irrigation records.

STANDARDS

2.5.1 Operators must retain suitable records of inputs, harvest, sales, crop rotations and other relevant activities.

2.5.2 All records required must be maintained and kept for at least five years after the certified product has been sold.

2.5.3 Each year certified operators must complete and return to a Yearly Summary that provides details concerning inputs, sales and estimates of future production.

2.5.4 Operators must ensure that records allow traceability and product identification throughout the supply chain.

2.5.5 The NASAA Label or indication that the product is certified, certification status of product, and producer certification number must be clearly indicated on consignment notes and/or invoices.

2.5.6 All records must be made available during inspection.

2.5.7 Operators shall maintain a complaints register and take appropriate action with respect to received complaints and/or deficiencies found in products or services that affect compliance with the requirements of certification. Documentation of actions taken shall be maintained and where appropriate notified to the certifier.

2.5.8 Where part certification of a property applies records of conventional harvests and sales must be available for scrutiny during inspections.

2.6 PARALLEL PRODUCTION

GENERAL PRINCIPLES

Producing exactly the same crop on an organic and non organic farm by the same operator is deemed to be parallel production and substantially increases the risk of inadvertent mixing or contamination of certified product. Certified organic farms do not carry out parallel production. However, operators may progressively convert their farming unit under certification over time. Until such time as the entire farming unit is incorporated under certification, the farming unit may operate under Parallel Production. Upon application the operator must detail the production area and how they intend to eventually convert that production area to certification.

STANDARDS

2.6.1 Organic and In Conversion product and conventional product must be distinguishable by species and/or variety, including some verifiable difference such as appearance.

2.6.2 The same crop must not be grown as conventional, Conversion to Organic and Organic on the same production unit without adherence to 2.6.4 below.

2.6.3 Establishment of new perennial crops on certified land must be in accord with this Standard.

2.6.4 Simultaneous production of the same organic and non organic crops or animal products (parallel production) is only permitted where such production is undertaken in a way that allows clear and continuous separation of all product claimed as certified or certifiable as organic.

2.6.5 The only permissible parallel production is where there is perennial or annual produce from quarantine or buffer zones which must be sold as conventional.

2.6.6 Prohibited inputs or disallowed materials utilised on the conventional production unit of the farm shall be stored in a separate location on the non certified area from those where the equivalent organic inputs or materials are held or handled.

2.6.7 *The entire property must be converted to organic over a period of no more than 10 years from the date of application for certification.*

Where this is not achieved the operator must provide a plan and timeline for the conversion of the entire property.

DEROGATION

The exceptions to this requirement are:

- *Where a grower has applied to run trials for perennial crops using alternative management practices as part of converting a property. Such cases may qualify for certification for a limited period not beyond 5 years and require a high level of documentation regarding production, storage and marketing of produce which is certified and/or conventional. After this 5-year period from application, all new establishments of crops will need to be carried out in compliance with this Standard, OR*
- *Where the operator is subjected to additional inspections at critical times and scrutiny of all records (including conventional produce).*
- *Prohibited materials shall be stored in a separate location from those where organic products are stored.*
- *Where there is a mandated requirement for pest, plant and disease control, operators can apply for an exception to standard 2.6.4 above.*

2.7 TRANSFER OF CERTIFICATION

GENERAL PRINCIPLES

Certification is approved based on a combination of the farm management practices, the land use and the growing conditions of the product and involves a contract between the certification body and the operator for a specified parcel of land and crop(s).

Certification is therefore not automatically transferable either to a new owner upon sale of a property or to a new property upon being taken up by a certified operator. The new owner will need to lodge a new application if certification is desired, and this may require a period of time to demonstrate appropriate organic management skills.

STANDARD

2.7.1 Certification is not transferable.

2.8 LEASING OF LAND

GENERAL PRINCIPLES

Leasing of land is often the only way an operator can farm. Arrangements for certification of leased land need to ensure that the operator has control over management and decision making on that land.

STANDARD

2.8.1 Growers who lease land will be required to produce evidence of lease agreements which specify that all management activities are the sole responsibility of the lessee (licensee) or alternatively, include the lessor as a party

in the contract of certification.

2.9 INSPECTION

GENERAL PRINCIPLES

The NASAA Organic Standard complies with The National Standard (Department of Agriculture DoA) and the IFOAM Basic Standard (IBS). There are obligations to manage an accountable, confidential, fair and transparent certification process, which includes inspections. Inspectors do not provide advice to operators other than to ensure that the operator understands this Standard and that their activities comply with this Standard.

Operators expect inspections as part of their contract with the certifying body. These inspections may be routine, additional or unannounced, as defined below:

- **<u>Routine:</u>** inspections are annual. The operator is advised of a pending inspection, contacted by the inspector and a mutual time arranged.
- **<u>Additional:</u>** The operator may request additional inspections when there is a change in contract required or may require an additional inspection to satisfy certification requirements. Additional inspections are paid for by the operator.
- **<u>Unannounced:</u>** inspections are a requirement of accreditations and are a tool for ensuring compliance. Unannounced inspections may be selected at random and/or in response to concerns. The operator is not forewarned of the inspection.

STANDARDS

2.9.1 Operators will be subject to annual inspections at a minimum.

DEROGATION:

Input Manufactures are not necessarily subject to annual inspections. Upon review of their operation the certifying bodymay determine that the inspection frequency for an Input Manufacturer is every second year (biannual) or every third year.

2.9.2 The operator, or authorised representative, must accompany the inspector throughout the inspection process.

2.9.3 The operator must provide the inspector with all relevant records including those relating to conventional products if requested.

2.9.4 The operator must allow the inspector access to all areas of the property including uncertified areas.

2.9.5 Operators may be subject to third party inspections from the Department of Agriculture (DOA) Governments with equivalence agreements (ie. JAS/NOP) and/or the International Federation of Organic Agricultural Movements (IFOAM) to ensure that accreditation requirements are being met.

2.9.6 Every operator must be inspected before they can be eligible for certification.

2.10 SANCTIONS

GENERAL PRINCIPLES

Sanctions may be imposed when there are non-compliances or non conformities to this Standard. An operator unable to demonstrate compliance with this Standard may be subject to the following:

- <u>Suspension:</u> A defined period, ordinarily no greater than two weeks, during which an operator must provide verification of compliance with this Standard following notification of non-compliance with any section of this Standard. During this period an operator must not sell produce with reference to certification.
- <u>Decertification</u>: Either partial or total withdrawal of certification as a result of ongoing non-compliance with the Standard, following a period of suspension.
- <u>Termination</u>: cancellation of the operators contract following a period of suspension or decertification

STANDARDS

2.10.1 Manifest non-compliance with this Standard such as mixing organic and conventional products will result in decertification.

2.10.2 Failure to observe contract conditions will result in suspension until compliance is demonstrated.

2.10.3 Ongoing failure to observe contract conditions will result in decertification.

2.10.4 Additional inspections will be scheduled at the operator's cost where previous serious non-compliance has been observed.

2.10.5 Failure to complete the Annual Return, complete a certification contract, pay levies and/or associated costs of certification will result in suspension and possible decertification.

2.11 DEFERRAL

GENERAL PRINCIPLES

Deferral of certification voluntarily suspends certification when there is no production due to factors such as drought, fire or other extenuating circumstances. Operators remain compliant with this Standard during this period.

STANDARDS

2.11.1 Deferral of certification will only be granted to operators upon application outlining the reason for requested deferral of certification.

2.11.2 During deferral the operator shall comply with the requirements of this Standard and complete a Yearly Summary for each year under deferral.

2.11.3 During deferral no sales can refer to certification.

2.11.4 Deferral shall be reconsidered annually.

2.12 APPEALS

GENERAL PRINCIPLES

Certified operators may have grounds for requesting a review of a certification decision as a result of an inspection or any other situation that may arise from time to time. Operators have the right of appeal which must be submitted in writingoutlining the reasons for the request for reconsideration

STANDARD

2.12.1 Appeals by certified operators must be submitted in writing within 30 days of a decision being made and must outline the reason for the appeal.

2.13 EXPORTING ORGANIC PRODUCT

GENERAL PRINCIPLES

Exports comply with the Commonwealth of Australia Export Control Act 1982 and the Organic Produce Certification Orders No 6 of 1997 and are subject to those orders.

STANDARDS

Exporters of certified organic products shall be certified and meet importing country requirements.

DEROGATION

Exporters who handle finished packaged goods for which they can verify through documentation the certification status of products for which they trade do not have to be certified. They shall, however, comply with the requirements defined under this section of the Standard.

2.13.1 Exporters of certified organic products shall be certified and meet importing country requirements.

2.13.2 In addition to general requirements for handling and packaging, exporters shall ensure the following:

- Containers must be inspected/passed by a licensed.accredited container inspector.
- The container must be free of perforations or other structural damage, which could allow the product to be contaminated from the outside.

- The interior of the container must be free from visual residue or dirt that could cause contamination from the inside.
- Protective impervious sleeves or steam cleaning must be provided for all interior surfaces of containers used for bulk storage and therefore direct contact with organic products.

  Loading areas must be free from pests and pest habitat.
- Loading devices must be professionally cleaned to inhibit contamination and/or be subjected to a volume (plug) of the product which is to be kept separate from the organic consignment.

2.13.3 Records and documentation must be provided which satisfy the Export Control Orders.

2.14 ORGANIC PRODUCE CERTIFICATES

STANDARD

2.14.1 Organic Produce Certificates will be issued upon application.

2.15 REVOCATION OF ORGANIC PRODUCE CERTIFICATES

STANDARD

2.15.1 Revocation of an Organic Produce Certificate may occur if it is believed that:

- The information within was incorrect in an important way;
- False or misleading information led to its issuance; or
- The recipient of the certificate has been deemed not to have complied with this Standard.

2.16 USE OF NASAA LABEL

GENERAL PRINCIPLES

The NASAA Label accurately indicates throughout the market chain, including the consumer, that the produce so labelled has been produced in accordance with this Standard.

RECOMMENDATIONS

Labels should contain advice on how to obtain all additional product information.

STANDARDS

2.16.1 Labelling of certified products must include the following details:

- The person or company legally responsible for the production or processing of the product
- Level of certification
- Registration number and relevant NASAA Label

2.16.2 Only operators subject to inspection may use the NASAA Label.

2.16.3 The colour of ink used when reproducing the NASAA Label must be the correct pantone colour. Where colour is not used, black ink may be used. Any other variation in colour must be approved in writing.

2.16.4 Designs, artwork and advertising incorporating the NASAA Name and Label must be approved by NCO prior to use.

2.16.5 Operators shall not use the NASAA Label if their certification is under deferral or has been suspended or withdrawn.

2.16.6 Livestock labelling must include brands or tags that clearly identify the animal as having come from a certified operator.

DEROGATION

Exceptions to general labelling requirements are when raw product is transported from one certified operator to another or to a certified processor in bulk containers. Under these circumstances an identification mark and accompanying documentation must be provided which clearly identifies the product, the operator's name and address and a declaration that the product was produced in accordance with this Standard.

2.17 CONVERSION LABELLING

GENERAL PRINCIPLES

Conversion labelling makes it clear that the ingredients within the certified product are from a farm in the stage of conversion to organic that may have only been using organic management practices for a short time.

STANDARD

2.17.1 Conversion labelling may be applied subject to the criteria in section 2.16 above with the following additions:

- Any reference to Organic on labelling may only appear in the context of Conversion to Organic.
- The Conversion label must be clearly distinguishable from the Organic label.

2.18 LABELLING

GENERAL PRINCIPLES

Labelling is employed to provide accurate and non-ambiguous information about products. The Name NASAA and the NASAA Label are protected by law. All false claims of certification are actively pursued, whether printed or verbal and legal action will be taken if necessary to protect its label.

STANDARDS

2.18.1 Any claims about organic ingredients must be made in a manner which is no different in colour, style and size of lettering to other ingredients.

2.18.2 All ingredients must be listed on the label in order of percentage by volume.

2.18.3 Non-organic ingredients must be identified as such and show their maximum concentration.

2.18.4 Some ingredients not satisfying this Standard may be used. These must be of agricultural origin and unavailable in sufficient quantities as certified organic products. Subject to approval in writing such ingredients may be added to processed products at levels of no more than 5% of total. Where more than 5% of agricultural ingredients are non organic, no NASAA Label may be used and the product description may only make reference to the organic ingredients certified.

2.18.5 Any product of non-organic agricultural origin shall not include prohibited products or ingredients or be subject to prohibited processing methods.

2.18.6 All ingredients of a multi ingredient product shall be listed on the product label in order of their weight percentage. It shall be apparent which ingredients are of organic certified origin and which are not. All additives and preservatives shall be listed with their full name.

2.18.7 If herbs and/or spices constitute less than 2% of the total weight of the product, they may be listed as “spices” or “herbs” without stating the percentage.

2.18.8 Certified organic products may not include the same ingredient derived from both an organic and a non-organic (including Conversion to Organic and Organic) source.

2.18.9 Any one processed product must contain a minimum of 95% of Organic ingredients by raw material weight (excluding salt and added water) to be labelled as a certified Organic product. Where more than 5% of Conversion to Organic ingredients are used in an Organic product, the product must be labelled as In Conversion to Organic.

2.18.10 Where the Organic ingredients are between 70% and 95%, labelling must be restricted to reference to organic ingredients only. No use of the certification label is permitted.

2.18.11 Where less than 70% of the total agricultural ingredients by raw material weight are organic no reference to certification or certified ingredients may be made.

2.19 CALCULATING THE PERCENTAGE OF CERTIFIED INGREDIENTS

STANDARDS

2.19.1 To calculate the percentage of product that may be labelled or represented as organic or bio-dynamic in a composite product, the following calculations should be used.

- By weight:

  dividing the total net weight (excluding water and salt) of the organic/bio-dynamic ingredients by the total weight (excluding water and salt) of the finished product.

- If the product and ingredients are liquid:

  dividing the fluid volume of all organic/bio-dynamic ingredients (excluding salt and water) by the fluid volume of the finished product (excluding salt and water).

- For products containing ingredients in both solid and liquid form:

  dividing the combined weight of the solid organic/bio-dynamic ingredients and the weight of the liquid organic/bio-dynamic ingredients (excluding salt and water) by the total weight (excluding salt and water) of the finished product.
  Note: If any ingredient is a concentrate, or reconstituted from concentrates, the calculation should be made on the basis of single-strength concentrations of the ingredients and finished product.

2.19.2 For other than reconstituted products, where water is added in concentrations greater than 70% of the product volume the organic ingredient percentage shall be listed per total product volume.

SECTION THREE – PRECAUTIONS & GENERAL REQUIREMENTS

3.1 RESIDUES AND POSSIBLE CONTAMINATION

GENERAL PRINCIPLES

All relevant measures are taken to ensure that organic soil and product is protected from contamination.

This Standard cannot guarantee that produce certified as organic will be completely free of residues. Small residues of contaminants are found virtually everywhere on earth, and products may be subject to contamination from air, water and soil. However, this Standard aims to produce the necessary safeguards to ensure the lowest practicable risk of residues.

Old orchard sites, livestock dips, old buildings, tobacco or potato paddocks are examples of potential contamination areas. In some cases, high and unavoidable risks of contamination from human activity or natural sources may preclude an operation or farm, or parts thereof, from certification.

RECOMMENDATIONS

In order to ensure the integrity of the property from external contamination the operator should formally advise neighbours, including federal, state, and local government, or statutory authorities, of the organic status in certification of the operation.

Licensees should take reasonable measures to identify and avoid potential contamination.

Accumulation of heavy metals and other pollutants should be avoided and the appropriate remedial measures should be implemented where possible.

Contamination that results from circumstances beyond the control of the operation does not necessarily alter the organic status of the operation.

Verifiable evidence of previous land use should be provided by the operator where possible.

Risk management planning should be used as a tool to address contamination risks and outline management strategies to minimise the impact of risks on the integrity of certified produce and land. Areas of high risk should be identified in risk management plans and appropriate methods implemented to preclude such areas from certified crop and livestock production.

STANDARDS

3.1.1 It is the operator's responsibility to take all measures to prevent contamination, including aerial and roadside spraying of soils, cropping areas and irrigation water. Where there is evidence that prohibited chemical residues are present tests shall be required to ascertain contamination levels.

3.1.2 After the whole farm is certified, prohibited products must be removed from the certified property and disposed of in accordance with legislated requirements.

3.1.3 Organic products sampled must not exceed 10% of the maximum limit (ML) for chemicals for that product where historic contamination is present. Chemical residues that are detected at any level for a specified product that cannot be explained by historic practices will automatically disqualify the specified product from certification and may result in suspension and/or decertification of the operator.

3.1.4 Hydroponic systems are prohibited for general plant production.

3.1.5 Soil levels of 100% or more than the ML for a specified agricultural product may disqualify the land from certification until such time as there is adequate evidence substantiated by further tests that the residue concerned is within the set limits. In such cases, permanent physical or biological groundcover will be required to prevent soil splash or dust contamination of produce.

3.1.6 Where there is no ML defined for a chemical substance for a specified product there is zero tolerance for the chemical. Soil tests that reveal contamination of the specified chemical must be followed by tissue testing to verify no chemical residue for that chemical.

3.1.7 For synthetic structure coverings, mulches, fleeces, insect netting and silage wrapping, only products based on polyethylene and polypropylene or other polycarbonates are permitted. These shall be removed from the soil after use and shall not be burned on the farmland.

3.1.8 Unwoven synthetic plastic mulches for weed control are not permitted.

DEROGATION

Where need can be demonstrated, written approval may be sought for the use of unwoven and synthetic plastic mulch products.

3.1.9 The new or replacement use of treated timber (ie CCA, creosote) is prohibited.

DEROGATION

Where it can be demonstrated that alternatives are not available, permission may be granted for the selective use of treated timber.

3.1.10 All equipment from conventional farming systems shall be thoroughly cleaned of potentially contaminating materials before being used on organically managed areas.

3.1.11 Where contamination has occurred or is suspected, the operator must locate and address the source and advise the certifier within 24 hours of discovery.

3.1.12 Where prohibited substances have been applied directly and intentionally to certified products, or there is a demonstrable failure to take reasonable precautions against contamination, decertification will follow.

3.1.13 Products will be tissue tested for heavy metals and pesticides if there is indication of risk from contamination.

3.1.14 Wool, meat and animal products, including honey and eggs, shall be tissue tested for pesticides and heavy metals prior to sale with reference to organic certification.

3.1.15 Random testing will be conducted for contaminants.

3.2 GENETICALLY MODIFIED ORGANISMS

GENERAL PRINCIPLES

Organisms, which are derived from recombinant DNA technology, are genetically modified organisms and have no place in organic production and processing systems.

The NASAA Organic Standard prohibits the presence of GMO's either deliberate or accidental in any segment of the organic food chain.

RECOMMENDATIONS

Every potential source of GMOs in the supply and input chain, and any sources from historic or adjacent usage, should be identified and operators should familiarise themselves with the vectors and modes of potential transfer of material with modified DNA to avoid contamination.

STANDARDS

3.2.1 The accidental, deliberate use and/or the negligent introduction of genetically engineered organisms or their derivatives to organic farming systems or products are prohibited. This includes, but is not limited to:

- seed
- feed
- propagation material
- farm inputs such as fertilisers and compost
- vaccines
- crop protection materials
- Downstream products

3.2.2 Operators using input materials at risk of containing GMOs must obtain signed statements from the suppliers of these materials that they do not contain GMOs or their derivatives, backed up by laboratory analysis where deemed necessary.

3.2.3 The certification of organic crops will be withdrawn where genetically engineered crops are grown on the same farm.

3.2.4 Operators must not use ingredients, additives or processing aids derived from GMOs in certified products. Processing operations that handle GMOs in conventional products will need to develop adetailed risk strategy for prevention of contamination of certified product.

3.2.5 Operators must not knowingly permit exposure or fail to take action against the application of or exposure to GMOs.

3.2.6 Inputs, processing aids and ingredients shall be traced back one step in the biological chain to the direct source organism from which they are produced to verify that they are not derived from GMOs.

3.2.7 Operators must conduct an assessment of risks from contamination with GMOs and take action where appropriate. These actions may include, but are not limited to:

- knowing about contaminant risks
- implementing distances/buffer zones from potential contaminants
- implementing special handling, transport and storage arrangements
- maintaining samples
- testing of crops perceived at risk

3.2.8 Planting or sowing for organic production will not take place until 5 years after the harvest (or removal) of any genetically engineered crop that may have been planted on the land.

3.2.9 Contamination by GMO's that results from circumstances beyond the control of the operator may alter the organic status of the operation.

3.2.10 Any products that are tested and reveal the presence of GMO's will be decertified.

3.3 WINDBREAKS / BUFFER ZONES

GENERAL PRINCIPLES

Windbreaks and shelter-belts act as a form of buffer zone providing multiple functions including some protection from contamination.

Examples of buffer zones include:

- multiple rows of trees and or hedges
- acceptable distances from contamination
- physical barriers to prevent spray drift

RECOMMENDATIONS

Living windbreaks and shelter-belts should be provided to protect crops and livestock from contamination and assist in the reduction of soil erosion.

STANDARDS

3.3.1 Buffer zones must be provided to protect certified areas from contamination from adjacent properties where appropriate.

3.3.2 Requirements for buffer zones shall be based on appropriate and practical situations and in each case will be no less than 5 metres.

3.3.3 Where outside rows of a crop are used as a buffer zone, produce from these rows shall be quarantined and may not be sold as certified. Records shall be maintained to verify compliance with this requirement.

3.4 SPRAY EQUIPMENT

GENERAL PRINCIPLES

Spraying of allowed products is carried out with clean equipment that does not threaten the crop with contaminants from past use.

RECOMMENDATIONS

Dedicated spray equipment should be used.

In cases of equipment with a previous history of prohibited input usage, effective cleaning should be carried out and analysis for residues may be required.

STANDARDS

3.4.1 The operator shall minimise the risk that spray equipment is contaminated by prohibited substances through appropriate and effective cleaning of such equipment.

3.4.2 Records shall be kept of the procedures for cleaning out non-dedicated spray equipment including dates clean down took place.

3.5 LANDSCAPE AND ENVIRONMENT

GENERAL PRINCIPLES

A farm is a functional part of the wider landscape in which it is located and actively contributes to the long term ability of the landscape to provide economic, ecological, cultural, aesthetic, amenity and social services.

Organic farmers harness the capacity of the ecosystem to produce economic services, but must do so in ways that enhance the provision of other ecosystem services for others and for future generations to enjoy. Operators respect that the relationships and synergies of ecosystems are complex, with the roles of the various components rarely fully understood.

Management is guided by the precautionary principle where the risk of environmental degradation is more important than engaging in activities that are contrary to recognised ecosystem principles.

Ecosystem principles of relevance to organic production include:

- respect for inter-connectivity meaning that a single desired outcome may need management of multiple factors (as in pest management), and that single changes can have multiple outcomes, some of which are unintended and need to be avoided (as with the use of some pesticides, that kill beneficial insects)
- appreciation of and appropriate response to threats such as pests, diseases and weeds
- understanding habitat needs such as extent and character and protection from exploitation

The role of science in establishing ecosystem principles is accepted and encouraged.

New practices and inputs are usually trialed by organic operators on a small scale before large-scale use.

Organic operators are aware of the cumulative impacts of activities within a landscape.

RECOMMENDATIONS

To appreciate their role in both landscape and environmental management, operators should familiarise themselves with regional natural resource management plans and initiatives.

The organic management plan (OMP) should identify agreed significant landscape objectives such as biodiversity conservation, management of weeds and feral animals, tourism, water harvesting and watertable management in relation to dryland salinity, river water quality targets, revegetation and how the organic operator intends to contribute to meeting these objectives.

Operators should maintain a significant portion of their farms to facilitate biodiversity and nature conservation.

Where there are special opportunities such as remnant vegetation, areas with endemic flora, wetlands, riparian areas, springs, floodplains, swamps, other water rich areas and native grasslands owners should set aside and manage these areas for wildlife habitat.

Where opportunities are less obvious, owners should look to enhance biodiversity and wildlife habitat in:

- all areas which are not cultivated and are not heavily grazed such as extensive orchards, hedges, hedgerows, edges between agriculture and forest land, groups of trees and/or bushes, and forest and woodland
- ecologically diversified (extensive) field margins and fence lines
- dams, water-ways, drainage reserves, easements and roadsides.

Operators should familiarise themselves with the standards for water management in particular the need for non-polluting practices, environmental flows and irrigation scheduling.

To minimise future need for restricted or prohibited inputs and potential damage to the environment, organic operators should:

- observe property hygiene principles by ensuring that weeds, pests and diseases do not enter and establish on their properties by checking cleanliness of inputs, vehicles, farm machinery and livestock.
- be alert for potential animal and plant pests through identification and as appropriate, eradication before pest proportions are reached.
- systematically inspect areas set aside for biodiversity and wildlife habitat for weeds and pests especially following flood or fire.

STANDARDS

3.5.1 Each farm shall contain an area consisting of no less than 5% of total area that is set aside from intensive production and includes at least perennial grasses and or trees/shrubs.

DEROGATION

Where the farm is less than 4ha, the requirement to set aside an area of no less than 5% from intensive production may be waived upon application.

3.5.2 The operator must consider landscape and environment issues within the organic management plan. Where possible these should be linked to known regional issues.

3.5.3 The organic management plan must identify risks of environmental degradation (such as water, wind erosion, soil acidity, salinity and over grazing of vegetation) and signal remedial actions to be taken.

3.5.4 Clearance of any primary ecosystem for new crop or grazing land is prohibited.

3.5.5 Biodiversity, which promotes functional farm ecosystems, must be a component of an organic farm.

3.5.6 The operator must not take measures that fail to build biodiversity or that needlessly simplify species diversity on an organic farm.

3.5.7 The operator must take measures to limit the incursion of preventable pests, disease and weeds on to the property.

3.5.8 Clearance of native vegetation including native grasslands that has taken place during the last 5 years will be subject to consideration before certification is determined. Acceptance for certification will be based on the land clearing with relation to the following criteria – biodiversity value, hydrology, erosion, nutrient run off, habitat significance and conformity to state regulation.

3.5.9 Ecologically sensitive or representative areas must at least be retained in part in their natural state. Consideration must be given to grazing, weed and pest management of such areas.

3.5.10 No natural wetlands may be drained.

3.6 SOIL CONSERVATION, ORGANIC MATTER, HUMUS AND COMPOST

GENERAL PRINCIPLES

Optimum soil fertility, soil structure and biological activity are fundamental aims of organic farming. Organic growing systems are soil based. They care for the soil and surrounding ecosystems and provide support for a diversity of species, while encouraging nutrient cycling and mitigating soil and nutrient losses. Widely varying soil types will require/involve different management approaches aimed at achieving the above through combinations of techniques such as green manuring, composting, legume crops and improved pastures, animal use, appropriate cultivation practices and deep rooting plants.

