



Australian Government

Rural Industries Research and
Development Corporation

Going Organic

Organic Livestock Production

A conversion package for organic livestock production in the
rangelands of western New South Wales



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Going Organic – Organic Livestock Production – A conversion package for organic livestock production in the rangelands of western New South Wales

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Development Corporation**

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A conversion package for organic livestock production in the
rangelands of western New South Wales

Produced for the Rural Industries Research and Development Corporation

by Robyn Neeson
NSW Department of Primary Industries, Yanco

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Foreword

Going Organic – Organic Livestock Production – A conversion package for organic livestock production in the rangelands of western New South Wales was developed for producers wishing to convert to organic production and for producers already involved in organic production but keen to diversify their production. The package does not aim to be prescriptive: it aims to provide a framework for organic conversion and diversification and suggests possible strategies and pathways for moving forward.

This publication is the first in a series of manuals; it is part of a project coordinated by the NSW Department of Primary Industries and jointly sponsored by the Rural Industries Research and Development Corporation. The first stage of developing the package involved a series of workshops for key NSW Department of Primary Industries staff and organic industry specialists. During the workshops the similarities and differences between conventional and organic systems were discussed and, where possible, measures designed to help overcome any perceived impediments to conversion or diversification were identified. This formed the framework for preparation of the draft package. Stage two involved presentation of the draft to organic and conventional producers at additional workshops across regional New South Wales and a final review of the package by organic certifying organisations.

True evaluation of the package lies, however, with practitioners. The authors hope the information provided will help make the transition to organic production or to diversified organic production a smooth one.

This project was funded by RIRDC core funds which are provided by the Australian Government.

This report, an addition to RIRDC's diverse range of over 1600 research publications, forms part of the Organics Systems R&D sub-program, which aims to facilitate the organic industry's capacity to meet rapidly increasing global demand.

Most of RIRDC's publications are available for viewing, downloading or purchasing online through the RIRDC website:

- downloads at www.rirc.gov.au/fullreports/index.html
- purchases at www.rirc.gov.au/eshop

Peter O'Brien
Managing Director
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Executive summary

What the report is about

This publication is the first in a series of manuals; it is part of a project coordinated by the NSW Department of Primary Industries and jointly sponsored by the Rural Industries Research and Development Corporation. The first stage of developing the package involved a series of workshops for key NSW Department of Primary Industries staff and organic industry specialists. During the workshops the similarities and differences between conventional and organic systems were discussed and, where possible, measures designed to help overcome any perceived impediments to conversion or diversification were identified. This formed the framework for preparation of the draft package. Stage two involved presentation of the draft to organic and conventional producers at additional workshops across regional New South Wales and a final review of the package by organic certifying organisations.

Target audience

It is the aim of the report to provide information for producers and the related industry bodies that will help make the transition to organic production or to diversified organic production a smooth one.

Background

Market signals, both domestic and international, indicate significant demand for organically produced product. By the year 2015 it is predicted that the world trade in organic products will be US\$100 billion. Australia has an opportunity to capture a proportion of this market. However, whilst demand for organic products is high, particularly in export markets, the rate of farm conversion to organic

agricultural systems is relatively slow. Currently only about one per cent of Australian producers are involved in organic production and the area devoted to such production is only about 0.8 per cent of total area farmed.

Objectives

One of the major contributing factors to the slow conversion rate is that there is limited relevant information about how to go through the conversion process available to producers. Existing information is largely anecdotal, undocumented, irrelevant to Australian conditions, or not readily accessible through mainstream agriculture extension programs. The aim of this project is to determine relevant conventional and organic production techniques for a number of key organic products, as well as identifying what further information was required to assist conversion in these systems.

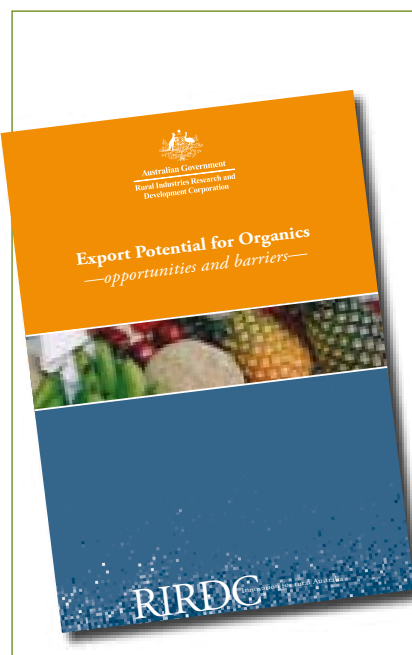
Methods and Results

This project identified a number of key products with potential for organic production in N.S.W.

Through a series of interactive workshops, key impediments to growers undertaking successful organic production of these products were identified and three conversion packages have been produced. Feedback from producers attending a series of final workshops was collated and has been incorporated into the packages. A survey of producers indicated 86% thought the packages were very useful, whilst 14% indicated the packages were of moderate use in providing information to assist them towards achieving organic conversion.

Conclusions

This project has developed valuable information to assist agricultural producers to successfully make the transition from conventional to organic production for a number of key commodities. Following this, institutional support (research, development and extension) from mainstream providers must provide further impetus for the development of a sustainable organic industry in Australia.



Export Potential for Organics—opportunities and barriers, RIRDC publication number 06/061.

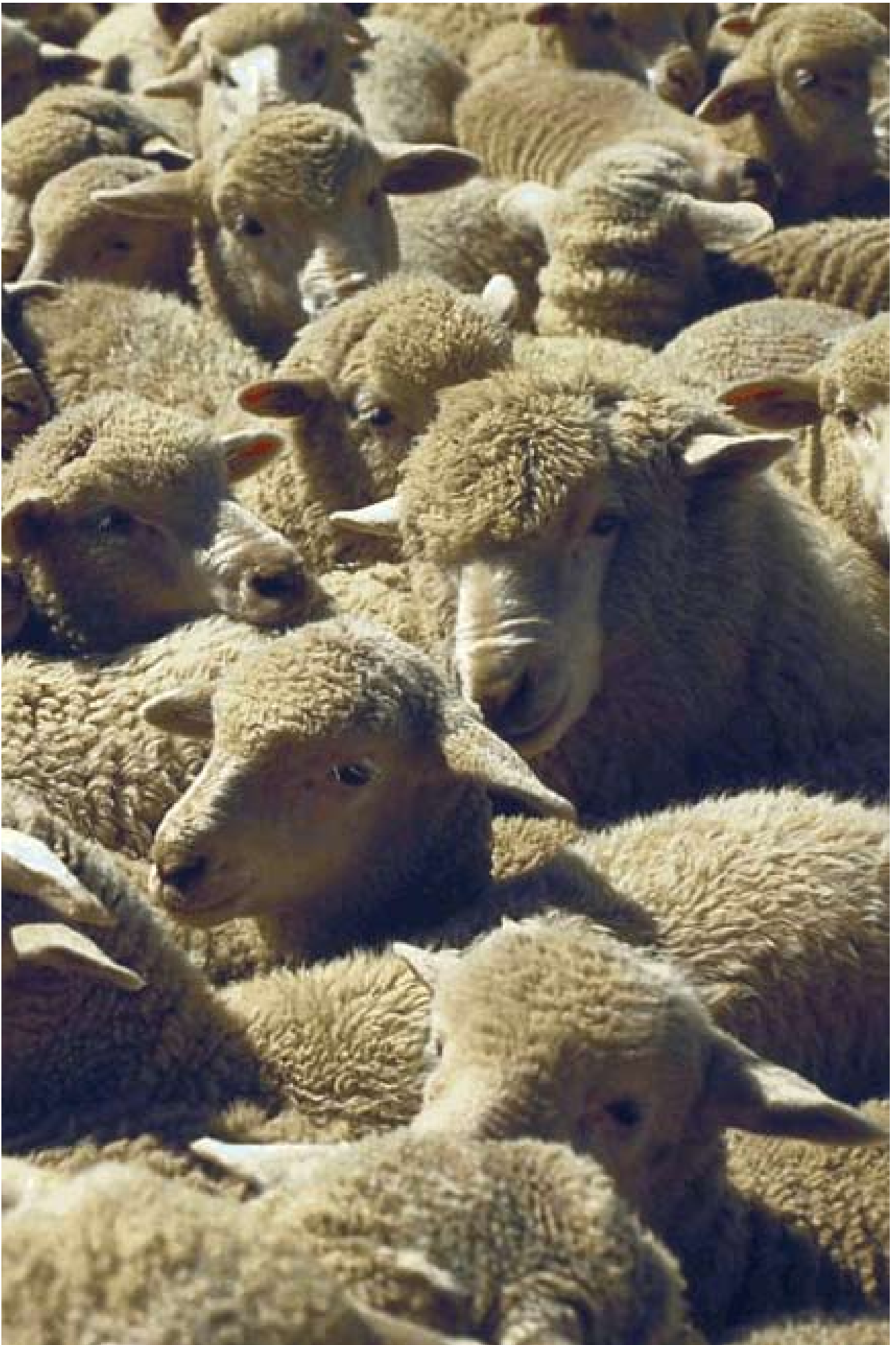
In virtually all developed economies, demand outstrips supply for organic products, with many markets experiencing growth rates of 10–30% p.a.

This RIRDC report identifies opportunities and investigates impediments to the Australian organic industry in accessing export markets through a process of market scoping.

Currently the top five prospective markets are Japan, Continental Europe, the United Kingdom, the United States and Southeast Asia, while the top products are beef and lamb, cereal based products, processed foods, juices, beverages, wine, jam, honey and condiments.

In the longer term other markets and products will emerge. Perishable foods will be confined to closer markets such as Southeast Asia.

This report provides information fundamental to anyone contemplating organics as an export opportunity. RIRDC Pub No 06/061. \$21



1. Introduction to organic farming

This chapter provides an overview of the organic industry, the market potential for organic products, and the basic principles of organic production. Some of the production practices discussed here do not apply to rangeland producers, but the concept of creating and maintaining a holistic, dynamic farming system with emphasis on soil health and biological diversity does apply, no matter where the farm and what the products.

1.1 Industry size and structure

1.1.1 The world scene

Organic farming is practised in approximately 100 countries of the world. The total area of organically managed land worldwide is around 23 million hectares. Worldwide there are approximately 398 804 organic farms. (International Federation of Agriculture Movements 2003).

The retail value of the organic industry worldwide in 2005 was valued at US\$30 billion, and it was predicted to be worth US\$31 billion in 2005. In 2005 organic retail sales accounted for US\$13 billion in Europe, US\$13 billion in the United States, and US\$450 million in Japan. By the year 2015 it is predicted that the world trade in organic products will be US\$100 billion. (International Federation of Agriculture Movements 2005).

The organic sector is reported to be growing at between 20 and 25 per cent a year. If the growth rate experienced in Europe in the past 10 years continues, it is expected that, by 2010, 30 per cent of food consumed will be organic. Some countries, such as the United Kingdom, have reported consistent



growth in the consumption of organic foods (at 40 per cent a year), with the increase in production (25 per cent a year) failing to keep pace with demand.

The New Zealand organic industry has enjoyed spectacular growth in recent years: exports increased from \$1.1 million in 1990 to over \$60 million in 2003. Europe, Japan and the United States are important markets for New Zealand organic produce: exports to Europe amounted to \$28.7 million in 2003 and are expected to grow to over \$100 million by 2008.

The International Federation of Agriculture Movements, a private organisation, is the peak world body for organic agriculture. It has about 700 member organisations from around the world and runs an international accreditation program. The Codex Alimentarius Commission (created in 1963 by the UN Food and Agriculture Organization and the World Health Organization) works to encourage all countries to harmonise standards and import controls for organic produce. Australia has played a central role in Codex's Organic Program, acting as chair for a number of years and regularly participating in negotiations to put forward the case for the Australian organic industry.

1.1.2 The Australian scene

It is estimated that there are about 2100 certified organic farming operations in Australia, farming about 10 million hectares. The number of organic farmers has increased by 10 to 15 per cent in each of the past two years (Australian Certified Organic 2003). About 310 certified organic farms are located in New South Wales.

Estimates of the value of Australian organic produce vary. Australian Certified Organic's 2003 *Organic Food and Farming Report* estimated the farm-gate value for such produce in 2002 at A\$90 million and exports (possibly reduced as a result of drought) at A\$40 million. Australia-wide, in 2002 there were an estimated 500 certified processors and manufacturers of organic produce, contributing to an industry worth about A\$300 million annually at retail level; this represents an increase of A\$222 million since 1990. The Commonwealth Department of Agriculture, Fisheries and Forestry estimates that retail sales of organic produce in Australia increased from A\$28 million in 1990 to nearly A\$200 million in 2003 (press release, 21 August 2003). Wynen (2003) reports the retail value of Australian organic produce to be

A\$165 million. RIRDC (2007) estimates the retail value for organic produce is worth between A\$250 - A\$400 million. *The Organic Food and Farming Report* suggests that growth is continuing at between 10 and 30 per cent a year, depending on the sector. Beef, milk and horticulture were of particular note.

Almost 20 years ago pioneers of the organic industry asked the Australian Quarantine and Inspection Service for assistance in developing an export program and a national standard for organic production. In 1992 AQIS, in conjunction with the Organic Producers Advisory Committee (now the Organic Industry Export Consultative Committee), released the National Standard for Organic and Biodynamic Produce, which sets out the minimum requirements for organic products exported from Australia.

AQIS is responsible for accrediting organic industry organisations seeking to become an AQIS-approved certifying organisation. An audit of the organisation and its

documented system is conducted against the requirements of the National Standard for Organic and Biodynamic Produce, the Export Control (Organic Produce Certification) Orders 1997, and importing country requirements. Once the organisation is approved, AQIS issues a Quality Management Certificate. At the time of writing eight organic certifying organisations were operating in Australia:

- Australian Certified Organic
- AUS-QUAL
- the Bio-Dynamic Research Institute
- NASAA—the National Association of Sustainable Agriculture Australia Ltd
- Organic Growers of Australia
- Organic Food Chain
- Tasmanian Organic Dynamic Producers
- Safe Food Production Queensland.

Appendix A provides contact details for these organisations.

The role of the certifying

organisations is to ensure that products marketed under their logo are produced according to specific standards. Each organisation has its own standards in addition to the national standard. Figure 1.1 describes the certification framework for the Australian organic industry.

NASAA and Australian Certified Organic are the only Australian certifiers accredited by International Federation of Organic Agriculture Movements (IFOAM). They are also accredited with the United States Department of Agriculture National Organic Program (USDA NOP); also the Japanese Agriculture Standards (JAS) administered by the Japan Ministry of Agriculture Forestry and Fisheries (MAFF), this recognition provides market access to these countries for Australian certified products, which have been accredited by these respective systems. Sections 3.3 and 6.1 provide more information about obtaining organic certification and the organic Export Control Program.

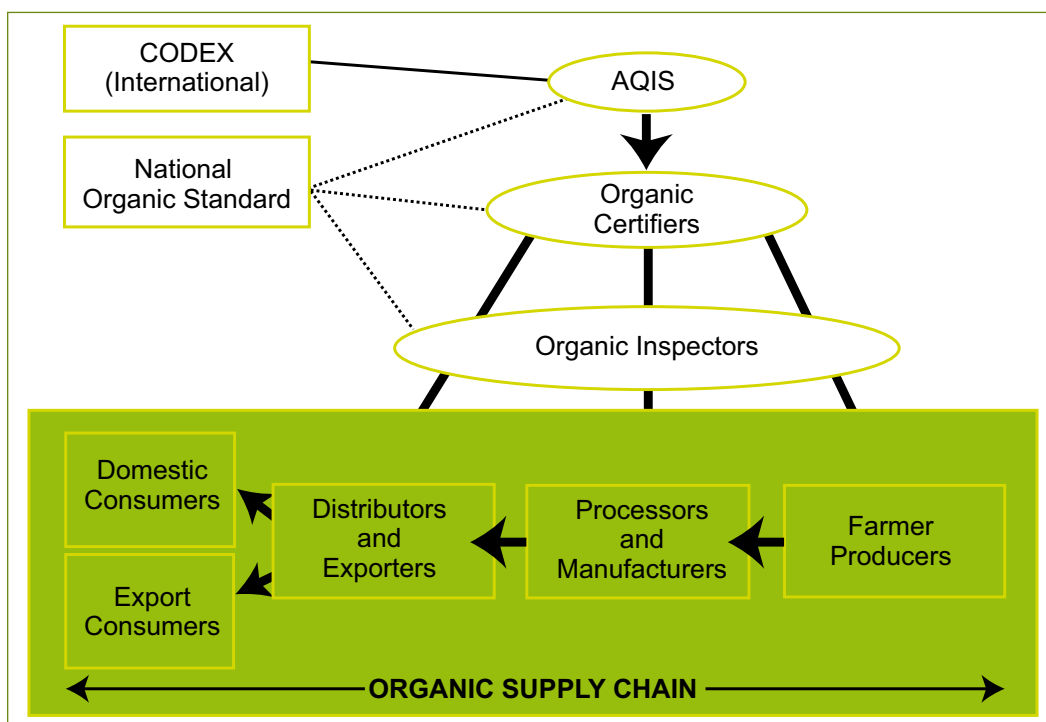


Figure 1.1 Certification framework for the Australian organic industry. Source: May and Monk (2001)

1.2 The potential market for organic products

In 2001 Australia exported over 37 000 tonnes and over 322 000 litres of organic products to more than 20 countries. Organic grains accounted for two-thirds of the tonnage exported; they were followed by processed products (11.8 per cent), seeds (10.3 per cent) and horticultural products (9.4 per cent). Fruit juice, wine and soy milk were the main types of organic beverages exported. Opportunities for export include fruit and vegetables, dairy products (a rapidly growing sector), rice, wool, herbs, wine, beef and sheep meat. (AQIS 2002).

Of the top 10 export destinations in 2001, six—the United Kingdom, Italy, Switzerland, France, the Netherlands and Germany—were in Europe and accounted for over 70 per cent of Australian organic exports. Other important export markets in 2001 were Japan (12 per cent), Singapore (5.5 per cent), the United States (5 per cent) and New Zealand (2 per cent) (AQIS 2002).

The main opportunities for organic products in Japan have been identified as soybeans and soy-based products, corn, corn-based products, grains and flours, dairy (eg. ice cream), edible oils, meat and fresh produce. However, with fresh produce, fumigation can result in the product being certified non-organic. It is estimated that over US\$1.5 billion of organic products are imported into the US, compared to about \$150m in American exports. Opportunities for Australian exports to US include orange juice, beef, and lamb (Halpin 2004).

The estimated value of organic products imported into Australia in 2003 was \$13 million. Imports are primarily from the United Kingdom and the USA and are

mostly processed grocery lines, such as coffee, pasta sauces, olive oil, soy drink, and preserves. Other organic imports include herbs, spices, grains, pulses, nuts, dried fruits, rice, honey, and sunflower oil. Organic fruit and vegetables are mainly imported from New Zealand to meet shortfalls in domestic supply. An increasing number of organic personal care products such as skin care products, hair care products, deodorants and soaps are imported into Australia (Halpin 2004).

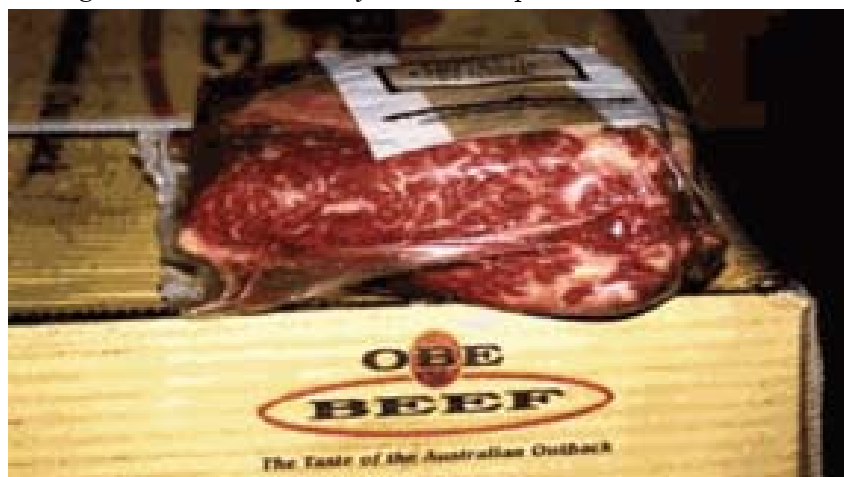
1.2.1 Market opportunities for organic livestock products

Domestic markets exist for a range of organic meat products, which are marketed through supermarkets and butchers, direct to restaurants, through organic retailers and wholesalers, and by home delivery. The following points about the market potential for organic meat products were made in *The Organic Meat Myth Revealed*, a report detailing the opportunities in Europe for New Zealand organic beef and lamb (Aitchison 1999):

- The organic industry is experiencing exponential growth. It is the fastest growing retail sector in the European Union.
- Organics is not a fad; all major

players are committed long term, but at present supply is unable to cope with demand.

- An opportunity exists to supply high-quality organic chilled beef and lamb to the European Union under quota to specification in a complementary season.
- An opportunity exists for organic beef and lamb for approximately the next three years [2000 to 2003] at elevated premiums and for beef for the next six years. Premiums are predicted to soften as more products become available.
- Like other organic products, organic meat must perform commercially alongside conventional meat. Organic meat is not a threat to conventional production; rather, it is an alternative for those who demand choice.
- UK supermarkets say New Zealand lamb will always be their preferred complementary season alternative after lamb from their own country.
- Value-added organic meat products should be considered as the next market development.
- Organic production is not a get-rich-quick scheme. If premiums can be achieved they are often simply compensation for a loss in production.



Organic beef packed and ready for export. Source: Address to Inaugural National Organics Conference 2001. 27-28 August - Sydney, by Simone Tully, OBE Beef

Many of these observations are relevant to Australian organic meat production for both domestic and export markets. A consistent supply of quality product that is reasonably priced will ensure sustained industry development. Producers must be market makers, not market takers. They should also realise that some product, despite its organic status, might need to be sold into conventional markets.

A report produced in 2002 for Victoria's Agribusiness Group (in the Agriculture Division of the Department of Natural Resources and Environment), which investigated market opportunities for organic livestock products in Germany, the Netherlands and the United Kingdom, envisaged some limited export opportunities for Australian organic livestock products such as processed dairy products (particularly bulk cheeses and other dairy products to the Netherlands), high-quality beef (to supermarkets in the Netherlands) and lamb (to the United Kingdom, although the preferred supplier is New Zealand).

There could also be some opportunity for processed meat products and raw materials or semi-processed dried or liquid meat product for processing into organic stock cubes and soups. Organic baby foods are also identified as experiencing rapid growth, and continuing growth is expected in this sector (Rennick 2002).

1.2.2 Marketing challenges for rangeland producers

Providing a quality product that consistently meets defined market requirements is the challenge for organic rangeland beef and sheep meat producers. Nutrition and age at slaughter have a big impact on the quality of the final product. Producers also need to meet the

requirements of the non-organic market since they will most probably have to sell some product there.

It might be necessary to agist stock on certified organic properties in wetter areas in order to finish the stock for market. Certified lake-bed farmland also has potential for finishing livestock because feed often persists longer in these areas. Supplementary feeding on farm requires access to a source of certified organic stockfeed: availability and cost will determine whether this is a viable option.