Problematic soils displaying high levels of salinity, sodicity, acidity, structural decline, waterlogging and erosion susceptibility require specialised techniques to redress these difficulties.

The principal aim of nutrient management on organic farms is to supply nutrients to the plant via the soil rather than directly to the plant. For example, permitted fertilisers are assimilated into the soil by soil organisms and the nutrients slowly released to the plants.

Organic matter is any material in the soil that was originally produced by living organisms. Humus is the decomposed tissue of plant and animal materials. The original tissues contain a wide range of organic compounds, which typically decompose at different rates.

In a soil, which at first had no readily decompostable material, adding fresh tissue under favourable conditions immediately starts rapid multiplication of bacteria, fungi and actinomycetes, which soon begin actively decomposing the fresh tissue. As the most readily available energy sources (carbohydrates, fats and proteins) are used up, those micro-organisms again become relatively inactive, leaving behind a dark mixture, usually referred to as humus. Newly formed humus is a combination of resistant materials from the original plant tissue and compounds synthesised as part of the micro-organisms' tissue, which remains as the micro-organisms die. It is quite resistant to further microbial attack, so its nitrogen and other essential nutrients are protected from ready solubility and dissipation. Humus holds water and minerals extremely well. It sticks together very well, so helping soil establish and maintain a strong crumb structure and it provides some nutrients as it is slowly decayed by microbial activity.

Great emphasis is placed on the levels of organic matter and humus maintained in soils as an indicator of sustainability and of organic status.

RECOMMENDATIONS

Operators should minimise loss of topsoil through minimal tillage, contour banks and other works where appropriate maintenance of soil plant cover and other management practices conserve the soil.

Operators should take measures to prevent erosion, compaction, salinization and other forms of soil degradation.

Operators must measure soil organic matter when first applying for certification, and should subsequently monitor organic matter levels through appropriate testing. Producers should endeavour to develop a soil profile with good humus levels and by improving organic matter aim to achieve the following:

- Stable soil aggregates, resulting in improved structure and tilth
- Improved aeration, water penetration and moisture-holding capacity
- Improved cation exchange capacity (CEC) to retain nutrients and prevent leaching
- Buffering against high or low pH and against rapid change in soil pH
- Provision of a carbon source for micro-organisms
- Additions of nutrients contained in organic matter

The use of compost in sustainable agriculture should be maximised for its nutrient cycling function.

While not all operations can utilise compost for reasons of scale of enterprise and availability, it has useful functions at varying levels of application:

- At low levels it can add significantly to soil microbial activity
- At moderate levels it can provide important nutrients
- At higher levels it can improve soil structure and cation exchange capacity
- Proper composting is important particularly if using diseased plant tissues, materials with a high weed seed burden and materials brought in from off-farm sources (especially from conventional farms). Proper technique involves the right balance of high carbon ingredients (eg. sawdust) to high nitrogen ingredients, aeration, moisture and temperature to achieve heating sufficient to kill pathogens and weed seeds and to break down materials to form humus.

STANDARDS

3.6.1 Crop production, processing and handling systems shall return nutrients, organic matter and other resources removed from the soil through harvesting by the recycling, regeneration and addition of organic materials and nutrients.

3.6.2 Composts must be effectively manufactured regardless of the technique used.

3.6.3 Leachates must be prevented from contaminating ground or surface water systems.

3.6.4 All materials brought onto the farm must be below acceptable levels of contamination with pesticides and heavy metals.

3.6.5 Testing of compost or raw materials to establish acceptability of the final product may be required.

3.6.6 The application of compost shall reflect the crop nutrient requirements, soil and climatic conditions and prevent contamination of ground and or surface water and the land.

3.6.7 Erosion of land through wind and water must be minimised. Practices, which guard against sheet, rill, gully or other erosion will need to be demonstrated, including protection of riparian areas. Reparations of past erosion events will need to be under way if operators are to achieve and maintain full certification. All active erosion gullies will need to be identified and addressed in the OMP.

3.6.8 Operators must aim to improve soil structure and cultivation must be minimised.

3.6.9 A measure of OM levels at the time of application shall be provided.

3.6.10 The use of long fallows as the principal basis for weed control is not permitted.

3.6.11 Where successive inspections reveal that excessive tillage or other management factors have contributed to declining soil structure, a producer will be required to develop and implement a plan for soil restoration. Regular monitoring of soil organic matter will be part of any restoration plan. Where this is not implemented, decertification will follow.

3.7 GREEN MANURE

GENERAL PRINCIPLES

Green manures are plants grown to be returned to the soil for organic matter rather than for harvest. They may be mulched or turned into the soil. Green manures will usually include some legumes for nitrogen addition. Most green manures are grown in the non-cropping period and are incorporated into soil at flowering and prior to seed set.

RECOMMENDATIONS

The deliberate sowing of selected species is recommended for a green manure program.

STANDARD

3.7.1 The effective use of green manure crops for returning nutrients and organic matter to the soil shall be an integral part of organic management where appropriate.

3.8 DIVERSITY IN CROP PRODUCTION

GENERAL PRINCIPLES

Species diversity is a fundamental principle for resilient and sustainable agroecosystems.

RECOMMENDATIONS

Diversity in crop production is achieved by a combination of:

- A diverse and versatile crop rotation that includes, but is not limited to, green manure, legumes and deep rooting plants
- Appropriate coverage of the soil with diverse plant species for as much of the year as possible
- Tillage equipment and practices that minimise the need for cultivation

STANDARDS

3.8.1 Diversity in plant production and activity shall be assured by maintaining crop rotation requirements and/or variety of plantings. Minimum rotation practices for annual crops shall be established unless the operator demonstrates diversity in plant production by other means.

3.8.2 Operators shall manage pressure from insects, weeds, diseases and other pests while maintaining or increasing soil organic matter, fertility, microbial activity and general soil health.

3.8.3 Floor cover on orchards and plantations must be sod based and only subject to cultivation for purposes of renovation.

3.8.4 Operators must establish and maintain diversity in floor cover or other orchard/vineyard vegetation to encourage natural insect predators and parasites.

3.8.5 The proper organic management of fertility will require the rotation of crops, the use of animals and other mechanisms such as tillage to incorporate residues.

3.9 WATER MANAGEMENT

GENERAL PRINCIPLES

Organic farming methods aim to maintain water quality on and off the farm and to use water efficiently and responsibly, whether in irrigated or rain fed farming systems.

RECOMMENDATIONS

Operators should use techniques that conserve water, such as increasing organic matter content of soil, timing of planting and the appropriate design, efficiency and scheduling of irrigation practices.

Operators should apply water and inputs in a way that does not pollute water by run-off to surface water or leaching into ground water.

Organic operators should install systems that permit the responsible use and recycling of water without pollution or contamination either by chemicals, or by animal or human pathogens.

Operators should plan and design systems that use water resources responsibly and in a manner appropriate to local climate and geography.

Organic Management Plans should anticipate, address, and mitigate impacts on water resources, including but not limited to the application of manure, stocking densities, application of soluble fertilisers, and effluent from processing and handling facilities.

Water should be recycled as far as possible within the farm by mechanical and/or biological means.

Water from off-farm sources (eg. river, public or shared channels, bores or drainage water) should not carry substances not compatible with this Standard.

Catchment targets and community strategies should form part of the water management strategy on the organic farm.

Water use and quality must be carefully managed. Except where local salinity issues are outside the control of the individual farmer, certified organic operators must demonstrate that water, which exits the farm, is at least as high quality in terms of salts and turbidity as any surface water that enters.

STANDARDS

3.9.1 Operators shall not deplete nor excessively exploit water resources, and shall seek to preserve water quality. Where possible they shall recycle rainwater and monitor water extraction.

3.9.2 Water shall be harvested, extracted, used and disposed of in such a way as to minimise impact on naturally occurring aquatic, terrestrial or ground water systems.

3.9.3 On-site harvest of water for agricultural use (including stock water, aquaculture and processing) must allow for enhancement of on-farm and local ecosystems that are under the immediate influence of the operator. In the harvest of water provision must be made for environmental flows to maintain riverine health, wetlands and biodiversity.

3.9.4 Hydrological balances and environmental flows must be maintained with relation to irrigation practices and on-farm measures must be taken to address ground water recharge and discharge when dryland salinity is present.

3.9.5 Reclaimed or recycled waters must not introduce pollutants and/or excessive nutrients onto the farm and must not include waters reclaimed directly from conventional fields.

3.9.6 Where unacceptable risks of contamination are suspected water must be regularly tested.

3.9.7 Water containing treated human and industrial effluent, and/or their treated by-products, intended for use for irrigation on certified crop production may only be used via trickle irrigation either:

- on green manure crops;
- on crops for human consumption *if the water has been graded for unrestricted agricultural use*; or
- after the water has been subject to effective treatments and has re-entered a natural public waterway system;

provided that this water does not come in contact with the edible portion of the crop.

3.9.8 Farm practices must not permit pollution of ground and surface water.

3.10 IRRIGATION MANAGEMENT

GENERAL PRINCIPLES

Irrigation practices prevent contamination of water and products, whilst protecting the environment through efficient usage.

RECOMMENDATIONS

Monitoring is an important aspect of irrigation management and can involve techniques such as the use of tensiometers, gypsum blocks, neutron moisture meters or gravimetric measurement techniques. Test wells are highly desirable in areas with salinity problems. Weather-based irrigation scheduling methods may also be useful, but should be validated by soil monitoring. Growers should keep records of irrigation timing, volumes and soil moisture status. These records should enable the grower to develop good scheduling and to demonstrate the use of scheduling.

STANDARDS

3.10.1 Irrigation practices must ensure leaching of nutrients is minimised whilst maintaining an appropriate leaching fraction for salinity management.

3.10.2 Irrigation methods must be adequately designed, managed, scheduled and monitored to reduce problems with water table and salt management and to make minimum disturbance to the environment and natural ecosystems.

3.10.3 Irrigation management must include considerations for ephemeral wetlands, river flow regimes and wildlife habitats.

3.10.4 Hydrogen Peroxide may be used for cleaning irrigation lines but not exceeding 4ppm when discharged onto the production unit.

SECTION FOUR – GENERAL STANDARDS FOR CROP PRODUCTION

4.1 ANNUAL CROP ROTATION

GENERAL PRINCIPLES

Organic systems are designed and managed to respond to the cycles of nature and to exploit opportunities made available through climatic events and to prepare for poorer seasonal conditions.

A fundamental part of organic farming is the need for a sound rotation. The use of rotations in both broadacre and horticulture is important to enable an opportunity for the field to regain lost fertility through natural means such as a pasture ley, legume crop or green manure, and to manage weeds, pests and diseases. Rotations provide:

- The chance for a given field to restore/regain soil fertility
- The provision of a pest and disease break cycle
- The opportunity to provide hydrological balance
- The greater integration of animal and cropping enterprises
- The availability of a sequence in which pasture improvement may take place
- The opportunity to manage weeds

Recognition of the unpredictable nature of climate will always be taken into account in interpreting the following crop rotation Standard.

RECOMMENDATIONS

Farmers should maximise the percentage of pasture, the use of deep rooting perennials and legumes in the rotation, minimise tillage and maximise opportunities to retain crop residues.

STANDARDS

4.1.1 Certified operators shall use untreated organic seed and plant material for production of organic crops.

DEROGATION

Where evidence is provided that organic seed is not available, approval may be granted to use conventional seed. The use of non certified seed and plant material will be subject to review on a regular basis.

4.1.2 No annual crop of the same species, family or similar characteristic shall be planted more than 2 years out of 5 in a given field (eg garlic/onions, hard wheat/soft wheat, carrots/parsnips, white potatoes/red potatoes).

4.1.3 Except where fertility and structural characteristics are entirely met by the importation of composted manures or other permitted varieties of Organic Matter (OM), in any three year period, at least one year shall be used to grow one of the following:

- A green manure crop either volunteer or planted which is mulched or incorporated at a time and in a state considered appropriate to render fertility and structural improvement to that portion of land;
- An annual legume which has demonstrably nodulated which may be permitted to mature and seed if required; or
- A pasture ley phase which remains intact for a period of at least 12 months and includes the use of at least one legume.

4.1.4 The measurement of levels of fertility and the percentage of OM in a given field shall be measured with sufficient frequency to demonstrate that, even under the above rotational program, there is ongoing maintenance and improvement of OM. In the event of soil testing revealing a negative long-term trend, a modified rotational program shall be developed by the operator for approval.

4.1.5 The use of fallowing as a moisture and weed management tool is restricted. Given the high levels of oxidisation of OM under summer conditions, a pasture phase or crop residues must be maintained to compensate any fallow periods which span a period of more than 6 months. Other requirements remain as above.

4.1.6 In the event of drought, and the failure to produce yields of product from a given field, that field shall be deemed to have been cropped for these purposes.

4.1.7 No stubble burning shall take place.

DEROGATION

The use of cold burning of crop residues on limited basis for control of pest, disease and intractable residues (that make planting impossible) will require an application stating the net benefits of the practice. Exceptions to these requirements may be where opportunity sowing is standard practice and where a prolonged pasture phase can be demonstrated to have preceded a cropping phase.

4.2 PRODUCTION OF SEEDS, SEEDLINGS AND PLANT PROPAGATIVE MATERIAL

GENERAL PRINCIPLES

Processes of production and distribution of inputs such as seeds, seedlings and plant propagative material are subject to the same requirements of scrutiny and assessment as other inputs.

The production of seed, seedling and plant propagative material on defined land parcels will be subject to the conversion requirements outlined in section 2.1 - 2.3 of this Standard.

The production of seed, seedling and plant propagative material for use as an input product onto certified land does not have to go through a land conversion period if such product is managed through a landless system.

The production of seedlings designed for direct human consumption, such as potted herbs, will be required to go through a 12-month conversion period prior to being labelled with reference to certification.

Rigorous and accountable cleaning of materials used in conventional containerised production prior to being eligible for organic status equates with the function of the conversion period for land based organic production.

The production of organic seed, seedling and propagative material shall be of equal or higher quality than the equivalent conventional product.

Organic producers of seeds, seedlings and plant propagative material use input material that complies with this Standard.

RECOMMENDATIONS

Open pollinated varieties should be accessed where possible and if they are suitable for use as inputs into organic production systems.

Where seeds, seedling and plant propagative material production takes place in containers, the potting mix should be derived from compost leaf mould, worm casts and clean inert material of natural origin harvested to avoid environmental damage.

Plant propagative material should be grown as much as possible with nutrients contained within the potting medium. Where fertigation is used growers should observe the organic principle of soil fertility management and minimise leaching of nutrients into the environment.

Containers should be recyclable.

Where there is conventional and organic production of plant material then the risk of product confusion and contamination by prohibited substances should be managed through clear identification and visible separation of the areas.

Operators whose product is used by other growers should accept a ‘duty of care’ that their product is free from weeds, soil and seed borne disease and is true to description. There should be records of rationale used in selection, growing and protection of seed, seedlings and propagative material quality and type.

All waste materials from cleaning programs or renewal of the means of production, such as pots and spent fillings, should be disposed of without detriment to the environment.

STANDARDS

4.2.1 Seed and plant materials shall be propagated under organic management one generation, in the case of annuals, and for perennials, two growing periods, or 12 months, whichever is the longer, before being certified as organic seed and plant material.

4.2.2 Producers of organic seedlings shall manage the production organically and use organic parent material.

4.2.3 Operators shall use organic and plant material of appropriate varieties and quality. When organic seed and plant materials are not available, conventional materials may be used provided that they have not been treated with pesticides and/or fungicides not otherwise permitted by these standards

DEROGATION

Where untreated conventional seeds and plant materials are not available, chemically treated seed and plant material may be used. The use of non organic seed must be approved prior to sowing. This standard will be reviewed on an ongoing basis

4.2.4 Appropriate documented evidence is required to verify that seeds, seedlings and propagation materials and methods meet the requirements of this Standard. See Table One "Product for Plant Production" below.

4.2.5 Producers must implement a cleaning program of equipment previously used in conventional production.

4.2.6 Operators must notify the certifying body prior to using prohibited inputs that would render the finished product non organic.

4.2.7 Operators of a certified production system that is managed contrary to this Standard must dispose of all products as 'conventional' prior to reinstating and implementing a cleaning program. Repeated violations resulting from failed or insufficient management may lead to decertification.

4.2.8 Where containers are used, they must be made of non-porous material.

4.2.9 Facilities used for organic seedling production must be separated from conventionally managed facilities by a buffer zone and/or impervious screen as determined by risk.

4.2.10 Organic seedling production areas must be clearly labelled. Any outdoor areas used for organic seedlings must be marked off with paint, ribbons, rope or other conspicuous methods.

4.3 PLANT PRODUCTION

STANDARDS

4.3.1 Organic fertigation irrigation lines must be dedicated.

4.3.2 In the production of seedlings the table below details treatments and media that are permitted and restricted.

PERMITTED	RESTRICTED
Hot water treatment Legume inoculants Mycorrhizal inoculants Non chemical scarification Untreated bark fines Solarisation Steam sterilisation Sawdust from untreated wood Vermiculite Perlite	Foliar feeding (nutrients should be applied or constituted within the growing medium) Trace elements (based on evidence of deficiencies) River sand (extraction must not cause damage to riparian zone and subject to permit) Soil/Loam (subject to extraction) Peat (Restricted – sustainably harvested and subject to permit)

Table 1 - Product for Plant Production

4.4 FERTILISERS AND INPUT PRODUCTS

GENERAL PRINCIPLES

Healthy soil is the primary prerequisite for healthy plants, animals and products. With organic farming, the care of living soil and consequently the maintenance or improvement of soil fertility, particularly nutrient cycling, is fundamental to all measures adopted. Organic farming returns plant or animal material to the soil to increase or at least maintain its fertility and biological activity.

Nutrients exported from a farm are balanced by inputs to ensure long-term sustainability. Failure to replace nutrient exports will deplete soil fertility. Conversely, the over-use of fertilisers and input products will lead to a build up of nutrients in the soil which may eventually lead to ecological and environmental harm. Consequently a balance of outputs and inputs is needed. Organic operators need to be aware that nutrients can be moved around farms through rotations, animal management and use of manures and organic effluent, resulting in areas of depletion and areas of accumulation.

To maintain nutrient balance, emphasis is given to crop rotations including legumes and the use of composts and manures to balance nutrient exports, together with judicious and justified use of approved mineral supplements.

Mineral inputs to the farm are intended to maintain a balanced soil chemical fertility and not as fertilisers for crops.

RECOMMENDATIONS

Biodegradable material of microbial, plant or animal origin produced from organic practices should form the basis of the fertility program.

Nutrient resources should be used in a sustainable and responsible manner.

Nutrient losses from the farm to the natural environment should be minimised.

Nutrients should be used in such a way and at appropriate times and places to optimise their effect.

Naturally occurring mineral fertilisers and brought in fertilisers of biological origin permitted under this Standard should be regarded as only one component of the nutrient system, and as a supplement to, and not a replacement for, nutrient recycling.

Mineral inputs are regarded as supplements and not as fertilisers.

Fertility should be maintained through practical methods of approved supplements, cycling and biological activity.

The use of approved inputs should optimise soil biological functions for plant nutrition.

In heavy feeding crops, the use of inputs should be applied with reference to proper understanding of soil nutrient levels and crop requirements.

Cultivation practices are designed to minimise negative impact on soil structure and biological activity.

Physical, chemical and biological factors affecting soil fertility need to be well understood by certified organic farmers and can be complimented by detailed soil testing at intervals to permit a holistic management of soils and fertility.

Accumulation of heavy metals and other pollutants should be prevented.

STANDARDS

4.4.1 Material of microbial, plant or animal origin shall form the basis of the fertility program.

4.4.2 Nutrients and fertility enhancing products shall be applied in a way that protects soil, water quality and biodiversity.

4.4.3 Fertilisers and soil conditioners shall be limited to those described in Annex 1 “Products for Use as Fertilisers and Conditioners”.

4.5 HUMAN FAECES

STANDARD

4.5.1 Manures containing human faeces and urine shall not be used on land used for the production of food or animal feeds.

4.6 ANIMAL MANURES

RECOMMENDATIONS

Animal manures from another farm should be effectively composted to reduce the introduction of diseases, antibiotics and other pollutants to the soil. All animal manure slurry or shed manures should be composted in preference to direct application.

STANDARDS

4.6.1 Raw animal liquid waste must be from certified organic production systems and may only be applied to green manure crops or pastures and never be directly applied to edible crops for human consumption.

4.6.2 Dissolving imported raw manure in water and spreading the liquid or using it in fertigation is not permitted unless such material is composted first.

4.6.3 Fowl manure must be composted before application regardless of origin.

4.6.4 Other animal manures, slurry or shed manures must be composted prior to application except where derived from the operator's own certified property.

4.6.5 When animal manures are anaerobically composted they must employ a fully effective process.

4.7 FISH PRODUCTS

Sea fish fertilisers manufactured from waste products for direct use or composting can be valuable sources of nutrients.

STANDARDS

4.7.1 Fish fertilisers derived from sea fish caught primarily for the purpose of fertiliser manufacture are prohibited.

4.7.2 The use of inland pest fish species for fertiliser is acceptable subject to contamination testing.

4.7.3 Sulfuric acid or formaldehyde shall not be used as a stabiliser in fish products.

4.8 SEAWEED

STANDARDS

4.8.1 The use of seaweed, ground seaweed and pure liquid seaweed is permissible under the following circumstances:

- the collected material is free of contamination
- collection is carried out under permit from state or regional authorities

4.8.2 The final product shall not contain artificial preservatives or products which are not listed in Annex 1 "Products for Use as Fertilisers and Conditioners" or Annex 2 "Products for Control of Plant Pest and Disease" of this Standard.

4.9 SPENT MUSHROOM COMPOST

Spent mushroom products that have been composted may be used subject to verification that no prohibited products are present.

STANDARD

4.9.1 Spent mushroom compost containing prohibited products is not permitted.

4.10 MULCHING

GENERAL PRINCIPLES

Mulch can protect soil and plants from desiccation, suppress weeds and assist in adding organic matter. It can also moderate soil temperature.

RECOMMENDATIONS

Mulch material should be provided from certified organic sources. However, if unable to source certified mulch material, the producer should ensure and verify through documentation or testing that mulch materials from non-certified sources are free of contaminants and not treated with ammonium, straw shorteners or other chemical substances.

Growers should be aware of the potential negative impacts of mulch including reduced soil temperature and restriction of aerobic soil processes.

STANDARDS

4.10.1 Mulch materials from uncertified agricultural sources shall not be placed in contact with the edible portion of the crop.

4.10.2 Glossy paper or coloured paper containing lead is not acceptable for use as a mulch material.

4.10.3 Any treated timber products are not permitted for use as mulch material.

4.11 FERTILISERS OF MINERAL ORIGIN

GENERAL PRINCIPLES

Mineral bearing rocks are important for addressing mineral imbalances in organic farming and are capable of supplying most mineral needs if supplied in correct combinations. It is intended that natural processes help utilise the mineral content, and rocks are not chemically treated in order to increase solubility.

STANDARDS

4.11.1 Operators must ensure that rock-based materials are sourced from supplies that are low in potential contaminants such as cadmium. See Annex 7 “Maximum Levels of Pesticide and Heavy Metals”.

4.11.2 The use of gypsum produced as a manufacturing by-product is prohibited.

4.11.3 Reactive rock phosphates must have cadmium levels below 20 parts per million (ppm).

4.11.4 Wood ash from treated timbers is prohibited.

4.11.5 Mineral fertilisers shall only be used in a program addressing long-term fertility needs together with other techniques such as organic matter additions, green manures, rotations and nitrogen fixation by plants.

4.11.6 Mineral fertilisers shall be applied in the form in which they are naturally composed and extracted and shall not be rendered more soluble by chemical treatment, other than addition of water and mixing with other naturally occurring permitted inputs.

4.11.7 Mineral (elemental) sources for supplying trace elements are permitted where the producer can demonstrate the necessity, provided the material does not contain synthetic nitrogen compounds or products not listed in Annex 1 “Products for Use as Fertilisers and Conditioners”.

DEROGATION

Potassium sulphate is permitted where there is evidence of a deficiency in the soil.

4.12 THE USE OF ACTIVATORS

GENERAL PRINCIPLES

Activators can play a role in catalysing enhanced biological activity.

STANDARDS

4.12.1 Activators free from prohibited substances or genetic modification are permitted.

4.12.2 Activators must be listed in Annex 1 “Products for Use as Fertilisers and Conditioners” or be suitable according to Annex 8 “Input Manufacturing Assessment”.

4.12.3 Biodynamic preparations are permitted.

4.13 THE USE OF SLUDGES

GENERAL PRINCIPLES

Organic agriculture is not a dumping ground for modern wastes, even where recycling of nutrient may be a positive factor. The quality of waste, and the process which drives its production, can both preclude it from use in organic farming.

STANDARDS

4.13.1 The use of sewage sludge is prohibited on food and feed crops.

4.13.2 The use of sludges on perennial fibre crops and agro forestry is permissible provided that there is no evidence of excessive accumulation of heavy metals (eg tree plantations) nor any risk of pollution of surface or ground water.

4.14 PEST, DISEASE AND WEED MANAGEMENT

GENERAL PRINCIPLES

Organic pest, disease and weed management is founded on an understanding of the ecology of crops, pests, diseases and weeds and their interactions with the environment.

Preventative rather than curative measures are the first line of defence for organic systems. In this context, the design and functional diversity of organic systems makes them robust and resilient, thereby minimising the need for pest, disease and weed control interventions.

Where intervention is required, crop losses are minimised through an integrated approach to pest, disease and weed management based upon biological and cultural control techniques. The reliance on substances rather than practices for the management of pests, diseases and weeds is not in accordance with the principal aims of organic agriculture.

RECOMMENDATIONS

Integrated pest, disease and weed management strategies should be developed proactively and documented. Cultural techniques, including resistant plant varieties, crop management, quarantine and hygiene measures, should be used to minimise pest and disease risk.

Natural enemies of pest species should be protected and encouraged through appropriate habitat management. Livestock should play an integral role in pest and weed management wherever practical.

Monitoring of pest and beneficial species should be used to determine the need for, and timing of, pest, disease and weed management activities.

Operators should understand the ecology of weed populations. Attention to long term control of seed banks should be part of any weed management strategy. Such strategies should provide effective weed management whilst permitting soil development.

Feral animals and pest plants which are serious threats to natural and agricultural ecosystems should be managed. Prevention of invasion needs to be demonstrated as a first step. Operators should understand the ecology of the pest species and the changed conditions which make the natural ecosystem and farm more prone to invasion. The presence of pest plants and animals does not constitute a breach of this Standard, but their impact on land, water and biological systems should not be detrimental.