Although producer alliances offer the most efficient way of entering markets, this form of marketing provides challenges when it comes to turning out a consistent product. Climate, breeds and grazing conditions can vary from property to property, and this affects the quality of the final product. It is for this reason that some producers agist their stock to finish them on organic land near a certified abattoir. On the other hand, some producers are selling at the farm gate, allowing other groups to finish and process their stock.

1.2.3 Organic sheep meat and wool

In 2004, organic meat products made up an estimated 44% (or approximately A\$36.4 million) of the total farm gate value of Australian organic production (Halpin 2004).

Sheep production for meat and wool has traditionally been a mainstay enterprise in the Western Division rangelands of New South Wales. The most common breeds used are merino bloodlines. More recently, though, many producers have been restructuring their enterprises in favour of beef and sheep meat, mainly because of the low returns gained from wool. Some new sheep meat breeds such as the Dorper offer considerable potential for rangeland producers: they have excellent foraging ability; they shed their wool, thus requiring little if any shearing or crutching and reducing susceptibility to flystrike; and they produce excellent carcasses.

Sheep meat

In 2004, the farm gate value of Australian organic sheep and goat meat was estimated to be A\$2.92 million (Halpin 2004).



Organic lamb packs - Woolworths

Food safety scares have resulted in increased demand for organic meat products in domestic and export markets, but some processors say that premiums of 25 to 50 per cent over non-organic produce could impede the development of the industry. Lamb is the main meat sought by processors, although there is a small market for mutton.

Prime cuts from crossbred meat sheep in the 18 to 22 kilogram weight categories (a fat score of 2, 3, 4; 15 millimetres of fat at the 12th rib) are generally demanded. Producers unable to meet these requirements as a result of limited feed might need to consider developing alliances with other certified producers and agisting their stock in order to finish them satisfactorily. Markets for forequarter cuts are more difficult to find; they are in the ready meals and value-added and processed food sector (Queensland Department of Primary Industries and Fisheries 2001).

The price received for organic lamb averages \$3.50 a kilogram dressed weight, although higher prices are often received—\$5.20 a kilogram dressed in February 2004, for example. Processors generally prefer to offer a fixed price; one that does not fluctuate with the highs and lows of the conventional market. The benefit of a fixed pricing system is that organic producers always know in advance their returns, although they can be disadvantaged if the conventional market price exceeds the fixed price.

There are seven main distribution options for organic meat:

- selling direct from the farm to individual consumers or groups of consumers
- selling direct to a wholesaler
- arranging the slaughter with a certified abattoir to sell on



European Union

- domestic or export markets
- direct agreement with a butcher or restaurant
- selling through groups or cooperatives—'selling alliances'
- selling to a certified abattoir
- developing a partnership agreement with an abattoir to sell to domestic or export markets.

The primary export markets for organic sheep meat are the European Union, Japan and the United States.

The European Union

The organic meat sector is considered to be one of the largest export growth sectors—up to 20 per cent growth annually—for all Australian products sold to the European Union. In most EU markets there is an undersupply of organic meat, and it is predicted that the key destinations in the EU will be the United Kingdom (where organic meat accounts for 5 per cent

of the total meat market), Germany, France and Denmark (Cross 2000). Access requirements for lamb sold to the EU are as follows:

- The lamb—and the property where it is produced—must be certified by an AQIS-accredited Australian organic certification organisation.
- Sheep must be slaughtered at an EU-accredited abattoir.
- The exporter must have an EU quota. The 2004 quota for Australian sheep meat and goat meat, including organic, was 18 650 tonnes.

As of 1 January 2006 it is also a requirement that sheep have electronic ear tags.

Japan

The market for organic lamb in Japan is dependant on lamb consumption in general: consumer preferences and competition from other meats determine the market share. Japanese consumers prefer

beef and are not traditional sheep meat consumers (Queensland Department of Primary Industries 2001). In 1999–2000 Japan imported 10 000 tonnes of non-organic sheep meat and 5000 tonnes of lamb from Australia.

There are four main distribution channels for organic food in Japan:

- HAN, or home delivery service, companies, which have the largest market share in terms of volume and value
- food manufacturers
- the food service industry
- retailers such as department stores and supermarkets.

Japan MAFF has accredited the Bio-Dynamic Research Institute, Organic Growers of Australia, the National Association for Sustainable Agriculture Australia, Tasmanian Organic-dynamic Producers and Australian Certified Organic. This accreditation allows these Australian certifying organisations to administer the JAS requirements, thus Australian certified products can be exported to Japan.

The United States

US sales of organic produce grew from US\$260 million in 1980 to US\$4.2 billion in 1997. Average annual growth more recently has been 23 per cent. In 1995 sales of organic meat in the United States amounted to US\$32 million.

Although beef is preferred, the demand for lamb is increasing. In 1999–2000 the United States imported more than 21 000 tonnes of non-organic lamb and more than 15 000 tonnes of mutton from Australia.

Currently, access for Australian certified products to the United States relies on “conformity assessment direct registration” recognition between an Australian

certifying organisation and the USDA NOP. At present only Australian Certified Organic and the National Association of Sustainable Agriculture Australia have “conformity assessment direct registration” recognition with the USDA NOP.

Wool

Major opportunities for organic wool have not yet been identified in the domestic market—although a few producers are value-adding and selling specialty products—but there does appear to be some potential in the export markets of Europe, the United States and Asia.

There are few processors of organic wool in Australia, and the existing ones are demanding fine wool for the production of clothing for the fashion market or baby wear. Fletcher’s International recently opened an organic wool processing line at its Dubbo (central west NSW) wool processing facility.

At present, unreliability in the demand for and the supply of organic wool means that most is sold on the conventional market. Australian Organic Wool Growers, an Australia-wide group representing 30 producers, aims to attract a 10 per cent premium for growers. In 1999–2000 the premium varied from 3 to 20 per cent. The wool sold ranged from 22 micron for merino wool to 28–30 micron for crossbred wool.

The greatest constraints to increasing the volume of organic wool are lack of organic drenches for internal parasite control, lack of organic treatments to control flystrike, and lack of reasonably priced organic wool dyes (Queensland Department of Primary Industries and Fisheries 2001). There does, however, seem to be increasing demand for ‘eco-label’ and residue-free wool, particularly in European markets. Organic wool

fits into this category.

Among the distribution options for organic wool are the following:

- direct sales to consumers or groups of consumers
- arranging the wool’s scouring and top making
- selling directly to wool processors—scourers or top makers—or textile houses
- selling directly to wholesalers or exporters
- selling through groups or cooperatives
- developing a partnership agreement with processors or wholesalers to sell to domestic or export markets.

According to the Kondinin Group (2000), in Europe and Japan there is interest in purchasing organic wool from Australia. New Zealand research results suggest that the best opportunities are for small-volume, high-value niche apparel markets in the United States and Europe. A report commissioned by the Rural Industries Research and Development Corporation in 1995 states:

Overseas interest in Australian organic wool is high and enquiries have been received from both Japan and Western Europe. If this interest can be converted into sales, the potential for organic wool as a product is impressive. The main limitation appears to be availability of an organic scouring facility.

In Germany there are opportunities for residue-free wool, although stringent regulations have in the past resulted in rejection of entire shipments of organic wool. Japan and the United States are significant importers of fine- to medium-micron Australian wool: in 1999–2000 Japan imported more than 6000 tonnes and the United States imported 11 000 tonnes. Although there are no market access barriers to raw wool, there are restrictions on woollen apparel going to both

countries. Further, all wool entering Japan must be fumigated for pest control, thus negating its organic status.

The economics of organic sheep meat and wool

A Queensland Department of Primary Industries study of a representative property found that organic production systems, for both wool and sheep meat enterprises, could be more profitable than conventional production systems and that such enterprises are likely to contribute more to the fixed costs of a grazing business.

The organic wool production system generated a net profit, whilst the sheep meat enterprise was unprofitable largely because an owner-operator allowance of \$30 000 was contributed to this part of the enterprise.

The net loss generated was, however, lower than that incurred by a similar conventional enterprise. Table 1.2, below, shows the profitability results.

Box 1 on this page, shows sales figures for a transaction in August 2002. This information was provided by Rural Organics (pers. comm., September 2002).

1.2.4 Organic beef

In 2004 the farm gate value of organic beef was estimated to be A\$54.35 million (Halpin 2004).

Table 1.2 Profitability results: conventional and organic wool and sheep meat production

Enterprise	Gross margin per DSE (\$)	Net profit/loss (\$)
Wool		
Conventional production	8.61	-23 587
Organic production	11.08	4 581
Sheep meat		
Conventional production	9.63	-25 251
Organic production	11.34	-8 280

Note: DSE denotes 'dry-sheep equivalent'.

Source: Queensland Department of Primary Industries (2001).

Details of an organic sale

Clevers Organic Meats – McClure & Daughters Certified Organic Lamb Sale

BOX 1

McClure & Daughters delivered 212 certified organic lambs to the Yanco Abattoirs on 25/07/2002, where they were slaughtered on the following day to certified organic standards. The carcasses were then freighted to Gosford, where they were processed by Clevers. Clevers distributed them to commercial outlets on the east coast, including Coles and Safeways.

The lambs were sold for: \$4.50/kg (hot weight) if they weighed over 18kg
\$3.75/kg (hot weight) if they weighed under 18kg

McClure & Daughters paid the freight to Yanco, killing charges (\$10.80/head) and the meat levy.

The skins (April shorn) made \$10.00 each.

Tonight in Safeways in Kew, Melbourne, McClure & Daughters certified organic lamb was selling for the following retail prices. (Conventional price comparison is also given.)

Certified organic lamb prices (per kilogram)

Certified organic lamb leg	\$11.49	Safeways
Conventional lamb leg	\$7.49	Safeways
Certified organic forequarter chops	\$11.99	Safeways
Conventional forequarter chops	\$6.39	Safeways
Certified organic lamb sausages	\$11.99	Safeways
Certified organic lamb sausages	\$12.98	COLES
Conventional sausages	\$5.99 & \$3.99	COLES

Also:

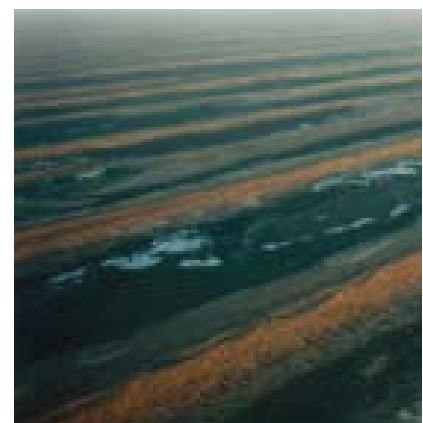
Certified organic beef prices

Certified organic porterhouse	\$29.99	Safeways
Conventional porterhouse	\$20.99	Safeways
Certified organic rump	\$18.99	Safeways
Conventional rump	\$15.99	Safeways
Certified organic scotch fillet	\$29.99	Safeways
Conventional scotch fillet	\$15.99	Safeways
Certified organic mince	\$12.99	Safeways
Conventional mince	\$9.99	Safeways

There are indications that the market potential for organic beef is considerable particularly in the food service sector and higher-end eating establishments (McKinna et al 2006). Organic beef is marketed mostly as prime cuts—fresh, chilled and in cryovac™ packaging. Meal solutions (value-adding) should be

seriously considered as a marketing option.

A number of organic producer alliances in Australia are marketing beef into domestic and export markets. One of these groups, OBE Company Pty Ltd, farms more than 7 million hectares in



Queensland Channel Country

the Channel Country, selling beef in the domestic market and exporting to Japan and the United States. OBE aims to market 4000 tonnes of dressed organic beef to Japan each year. The story behind OBE's establishment is essential reading for those intending to establish a production alliance (see Pahl 2000). Other organic and biodynamic meat alliances are Australian Organic Meat, which supplies cryovac meat cuts to a home-delivery service in Japan, and Three Rivers Beef, an alliance of biodynamic producers based in Western Australia. A Western Australian processor is licensed to process up to 4000 head a year for the Japanese market.

Supplies of organic beef from the New South Wales rangelands are inconsistent and of variable quality. Formation of a 'one-label' producer alliance would improve supply consistency, although the quality shortcomings would still need to be tackled.

Australian Organic Meats has developed a system for finishing organic livestock. It buys from organic producers, preferably Aberdeen Angus or Hereford cattle, 70–80 per cent of which are sold as store weaners at 350–400 kilograms live weight. These are taken to finishing stations and fattened for eight to nine months, and 40–50 per cent of them are then placed in a feedlot for finishing on grain for 70–90 days. The resultant product is sold to the European Union (270–300 kilograms carcass weight at abattoir required) and to the domestic market (220 kilograms carcass weight required). Figure 1.2 illustrates the process.

Woolworths and Coles supermarkets now stock lines of organic beef and lamb. The supplier of organic beef to both chains is Cleavers Organic Meat Company, located at Gosford, near Sydney. Cleavers has reported



Organic beef retail packs. Source: Address to Inaugural National Organics Conference 2001. 27–28 August – Sydney, by Simone Tully, OBE Beef

sales growth of 20–30 per cent a year since starting production in 1999. The market premiums the company offers producers range from 20–30 per cent, depending on quality. The supermarkets mostly sell organic prime cuts, although diced, stir-fry and mince meat as well as sausages have also been very successful.

Considerable potential exists for Australian organic beef in export markets. Livestock welfare and food safety scares related to livestock products—BSE (bovine spongiform encephalopathy, or mad

cow disease), and foot and mouth disease—have led to increased consumer interest in organic products. Consumers believe animals raised in organic systems are healthier and more natural.

Japan, already targeted by a number of organic beef processors, is seen as having the greatest market potential for organic beef. Other markets exist in the European Union—the United Kingdom and Germany being potentially very important major markets. The United States and Hong Kong also offer potential. There is a quota system for beef

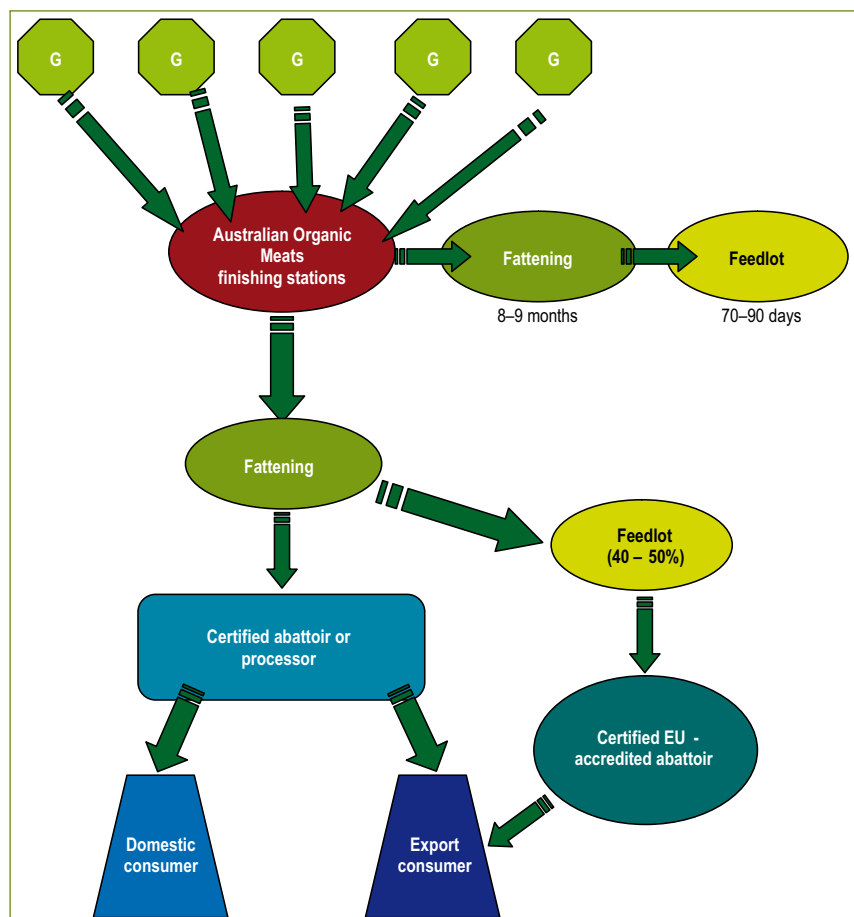


Figure 1.2 The Australian Organic Meats finishing process

1.2.5 Other marketing opportunities

Wildlife tourism and husbandry

The Western Division of New South Wales is a landscape with unique and diverse flora and fauna. Wildlife-based tourism and husbandry would complement organic production practices and might be considered a potential additional income stream for organic rangeland producers. Livestock and plant (bush tucker) products could be considered.

Often recognised as a problem for rangeland graziers because of competition for livestock feed and water supplies, wildlife is increasingly being viewed as important for its conservation and tourism values. Looking at wildlife for its conservation value may, however, take a major shift in how wildlife are accommodated within the management of a farming system.

Farm tourism is already an established enterprise on many

Western Division holdings. In addition to gaining tourism income, landholders might also consider harvesting wildlife (for example, kangaroos) within strict quotas and protocols. Initially, such proposals could be based on the existing kangaroo industry. The primary purpose would, however, be to produce a net conservation gain and to market products accordingly.

Similar models of wildlife conservation have been successfully implemented overseas, and the Australian Senate has recommended a trial in Australia. The proposed trial would measure returns from wildlife tourism, bush-tucker enterprises (plants and animals), the sale of plants and animals for conservation, and ecosystem services. Known as the FATE project—the Future of Australia’s Threatened Ecosystems—the trial would aim to demonstrate and test strategies for taking advantage of the interlinked opportunities illustrated in Figure 1.3. The practical focus

of the project is a very ‘tight’ demonstration, through rural experimentation, of the sustainable and economically advantageous use of native animal and plant resources to provide extra income for rural and regional Australians.

Ultimately, the success of wildlife management enterprises will depend on consumer perceptions. Clear and concise net conservation benefits need to be demonstrated before any such enterprise will be accepted by conservation and animal welfare groups, both in Australia and overseas.

When asked about such a proposal, Australian organic certifiers were divided in their responses. Some saw potential market opportunities in Europe, where consumer interest in organic products is high; others thought there could be problems with the acceptance of wildlife products as a result of lack of compliance with the International Federation of Organic Agriculture Movements and the EU organic

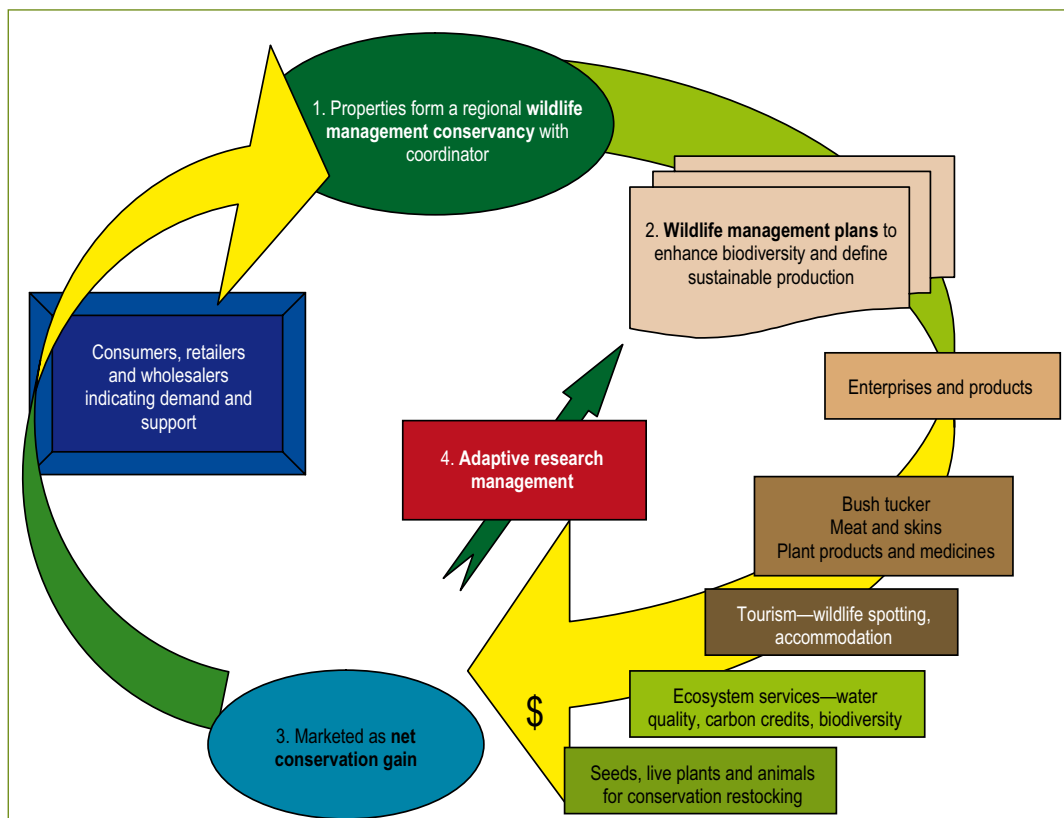


Figure 1.3 Steps in the process of sustainable use of wildlife. Source: Wilson (2002).

standards. Undoubtedly, acceptance of such products would require negotiation between Australian certifiers, relevant Australian government authorities and importing countries' counterparts. The results of the FATE project could help to strengthen the argument for sustainable use of wildlife.

More information on the FATE program can be found at <http://www.fate.unsw.edu.au/>

Feral animal harvesting

In the Western Division of New South Wales wild pigs and goats are currently harvested for meat, whilst foxes are harvested for their fur. Professional contractors are granted access to properties in return for shooting or trapping feral animals.

Wild pig is exported to Europe and is considered a delicacy in Germany. Goat is sold on the domestic and overseas (mostly Middle Eastern) markets. There might also be an

opportunity to export organic goat to some Asian countries, such as Taiwan, that consume goat in relatively large quantities. Wild goats trapped, domesticated and crossed with Boer bucks have been shown to be an economic alternative to sheep production enterprises. Goat hides are also a potential product.

Organic certification of properties where these animals are trapped would confer organic status on the product, although it would be necessary to resolve difficulties such as those associated with traceability—that is, problems of animals roaming onto non-certified adjoining holdings. Harvesting of feral animals for meat would be approved as organic only if it can be proved to the certifier that the animals have been contained in a clearly defined, organically managed area for the entirety of their lives. If a group of adjoining holdings is certified this could be a less pressing concern, provided it can

be demonstrated that the animals' ranging habit has not extended beyond the certified area.

The offspring of wild goats could be considered suitable for meat production if they were produced from a managed breeding program and under an organic system that guaranteed exclusion from non-organic stock—for example, effective fencing.

Sustainable wild harvesting of feral animals is a sensitive subject. It is unlikely that harvesting techniques aimed at promoting feral species would be encouraged, so the financial impact of an inevitable decline in harvestable numbers must be considered. Controlled farming techniques, whereby minimal environmental impacts resulting from the presence of feral species can be demonstrated, might be considered acceptable in some circumstances.



In the Western Division of New South Wales wild pigs and goats are currently harvested for meat, whilst foxes are harvested for their fur.

2. Organic production principles: an overview

‘Organic agriculture’ is defined worldwide as ‘farming without the addition of artificial chemicals’. An artificial chemical is a substance that has been manufactured or processed chemically. For example, rock phosphate is acceptable on an organic farm but superphosphate is not; the difference is that superphosphate is rock phosphate with a manufactured chemical, sulphuric acid, added to make more of the phosphate soluble. The definition includes the word ‘addition’ because organic farming is not necessarily chemical-free farming: there are almost always artificial chemicals in the soil, the water and the air.

Like many English words, ‘organic’ has several meanings. In the context of agriculture, the meaning refers to whole-farm management—the farm being treated as a living organism. Organic farms traditionally aim for optimal production rather than yield maximisation. They seek to operate as closed systems, using renewable resources wherever possible. In terms of management, they can be more complex, but they are generally less dependent on external, or off-farm, inputs. Central to organic farming is good environmental management. Best environmental management practice, such as irrigation scheduling, is encouraged.

Organic systems are essentially biological systems, both above and below the soil. Pest, disease and weed control must, in the first instance, encourage and maintain natural biological processes. Management strategies based on an understanding of biological cycles and other interactions are the main tools for replacing reliance on



Management strategies based on an understanding of biological cycles and other interactions are the main tools for replacing reliance on synthetic inputs such as artificial herbicides, insecticides, fungicides, drenches, superphosphate and urea.

synthetic inputs such as artificial herbicides, insecticides, fungicides, drenches, superphosphate and urea.

Biodynamic agriculture is a type of organic farming. It developed from a series of eight lectures on agriculture given in 1924 by Austrian Rudolf Steiner (1861–1925), founder of the spiritual system known as anthroposophy. The lectures were a response to farmers’ observations that soils were becoming depleted and there was a deterioration in the health and quality of crops and livestock following the introduction of chemical fertilisers at the turn of the century. Steiner believed a renewal in agriculture was necessary in order to find a way to re-invigorate the earth.

Biodynamic agriculture sees the farm as a living organism interacting with its environment to build healthy soil and nutritious food that sustains plants, animals and hence humankind. Emphasis is placed on the integration of crops and livestock, the recycling of nutrients, and the health and

wellbeing of crops and animals.

The farmer, too, is part of the whole. These interactions within the farm ecosystem lead to a range of management practices that take account of the environmental, social and financial aspects of the farm as a whole.

Although biodynamic agriculture parallels organic farming in many ways (especially in relation to cultural and biological practices), it is set apart from other organic systems by virtue of its association with anthroposophy. Steiner identified energies working in nature and so proposed practices that would deploy those energies. He emphasised farming practices designed to achieve a balance between the physical and the higher, non-physical, realms and that acknowledged the influence of both terrestrial and cosmic forces. The aim is to endow the farm, its products and its inhabitants with life energy.¹

Biodynamic farmers aim to develop a soil rich in humus; among other things, this involves careful use of

1. The higher, non-physical, realms are the etheric, the astral and the ego. The terminology and the complex underlying concepts of anthroposophy can make biodynamics hard to grasp. Biodynamic farmers believe there are forces beyond gravity, chemistry and physics that influence biological systems.

plants, animals, machinery and special preparations. Humus—decomposed organic matter—is principally made up of water, and it helps to bind soil particles and retain soil nutrients. Among the humus-building techniques are the following:

- use of special preparations to stimulate biological activity
- application of composts containing biodynamic preparations
- use of cover crops and green manuring
- crop rotation and companion planting
- appropriate tillage—for example, at the correct soil moisture level and using suitable equipment
- addition of rock dusts, lime and rock phosphate as necessary.

A distinguishing feature of biodynamic farming is the use of nine special preparations made from mineral, plant or animal extracts, usually fermented and applied in homeopathic proportions to compost or the soil or directly onto plants after dilution and specialised stirring procedures. The preparations are intended to help moderate and regulate biological processes and strengthen the life (etheric) forces on the farm. They are numbered BD500 to BD508.

2.1 Soil management and crop nutrition

Within organic standards, there is worldwide agreement that organic farming systems should maintain or increase soil fertility on a long-term basis. Australia's organic standard, the National Standard for Organic and Biodynamic Produce, states that the primary aims of organic agriculture are as follows:

- production of food of high nutritional value
- enhancement of biological cycles

in farming systems

- maintaining and increasing the fertility of soils
- working as far as practicable within a closed system
- avoidance of the pollution resulting from conventional agriculture
- minimising the use of non-renewable resources
- coexistence with and protection of the environment.

... This is achieved through management practices that create soils of enhanced biological activity ... such that plants are fed through the soil ecosystem and not primarily through soluble fertilisers added to the soil.

... Organic farming systems rely to the maximum extent feasible upon crop rotations, crop residues, animal manures, legumes, green manures, mechanical cultivation, approved mineral-bearing rocks ... to maintain soil productivity and tilth and to supply plant nutrients ... (AQIS 2002)

Conversion from a conventional fertiliser regime to an organic soil-building process first involves eliminating the use of artificial chemicals in the farming system. This means that fertilisers such as superphosphate and ammonium nitrate are excluded and are replaced by practices that foster the cyclical

renewal of nutrients to maintain crop health. Organic matter content, microbial activity and general soil health are taken as measures of soil fertility. An analysis of organic farming systems in Europe (Stolze et al. 2000) found that organic farming increased microbial activity by 30–100 per cent and microbial biomass by 20–30 per cent.

In the United States a comparative study of organic, conventional and integrated apple production systems in Washington State from 1994 to 1999 found that the organic and integrated systems had better soil quality and potentially lower negative environmental impacts than the conventional system. The organic system ranked first in terms of environmental and economic sustainability, the integrated system ranked second and the conventional system last (Reganold et al. 2001).

Research into the sustainability of organic farming systems in Australia has been limited. It has tended to focus on comparative studies in broad-acre cropping and livestock systems, which are characterised by their low use of external inputs. Phosphate rock, lime and dolomite, legume rotations, incorporation of green



Testing the soil

manure and crop refuse, manure application during livestock grazing, and application of microbial preparations can all be used for building soil fertility in these systems. Studies by Penfold (1995), Derrick (1996), Derria et al. (1996) and Schwarz (1999) suggest a trend towards deficiencies in phosphorous, nitrogen and sometimes sulphur under current organic management regimes in broad-acre, or extensive, cropping and livestock systems.

The limited studies of intensive organic farming systems in Australia have generally shown an increase in soil health compared with conventional practice (Wells and Chan 1996; Huxley and Littlejohn 1997; Stevenson and Tabart 1998). This could be a reflection of the cost-effectiveness of applying larger applications of compost and commercial organic fertilisers and incorporation of green manures for high-value crops such as fruit, vegetables and herbs.

2.2 Organic soil conversion

Organic farming starts with the soil. The organic farmer's primary aim should be to provide crop and animal nutrition by implementing practices that nurture the soil, stimulate soil life and conserve nutrients. This involves developing both long-term and short-term



Organic farming starts with the soil. Photo source: Should I Convert to Organic Farming by Viv Burnett, Robyn Neeson and Els Wynen. RIRDC Publication No. 05/084

strategies to improve soil health.

Organic conversion is not just about replacing a high-input chemical system with a no-input or every-'alternative'-input system. The organic soil-building process goes through three critical stages, which can be called the adjustment phase, the comfort phase and the maintenance phase.

2.2.1 The adjustment phase

The adjustment phase involves developing a system that reduces a crop's reliance on artificial chemicals. This could be likened to going 'cold turkey' for farming systems that are heavily dependent on chemical inputs. During this phase some farmers have observed that crop yields decline as the system converts from a chemical to a biological one and is starved of its regular 'fix' of readily available chemical fertilisers.

The length of this preliminary soil-building process depends largely on the soil's pre-existing condition and fertiliser history. The adjustment phase involves increasing biological activity by providing optimal soil conditions. The challenge for the organic farmer is to adopt a cost-effective strategy that encourages and builds on biological processes in the soil whilst maintaining optimal plant nutrition. In addition to standard organic practices (such

as the planting of legumes, use of green manures, and applications of compost and rock dusts), commercial organic fertilisers, seaweed, fish emulsion, sugar solutions and microbial preparations are used to stimulate soil biological activity

and supplement plant health.

2.2.2 The comfort phase

The comfort phase is characterised by an increase in biological activity and a corresponding release of previously 'locked-up', or unavailable, nutrients. It is during this phase that optimal crop yields are reached. Organic farmers must take care not to over-fertilise during the comfort phase. This is more likely to occur in intensive horticulture systems, where application of compost and green manure is common practice. Evidence of over-fertilisation is usually in the form of physiological problems for crops and increased pest and disease incidence.

Farmers should be aware, too, that the nutrient reserve can be depleted if the soil system is not being monitored properly. Soil nutrient levels should be regularly monitored. Soil and plant tissue testing allows nutrient requirements to be tracked, thus avoiding 'overfeeding' or 'underfeeding' the soil system.

2.2.3 The maintenance phase

Research has shown that over a long period some organic systems have experienced a decline in soil nutrient reserves (Small et al. 1994; Penfold et al. 1995). This could be attributed to long-term drawing down of nutrients during harvesting of crop or (less so) livestock products and through natural processes such as leaching.

In Australia such a decline has been particularly evident in broad-acre cropping and livestock enterprises where there is a phosphorous deficiency. This has implications for cereal and legume crops. Phosphorous deficiency in legumes affects the plant's ability to fix atmospheric nitrogen in root nodules, and this nitrogen fixing

provides an essential nutrient for subsequent crops in the rotation.

Preparation of a nutrient budget by reconciling soil system inputs and outputs and correlating this with regular soil tests and crop performance can help organic producers track the annual soil nutrient cycle.

The methods used by organic farmers to maintain soil health are discussed in the following sections.

2.2.4 Increasing biological activity

Organic conversion begins with encouraging increased microbial and arthropod activity in the soil. The elemental composition, structure and organic matter content of the soil must be favourable if biological activity is to be improved.

Biological activity begins with the breakdown of soil organic matter. During the decomposition process, the organic molecules are broken down into simpler molecules that require further decomposition into mineralised nutrients. Organic farmers supply organic matter by incorporating green manure crops and crop refuse and adding compost. Some farmers apply microbial preparations such as BD500 and EM (effective micro-organisms) and compost teas to inoculate the soil and speed up its biological transformation.

Use of bio-indicators is becoming an increasingly important way of assessing soil health. Pankhurst et al. (1997) reviewed how soil organisms and biotic processes can be used as indicators of soil health. A range of techniques are available for assessing biological activity, among them measurements of soil microbial activity based on the soil's carbon dioxide respiration, DNA testing to determine the

diversity and abundance of micro-organisms present, and an 'in situ' technique to measure activity based on measuring the tensile strength of a cotton strip that has been buried in the soil. Commercial laboratories that offer services to assess soils for microbial status are now becoming more common in Australia.

2.2.5 Green manuring

Green manure crops are grown specifically for ploughing back into the soil to build up organic matter and nutrients and to stimulate biological activity. The type of green manure crop and the stage at which it is turned in determine the amount of organic matter or nutrients returned to the soil. A lush, actively growing legume sward of, for example, vetch, faba beans or lupins contains large amounts (50–140 kilograms a hectare) of nitrogen that is released into the soil on ploughing in. When allowed to mature, the same crop contributes more organic matter but less available nitrogen. If a soil is low in organic matter, a green manure crop that increases soil organic matter is desirable—for example, oats. Green manures can also act as 'break crops' to reduce the carryover of pests and diseases in subsequent crops in the rotation. Green manure crops are an essential component of intensive organic annual cropping rotations.

Nitrate leaching following the incorporation of a green manure crop can occur when rainfall exceeds evaporation, resulting in net drainage. Nitrate leached below the root zone is effectively lost from the system. There is some evidence that nitrate leaching might be less under an organic regime than under conventional systems (Lampkin 1990). Rotation design for an organic system should consider how large nitrogen losses following ploughing in of the green manure crop can be minimised. Establishment of a cereal crop immediately after incorporation of the green manure has been shown to be the simplest and among the most effective methods of reducing nitrate leaching.

Some organic farmers apply foliar sprays of sugar, molasses or compost teas to a green manure crop before turning the crop in. It is thought that this provides additional energy for micro-organisms, enabling more rapid breakdown of green matter before planting the next crop.

2.2.6 Undersowing crops

Undersowing of crops—for example, a barley crop undersown with the grass or clover pasture that will follow in the rotation in the succeeding year or almost any



Green manure crops of oats, faba bean and vetch, NSW Department of Primary Industries organic demonstration site, Yanco. Photo: NSW Department of Primary Industries.



Lucerne undersown eight weeks after the emergence of sweet corn grows rapidly following the sweet corn harvest, NSW Department of Primary Industries organic demonstration site, Yanco. Photo: NSW Department of Primary Industries.

crop undersown with a leguminous green manure—is central to organic farming. The practice has been shown to increase the diversity and abundance of insect species (Vickermann 1978). Among other benefits are the potential for higher protein content in cereals undersown with a legume as the result of a small net nitrogen gain, better weed suppression and improved pest and disease control, as well as establishment of that most important clover-based pasture (Lampkin 1990).

2.2.7 Permanent swards and pastures

In livestock and cropping enterprises, legume-based pastures provide the system's primary nitrogen input and livestock largely recycle other nutrients. In orchards, permanent swards (sods or stretches of turf or grass) are sometimes planted between the rows and are the preferred method of inter-row management because the soil ecosystem remains undisturbed. This promotes the growth of plant roots, soil microfauna and flora, worms and mycorrhiza and helps retain good soil structure.

A mix of deep-rooted and shallow-rooted species increases the potential for gaining access to soil nutrients. In organic pastures herbs

such as chicory, plantain, yarrow and caraway are often added. Ideally, an orchard sod consists of a range of perennial plant species. Grasses such as rye-grass and fescue are efficient in obtaining potassium from the soil and can use excess organic nitrogen. Legumes such as clover and lucerne can contribute 40–140 kilograms per hectare per year of nitrogen to the soil reservoir. Herbs such as comfrey and chicory often have a high mineral content and have deep roots capable of bringing up leached elements that would otherwise be unavailable to the crop.

2.2.8 Rock dusts and re-mineralisation

Many Australian soils are leached of elements essential for plant



Having a mix of deep-rooted, shallow-rooted, fibrous-rooted and nitrogen-fixing species in green manure crops increases the potential for gaining access to soil nutrients and improving soil structure. Pictured here are, from left to right, oat, faba bean and rape roots. Photo: NSW Department of Primary Industries.

growth, and many years of farming with emphasis on supplying a nitrogen–phosphorus–potassium fertiliser regime at the expense of minor elements might have resulted in further ‘mining’ of particular trace elements. This theory has some support: evidence suggests a gradual decline in the elemental composition of fresh fruit and vegetables since the 1940s (McCance and Widdowson 1992).

Soils having higher biological activity play an important part in increasing the availability of micronutrients. Much research has been done into the symbiotic roles of arbuscular mycorrhiza fungi in increasing phosphorus availability in plants and into rhizobium bacteria and their ability to fix atmospheric nitrogen for plant use. There has, however, been little research into the role of other soil micro-organisms in improving plants’ micronutrient uptake.

The re-mineralisation of Australian farming soils is a strategy recently proposed by some soil health practitioners. Various techniques for re-mineralisation are attracting an increased following among farmers, largely based on balancing the cation exchange capacity of soils and achieving a satisfactory calcium–magnesium ratio (Albrecht 1975). The effectiveness of these techniques is yet to be scientifically

evaluated under Australian conditions.

Re-mineralisation involves the addition of various fertilisers of mineral origin. These rock-based materials include reactive and colloidal rock phosphate, dolomite, limestone and rock dusts (from silicate rocks, including basalt and bentonite and some commercial organic blends). Rock dusts can be added directly to the soil or added to compost heaps. Whichever method is favoured, the release of nutrients from the dusts is accelerated by moist conditions, high temperatures and high biological activity—for example, during a green manure stage or composting. Where soils have good biological activity and are subject to irrigation, mineral product effectiveness can be further increased.

Rock phosphate becomes available more quickly under acidic soil conditions (a pH less than 5.5) and where annual rainfall exceeds 600 millimetres. Since the benefits of rock dusts are not available immediately to the crop, the dusts should be applied a few seasons before cropping. Consistent small applications throughout the rotation should be considered.

It is important to note that some commercially available mineral rock dusts contain unacceptably high levels of heavy metals. Unlike other commercial fertilisers, rock dusts are not required to undergo testing or registration under the *Fertiliser Act 1998*. Each batch should be tested in order to determine the presence of any impurities, or a written declaration should be obtained from the manufacturer or supplier.

2.2.9 Improvements to soil structure

Improvements in the biological activity and cation exchange

capacity of soils will generally lead to an improvement in soil structure, but this needs to be supported by suitable cultural practices. Use of suitable machinery at the correct soil moisture, incorporation of soil organic matter, and improvement of soils using differing types of crop root physiology are techniques organic farmers use in order to develop soil structure.

Lampkin (1990) describes cultivation practices as having the greatest impact on the soil of any agricultural activity. He summarises the organic approach to soil cultivation as one that seeks to maintain soil structure and allow the soil to have vegetative cover for as long as possible within the rotation. Shallow cultivations, where only the surface layers of the soil are mixed, are an important element of this approach. Deep cultivation of dry soil is practised to loosen and aerate soil, avoiding inversion of the lower layers. Green manures or cereal crops are sown as soon as practicable following cultivation: their roots help stabilise loosened soil and minimise nitrate leaching.

2.2.10 Seasonal nutrient requirements

During conversion to organic production and during a crop's growth period additional nutrients might need to be supplied. It is important that crop growth does not falter during the growing season, and in this instance sap or tissue tests on the crop offer a method of rapidly checking crop nutrient status. Nitrogen, phosphorous, potassium and calcium are the elements most often required by crops.

Nitrogen

Nitrogen is required in reasonable quantities by most vegetables. Unlike many elements, it is relatively mobile in the soil nutrient pool. As nitrate, nitrogen is water

soluble and can be rapidly leached from the crop root zone. When large amounts of organic carbon are present—for example, when straw or crops rich in organic matter are turned into the soil—nitrogen can become temporarily unavailable as soil microbes use the nitrogen to help them digest the carbon. Nitrogen can also be lost in gaseous form, through the processes of denitrification and volatilisation.

Before planting, nitrogen is supplied through incorporation in the soil of legume-based green manures, compost, blood and bone (usually applied as an ingredient during composting) and commercial organic fertilisers.

Although nitrogen mineralisation can be high—up to 900 grams a day—this might be inadequate for a rapidly growing vegetable crop. Short-season crops such as radishes and beets will most probably be able to obtain all their nitrogen requirements from a green manure crop, compost or organic fertiliser that has been applied before planting. Crops with a growing season beyond six to eight weeks will probably need additional nitrogen, applied as a side-dressing or foliar spray or, if used, by means of drip irrigation. Commonly used substances are fish emulsion, worm juice and compost teas (made from stinging nettle, for example).

Phosphorous

Although soil tests might show there is sufficient phosphorous in the soil, the phosphorous might be in a form that is not readily available. Cold, wet soils, which can limit root growth, restrict phosphorous availability. In addition, organic sources of phosphorous are less soluble than conventional forms such as superphosphate, which is treated with sulphuric acid to increase its solubility, so there is a time lag before phosphorous

becomes available for the crop. Increasing biological activity improves availability, but additional phosphorus applied in small, regular doses will ensure that a reliable supply is available for crop growth. Rock phosphate, guano, fish meal and bone meal (usually added as an ingredient during composting) all contain moderate levels of phosphorus and are commonly applied in organic systems. Phosphorus should be applied at least a year before cropping.

Potassium

The element potassium is needed for flower and fruit development and to improve storage quality; it is particularly important for crops such as tomatoes. Among the organic sources of potassium are compost, seaweed, basic slag, wood ash, sulphate of potash, and green sand (langbeinite). Numerous commercial organic fertiliser blends containing potassium are available.

Calcium

Calcium is needed for plant cell strength, pest and disease resistance, and post-harvest quality. The Albrecht theory of plant nutrition holds that calcium and its relationship (ratio) with cations, particularly magnesium, are critical for soil-building processes and crop growth. Like phosphorus, calcium must be applied well before planting, with regular, small doses beneficial to sustain soil levels. Limestone (naturally mined), dolomite and gypsum are sources of calcium. Dolomite is also a source of magnesium, and gypsum also contains sulphur.

Other elements

Other minor elements essential for crop growth might be lacking in the soil. Commercial organic fertilisers, compost and foliar applications of seaweed, worm liquid and compost teas can be used to remedy deficiencies.



Preserving pasture quality is important for maintaining livestock health. Organic farmers inspect pastures during a NSW SPI Prograze workshop.

2.2.11 Correcting nutrient deficiencies organically

Unseasonal weather conditions, such as a prolonged dry spell or heavy rain, or just a miscalculation of crop nutrient requirements, can result in a nutrient deficiency. If this happens during a critical growth period, plant health can decline, predisposing crops to pest and disease attack, and a permanent yield depression could result, so it becomes necessary to remedy any

deficiency quickly. Leaf analysis is the usual method of detecting deficiencies during the growing period. Organic farmers use foliar sprays containing products such as fish and seaweed extracts, molasses and trace elements to redress temporary deficiencies. Guidelines for foliar feeding of plants can be found on the website of the US National Sustainable Agriculture Information Service <<http://www.attra.ncat.org/attra-pub/PDF/foliar.pdf>>.



2.3 Livestock production and organic farming

Livestock play an important part in organic farming. Crop nutrition is improved when a pasture or grazing phase is incorporated in the cropping rotation. This is common practice in broad-acre systems and in some annual vegetable production systems. Among the nutritional benefits offered by a pasture phase are nitrogen fixation through the legume component and the recycling of organic matter and nutrients via livestock manure. The pasture phase can also help to suppress pests, disease and weeds by providing a break in the disease cycle.

Nitrogen fixed by legumes and other nutrients consumed by livestock during grazing are returned to soil in manure and urine. Managed carefully, livestock and manure can play an important role in nutrient cycling on an organic farm. Composting of livestock manure is generally required, particularly if the manure is obtained from somewhere other than the organic farm.

Livestock are used extensively for weed control on organic farms. For example, they can graze down weeds before a crop is sown or they can be used after crop establishment for weed control and to improve tillering. Crops can sometimes be chosen so that livestock selectively graze out weeds, leaving behind the less palatable crop. Chinese weeder geese are often used in organic vegetable and fruit production to selectively remove grasses and some broad-leaf weeds from crops.

Livestock can also help with preparing the ground for planting by grazing and trampling crop stubble and reducing the length of a pasture sward.



The pasture phase in a mixed cropping–livestock system builds critical fertility and structure into rotations and reduces potential for the build-up of insects and disease.

2.3.1 Livestock nutrition

In organic farming, animal husbandry aims to provide a diet that livestock are best adapted to; the aim is not to maximise weight gain at the expense of animal health and contentment. Although good nutrition seeks to produce adequate yields, it has an enormous effect on animal health and is therefore very important in disease prevention.