The use of substances for pest, disease and weed control should be minimised.

STANDARDS

4.14.1 All organic production systems shall display a set of positive processes/mechanisms capable of accounting for management of significant pests, weeds and diseases under normal circumstances.

4.14.2 The Operator’s Organic Management Plan shall include management strategies for endemic pest, disease and weed problems of relevance to the organic enterprise.

4.14.3 Approved pest, disease and weed management methods include:

- quarantine and hygiene
- use of appropriate crop varieties
- biological control
- crop rotations
- mulching
- mowing and grazing
- companion planting
- competitive or allelopathic crops
- heat, including steam, flame and hot water
- soil solarisation (restricted)
- mechanical means including cultivation
- the use of substances listed as 'Approved' in Annex 2 “Products for Control of Plant Pest and Disease”)

4.14.4 Thermal sterilisation of soils to combat pests, diseases and weeds is restricted to greenhouses and growing media used in landless production.

4.14.5 Cultivation shall be minimised. The need for cultivation must be demonstrated through a monitoring program.

4.14.6 Treatment with permitted substances shall only be used as a last resort after all other appropriate techniques under 4.14.3 have proven ineffective. The need for such treatment must be demonstrated through a monitoring program.

4.14.7 Treatment with permitted substances shall be well planned and safely implemented to protect beneficial species, the environment and workers applying the materials.

4.14.8 Permitted substances for pest, disease and weed management are listed in Annex 2 "Products for Control of Plant Pest and Disease") and shall be subject to the conditions of use outlined in that Annex.

4.14.9 Only those substances listed in Annex 2 "Products for Control of Plant Pest and Disease" can be used as active ingredients of formulated products. All other components of formulated products should meet the criteria of Annex 8 "Input Manufacturing Assessment". From 2005, all such components of formulated products must meet the criteria of Annex 2 "Products for Control of Plant Pest and Disease".

4.14.10 Synthetic pesticides, including insecticides, fungicides, miticides and herbicides, are prohibited from use.

4.14.11 Metaldehyde in traps for slugs and snails is prohibited.

4.14.12 Where the use of prohibited substances is required for pest, disease or weed control on existing certified areas, such as for mandatory control of declared weeds, the areas treated with prohibited substances shall be withdrawn from certification. The operator must notify the certifying body prior to the use of any prohibited substances, and shall supply the following information before the treated area can be considered for re-certification:

- an updated farm map detailing the area(s) intended for treatment
- the operator's reasons for withdrawing the area(s)
- a copy of official notification of any mandatory control requirements
- details of the treatment program including substances and application equipment to be used
- details regarding storage of the prohibited substances during the treatment program
- management strategies to avoid contamination of certified areas adjacent to the area(s) to be treated
- a long term management strategy aimed at replacing the proposed emergency control measures with organic alternatives

4.15 ON-FARM PROCESSING

GENERAL PRINCIPLES

Processing includes, but is not limited to, the packing or bottling, storing, dehydrating, cleaning and handling of organic food and fibre. Certified operators may carry out on-farm processing as a mechanism of value adding.

On-farm processing may involve the handling of other certified operators' products.

The processing facility may be inspected in conjunction with other areas of the farm at regular inspection time.

STANDARD

4.15.1 Certified operators who handle more than one other certified operators' product are required to be certified as Processors.

4.16 OFF FARM PROCESSING

GENERAL PRINCIPLES

Processing facilities can be certified in their own right, i.e., be able to process organic product for many producers, or can be certified as a Sub-licensee where the processing facility itself does not become certified. In such instances, responsibility for maintaining compliance with this Standard is a contractual obligation of the certified operator applying for Sub-licensee Certification. Sub-licensee Certification is limited to the processing of one other certified operators' product.

STANDARD

4.16.1 Any handling, storing, packing and processing of organic products off farm must be covered by organic certification and inspection to maintain the certified organic integrity of the product.

4.17 TRANSPORT & HANDLING

GENERAL PRINCIPLES

Any transport and handling of organic products is done in ways that maintain integrity and quality, and minimise risk of contamination and development of pests and disease. Unpackaged organic products are transported in ways which separate them in time or space from conventional products.

RECOMMENDATIONS

It is preferable that transport vehicles and shipping containers are dedicated to organic usage.

The choice of transport should be based on accessibility for cleaning prior to handling organic products. Stainless steel and other metal tray/tipper trucks and tankers normally used in food transportation are recommended as they are easily cleaned between shipments of certified and non-certified material.

Cartage record templates should be obtained from the certifying body.

Wooden containers, if used, should be dedicated to certified products only and clearly labelled as such, or lined as indicated below.

STANDARDS

4.17.1 Every precaution must be taken to avoid the possibility of contaminating organic produce with conventional goods, non-agricultural materials or pollution, including cleaning or disinfestation products.

4.17.2 Mixing or switching of organic with non-organic products is prohibited.

4.17.3 Transportation systems must be able to be cleaned with ease to ensure product integrity during transit.

4.17.4 Vehicles which carry toxic and poisonous materials are prohibited for transporting unpackaged and bulk certified food transports.

4.17.5 Responsibility for cleaning of transport lies with the certified operator.

4.17.6 Organic and non-organic products may not be transported together unless they are packaged and sealed.

4.17.7 Non-dedicated containers must be cleaned or lined and covered with an approved protective material (eg polyethylene sheeting).

4.17.8 All vehicles carrying bulk goods must be suitably covered with sheeting or tarpaulins to prevent any external contamination.

4.17.9 Vehicles and containers used must be excluded from non-permissible pest control activities (ie, fumigation and preventative spraying), both before shipment and during transit.

4.17.10 Operators shall develop a protocol for the transportation of organic bulk goods and that transport shall be carried out according to the requirements of this Standard.

4.17.11 Documentation associated with the picking up, transport and delivery of organic produce shall be completed at each point in the chain of custody and kept by the transport company or operator responsible.

4.17.12 Labelling of packages or containers in transit must include the name and address of the certified operator, the certification number and the name of the product with reference to the organic production method.

4.17.13 If there is doubt that the products received by an operator are organic they may not be passed on or processed until there is clear evidence of the organic status of the product.

4.18 STORAGE & WAREHOUSING

GENERAL PRINCIPLES

Maintenance of the integrity of organic product is vital, through clear identification and protection from contamination, including storage and warehousing facilities.

RECOMMENDATIONS

Handlers and processors should handle and process organic products separately in both time and place from non-organic products.

Handlers and processors should identify and avoid pollution and potential contamination sources.

Stock record systems should be coded so that it can clearly be determined what quantity of organic material is in storage at any one time.

Old timber structures are not recommended and may require sealing or coverage.

Co-storage of organic products with different basic storage needs is not recommended.

STANDARDS

4.18.1 Conventionally produced and certified produce must be separated in time and space.

4.18.2 Where organic products are in bulk form, storage area surfaces must be physically sound and capable of being easily cleaned (ie. free of major cracks and crevices, which harbour pests and food residues). Well prepared concrete, steel and food grade surfaces are acceptable.

4.18.3 Rusted or contaminated surfaces must be re-sealed or covered with a non-contaminating liner.

4.18.4 Besides storage at ambient temperature, the following storage conditions are approved:

- Modified atmosphere (ie. nitrogen, oxygen, ozone, carbon dioxide)
- Cooling
- Freezing
- Drying
- Humidity manipulation

4.18.5 Co-storage of conventional produce and organic produce under controlled atmosphere is prohibited.

4.18.6 Sacks or bulk bags must be dedicated for organic use only and clearly marked as such.

4.18.7 Labelling must clearly identify the organic nature of products in storage.

SECTION FIVE – INDIVIDUAL CROP CATEGORIES

5.1 COTTON PRODUCTION

GENERAL PRINCIPLES

Cotton production under this Standard is aimed at providing a contaminant free growing environment and product, in addition to satisfying minimum criteria for the conservation of soil, water and biodiversity in the production phase. The segregation and preservation of the identity of organic cotton from field to factory and beyond is maintained through organic certification.

RECOMMENDATIONS

Production should take place in areas where some plant diversity exists in surrounding areas, whether or not the area has been used for conventional cotton in the past.

Selection of the farm area should favour those where natural growing advantages are present such as higher fertility, reduced weed burden and low contamination history.

Soil structure and fertility should be improved with crop rotation, cover cropping, pasture, green manures and composting.

An organic IPM program should be designed which incorporates cultural practices such as timing, variety, rotation, proximity of other insect pest host plants, trap cropping (provision for habitat for beneficial insects be it perennial or annual) and intercropping. The grower should make provision for the release of beneficial insects such as trichogramma or other parasites or predators and should demonstrate an understanding and recognition of invertebrates within the cropping ecology. Pheromone traps, food attractants, and mating disruption devices should be used, along with the use of permitted bacterial and viral inputs. Management should lead to the building and maintenance of a suitable, stable plant/insect ecology capable of providing buffering against incoming pest insects.

Mechanical weed control such as cultivation, chipping and scuffling should be considered along with grazing, mowing and steam or flame weeding.

Timing of cultivation, layout and levelling, mulches and crop residue management as well as design and maintenance of water application and drainage systems should be undertaken.

Crop residues should be retained on the surface to reduce soil erosion.

Land levelling should have taken place to ensure efficient application of water and, where irrigation occurs, a recirculation system should be in place to re-use water from organic fields.

Design of irrigation drains and furrows should permit the conveyance of water at non-erosion velocities around and from the farm. Tail drains should be designed to eliminate erosion especially where water drops from field to tail drain. A water scheduling system should be in place.

Tail water should be analysed to determine phosphorous, nitrogen, turbidity and pH.

STANDARDS

5.1.1 Water must only be used from existing entitlements or from waters harvested from flood situations.

5.1.2 Only re-used water from organic production areas may be re-applied to organic production areas.

5.1.3 Minimum vegetative cover on all channel/drainage systems is required to prevent soil erosion and to minimise the occurrence of unwanted pest plants.

5.1.4 Harvest equipment must be cleaned out prior to use to prevent the remnants of conventional cotton from contaminating the organic product.

5.2 GINNING

STANDARDS

5.2.1 Only certified gins may be used to process organic cotton.

5.2.2 Storage facilities must demonstrate separation of organic bales and a durable and clear system of marking and recording of stocks.

5.3 WILD HARVESTED PRODUCTS

GENERAL PRINCIPLES

Wild harvested products lead to the encouragement and fostering of a wide range of flora and fauna, which would naturally occur within such ecosystems.

The production and harvesting of certain wild or naturally occurring foods and fibres is included under this Standard.

Fishing and hunting of migratory or wild animals is not included in this Standard.

Whilst Wild Harvest will not include the same proactive management measures seen in organic farming, the following standards will apply.

STANDARDS

5.3.1 Harvest and production shall occur within a system which is not subject to degeneration of the natural ecosystem within which the products are grown, but is naturally regenerating under the harvest processes.

5.3.2 Where an area designated for wild harvest is subject to harvest by other operators, those operators practices must not fail to satisfy the same requirements for sustainability and regeneration of the resources base.

5.3.3 Harvesting of produce shall not involve the clear felling of flora or stripping of fruits of an area which may compromise the ability of the area to function naturally as a complete ecosystem.

5.3.4 The harvest process shall not discriminate against native species and shall protect as much as is feasibly possible the natural ecosystems within which these species have evolved.

5.3.5 Areas to be certified under the Wild Harvest label shall be clearly defined and identifiable. Such areas shall not have been subjected to the application of prohibited substances.

5.3.6 Wild Harvest areas shall be a satisfactory distance from conventional farming which may otherwise pose potential contamination hazards for the operation.

5.3.7 The Wild Harvest area must not be grazed by conventional stock unless they conform to the requirements of quarantine, and are managed in accordance with this Standard.

5.3.8 Wild Harvest operations must not violate indigenous land holder rights and interests, nor pose problems to their way of life. There must be payment of royalty rights and other remunerations where these are applicable.

5.3.9 The operator must exhibit a proven working knowledge and management ability for the region and ecosystems in question.

5.4 LABELLING

STANDARD

5.4.1 Products certified under Wild Harvest can only be labelled as “Organic”.

5.5 LANDLESS SYSTEMS

GENERAL PRINCIPLES

Landless production systems refer to plant products where production is not linked to soil.

STANDARDS

5.5.1 Under landless systems, parallel production is not permitted.

5.6 SPROUTS

GENERAL PRINCIPLES

Sprouts are grown without land in clean water.

RECOMMENDATIONS

The use of naturally sourced spring or rainwater is preferable to mains water.

STANDARDS

5.6.1 Organically certified sprouts must be produced only from organically certified seeds.

5.6.2 The production process must give due consideration to the potential effects of by-product effluent and other waste products to the manufacturing surrounds.

5.6.3 Water used in production must be at least of World Health Organisation (WHO) standards for (potable) drinking water.

5.6.4 No growth promoting, fungicide or other prohibited additives may be mixed with sprout water.

5.6.5 The growing medium must be hygienic, non-permeable and able to be cleaned effectively using organically approved methods. Cleaning methods must in no way pose a contamination risk to sprout production. Packaging of sprouts must comply with the NASAA Organic Standard.

5.7 MUSHROOMS

GENERAL PRINCIPLES

Mushroom production is considered to be an agricultural practice but may also be the subject of a landless production system that meets all appropriate requirements of this Standard.

RECOMMENDATIONS

Management practices aimed at preventing pest/disease should be implemented. Such practices include:

- sanitation
- proper airflow
- removal of affected blocks
- controlled atmosphere (air tight vessel containing carbon dioxide or nitrogen)
- forced air circulation

STANDARDS

5.7.1 Mushrooms shall be grown on or in a medium which satisfies the requirements of this Standard.

5.7.2 Steam sterilisation, heating, ethanol and hydrogen peroxide treatments of buildings and equipment are allowed.

5.7.3 Chemical substances either in the compost or sprayed on the crop as a fog are not permitted unless listed in Annex 2 "Products for Control of Plant Pest and Disease". The following substances are prohibited:

- Chlorinated water for disease control
- Formaldehyde for sterilisation
- Fumigation by methyl bromide
- Bleaching mushrooms
- Post harvest treatment of compost with fungicides

5.7.4 Operators must ensure there are adequate physical and barrier methods for fly and pest control (refer to Annex 2 "Products for Control of Plant Pest and Disease").

5.7.5 Only organically sourced spawn may be used.

DEROGATION

Where evidence is provided to demonstrate that organic spawn is not available in sufficient quality and quantity, approval may be granted to use spawn not produced in accordance with this Standard.

5.8 DRIED FRUIT

GENERAL PRINCIPLES

Under this Standard dried fruit is dried naturally and not subjected to mixing or contamination.

RECOMMENDATIONS

Fruit should be dried with no additives.

The type of drying method used should be itemised on all packaging.

STANDARDS

5.8.1 The use of vegetable oils and potash for grape drying is permitted. Where available, organic vegetable oils must be used.

5.8.2 The use of sulphur dioxide is prohibited for dried fruit.

5.8.3 Fruit drying racks must be on a dedicated portion of certified land and subject to inspection. Racks used for certified produce may not also be used for conventional product.

5.8.4 Wooden racks must not be treated with any materials which could contaminate produce.

5.8.5 Dust must be minimised in the vicinity of racks.

5.8.6 Rack areas may only be used for the purpose of drying fruit.

5.9 COFFEE, COCOA AND TEA PRODUCTION

GENERAL PRINCIPLES

These crops are cultivated in ways that protect the environment, ensure product integrity and maintain optimal social and economic independence of those involved in production.

Production may come from plantations or shade tree environments.

This section should be read in conjunction with Section 8 Social Justice.

RECOMMENDATIONS

Clones and seedlings should be adapted to the local environment and be resistant to local pests and diseases.

Continuity of production should be maintained by replanting programs.

Soil pH should be corrected if necessary using lime or dolomite.

Firewood used in processing or production systems should not lead to deforestation.

As much as possible, processing and packaging should be carried out in the country of origin.

Suitable areas for organic home gardens and/or animal husbandry should be available to workers.

STANDARDS

5.9.1 Erosion must be prevented using effective soil conservation methods such as:

- Covering soil when not in use
- Terracing and contouring
- Using silt traps and arresting gully erosion with structures if necessary

5.9.2 Soil OM must be improved by available methods such as compost, legumes and mulch.

5.9.3 Fertility must be maintained in the long term by replenishment through minerals, composts and other available techniques approved under this Standard.

5.9.4 Except in plantations, shade trees and shrubs must be maintained in the production area to provide nitrogen and shade and help with pest control.

5.9.5 Waste recycling must be carried out.

5.9.6 Burning must not lead to soil loss.

SECTION SIX – GENERAL STANDARDS FOR ANIMAL HUSBANDRY

6.1 ANIMAL HUSBANDRY

GENERAL PRINCIPLES

Organic livestock husbandry is based on the harmonious relationship between land, water, plants and livestock, respect for the physiological and behavioural needs of livestock and the feeding of good quality, organically grown feedstuffs.

Pastures are managed for biodiversity and soil conservation as well as animal production.

Organic animal management is based on the principles of balanced nutrition and feeding for prevention of disease and resistance to infection, parasitic attack and metabolic disorders.

RECOMMENDATIONS

Producers should maintain conditions that enhance, as much as possible, the animals' lives, physiological needs and behavioural needs.

Animal breeding and selection should consider breeds and genetic characteristics, which are naturally suited to the individual farm.

Maintenance of ground cover is important for soil conservation which may require farmers to adjust stocking rates when required.

Grazing practices should lead to the fostering of biodiversity. Grazing and pasture management should be based on minimisation of nutrient application and subdivision of areas to land class and should incorporate responsive grazing in contrast to set stocking.

Artificial insemination is not recommended.

STANDARDS

6.1.1 Animals shall be allowed to practise their normal behaviours without interference to normal growth patterns. In particular animals must be capable of natural copulation and birth.

6.1.2 Embryo transfer techniques and cloning are prohibited.

6.1.3 Artificial insemination using separated, segregated or otherwise modified sperm is prohibited.

6.1.4 The use of genetically engineered species or breeds is not allowed.

6.1.5 Hormonal heat treatment and induced birth are not allowed.

DEROGATION

Unless applied to individual animals for medical reasons and under veterinary supervision.

6.1.6 Synthetic growth promotants are prohibited in all livestock production systems.

6.1.7 The operator must make provision for both animal welfare and soil protection through adequate ground cover that considers all extremities in climatic conditions.

6.1.8 Stocking rates for livestock must be appropriate for the region, taking into consideration feed production capacity, health, nutrient balance, and environmental impact.

6.1.9 Grazing animals shall be subject to control that includes the capacity to remove animals from a given area as part of a rotation.

6.1.10 Animals shall be provided with adequate diet, nutrition and water supply so as to maintain them in fat score 2 or better (sheep and cattle).

6.1.11 Meat, wool, eggs, milk and honey will be subject to a NATA approved laboratory testing of tissue for chemical and heavy metal residues prior to application of the NASAA label.

6.1.12 Land and animals may move from conversion to organic simultaneously subject to the requirements for all other land and animal conversion periods. Where existing animals are converted separately to land the following management time frames apply:

ANIMALS	MINIMUM ORGANIC MANAGEMENT PERIOD
Cows for milk production	6 months
Fowl for egg production	Not permitted
Fowl for meat production	Not permitted
Ruminants and Monogastrics	Not permitted
Aquaculture species	Not permitted

Table 2 – Minimum Organic Management Periods for Existing Livestock

6.2 ANIMAL SOURCES

GENERAL PRINCIPLES

Organic animals are born and raised on organic holdings.

RECOMMENDATIONS

Wherever possible, sources of livestock should be from certified organic farms.

Animals should not be sourced from properties suspected to be carrying infectious diseases.

STANDARDS

6.2.1 Only animals born, raised and gestated on an organic farm from the last trimester are eligible for full organic certification. Exceptions are listed in Table 3 "Maximum Age for Brought in Livestock Products" below:

ANIMALS	MAXIMUM AGE OF BROUGHT IN LIVESTOCK
Cows for milk production	Dairy calves up to 4 weeks old that have received colostrum and are fed a diet consisting mainly of full milk
Fowl for egg production	From 2 day old chicks
Fowl for meat production	From 2 day old chicks
Ruminants and Monogastrics	From last trimester of pregnancy
Aquaculture species	In a fingerling form

Table 3 – Maximum Age For Brought In Livestock Products

6.2.2 Regardless of the certification status of animals on the organic farm, no more than 10% of a herd may be replaced annually from conventional sources in accordance with the requirements outlined in Table 3 "Maximum Age for Brought In Livestock Products" above.

DEROGATION

Exceptions to this may be sought based on the following

- Drought or other natural disaster
- Herd/flock replacement incorporating upgrade of genetic material incorporated into a complete organic livestock management program

6.2.3 Brought in animals from non organic sources and their products may be converted to organic with the minimum time frames as set out in Table 3 "Maximum Age for Brought In Livestock Products" above.

6.2.4 Certification of animals as organic will require that the relevant pasture and feed is also certified organic.

6.3 ANIMAL WELFARE AND INFRASTRUCTURE

GENERAL PRINCIPLES

Animals should be allowed to satisfy their basic behavioural needs. In particular, organic livestock are able to forage on certified land, move untethered and uncaged and take wing in the case of flight birds.

Fences, yards and housing are constructed in ways which do not lead to injury or bruising as a consequence of poor design.

RECOMMENDATIONS

Operators should maintain conditions that promote, as much as possible, the animals' physiological and behavioural needs.

Shelter in paddocks should include windbreaks and shade throughout the day.

Animal breed selection should encompass consideration of breeds and genetic material, which is naturally suited to the farm and district environment.

Yards next to animal housing should be managed to provide comfortable and secure conditions without excessive mud, dust, hazardous material, points of potential contamination or land degradation.

STANDARDS

6.3.1 Shelter and shade shall be provided to give all animals protection against the sun, extreme wind and rain.

6.3.2 Measures must be taken to provide animals with adequate alternatives to waterlogged pasture, holding pens and accommodation.

6.3.3 Landless animal husbandry systems are prohibited. Animals must be allowed free movement and access to pasture at least on a daily basis.

6.3.4 When confined for nights, inclement weather or for other reasons on a temporary basis, animals must have access to:

- A sleeping area with adequate natural bedding material
- An adequate supply of fresh water and feed
- Adequate space to stand, lie down, turn around, groom, and carry out natural behaviour such as stretching and wing flapping
- Adequate fresh air, sunlight, ventilation (to prevent high humidity and build-up of gases), and insulation from heat and cold
- Housing cleaned of manure, urine and uneaten or spilt feed as often as necessary to minimise unpleasant odours and avoid attracting pests

6.3.5 Where livestock are housed, the minimum "on ground" density shall comply with the following, for:

Small to medium ruminant animals	Not less than 1.5 square meters for every animal
Medium to large ruminant animals	Not less than 3 square meters for every animal on ground
Small to medium mono-gastric animals	Not less than 1.5 square meters for every animal
Medium to large mono-gastric animals	Not less than 3 square meters for every animal
Poultry and squab	For adult laying birds no more than 16kg per square metre and for all other adult birds 25kg per square metre
Ducks, geese and turkeys	Ducks, geese, housing is not necessary after the agnostic stage however shelter for shade purposes is required; For turkeys, not less than 1 metre square for every two (2) birds on ground

Table 4 - Housing density for housed animals

6.3.6 Housing, pens, equipment and utensils must be cleaned and disinfected to prevent cross-infection and the build-up of disease carrying organisms. Only those products listed in Annex 8 "Products Permitted for Cleaning and Sanitation of Surfaces and Equipment" are permitted for sanitation purposes.

6.3.7 Housing must allow for unrestricted access to the outdoor run area for all birds during daylight hours. Total bird numbers contained in any single house must provide that sufficient outdoor run areas surround each building to ensure stocking densities are capable of sustaining reasonable vegetative cover for given seasonal conditions.

6.3.8 Floor litter material must be provided from untreated sources. If this litter material is consumed by the housed species, the material must comply with the feed requirements outlined in this Standard.

6.3.9 Chicken tractors shall not be permitted where restrictions to free range and movement result.

6.3.10 In the case of laying hens natural light may be supplemented by artificial means to provide a maximum of sixteen 16 hours light per day with a continuous nocturnal rest period without artificial light of at least eight (8) hours.

6.3.11 Fowl, rabbits, and pigs must not be kept in cages that preclude natural foraging and flight in the case of winged birds.

6.3.12 Animals must be protected from predation.

6.3.13 Herd animals must not be kept in isolation.

DEROGATION

Male animals and animals about to give birth may be exempted, as well as animals in smallholdings with individual animals only.

6.3.14 The use of restraining tethers, cages or pens are not permitted except for short periods for holding purposes only.

6.4 CONTAMINATION RISKS IN PADDOCKS, YARDS AND SHEDS

GENERAL PRINCIPLES

Organic livestock production avoids contamination resulting from past and adjacent practices through identification of risks and the implementation of appropriate action to minimise or eliminate such risk.

RECOMMENDATIONS

Each operator should develop a risk management plan that identifies all physical, biological and chemical hazards that may pose risks to animal health, welfare and integrity.

STANDARDS

6.4.1 Dip sites shall be tested for chemical and heavy metal contamination and require renovation or quarantine if contamination levels are above MLs.

6.4.2 Shearing sheds shall be free of contamination from past use and free of all prohibited veterinary input products. The operator shall ensure boards are adequately cleaned by heavy scouring to remove animal and dung residues prior to use.

6.4.3 Restricted substances must be stored in lockable storage facilities and adequately identified as such.

6.4.4 Yards shall be tested to ensure that contamination levels are below the ML's for organophosphates, organochlorines and arsenic in relevant animal products.

6.4.5 Where contamination is greater than the allowable levels, the yards shall be relocated or top-dressed with a minimum of 10cm of acceptable uncontaminated material.

6.4.6 Portable dips must be thoroughly cleaned and shall require a written specification for cleaning methods submitted, and approved. Cleaning of portable dips shall not be conducted on a certified organic farm.

6.4.7 The use of creosote posts in certified production areas is not permitted.

6.4.8 Existing chromium arsenate posts may only be used for end assemblies and not in areas of animal confinement eg yards.

6.4.9 Public or private utilities within or adjacent to the farm suspected of posing contamination risks must be identified.

6.5 DIET AND NUTRITION

GENERAL PRINCIPLES

Organic animals are fed on certified organic feeds and/or pasture sourced primarily from the farming unit.

Animal health results from a combination of good management practice and sound nutrition.

RECOMMENDATIONS

Energy, protein and roughage supplies should be adequate to maintain good animal health and condition (eg. young and reproducing cattle and sheep fat score 3 or above; dry animals fat score of 2 or above).

Minerals and trace elements should be provided to stock where it is known that specific deficiencies occur. Where possible, such deficiencies should be corrected by soil amendments so that the animals' intake is in a natural (plant) form. Where appropriate, natural mineral fertilisers, rock dusts, or sea products (fish and/or seaweed applications) should be applied to pastures, and multiple pasture species, especially those known to accumulate deficient elements, should be planted.

Based on human and animal health consideration meat meal should not be fed to certified livestock including pigs and poultry.

STANDARDS

6.5.1 The diet must comprise 100% organic feed, be balanced according to the needs of the animal, be sufficient and of good quality and include daily access to roughage in the case of ruminants.

6.5.2 For livestock products to be labelled as organic or biodynamic, the livestock diet must be sourced from organic or biodynamic feed.

6.5.3 Feeding any portion of in conversion feed will result in the labelling of animal products as in conversion.

DEROGATION

Feed produced and stored from the same production unit (ie not brought in) during the in conversion period may be fed to organic and biodynamic livestock without them losing their organic or biodynamic status.

6.5.4 Grazing must be on herbage grown according to this Standard.

6.5.5 All animals must have access to organic forage.

6.5.6 Feed supplements of non agricultural origin can include minerals, trace elements and vitamins only if from natural sources.

6.5.7 Feed supplements of agricultural origin must be of certified organic or biodynamic origin.

DEROGATION

If organic agricultural feed or feed supplements are unavailable, application may be made for provision to feed up to 5% of the animal diet (calculated on an annual basis) with non organic agricultural supplements provided it does not contain prohibited substances.

6.5.8 Offspring must receive colostrum from the mother within six hours of birth and be reared by their mother for at least the first 12 hours after birth in order to assist in their development of a natural immunity to infection.

DEROGATION

Stock may qualify for an exemption based upon disease risk management upon application. Where multiple suckling or bucket rearing is used, organic whole milk of the same species must be provided for at least 8 weeks after birth. Only in emergencies can non organic milk or milk replacers or other substitutes be used. Feed supplements used during and after this period must be in accordance with this Standard and not contain synthetic additives, antibiotics etc

6.5.9 Feeds containing offal, faeces, urine, urea, slaughter products, food industry by-products treated with solvents, same species materials or other prohibited substances are not permitted. Meat meal, which is not sourced from certified organic animals, is permitted to be fed to fowl and pigs at rates of no more than 2% of total diet.

6.5.10 The use of certified organic meat meal which is sourced from certified, organic animals, is permitted for use for non ruminants without restriction as long as there is no feeding of the same species.

6.5.11 Ruminants may not be fed with animal products except milk products.

6.5.12 Vitamins, trace elements and supplements shall be from natural origin.

DEROGATION

Exceptions shall be made if there is satisfactory documented evidence that there is a demonstrated deficiency in feedstuffs and there is documented evidence that dietary requirements cannot be sourced in sufficient quantity and quality from natural sources.

6.5.13 Over 50% of the feed shall come from the farm unit itself, or be produced in cooperation with other certified farms in the region.

6.5.14 Rumen activators are restricted to rejuvenation of the animals' metabolic processes and must be derived from natural and non-genetically engineered ingredients.

DEROGATION

In the event that 95% or more of organic feed sources are not available as a result of drought or other natural disaster, and after notification, feeds may be of non organic origin, provided that they do not contain substances listed in this Standard as prohibited. In such an event, full organic livestock status may be regained in 6 months from the cessation of such practice. Tissue tests may be required. This derogation should be read in relation to importing country requirements.

PERMITTED	RESTRICTED	PROHIBITED
Certified organic feeds Pasture from a certified organic farm Organic food industry by products Natural vitamins	Seaweed Molasses Minerals Lime Rumen activators including probiotics Minerals and trace elements Bentonite Fish by products Meat meal (non ruminants only) Vitamins - sourced from non-natural sources Yeast Apple cider vinegar Amino acid isolates (see below)	Urea and other synthetic nitrogen compounds Artificial Colorants Hormones Manures Slaughter by products of the same species Solvent treated feeds Synthetic feed additives, appetisers and preservatives Synthetic growth promoters and stimulants Synthetic anti-oxidants Emulsifiers and antibiotics Synthetic fodder preservatives such as acetic, formic and propionic acid

Table 5 - Livestock Diet and Nutrition

The following feed substances may be used:

- bacteria, fungi and enzymes
- by-products from the food industry (eg. molasses)
- plant based products

DEROGATION

Methionine may only be added to poultry rations where the certification body has given prior agreement. Methionine may not be used on an ongoing basis, approval will be for a defined period.

Methionine may be used as a last resource in cases where the following conditions have occurred:

- *Protein content of grain is low due to seasonal conditions during production of grain and*
- *Pulse variety and/or variety of food natural to poultry diet are not available, and*
- *Green paddock feed is not available due to prolonged dry conditions*

6.6 HEALTH

GENERAL PRINCIPLES

Organic management practices promote and maintain the health and well being of animals through balanced organic nutrition, stress-free living conditions, breed and breeding selection for resistance to diseases, parasites and infection.

Organic animal management is based on the prevention of disease and raising healthy animals that are able to resist infection, parasitic attack and metabolic disorders.

RECOMMENDATIONS

Health promotion and disease prevention should include the following techniques:

- Breeding and selection
- Exercise and access to the open
- Access to organic feed
- Appropriate stocking densities and rotational grazing

Approved veterinary treatment should be considered as an adjunct to, and not a substitute for, good management practices.

The aim should be to develop resistance in animals through breeding and selection and to correct the cause of the disorder, rather than treating the symptoms.

Internal and external parasites should be managed, as much as possible, through farm management practices such as rotation through paddocks, stock and feed diversity, double fencing and grazing management.

Management of different species in pasture rotations should be practiced for parasite control.

STANDARDS

6.6.1 Animal health must be maintained primarily through pro-active management, breeding and selection to address the cause of disorders, rather than treating the symptoms.

6.6.2 The operator shall provide records of veterinary treatment to animals.

6.6.3 If animals suffer disease or injury despite preventative measures the operator must not withhold appropriate veterinary treatment, even if it results in the loss of certification to the treated animals.

6.6.4 The following conditions will apply to the use of prohibited inputs:

- That there is a health care emergency
- That a future organic option for the treatment is developed to prevent re-occurrence
- That a program of parasite management including grazing, counting and culling is in place

6.6.5 The use of any veterinary drugs, including antibiotics, is not permitted (eg. dry cow treatment for mastitis). This Standard prohibits the addition of any antibiotics to feedstuff.

6.6.6 In the event that prohibited parasiticides and/or antibiotics are administered, the following conditions of certification shall apply:

Meat loses certification on a permanent basis
Sheep will require a period of at least 18 months before wool products regain organic certification
Milk products must be withheld for a period of at least 6 months before being acceptable as organic
Eggs lose certification on a permanent basis
Poultry meat loses certification on a permanent basis
Aquaculture loses certification for that cohort

Table 6 - Withholding Periods for Livestock

6.6.7 Vaccines may be used when an endemic disease is known or expected to be a problem in the region of the farm and where the disease can not be controlled by other management techniques. The use of vaccines under these circumstances will not prejudice certification and does not require quarantine procedures. Vaccines shall not be genetically engineered.

DEROGATION

Where vaccination for export is required application may be made for their use.

PERMITTED	RESTRICTED	PROHIBITED
Copper sulphate Magnesium salts Homoeopathic remedies Herbal remedies Limestone and dolomite Natural vitamins Vegetable/Herbal oil extracts Clays Sulphur Garlic, garlic oil and extracts Seaweeds Seaweed meal or extracts Sea salt and salty water Methylated spirits Cider vinegar Zinc sulphate Diatomaceous earth	Rotenone Monosodium fluorosilicate (Animal products must be quarantined for 3 weeks after treatment) Pyrethrum Neem Hydrogen peroxide Vaccinations Tallow	Synthetic parasiticides on a routine basis Antibiotics on a routine basis Medication in the absence of illness Sub-therapeutic doses of antibiotics Hormones Proprietary anthelmintic agents Chemically synthesised tranquillisers Modified organisms or products thereof Prophylactic use of allopathic medicine Synthetic growth promoters and stimulants Synthetic substances used to suppress natural growth

Table 7 – Livestock Health

6.7 WEANING

GENERAL PRINCIPLES

Weaning of animals shall enable the natural process of animal rearing to occur, including progeny having access to colostrums or first milk where relevant.

STANDARD

6.7.1 Weaning times shall conform to the following minimum time frames:

Calves	3 months
Lambs	9 weeks
Piglets	6 weeks

Table 8 - Minimum weaning times

6.8 ANIMAL SURGICAL TREATMENTS

GENERAL PRINCIPLES

Animal surgical treatments are only carried out if the operator can demonstrate that the benefits of the action outweigh the consequences of non-treatment and there are no other acceptable management options.

RECOMMENDATIONS

The operator should choose breeds and practices which do not rely on surgical treatments.

STANDARDS

6.8.1 Animal mutilations are not permitted.

6.8.2 Where the following surgical treatment is shown to be necessary, it shall be performed in such a way that minimises the stress and injury to the animal:

- Castration

- Tail docking of lambs
- Mulesing (only for Merino)
- Dehorning
- Ringing

6.8.3 Dehorning shall be undertaken shortly after birth if necessary and within the first four months of life. Dehorning of animals over 6 months shall be done under anaesthetic.

6.8.4 Tooth cutting or grinding is not permitted.

6.8.5 Castration of lambs and calves must be carried out as soon as possible after birth and no later than 10 weeks after birth for lambs and 6 months for calves. Animals over 6 months of age must be castrated under the scrutiny of a licensed veterinarian and with anaesthetic.

DEROGATION

That when up to 5% of stock are missed as a result of incomplete muster or timing of birth, they may be castrated as per the other 95%.

6.8.6 Pigs may only be castrated before 2 weeks of age.

6.8.7 Tail removal and mulesing of at least 95% of lambs shall be carried out within 10 weeks of birth and under optimal circumstances to minimise fly and bacterial infection. The operator must provide a management plan demonstrating the need for mulesing. The management plan shall include references to the sheep breed, bloodline and any genetic improvements under way. In addition, the plan must demonstrate that available, permitted fly treatments are ineffective and that fly control measures and strategic crutching have failed to replace mulesing.

6.8.8 Tail cutting in cattle is not permitted except for the removal of non-flesh portions of tails.

6.8.9 Teeth cutting, de-beaking and wing cutting are prohibited.

6.9 ANIMAL RECORDS AND IDENTIFICATION

GENERAL PRINCIPLES

Identification of organic animals is the basis for ensuring traceability, final product identity and permitting accurate and informed management.

RECOMMENDATIONS

Branding using commercial inks should be practiced with caution as contamination may result.

Sheep, cattle, pigs and goats should have individual identification.

STANDARDS

6.9.1 Tags or markers shall be affixed to any animals requiring individual identification.

6.9.2 Approved identification includes the following:

- Hot and Freeze branding
- Electronic collars
- Earmarking
- Tattooing
- National Livestock Identification Scheme
- Electronic and rumen bolus
- Ear tags

6.9.3 The operator shall maintain adequate records and identification practices to ensure that each animal mob; flock, herd or school can be identified and traced back to the farm.

6.9.4 Records must identify each individual that has received prohibited treatment(s) and has been quarantined.

6.9.5 Records shall include details that identify the organic status and/or quarantine periods of all stock that have been brought in.

6.9.6 Records shall include details of feedstock brought in and identification of the animals that had access to that feedstock.

6.9.7 Records of all livestock sales and purchases must be maintained up to date and kept for a period of five years after the disposal of the animal.

6.10 QUARANTINE

GENERAL PRINCIPLES

The quarantine period and location helps to restrict the entry of chemical and biological agents onto the organic production area.

RECOMMENDATIONS

A quarantine paddock should be one that is dedicated to use and sized and managed to permit an effective barrier against pests, contamination and disease of any new stock brought onto the certified property.

STANDARDS

6.10.1 Where prohibited treatments are used or non-certified stock are brought on-farm, the producer shall provide a certified paddock dedicated for quarantine purposes that ensures treated or purchased stock are quarantined from other stock and from organic cropping areas. This paddock shall have stock proof fences on all sides.

6.10.2 Non certified stock can be agisted on certified land provided the quarantine requirements are adhered to and the animals are clearly identified as non certified and are managed in accordance with this Standard during the agistment period.

6.10.3 The period of quarantine shall be for at least three weeks or three times the withholding period specified for the relevant treatment in existing legislation, whichever is greater.

6.10.4 The quarantine area of the farm shall not be used for organic crop production other than pasture for a period of at least 12 months after the quarantine period has finished.

6.10.5 Documented records describing the use of a paddock shall be maintained for a period of five years after the paddock was first used for quarantine purposes.

6.11 TRANSPORT

GENERAL PRINCIPLES

Transport of organic stock is carried out to ensure the best animal welfare and sanitation, the preservation of identity and to permit traceability of the animals. An organic management plan is used to ensure that the holding, loading, watering, transport and delivery of livestock is conducted with hygiene and oversight.

RECOMMENDATIONS

Animals should be transported to the nearest available certified facilities for slaughter and should not be unnecessarily transported between properties or owners unless required by feed shortages and drought.

Transport of animals between properties or to abattoirs shall take into consideration welfare requirements and shall ensure the minimisation of stress to the animal at all times.

STANDARDS

6.11.1 An Organic Management Plan for transport of organic livestock shall be in place. This plan shall address the following:

- Mustering
- Holding
- Feeding
- Watering
- Identification
- Vehicle cleandown
- Loading
- Travel
- Oversight
- Delivery
- Documentation

6.11.2 Animals must be handled calmly and gently during transport and slaughter to minimise stress.

6.11.3 Loading and unloading facilities must not have parts protruding or sharp edges that can cause injury or damage.

6.11.4 Transport vehicles shall be of suitable size to prevent damage and or bruising.

6.11.5 Transportation vehicles and methods shall be suitable for the specific needs of each animal and minimise the adverse effect of mixing different groups of animals or animals of different sex. Animals shall not be mixed with livestock from other properties.

6.11.6 Floors and ramps must be corrugated or suitably designed so the animal does not slip unduly.

6.11.7 Gates must be used in transport vehicles to segregate animals into compatible groups and restrict movement of animals that could cause injury or damage.

6.11.8 No chemically synthesised tranquillisers or stimulants shall be given prior to or during transport. (Electrolytes are permitted provided they do not contain synthetic amino acids)

6.11.9 Certified organic feed and clean water must be available before and after transport.

6.11.10 No transport leg shall exceed 8 hours. Exceptions to this requirement include those cases where:

- There is no certified organic abattoir within 8 hours drive.
- There is no abattoir capable of satisfying national or importing country requirements within an 8 hours drive.

6.11.11 The party owning the certified product shall be responsible for maintaining the organic integrity of the transport process.

6.11.12 Unfit animals may not be transported unless under the care of a licensed veterinarian.

6.11.13 Electric prodders and other such instruments are not permitted.

6.12 STOCK ROUTES

GENERAL PRINCIPLES

The transit or organic livestock or of non organic livestock on organic land is conducted in ways that avoid transmission of parasites, disease, chemical or other biological agents and that physical and biological features of the property/route are not damaged.

RECOMMENDATIONS

A report from a licensed veterinarian should be obtained to testify to the disease and parasite free status of the stock.

The organic operator should identify and require the protection of any sites of significance such as habitat, animal or plant communities or riparian zones and develop a code of conduct for peripheral activities that might pose risks for contamination, pollution or other environmental impacts.

STANDARDS

6.12.1 The movement of certified stock through non certified land shall be restricted. Public stock routes may be used for the movement of certified stock, but only where that movement is carried out without delay and only on routes that have not been treated with prohibited inputs in the past 3 weeks.

6.12.2 The use of stock routes for movement of certified livestock shall be separated in time and space to that of conventional livestock.

6.12.3 Where public stock routes occur on certified land there shall be a dedicated passage for the regular transit of non organic stock through organic lands. This passage must be permanently fenced or excluded from access by organic stock for at least 6 months.

DEROGATION

Where episodic events (less than annual) occur, the routes may be excluded from organic livestock for a reduced period and their overnight sights treated or quarantined.

6.12.4 Stock routes shall be identified on a map.

6.12.5 Conventional livestock shall be fed organic feed and not be treated with prohibited substances during movement through certified land.

6.12.6 Conventional livestock shall be individually identified and records maintained to indicate the duration of transit, and number of non organic stock.

6.13 CONTAMINATION DURING TRANSPORT

STANDARDS

6.13.1 Residues from previous use must be cleaned with a pressurised water flow, and brooms if necessary, before transporting certified product.

6.13.2 When used, disinfectants must be rinsed from the transport vehicle before organic stock are loaded.

6.13.3 The clean down procedure must be specified by the organic operator in a written form and be evidenced as carried out by a log provided by the transport company/authority. This log shall also specify the date, operator's name, departure and destination points, conformance with clean down, previous use and the time of departure and arrival of livestock consignment.

6.14 IDENTITY DURING TRANSPORT

STANDARD

6.14.1 Cattle must be identified and accompanied by documentation listing the description of the livestock along with their organic status.

6.15 SLAUGHTER

STANDARDS

6.15.1 Slaughter may only be carried out in a certified abattoir, which has undergone complete clean down and rinse after any processing of conventional livestock.

6.15.2 Slaughter will be carried out quickly and without undue stress.

6.15.3 For waiting periods in excess of 6 hours, provision of clean and dry areas must be made for animals to lie down and any feeds provided must be certified organic.

6.15.4 Animals may not be held or herded in an area where the killing of other livestock is visible.

6.15.5 A stun action device must be backed up by emergency measures in the case of failure.

6.15.6 Death by bleeding, without stunning, is not permissible unless cultural or religious requirements are being met under an approved scheme and the practice is carried out in an appropriate calm environment.

6.15.7 Bleaches, sanitisers, detergents, antibacterial or other cleaning agents must be rinsed from all facility surfaces before use.

6.15.8 Water must be free from unacceptable microbiological contamination and if chlorination is used to achieve this, chlorine levels must be less than 4 parts per million (ppm).

6.15.9 Carcasses or quarters must be stored in a separate and clearly identified chiller or in a clearly defined area within the same chiller.

6.15.10 Offal will only be retrievable for organic purposes if the time of its collection and separate processing and storage can be controlled and documented.

6.15.11 Boning rooms must be limited to the processing of organic lines only for the entire duration of the boning event. Boning must not be carried out concurrently with non-organic runs. Complete clean down of boning rooms must precede organic runs.

6.15.12 Clearly identifiable labelling such as branding of all carcasses must take place which differentiates them by colour from conventional carcasses and identifies them as organic.

6.15.13 Stamping of carcasses, sides or quarters will be carried out by approved personnel.

6.15.14 Product which is dropped or spilled must be identified and not labelled or sold as organic.

6.15.15 Frozen processed product must be stored in separate freezers except where clearly identifiable proprietary labelling makes mistaken identity impossible.

6.15.16 The audit trail from receipt to dispatch must be documented in full.

6.15.17 Where stock is slaughtered for organic sale the processing facility must be inspected as a certified component of the operator's operation or certified in its own right before the NASAA Label may be applied.

6.15.18 Only abattoirs with a recognised Quality Assurance System shall be considered for certification and should formally incorporate organic procedures into their internal organic management plan.

SECTION SEVEN – SPECIFIC LIVESTOCK STANDARDS

7.1 RANGELAND MANAGEMENT

GENERAL PRINCIPLES

Pastoralism carried out under organic management enhances biodiversity, minimises soil and nutrient loss and ensures animal welfare. This section should be read in conjunction with the General Standards for Livestock Husbandry (Section 6).

RECOMMENDATIONS

Cell, rotational or holistic grazing techniques are recommended.

Grazing management should be carried out with reference to total grazing pressure.

Carrying capacity should be calculated with reference to prescribed district rates and ecological indicators.

Stocking and de-stocking strategies should be carried out with reference to carrying capacity as the primary consideration.

Stations should be fenced in such a way that Land Managements Units are segregated for optimum management.

STANDARD

7.1.1 Monitoring of environmental indicators is required. This shall include:

- Photopoints
- Transect studies
- Exclusion zones
- Species counts
- Pasture cover
- Water/riparian zones
- Reference to catchment management targets

7.2 FEEDS

STANDARDS

7.2.1 Only feeds from organic certified sources (pasture and concentrates) are permitted with the exception of up to 5% of the total feed intake permitted to include supplementary feed of non-agricultural source. Such feed must not include prohibited substances.

7.2.2 Prohibited feeds include urea, blood and bone and concentrates from non-organic sources other than those listed in this Standard.

7.3 HEALTH & WELFARE

GENERAL PRINCIPLES

Good management and feed quality should form the basis for animal health.

STANDARDS

7.3.1 Flies, ticks and buffalo fly may not be treated with synthetic chemicals.

7.3.2 Poisonous plants must be withheld from stock access at critical times.

7.3.3 Mustering must not include the use of lead shot.

7.3.4 Vaccines may be used if the farm or district can be demonstrated to harbour diseases or pathogens against which the vaccine is deployed. The use of vaccines under these circumstances will not prejudice certification and does not require quarantine procedures. Approval shall be sought in writing prior to using any vaccine.

7.3.5 Feral animals may be managed using the following:

- Physical exclusion, chasing and guard dogs
- Trapping of individuals and herds using live traps with humane destruction
- Shooting of feral animals or wildlife under licence is a restricted activity and assessed on a case by case basis. Criteria for assessment will include effect on non-target species and consideration of environmental impact

- Poisons for control of rodents or feral animals in the field are prohibited, unless required by a statutory authority and the statutory authority confirms use in writing.

7.4 LAND TENURE

STANDARDS

7.4.1 Lands may be freehold or pastoral lease. Conformity to lease conditions is required.

7.4.2 The rights of traditional owners must be respected.

7.5 WATER

GENERAL PRINCIPLES

Tanks and watering points should be located to enhance rangeland management.

STANDARDS

7.5.1 Water must not be impounded unless in a manner approved by a catchment management authority.

7.5.2 Any engineered or non naturally occurring artesian well must be tapped and be subject to controlled flow. Water tanks must be capable of being managed to permit rotation and movement of stock.

7.6 WOOL

STANDARDS

7.6.1 Wool may only be certified organic if sheep have been managed according to this Standard for at least 18 months.

7.6.2 Testing of wool for chemical residues and heavy metal contamination must take place before sales. ML's for mammalian tissue will form the benchmark for chemical residues with the acceptable level being 10% of these figures for historic contamination.

7.6.3 Any detection of prohibited chemicals at any level, which may have resulted from recent use, will prevent certification. Arsenic levels must fall below 0.2mg/kg. Operators will be expected to reduce any sources of this historic contaminant through active management and monitoring.

7.7 SHEARING

STANDARDS

7.7.1 Shearing may only be carried out at a certified shearing shed that has been subject to inspection.

7.7.2 Sheds must be free of prohibited inputs and have holding yards, pens and boards, tables and storage bins subjected to residue tests.

7.7.3 Wool from non-organic sources must not be present in wool sheds at the time of organic shearing.

7.7.4 Adequate shelter from climatic conditions must be provided for sheep immediately off shears.

7.8 SCOURING

STANDARD

7.8.1 Wool scouring tensides must be readily biodegradable and there shall be an appropriate waste water treatment.

7.9 HONEY

GENERAL PRINCIPLES

The following standards for the harvesting and packaging of bee (Apis mellifera) products (honey, wax, pollen, royal jelly and propolis) complement the generic standards for organic production and processing.

Bees are feral creatures with 'castes' (queen, workers and drones) forming an insect social community, the colony, housed within a structure called a hive. As available, harvested nectar, honeydew, pollen (and water) is used and converted by bee activity into honey, wax, propolis and royal jelly to sustain and perpetuate the colony. The apiarist uses and manipulates the colony's natural (instinctive) behaviour to optimise access to these products. The beekeeper places hives to form apiaries on identified leased, owned or used sites.

Aspects of bee behaviour and performance are improved through selection of breeding material (drone and queen) and achieved through queen replacement. The organic beekeeper uses races of Apis mellifera that are suited to the climatic and foraging conditions likely to be encountered and the type of bee product being optimised (propolis / royal jelly / honey / wax).

As the apiarist cannot control where bees fly or what they gather, product integrity is attained through risk management strategies to limit contamination particularly in regard to site selection.

The organic apiarist uses benign treatments, hive materials, apiary equipment and packaging materials to ensure bee health and product integrity.

Apiarists demonstrate a 'duty of care' towards the colonies in their apiary by disease management practices, strategic (conservative) product removal, site selection and provision of water.

Apiarists demonstrate a 'duty of care' to the environment by observance of legal requirements, destruction of feral colonies and site care.

RECOMMENDATIONS

The organic apiarist should practice a system of disease management that limits the exchange of bee material among hives, ensures systematic replacement and cleaning of hive material, records colony performance and hive movements.

Apiarists should be familiar with the nutritional characteristics of plant sources that the bees are working to avoid inappropriate product removal and the need to feed hives.

Hives should be constructed of natural materials, smoker fuel should be non-sparking natural material producing a 'cool smoke' eg hay, pine needles, clean wood chips/shavings. Wax used to make foundation should be sourced preferably from the operator's own certified organic hives.

Honey extraction and packaging temperatures should not affect the quality and beneficial properties of honey. If recycled containers are used they should be clean and free from foreign odours.

Apiarists should understand bee behaviour and manipulate the colony accordingly with bee removal/hive inspection aided by clearing boards, brushing, shaking, blowers, or minimal smoking using natural fuels.

Apiarists should understand the factors affecting storage of empty combs such as influence of temperature and the need for exclusion of moths and mice.

STANDARDS

7.9.1 Bee colonies may be converted to organic production. Introduced bees shall come from organic production units where available.

7.9.2 Bee products may be sold as organically produced when the requirements of these standards have been complied with for at least one year.

7.9.3 A risk assessment of all proposed hive sites must be undertaken. This written assessment must document the requirements below, and will be required prior to inspecting a new applicant for certification. Existing operators who have not supplied this risk assessment will be required to do so prior to reinspection.

7.9.4 On an aerial photo or topographical map of a minimum size of 1:25,000 (LandSat images may also be used) the apiarist shall:

- Demonstrate that within a radius of 5 kilometres from the apiary site, nectar, honeydew and pollen sources consist essentially of organically produced crops and/or spontaneous vegetation that meet organic crop production requirements sufficiently to supply all nutritional needs of the bees
- Identify any non-agricultural production sources possibly leading to contamination eg. urban centres, motorways, industrial areas, waste dumps, waste incinerators
- Identify the areas where land uses may include agricultural production systems possibly leading to contamination eg. conventional and GMO crops, grazing land and orchards

7.9.5 If it is considered that site characteristics pose a serious risk of contamination the site will not be accepted for organic honey production.