Dietary diversity is the key. A balanced diet helps to meet the animals' physiological needs. Lampkin (1990) points out that cows with high production levels as a result of emphasis on concentrates in their diet have a shorter productive life. In organic systems crop rotation and a variety of plant species in the pasture help to achieve diet diversity. A mixture of deep-rooted and shallow-rooted species increases the potential for nutrients to be available and helps eliminate nutrient deficiencies. Herbs such as chicory, plantain, yarrow and caraway are often added. Deep-rooted native species can recycle and make available nutrients that otherwise remain unavailable, deep in the soil. Legumes such as lucerne can supply organic nitrogen to the grass component of pastures and help recycle deep nutrients.

Nutrient imbalances are less likely to occur in organically raised livestock when plant nutrients are provided through the balancing of soil fertility and the soil's biological activity, rather than when water-soluble nutrients are provided.

The long-term aim of organic systems is to remedy soil deficiencies. Under the organic standards, any mineral supplements used should be from natural sources. For example, additives such as urea and synthetic amino acids are not permitted, whereas seaweed and seaweed extracts, which contain a range of minerals, are. Nutrients can also be provided in mineral licks and fodder mixes or by drenching. Exceptions are made for potassium-based fertilisers.

The national standard requires that all food for organic livestock be organic—either as purchased input or, preferably, produced on the farm. In connection with feeding supplements and rations the National Standard for Organic and Bio-dynamic Produce is under constant review so practitioners should refer to their certifiers or AQIS for the most current standard. The national standard states:

In order to satisfy their nutritional requirements, livestock can be given free access to mineral supplements (e.g. mineral licks, shell-grit and trace elements from mineral origin).

Feed supplements of agricultural origin must be of certified organic or biodynamic

origin where the operator can prove that the required products are not available.

An exception is made for supplements of non-agricultural origin² when the following three circumstances all apply:

- They constitute no more than 5 per cent of the animals' diet on an annual basis.
- They are not processed with products that do not meet the requirements of the standard.
- They do not contain materials of genetically modified origin.

The supplements of non-agricultural origin can be only the following:

- minerals, trace elements, vitamins and pro-vitamins of natural origin
- binders, anti-caking agents, emulsifiers, stabilisers, thickeners, surfactants and coagulants from natural sources
- acids of natural origin
- marine products of plant origin.

When feed rations are prepared, they must consist of organic or organic-in-conversion products and be labelled accordingly. As with supplements, feed rations of non-agricultural origin are restricted to the products just listed.

The following are prohibited feed products:

- antibiotics, coccidiostats, medicinal substances, growth promoters and any other substance intended to stimulate growth or production
- synthetic nitrogen compounds, non-protein nitrogen compounds and amino acid isolates.

The feeding of animal products and by-products to the same species—excluding milk and milk products to ruminants—is strictly prohibited.

In cases of extreme climatic or other extenuating circumstances, such as fires, exemptions for feed inputs may be granted. The national standard states:

The use of such feed should be sourced from, in the first instance:

- *organic-in-conversion produce or untreated conventionally produced feed may only be used after it has been demonstrated that organic-in-conversion produce is unavailable.*

Only in circumstances described above, where organic in-conversion feed is sourced, the organic or biodynamic status of the livestock is unaffected.

Livestock fed on conventional produce must, however, be fed on organic inputs for six consecutive months or for the life of the animal, whichever is the shorter, before they can regain their organic or biodynamic status. Residue testing can be required in order to confirm regained organic or biodynamic status.

2.3.2 Soil management for nutritious pastures

Slow, organic remediation of soils through improved biological activity provides balanced plant nutrition and growth and hence improved nutrition for livestock. The aim is to build soil fertility through management. This includes rotation of crops, incorporation of organic matter such as green manure, and cultivation practices that increase the aeration of soil. Aerator ploughs (for example, Agroplow® and Yoeman's®) and deep ripping are used to open up the soil profile, and a deep-rooting species such as lucerne or chicory is sown to keep the soil open. Additions of mineral rock and approved organic fertilisers are also useful.

2.3.3 Encouraging predators to manage pasture pests

Synthetic pesticides cannot be used when producing fodder or pasture for stock. Rather, cultural practices that encourage healthy plant growth and other management practices that encourage predators of pests are used. Davidson and Davidson (1992) give the example of 1000 ibis consuming nearly a quarter of a million pests during a day.



Davidson and Davidson (1992) give the example of 1000 ibis consuming nearly a quarter of a million pests during a day.

² Livestock feed produced before the inspection should be replaced during the in-conversion period.

Providing shelter, breeding grounds and year-round food sources for predators encourages them. Nectar-producing species incorporated in pastures and windbreaks attract wasps, which parasitise scarab species in pastures. On-farm wetlands encourage predatory waders and, suitably located and designed, provide a filter for nutrients in drainage before it leaves the farm.

2.3.4 Breeding

In conventional livestock systems the genetic emphasis is on high production. The organic farmer selects livestock for a wider range of qualities, among them pest (parasite) and disease tolerance or resistance (for example, Brahman tick tolerance) and mothering ability. Breeding for lifetime yield is more commonly the practice in organic farming. While the aim of conventional livestock production is for high, early productivity, the aim with organic livestock is to increase the animals' productive life, and this is often associated with resistance to disease (Boehncke 1990). Developing longevity in the herd offers a number of advantages:

- A long growth period means a long youth, and a long immature stage has been shown to be a precondition for a longer life.
- The farmer has the opportunity to get to know the herd, which

makes handling easier and allows for a thorough knowledge of the herd's disease history.

- The herd establishes a stable social order and a stable health state.
- Stress factors become adapted to conditions over a longer period.
- The quality and quantity of colostrum in older cows is greater.

Breeding should be within the genetic capacity of the species concerned. For example, breeding for high feed conversion can lead to arthritis and breeding for large hindquarters can lead to birthing difficulties.

During conversion to organic production, livestock bought externally must be organic or, if conventional, placed in a quarantine area for three weeks.

Once the farm is fully organic, external purchases are confined to breeding stock only: all other livestock should be bred on the property. Replacement breeders may be introduced at an annual rate of 10–20 per cent (depending on the certification organisation) of the existing breeding stock.

A limited provision does, however, exist in the standards for taking on agisted stock.

Livestock produced by artificial

insemination are allowed by most certification organisations if natural behaviour is not practical or new genetic material is required.

Embryo transplant is not permitted since this technique usually necessitates hormone injection to synchronise breeding cycles and tends to lead to decreased diversity in the herd. Livestock produced using genetic engineering are not permitted.

2.3.5 Livestock welfare

Organic farmers aim to minimise physical and psychological stress in their livestock in order to promote wellbeing and reduce the incidence of disease. Having non-stressed livestock also helps reduce veterinary bills and maintain meat tenderness.

The national standard requires that *'maintenance of livestock ... be guided by an attitude of care, responsibility and respect for living creatures ... Living conditions must consider the natural needs of the animal for free movement, food, water, shelter and shade. Consideration must be given to their specific natural behaviour patterns'*.

In relation to stress, the standard says, *'Pain inflicted by treatments such as castrating, marking and mulesing must be kept to a minimum'*. For example, NASAA prohibits common practices such as de-tailing of cows, although de-horning and castration are allowed when carried out as humanely as possible and within specific age limits.

Management aims to minimise stress during potentially stressful periods. After shearing, for example, stress can be reduced by providing good pasture with low or no parasitic infection. Reducing noise and not rushing stock through gateways can also help minimise stress during handling.



Organic beef. Photo: Andy Monk

Animals experience added stress when being transported to market and during slaughter. The NASAA standards state, 'Slaughter will be carried out quickly and without undue stress ... animals may not be held or herded in an area where the killing of other livestock is visible'.

The benefits of shade and shelter for livestock are well documented. Organic animal husbandry requires that sufficient protection be provided against excessive sunlight, temperature, wind, rain and other harsh climatic conditions. This can be achieved through the provision of windbreaks and sheltered paddocks.

Livestock such as geese should be protected from predators such as foxes and dogs.

2.3.6 Livestock health

The organic approach to animal health care focuses on prevention of disease through diet, shelter, breeding and husbandry practices, rather than treatment. It is not possible to eliminate all animal disease, but when disease does occur a healthy animal is in a better position to cope with it.

For many organic farmers, good observation is an important part of disease management. A producer who keeps daily or frequent records will be in a better position to identify the possible origins of a disease or injury.

Organic standards exclude the routine use of veterinary drugs such as antibiotics and some vaccinations. Organic farmers rely instead on treatments such as herbs, vitamins and minerals, homoeopathy, acupuncture, and dietary additives such as pro-biotics.

There is, however, not always a satisfactory 'organic treatment' for health problems, and when an organic treatment is not effective

there is no doubt that conventional treatment must be used: the welfare of the animal is paramount. If the law requires that diseases or pests be reated, this overrules the organic standards.

Box 2 describes the conditions of use for vaccinations and non-permitted veterinary treatments.

Selection of stock on the basis of disease tolerance and resistance is an important tool of the organic farmer. Recurrent health problems point to something amiss in the system. If individual stock exhibit recurrent problems they are culled.

Internal parasites

Organic farmers are not permitted to use conventional anti-worm preparations. Drenching is done only when necessary, as routine use is not permitted and could lead to the development of resistance. If permitted substances or practices do not satisfactorily treat an animal, the animal's welfare takes priority over organic status.

Among the organic treatments used are drenches made from a mixture of natural products such as garlic, molasses, vegetable oil and cider vinegar. Copper sulphate in minute doses is also favoured by some organic farmers. Others use aloe vera, clay products, diatomaceous earth, other vegetable and tree products, and Nutrimol®.

Homoeopathic remedies are widely used, with reported excellent results. Homoeopathy works on the principle of 'substances usually in extreme dilutions which, when given to healthy individuals, produce the same symptoms as the disease being treated ... the whole organism is treated in an attempt to raise its levels of resistance and stimulate its ability to throw off disease' (MacLeod 1981).

Homoeopathy aims to stimulate the

body's natural defence mechanisms. Although there is little scientific evidence of its effectiveness, the practice is widely used in organic dairy farming. Only a few trials have been conducted; some have demonstrated effects, while others have failed to do so.

Some substances listed as permissible are not registered as veterinary treatments, and the Organic Industry Export Consultative Committee, which is responsible for approving changes to the National Standard for Organic and Biodynamic Produce, has been asked to explore the legality of using these unregistered substances.

Alternative management practices aim to disrupt a parasite's life cycle. Temperature and moisture favour the development of internal parasites, so after rainfall or irrigation livestock are moved to a clean pasture; alternatively, pastures can be harrowed following grazing to expose the eggs and larvae to sunlight and heat.

The New Zealand Agroecology Program found pastures such as chicory and lucerne to be least conducive to parasite larvae intake.

Resistance to internal parasites increases with age because immunity develops through previous exposure. Sheep reach a higher level of resistance at about nine months, whereas cattle reach this stage at about 18 months. Late pregnancy, lambing and weaning are critical periods for infection because resistance drops with increased stress and as feed intake increases, so it is critical to provide clean pasture at these times. Good nutrition and grazing rotations assist in developing and maintaining resistance.

Grazing management is very important in managing parasites.

Use of vaccinations & other veterinary treatments in organic livestock systems

BOX2

Animal welfare is a primary concern within organic livestock production systems. Whilst organic standards state that the adoption of good management practices is the preferred method to maintain livestock health in an organic system, they also recognise that sometimes this alone is insufficient to guard against diseases and illness.

Organic standards outline specific requirements for the use of vaccines and other allopathic livestock treatments. The standards classify the use of vaccines as 'restricted'. This means that their routine use is discouraged and is only permitted when it can be demonstrated by the organic operator that a specific disease is endemic in the region or on the organic farm, or where their use is required by law, or in proven cases, where such a disease cannot be effectively controlled by other management practices. Organic certifiers require written verification from a veterinarian to confirm the presence or threat of disease infection prior to approving the application of the treatment. In addition, the vaccines must not contain genetically modified ingredients or by-products. The use of vaccines under these circumstances will not prejudice certification and does not require quarantine procedures. Full records of treatments must be kept.

Use of non-permitted veterinary treatments:

Other conditions apply to the use of veterinary treatments (such as drugs and antibiotics) or other treatments not listed or not permitted for use under organic standards. Prohibited treatment use is only acceptable in cases of emergency; however organic standards stress that such treatments (including medicines) should not be withheld where animal welfare concerns exist.

If parasiticides and/or antibiotics are required, organic standards specify a number of management conditions which must be applied to treated livestock. Treated stock

must be excluded for a period of time from certified organic land and separated from non-treated organic stock. This means containing those livestock to be treated in a defined quarantine area during and following treatment for a period which is equivalent to three times the legal withholding period of the substance in question, or a minimum of 3 weeks, whichever is longer. Following this quarantine period, treated stock are permitted to mingle with organic (non-treated) stock and range on certified organic land provided they are clearly identifiable from the organic stock as well as traceable through farm records.

If organic livestock are treated with parasiticides and/or antibiotics a period of de-certification follows and the livestock and / or their products cannot be sold as 'certified organic'. The meat from treated livestock, eggs and poultry can never be sold as 'certified organic'. Wool regains its certified organic status 18 months following treatment and milk 180 days following treatment. The offspring of treated livestock however may attain organic certification status for meat if managed in accordance with organic standards and conceived on the certified unit or other certified lands or where the parent is managed in accordance with organic standards from the last trimester of pregnancy onwards, including throughout the lactation period. This means that any treatment applied to a breeder must occur prior to the start of the last trimester of pregnancy and full organic management must be sustained from this point onwards for their offspring and its meat products to be certified as organic.

The use of anaesthetics does not result in the loss of certification status, but does require the treated livestock is withheld from sale or killing for a period three times the legal withholding period of the substance in question or a minimum of three weeks, whichever is longer.



Spelling paddocks can control worm populations, as can alternate grazing. This latter method can involve older, less susceptible stock grazing wormier pastures before young stock or having a higher number of less susceptible stock together with young stock. Another form of alternate grazing is to graze alternately with different species—for example, cattle before sheep because cross-infection does not occur to any great extent—or with different species together. This also offers benefits in terms of weeds: different grazing habits will prevent the domination of a particular weed species. Strip grazing involves back-fencing stock to match larvae development so that the stock do not contaminate their pasture. Most organic farmers prefer low stocking rates and relatively intensive rotations.

Cultivation and intermediate cropping allow for a break in the build-up of insects, parasites and disease and therefore a clean pasture. Sowing mustard and ploughing it in as a green manure has been shown to clean a pasture (Belstead and Belstead 1992).

In summary, maintaining good health and reducing the risk of parasites involves the following:

- maintaining a high plane of nutrition and minimum stress
- grazing management that reduces exposure to parasites
- eliminating herd drenching and drenching individual stock only when infection is sighted—close observation is crucial here
- after the system is established, culling of animals that show signs of heavy infestation.

Liver fluke (*Fasciola hepatica*) control can be achieved by controlling the intermediate host, the freshwater snail. In organic farming systems this is done by excluding livestock from water sources the snail inhabits and by using birds such as ducks. Snails prefer damp, slightly acid conditions, so the addition of lime can be useful. Copper sulphate is approved under the national standards, although its use is under review. Iron phosphate shows promise and is under review as an approved input.

Clostridial diseases are caused by spore-forming anaerobic bacteria. At present, conventional control is through vaccination. In organic farming, use of vaccines is permitted only when a specific disease is known to exist on the organic

farm or on neighbouring farms and cannot be controlled by other means. To deal effectively with clostridial disease, the first goal is to avoid predisposing factors. For example, in *Clostridium chauvoei* (blackleg, or malignant oedema) a significant predisposing factor is injury, and among the management strategies are avoiding and treating injuries, avoiding use of the same site for operations such as lamb marking, and burning dead stock where they lie. Some practices emphasised in organic farming reduce the likelihood of injury. For example, dipping and drenching are avoided (so stress and rough handling are minimised) and birth complications are minimised through appropriate breed selection.

The most commonly used disinfectant for equipment in an organically certified operation is methylated spirits.

When a serious disease is endemic and cannot be otherwise controlled, vaccination is an appropriate and important management strategy.

External parasites

External parasites are managed through a range of practices, among them the following:

- observation of livestock
- selection of resistant or tolerant stock—genetic selection and culling of susceptible stock
- monitoring the presence of pests and trapping them—for example, using fly traps
- cleanliness—for example, burning the crutchings from fly-blown sheep
- biological controls—for example, using dung beetles to remove faeces and hence the eggs of the buffalo fly (*Siphona exigua*)
- organic treatments—derris, rotenone (derris) and monocalcium fluorosilicate (Flockmaster®) for lice, lime



Grazing management is an important tool in managing parasites.

sulphur for itch mite, zinc sulphate for lumpy wool, and neem and eucalyptus (*Eucalyptus globulus*) oil for fly strike

- double-fencing—particularly adjoining conventional livestock—to help prevent the spread of lice from infested to clean livestock.

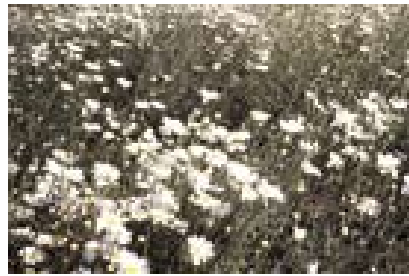
2.4 Plant pest and disease management

Organic systems are designed to re-create natural systems, which support several competing species, so that no single species has a consistent advantage. This is contrary to the main objective of modern agricultural systems, where the enterprise must maintain permanent control in order to be viable.

Organic producers also believe that, by maintaining a vigorous and healthy crop through the adoption of sound cultural practices, plants are better able to withstand attack from pests and disease. Predicting potential problems and developing strategies to prevent the problems from occurring is the key to successful organic pest and disease management.

Organic farmers take an ‘integrated pest and disease management’ approach. Such an approach is sometimes called ‘ecological pest management’ in the case of organic farming, to differentiate it from integrated pest and disease management in conventional farming, which includes the use of pesticides.

Pesticides are generally not available to organic farmers, although some substances that are derived naturally are allowed for restricted use—for example, natural pyrethrum (without the addition of the synergist piperonyl butoxide) and *Bacillus thuringiensis*.



Pyrethrum

In organic systems integrated pest and disease management makes use of a range of non-chemical techniques:

- cultural controls such as crop rotation, cultivation and crop manipulation—for example, varying the crop spacing and the planting time—and crop hygiene
- manipulation of species diversity—for example, increasing the number of plant species that act as a barrier to a pest or that provide an alternative (preferred) host
- crop resistance or other physical attributes of the crop—such as spines or hairs—that deter pests
- natural and biological controls—for example, encouraging the natural enemies (parasites, predators and disease organisms) of a pest species by providing a favourable habitat or food source
- mechanical controls to trap or kill pests or physically prevent them from gaining access to crops
- modification of the physical environment—for example, using light traps and sticky traps (to trap and monitor insect pests), laying down clear plastic to control weeds (solarisation), planting a crop such as mustards that inhibits certain pest species (known as bio-fumigation), or planting antagonistic species (known as allelopathy) for weed control
- use of livestock—for example, using ducks and geese to reduce populations of snails and weeds

and to maintain hygiene by consuming crop refuse.

2.5 Weed management

Economic weed control—without the assistance of synthetic herbicides—remains one of the most difficult aspects of successful organic production.

A well-managed organic system should not develop a significant weed problem. A primary objective for organic farming is to change the composition of the weed community, so that the farming system gains maximum benefit. Sometimes, however, one weed species might dominate or a noxious weed (one that, by law, must be controlled) might be present and this situation must be managed.

Whereas most conventional farmers see a weed as something that grows where it is not wanted, organic farmers see it as a sign that something in the farming system needs attention. Weeds are also seen as having an important ecological role: for example, some deep-rooted species will recycle nutrients from deep down in the soil profile, making them available to shallow-rooted species.

In order to develop an integrated strategy for suppressing weeds without using chemicals, organic farmers need to have a good understanding of weeds’ behaviour, their growth characteristics, and the conditions that favour their presence. Manipulating soil fertility and using cultural techniques to control seed banks are examples of long-term strategies used by organic producers for the management of weeds. Among the shorter term strategies are mulching, using grazing animals, biological control, hand weeding, and mechanical methods such as slashing, cultivation, brush weeding and thermal weeding.

2.5.1 Reducing the seed bank of weeds

Stopping weeds going to seed can greatly reduce weed pressure. Most soils contain a sizeable population of weed seeds, and each time the soil is disturbed some of these seeds will germinate. Over time, however, it is possible to reduce this population by stopping weeds going to seed during the season and then following up with off-season control measures.

Planting of short-season crops such as lettuce offers an opportunity to suppress weeds, and competitive cover crops such as pumpkins can smother weeds. Cultivation, grazing and mowing can prevent weeds from setting seed. If the weeds do manage to set seed, baling them into hay and removing them from the paddock before seed dispersal is an option. The bales could then be used in compost production: correct composting makes seeds unviable.

2.5.2 Planning an organic weed management program

The following principles need to be borne in mind when planning an organic weed management program:

- Learn to identify your weeds. Learn about weeds' life cycles and growth habits—including their time of emergence, their growth rate, the method of dispersion, the time of seed set, and why the weeds are filling that ecological niche.
- Take a longer term view, rather than focusing solely on the current or coming season. It is necessary to determine how weeds can be managed throughout the rotation. A reduction in the seed bank might take some years.
- Take an integrated approach to weed management. Avoid reliance on a limited number



A well-managed organic system should not develop a significant weed problem.

- of methods. Be innovative with equipment, tillage and rotations.
- Planning should aim to prevent weed outbreaks. Once the weeds are there, the problem is much harder to manage.
- Observe and record changes to weed populations in each field.
- Introduce changes with the lowest risk crop in the rotation.
- Determine what soil characteristics or management practices favour particular weeds. The presence of a weed species might be an indication of a fertility or structure problem. A slight change in pH or improvements to irrigation management or drainage can remove the conditions that were desirable for the growth and spread of a weed.
- Build weed management strategies into whole-farm planning. For example, develop a fence layout and paddock size that allow for strategic grazing (say, with goats), grow less competitive crops in paddocks where weeds are not a problem, leave uncultivated areas to host potential biological control agents (such as Patterson's curse weevil), and choose crops that are able to compete effectively with weeds.
- Weeds can be beneficial. Among

the benefits to the farming system might be erosion control, a habitat for beneficial insects, capturing of soil nutrients and moisture at depth, and food or medicinal value for livestock.

2.5.3 Organic weed management practices

Surveys of organic growers reveal that the most frequently used weed management practices are manual and mechanical tillage, rotations including vigorous cover crops, slashing, and numerous cultural strategies (Kristiansen et al. 2001). An integrated approach to weed management relies on long-term remediation strategies—such as soil amelioration or the use of biological controls—backed up by short-term management practices. Numerous options are available to producers.

Hand weeding

Hand weeding is perhaps the single most valuable tool in organic weed management. It can involve chipping or digging using a hand-held implement or pulling out weeds by hand. One weed allowed to seed could become an outbreak in a few seasons. Organic farmers never walk past a potential weed problem. Hand weeding is often useful in inaccessible areas or as a final clean-up after relying on other methods.

Mulching

Organic farmers use mulches to help to reduce weed competition, conserve soil moisture, lower the soil temperature, and prevent erosion. Among the organic materials used are hay, paper and cardboard, compost and sawdust. Organic standards prohibit the use of solid non-woven plastic or synthetic material sheets. Sometimes woven plastic or synthetic materials will be approved if they are completely removed from the paddock after harvest. To be effective, organic mulches should be applied and regularly maintained to a depth of 100 millimetres.