7.9.6 A list and maps of bee keeping locations must be kept updated.

7.9.7 Apiary sites must be clearly identified, with certification status and certification number.

7.9.8 Where an enterprise has conventional and organic colonies then organic hives must be clearly coded with a permanent marking system and kept separate from non-organic hives.

7.9.9 During the conversion period, the wax shall be replaced by organically produced wax unless no prohibited products have previously been used in the hive and there is no risk of contamination of wax.

7.9.10 Hives must be constructed from natural materials. Food grade plastic may be used for foundations only.

7.9.11 Frames shall be from untreated timbers and foundation formed from wax from certified organic colonies. Cappings can be used from conventional foundations managed under organic regimes.

7.9.12 Hives may be painted with vegetable oil and paraffin or beeswax mixture, or naturally compounded paints subject to approval. Acrylic paint may only be applied to the exterior of the hive.

7.9.13 The health and welfare of the hive shall be primarily achieved by hygiene and hive management.

7.9.14 Antibiotics must not be used. Veterinary medicine must not be used in bee keeping. Colonies with notifiable diseases must be destroyed and all hive material heat-treated in an approved manner that destroys infectious material. Flywire and herbal repellents subject to approval may be used for protection of combs. The use of paradichlorobenzene or phostoxin for protection of combs is not permitted.

7.9.15 A disease management system must be practiced with records that indicate movement of hive materials, hives, queen replacements, uniting of hives and colony performance eg honey supers harvested.

7.9.16 All hives must be clearly identified as organic and by number.

7.9.17 Flame and steam sterilisation; caustic soda; lactic acid; acetic acid; oxalic acid; formic acid; sulphur; etheric oils and bacillus thuringiensis are permitted for hive disinfection and pest/disease control.

7.9.18 The feeding of a colony is only permitted under exceptional circumstances to overcome temporary food shortages due to climatic conditions. Only certified organic honey or organic sugar syrup may be used in this instance. The feeding of organic honey is currently under review.

7.9.19 Smoking of bees must be kept to a minimum. Smoker fuel shall only consist of natural materials, eg. Hay, clean wood chips/shavings, pine needles.

7.9.20 The apiarist must not use a repellent consisting of prohibited substances as protection when working colonies or inspecting hives (eg. at harvest).

7.9.21 The destruction of bees in the combs as a method of harvesting of bee products is prohibited.

7.9.22 In choice of race, account must be taken of their suitability for local conditions, their vitality and resistance to disease.

7.9.23 Apiarists must observe National or State laws, which may include prohibitions on hive sites in National Parks and other proclaimed parks, reserves and forests.

7.9.24 Extraction and packaging of honey must be managed at temperatures that do not exceed 45 degrees Celsius. The use of steam heated capping removal equipment is permitted.

DEROGATION

Permission may be granted to pasturise honey for use in a value added end product but not for sale in its natural state.

7.9.25 Clipping of wings (queens) is not permitted.

7.10 MILK PRODUCTION

All relevant Sections of the Animal Husbandry requirements must also be complied with. (Refer to Section 6)

GENERAL PRINCIPLES

Milk production under this Standard is aimed at satisfying criteria that ensure the sustainable management of land, the welfare of animals, the quality of the milk product and the protection of that product from contamination.

RECOMMENDATIONS

It is recommended that the whole herd be managed according to this Standard from birth. Organic milk production should be based on correct soil and animal nutrition achieved by balanced mineral and dietary input to maintain health.

STANDARDS

7.10.1 A management plan for the appropriate treatments of specific animal health issues such as mastitis, grass tetany, milk fever, scours, bloat, or pink eye must be in place.

7.10.2 Strategies to deal with adverse seasonal conditions such as drought and extreme wet must be developed.

7.10.3 Routine use of veterinary drugs is not permitted (eg. dry cow treatment for mastitis).

7.10.4 In the event of use of veterinary drugs, quarantine of animals and milk is necessary and provision of a test bucket must be made to maintain separation of any conventional milk for 6 months before being acceptable again as organic.

7.10.5 Quarantine procedures must be observed in the case of use of veterinary drugs.

7.10.6 An identification system must be in place to record the identity and performance of milking animals and to document any individual veterinary treatments.

7.10.7 Replacement dairy stock obtained from non-organic sources must be under organic management from 4 weeks old before milk is sold as certified. Carcasses of these animals may not be sold as organic. Refer to Table 2 “Conversion Periods for Livestock Products”.

7.10.8 Offspring must receive colostrum from the mother within six hours of birth and be reared by their mother for at least the first 12 hours after birth in order to assist in their development of a natural immunity to infection.

DEROGATION

Stock may quality for an exemption based upon disease risk management upon application. Where multiple suckling or bucket rearing is used, organic whole milk of the same species must be provided for at least 8 weeks after birth. Only in emergencies can non organic milk or milk replacers or other substitutes be used. Feed supplements used during and after this period must be in accordance with this Standard.

7.10.9 Replacement offspring obtained from non-organic sources must be at least one week old and may not be purchased from a market.

7.11 DAIRY MANAGEMENT

STANDARDS

7.11.1 Acid and alkaline line clean down products shall be rinsed of any trace before use for organic milk.

7.11.2 Dairy plant must undergo an annual maintenance check to determine that working condition, seals and rubbers are satisfactory.

7.11.3 Dairy waste water must be retained on site and must not pollute natural waterways on or off the farm.

RECOMMENDED	RESTRICTED	PROHIBITED
Self replacing herds All feeds grown on own certified farm All manures/slurry spread on-farm Regular herd testing Shelter and shade in all paddocks Surfaced and maintained laneways, tracks and yards free from deep mud Water sprinklers and shade in milking yards Homoeopathic treatments Fly traps, screens, zappers and water misting for fly control Boiling water or steam sterilisation of plant	Iodine based teat wash Zinc and sulphur based foot baths Brought-in replacements not to exceed 10% Natural oils and salves for teat care Non organic milk without antibiotics for emergency calf feeding only	Routine use of antibiotics or other veterinary drugs Disbudding over 3 months of age Castration by rings over 4 weeks of age Embryo transplants Weaning under 9 weeks of age Hormones, (fertility and production) Castration without veterinary assistance over 6 months of age Cloning Tail Cutting

Table 9 – Organic Dairy / Herd Management Practices

7.12 POULTRY/FOWL

GENERAL PRINCIPLES

The principles of animal welfare, freedom from contamination and sustainable land management underlie fowl production in this Standard.

RECOMMENDATIONS

Operators should seek to source bird varieties appropriate and adapted to the region in which the farm is situated.

The farm should produce its own certified organic feeds.

Bird varieties should be chosen for their disease resistance and longevity.

Access to dust baths for the control of external parasites should be provided.

The use of homoeopathic treatments, the balancing of nutrients and general diet, high quality feeds, stock management and minimum stocking density practices should be practised so as to minimise disease problems.

In circumstances where disease outbreaks occur or are suspected, affected stock should firstly be isolated from the main flock and treated separately.

Cleaning of facilities should be by use of non-toxic and biodegradable soaps, burning, tea tree oil, eucalyptus oil and steam.

Alternatives to chlorine based cleaners should be used for egg cleaning.

Eggs should be stored in cool storage prior to sale.

7.13 FEED AND FEEDSTUFF

STANDARDS

7.13.1 Poultry shall be fed on certified organic feedstuffs.

DEROGATION

When required feeds are not available an exemption may be sought to use up to 5% of non organic feeds calculated on an annual basis. These feeds must not contain prohibited substances and must not be derived from prohibited processing practices.

7.13.2 For poultry products to be labelled as certified organic poultry must be fed on feed which is certified Organic. Feeding any portion of feed which is certified “Conversion to Organic” will result in the labelling of poultry products as “Conversion to Organic”.

7.13.3 Free-range areas must have a majority of vegetative cover, rather than bare soil. Rotations of free-range areas are required to maintain cover, to protect soil from degradation, minimise nutrification and parasitic infestation and to ensure a constant availability of live foods.

7.13.4 Meat meal that is certified organic (derived from animals of organic origin) is permitted to be fed to fowl without restriction. Meat meal that is not from animals of organic origin shall not be fed at rates higher than 2% of total daily diet.

DEROGATION

An exception may be granted to increase the use of non certified meat meal to a maximum of 5%, providing that the total non-organic component still remains at a maximum of 5% of total diet.

7.13.5 The feeding of same species is prohibited.

7.13.6 Birds must have continual access to clean water and feed.

7.13.7 Growth promotants and antibiotics in feed or otherwise are prohibited in organic production.

7.13.8 Vitamins, trace elements and supplements shall be used from natural origin when available in appropriate quantity and quality.

DEROGATION

Vitamins from non-natural sources may only be used if (1) there is a demonstrated deficiency in feedstuffs and (2) there is satisfactory documented evidence that the vitamin cannot be sourced sufficiently from natural sources.

7.13.9 All feed must be derived at least from the region.

7.13.10 Refer to Table 5 in regards to the use of Amino Acid isolates in feed.

7.14 SURGICAL AND OTHER TREATMENTS

STANDARDS

7.14.1 De-beaking, wing burning and other practices deemed inhumane and are prohibited from practice under this Standard.

7.14.2 In all instances measures must be taken to ensure the health and vitality of the flocks so as to minimise chances of disease and pest outbreak.

7.14.3 Where pharmaceutical or veterinary treatments are applied, operators must clearly identify which birds or batches of birds have been treated.

7.14.4 In the event that prohibited parasiticides and/or routine antibiotics are administered, eggs and carcasses lose their certification permanently.

7.14.5 Provided that there is evidence that the pathogen is on the property or potentially within the livestock, the use of vaccinations is permitted.

7.15 REPLACEMENT STOCK

STANDARD

7.15.1 Replacement stock shall be introduced no older than two days old for meat or for egg production unless being sourced from poultry systems in full compliance with this Standard.

7.16 QUARANTINE

STANDARDS

7.16.1 Following application of prohibited inputs for the control of disease and pests, a quarantine period of at least three (3) times the normal withholding period or three (3) weeks, whichever is longer, must be adhered to before treated birds can be allowed back with the main flock. Treated poultry shall remain clearly distinguished from certified stock and can not be sold with reference to certification. (Refer Table 5 “Withholding Periods for Livestock” above)

7.16.2 A quarantine area must be set aside for such purposes and not be brought into organic production for a period of at least 3 weeks for animal grazing following last exposure to birds subjected to veterinary treatments. The quarantine area shall not be used for cropping purposes for a minimum of twelve (12) months.

7.17 HOUSING AND STOCKING

STANDARDS

7.17.1 No intensive cage rearing of birds is allowed under this Standard.

7.17.2 Poultry must be permitted at least 8 hours continuous darkness per 24-hour period and must have access to natural light and forage areas for at least 6 hours per day.

7.17.3 Poultry may not be certified for organic production if animals are contained within permanent or mobile enclosures that do not permit free ranging.

7.17.4 Mobile houses must be continuously open during daylight hours to allow unrestricted egress and ingress of birds and stocking rates inside these houses must not exceed five birds per square metre. (Refer Table 3 "Housing Density for Housed Animals")

7.17.5 At least one third of the flooring of housing areas must by covered by litter material such as straw, wood shavings, sand, turf, etc. An area for collection of bird droppings must also be provided.

7.18 TRANSPORT

STANDARDS

7.18.1 Transport by axle vehicles must be minimised and not exceed eight (8) hours in duration.

7.18.2 The transport medium must be cleaned prior to loading and records maintained to verify such clean down.

7.18.3 Transport shall be carried out in a humane manner, which ensures a safe and comfortable journey.

7.18.4 All effort must be made to minimise animal suffering and stress.

7.19 RECORDS

STANDARDS

7.19.1 All producers are required to keep an inventory of the following:

- Stock
- Feed sources
- Sales
- Deaths and causes thereof
- Any medications administered, and
- Quarantine procedures

7.20 SLAUGHTER AND SALES

STANDARDS

7.20.1 Facilities for slaughter of poultry must be inspected and certified.

7.20.2 Eye and ear contact of live birds with dead carcasses must be avoided.

7.20.3 Eggs must be thoroughly cleaned of material which may harbour microbiological contaminants.

7.20.4 Tissue tests must be carried out on eggs or meat prior to certification and sale as organic.

7.21 PIG PRODUCTION

GENERAL PRINCIPLES

Organic pig production is based on sustainable management techniques that provide good health and welfare conditions to enable pigs to satisfy their basic behavioural needs. Grazing is provided to pigs to enable access to feed and roughage and the opportunity for activity. Breeds should be chosen with regard to their management and local conditions to enhance the natural well being of the pig and resistance to disease and infections.

7.22 FEEDS AND FEEDSTUFF

STANDARDS

7.22.1 Pigs should be fed a diet totally comprising feeds of organic origin. Up to 5% of all feed (averaged on an annual basis) may be brought in as feed supplements and may include the following:

- Minerals of natural origin
- Sea weed and fish products
- 2% meat meal from conventional origin (ie. not manufactured from certified organic animals)
- Molasses

7.22.2 Meat meal may only be used in excess of 2% if the meat meal is certified organic. The feeding of the same species is prohibited.

7.22.3 At least 50% of certified feed must be sourced from the farm and all feed shall be preferrably sourced from within the region.

DEROGATION

In the event that 95% or more of organic feed sources are not available, as a result of drought or other natural disaster, and after notification, up to 40% of feeds may be of non organic origin, provided that they do not contain substances listed in this Standard as prohibited. In such an event, full organic livestock status may be regained in 6 months from the cessation of such practice. Tissue tests may be required.

7.22.4 The following products shall not be included in, nor added to the feed or in any other way be given to farm animals:

- Synthetic growth promotants
- Synthetic appetisers
- Preservatives
- Artificial colouring agents
- Urea
- Manure products
- Feed subject to solvents during extraction or the addition of other chemical agents
- Pure amino acids
- Genetically Engineered organisms or products thereof
- Any meat meal containing porcine waste

7.22.5 Vitamins, trace elements and supplements shall be used from natural origin when available in appropriate quantity and quality.

DEROGATION

Vitamins from non-natural sources may only be used if (1) there is a demonstrated deficiency in feedstuffs and (2) there is satisfactory documented evidence that the vitamin cannot be sourced sufficiently from natural sources.

7.23 SURGICAL AND OTHER VETERINARY TREATMENTS

STANDARDS

7.23.1 Tooth cutting or grinding is not permitted.

7.23.2 Permanent ringing may not be carried out. Rings should only be attached for periods where land management issues may be compromised. In such cases prior submission detailing how the management of land will be altered to ensure non-dependency on ringing.

7.23.3 Animals may only be castrated before 2 weeks of age.

7.23.4 Sick and injured animals shall be given prompt and adequate treatment. In the event that an illness requires treatment using a veterinary medicine, and no other alternative is available, then the treatment shall be administered without delay. That individual pig must be identified and segregated in a quarantine area for 3 weeks or 3 times the withholding period, whichever is greater, and shall not be sold with reference to certification.

7.23.5 The use of anaesthetics will not result in loss of organic status but the animals must be withheld from sale for at least 3 weeks.

7.23.6 Natural medicines and methods including homoeopathy, herbs, and acupuncture are permitted. Minerals and trace elements shall be provided where there is a demonstrated deficiency.

7.23.7 The use of vaccines is restricted to those known to be required in a district or region where the disease cannot be controlled using other management techniques. Vaccines must not be genetically engineered.

7.24 REPLACEMENT STOCK AND BREEDS

STANDARDS

7.24.1 Animals from organic farms should be sourced, but for purposes of establishing breeding stock or supplementing bloodlines, conventional pigs may be introduced to the organic farm, subject to a quarantine period in a designated area. Such animals may never be sold as certified and must be identified by records.

7.24.2 The use of transgenic pigs or genetic material is not permitted to be introduced into the herd or bloodline and verification must be provided.

7.24.3 Hormonal heat treatment and induced birth is not permitted unless for emergency purposes and under the supervision of a veterinarian.

7.24.4 Artificial insemination is not recommended but is permitted, provided that genetic material is free of genetically engineered sources.

7.24.5 Embryo transfer is not allowed.

7.24.6 Use of genetically modified animals is not permitted.

7.25 HOUSING AND STOCKING

STANDARDS

7.25.1 Pigs must be provided with free-range access to pastured areas.

7.25.2 Stocking rates must meet animal welfare standards of half a square metre per 100kg of animal.

7.25.3 Adequate shade and shelter must be provided with clean bedding comprising edible organic material.

7.25.4 Locations for wallowing must be provided.

7.25.5 Sufficiently well drained sites for lying shall be provided.

7.25.6 Fresh water and adequate feed must be available at all times.

7.25.7 Housing must allow sows to express their full range of natural behaviours and must not involve permanent confinement or any housing system which prevents the sows from lying down, standing up or turning around with ease.

7.26 TRANSPORT

STANDARDS

7.26.1 Stress on the pig during transport and slaughter shall be minimised at all times. Pigs of significantly different weights are to be separated during transport.

7.26.2 Certified pigs must be physically separated from conventional pigs if on the same truck.

7.26.3 Transport to the abattoir must not exceed 8 hours and should be by the most appropriate route, which is both direct and not excessively rough. Exceptions include:

- There is no certified organic abattoir within an 8 hour drive
- There is no abattoir capable of satisfying national or importing country requirements within an 8 hour drive
- An OMP is developed to adequately address stress minimisation of livestock and submitted for approval.

7.26.4 Holding, loading and transport should avoid sunburn, temperature stress and exposure. Exposure to direct sunlight shall be limited to 2 hours.

7.26.5 Electric prodders, unmuzzled dogs, sticks, metal or polyethylene pipes or heavy belts are not permitted.

7.27 RECORDS

STANDARDS

7.27.1 Each pig must bear an identification mark before leaving the certified farm.

7.27.2 Pigs treated with non-permitted substances or purchased from a non certified premise must be clearly identified at all times and records maintained to verify quarantine, treatments, and slaughter of such animals as conventional.

7.27.3 Records shall be kept for all feed and feed supplements purchased from off farm.

7.27.4 Records of gene stock and bloodlines shall be kept.

7.28 FISH AND CRUSTACEA

GENERAL PRINCIPLES

Aquatic production takes place in ponds or estuarine systems or locations where permanent fish farming takes place. Aquaculture includes the farming of many different species using diverse forms of production in fresh, brackish and salt water. This Standard covers carnivorous, omnivorous and herbivorous organisms of all types and at all stages of growth, grown in any form of enclosure such as earthen ponds, tanks and cages (open and closed systems).

Wild sessile organisms in open collecting areas may be certified as organic.

Organisms that are moving freely in open waters, and/or that are not capable of inspection according to general procedures for organic production, are not covered by this Standard.

7.29 CONVERSION TO ORGANIC AQUACULTURE

GENERAL PRINCIPLES

Conversion to organic aquaculture is a process of developing farming practices that encourage and maintain a viable and sustainable aquatic ecosystem.

RECOMMENDATIONS

The total production in each farming unit or under each operator's control should be converted to organic aquaculture over a specified period of time. If a production unit is not converted all at once, the operator should ensure that organic and non-organic production and product can be clearly separated in production and documentation, to prevent unintentional mixing of materials and products.

Independent sections of the production unit should be converted in such a way that this Standard is completely met on each section before it is certified as organic.

There should be a clear plan of how to proceed with the conversion. This plan should be updated as necessary and cover all aspects relevant to this Standard.

STANDARDS

7.29.1 The operation shall comply with this Standard throughout the conversion period and all relevant requirements of Section 2 (General Certification Requirements), Section 3 (Precautions and General Requirements) and Section 6 (General Standards for Animal Husbandry) of this Standard. Calculation of the conversion period may not start before the date of the last non-complying input or practice.

7.29.2 The length of the conversion period shall be at least one life cycle of the organism or one year.

7.29.3 Operators shall ensure that conversion to organic aquaculture addresses environmental factors and past use of the site with respect to waste, sediments and water quality.

7.29.4 Where the entire production is not converted the following is required:

- Physical separation between conventional and organic production units. For sedentary or sessile organisms not living in enclosures, the area shall be at an appropriate distance from pollution or harmful influence from conventional aquaculture/agriculture or industry.
- Converted units shall not be switched between organic and conventional management.
- Brought-in organisms of conventional origin shall not be converted to organic unless they are spat or fingerlings or are immature organisms which are at least 12 months from maturity and harvest.

- The conversion period must see the production of an organic management plan that addresses:
  - The past 3 year history of the site/location and the records and analysis of sediments and nutrients generated and the resultant water quality.
  - An analysis of the operation's future impact on nutrient and sediment accumulation and resultant water quality.

7.30 BASIC CONDITIONS and AQUATIC SYSTEMS

GENERAL PRINCIPLES

Management techniques are governed by the physiological and behavioural needs of the organisms in question and the demands of the ecosystem. Management techniques, maintain and protect the good health and welfare of the organisms and the environment.

When introducing non-native species, special care is taken to avoid unnecessary permanent disruption to natural ecosystems.

RECOMMENDATIONS

Production should maintain the aquatic environment and surrounding aquatic and terrestrial ecosystem, by using a combination of production practices that:

- encourage and enhance biological cycles
- use a wide range of methods for disease control
- prohibit synthetic fertilisers and avoid chemotherapeutic agents
- provide for polyculture where possible
- minimise the impact of surplus nutrients and avoid eutrophication

Converting material of plant and animal origin into animal production results in nutrient and energy losses. For this reason feed sources based on by-products and waste materials of biological origin not suitable for human consumption should be encouraged.

STANDARDS

7.30.1 Aquatic ecosystems shall be managed to comply with the relevant requirements of Sections Two and 3.5 of this Standard.

7.30.2 All non-indigenous fish must be thoroughly contained so as to ensure that they are not released into the wild and the operator must document any escapes that are known or suspected to occur.

7.30.3 Stocking densities shall permit fish to form shoals and must not negatively impact on fish welfare.

7.30.4 One hundred square metres is the minimum cage area with a minimum of 9 metres depth in estuarine systems. The density of fish must not exceed 10 kilograms per cubic metre in any system.

7.30.5 Construction materials and production equipment shall not contain paints or impregnating materials with synthetic chemical agents that detrimentally affect the environment or the health of the organisms in question.

7.30.6 Adequate measures shall be taken to prevent escapes of farmed species from enclosures and any known or suspected escapes must be documented.

7.30.7 Adequate measures shall be taken to prevent predation on species living in enclosures.

7.30.8 Water use must be monitored and controlled to permit minimum use and discharge of water and nutrients into the environment.

7.30.9 Fertilisers and pesticides used must be in conformity with products listed in the Annexes 1 and 2 of this Standard.

7.31 LOCATION OF PRODUCTION UNITS

GENERAL PRINCIPLES

Location of organic production units maintains the health of the aquatic environment and surrounding aquatic and terrestrial ecosystem.

RECOMMENDATIONS

Production units should be at appropriate distances from contamination sources and conventional aquaculture.

Aquaculture production should minimise negative environmental impact.

STANDARDS

7.31.1 Distances between organic and conventional production systems shall be a minimum of 5 metres between ponds and 100 metres in open waters where feeding is carried out.

7.31.2 The generation of nutrient ponds must not result in unnecessary discharges into riverine systems.

7.31.3 Intake of waters for pond systems must be upstream or below discharge points and discharge waters must be filtered through mechanical or biological systems to minimise nutrient discharges.

7.31.4 Ponds must be cleaned regularly and any nutrient sludges must be disposed of in ways which prevent access of nutrients to riverine systems.

7.31.5 For estuarine systems, nutrification through waste or feed spillage must be arrested through good management.

7.31.6 Generation of nutrients in estuarine systems must be managed to permit maximum dispersal through regular movement of cages and location with relation to appropriate current/tidal movements.

7.31.7 Nutrient inputs must not include any products not permitted in the annexes of this Standard.

7.32 AQUATIC PLANTS

GENERAL PRINCIPLES

Organic aquatic plants are grown and harvested sustainably without adverse impacts on natural areas.

RECOMMENDATIONS

The act of collection should not negatively affect any natural areas.

STANDARDS

7.32.1 Aquatic plant production shall comply with the relevant requirements of Sections Two, Three and Six of this Standard.

7.32.2 Harvest of aquatic plants shall not disrupt the ecosystem or degrade the collection area or the surrounding aquatic and terrestrial environment.

7.33 LOCATION OF COLLECTING AREAS

GENERAL PRINCIPLES

Wild sedentary or sessile organisms in open collecting areas may be certified as organic if they are derived from an unpolluted, stable and sustainable environment.

RECOMMENDATIONS

Collecting areas should be at appropriate distances from contamination and conventional aquaculture.

Negative environmental impact from aquaculture production or harvesting shall be minimised.

STANDARDS

7.33.1 The harvesting/production area shall be clearly defined and shall be capable of inspection with respect to water quality, feed, medication, input factors and other relevant sections of this Standard.

7.33.2 Collecting areas shall be at appropriate distances from pollution and possible harmful influences from conventional aquaculture. A minimum of 100 metres must separate conventional and organic operations where feeding is carried out.

7.33.3 Any identified sources of pollution must be at least 5km from organic sites unless it can be clearly demonstrated through objective testing that the pollution sources pose no significant risk of contamination to the operation.

7.33.4 The harvesting of aquatic plants shall not disrupt the ecosystem or degrade the collection area or the surrounding aquatic and terrestrial environment.

7.34 HEALTH AND WELFARE

GENERAL PRINCIPLES

Management practices achieve a high level of disease resistance and prevention from infection. All management techniques, especially when influencing production levels and speed of growth, maintain the good health and welfare of the organisms. Living aquatic organisms are handled as little as possible.

The well being of the organism is paramount in the choice of treatment for disease or injury.

RECOMMENDATIONS

The cause of outbreaks of disease or infection should be identified, and management practices implemented to prevent the causative events and future out-breaks. When treatment is necessary the use of natural methods and medicines should be the first choice.

Disease treatment should be carried out in a way that minimises harmful effects on the environment.

STANDARDS

7.34.1 Operators shall comply with all the relevant requirements of Section 6.6 of this Standard

7.34.2 In the event of the use of non permitted veterinary drugs, the organism, or generation of organisms treated will lose certification and conversion of the operation or specific enclosure may be required to begin once again.

7.34.3 The prophylactic use of veterinary drugs, except vaccinations, is prohibited.

7.34.4 Vaccinations are permitted if diseases that cannot be controlled by other management techniques are known to exist in the region. Vaccinations are also permitted if they are legislated. Genetically engineered vaccines are prohibited.

7.34.5 Synthetic hormones and growth promoters are prohibited.

7.34.6 Current accurate disease management records must be kept where applicable. The records shall include:

- identification of the infected and infecting organisms concerned
- details of treatment and duration, including application rate, method of application, frequency of repetition and concentration of organisms
- brand names of drugs used and active ingredients

7.34.7 In case of irregular behaviour by the organisms, the water quality shall be analysed and adjusted as necessary according to the needs of the organisms.