A green-manure (such as vetch) cover crop can also act as a mulch against weeds. The main crop is then planted into the residual surface mulch of the cover crop. Also referred to as a 'living mulch' or 'smother crops', this technique relies on the senescence of growth in the cover crop, which is then mulched down to form a surface mulch. Cowpeas and cold-sensitive clovers have also been used with success.

Tillage

The US Sustainable Agriculture Network publication *Steel in the Field: a farmer's guide to weed management tools* is essential reading in relation to tillage (Bowman 1997).

Primary cultivation practices such as deep ripping can improve drainage and alter the composition of weed species in a field. In combination with other control measures such as green manuring, they should aim to reduce the weed burden before cropping. The final primary cultivation before planting should be carried out after optimum weed germination.

Secondary cultivations—those carried out after primary tillage (for example, to control weeds either

before or after sowing)—should be shallow and should aim to minimise soil inversion and soil mixing, so that a new bank of weed seeds is prevented from establishing at the soil surface. Other techniques such as flaming avoid soil disturbance and, if properly timed, can offer an effective alternative to cultivation.

These methods of minimising soil disturbance are based on the premise that weed seeds require exposure to light to germinate. Known as 'stale seedbed' techniques, they take advantage of seeds' need for light. The seedbed is formed about two or three weeks before the crop is planted. After seven to ten days of good growing conditions (moist soil and warm temperatures) there is a flush of weeds, which can be killed with flame weeders or cultivation. Assuming all the weeds are killed and the soil on the bed is undisturbed—apart from the minimal soil disturbance resulting from seeding or transplanting the crop—fewer weeds should germinate during the season. Because of this light sensitivity, there is some evidence that night cultivation can also drastically reduce the germination of certain weed seeds.

In row-cropping situations good weed control is facilitated by creating and maintaining evenly spaced, straight hills or beds. Mechanical weed control between crop rows using an implement such as a rotary tiller (for example, the WeedFix®) should be carried out when weeds are small and when the crop is at the two- to three-leaf stage and, if necessary, again at the five-leaf stage or while it is still feasible without damaging the crop. Once the crop canopy has closed, competition from weeds should be minimal.

The most difficult area in which to manage weeds is within the crop row. Hand weeding is probably

the most common method here. Guards around tillage implements will allow weeding to be done as close as possible without damaging the crop.

To ensure a good weed kill, cultivation should be avoided if rain is imminent, and it should be timed for the earlier part of the day during hot, dry and windy conditions. Avoid cultivating wet soil: it will become compacted and drainage will be impeded.

The choice of tillage equipment depends on the job at hand, the farmer's budget, and the commercial availability of the equipment. Many vegetable growers use rolling cultivators because these permit shallow cultivation and can be adjusted for different row spacings and crop configurations. Mouldboard ploughing during primary tillage is the most effective way of reducing weed populations because it buries seeds sufficiently deeply to reduce germination. Mouldboard ploughing is, however, considered more destructive for soil structure than chisel ploughing.

Any form of prolonged tillage will affect soil structure and increase soil compaction, as well as predispose a paddock to soil erosion and fertility losses.

In summary, the following guidelines for mechanical cultivation should be kept in mind:

- Equipment should be accurately adjusted for each cultivation.
- Establish straight rows and beds far enough apart to avoid injuring crop plants during between-row cultivations.
- Withhold irrigation after cultivation or avoid cultivating if rain is imminent, to prevent weeds from re-establishing.
- Establish 'traffic' rows to avoid compaction throughout the field.

- Hand hoeing can be practical for some crops. To avoid the adverse effects of root damage to the crop, hoeing should be done before the crop and weeds are large.
- Decrease the row spacings or increase the planting density. Narrow row spacings will produce faster canopy cover, thus shading out weeds.

Water management

Effective water management is a central tool for managing weeds in organic production.

Pre-planting irrigation or rainfall will stimulate weed emergence, after which the weeds can be killed by shallow cultivation or by flaming. Planting of the main crop should occur shortly afterwards to avoid further weed germination as a result of rainfall.

If drip irrigation lines are buried the crop will receive water but weeds closer to the soil surface will receive only minimal amounts, particularly if there is no rain. Post-planting operations will also be greatly facilitated if the drip line is buried.

Crop physiology

Vigorous crops will often out-compete weeds. Fast-growing crops can quickly cover beds and fill in gaps that weeds might otherwise occupy. Species with large leaves can shade out competing weeds.

Biological weed control

Various biological agents are available to help with weed management, among them insects (for example, crown root weevil for control of Patterson's curse), fungi and bacteria (for example, rusts formulated into biological herbicides known as myco-herbicides) and plant derivatives (for example, corn gluten meal, some vegetable oils, and plant root exudates such as those from

oilseed rape). Some of these have been formulated into commercial products known as bio-herbicides. It is necessary to obtain approval from the farm's certifier before using any treatment.

Some biologicals are effective over a longer period and rely on establishing and maintaining a colony of organisms. The organisms' persistence—and thus long-term weed control—depends on a sustainable food source, so it is desirable to set aside an area where a low level of the host weed or an alternative food source is maintained. Such areas are usually uncultivated borders (in windbreaks, for example) adjacent to cropping areas.

Researchers often look for unsprayed or uncultivated sites in which to release biologicals, so an opportunity may arise to collaborate in trial work to evaluate these new control agents.

Genetically modified organisms are not permitted as biological controls in organic systems.

Flame weeding

Flame weeding can be used to control weeds before and after germination of the crop. Effective pre-emergent flaming calls for good timing. The operation must be done after a flush of young weeds appears but ahead of significant crop emergence. The most effective time to kill weeds is before the three- to four-leaf stage. 'Indicator' seeds can be sown with the crop, timed to emerge just before the crop to show when it is safe to flame.

Post-emergence flaming is done either by cross-flaming or by parallel flaming. In cross-flaming, burners are set on either side of the crop row, in a staggered pattern, with burners oriented perpendicular to the row, so that the combined flames cover the entire drill area. In

parallel flaming, burners are again set on either side of the row, but the flames are oriented parallel to the row. Ideally, beds should be smooth, with minimal clods: protruding clods or uneven terrain can shield small weeds or deflect the flame into the crop canopy.

For energy-efficient flaming it is desirable to travel as fast as possible, using the lowest gas pressure and the least fuel. There will be little immediate visible effect, but weeds will droop and wilt within a few hours. A quick way of testing if the flaming has been effective is to firmly squeeze a plant leaf between thumb and forefinger, then let go. If you see a fingerprint where you squeezed, the heat has burst the cell walls and the leaf will wither.

As noted, for flaming to be successful, operations need to be carefully timed. When weed pressure and planting schedules allow, delay the final flaming until just before transplanting vegetable crops or planting fast-germinating, direct-seeded crops. This gives the crop the least weed competition during its most vulnerable stage. Flaming is best done in the heat of the day when it is hot and dry and there is little or no wind.

Flaming will have differing impacts on pests and their predators, so it is important to monitor populations carefully to determine how they are being affected. For example, US researchers have found that ladybirds cope better with higher temperatures than do tarnished plant bugs, a serious cotton pest. The ladybird preys on the pest in both its larval and adult stages. Further, the tarnished plant bug appears at about the same time as the cotton plants can first tolerate flaming.

Crops differ in their susceptibility to damage from flaming. For example, onions are flamed about

two weeks after the transplants are established. Corn can be flamed at any time, although many flame users do not flame from the 12- to 25-centimetre growth stage to avoid stressing the plants while their root system is developing. Green beans, on the other hand, cannot handle exposure to the flame, so flaming is used only at pre-emergence to deal with the initial flush of weeds. When flaming around sensitive plants, plant parts can be protected with a wall of mist. Spraying a thin layer of water over the plants with flat-fan nozzles will help protect them.

For some crops that send up early leaves before their growing point emerges, early post-emergence flaming can be used. Even if the young leaves are singed, these crops will recover as long as the growing point survives. Once the growing point emerges, substantial growth should occur before the stalks are flamed.

Two types of flaming equipment are generally available. The first is a hand-held propane flamer connected to a backpack-supported fuel tank. This manual method allows for greater selectivity and accuracy in applying the flame and is generally used for inaccessible areas or small weed outbreaks. The second type of equipment involves propane burners that can either be singly mounted or be attached to a two-row, rear-mounted, tractor-drawn cultivator. These may be four- or six-row flamers, depending on the size of the operation. This method is generally used in large fields and, if attached to a cultivator, allows flame weeding and mechanical cultivation to be done in one pass. The burners need to be adjusted so that they work efficiently with a cultivator because the soil the shovels throw can interfere with the flame hitting the target weeds.



Corn crop before flame weeding



Corn crop after flame weeding

For flaming between rows of emerged crops, accuracy and the safe use of equipment are essential:

- The burner height and angle (vertical and horizontal) should be carefully adjusted, and the fuel pressure, tractor speed and regulator setting should be checked frequently.
- Young crops should be carefully checked for flame damage to stems, buds or leaves.
- Flaming should be restricted to calm conditions and attention should be paid to the speed and direction of any air movement.
- Burners should be adjusted to a pilot setting when turning at the end of rows.
- Burner nozzles should be cleaned out each year to remove carbon and rust, which can flake off the inside of the steel pipe that leads to the burners. A bluish centre flame should be visible during peak operation.
- Operators need to become familiar with, and practise, the safety rules for proper inspection, filling and use of propane tanks and equipment.
- It is advisable to gain approval from local fire authorities before flaming. Of course, flaming should never be done during a total fire ban.

Sanitation

Good sanitation can help prevent new infestations and the spread of weeds. This can involve the use of

well-graded seed, the removal of crop refuse, thoroughly composting manures and green waste, and cleaning down machinery between operations and before moving from one field to another. Livestock can act as weed carriers if they have been grazing on weed seed in infested pastures or have been hand fed on grain. Mulch applied to crops should be free of weed seeds. Properly composted crop refuse has no viable seeds.

Organic sprays

A number of organic sprays are approved for weed control under the National Standard for Organic and Biodynamic Produce (AQIS 2002). They include essential oil sprays, homeopathic products and biodynamic peppering; their efficacy is yet to be scientifically evaluated. A pine oil derivative is approved for use by some certifiers, although some preliminary trials of it have shown minimal efficacy.

Agricultural Research Service scientists in Beltsville, Maryland, demonstrated effective control of a common range of broad-leaf weeds by spraying vinegar on plants. Five and 10 per cent vinegar concentrations killed the weeds during the first two weeks after emergence and, at a higher concentration, vinegar had an 85 to 100 per cent kill rate at all growth stages. The vinegar used was made from fruits or grains, to conform to organic farming standards.

Grazing animals

Goats, pigs, sheep and other animals will eat weeds but will also root or graze on any crop plants present in the field. Pigs are sometimes useful to root out the tubers of nut grass and Johnson grass before the next crop. Sheep can be used to 'crash' graze paddocks to prevent seed set.

2.5.4 Managing problematic weeds

Weeds that organic growers commonly report as problematic tend to have underground parts—examples are couch, dock, kikuyu and sorrel—that are less vulnerable to the usual forms of non-chemical weed control such as tillage and mulch or are heavily seeding annuals (Kristiansen et al. 2001). Some annual weeds have very long-lived seeds and can survive for more than 40 years before germinating.

The primary approach to controlling perennials with cultivation is to separate the above-ground and underground parts and then exhaust the food reserves in the underground part. Tap-rooted and shallow-creeping perennials are generally easier to control; the deep-creeping and tuber, corm and bulb types are often the most problematic. Difficult-to-manage annuals are controlled by preventing the conditions that encourage seed germination and by stopping further seed set. Merfield (2000) provides some useful management strategies for weeds of this kind.

Noxious weeds

Farming organically does not exclude anyone from adhering to laws imposed by the Commonwealth or the states and territories. Under the New South Wales Noxious Weeds Act 1993, for example, producers are required to control certain weeds. The Act does not specify chemical control, but it does specify that the noxious weed be either fully and continuously



New South Wales Department of Primary Industries Noxious Weeds Declaration site www.dpi.nsw.gov.au/agriculture/noxweed

suppressed and destroyed (for W1 and W2 category weeds) or be prevented from spreading and its numbers and distribution reduced (W3 category weeds). For a W4 noxious weed, the action specified in the declaration must be taken. The Act can be viewed online < <http://www.legislation.nsw.gov.au/viewtop/inforce/act+11+1993+FIRST+0+N> > and details of weeds declared in New South Wales can be viewed online at < <http://www.dpi.nsw.gov.au/agriculture/noxweed> >.

Woody weeds

The ecosystem that consists of what are commonly referred to as 'woody weeds' extends from about Charleville in south-west Queensland to the Cobar region in north-west New South Wales. This ecosystem has changed greatly since grazing began. The land is now covered in *Dodanea*, *Eremophila*, *Acacia aneura* and other shrubs, which are choking once extensive native grasslands.

The causes of change are unclear. Stocking with sheep has been implicated, as has regrowth resulting from significant rains. Wet periods have raised graziers' expectations

of the land's carrying capacity, and their stocking has often proved too high to be sustained through dry or drought periods. This has provided the conditions for woody weed establishment and, in the absence of fire, these weeds have caused the loss of desirable perennial grasses and a reduction in carrying capacity (McKeon et al. 2000). Another theory is that the extinction of boodies—small burrowing marsupials—might have meant that seedlings were no longer grazed and that this grazing might have helped control the shrubs in the past (Noble 1998).

Woody weeds can affect the productivity of the land and its management. As the quantities of available fodder decline, animal productivity falls. Eventually, stock are forced to feed in a series of disjointed areas, thus intensifying their impacts (Date and Murphy 1990). The weeds also create problems of visibility and impaired movement, making mustering and working with stock difficult, increasing management costs, and possibly threatening a farm's viability (Date and Murphy 1990). The economic and aesthetic value of the property can also decline.

Woody weeds need to be managed in order to maintain the land's grazing potential and to facilitate mustering. Conventional management involves cultural, chemical and mechanical control methods, but organic producers are not permitted to use chemicals, so they must develop a cost-effective strategy that integrates a number of practices. Organic certifiers also expect producers to use a management regime that upholds the ecological integrity of a region.

One strategy for organic producers is to remove the infested areas from certification so that they can be chemically treated. This involves fencing to prevent certified livestock moving into non-certified areas. Careful selection of herbicides is necessary to avoid residues in the soil and persistence in the environment.

A woody weed management plan

A weed management plan should be an important part of any organic management plan because of the financial and management constraints weeds can place on an enterprise. Such a plan should allow for gradual control of these plants within a negotiated financial framework: the focus should be on achieving realistic annual targets. Management plans need to allow for the reintroduction of desirable vegetation to take the best advantage of biological and climatic time frames. Animal and plant control boards have the necessary networks to obtain the latest technology in weed removal and replacement with desirable vegetation.

To clear woody weeds it is necessary to obtain permission from the relevant government authorities. In New South Wales the *Native Vegetation Act 2003*, administered by the Department of Infrastructure, Planning and Natural Resources,

provides for the protection and management of native vegetation. More information about the Act can be found on the department's website <<http://www.legislation.nsw.gov.au/viewtop/inforce/act+103+2003+FIRST+0+N/>>.

Any clearing authorised under the *Noxious Weeds Act 1993* is excluded from the operation of the Native Vegetation Act. Clearing of non-native environmental weeds is covered by the Native Vegetation Act only if the weeds are on state-protected land, where all vegetation, native or non-native, is covered by the Act. As a result, any proposal for control of environmental weeds on state-protected land requires an application to be made to the Department of Infrastructure, Planning and Natural Resources.

The Northern Rivers Rural Buying Service has developed a useful guide to woody weed control (see <<http://www.nrrbs.com.au/chemicalwoodyweedcontrol.htm>>). Although it largely focuses on chemical management, some strategies are worth the organic producer's attention:

- Prevention is better than control.
- Replace woody weeds with

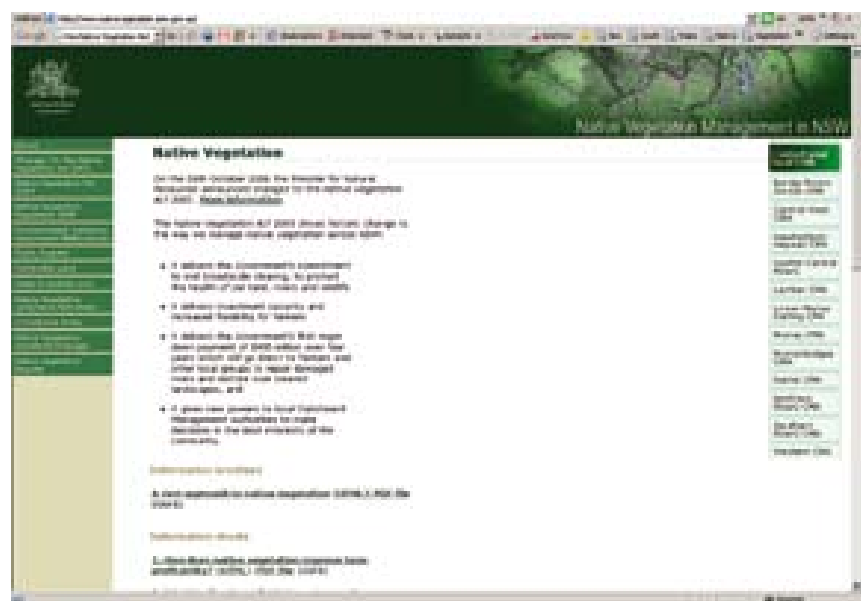
competitive pasture species.

- Clean up small scattered areas first.
- Treat edges of large areas to prevent spread.
- Focus on productive land first.
- Improve fencing as necessary, to enable proper grazing and fire management.
- Is the infestation toxic to stock or could it harbour vermin?
- Does the infestation threaten other parts of the property or neighbouring land?

Locate the target, develop a program, develop a solution, create a financial plan, and mark your planned activities on a calendar. A three-cycle plan: *Treat—Follow up—Check*, allows you to plan your attack on woody weeds over three or more seasons. Infestations should be treated, results of the treatment should be monitored, and any follow-up treatment for missed weeds should be carried out. It is important to regularly check for re-infestations.

Management options

An integrated approach to woody weed management is essential. Within any program or plan, it is recommended that options such as



Native Vegetation Management in NSW online at <http://www.nativevegetation.nsw.gov.au/>

burning, biological control, chemical and mechanical methods be integrated. Sustainable management practices can manage the problem with the flexibility required for the variable rangeland environment. A case study of agricultural production in rangelands (Gracie n.d.) found that this technique was the best available for combating woody weed invasion. Care should always be taken when applying burning, biological and chemical control methods.

Burning

In parts of New South Wales management burning can be both economically viable and an ecologically acceptable method of controlling woody weeds (Date and Murphy 1990). There are two roles for burning in scrub: first, immediate benefits may result from the burning of areas infested with mature shrubs; second, shrubs may be eliminated if burning is conducted in open areas soon after infestation.

The Northern Territory Department of Primary Industries (http://www.nt.gov.au/dpifm/Primary_Industry/) offers suggestions for successfully controlling woody weeds with fire (see Box 3).

Biological control

Grazing goats and some 'browsing' sheep species such as the Dorper on pest species is a viable option for controlling woody weed outbreaks. Many rangeland graziers are combining goat meat production with woody weed management.

The effectiveness of goats depends on the palatability of the target weed (Date and Murphy 1990). Goats do not need to be stocked at high rates in order to control the target species. In western New South Wales they have been used for limited control of weed species such as *Dodonaea attenuata*



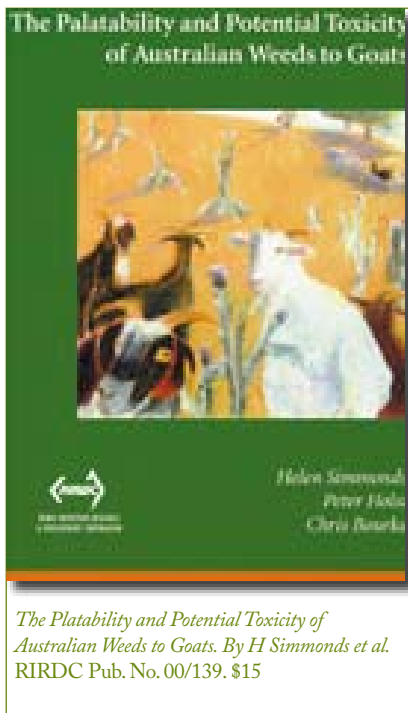
The Northern Rivers Rural Buying Service has developed a useful guide to woody weed control (see <<http://www.nrrbs.com.au/chemicalwoodyweedcontrol.htm>>)

BOX 3

The Northern Territory Department of Primary Industries offers the following suggestions for successfully controlling woody weeds with fire.

1. *Burn early. Seedlings are most easily killed by fire. Established trees and shrubs (apart from mulga) are harder to kill.*
2. *There must be sufficient pasture accumulation as fuel. De-stocking country following rain will assist pasture to accumulate as fuel.*
3. *Dry grasses and spinifex provide the best fuel. The Aristida species (kerosene grass, mulga grass, wire grass) burn particularly well. Herbage species generally have low flammability—even when dry.*
4. *Use a fire of the required intensity. Cool to moderately intense fires will thin young mulga without killing all adult trees. Hotter fires are needed to control witchetty bush and broombush. Fire of increasing intensity is required as the fuel supply becomes limiting or patchily dispersed. Hot fires offer the only chance of moving into adjacent dense scrub that has inadequate fuel accumulation.*
5. *Use favourable weather conditions to maximise the result from available fuel levels. Temperature, wind speed and direction, and humidity must be right for the fire to carry at the required velocity and intensity.*
6. *If a fire will not carry on areas that appear to have adequate fuel, try again on a hotter, drier or windier day. Do not persist with a low-intensity fire that consumes the available pasture but kills very few shrubs.*
7. *Consult with the Rural Fire Authority regarding fuel and weather conditions prior to burning.*
8. *Their advice must always be followed—particularly at times of high fire danger.*

Post-fire pasture management. Low stocking rates, to enable the re-establishment of a vigorous pasture, will assist in woody weed control. Dense, vigorous perennial grasses compete strongly against seedlings of woody weeds. Follow-up fires may be required at 5 to 10 year intervals in some areas for control of woody weeds. The rate at which shrubs re-establish will be largely determined by subsequent rainfall.



and *Acacia aneura* (NSW Soil Conservation Service n.d.). The long-term effects of goats and browsing sheep on the environment are still largely unknown, so areas containing goats or sheep must be securely fenced and populations and their impacts constantly monitored.

Successful control using grazing animals depends on good fencing and a good pasture use and development plan. There are four keys to good pasture management:

- good fences
- rotational grazing
- enough animals to defoliate woody weeds in the spring without overgrazing grasses
- maintenance of pasture fertility to improve grass cover and minimise soil erosion as woody weeds decrease.

Insects and fungi are other biological agents that have been used for effective weed control.

Mechanical methods

Mechanical methods involve the use of machinery and include ripping, chaining, pushing, rolling and blade ploughing (Date and Murphy 1990). These are by far the

most expensive methods for treating a weed problem and might have only a limited effect in clearing large areas of plants. It is possible to use mechanical controls at any stage of the weeds' life cycle. Shallow tillage is recommended, so that weeds are not buried to later regrow (Stinner and Blair 1990). Excessive soil disturbance can lead to increased seedling establishment, which will necessitate expensive and avoidable secondary treatment (see also Bastin et al. 1998).

Chemicals

Organic farmers might choose to exclude an area infested with woody weeds from certification so that they can treat it chemically. Following treatment—and provided no follow-up chemical treatment is necessary and chemical residues are not present—the area may undergo organic conversion. Treated areas should be fenced off to exclude organic stock.

Herbicides are best used in the early stages of weed growth, when shrubs are small and densities are low (NSW Soil Conservation Service n.d.). Because of the high cost of herbicide application per shrub, this method is preferred mainly for selective use. As a result, herbicides are most commonly used around infrastructure such as fence lines and dams (Date and Murphy 1990). Care must be taken to avoid contaminating water sources. Herbicides are suitable for treating widely scattered shrubs or isolated close stands or for containing actively encroaching weed populations (NSW Soil Conservation Service n.d.).

Sustainable management

If stocking rates are matched with the rate of feed regeneration a good stand of pasture with limited weed growth can be maintained (Date and Murphy 1990). This method focuses on maximising

profit per head of stock rather than maximising stock numbers—an important principal of sustainable grazing. Research and development efforts in the past 30 years have yielded a set of recommendations for sustainable pasture management that are widely recognised by members of the pastoral community as well as by others:

- light stocking levels calculated to harvest the most productive perennial vegetation without permanently reducing its abundance
- stocking levels adjusted so as to track the available forage closely and carefully
- delaying restocking after drought until perennial vegetation has had the opportunity to re-establish.

Crop rotation can also help limit weed infestation. It can break the plant life cycle, thus controlling weed numbers. Rotation of both summer and winter crops is also useful in that it facilitates control of both summer and winter weeds (Francis and Clegg 1990). Further, the allelopathic properties of certain crops can be used to counter weeds.

2.5.5 Financial incentives for weed and feral animal management

The NSW Farmers website <<http://www.nswfarmers.org.au/nht/incentfarwest.pdf>> lists incentive schemes for producers in the far west of the state. WEST 2000 Plus offers financial incentives for woody weed control by means of a number of measures that lead to the establishment of perennial grass pastures. The grants must be matched dollar for dollar by the applicant. They have been keenly sought: 282 landholders have matched the \$1 million

received from the program with \$1.25 million of their own funds to make 120 000 hectares 'woody weed free'. The most popular means of control were raking, blade ploughing and chemical use, with much of the work targeted at areas of properties where improved access is required for stock mustering and handling—in holding paddocks, for example.

A random sample of successful WEST 2000 Plus applications for assistance with woody weed control, as well as three demonstration activities, were used in the benefit–cost analysis in Table 2.1. The findings of these investigations confirm the value of keeping areas 'open', as compared with removing woody weeds from areas of dense infestation.

Where asking prices for grazing land are about \$30 a hectare, the data show that some control activities are costing more than the value of the land and presumably are over-valuing the long-term productive value of the land.

Table 2.1 Benefit–cost ratios for woody weed control activity: WEST 2000 Plus

Activity	Total cost (\$)	Area (ha)	\$/ha	Benefit–cost ratio
Blade ploughing and chemicals	14 400	259	56	0.28a
Crocodiling, raking firebreaks	7 640	162	47	0.34a
Chemicals	13 944	400	35	0.46a
Chaining	12 830	990	13	1.23a
Large-scale demonstration burn and improved TGP management	5 000	800	6	0.77b
Management burn	5 000	1000	5	0.96b
Chemicals and chipping	10 000	3000	3	1.44b
Management burn (different sites)	1 200	400	3	1.60b
Chemicals—selected application	7 736	4049	2	2.40b
Large-scale demonstration burn and improved TGP management—Coolabah	3 000	2000	1.5	3.21b
Management burn—Louth	5 000	5000	1	4.81b

a. Based on net present value of returns for clearing severely infested land—\$15.95 per hectare.

b. Based on net present value of returns for retaining land as 'open'—\$4.81 per hectare.

Note: TGP denotes 'total grazing pressure'.



Demonstrating steam weeding at a Yanco organic demonstration site. (NSW DPI 2000)

3. Gaining organic certification

Conversion to organic farming is a dynamic process: it involves conceptualising, then action and observation, and finally reflection and refinement. It is a cyclical and continuous process. Figure 3.1 illustrates the concept.

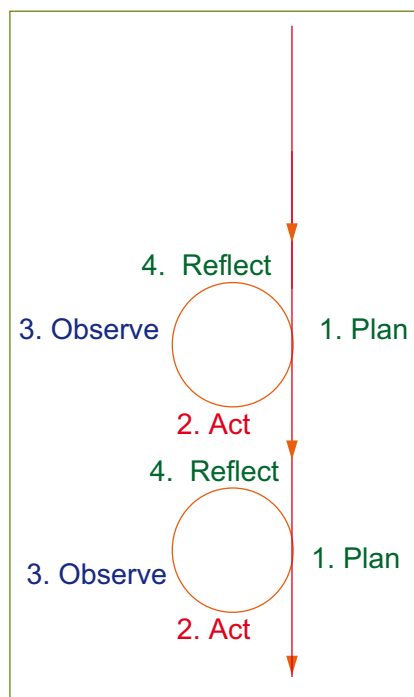


Figure 3.1 An action learning model. Source: Kolb (1984)

Observation and reflection are particularly important because organic systems are, by their nature, holistic. A change to one component of the system will affect other components. Monitoring and recording the consequences of implementing a change are crucial to success.

Planning is an essential requirement of any business—not least an organic enterprise. To put it simply, if there is no planning the venture will almost undoubtedly fail.

3.1 A self-assessment test

Organic conversion starts with personal conversion—for you

and your thinking. You must be committed to strictly following organic principles, yet be flexible enough to work with the ever-changing face of nature. Information is not readily available through conventional sources, so be prepared to spend many hours researching and testing new techniques. The self-assessment test shown in Figure 3.2 is designed to help aspiring organic farmers decide how far along the conversion pathway they are.

3.2 Beginning the conversion

John Melville, from Bioterm Consulting Pty Ltd, has a message for aspiring organic farmers: ‘A problem is a positive opportunity for development’. This is how the farm conversion process should be considered; failures should not be seen as problems but rather as a way of moving forward and developing and improving your organic system step by step.

Conversion begins by making small changes that will have the biggest impact on the farming system. It is best to change small aspects of management that can be implemented without excessive cost or loss of crop yield or quality. Avoid trying to change to total organic management immediately.

Changes to soil fertility and soil management should be considered early in the process. This will involve conducting soil analyses, determining how to substitute non-organic fertiliser inputs with organic inputs and crop rotation practices (for example, green manuring) and assessing current cultivation practices. Locating organic inputs can be time-consuming and costly;

some certification organisations do, however, provide a database of suppliers of certified organic inputs. Livestock can play an important role in the future soil fertility program, so it is also necessary to investigate how stock can be managed organically.

Paying increased attention to pest monitoring and determining ways of reducing pesticide applications form another area that should receive high priority during the early stages of conversion. It is worth considering employing a crop-check consultant to help with pest and predator identification and the development of strategies to predict and manage pest incursions.

Noxious weeds and other difficult-to-control weeds (such as perennials or weeds with rhizomes) should be targeted before organic practices are introduced. It is important to remember, though, that weeds are commonly an indication of a soil fertility imbalance or a structural problem in the soil: these problems must be remedied if their recurrence is to be prevented.

The first stage in the planning process involves information collection. Armed with as much information as possible, a farmer will be in a better position to make informed decisions and plan the conversion strategy. Information can be obtained from a variety of sources:

- successful organic (and conventional) farmers
- extension and research staff employed by government departments
- state organic organisations and the Organic Federation of Australia

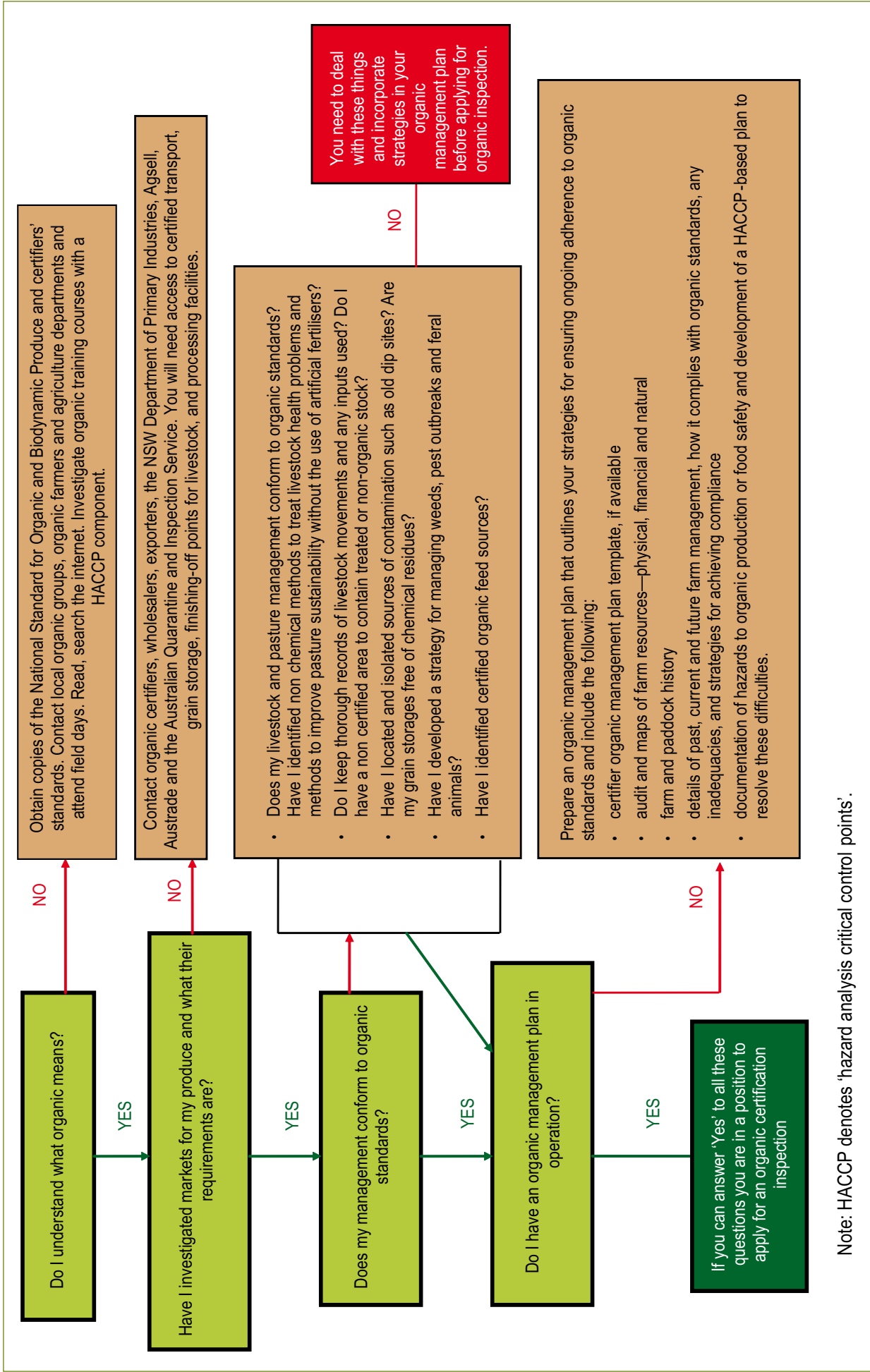


Figure 3.2 How far away am I from being ready to apply for organic certification?

- certification organisations
- organic consultants
- organic (and conventional) producer groups
- books and other publications
- crop and market forecasts
- organic wholesalers, retailers and exporters
- short courses and workshops—for example, the Tactical Grazing Management course run by the NSW Department of Primary Industries
- agricultural research and development organisations—for example, the Rural Industries Research and Development Corporation
- the internet
- universities, agriculture colleges and TAFE colleges—especially their libraries
- organic (and conventional) farmers' newsletters—for example, the *Western Division Newsletter* and journals and papers such as *Acres Australia*
- field days, agricultural trade shows, conferences and workshops.

This list is by no means conclusive, but it offers a good starting point.

When seeking information, people planning to convert to organics should not limit themselves to 'organic' networks. Much of the information available to conventional farmers is equally relevant to organic practitioners (and vice versa), particularly as conventional agriculture investigates ways of reducing reliance on chemicals.

Important information to have is a copy of the organic production standards. Each certifier has its own standard, which is available on-request. Some certifiers' standards are on their website. The standard adopted will depend on the certifying organisation. The certifiers' standards are based on the

National Standard for Organic and Biodynamic Produce, which sets out the minimum requirements for production, processing and labelling of organic produce. The Australian Quarantine and Inspection Service administers the national standard and audits each approved certifying organisation to ensure it complies with the requirements of the national standard, the Export Control (Organic Produce Certification) Orders 1997 and importing countries' requirements. The national standard can be viewed on the AQIS website <www.aqis.gov.au/organic>.

3.3 Conversion and certification

'Conversion' refers to the physical and biological changes the farmer and the farming system must make in order to comply with organic standards. 'Certification' refers to the formal process of assessment designed to lead to accreditation of the farming system as compliant with organic standards. Before going down the conversion path, farmers should ask themselves the questions posed in Figure 3.2.

3.3.1 Conversion planning

Converting to organic farming is not a short-term project, and there are no fixed methods for doing it. Each farm unit is a unique system, and successful conversion requires careful assessment of the resources available and the interactions between components of the system.

A degraded resource base and economic pressures resulting from previous land use can constitute the biggest constraints to successful conversion, and more specialised and intensive farms will generally take longer to convert. These systems require more time and effort to reintroduce diversity. The conversion process calls for a high



level of commitment and often entails financial risk. Furthermore, there is little in the way of detailed information and advice about how to embark on the venture.

Basically, the conversion process begins with personal conversion—attitude and approach. It is then important to develop a planning framework. Often called an 'organic management plan', the framework accommodates changes in production methods and the potential financial consequences and outlines strategies for continued adherence to organic standards. It should also set out the steps to be followed during conversion and a time scale over which the conversion will occur. Preparation of such a plan is an essential pre-certification activity.

3.3.2 Developing an organic management plan

When developing an organic management plan, the following

questions should be borne in mind:

- *How much, and over what time frame, will I convert?* It is a good idea to initially use only part of the farm to trial organic methods. A drawback is, however, that this might not allow for suitable rotations or provide the scale required for necessary adjustments in techniques and machinery. On the other hand, converting only part of the farm might allow for better financial stability if yields become depressed. Perhaps, too, it is worth trying organic production of just one commodity grown on the farm, although this could entail more work—for example, segregating organic and conventional produce. Under organic standards, the growing of organic and conventional produce on the same farm is referred to as ‘parallel production’. The standards prohibit production of the same crops (or livestock) organically and non-organically on the same farm where the crop (or livestock) products are not visibly different. For example, it is not permitted to grow an organic crop of Rosella wheat and a conventional crop of Janz wheat on the same farm, but it is permitted to grow organic Rosella and conventional oats, provided all sources of contamination have been considered.
- *What are the potential sources of contamination and how will I overcome them?* Organic standards require that the producers implement a process for documenting and monitoring the potential for contamination from substances and practices that are not permitted and that strategies be introduced to avoid these risks. A system similar to HACCP—

hazard analysis critical control points—should be considered. Any risk assessment requires asking, at each point in the production process, four further questions:

- What are the potential sources of contamination during the production, harvesting, storage, transporting and processing of the crop or livestock?
- Which of these contamination risks is significant and likely to occur if not properly managed?
- What must be done to keep these risks at an acceptable level?
- What records or evidence will I need to demonstrate that I have controlled the hazard?

If parallel production is practised then harvesting, sowing, transport and processing equipment must be thoroughly cleaned before organic produce is handled. Storages for organic and conventional produce must be separate, and there must be a strong system of traceability. Additionally, external sources of contamination—such as over-spray from adjoining properties and contamination of watercourses running through the organic land—should be identified. The use and sources of external inputs such as seed, fertiliser and livestock feed, even if they are organic, must also be recorded.

- *What rotations should I implement?* When making decisions about rotations, it is important to consider the implications of each crop for subsequent crops in the rotation. The potential for pests and diseases, weed management, fertility management and livestock requirements must

also be taken into account and be balanced against what will be profitable for the farming business. Production decisions must be viewed against the goal of optimising the economic return. Rotations must be flexible, too. One organic producer has said he would select a crop for a rotation only if it offered at least three benefits—for example, an economic return, soil structure (or nutrition) improvement, and a pest and disease break (Whittacker, pers. comm., November 1997).

- *Is my farm layout suitable?* Now is the time to consider the appropriateness of the farm’s layout and how it will facilitate organic conversion. Paddock size, fencing, irrigation layout, the location of watercourses and wetlands, the presence of windbreaks, topography and soil types are all relevant.
- *Do I have suitable equipment and farm structures?* Conversion to organic management could necessitate modification or replacement of existing farm equipment and structures. Specialised sowing and weed management equipment might be needed; sealed storages might have to be built to allow for carbon dioxide disinfestation of produce; refrigeration units could be required to control post-harvest insect pests and diseases.
- *Do I have a recording and monitoring system?* Keeping records of crop production, cropping history, soil tests, livestock movements, pest and disease management and crop sales will facilitate monitoring of the impact of management practices and the changes that have occurred during conversion. Certifiers will ask for some information—such as details of

crop yields and sales—as part of the certification contract.

- *What financial factors should be considered?* The capital investment required for changes must be taken into account; this could include, for example, livestock housing, machinery, storage facilities such as coolrooms, and facilities for processing, packaging and marketing of produce. A viable marketing strategy should be established before proceeding with the organic management plan. Marketing options—including the availability of markets, the premiums offered (generally none for in-conversion produce) and marketing alliances—and value-adding potential all need to be assessed.
- *How do I start?* Start slowly. Gain experience with new crops and techniques and the potential output of the system. Start with a couple of paddocks entering the rotation for a couple of seasons. Then other paddocks can be brought in and the original paddocks can progress to later stages of the rotation. In this way the original paddocks are always a couple of years ahead, and mistakes learnt will not be repeated. Most importantly, record observations and redesign the conversion plan each year to take into account experiences with each paddock.

3.3.3 Additional considerations for rangeland livestock producers

Some specific considerations apply to rangeland livestock producers who are converting the farm to organic production. In general, they concern the management of livestock and of pests and weeds.

- *Livestock mix and breeds.* Is my

livestock mix appropriate? Are there markets for my products? Are the breeds the most suitable for meeting the objectives of organic production—for example, more resistant to pests? Do I allow for the natural behaviour of livestock, such as natural breeding techniques and appropriate weaning times (three months for calves and nine weeks for lambs)? Are all my livestock clearly tagged for easy tracing?

- *Grazing management.* Is grazing management conducted in such a way as to preserve the health of the livestock as well as the ecological aspects of the property? Has the carrying capacity of the grazing units been assessed? Are the stocking rates appropriate? Do I have in operation a monitoring system that can verify sustainable grazing practices? Does the carrying capacity of the grazing units take into account seasonal variability and the long-term sustainability of the region? Are the paddock sizes appropriate? Can I provide at least 50 per cent of my livestock's feed requirements from my farm? Do I have access to a certified source of supplementary feeding? Do I have an area of the farm set aside in which to quarantine non-organic livestock or livestock that have been treated with a prohibited substance? Am I aware of the organic standards for drought feeding?
- *Livestock health.* What products and practices am I currently using to manage pests and diseases of my livestock? Are these compatible with organic standards? If not, what management practices must I adopt so that I comply with organic standards yet retain the health of my livestock?
- *Livestock holding yards and*

shearing sheds. Are stockyards and shearing sheds free of chemical residues? Are they designed to minimise bruising and trauma to livestock? Are old dip sites and other areas of potential contamination securely fenced off from livestock?

- *Livestock transport.* Do transport times for stock—that is, how long stock travel in any single stretch—comply with the certifier's standards? Is the livestock transporter willing to ensure that organic stock are segregated from non-organic stock and that transport equipment, trailers and loading systems are designed to minimise stock stress and are cleaned before loading certified stock?
- *Commons and stock routes.* Do commons or stock routes exist within my holding? If so, can I exclude my organic stock from these areas when non-organic stock are travelling through? Can I gain approval from the Rural Lands Protection Board to have these areas narrowed down and fenced off?
- *Noxious and woody weed management.* Can I manage my woody weeds in accordance with the certifier's requirements? Have I used residual chemicals (such as Velpar®) to control woody weeds and, if so, can I satisfactorily exclude these areas from surrounding certified areas. What other permissible management techniques can I introduce?
- *Feral animals.* Do my current control methods for feral animals comply with the certifier's standards? For example, if I use 1080 (sodium monofluoroacetate) baits are they buried, marked, mapped and routinely checked and are the unused baits retrieved? What other methods are approved?

- *Regulatory requirements.* What options do I have if a plague locust outbreak is declared on my property?

Once questions such as these have been considered and an organic conversion strategy has been planned and implemented, the system should be ready for formal certification.

3.3.4 Certification

The certification process involves having the farm and the farming methods examined in order to confirm that they meet the certifier's standards for organic farming. The certifier's standards cover all the requirements of the National Standard for Organic and Biodynamic Produce. Since January 1993 exports of organic produce have been required to meet the national standard, which sets out the minimum requirements for production, processing and labelling of organic produce and requires that all exporters, as well as producers and processors, be certified with an accredited industry organisation.

As noted, as of July 1, 2007 eight organisations are accredited by the Australian Quarantine and Inspection Service to inspect and certify organic producers. (They are listed, along with their contact details, at the beginning of Appendix A.) Each certifier has standards that must be complied with in order to meet the requirements of the national standard. In the Western Division of New South Wales, Organics for Rural Australia, or ORA, is providing a service to producers to facilitate conversion to and certification of organic status.

Certification ensures the integrity of the organic product 'from paddock to plate', providing a guarantee to consumers. It also protects the interests of genuine organic producers in maintaining

and increasing their market share. Trade Practices Law imposes severe penalties for passing off non-organic produce as organic.

There appears to be considerable potential for exporting Australian organic produce. Producers and exporters need to be aware that a certification program must cover any treatment, preparation and packaging of the organic product before export. All exporters must be approved for this purpose. Domestically, the market for organic produce has expanded. Consumers now recognise a certified organic product as their best guarantee that the product was in fact produced using organic practices. This is particularly important to consumers with health concerns. Organic retailers and wholesalers generally will not buy uncertified produce.

Levels in the certification process

Full certification is generally granted following three consecutive years of organic management. Producers must be involved in an accredited organic inspection system for a minimum of 12 months before receiving any certification level. The 12-month pre-certification period does not begin until a farmer has made a formal application to the certifier and has submitted a statutory declaration and responses to a farm questionnaire. Some certifiers' standards refer to 'pre-certification' (also known as 'pre-conversion'), 'in conversion' and 'organic' levels. Organic standards must be adhered to at all three levels, each level usually being a reflection of the amount of time or the degree to which an organic system has been implemented. Adherence to the 'in-conversion' and 'organic' phases entitles farmers to market and label their product accordingly. No label is issued during 'pre-certification'. Figure 3.3 shows the steps in the certification process.