7.34.8 Aquatic animals shall not be subject to any kind of mutilation.

7.34.9 The use of chemical allopathic veterinary drugs and antibiotics is prohibited for invertebrates.

7.34.10 Operators shall routinely monitor all facets of the operation to maintain water quality, health and natural behaviour of each cohort (school).

7.35 BREEDS AND BREEDING

GENERAL PRINCIPLES

Breeding strategies and practices in organic aquaculture interfere as little as possible with natural behaviour of the animals. Natural breeding methods are used.

RECOMMENDATIONS

Breeds should be chosen that are adapted to local conditions.

Breeding goals should aim at obtaining good food quality and efficient conversion of inputs to animal growth.

Brought-in conventional aquatic organisms should spend at least two thirds of their life in the organic system before being acceptable for certification.

STANDARDS

7.35.1 Where available, brought-in aquatic organisms shall come from organic sources.

7.35.2 Where not available from organic sources, fish from a conventional hatchery may be used for a period until reviewed.

7.35.3 Artificially polyploid organisms and genetically engineered species or breeds, are prohibited.

7.36 NUTRITION

GENERAL PRINCIPLES

Organic aquaculture production provides a good quality diet balanced according to the nutritional needs of the organism. Feed is only offered to the organisms in a way that allows natural feeding behaviour, with minimum loss of feed to the environment.

Feed is comprised of organically produced products, in situ nutrient sources, by-products from organic food processing and waste products from the fish industry.

RECOMMENDATIONS

Nutrient management should maintain the biological diversity of the area.

Operators should design feed rations to supply most of the nutritional needs of the animal from organic plants appropriate for the digestive system and metabolism of the species.

Feed bought into the operation should be comprised of by-products from organic and wild sources not otherwise suitable for human consumption.

Operators should maintain the biological diversity of areas that are managed and maintain adequate representation of naturally occurring organisms.

Operators should design good quality balanced diets according to the physiological needs of the organism.

Operators should feed animals efficiently, according to their natural feeding behaviour and with minimum losses to the environment..

Operators should design systems so that the production area comprises the entire food chain with minimal reliance on outside inputs.

STANDARDS

7.36.1 Aquaculture feeds shall contain 100% certified organic components, or waste products only of aquatic origin.

7.36.2 Where certified organic components or waste products are not available feed of conventional origin up to a maximum of 5% (by dry weight) including commercial fishmeal may be used.

7.36.3 Mineral and vitamin supplements are permitted if they are supplied in their natural form.

7.36.4 Feed comprised of by-catch shall not be used.

7.36.5 The following products shall not be included in or added to the feed or in any other way be given to the organisms:

- Synthetic growth promoters and stimulants
- Synthetic appetisers
- Synthetic antioxidants and preservatives, urea and other synthetic nitrogen compounds, feedstuffs subjected to solvent (eg. hexane) extraction, amino acid isolates
- Material from the same species/genus/family as the one being fed
- Artificial colouring agents
- Genetically engineered organisms or products thereof
- Slaughter products of the same species
- All types of excrement including droppings, dung or other manure
- Preservatives, except when used as a processing aid.

7.36.6 The following feed preservatives may be used:

- bacteria, fungi and enzymes
- by-products from the food industry (eg. molasses)
- plant based products.

7.36.7 Synthetic chemical feed preservatives are permitted in response to severe weather conditions.

7.37 TRANSPORTATION AND HANDLING OF LIVING MARINE ANIMALS

GENERAL PRINCIPLES

The transportation medium is appropriate for the species with regards to water quality including salinity, temperature, oxygen etc. Transportation distance, duration and frequency are minimised.

RECOMMENDATIONS

Transport of living aquatic animals should be minimised and be done in the most considerate manner. Living animals should be monitored regularly and maintained in a healthy state during transportation.

STANDARDS

7.37.1 Operators shall prepare an organic handling plan to define and implement measures to ensure that organic aquatic animals are provided with conditions during transportation and slaughter that meet animal specifi needs and minimize the adverse effects of

- Diminishing water quality
- Time spent in transport
- Stocking density
- Toxic substances
- escape

7.37.2 Operators must comply with the requirements of section 6.11 (Transportation) where relevant.

7.37.3 Transportation shall not cause avoidable stress or injury to the animals.

7.37.4 Transportation equipment and/or construction materials shall not have toxic effects.

7.37.5 Water quality, including salinity, temperature, oxygen content, pH shall be monitored to ensure appropriateness for the species in transit.

7.37.6 Chemically synthesised tranquillisers or stimulants shall not be given to the animals prior to or during transport or at any time.

7.37.7 There shall be a minimum of one person specifically responsible for the well being of the animals during transport.

7.37.8 Fish shall not be out of water for more than 30 seconds during any handling.

7.38 SLAUGHTER

GENERAL PRINCIPLES

Stress and suffering of the organism is minimised during the slaughter process.

Slaughter management and techniques are governed by careful consideration of the physiology and ethology of the organisms in question and accepted ethical standards.

RECOMMENDATIONS

To avoid unnecessary suffering, the organisms should be in a state of unconsciousness before bleeding out.

STANDARDS

7.38.1 Aquatic vertebrates shall be stunned before killing. Operators shall ensure that equipment used to stun animals is sufficient to remove sensate ability and/or kill the organism and is maintained and monitored.

7.38.2 Oil of cloves, ice slurry or carbon dioxide are permitted for the sedation of fish, for pre-slaughter or transportation purposes.

7.38.3 Aquatic vertebrates shall be in a state of unconsciousness before bleeding to death.

7.38.4 Equipment shall be regularly inspected and monitored for proper functioning. Equipment relying on gas or electricity shall be constantly monitored.

SECTION EIGHT – SOCIAL JUSTICE

8.1 SOCIAL JUSTICE

This Standard is applicable to Special and International Projects including Grower Group Certifications and those operators in the IFOAM certification program.

GENERAL PRINCIPLES

Social justice and social rights are an integral part of organic agriculture and processing.

RECOMMENDATIONS

Operators should comply with all International Labor Organisation (ILO) conventions relating to labour welfare and the UN Charter of Rights for Children.

All employees and their families should have access to potable water, food, housing, education, transportation and health services.

Operators should provide for the basic social security needs of permanent employees, including benefits such as maternity, sickness and retirement benefit.

All employees should have equal opportunity and adequate wages when performing the same level of work regardless of colour, creed or gender.

Workers should have adequate protection from noise, dust, light and exposure to chemicals that should be within acceptable limits in all production and processing operations.

Operators should respect the rights of indigenous peoples, and should not use or exploit land whose inhabitants or farmers have been or are being impoverished, dispossessed, colonised, expelled, exiled or killed, or which is currently in dispute regarding legal or customary local rights to its use or ownership.

Contracts should be fair, open to negotiation, and honoured in good faith.

STANDARDS

8.1.1 Where national laws fail to address social justice then operators shall have a verbal or written policy on social justice. Operators who hire fewer than ten (10) persons for labour and those who operate under a state system that enforces social laws may not be required to have such a policy. At a minimum, and where relevant, such a policy should include the following:

8.1.2 In cases where production is based on violation of basic human rights and clear cases of social injustice, that product cannot be declared as organic. The certification applicant shall not engage in or support the use of corporal punishment, mental or physical coercion or verbal abuse.

8.1.3 Operators may not use forced or involuntary labour.

8.1.4 Employees and contractors of organic operations have the freedom to associate, the right to organise and the right to bargain collectively.

8.1.5 Operators shall provide their employees and contractors equal opportunity and treatment, and shall not act in a discriminatory way.

8.1.6 Operators shall not hire child labour. Children are allowed to experience work on their family's farm and/or a neighbouring farm provided that:

- Such work is not dangerous or hazardous to their health and safety
- It does not jeopardize the children's educational, moral, social, and physical development
- Children are supervised by adults or have authorisation from a legal guardian

8.1.7 Employers shall provide all employees with potable drinking water, latrines or toilets, a clean place to eat, adequate protective equipment and access to adequate medical care.

8.1.8 Operators shall provide written terms and conditions of employment to all employees which is understood by the worker. The Terms and Conditions must include :

- wages, frequency and method of payment;
- location,type and hours of work;
- health and safety procedures;
- employment conditions including disciplinary and termination procedures
- employee benefits

These requirements are not necessary where the operator is unable to write; where workers are employed for less than 6 days or emergency labour is required to address unpredictable problems. In these cases mutual agreements on terms and conditions are sufficient.

SECTION NINE - POST PRODUCTION

9.1 PROCESSING

GENERAL PRINCIPLES

Processing and preparation of organic foods or foods containing organic ingredients is carried out to optimise and maintain quality and integrity. This is achieved through minimising processes, limiting refinement of foods and restricting or avoiding additives and aids whilst maintaining sanitation, hygiene and food safety.

Throughout the chain of custody, i.e. the harvest, transport, receival, storage, processing, preparation, packaging, warehousing, labelling and dispatch of organic produce, effective precautions are taken to ensure that the organic integrity of the material is retained. This involves compliance with this Standard by all the producers, operators and handlers in the supply chain, starting with certified organic producers.

Certification of a facility, operator, or processed, manufactured and/or packaged product from such a facility or operator is offered and maintained only after the minimum requirements of this Standard, and all those standards to which this certification scheme is subject, have been met.

STANDARDS

9.1.1 Before inspection arrangements are implemented, the operator must draw up a full description of the processing/preparation facility which includes the following:

- Completion of the Organic Handling Plan Questionnaire
- A process flow chart/Product Flow Chart
- Site Plan

9.1.2 Processing/preparation and sale of certified food and beverages using reference to certification as organic or conversion to organic may only occur following inspection and certification of the processing and preparation establishment. Protection of organic products from substitution, contamination and mixing with conventional product must be ensured through practices and documentation throughout all stages of production, handling, transportation, storage and processing.

9.1.3 Food safety and hygiene systems are required to be in place.

9.1.4 Any change to management or production systems that may result in changes to compliance with the Organic Quality Management System must be notified.

9.2 TRANSPORT

GENERAL PRINCIPLES

Transport and loading facilities are important in ensuring the integrity of the organic product and are subject to inspection.

RECOMMENDATIONS

Transport vehicles and shipping containers should be dedicated to organic usage. Where this is not appropriate clean down requirements will be required.

The choice of transport should be based on accessibility for cleaning prior to handling organic products. Stainless steel and other metal tray/tipper trucks and tankers normally used in food transportation are recommended as they are easily cleaned between shipments of certified and non-certified material.

STANDARDS

9.2.1 Provision must be made to avoid mixing or contamination of organic products in the transport phase.

9.2.2 Transportation systems must be able to be cleaned with ease to ensure product integrity during transit.

9.2.3 Vehicles which carry toxic and poisonous materials are not acceptable as occasional transportation for unpackaged and bulk organic product.

9.2.4 Responsibility for cleaning bulk transport systems lies with the consigner of the organic product unless otherwise agreed.

9.2.5 Prior to loading, trucks or vessels must be inspected by responsible personnel. Bulk Organic and non-organic products may not be transported together.

DEROGATION

If organic and non organic food materials are segregated in clearly labelled and differentiated retail packs and further isolated by separate wrapping on pallets, it is acceptable to have combined shipments of these goods in the same vehicle or shipping container.

9.2.6 Wooden containers, if used, must be dedicated to organic certified products only and clearly labelled as such, or lined. Non-dedicated containers can be used only if cleaned, lined and covered with an approved protective material (eg polyethylene sheeting).

9.2.7 All vehicles (and containers in general) must be suitably covered with sheeting or tarpaulins to prevent any external contamination to the organic foods.

9.2.8 Vehicles and containers used must be excluded from non-permissible pest control activities (ie fumigation and preventative spraying), during both pre-shipping and transit.

9.2.9 Documentation associated with the picking up, transport and delivery of organic produce shall be completed at each point in the chain of custody and kept by the transport company or operator responsible.

9.2.10 Labelling of packages or containers in transit must include the name and address of the operator or the person/company responsible for production, the certification number and the name of the product with reference to the organic producer and their number.

9.2.11 The party owning the certified product at the point of transportation shall be responsible for maintaining the organic integrity of the transport process.

9.3 STORAGE AND WAREHOUSING

GENERAL PRINCIPLES

Storage and warehousing of organic raw materials and finished food and fibre products protects their integrity from mixing or contamination.

RECOMMENDATIONS

Old timber structures are not recommended and may require sealing or coverage. Co-storage of organic products with different basic storage needs is not recommended.

STANDARDS

9.3.1 All organic food storage and holding areas must be designated and must be clearly marked or labelled as such unless the whole operation is to be certified.

9.3.2 Conventionally produced and certified produce must be separated spatially in designated areas and, if different levels (Organic/Conversion) of certified produce are being stored, these must also be clearly segregated in designated and labelled areas.

9.3.3 Stock record systems must be coded so that it can clearly be determined what quantity of organic material is in storage at any one time.

9.3.4 Storage area surfaces must be physically sound and capable of being easily cleaned (ie free of major cracks and crevices which harbour pests and food residues). Well prepared concrete, steel and food grade surfaces are acceptable. Rusted or contaminated surfaces must be re-sealed or covered with a non contaminating liner.

9.3.5 Besides storage at ambient temperature, the following storage conditions are approved:

- Modified atmosphere (ie, nitrogen, oxygen, carbon dioxide)
- Cooling
- Freezing
- Drying
- Humidity manipulation

9.3.6 Co-storage of conventional produce and organic produce under controlled atmosphere is not permitted. Other storage plans which do not threaten the integrity of organic product shall be assessed on a case by case basis.

9.3.7 Sacks or bulk bags must be dedicated for organic use and clearly identified.

9.3.8 Determinationas to whether analytical examination of surfaces for contaminating residues is necessary. If so the inspector shall take swab/residue samples to check product integrity if the store area presents risks to product integrity.

9.3.9 Labelling which clearly designates the organic status of products in storage must be in place at all times.

9.4 PROCESSING OF ORGANIC FOOD AND FIBRE

GENERAL PRINCIPLES

Organic food is processed by biological, mechanical and physical methods in a way that maintains the vital quality of each ingredient and the finished product.

Organic products should be processed in a minimal way that maintains the nutritional value of the food.

Processors should choose methods that limit the number and quantity of additives and processing aids.

STANDARDS

9.4.1 The following are approved for processing and preparation methods:

- Mechanical and physical
- Biological processes such as fermentation
- Extraction
- Precipitation
- Filtration

9.4.2 Any additives, processing aids, or other substances that chemically react with or modify organic foods shall comply with the requirements of Annex 4 "Acceptable Additives of Non-Agricultural Origin and Processing"

9.4.3 Non mechanical extraction shall only take place with water, ethanol, oil, carbon dioxide and nitrogen of food grade quality and appropriate as to purpose.

9.4.4 The use of genetically modified organisms for the processing of organic and bio-dynamic products or their derivatives is prohibited including food additives or processing aids.

9.4.5 Operators shall implement a risk management process to assess how they will avoid the accidental introduction of the genetically modified organisms to the production area during the time that organic or biodynamic production is in progress. This shall include a procedure that ensures that only organic or biodynamic products are in the processing area at the one time.

9.4.6 Inputs, processing aids and ingredients shall be traced back one step in the biological chain to the organism from which they were produced to verify that they are not derived from genetically modified organisms.

9.4.7 Where cleaning or flushing procedures are used, the operator must ensure the removal of potential GMO contamination before organic and bio-dynamic produce is passed through the equipment.

9.4.8 Irradiation is not permitted.

9.4.9 The use of nanotechnology is prohibited.

9.4.10 Filtration techniques that chemically react with or modify organic food on a molecular basis are restricted to mechanical filtration. Filtration equipment shall not contain asbestos, or utilise techniques or substances that may negatively affect the product.

9.5 PACKAGING

GENERAL PRINCIPLES

Organic product packaging has minimal adverse impacts on the product and the environment.

RECOMMENDATIONS

Processors of organic food should avoid unnecessary packaging materials.

Organic food should be packaged in reusable, recycled, recyclable, and biodegradable packaging whenever possible.

STANDARDS

9.5.1 Packaging materials must not be capable of transmitting contaminants to the food, nor must the adhesives or inks used on them.

9.5.2 Organic produce shall not be packaged in reused bags or containers that have been in contact with any substance likely to compromise the organic integrity of product or ingredient placed in those containers.

9.5.3 All final packaging materials used must be of food grade, clean, new or as new, and of suitable design to protect the organic integrity of the product during transport and display.

RECOMMENDED	A full environmental audit for packaging Returnable outers and bulk containers A deposit scheme for cans and bottles Recycled outer packaging indicated as such Single layer, single substance recyclable packaging Bulk packaging at retail outlets for self selection Unbleached paper and cardboard
PERMITTED	Glass Paper and cardboard Polyethylene and polypropylene films Plastic containers Modified atmosphere packaging films Plastic & hessian nets and sacks
RESTRICTED	Wax coatings Wood
PROHIBITED	Expanded polystyrene using Chloro-Fluoro Carbons (CFCs) PVC (PolyVinyl Chloride) Lead Packaging materials, and storage containers, or bins that contain a synthetic fungicide, preservative, or fumigant.

Table 10 – Packaging

9.5.4 Any reuse of outer containers or external packaging must follow a cleaning and quality assurance program which renders such packaging as new.

9.5.5 Vacuum packing of product and the use of food grade nitrogen and ozone are permissible.

9.5.6 Product conforming to this Standard and packaged for purposes other than sale to the final consumer must be transported in packaging that is closed in a manner that prevents contamination or substitution. The name and address of the operator, a description of the product and indication that the product is certified (including certification level) must accompany packaging.

9.5.7 On receipt of a product referred to as organic by this Standard, the operator shall check the closing of the packaging or container, where it is required. Where the check leaves any doubt as to the integrity of the product, it may only be used in organic preparation or packaging after it is confirmed to be organic. This event must be recorded.

9.6 HANDLING AND PACKING

GENERAL PRINCIPLES

Organic products are handled in a manner that prevents contamination or substitution with substances or products not compatible with this Standard.

RECOMMENDATIONS

Integrity of organic foods and beverages should be achieved through the handling and processing of organic foods separately from non organic foods in dedicated facilities.

STANDARDS

9.6.1 Handlers and processors shall not mix organic products with non-organic products.

9.6.2 Handlers and processors must handle and process organic foods either separately in time or space from non organic products.

9.6.3 All organic products shall be clearly identified as such, and stored and transported in a way that prevents contact with conventional product through the entire process.

9.6.4 The handler and processor shall take all necessary measures to prevent organic products from being contaminated by pollutants and contaminants, including the cleaning, decontamination, and if necessary disinfection of facilities and equipment.

9.6.5 Handling and packing must be carried out in ways that avoid contamination of organic food with:

- Cleansers and sanitisers
- Residues from previous products
- Facility pesticide applications
- Prohibited processing aids or additives
- Packaging products or products used to modify the packaging environment

9.7 PEST CONTROL

GENERAL PRINCIPLES

Organic food is protected from pests and diseases by the use of good manufacturing practices that include proper cleaning, sanitation and hygiene and without the use of chemical treatment or irradiation.

RECOMMENDATIONS

Recommended treatments are physical barriers, sound, ultra-sound, light and ultraviolet-light, traps (including pheromone traps and static bait traps), temperature control, controlled atmosphere and diatomaceous earth.

Pest control systems (self or contractor managed) should use Integrated Pest Management (IPM) techniques and structural pest control and reliance on chemical treatments should be used as a last resort.

Ongoing monitoring should form the basis of pest control programs.

STANDARDS

9.7.1 The operator must manage pests and, in so doing practice the following methods:

- Premises must be well sealed to prevent insect, bird and rodent pests from accessing the storage and processing/preparation areas (eg. fly screens and air curtains).
- Insect control protection and treatment through monitoring, trapping, electrical zapping, sealing of harbourages and ultraviolet light attraction.
- Rodent control through exclusion, then trapping if needed and baiting only as a last resort. Baiting may only be carried out on the exterior of a facility and all bait stations must be dated, numbered and constructed as semi- enclosed boxes.

9.7.2 Bait selection must be such that the base material is clearly differentiated from any food materials on site. Baits must be positioned so that there is no potential for contamination of organic ingredients, organic food or of food contact surfaces. Sticky boards may be used in the interior of facilities.

9.7.3 Warehouse storage must allow for a gap of 0.5 metres between walls and product to enable sticky board inspection and changing to occur.

9.7.4 Physical control of insect pests in grain stores or flour handling facilities using diatomaceous earth products approved for grain handling is acceptable.

9.7.5 Where porous surfaces are contacted by organic materials, impervious materials must be placed over those surfaces that have been exposed to past use of prohibited chemicals.

9.7.6 All pest control activities shall be clearly documented.

9.7.7 Prohibited pest control practices include, but are not limited to, the following substances and methods:

- pesticides not contained in Annex 2 “Products for Control of Plant Pest and Disease”.
- fumigation with ethylene oxide, methyl bromide, aluminium phosphide or other substance not contained in Annex 4 “Acceptable Additives of Non Agricultural Origin and Processing Aids”.
- ionising radiation

DEROGATION

Treatment of active insect populations with insecticides shall only be done as a last resort after all means listed in Annex 3 "Substances and Methods Permitted for Pest Control in Storage and Transport Units" have been exhausted. Chemicals selected shall be approved by governmental authorities for that purpose and must not be used in any way which would subject organic products to exposure.

If facilities are not in current use for organic preparation and packaging, and all methods of insect prevention and disinfestation have proved ineffective, alternative products may be used. These shall have an LD_{50} rating of 500 or more - classifying them as 'Slightly Toxic'. In these instances it must be demonstrated that physical control is not possible, and if it can be proven that contact with and contamination of organic produce will not result, written permission may be sought to use these materials. Residual life of these non-volatile chemicals shall be short, and applications shall be made by state licensed pest managers using low hazard 'crack and crevice' techniques which deliver pesticides to the harbourages only and minimise contamination risk. At the resumption of organic preparation or packaging, at no less than 2 days after deployment of treatment, The right is reserved to require surface and tissue testing for any of those products demonstrated to have been used.

9.8 DOCUMENTATION

GENERAL PRINCIPLES

The maintenance of a comprehensive system of records that clearly demonstrate compliance with organic quality management is a necessary prerequisite of organic certification. The manual or electronic system of record keeping should be one that permits internal reporting and NASAA scrutiny in a clear and straightforward manner. Bar coding, batch numbering and dating systems are essential aspects of an audit trail.

STANDARDS

9.8.1 Records must be made available for inspection and assessment at the premises of the applicant/certified operator. The description of activities/processes, detailed maps/floor plans/process (product flow charts) diagrams and itemised inputs used should be in the form of the Organic Management Plan (OMP). Materials Safety Data Sheets (MSDS) must be made available for all products utilised at the premises.

9.8.2 Records must be maintained for a minimum of five years.

9.8.3 Records must show a clear audit trail for organic product from its entry into the preparation and processing system as raw material to the next stage in the supply chain or its ultimate release to the consumer as packaged, processed products.

9.8.4 The following records (as applicable) are required:

- NASAA Organic Standard
- A copy of certification contract
- A copy of current certificate of registration
- Records of purchases and receivals
- Internal transfer and receival records
- Sales records indicating nature, quantity and consignees of organic products sold
- Storage records
- List of suppliers
- Supplier Current organic certificates
- Organic operating manual and updates
- Cleaning and pest control protocols and records
- Product recall records
- Waste management records
- Production records
- Records of non-compliance and corrective actions
- Records concerning the health and hygiene of food handlers
- Pest and sanitation treatments
- Complaints register

9.9 BEST ENVIRONMENTAL PRACTICE

GENERAL PRINCIPLES

Organic handling, processing and preparation has minimal impact on the environment in respect of the source, use and fate of materials and ingredients.

RECOMMENDATIONS

Key aspects of a Best Environmental Practice program should include the management of chemical substances and waste products (collection, storage and disposal) and water and energy usage.

General aspects should include, but are not limited to, the following: boiler water disposal, cleaning materials, waste water, dust, waste, fumes, noise and products and packaging materials.

STANDARDS

9.9.1 Processors shall develop and implement Best Environmental Practice in order to reduce and eliminate the burden on the environment.

9.9.2 Operators must recycle waste products.

9.10 PRODUCT RECALL

GENERAL PRINCIPLES

The capacity to retrieve goods from the supply chain in the event of mis-labelling, contamination or mixing is part of the Organic Management Plan.

STANDARD

9.10.1 The processor or handler must have a system of product recall with clearly designated procedures and protocols to ensure that recall of a NASAA Labelled product can be quickly and effectively carried out.

9.11 PRODUCT ACCEPTANCE

GENERAL PRINCIPLES

The use of ingredients certified by another certifying organisation in finished products bearing the NASAA name and/or label is subject to approval. Approval may follow case by case assessment of a specified ingredient or finished product, or general certification transference with another certifying organisation. In both cases, processes are implemented to ensure that those products are equivalent to this Standard.

STANDARD

9.11.1 Affixing the NASAA name and/or label to non NASAA certified products shall be subject to prior approval.

DEROGATION

The exception to this is when minor ingredients that constitute less than 10% of the total weight of the product may be accepted on the basis of being certified by a certification body that has been approved by its government or have been accredited by a national accreditation body for the scope of organic certification. The total of all ingredients accepted on this basis shall not exceed 20% of the total weight of the product. Current certificates and verification of organic status shall need to be maintained by the operator.

9.12 IMPORTED PRODUCTS

GENERAL PRINCIPLES

Imported organic and biodynamic products are produced, prepared and labelled in ways that are equivalent to this Standard.

STANDARDS

9.12.1 Organic or biodynamic produce which is imported into Australia can be labelled as meeting this Standard provided it satisfies the conditions of 9.11 (Product Acceptance) above.

9.12.2 Imported organic or biodynamic produce may only be labelled as meeting this Standard if the operator (importer or trader) is certified and the imported products have not been subjected to exposure by materials not listed in this Standard.

9.12.3 An original export certificate issued by a competent authority or government approved certification body is required for each consignment.

9.12.4 The export certificate must accompany the organic or biodynamic consignment into Australia.

9.12.5 Imported organic or biodynamic produce not recognised as being equivalent to this Standard shall not be labelled, or exported, or combined with any produce, which suggests that it is certified to this Standard.

9.12.6 Following any pre or post entry quarantine chemical or ionising radiation treatments an operator must not label imported organic or biodynamic produce as meeting this Standard. In these situations all organic or biodynamic trade descriptions must be either de-faced or stencilled-over or destroyed.

9.13 SAMPLING

GENERAL PRINCIPLES

Samples of products are retained to permit analysis in cases where contamination is discovered or alleged in the marketplace.

STANDARD

9.13.1 Operators must maintain samples of batches of manufactured products for a period of 12 months or the shelf life of the product, whichever is greater.

SECTION TEN – ADDITIONAL REQUIREMENTS FOR INDIVIDUAL CATEGORIES

This section lists practices and additives covering specific industries.