If the decision is made to proceed with certification, a completed application form, along with the required fee, should be sent to the certifying organisation. The certifier then asks for the completed statutory declaration and questionnaire describing the products for which certification is sought and the management practices currently used on the farm.

Inspection

Once the application has been made and the certifier determines that an organic system is possible—based on the information provided in the statutory declaration and questionnaire responses—an inspector contacts the applicant to arrange an inspection time.

The inspection usually takes two to four hours but can take longer, especially on larger properties. The inspector goes through the application and statutory declaration with the farmer and asks questions. Farmer and inspector together examine the farm, the machinery and the livestock. The inspector might take soil or product samples to test for chemical residues; problem areas could be old dip sites, stock holding areas and grain storages.

The inspector then makes an overall assessment of the property and its management. A certification review committee considers the inspector's report and recommendation. The farmer might be asked for more information, or further inspections and tests for chemical residues might be called for. If successful, the farm will be approved for pre-certification, the phase that demonstrates to the certifier the farmer's ability to manage the enterprise organically.

Following pre-certification, another inspection takes place, and if the requirements of the organic standard are met a certificate of certification is granted. The

farmer is then required to enter into a licensing agreement with the certifier. From application to certification takes 12 months. This stage is commonly referred to as the 'in-conversion' level. A further

two years' in conversion is generally required before full organic status is granted by the certifier.

Once a farm is certified, it will be re-inspected each year. Unscheduled

inspections are also carried out as part of the certifier's obligation to meet the Australian Quarantine and Inspection Service requirements.

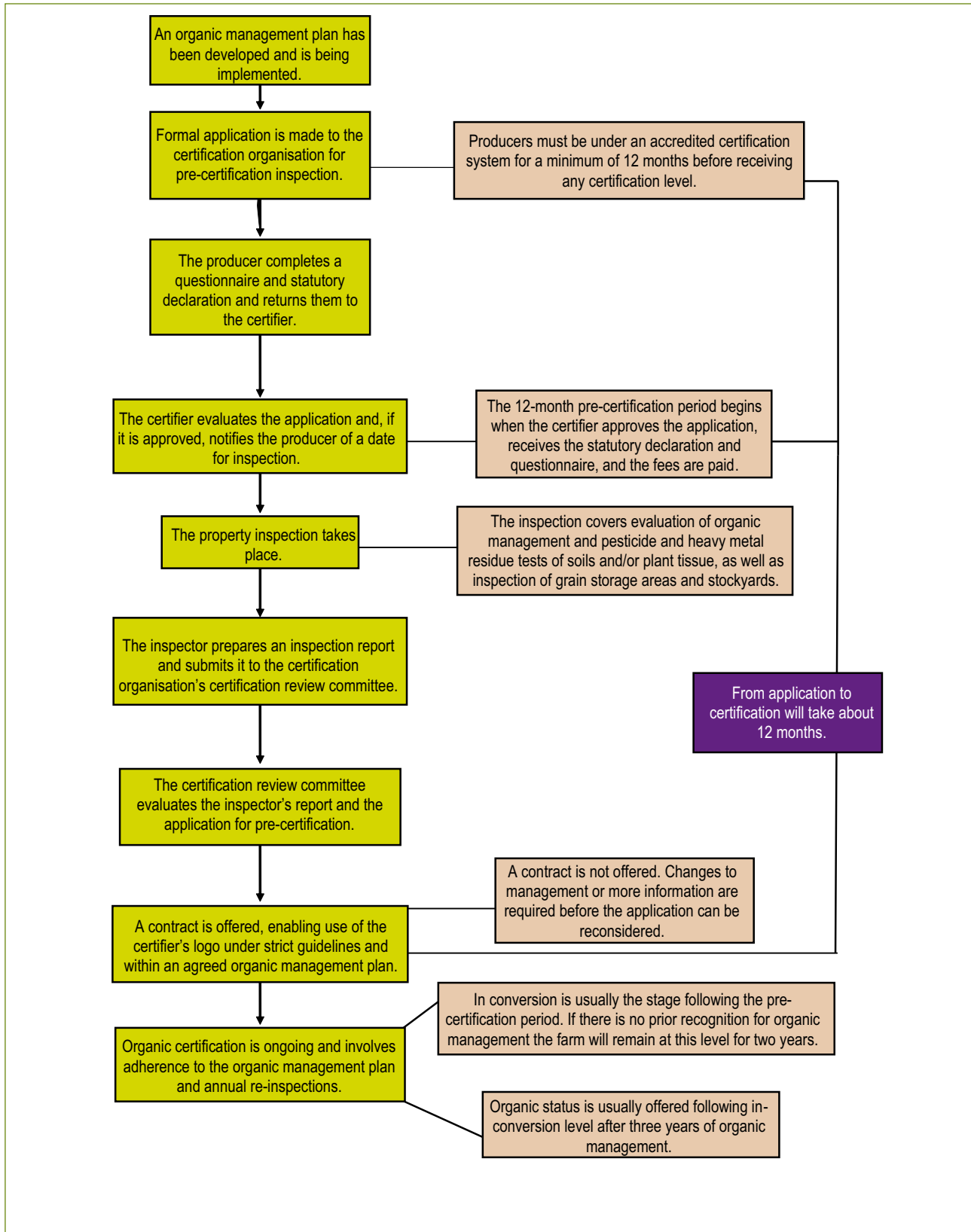


Figure 3.3 The certification process

The cost of certification

The cost of certification

A number of fees are associated with becoming certified. The amount and type of fees imposed can depend on the certification organisation and on the sales turnover of the producer. In general, however, around \$1300 should be allowed during the pre-certification period for the application fee, inspections (2 during pre-certification), and soil and produce residue tests.

Once certified for label use, on-going annual fees are payable which includes the costs associated with annual reinspection. These are generally around \$600. In addition, some certifiers place a levy (around 1%) on gross sale of organic produce when sales exceed a minimum amount.

Additional fees may be payable under certain circumstances such as

for fast tracking applications, adding new acreage and / or new products, and for residue testing.

Some certifiers offer a scheme for small growers, where local producer groups can apply for certification at a reduced rate. The typical fee per producer is around \$800 pre-certification, with annual fees of around \$400 once label use is approved.

Some certifiers also employ multi-skilled auditors, who can carry out other audits such as HACCP (hazard analysis critical control points) for clients.

How to stay certified

To comply with and retain organic accreditation, farmers must uphold the national standard. Any breach of the standard—such as use of a prohibited substance—will result in temporary or, for continued non-compliance, permanent de-certification. Under the national

standard inputs such as fertilisers and substances for pest and disease control are classified as ‘permitted’, ‘restricted’, or ‘non-allowable’.

Regardless of the type of input, its use must be recorded in the farm diary. If for any reason a non-allowable input is used, this use must be recorded and the certifier notified immediately. Only after the certifier is satisfied that organic management has been re-applied will it be possible to sell the produce in question as organic.

Continuing certification calls for good record-keeping. During inspections the inspector will want to see these records. This helps verify that management has been in accordance with the standard. Although it is not compulsory, adoption of a system for monitoring risk—such as HACCP—is recommended.



Field days highlight research findings and enable organic farmers to gather new information. Organic spelt field day at NSW DPI's Organic Research Site, Yanco.

4. Livestock production: how to meet organic standards

Rangeland producers considering organic livestock production should first determine whether their current stock meet the requirements of an organic system. Among the important considerations are the breed's market and environmental suitability and its resilience to pests and diseases.

4.1 Potential sheep breeds for organic production

[The author of this section is Geoff Duddy, Livestock Research Officer, Sheep, NSW Agriculture. The information is from a paper, 'New and introduced sheep breeds in Australia', presented to the Organic Rangeland Livestock Production Workshop in Hay on 3 September 2002. The paper is available from the Austrade website <<http://www.austrade.gov.au>>.]

In Australia the majority of organically certified land is found in rangeland regions, where livestock production has generally been limited to beef and wool. Organic lamb and sheep meat in these areas has generally been a by-product of the wool enterprise.

Now, however, several sheep breeds recently introduced into Australia offer traditional wool enterprises an opportunity to diversify into specialised organic lamb and sheep meat production previously restricted to less marginal areas. Many of the breeds will allow producers to focus on the ever-growing domestic lamb and sheep meat markets.

Many of the breeds have the following characteristics in common:

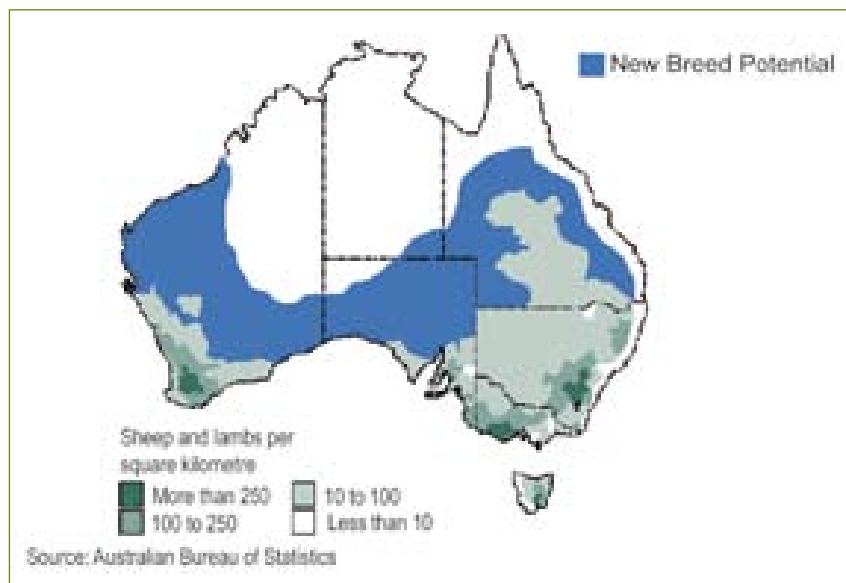


Figure 4.1 Sheep and lamb production in Australia: current and potential Source: Duddy (2002).

- hair (as opposed to wool) and a long or broad, fat tail or rump
- very hardy, non-selective grazers able to withstand extreme environmental conditions
- fat stored in the tail, being drawn on in times of nutritional and/or physiological stress
- strong maternal and flocking instincts, ensuring high levels of lamb survival
- sexually active at a young age
- ability to join year round
- woollen undercoats that are shed during warmer months
- no need for shearing, crutching, mulesing or docking
- reportedly high internal (worm) and external (fly, lice) parasite tolerance or resistance.

Coloured fibres, hair, kemp and medullated fibres in these breeds are of some concern to the Australian wool industry because of contamination fears. Management programs are being developed and implemented nationally to minimise the contamination risk.

The hardiness and low-input nature of the exotic breeds should allow rangeland producers to expand their enterprise mix and improve profitability through diversification. The ability of many of the breeds to tolerate difficult nutritional and environmental conditions might also enable expansion of sheep meat production systems beyond the regions currently grazed, as shown in Figure 4.1.

Breeds such as the dorper offer the opportunity to produce prime lamb in marginal areas and the ability to service traditional sheep meat markets. Most major Australian cities have Muslim populations that are interested in obtaining traditional meats, so the opportunities for domestic carcass sales are strong. Fat-tail breeds have the potential to further develop and supply halal as well as kosher and organic markets (or a combination of these) domestically and abroad.

If domestic and export markets are to develop, the industry must as a

priority develop and implement production and processing quality assurance programs. Year-round supply (and availability during peak demand periods) and quality assurance from production through to retail are essential if the customer base is to be retained and expanded. Producer-based cooperatives and alliances will be an important factor in the success of domestic and export sales.

Following is a review of lamb and sheep market potential, accompanied by recommendations in relation to use of the new breeds.

4.1.1 Afrikaner



The Afrikaner is a South African breed; its embryos were imported into Western Australia and South Australia in 1998. The breed is one of the oldest and larger framed in South Africa. Initially selected for production of skin blankets and as a dual-purpose animal for marginal and arid regions in South Africa, the Afrikaner was used in the development of the karakul, dorper and Van Rooy.

Purebred characteristics

- This breed is characterised by a shiny, white, kemp-free fleece that is shed annually. The hair is soft and pliable (not brittle), unlike that of other fat-tail breeds.
- The breed is well adapted to desert conditions and can survive extended periods without water if succulent plants are available.
- The tail consists of a 'fat reservoir' upper section and two smaller lower sections that form an S-shaped tip that finishes just

above the hocks.

- The fat stored in the tail is drawn on in times of nutritional and/or physiological stress.
- Long, strong legs, closely set hocks and an oval respiratory tract allow the Afrikaner to cover long distances in search of grazing and water.

F1 and above crosses suit the live sheep and export carcass trades. F1 merino crosses might require shearing and crutching.

To date there has not been widespread release of Afrikaner genetics. Upgrading and cross-breeding with merino ewes and several of the other fat-tail breeds is under way.

4.1.2 Awassi



The awassi is the most recognised and widely distributed breed of fat-tail sheep in the world, highly valued for meat, milk and carpet wool production. Awassis were imported into Western Australia in 1985 and into New South Wales in 1995.

Purebred characteristics

- The awassi is a large-framed breed with a broad, relatively short tail.
- The animal has a double-coated fleece containing a high proportion of medullated fibres—fleeces commonly contain hair, wool and kemp—suited to the carpet wool industry.
- They do not shed seasonally, so must be shorn.
- They are recognised as one of the best dairy breeds in the world, producing on average 1.75 litres

of milk a day over a 200-day lactation.

- A calm, easy-care, hardy breed, the awassi is well suited to pastoral and arid environments.

F1 and above crosses suit the live sheep and export carcass trades. F1 merino crosses might require shearing and crutching.

Under contract mating agreements, the breed has been used in Western Australia for live sheep export. Until recently it was also used in a commercial sheep-milking enterprise in New South Wales. To date, however, the breed has not been openly released to industry.

4.1.3 Damara



The damara is an extremely hardy fat-tailed sheep introduced (with embryos and semen) into Western Australia in 1996 from South Africa. It is easy to care for and requires only minimal management, factors that have led to a rapid increase in damara numbers in Australia.

Purebred characteristics

- Damaras have a short, hairy coat with a dense undercoat of fine wool fibres that are shed annually. Coat colours vary from white to brown, black and white roan, often with black spots.
- An exceptionally hardy breed, the damara can survive and produce under pastoral to arid conditions. Long legs and a short, trotting gait allow the breed to travel long distances in search of feed and water.
- A prominent roman nose, a dewlap, and a tail tapering to

a thin end below the hock are characteristic of the breed. A well-developed 'cushion' of fat behind the head is thought to aid with heat tolerance.

- This is a fertile breed, with up to 100 per cent lambing in semi-arid conditions.

F1 and above crosses suit the live sheep and export carcass trades. F1 merino crosses might require shearing and crutching.

4.1.4 Karakul



The karakul is one of the world's oldest breeds and possibly one of the first breeds domesticated. A hardy carpet-wool breed, karakuls were originally bred for the value of the 1- to 3-day-old lamb pelt (astrakhan), a patterned, silky pelt of exceptional quality. In Australia, frozen embryos were initially imported during the 1980s, in a joint University of New South Wales – Elders venture. Fares Rural, in Western Australia, has continued to increase stock numbers through contract matings in that state and, recently, in South Australia. To date, there has been no release of genetics to the industry, other than through contract matings.

Purebred characteristics

- Karakuls are medium-sized sheep with a long, narrow body, sloping rump and low-set, broad tail with an S-shaped base.
- The fleece is usually black, but red, brown, grey and white variants occur.
- Purebred lambs are usually born coal black with lustrous, wavy

curls and their face, ears and legs covered in sleek hair. With age, the fleece turns brownish or a bluish grey.

- Karakuls do not seasonally shed, so must be shorn.
- They are excellent foragers, able to survive under harsh feed conditions and able to withstand extremes of hot and cold.

F1 and above crosses suit the live sheep and export carcass trades.

To date, there has been no release of genetics to the industry, other than through contract matings.

4.1.5 Van Rooy



A 'synthetic' breed, the Van Rooy has been used in the development of several South African breeds, including the white dorper. Van Rooy embryos were imported into South Australia in 1998.

Purebred characteristics

- Van Rooy sheep are a white-haired breed with a broad, firm, oval tail.
- Being hardy and suited to pastoral and arid regions, the Van Rooy is covered in strong, calcareous hair and a short woollen undercoat.
- Rams are polled or scurred; ewes are generally polled; both males and females have long, broad ears.
- They are excellent foragers, with a strong constitution and good maternal instincts.

Upgrading and cross-breeding with merino ewes and several of the other fat-tail breeds is under way.

F1 and above crosses suit the live sheep and export carcass trades. F1 merino crosses might require shearing and crutching.

4.1.6 Dorper



The dorper—a South African mutton breed developed through crossing of Dorset horn rams and black-head Persian ewes (a shedding, fat-rump, hair breed)—is increasing in popularity as a sheep breed suitable for organic meat production. Selection over time led to the development of the black dorper (black head, white body) and the white dorper (white). The Van Rooy has also been used to improve conformation and maintain white points in the white dorper. Both types are collectively known as the dorper.

Dorper embryos were imported into Western Australia in 1996. The breed has since expanded into most mainland states.

Purebred characteristics

- Dorpers are characterised by a short, loose covering of hair and wool.
- A shedding breed, they require little, if any, shearing or crutching and have reduced susceptibility to fly strike.
- Dorpers are non-selective, eating shrubs, grasses, and so on, that are rarely grazed by traditional Australian breeds.
- They are generally polled, and they are fertile, with lambing percentages in excess of 150 per cent.
- Carcass conformation is excellent.
- A thick skin protects the sheep under harsh climatic conditions.

Dorper-sired first crosses generally have a piebald fleece, with shades of black and tan common. Second-cross lambs have the characteristic black head and neck markings of the dorper sire. The white dorper-sired cross produces predominantly white progeny. Shedding typically begins following the third cross. They are crossed primarily with merino ewes, and this cross has shown excellent growth rates without excessive fat deposition.

Dorpers are suited to both domestic and export carcass production.

4.2 Livestock management

Section 2.3 describes the general requirements for maintaining livestock health organically. Good pasture is a prerequisite. Providing a year-round supply of nutritious pasture is, however, often a challenge for producers in the rangelands of western New South Wales, particularly if considering organic production.

4.2.1 Grazing management

Organic standards require that grazing management consider the environmental and ecological integrity of the region as well as the maintenance of livestock health.

Figure 4.2 Interrelationships between resources, activities and external influences that constitute grazing management. Source: Stuth et al 1991

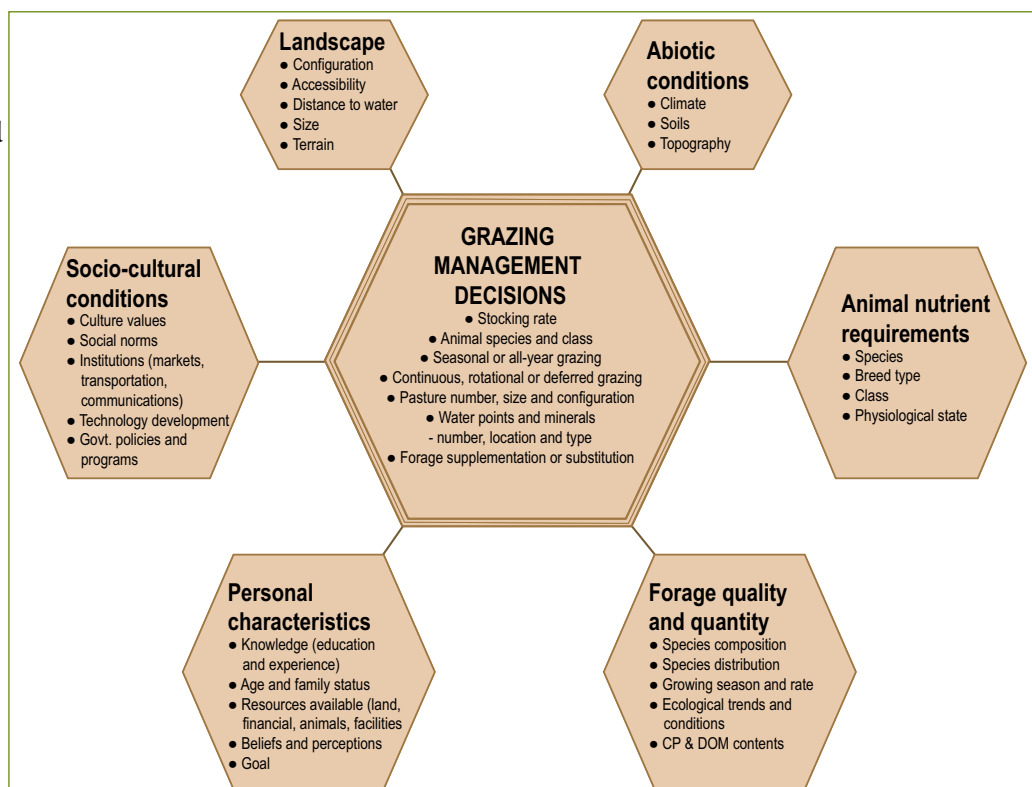
In order to retain their organic status, livestock must be grazed on certified pastures or fed on certified hay or grain. This means that the pastures, hay or grain must be grown or produced in accordance with organic standards.

Land where organic livestock are grazed must be monitored and managed with preservation of the ecological and environmental integrity of the region in mind. For example, the NASAA organic standards require monitoring of environmental indicators and carrying capacity with reference to prescribed district rates and ecological indicators. Adoption of *The Glove Box Guide to Tactical Grazing Management for Semi-arid Woodlands* (Campbell and Hacker 2000) or the Queensland Department of Primary Industries and Fisheries' safe carrying capacity assessments is recommended to assist with this (see Section 4.4).

Many factors, natural and imposed, internal and external, should be considered when determining grazing management strategies.

Figure 4.2 illustrates some of the factors affecting decision making. Grazing management is assessed with reference to total grazing pressure. Cell, rotational or holistic management is generally preferred by organic certifiers.

Grassed Up: guidelines for revegetating with Australian native grasses (Waters et al. 2002) is a useful reference for pasture establishment. The guidelines provide information about the use of 14 native grass species considered of high priority for commercial development and/or already being re-introduced to some areas. The characteristics and uses of these species are discussed in the context of their potential for eastern Australia. The document provides information that will encourage widespread commercial use of Australian native grasses and also help meet the differing needs of practitioners when using native grasses either for revegetation and rehabilitation or for seed production.



In Box 4, the Australian Organic Standard (Australian Certified Organic, version 5, May 2002) makes the following statement about grazing livestock on extensive pastoral holdings: or in similar environments:

(Note: practitioners should always check standards for latest additions or changes.)