It is additional to all other relevant requirements of this Standard outlined in the above sections, and must be interpreted in conjunction with these requirements.

The listing is not exhaustive and does not include all acceptable or all prohibited practices. Other practices should be checked for approval prior to use.

10.1 GRAIN, OILSEED AND PULSE PRODUCTS

STANDARDS

10.1.1 The following post production practices are approved for grain, oilseed and pulse products:

- Transport in metal tipper trucks fitted with heavy duty tarpaulins to protect grain in transit
- Designated or non-designated bins/silos made of steel and other non-contaminating metals that are easy cleaning and residue free
- Aeration of grain held in sheds and silos for extended periods to reduce moisture and pest problems or stored in high $C0_2$ atmospheres. Initial concentrations of 70-80% decreasing to 35% for 15 days may be necessary to achieve this
- All standard physical grain handling, cleaning, rolling and milling operations provided that the equipment is clean and free of residues or is dedicated to organic runs only. Where the equipment cannot be guaranteed to be residue free due to inaccessibility, the running of an organic 'plug' must take place. Stone rollers are very difficult to clean of residues and the 'plug' run must be standard
- Refrigerated or ambient air cooling of stored grain
- Diatomaceous earth used on storage or production structures or direct onto grain itself in accordance with application directions

10.1.2 The following practices are prohibited from use in grain, oilseed and pulse products:

- Aluminium salts (eg E541 sodium aluminium phosphate) as raising agents in flour
- Addition of vitamins other than those specified by the Australian Food Standards Code for flour. Food grade additions may be made to achieve these minimum levels in organic flour (eg. thiamine)
- Treatment of grain with any grain protectant chemicals or fumigation with any registered fumigant (phosphine, methyl bromide etc.)
- Addition of more than 5% of any non organic fillers such as other flours or starches to meet importing country requirements
- Rodent baits adjacent to ‘high risk’ locations such as grain storage bins or other open areas
- The use of pyrethrum as a grain contact treatment

10.2 FRESH FRUIT, VEGETABLES AND HERBS

STANDARDS

10.2.1 The following post production practices are approved for all fresh fruit, vegetable and herb products:

- Short term storage in clean wooden bins, wicker/cane baskets or jute sacks that are new and dedicated or cleaned in accordance with this Standard
- Segregated long term cool storage in areas designated for organic produce only
- Washing in potable water
- Dry brushing
- Ozone treatment for approved anti-microbial wash solutions
- Freezing, vacuum packing, dehydrating, pickling and canning

- Artificial ethylene gas ripening

10.2.2 The following practices are prohibited in post production practices for fresh fruit, vegetable and herb production:

- Co-storage with conventional pome fruit especially apples
- Synthetically formulated fungicidal dips
- Fruit waxing, except for approved waxes where necessary for export. Produce must be labelled as wax treated. Approved waxes may not be acceptable to importing countries and exporters should ensure that they are compliant with the requirements of importing countries.

10.3 DRIED FRUIT, VEGETABLES AND HERBS

STANDARDS

10.3.1 The following post production practices are approved for all dried fruit, vegetable and herb products:

- Sun drying on dedicated racks not treated with termiticides or other insecticides
- Tunnel drying using mechanically produced heat which presents no contamination risk to the product (eg. residues from burning fuel)
- Calcium carbonate/vegetable and olive oil drying techniques
- Certified or other acceptable oil additions to prevent fruit compaction and solidification during packing (total oil to be less than 1% of final weight)

10.3.2 The following post production practices are prohibited for dried fruit, vegetables and herb products:

- Calcium stearate, anti-caking agents and colourings
- Sulphur dioxide preservative treatments

10.4 JUICES

STANDARDS

10.4.1 The following post production practices are approved for juice production:

- Water and steam-cleaned plant and equipment
- Food grade anti-microbial rinses are acceptable but must be thoroughly rinsed with boiled or pasteurised water prior to contact with organic foods
- Pasteurisation of juices prior to bottling
- Citric acid and ascorbic acid E300 used as preservatives
- Centrifugation, muslin, diatomaceous earth or polysheet straining to remove unwanted residues
- Certified organic sugar
- Tetra paks

10.4.2 The following post production practices are prohibited for juice production:

- Conventional sugar additions
- Colouring agents and antioxidants other than those in Annex 4 “Acceptable Additives of Non Agricultural Origin and Processing Aids”.

10.5 CANNING

STANDARDS

10.5.1 The following post production practices are approved for juice production:

- Lined metal cans are acceptable
- Lead content in solder provided that the food pH is between 6.7 and 7.3
- 95% tin solder and cadmium free food grade solder

10.5.2 The following post production practices are prohibited for juice production:

- Aluminium lead bearing solder where lead content is over 5%

10.6 JAMS, CHUTNEYS, SAUCES & PICKLES

STANDARDS

10.6.1 The following post production practices are approved for the production of jams, chutneys, sauces and pickles:

- Physical preparations (boiling, straining, evaporation to thicken etc)
- Natural pectins, gelatine, corn flour and approved vegetable gums for thickening provided they do not contain or are derived from GMOs
- The addition of sugar or vinegar provided that it is no more than 5% total volume (unless of certified organic origin)

10.6.2 The following post production practices are prohibited for the production of jams, chutneys, sauces and pickles:

- Sulphur based preservatives
- Copper, Teflon-coated and aluminium cooking utensils

10.7 VEGETABLE OIL

STANDARDS

10.7.1 The following post production practices are approved for palm oil:

- Cold press techniques
- Application of heat
- Physical centrifugation and filtering clarification
- Natural bleaching earths which do not impart metals into the oil
- Cleaning of oil through filtration or precipitation with non asbestos products

10.7.2 The following post production practices are prohibited for the production of vegetable oil:

- Chemical extraction methods and use of chemical solvents
- Use of product in refining other than those appearing in Annex 4 Acceptable Additives of Non Agricultural Origin and Processing Aids

10.8 DAIRY PRODUCTS

STANDARDS

10.8.1 The following post production practices are approved for dairy products:

- Use of anti-bacterial rinses providing that all traces are flushed from contact surfaces with pasteurised or sterilised water
- Hydrogen peroxide or biodegradable compounds
- Transport of certified milk in stainless steel containers after collection
- Use of bacterial and enzyme preparations excluding genetically engineered strains
- Pasteurisation (heat treatment, high speed and vat)
- Separation and physical filtration methods
- Preparation of milk products (cooling, churning, culturing, ripening and cooking)
- Vacuum packing with or without nitrogen or $C0_2$ flushing
- Bottling of milk in glass, recyclable non-polymerising plastics and food grade waxed cardboard
- Packaging of cheeses in wax or cloth after brine washing
- Ultra Heat Treated (UHT)

10.8.2 The following post production practices are prohibited for dairy products:

- Preservatives, thickeners and emulsifiers (eg. potassium sorbate) that are not listed in Annex 4 “Acceptable Additives of Non Agricultural Origin and Processing Aids”
- Genetically manipulated enzyme and bacterial cultures

10.9 MUSHROOMS

STANDARDS

10.9.1 The following practices are approved for mushroom production:

- Compost of certified origin
- Steam sterilisation of equipment
- Paper, recyclable plastic or cardboard packaging

10.9.2 The following practices are prohibited for mushroom production:

- Fogging of premises using prohibited insecticides for insect control
- Treatment of medium with prohibited fungicides or chlorinated compounds

10.10 COFFEE

STANDARDS

10.10.1 The following practices are required for coffee production and manufacture:

- Sun or artificial drying of beans preferably using waste husks to fire the furnaces. No contamination from fuel burning of beans shall occur
- Coffee purchase records sufficiently detailed to allow trace back to certified production areas
- Cleaning with water and physical brushing/vacuuming methods
- Clean, dedicated jute or poly sacks labelled with certification status for coffee shipping and storage
- Segregated storage areas clearly marked and separated physically from the other store areas
- Fumigation of shipping containers where required by law for export before loading coffee after fumes have dissipated (minimum 24hrs)

10.10.2 The following practices are prohibited for coffee production and manufacture:

- Fumigation of coffee with methyl bromide prior to export
- Mixing or blending of organic and conventional coffees
- Use of any synthetic fungicides or pesticides in organic coffee storage

10.11 TEA

Standard 10.10.1 and 10.10.2 above are applicable to tea as well as the following:

STANDARDS

10.11.1 The following practices are approved for tea production and manufacture:

- Packing in poly bags or tea chests internally lined with plywood
- Use of recycled paper material for tea bag manufacture
- The provision of dust masks to factory workers to prevent tea dust inhalation

10.12 WINE

10.12.1 The following practices are approved for wine production and processing:

- Crushing in food grade construction material (food grade plastic or stainless steel)
- Clarification with approved products (refer to Annex 4 “Acceptable Additives of Non-Agricultural Origin and Processing Aids” and Table 11)
- Fermentation with naturally occurring yeasts on fruit and non genetically modified yeasts
- Fining with bentonite, diatomaceous earth, food grade gelatine, casein and physical processes such as chilling
- Maturation and storage in food grade inert materials, including new barrels, dedicated organic barrels or barrels that have been cleaned to remove interior residues under cover of an inert gas such as nitrogen

- Stabilisation using approved products (refer to Annex 4 “Acceptable Additives of Non-Agricultural Origin and Processing Aids” and Table 11)
- Sulphur dioxide for preserving wine to a maximum level of 100mg/l (total)
- Bottling or packaging in new containers sealed with non contaminated cork or other inert materials or in tetra paks
- Processing methods that include: settling, centrifugation, chilling, heating, filtration with approved media, treatment with inert gas

Activated carbon	L- Malic acid (E296)
	Membrane filters (asbestos free)
Argon (E938)	Mistelle (fortified certified organic grape juice)
Ascorbic acid (E300)	Nitrogen (E941)
Bentonite (E558)	Oxygen (E948)
Calcium carbonate (E170)	Oak pieces
Carbon dioxide (E290)	Pectin (E440)
Casein	Potassium carbonate (E501)
Citric acid (E330)	Potassium metabisulphite (E224)
Diatomaceous earth	Potassium tartrate (E336)
Egg white	Silicon dioxide (E551)
Gelatine	Sulphur dioxide (gas or aqueous) (E220) Restricted to maximum level of 100mg/l (total)
Isinglass	Tannic acid (filtration aid)
Kaolin	Tartaric acid (E334)
Lactic acid (E270)	Yeast (non GMO)

Table 11 - Additives and Processing Aids Allowed in the Production of Organic Wine

10.12.2 The following products and practices are prohibited for wine production and manufacture:

- GMO’s and their products including processing aids and additives
- Ion exchange processes for stabilisation
- Use of lead capsules
- Copper sulphate
- Asbestos wicks
- Blending with non organic wines at any percentage
- Erythorbic Acid
- Ammonium phosphate
- Ammonium sulphate

SECTION ELEVEN – NASAA STANDARDS FOR BIODYNAMIC AGRICULTURE

11.1 BIODYNAMIC PRINCIPLES

These Biodynamic Standards are based on the fundamental knowledge of Biodynamic Agriculture, as derived from Dr. Rudolf Steiner in the early twentieth century. Farm and garden management should reflect an understanding of the principles presented in the "Agriculture Course" given by Steiner in Poland in 1924. They enhance the continued development of the total farm and ecological system.

The principal aims of Biodynamic Agriculture include:

- Production of food of the highest nutritional value containing vital life force and the higher ordering principles of the cosmos
- The enhancement of biological cycles in farming systems
- Maintaining and increasing depth and fertility of soils
- Working as far as practicable within a closed system
- Co-existence with and the protection of the environment
- Development of a healthy and balanced cultural, social and economic environment
- Development of associative business forms, whereby a fair and equitable relationship is fostered between the producer, distributor and the consumer
- A deepening understanding of the relationship between humanity and nature

These Biodynamic Standards are in addition to all relevant sections of the NASAA Organic Standard which must also be complied with.

STANDARDS

11.1.1 Compliance with the relevant Sections of this Organic Standard shall be maintained.

11.1.2 Preparation 500 (horn manure) shall be applied to the total production at least once and preferably twice a year. An exemption shall be requested if this is not able to be carried out.

11.1.3 Preparation 501 (horn silica) shall be applied at least once to each crop, and at least once per year to permanent and semi permanent plants such as pasture grasses. An exemption shall be requested if this is not able to be carried out.

11.1.4 Compost preparations 502-507 shall be used to direct all fermentation processes in liquid manures and solid composts. Such fermented materials shall be regularly applied to all land. Where the fermentation takes place on the land itself – such as on pastoral holdings – compost preparations shall be brought to bear on plant and animal wastes, by addition of cow pat pit or biodynamically prepared fish emulsion or liquid plant teas or similar material.

11.1.5 Fertility programs shall aim for a build up of natural soil fertility in accordance with the underlying principles of the "Agriculture Course". Manure liquid manures and slurry of farm animals – in particular, cattle – plus composts of crop wastes and green manuring shall form the basis of fertilising, together with the Biodynamic compost preparations.

11.1.6 Any inputs to the farm including manures must go through a biodynamic composting process.

DEROGATION

Exceptions are: lime rock dusts and rock phosphates for spreading over areas and approved mulching materials for pasture and cropland.

11.1.7 Preparations 500 and 501 shall be stirred for one hour. Stirring shall be by hand, stirring machine or flow forms (see Resource Manual for instructions).

11.1.8 Preparations shall be applied using clean and dedicated equipment. Testing may be requested to verify that equipment is not contaminated with prohibited substances.

11.1.9 Preparations shall be stored in a suitable container away from fumes, electricity, contamination, heat and sunlight (except 501 which is stored in glass in sunlight).

11.1.10 Detailed record keeping of biodynamic practices shall be kept and made available for inspection.

11.2 SOIL AND MANAGEMENT

GENERAL PRINCIPLES

In market gardening and horticulture the use of compost made using biodynamic compost preparations is essential for soil and plant health. It is anticipated that use of brought-in already manufactured compost would cease by the time full certification is achieved.

For broadacre farming, the use of compost preparations on waste stubble and green manures help to increase soil fertility and structure within the grazing and cropping rotations. (Suggested amounts for fertility are given in the BAA Resource Manual)

11.3 PLANTS AND PLANT PRODUCTS

STANDARD

11.3.1 Wild harvest cannot be certified biodynamic unless the application of biodynamic preparations has been applied to the areas used for harvest.

11.4 ANIMAL CARE

RECOMMENDATIONS

The retention of horns on cattle are encouraged. This may require different strategies in animal handling, such as not containing cattle in small areas, which may stress animals.

11.5 BROUGHT-IN STOCK

STANDARDS

11.5.1 The bringing in of breeding stock from conventional sources is allowed up to a maximum of 10% per year.

11.5.2 All animals must be tagged and records shall be kept with regard to stock and produce. Refer to Section 6 General Standards for Animal Husbandry.

11.6 ANIMAL RECORDS

STANDARD

11.6.1 Animals must be born and raised on a certified biodynamic farm as part of an indigenous herd.

DEROGATION

Animals from certified organic farms may be sold as certified biodynamic after a minimum period of 2 years under certified biodynamic management.

11.7 BROUGHT-IN FEEDSTUFFS

STANDARD

Certified organic feed, which is brought-in, may not exceed 20% of daily intake calculated on a dry matter basis in order that stocking rates and farm capacity are managed sustainably. This applies to all animal types. Refer to Section 6.5 Livestock Diet and Nutrition.

11.8 PROCESSING AND/OR PACKAGING OF BIODYNAMIC PRODUCT

STANDARDS

11.8.1 Where less than 95% of product is biodynamic and organic certified product is added, then the product shall be marked “Organic”, not “Biodynamic”.

11.8.2 Where more than 5% of product is certified “In Conversion” the product shall be labelled “In Conversion” not “Biodynamic”.

11.8.3 Where an operator is implementing biodynamic practices during the conversion period product shall be labelled “In Conversion to Biodynamic.”

11.9 BIODYNAMIC PRODUCTION METHODS

RECOMMENDED

The application of biodynamic principles over the last three quarters of a century, involving both practical experience and scientific research is reflected in an increasing range of methods used in applying the biodynamic preparations. Record keeping is important so that methods are noted and results recorded.

An existing body of experience and research confirms the use of the methods outlined on the following pages.

Reference: “Biodynamic Resource Manual – working with biodynamics” (2004) *Biodynamic Agriculture Australia.*

ACTIVITY	METHOD	DETAIL
STIRRING	Hand stirring	Materials: Copper Wood Food grade stainless steel Food grade plastic Concrete Ceramic
	Mechanical stirring	Electric
		Hydraulic
		Impeller
	Flow forms	Jarna 7 forms per 200 litre @ 50 litres/minute 15 passes = 200 litre capacity
		Vortex 3 forms @ 250litres/minute 15 passes = 1000 litre
	Pumps	Archimedes screw (preferred) 50 – 400 litres/minute roller pump
		Diaphragm (preferred) 100 – 500 litres/minute
		Centrifugal 130 - 250 litres/minute Submersible
SPRAYING	500 spray pressure	10 – 40 pounds per square inch (psi)
	501 spray pressure	80 –120 psi
WATER TEMPERATURE	500	Should be above ambient and soil temperature at time of spraying Max 37° C
	501	Should be above ambient and soil temperature at time of spraying Max 37°C
COMPOST PREPARATIONS 502 – 507	Compost heap liquid composts for manuring	1 set of preparations per 15 tonnes (2 grams 502 – 506, 5 ml 507) 1 set of preparations per 20 acres also in 500 (add in the last 20 minutes of stirring)

	Cow pat pit	3 sets of preparations per 0.1 cubic metre For use to bring the influence of compost preparations on to crop residues, pasture, orchards, where nutrient factor is very small
	Fish, Seaweed Emulsions	1 set of preparations per 200 litres For use to bring compost preparations' influence on to crop residues, pasture, orchards, where nutrient factor is micro
	Prepared 500	7 sets of preparations to half a cubic metre of 500
500	Applied to total production area	Ideally twice a year and at least once (less than once a year only by approval)
		Once a year accepted for pastoral conditions (less than once a year only by approval)
501	Applied	To each crop (less than once a year only by approval)
501	Applied	Annually to permanent pastures (less than once a year only by approval)
PREPARATION STORAGE METHODS	500, 502 – 507	Cool dark position away from heat, electricity, toxic fumes
		Within wood, ceramic, or glass containers for each individual preparation
		Preparation storage containers held in lidded wooden box or ceramic crock surrounded by at least 8 cm of peat moss
	501	In glass container with some exposure to sunlight

Table 12 - Recommended Methods for Biodynamic Preparations

DEROGATION

The applicant shall demonstrate the link between situational practices and biodynamic objectives by providing a description of the particular methods employed in the prevailing circumstances to achieve these objectives.

Where the objectives are not supportive of biodynamic principles or where the practices do not achieve the stated objective the application for exemption may be rejected.

Reasons for granting exemptions will be based on factors such as:

- *Types of terrain on the farm*
- *Climate type of farm and specific seasonal conditions*
- *Scale and intensity of operations on the farm*
- *Mix of enterprises on the farm*

SECTION TWELVE – NASAA STANDARDS FOR HEALTH AND BEAUTY CARE PRODUCTS

SCOPE OF THE STANDARDS

This section of the NASAA Organic Standard covers products that are made from organic ingredients and include herbal, toiletries, body care products and cosmetics. They may include both therapeutic and non-therapeutic ingredients. Along with the National Standard for Organic and Biodynamic Produce Edition 3.3, NASAA will provide the benchmark for transparent and safe practices in relation to this developing industry.

It is the responsibility of the operators/applicant to be familiar with, and comply with any relevant legislative framework. Verification of compliance with the Therapeutic Goods Administration or Trade Practices (Consumer Product Information Standards) (Cosmetics) Regulation 1991, may need to be demonstrated to NASAA, unless otherwise excluded.

There are differing definitions of the term organic in different countries. In Australia, the export of organic produce is governed by the Export Control Orders (refer to Sections 2.13 and 2.14). Operators are advised to make themselves fully aware of importing country requirements in any country to which they wish to export certified organic product.

As a practical and explanatory tool to guide application of the National Standard and achieve domestic and export market access, these standards will provide the basis for the use of the NASAA label and are constructed using the principles of organic production and processing with regard to ingredients and manufacturing methods with some minor but obvious departures from food production. They are to be read in conjunction with the General Certification, and Post Production, Requirements set out in Sections Two and Nine of this Standard. All other relevant sections of the Standard apply.

12.1 LABELLING

GENERAL PRINCIPLE

Labelling will convey clear and accurate information to the consumer about the product and its constituent ingredients.

STANDARDS

12.1.1 Labelling will comply with the labelling requirements of Sections 2.16, 2.17 and 2.18 of this Standard.
12.1.2 Any ingredient specifically added as a preservative must be identified on the labelling.
12.1.3 Products containing 100% organic ingredients are able to use the words ‘100% organic’ beneath the NASAA label.

12.2 AGRICULTURAL INGREDIENTS

GENERAL PRINCIPLE

The raw ingredients which are of agricultural origin are certified organic.

STANDARDS:

12.2.1 All raw ingredients shall be certified organic in accordance with this Standard.
12.2.2 The use of Genetically Modified Organisms, or their derivatives, is prohibited.
12.2.3 Perfumes, colouration, flavours and fragrances shall be certified organic and their manufacture and use subject to all other relevant requirements of this Standard.
12.2.4 The use of synthetic colours, flavours and fragrances are prohibited.
12.2.5 Non organic grapefruit seed extract is prohibited.

12.3 NON AGRICULTURAL INGREDIENTS

GENERAL PRINCIPLE

The use of non agricultural ingredients shall be based on their need and the nature of those ingredients.

STANDARDS:

12.3.1 The use of non agricultural ingredients shall comply with the requirements of Annex 4 'Acceptable additives of Non Agricultural Origin' as defined in this Organic Standard.

12.3.2 The use of minerals that are unmodified and not subject to chemical processes may include the following when they are essential:

- sand
- montmorillonite and kaolin clays
- salt
- pumice
- chalk

12.3.3 The following are approved for use as emulsifying agents and/or surfactants: hydrolysis, hydrogenation or esterification or trans-esterification of the following materials:

- fats, oils and waxes
- lecithin
- lanolin
- monosaccharides, oligosaccharides and polysaccharides
- protein and lipoproteins,

but only where biological, mechanical and / or physical processing methods consistent with this Standard are undertaken.

12.3.4 The use of Sodium hydroxide is acceptable for the production of soap.

12.3.5 Ascorbic acid and tocopherol are permitted for use as anti oxidants.

PROHIBITED INGREDIENTS	
Parabens	Synthetic fragrances & perfumes
Synthetic vitamins (incl. dl-tocopherol)	Sodium Laurel sulphate
Talc	Padimate-O (PABA)
Synthetic colouring agents	Silicones
Synthetic flavours	Ethoxylated ingredients

Table 13 – Non exhaustive list of prohibited ingredients for Health & Beauty Care Products (to be read in conjunction with Annex 5)

This list of prohibited ingredients is not exhaustive and may be extended.

12.4 EXTRACTION AND PROCESSING METHODS OF RAW INGREDIENTS

GENERAL PRINCIPLE

Extraction and processing methods of raw materials preserve the essential nature of the product.

STANDARDS:

12.4.1 The following extraction methods are permitted

- cold extraction
- pressure
- distillation using water or steam
- percolation

12.4.2 Certified organic solvents including alcohol, oils, glycerine, honey, and sugar are approved for use.

12.4.3 Carbon dioxide and potable or demineralised water are approved extraction solvents.

12.4.4 The use of ionising radiation and genetically modified organisms is prohibited.

PROHIBITED
Mineral oils Benzene Hexane Propylene glycol

Butylene glycol Paraffin Petroleum derived solvents Genetically modified organisms Non-agricultural solvents other than those listed in 12.4.2 above

Table 14 – Non exhaustive list of prohibited extraction solvents

12.5 MANUFACTURING PROCESSES

GENERAL PRINCIPLE

The manufacture of organic health and beauty care products is designed to preserve the essential characteristics and benefits of ingredients and minimise environmental impacts.

STANDARDS:

12.5.1 The processing or preparation of all raw materials shall be done in accordance with all other requirements of this Standard.

12.5.2 The use of biological, mechanical and physical processing methods is permitted.

12.5.3 Biological processing methods that use Genetically Modified Organisms or their derivatives are prohibited.

12.5.4 No testing may take place on animals during the development or production of organic products.

12.5.5 The use of non listed processing methods and chemicals shall be considered on the basis of a technical report being submitted to address the following criteria:

- Biodegradability
- Toxicity
- Necessity
- Purpose
- Status of that product under National or International Standards.

12.5.6 The following chemical processes are prohibited

- Sulphonation
- Ethoxylation
- Propoxylation

12.6 PACKAGING

GENERAL PRINCIPLE

Packaging of health and beauty care is chosen for their relatively benign environmental impact, ability to be recycled and freedom of risk of contamination to the enclosed product.

STANDARDS:

12.6 Packaging must comply with the requirements of Section 9.5 of this Standard.

12.7 APPROVED COSMETIC LABEL

GENERAL PRINCIPLES

Labelling is employed to provide accurate and non-ambiguous information about products.
Due to the specific nature of organic beauty products many products contain between 70% and 95% organic ingredients with the remainder of the ingredients comprising of products that are in compliance with the NASAA Standards (eg clays and minerals) and whilst not harmful, are not from an agricultural origin so cannot be certified as “Organic”.

STANDARDS:

12.7.1 NASAA Approved Cosmetic label may be applied to products that contain between 70% and 95% certified organic ingredients providing that:

- such product is not labelled as “organic”
- the remainder of ingredients do not include prohibited ingredients and/or manufacturing processes as listed in the NASAA Standard

- comply with all other requirements of Section 12 with the exception of 12.1.1 and 12.1.3

12.7.2 Labelling shall comply with the following Sections :
- 2.16 of the NASAA Standard.
- 2.18 of the NASAA Standard with the exception of 2.18.4, 2.18.9, and 2.18.10
- 2.19 of the NASAA Standard

12.7.3 Conversion labelling does not apply to “Approved Cosmetic” labelling. (ie all ingredients of agricultural origin must be certified organic).

SECTION THIRTEEN – ORGANIC TRADER STANDARD

NASAA certifies traders to a discrete Standard for Organic Traders. Included in the scope of this Standard are retail operations, restaurants, home delivery, food preparation, retail based self-repackers and handlers. While the Organic Trader Standard is a discrete document, all relevant sections of this Standard also apply to Trader certification. For a copy of the Organic Trader Standard please contact the NASAA office or go to:

http://www.nasaa.com.au/data/pdfs/NASAA%20TRADER%20STANDARD.pdf

SECTION FOURTEEN – ANNEXES

Annex 1 – Products for Use as Fertilisers and Conditioners

Inputs should be used in accordance with legislated requirements and their inclusion within this Standard does not preclude limitations defined by appropriate authorities. Operators are reminded that it is their responsibility to ensure that the use of permitted products does not contravene legislated requirements.

PERMITTED PRACTICES AND INPUTS:

- Compost
- Manures from organic sources
- Straw from organic sources
- Lime, dolomite and crushed rock
- Sulphur, homoeopathic or biodynamic preparations
- Rhizobia or mycorrhiza inoculations

RESTRICTED PRACTICES AND INPUTS:

The definition of “Restricted” includes factors relating to

- The need and purpose of use, the pollution potential on and off the site of use, and the rate of application of the material
- The origin, extraction, contamination level and ecological or social consequences of the supply of the material

Unlike prohibited materials, which do not satisfy fundamental criteria with regard to composition, manufacture, environmental impact and consumer expectation, restricted materials are in accordance with this Standard subject to the stated provisos. Contamination levels are measured with reference to Maximum Levels as defined in this Standard.

Input materials listed below as restricted are determined using the following criteria:

1. Rate of Application and Purpose of use:

The rates of application of certain materials are noted in the body of this Standard with manures for example being restricted to 15 tonne/ha. Other materials may only be used on the basis of demonstrated deficiency such as potassium sulphate and on the basis that nutritional correction, or pest or disease control is not available using a more favourable product or method.

Through examination of records and annual inspections itwill be determined if rates of application are appropriate, but will expect operators will be expected to audit their own application rates and adjust them to suit these criteria.

Whilst certain products are allowed for certain uses, they must not be used for other purposes. For example, conventional straw may be used as mulch, but not for animal feed. Sewage sludge may be used on trees but not for food production. Operators should monitor their use of products with this criterion in mind and remember - product use will be examined on an annual basis.

Restricted products may not be used unless a clearly demonstrated need exists and all cultural methods of achieving desired results have been exhausted.

2. Product Specifications:

Product specifications relate to the purity of the product with regard to contamination from any pesticide, heavy metal or other product.

Operators should be aware of the specifications of products employed on their farms and, if in doubt, see that testing is carried out.

Routine and random tests of materials which fall into this category will be carried out.

INPUT PRODUCT OR SOURCE MATERIAL	APPLICATION RATES AND PURPOSE OF USE	SOURCE AND SPECIFICATIONS
Animal Manures		All off farm sources of manure must be composted prior to application. All chicken manure must be composted prior to application onto the productive field. The use of animal manures must not result in contamination to the certified production unit.
Algae		Natural form Not genetically modified
Animal by-products and materials - includes meat meal, bone meal, hoof and horn meal, urine and other waste products from livestock processing		Their use must not result in uptake by certified ruminant or herbivore livestock
Basic slag and coal dust	Demonstrated need only	No heavy metal contamination
Bentonite - refer to clay		
Bone meal - refer to animal by-products	Not animal feed	Must be from a waste source and carry no contamination
Boron products (including borates, boric acid)	Demonstrated need only (ie soil analysis)	From natural sources only
Calcium Carbonate - refer to limestone		
Calcium Sulphate - refer to gypsum		
Chelates (natural) calcium lignosulphates	Demonstrated need only	Non EDTA, non GMO derived
Clay / bentonite	Demonstrated need only	
Compost - includes compost from animals, food and textile industry waste, household vegetative waste		Compost must be produced under aerobic or anaerobic conditions in accordance with Australian Standard AS 4454 – 1999. Compost must not introduce contamination onto the certified area.
Compost Tea		As per comments above
Compost from sewage or sludge (non-edible product only)	Only on non-edible crops	As per comments above
Dolomite	Demonstrated need only (ie soil analysis)	From natural sources only
INPUT PRODUCT OR SOURCE MATERIAL	APPLICATION RATES AND PURPOSE OF USE	SOURCE AND SPECIFICATIONS

INPUT PRODUCT OR SOURCE MATERIAL	APPLICATION RATES AND PURPOSE OF USE	SOURCE AND SPECIFICATIONS
Earthworm castings or by products (specification of original substrate required and verified to be free of Heavy Metals and Pesticides)		Subject to satisfactory testing for contamination
Fish and fish by products (must not be harvested for the specific purpose of fertiliser)		Waste product or pest species
Guano (must be under 20 ppm cadmium and used on the basis of demonstrated deficiency)	Demonstrated need only	Testing for cadmium
Gypsum (must be of natural origin)	Demonstrated need only (ie soil analysis)	From natural sources only Must be sustainably mined
Limestone	Demonstrated need only (ie soil analysis)	From natural sources only
Magnesium carbonate - refer to dolomite		
Manure - pelletised or granulated composted chicken manure	Part of overall fertility program	No contamination
Meat/ blood meal - refer to animal by products above		
Mushroom waste (must be composted)	Not for animal feed or for use as growing medium unless organic	No industrial waste No contamination
Naturally occurring organisms if they are not new releases into the environment		Not new releases for environment
Peat (only for potting)	Potting mix only – not for broadacre use	Sustainably mined
Reactive rock phosphate (must be under 20ppm cadmium)	Demonstrated need only	Testing for cadmium Not fertiliser by product
Seaweed and seaweed products (must not contain preservatives and must be free from contamination)	As part of overall fertility program	Licensed harvest sites, low salts and heavy metals, unfortified
Straw from conventional sources	Not bedding or feed, no contact with edible crops	Composted if animal bedding, no residues
Sulphate of potash	In solid form only Demonstrated need only	Natural source, unfortified
Sulphur	Demonstrated need only	
Trace elements	Demonstrated need only	Unfortified, unadulterated source
Wood ash		Not from treated wood

Annex 1- Products for use as Fertilisers and Conditioners

PROHIBITED

All synthetic and non listed products including Chilean nitrate

Annex 2 – Products for Control of Plant Pest & Disease

The table below lists products permitted for the control of plant and pest disease, and any restrictions on rates of application and sources where relevant. Operators are reminded that it is their responsibility to ensure that the use of permitted products does not contravene legislated requirements.

INPUT PRODUCT OR SOURCE MATERIAL	APPLICATION RATES AND PURPOSE OF USE	SOURCE AND SPECIFICATIONS
Bacillus Thuringiensis		Non GMO or GMO derived
Biodynamic Preparations		
Biological Control	Must have a history of release for 3 years, be indigenous, or be subject to NASAA approval based on EIS or equivalent	Non GMO or GMO derived, free of all unspecified organisms
Boric acid	Not to be used in direct contact with food, soil or plant tissue	
Bordeaux and Burgundy mixes. Hydroxide, oxide, sulphate forms	Monitor bio accumulation, strategy for reduction in soil, not in aquatic systems	No more than 8kg/ha
Copper, as above or ionised forms		Not oxychloride form
Clay (including Bentonite and Kaolin)		
Derris elliptica, Derris Dust, Rotenone CAUTION – MAY BE HEALTH RISK	Not near aquatic systems or on edible plant portions	Unfortified, natural extraction
Diatomaceous Earth		
Foliar Sprays		Must not contain any prohibited materials and must not substitute for soil building programs
Fungal Preparations		Non GMO or GMO derived
Homoeopathic preparations		
Iron Phosphate	Molluscicide	
Lime Sulphur (calcium polysulphide)		
Mechanical traps		
Milk		Must not lead to soil contamination Non GMO or GMO derived
Mineral Oils (summer/winter/paraffin)	Light petroleum derivatives allowed as suffocating oils on foliage, dormant summer oils. Direct application to harvested crop prohibited	

INPUT PRODUCT OR SOURCE MATERIAL	APPLICATION RATES AND PURPOSE OF USE	SOURCE AND SPECIFICATIONS
Natural Acids (including vinegar)		
Neem Oil and Extracts	As part of integrated, ecological pest management	Natural extraction, no prohibited inputs
Paraffin Oil	Refer to mineral oils	
Pheromones, in traps or twists	Not used directly on crops	Non GMO or GMO derived
Plant Extracts and Products	Includes animal fats, alcohols, marigolds, sesame, garlic, chilli	Provided no potential contamination of end product
Plant and Animal Oils (inc. pine oil)		Specified source, free of prohibited inputs Natural extracts only
Plant Based Repellents		
Plastic Mulch	Removed after use and must not contain PVC	Need must be recognised by NASAA following assessment of written submission
Potassium Bicarbonate		
Potassium Permanganate	Seed dressing only	
Potassium Soap		
Propolis		
Pyrethrum	As part of integrated pest management, not storage	Not synthetic origin. Piperonyl butoxide (PbO) prohibited.
Quassia		Extracted from *Quassia armara*
Releases of Predators	As for biological releases	As biological releases
Rotenone	See Derris	See Derris
Ryania	Ryania speciosa	
Salt (Sodium Chloride)	Not more than rainfall deposition and not if soil EC levels exceed 500ms	Unadulterated Not to be used as a herbicide
Seaweed, seaweed meal and extracts	Non synthetic non fortified sources only	Extraction with sulphuric acid prohibited. Addition of formaldehyde prohibited Must fall within heavy metal limits
Shooting of pests, ferals, domestic animals	No protected species Only under registered permit	No suffering of targets
Silicates		
Sodium Bicarbonate		
Sodium Silicate	As part of ecological, pest management program	

Sterilised Insect Males	Within integrated program	Non GMO or GMO derived
Sticky Baits	Must not contain prohibited substances	
INPUT PRODUCT OR SOURCE MATERIAL	**APPLICATION RATES AND PURPOSE OF USE**	**SOURCE AND SPECIFICATIONS**
Sulphur		Unadulterated nature identical source
Viral, Fungal and Bacterial Preparations	As biological releases	As biological releases Non GMO or GMO derived
Wax - carnauba	Not for domestic use	Only permitted for use on citrus when required for export
Wetting Agents	Minor ingredient only – not as a singular input	Natural origin, no synthetic additives

Annex 2 – Products for Control of Plant Pest & Disease

Prohibited: All synthetic pesticides and weedicides and any product derived from genetically modified organisms

Annex 3 - Substances & Methods Permitted for Pest Control in Storage and Transport Units

TREATMENTS	SUBSTANCES / CONDITIONS
Controlled Atmosphere	Carbon dioxide Oxygen Nitrogen Argon Ozone
Ethylene Gas	Ripening of bananas
Pest Control	Physical barriers Temperature control (hot or cold) Diatomaceous earth Rodenticides (only approved containers) Sticky boards Biological controls Electric barriers or grids Sound Light Air curtains
Waxing of citrus fruit	Restricted for export produce to countries of mandatory requirement (need must be verified)

Pyrethrum may not be used as a contact treatment but may be used as a preparatory treatment for insect control. The withholding period prior to use is 48 hours.

Annex 4 - Acceptable Additives of Non-Agricultural Origin and Processing Aids

PRODUCT	ADDITIVE	PROC. AID	LIMITATIONS ON USE
E170 Calcium carbonate	X	X	For milk products only Not as a colouring agent
E184 Tannic acid		X	Filtration aid for wine
E220 Sulphur dioxide	X		Allowed in wine to a maximum of 100mg/L,(Total)
E224 Potassium metabisulphite	X		Wine only
E270 Lactic acid	X	X	For fruit and vegetable juice/products Restricted in livestock products to milk products - coagulation agent, pH regulation of salt bath for cheese
E290 Carbon dioxide	X	X	Must be food grade only
E296 L- Malic acid	X	X	L-Malic acid only
E300 Ascorbic acid	X		For fruit and vegetables where not available from natural sources
E306 Tocopherols	X		
E322 Lecithin	X	X	Obtained without bleaches or solvents
E330 Citric acid	X	X	PH adjuster
E331 Sodium citrate	X		For use in meat products only
E334 Tartaric acid	X	X	Wine only
E335 Sodium tartrate	X	X	For use in cakes or confectionery
E336 Potassium tartrate	X	X	Restricted for use in cereals/cakes/confectionery
E341 Mono calcium phosphate	X		Only as a raising agent in flour
E400 Alginic acid	X		
E401 Sodium alginate	X		
E402 Potassium alginate	X		
E406 Agar	X		
E407 Carrageenan	X		Milk products only
E410 Locust bean gum	X		
E412 Guar gum	X		
E413 Traganth gum	X		
E414 Arabic gum	X		Allowed in milk, fat and confectionery products
E415 Xanthan gum	X		Fruit and vegetable products
E440 Pectins	X		Unmodified
E500 Sodium carbonates (including bicarbonate)	X	X	

E501 Potassium carbonates	X	X	Cakes, biscuits and confectionery, rising agent
E503 Ammonium carbonate	X		Cereal products, confectionery, cakes and biscuits
E504 Magnesium carbonates	X		
E508 Potassium chloride	X		Frozen fruit, vegetables/canned fruit and vegetables, vegetable sauces/ketchup and mustard
E509 Calcium chloride	X	X	Milk, fat, soybean, fruit and vegetable products
E511 Magnesium chloride	X	X	Soybean products
E513 Sulphuric acid		X	pH adjustment of water during sugar processing
E516 Calcium sulphate	X		Cakes, biscuits, bakers yeast carrier and soybean products
E524 Sodium hydroxide	X	X	For sugar processing and for the surface treatment of traditional bakery products. For soap.
E526 Calcium hydroxide		X	Processing aid for sugar
E551 Silicon dioxide		X	As a gel or colloidal solution
E553 Talc		X	Not for use in cosmetic products
E901 Beeswax		X	
E903 Carnauba wax		X	Releasing agent
E938 Argon	X		
E941 Nitrogen	X	X	
E948 Oxygen	X	X	
Activated carbon		X	
Bentonite		X	Fruit and vegetable products
Casein		X	Wine only
Diatomaceous earth		X	Sweeteners and wine
Egg white albumen		X	Wine only
Ethanol		X	Solvent
Gelatin		X	Wine, fruit and vegetables
Isinglass		X	Wine only
Kaolin		X	Unrestricted for plant products but limited to extraction of propolis in livestock products
Perlite		X	
Vitamins	X		Only permitted when use is legally required (verification required)

Enzymes and micro-organisms			Must not be genetically modified. Micro-organisms shall be grown on substrates that consist entirely of organic ingredients and substances listed in this annex

Annex 4 - Acceptable Additives of Non-Agricultural Origin and Processing Aids

Flavouring Agents:

- Organic flavouring extracts
- Volatile (essential) oils produced by means of solvents such as oil, water, ethanol, carbon dioxide and mechanical and physical processes
- Natural smoke flavour

Annex 5 – Prohibited Substances: Parabens

Parabens are used as preservatives and anti microbial agents. Parabens include but are not limited to Methyl paraben, Propyl paraben, Ethyl paraben, Butyl paraben.
Parabens are esters of Para-hydroxybenzoic acid and may be components of Trade Name Preservatives such as Germaben ll.
It is the responsibility of the applicant to provide a detailed breakdown of components used in any such Trade Names.

Parabens are also known by the following alternative names (not including Trade names):

Common Name	The Synonyms for Paraben
benzylparaben	Benzoic acid, 4-hydroxy-, phenylmethyl ester 4-Hydroxybenzoate de benzyle benzyl 4-hydroxybenzoate Benzyl-4-hydroxybenzoat 4-hidroxibenzoato de bencilo Benzyl p-hydroxybenzoate benzoate, 4-hydroxy-, benzyl 4-(Benzyloxycarbonyl)phenol 4-Hydroxybenzoic acid benzyl ester Benzoic acid, p-hydroxy-, benzyl ester p-Hydroxybenzoic acid benzyl ester
isobutylparaben	Benzoic acid, 4-hydroxy-, 2-methylpropyl ester 4-Hydroxybenzoate d'isobutyle isobutyl 4-hydroxybenzoate Isobutyl-4-hydroxybenzoat 4-hidroxibenzoato de isobutilo 2-Methylpropyl p-hydroxybenzoate Benzoic acid, p-hydroxy-, isobutyl ester iso-Butyl p-hydroxybenzoate Isobutyl p-hydroxybenzoate p-Hydroxybenzoic acid isobutyl ester
Butylparaben	Benzoic acid, 4-hydroxy-, butyl ester 4-Hydroxybenzoate de butyle butyl 4-hydroxybenzoate Butyl-4-hydroxybenzoat 4-hidroxibenzoato de butilo 4-Hydroxybenzoic acid butyl ester 4-hydroxybenzoesaeure-butylester benzoate, 4-hydroxy-, butyl p-oxybutylbenzoate 4-(Butoxycarbonyl)phenol Aseptoform Butyl Benzoic acid, p-hydroxy-, butyl ester Butyl p-hydroxybenzoate n-Butyl 4-hydroxybenzoate n-Butyl p-hydroxybenzoate n-Butylparabenp-Hydroxybenzoic acid butyl ester
n-Propylparaben	Benzoic acid, 4-hydroxy-, propyl ester 4-Hydroxybenzoate de propyle propyl 4-hydroxybenzoate Propyl-4-hydroxybenzoat

	4-hidroxibenzoato de propilo 4-Hydroxybenzoic acid propyl ester 4-hydroxybenzoesaeure-propylester 4-hydroxybenzoic acid propylester propyl p-hydroxybenzoate propyl paraben benzoate, 4-hydroxy-, propyl Benzoic acid, p-hydroxy-, propyl ester n-Propyl 4-hydroxybenzoate p-Hydroxybenzoic acid propyl ester p-Hydroxybenzoic acid, propyl ester p-Hydroxybenzoic propyl ester
Ethylparaben	Benzoic acid, 4-hydroxy-, ethyl ester 4-Hydroxybenzoate d'ethyle ethyl 4-hydroxybenzoate Ethyl-4-hydroxybenzoat 4-hidroxibenzoato de etilo 4-hydroxybenzoesaeure-aethylester benzoate, 4-hydroxy-, ethyl ethylparaben ethyl parasept 4-(Ethoxycarbonyl)phenol 4-Carbethoxyphenol 4-Hydroxybenzoic acid ethyl ester Benzoic acid, p-hydroxy-, ethyl ester Ethyl p-hydroxybenzoate p-(Ethoxycarbonyl)phenol p-Carbethoxyphenol p-Hydroxybenzoate ethyl ester p-Hydroxybenzoic acid ethyl ester
Methylparaben	Benzoic acid, 4-hydroxy-, methyl ester 4-Hydroxybenzoate de methyle methyl 4-hydroxybenzoate Methyl-4-hydroxybenzoat 4-Hidroxibenzoato de metilo 4-Hydroxybenzoic acid methyl ester 4-hydroxybenzoesaeure-methylester benzoate , 4-hydroxy-, methyl methyl p-hydroxybenzoate p-hydroxybenzoic acid methyl ester methyl paraben methyl ester of p-hydroxy benzoic acid 4-(Carbomethoxy)phenol 4-(Methoxycarbonyl)phenol Benzoic acid, p-hydroxy-, methyl ester Methylben Methylparaben p-Carbomethoxyphenol p-Methoxycarbonylphenol

Annex 6 – Unrestricted & Restricted Substances for use with Livestock

Allowed (A): Substances that can be used on animals as per comments below without prejudice to certification. Use of allowed substances must be documented and used in accordance with label requirements and will not require quarantine of animals.

Restricted (R): Substances that are permitted for use after exhaustion of allowed alternatives or when preventative measures have not been effective in controlling a specific problem. Operators should not rely on the use of restricted products and their use may result in permanent or temporary loss of certification. The use of restricted substances must be documented along with quarantine requirements where relevant.

SPECIFIC PRODUCT	ALLOWED (A) / RESTRICTED (R)	COMMENTS
Acetic Acid	R	Not as a meat preservative
Alcohol	A	
Anaesthetics	R	To be administered by a vet
Aquatic Plant Products (including seaweed, kelp)	R	Sustainable harvest
Bentonite	A	
Biological Controls	R	Non GM or GMO derived
Brewer's Yeast	R	Non GM or GMO derived
Charcoal	A	
Cobalt	A	
Copper sulphate	A	
Diatomaceous earth	A	
Dolomite	A	
Electrolytes	A	
Epsom salts	A	
Fish liver oil	A	
Fluorosilicate	R	For sheep dipping and subject to withholding period
Herbal preparations	A	
Homoeopathic preparations	A	
Hydrogen peroxide	A	
Iodine	R	For teat wash
Magnesium Fluorosilicate	R	External treatment followed by 24 hour quarantine
Magnesium sulphate	A	
Meat meal	R	Non same species, 2% maximum
Minerals	A	
Molasses	A	

Potassium permanganate	A	
Probiotics	A	
SPECIFIC PRODUCT	**ALLOWED (A) / RESTRICTED (R)**	**COMMENTS**
Pyrethrum, natural	A	
Salt licks	R	Can not contain prohibited ingredients
Selenium	A	
Shell grit	A	
Sodium chloride	A	
Sulphur	A	
Tallow	A	
Vitamins	R	Natural only
Vaccines	R	Non GM or GMO derived
Zinc sulphate	A	

Annex 6 - Unrestricted & Restricted Substances for use with Livestock

Annex 7 - Maximum Permissible Levels of Heavy Metal & Pesticide

The table below lists maximum permissible levels of heavy metal and pesticides. Operators are reminded that it is their responsibility to ensure that the use of permitted products does not contravene legislated requirements.

IN SOIL			IN FERTILISERS / CONDITIONERS	
	mg/kg	kg/ha	Mg/kg	Kg/tonne
Zinc	150	336	1000	1.000
Chromium	150	336	1000	1.000
Copper	50	110	400	0.400
Lead	100	220	250	0.250
Nickel	50	116	100	0.100
Cadmium	2	4.4	20	0.020
Mercury	1	2	2	0.002
Arsenic	10	20	20	0.02

Annex 7 - Maximum Permissible Levels of Pesticide & Heavy Metal

Pesticide Levels

Non permitted pesticides in organic agriculture should not be detected in crops produced under this Standard.

In instances where historic land use or environmental conditions cannot preclude measurable levels of some pesticides, the following guideline is used:

- Maximum permitted pesticides in soil and tissue are 10% of those listed as permissible by FSANZ (Standard 1.4.1 and 1.4.2) except heavy metal in root crops and tubers where the level allowed is 100%. Soil contamination level criteria will be determined with reference to the crop grown in that soil. Crop residue levels will determine if those crops can be certified.
- Where pesticide residues falling above these levels are located in certified crops or products which cannot be explained by historic, adjacent or environmental background factors, those products and operators through the production/handling chain will be subject to immediate suspension. If it is the opinion that prohibited substances have been applied directly and intentionally to certified products, or that there is demonstrable failure to take reasonable precautions against contamination, decertification will follow. Any contaminants confirmed to be present in food products may be grounds for immediate decertification.

Annex 8 - Products Permitted for Cleaning & Sanitation of Surfaces and Equipment.

Operators will select cleaners, sanitisers and disinfectants based on the following criteria:

- non residual contamination
- rapid biodegradability into naturally occurring elements
- low toxicity
- worker safety
- life cycle impact of manufacture
- disposal

The use of any of the substances listed below will be followed by a thorough rinse of the area/equipment using potable water unless otherwise indicated.

Cleaning equipment will be clearly labelled as such in storage so as to avoid contamination with certified produce.

Operators shall take all necessary precautions to protect organic food against contamination by substances prohibited in organic farming and handling, pests, disease causing organisms and foreign substances.

Any Substance outside the parameters of this list will need to be assessed on a case by case basis.

SUBSTANCE	LIMITATIONS ON USE
Acetic Acid (vinegar)	
Alcohol, Ethyl	Allowed as a disinfectant
Alkali carbonates	
Bicarbonate Soda (sodium bicarbonate)	
Caustic soda (sodium hydroxide) and caustic potash	
Chloride of lime (calcium oxychloride, calcium chloride and calcium hydroxide)	
Hydrogen Peroxide	
Iodine	Non elemental not to exceed 5% solution
Isopropyl	Biodegradable detergent
Natural acids (vinegar, citric, lactic)	
Phosphoric Acid	Only for dairy equipment
Potassium and sodium soap	
Sodium Hypochlorite	Eg: as a liquid Bleach not to exceed 4ppm when discharged onto production unit (ie for cleaning irrigation systems)

Annex 8 - Products Permitted for Cleaning and Sanitation of Surfaces and Equipment

Annex 9 - Input Manufacturing Assessment

MINIMUM CRITERIA FOR INPUT PRODUCTS

Necessity: Each input must be necessary and necessity will be determined in the context of the use of the product. Parameters of yield, product quality, environmental safety, ecological protection, landscape and human/animal welfare may be used. Input use may be limited to crops, regions and seasonal or other conditions.

Nature and Method of Production: The material should be of animal, vegetable, microbial or mineral origin. Synthesised materials occurring naturally will be accepted. If access to renewable naturally occurring products is available, then they should be the first choice.

The ingredients of the product may be subjected to the following treatments:

- Mechanical
- Physical
- Enzymatic
- Other interaction with micro-organisms
- Chemical (restricted in many circumstances)

Any collection of raw materials must be a non-destructive one (the exception being a pest species where destruction will be welcomed) and be in accordance with State and Federal Law.

ENVIRONMENT

Environmental safety: The input may not be harmful and have lasting negative effects on the environment. Nor should the input give rise to unacceptable pollution of surface or ground water, air or soil. All stages during the processing, use and breakdown must be acceptable.

The following characteristics of the input will be taken into account:

Degradability:

- All inputs must be degradable to CO_2, H_2O and /or their mineral form.
- Inputs with a high acute toxicity to non-target organisms should have a maximum half-life of 5 days
- Natural substances used as inputs which are not considered toxic do not need to be biodegradable within a limited time

Acute toxicity to non-target organisms:

- When inputs have a relatively high acute toxicity for non-target organisms, their use will be restricted or prohibited. Measures have to be taken to guarantee the survival of these non-target organisms. Application rates may be limited.

Long-term chronic toxicity:

- Inputs which demonstrably accumulate in organisms or ecological systems, or inputs, which are considered to be mutagenic or carcinogenic, may not be used. If there are any risks, alternatives to these products will need to be developed or in development.

Chemically synthesised products and heavy metals:

- Inputs may not contain harmful amounts of man made chemicals. Only nature identical synthesised products will be accepted. Input products with heavy metals must not contain levels above those listed in the NASAA Standard. The exception is copper and copper salts, which may be permitted until more advanced IPM programs are in place.

HUMAN HEALTH AND QUALITY

Human Health: Inputs must not be harmful to human health, in the processing, use or the degradation process.

Product Quality: Input products may not be detrimental to the quality of crops upon which it is used.

Ethical aspects: Inputs must not be detrimental to the quality of crops upon which they are used.

SOCIO-ECONOMIC CONSIDERATIONS

Consumers' perception: Inputs must not meet resistance or opposition from consumers of organic products. An input might be considered by consumers to be unsafe to the environment or to human health although this has not been scientifically proven. Inputs should not threaten the perception of natural processes lying at the heart of organic agriculture eg. Genetic Engineering.

GLOSSARY

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