BOX 4

- 5.7.1 Grazing management shall include judicious use of ecological aspects of the pastoral holding, fencing and mixed stock use where appropriate, which allows for cell grazing or similar sustainable grazing management practices. Stocking rates shall be such as to maintain long-term sustainability of the region. Tactical grazing decisions shall be based upon seasonal and climatic fluctuations to ensure long-term resiliency of the operation.
- 5.7.2 Tree and shrub pushing shall be limited to maintain feed through scarce periods. This shall not take the place of well balanced and managed grazing pressure in good years. Protected or scarce floral species shall not be destroyed and shall be encouraged to expand wherever feasible. Federal and state clearing and environmental laws shall be complied with.
- 5.7.3 Native wildlife shall be effectively managed and/or protected as required by relevant laws. Native biodiversity and ecological characteristics shall be a priority of the operator to ensure a regenerating and resilient pastoral environment.
- 5.7.4 Environmental indicator monitoring, optimally by third parties, shall take place which maintains verification of sustainable grazing practices. This should include soil types and cover, pasture types and forage, animal products and total grazing pressure.
- 5.7.5 Traditional landowner rights on pastoral leases shall be respected.
- 5.7.6 No prohibited products under this Standard are to be stored on certified areas of the farm unit at any time.
- 5.7.7 Mandatory spraying by weed control or pest control authorities shall lead to decertification of affected areas. Weed control shall be managed by the operator in such a way as to (re)establish historically overgrazed areas to ensure beneficial pasture species and related native flora are allowed to flourish.



Organic goats at David and Mary Booth's property "Buronga" near Cootamundra, NSW. The chevon (goat meat) is further value-added into meat pies and fine leather from the goat hides.

Management during drought

To maintain full certification of both lands and animals, the normal requirements of the standard must be maintained throughout a drought period. This means feeding stock fodder that is certified organic and stock having access only to certified organic lands. The organic standard is tough in this regard. Any variations to the standard mean that either stock or lands, or both, might lose certification. During the 2002–03 drought Australian Certified Organic issued the following instructions (see Box 5) in relation to feeding organic livestock:

BOX 5

There are some (drought feeding) options for certified farmers, depending upon your situation ...

If you are fortunate enough to have access to all your normal certified organic feed sources, then you will not need to do more than you have currently been doing—apart from counting your blessings.

Action 1) If you are a certified organic or in-conversion certified operator, you may consider the following:

To cite the Australian Organic Standard ...

- 5.1.31 In cases of extreme climatic or other extenuating circumstances, exemption to fodder requirements may be granted with up to 40% of dry matter intake being sourced from products other than those referred to ... The use of such feed shall be sourced in the first instance from (a) in-conversion fodder, or (b) conventionally produced fodder, verified to be free from agrichemical residues, where it can be verified that products from (a) are unavailable. Such exemptions shall follow written communication to the Certification Office (CO) by the certified operator and written confirmation from the CO of exemption.
- 5.1.32 Where feed is sourced from (a) above, certification status shall be unaffected. Livestock fed from source (b) above must be fed on organically sourced inputs for a consecutive 6 month period before regaining organic status. Additional livestock residue testing may be required, under the direction of the CO, prior to re-attainment of certification.

Hence if you wish to consider this option, you need to send a formal application to the BFA/ACO [Biological Farmers of Australia – Australian Certified Organic] office and, following acceptance, feed stock and keep records accordingly.

Such allowances will hold for a 6 month period—after which you would need to apply again if you need to continue doing this. You will also need to inform the office when you plan to begin feeding only certified feeds to your livestock again—to begin them on the 6 months 're-conversion' phase prior to regaining certification.

Action 2) If you are a pre-certification or certified producer who is not currently nor planning to sell stock for some time into the future, above action. The same applies—in that you will need to apply to the office etc.

The process to follow would be:

- i. Apply to ACO for allowance.
- ii. Receive confirmation of allowance for up to 6 months.
- iii. Take tests or have confirmed non-residue status of non certified feeds.
- iv. Feed animals with other acceptable (non-certified) sources.
- v. Record all feed inputs and report back to office when this feeding stops.
- vi. Six months following the last feeding with non-certified

feeds, certification may be regranted for stock.

Action 3) *Buying Certified In Conversion to Organic feed is an option already for IC [in-conversion] producers (that is, it does not affect the certification status). If A level or fully certified organic producers wish to do this also, you may do this for a portion of the diet following application to the office as specified.*

Action 4) *5% of feed as supplements from non-certified sources. Where you cannot source the small proportion of feed supplements from certified sources (eg dairy producers feeding small volumes of grain) you may in restricted instances use uncertified feed.*

The conditions of such use are:

- i. That certified feed is verified to be commercially unavailable.
- ii. That the uncertified feed is verified to be chemical residue free.
- iii. That this provision shall only last during this exceptional period of drought and only following application for use to the certification office—and approval in writing.
- iv. That the feed is otherwise accepted in the standard—ie non-GMO, non treated, etc.
- v. That the proposed diet clearly outline that total amounts of non-certified products of total diet fall within the 5% realm.

Note that this is most specifically designed for dairy producers who cannot get access to such feed. This still requires special application to the office and verification that certified feed is otherwise unavailable in commercial quantities.

Note that products such as molasses and other products if not from certified sources may affect markets such as the US for producers.

Animal welfare requirements remain paramount for certified operators and, to this end, you may consider that it is all too much to continue holding stock at this point. Please ensure that this (along with your economic livelihood) is paramount in making these decisions.

Other options

There are a number of other options for managing during a drought:

- de-stocking or selling stock as certified before loss or suspension of certification for the stock
- agisting stock on other certified organic lands, so their certification is not affected
- agisting stock on non-certified lands and selling the stock later as non-certified or as breeders
- selling stock as non-certified
- selling products from stock—for example, eggs or milk—as non-certified during the drought
- de-certifying some areas of the property and/or (some of) the stock—remember to inform the certification office beforehand—to ensure that it is possible to carry on.

A producer should never risk the certification of the entire property by not complying with the standard.

Special feed mixes

The following, prepared by Katrina Hobbs from Country Heritage Feeds <katrina@organicstockfeed.com>, outlines examples of particular feed options.

What feed sources should be fed to ruminants in need of supplementation? The best way of answering this question is by considering two important factors, the condition of the paddock feed and ... the main objective for supplementary feeding of your livestock.

1. Paddock condition

Assessment of both quality and quantity of paddock feed sources is the first step in determining supplementary feed requirements. We will discuss two typical paddock conditions in dry seasons.

- a) Large quantity of dry grass that is low in protein. Sometimes there is ample dry feed available, however there is very poor nutritional quality in the pasture. Dry low-protein pastures also lack palatability and lignification makes the grass hard to digest. Stock on this pasture can not maintain condition unless supplemented. The most cost-effective way of supplementation in this situation is to help the animal better utilise the dry pasture. The dry pasture provides the energy for the livestock so therefore a suitable supplement will provide protein and trace elements. There are certified organic dry season supplements (mainly in the form of loose licks) commercially available that serve this purpose. These supplements typically have low feeding rates and provide both protein and other essential trace elements.
- b) Low quantity and quality pasture. If pasture quality and also quantity of pasture is lacking, supplementation will need to be more like a full feed than a protein supplement. This is because it is vital that a drought-affected animal has both its protein and energy needs provided for. Without the correct balance of protein and energy the animal will 'slip in condition'.

Certified organic full feeds such as grower, maintenance or starter/finisher rations are also available for purchase from certified manufacturers.

2. Main objective for feeding

To identify what supplement is most suitable for your livestock also involves identification of the objective in feeding. Supplementary feeding may be necessary to wean young animals, maintain condition of livestock, or to boost growth or finish livestock for market. Whatever the purpose, the supplement must be aligned to meet the farm's objectives. For example, a dry season loose lick fed to a drought-stricken animal will not build muscle and promote growth because its purpose is to maintain the animal by helping it better utilise dry pasture. If the farm's objective was to promote growth and build muscle a grower or finisher feed would be better suited.

What are full feeds, supplements and concentrates?

A full feed is a 'ready to use' livestock diet that provides all components required to satisfy the animal's nutritional needs while maximising production. The full feed's bulk ingredient is grain, and the ration is completely balanced to provide all the animal's nutritional requirements. Examples of full feeds include calf meals, weaner meals, beef starter/finisher meals and grain-based maintenance rations. Full feeds are very effective at building

muscle and growth on livestock, as well as providing balanced and complete nutrition to an animal. A full feed is also a good option when pasture quantity is lacking.

A concentrate provides the necessary inputs to be added to on-farm ingredients. For example a farmer may grow their own barley but require the addition of micro-ingredients such as protein meals, vitamins, minerals and trace elements to be added to their grain to make a full balanced feed diet for their livestock.

Supplements are normally most often required during the cooler months or in drought conditions. Typically, supplements are fed to ruminants to counteract that which is apparently lacking in pasture during dry times. Supplements are fed at low feeding rates (for example, 500 grams per head per day) and are designed to assist the animal in better utilising pasture or to provide nutrients lacking from on-farm feed sources. For example, supplements may be designed for animals on calcium/phosphorus-deficient country or for drought-affected animals or may be designed to complement and provide for lacks associated with a specific on-farm feeding program such as mulga feeding.

Strategies to help reduce the cost of supplementation

1. Increase effectiveness of supplementation by knowing what your stock need on your country.
2. Identify the main objective in seeking to supplement livestock—for example to finish, to maintain or to grow.
3. Segregation of the herd, allowing supplementation that is specific to the stock's needs.
4. Consider the benefits of early weaning. Early weaning improves the condition of breeding stock and reduces the need for supplementation. Young animals consume less feed, so supplementary feeding young animals may be more cost-effective than supplementing lactating animals and their young.

As you can see, there are varying forms of supplementation available to livestock producers. Supplementation needs to not only meet the objectives and needs of the producer; the most cost-effective method of supplementation also needs to be adopted. Consideration of pasture quality and farm objectives leads to more effective supplementation of ruminants.

It is also worth looking at concentrates that form a component of the diet. In all cases, the percentage of overall feed over a given period (a year) should be considered (rather than a given day).

There is one variation to the feed supplements. This will require a written submission and will be assessed case by case. In each case, the logic just outlined will still be applied, with the feed ration for an entire year—or the entire life of the animal if this is shorter—being taken into consideration when calculating percentages.

Are there any variations to this?

If particular markets specify additional requirements, these requirements stand. It is very important to remain aware of the requirements since this may affect the movement of product into some of those markets during drought.

Finally, producers should never do anything because they have 'heard someone say' or because 'so and so' said it was alright. To avoid affecting certification and to work in the best interests of the enterprise, a producer should always seek written advice from the Biological Farmers of Australia – Australian Certified Organic office.

Urea and other prohibited feed supplements

Can I feed urea to my stock during a drought? The simple answer is *no*—for any stock you wish to maintain as certified in the longer term. Feeding urea would immediately and permanently de-certify all meat livestock that have access to it.

If a producer has breeders that are not in calf and will not be for some time, there is one option for feeding supplements not in accord with the standard in very restricted instances. To take up this option, the following must be done:

- Apply in writing to the Biological Farmers of Australia office, outlining exactly what you wish to feed, where, when and how.
- Await written confirmation of acceptance.
- Carry out feed supplementation—in dedicated quarantine areas or away from certified land areas—with clear segregation from all other certified areas and stock. That is, there must be no contact with either certified land or certified stock.
- Record all activities and report this to the office.
- Confirm when the feeding has ceased and full compliance with the standard is occurring across the entire operation.

Note that these practices are a last resort, must be carried out in the way just described in order not to affect certification, and give cause for additional auditing. Action can be taken only after written confirmation from the certification office that it will be acceptable in the particular instance. Any certified stock that in any way gain access to the supplements will lose their certification permanently. Caution is thus essential if this route is taken.

Further, genetically modified organisms are never allowed in any feed rations. This now potentially includes cotton, soy, corn and canola—the last three if they are obtained from overseas.

Any progeny arising from stock fed non-complying feeds are not certifiable at any point in their own lives. In other words, the progeny must have been within an animal that has been managed in accord with the standards since the time of mating.

Quarantine

During a drought quarantine areas are essential if non-permitted inputs or supplements are being used. This might involve creation of additional quarantine paddocks in which the non-permitted products can be administered or fed out. The certification office should be informed in advance, in writing, ideally with an updated farm map outlining showing the new areas. As with all quarantine area requirements, such areas must remain quarantined for a minimum of 12 months after the supplements or non-permitted inputs were last used.

Sprouted grains for feed

For some operations, sprouting of grains—certified grains, that is—is a very useful strategy for maintaining optimal animal health and nutrition. But what about uncertified grains? The short answer is that use of uncertified grains will affect the certification status of the livestock concerned until six months have elapsed since the last feeding of such products. It may, however, be a useful way of extending the life of expensive and hard-to-get feeds.

Following application to the certification office and confirmation from the office in writing that the proposal is acceptable, in exceptional circumstance situations a component of the feed could be obtained from non-certified sources and sprouted, which bulks it up to seven times its original size. In these instances the percentage of the feed can be calculated on the original weight of the grain—that is, before sprouting.

The percentage of feed allowed: does this apply on a daily or annual basis?

Percentages for feed can be calculated on an annual basis. This means that if a producer feeds out, say, 60 per cent of feed as conventional during the period of exceptional circumstance for three months, then stops, and returns to certified organic feed only six months later, those animals can be brought back into full certification—on the grounds that on an annual count the non-certified component accounted for less than 40 per cent of the total diet.

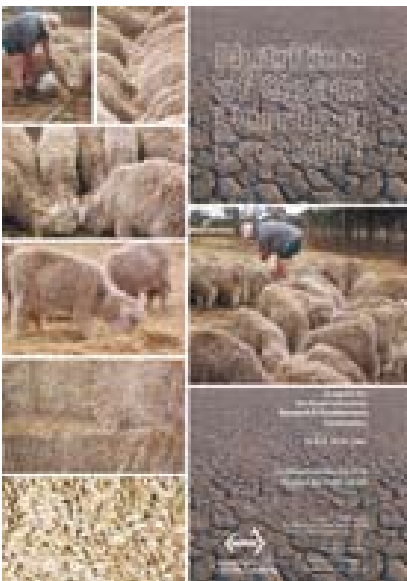
Applying for an exceptional circumstance exemption

Producers must do the following in order to apply for an exceptional circumstance exemption:

- Apply in writing to the certification office, noting that they have been dramatically affected beyond their control by drought and/or fire and briefly outline their particular circumstances.
- Detail the proposal for feeding and stocking regimes through this time.
- Do not implement this regime on the farm until written confirmation is received from the certification office—verbal approval is insufficient—that the proposal is either acceptable or acceptable with modifications.
- Keep records and either comply with the accepted plan or seek and obtain authorisation if it is necessary to diverge from this plan.
- Contact the certification office in writing when the non-certified feeding arrangement has ended. Then the six-month re-certification of livestock can begin.



Drought feeding sheep by hand. Photo Alan Bell



Nutrition of Goats During Drought. By B.A. McGregor. RIRDC Pub. No. 03/016. \$26.

4.2.2 Livestock rotation and movement considerations

Quarantine areas

Occasionally certified livestock must be treated with a prohibited substance (for example, a chemical drench) or be fed non-certified

feed. When this happens, stock should be moved to a quarantine paddock treatment *beforehand*. The quarantine area ensures that treated, or purchased non-organic, stock are kept separate from other organic stock and from organic land. Such an area should be clearly identified on the farm and the farm map, and treated or non-organic stock should be marked with a distinguishing tag.

Quarantined livestock must remain in the quarantine area for at least three weeks or for three times the withholding period specified in legislation for the treatment, whichever is greater. Once they are removed from this area, the area cannot be used for organic production for at least 12 months.

Following any prohibited treatment, livestock meat products are permanently excluded from certification. The stock's progeny may be certified for meat production, providing that mating occurred after treatment with the prohibited substance and providing that subsequent management of

both parent (during the pregnancy) and progeny is organic.

Sheep require a period of at least 18 months under organic management before wool products regain organic certification.

Agistment

Organic producers might sometimes want to agist or buy uncertified stock. This is permitted under organic standards provided the quarantine restrictions just noted are complied with. Once stock have been removed from the quarantine area they may be grazed on certified land provided they are clearly distinguished from certified stock—for example, by using specific tags. Non-organic stock that have been bought in but are subsequently managed according to organic standards are permanently de-certified for meat products. Their progeny, however, can be sold for certified meat, provided they have been managed according to organic standards from the third trimester of pregnancy.

ACO's Australian Organic Standard (Box 6) makes the following statement about agisting non-certified livestock on certified land:

BOX 6

- 5.7.10 The running of uncertified stock on certified land is allowed on strict condition that such stock have been quarantined after treatment of any prohibited inputs as outlined in this Standard, are managed in accord with the Standard during this time, and are readily identifiable from certified stock, and do not pose contamination risks for certified stock.
- 5.7.11 Easily identifiable and resilient tags or other markings shall be used to distinguish certified stock, as well as to distinguish de-certified stock (requiring prohibited treatments, etc), quarantining stock, and uncertified stock.
- 5.7.12 Fencing management shall be maintained to ensure that mixing with neighbouring stock is eliminated or significantly reduced so as not to pose problems of contamination or identification.

The exception is if stock have been treated with hormones or been infected with diseases such as ovine Johne's disease or bovine spongiform encephalopathy. In this instance the following applies:

- 5.1.8 Stock that have had or continue to have hormone treatments, or which may be infected with, or arise from operations known to contain OJD, BSE or other diseases, are prohibited from access to certified lands. Where such risks are possible from the source, certificates or confirmation that such stock are free from all such ailments is essential where such stock are to be utilised for breeding of certified organic stock or where such stock shall have access to certified lands.

If certified stock are agisted on a non-certified property—for example, because of drought—they will be permanently de-certified for meat products.

Finishing stock

In order to finish organic livestock to the required market standard, rangeland producers might need access to certified off-farm feeding stations. Producers might decide the best option is to sell at this point, in which case there are organic operators that specialise in finishing livestock. Australian Organic Meats is one such operation. It will purchase stock and grow it on organically until it meets market requirements.

Under ACO's Australian Organic Standard (Box 7) the following conditions relating to finishing and agistment apply:

BOX 7

- 2.1.19 Feedlotting of livestock, battery production systems and other means of densely confined and intensive production systems are not recognised nor allowable within organic production systems.
- 2.1.20 In certain cases, specifically approved by the [certification office], livestock may be moved to certified farming systems which are naturally ideal for finishing livestock. Such instances for approval would include livestock being sourced from native pastures which are naturally ephemeral in terms of seasonal fluctuations, or where the natural environment is not suited to fattening and finishing stock. Such operations would be approved based upon their sympathy with best ecological management of natural resources and best welfare management of stock.
- 2.1.21 Operations agisting or finishing stock shall conform with all requirements as outlined in this section, with the exception of restocking rates for stock.
- 2.1.22 In cases of need for finishing livestock on high-value diets, livestock may be fed only on certified lands and on additional acceptable products outlined in 'Feeds' below.
- 2.1.123 Agistment or finishing areas and/or farm units shall be dedicated to use for certified organic stock only and shall be certified as such.

Travelling stock routes and commons

Some rangeland operations have travelling stock routes or commons within their boundaries. In these instances the movement of uncertified stock on and off certified farms can occur. ACO's Australian Organic Standard (Box 8) states:

Organic producers should inform the Rural Lands Protection Board of their organic status and the certification requirements for stock movements. Restrictions on animal movements caused by diseases such as ovine Johne's disease should also be discussed. It is important to seek notification and keep records of all stock movements through the property and to stay in regular contact with the Rural Lands Protection Board and its local staff.

BOX 8

- 2.1.24 In the case of commons lands and/or stock routes which are mandatory under law to require passage of regional stock which may be uncertified, such instances shall not affect certification where careful management by the certified operator ensures, on an ongoing basis, that no contamination is posed to certified stock and/or lands. This may include, in some instances, the requirement for additional monitoring to verify the above.
- ...
- 5.1.38 When certified operators have stock routes through their property (eg rangeland regions) or where common areas are required to be used on an emergency basis, the following applies:
- 5.1.39 Notification to the Certification Office is required of movement of all non-certified stock through stock routes on certified lands.
- 5.1.40 As a guide, the following movement requirements apply:
- Cattle 16 kms/day
Sheep 10 kms/day
- 5.1.41 No mingling is permitted with uncertified stock at any time.
- 5.1.42 Certified stock not to have access to areas where uncertified stock are travelling through.
- 5.1.43 Prior to use of common lands (in cases of emergency such as flooding), the certified operation shall make application to the CO for approval.
- 5.1.44 Identification of part contamination points and preventative management is required of the certified operator to ensure maintenance of certification status of stock when on common lands and/or following movement of uncertified stock through stock routes.

4.2.3 Transportation and handling

Access to reliable transport is essential for the movement of livestock to market. Transport operators should be informed that produce is organic and that it should be isolated from conventional produce to minimise the risk of contamination. Organic standards emphasise the welfare of livestock, minimising the risk of contamination during transportation and handling, and providing full documentation of procedures.

ACO's Australian Organic Standard (Box 9) imposes the following conditions in relation to the transportation and handling of organic livestock:

BOX 9

- 5.7.15 Mustering shall not include the use of lead shot.
- 5.1.45 Transport of animals between properties or to abattoirs shall take into consideration and comply with animal welfare requirements. Such consideration shall include minimisation of stress on animals through the assessment of the needs of each animal, the fitness of animals for travel, prevention of mixing of different mobs, groups or sexes of animals where stress or social disharmony may arise, needs of animals in regard to prevention of thirst and hunger, temperature, relative humidity and travelling conditions and potential impact on animals, and the quality and suitability of the mode of transport and all handling equipment to ensure best practice in animal welfare management.
- 5.1.46 Except in circumstances deemed acceptable by the [certifying office], transport times shall not exceed 8 hours from leaving the farm gate to end point arrival. A responsible person or persons shall be allocated by the certified operator to ensure the wellbeing of the animals throughout the process of transport and slaughter is maintained.

It is recognised that the isolation of many rangeland pastoral operations may result in the eight-hour limit being exceeded, so the following clause relating specifically to remote rangeland operations has been added:

- 5.7.17 Transport times from remote locations shall comply with the Standard, with exceptions being granted on a case by case basis. Such exemptions shall take into consideration animal welfare issues, segregation and related logistics. (Continued on next page)

The ACO standard continues:

- 5.1.47 Certified organic feeds and quality potable water shall be made available between transport legs if spelling and feeding are required.
- 5.1.48 Spelling areas and other off-farm holding areas shall require certification or, at the direction of the [certifying office], on-site inspection, where used for certified stock holding.
- 5.1.49 All measures shall be taken to ensure no cross-contamination may occur in transit, and all measures shall be taken to ensure no mixing of certified with uncertified stock occurs. This shall entail clear identification and differentiation of all certified stock.
- 5.1.50 Transport operators shall be made aware of certification requirements, including wash down/sweep down requirements for all transport equipment and trailers prior to loading and unloading of certified stock. Such considerations shall include loading systems which minimise stress to livestock.
- 5.1.51 Certified animals shall not be treated with any prohibited substances under this Standard to the point of slaughter. Use of electric prods is prohibited for use on certified animals.
- 5.1.52 Electrolytes shall be permissible after applying to, and receiving acceptance by, the [certifying office] as to the type and concentrations used in drinking water. Electrolytes containing synthetic amino acids shall not be allowed.

The NASAA Organic Standard (Box 10) specifies the following additional conditions for transportation of organic livestock:

- 23.11.1 An Organic Management Plan for transport of organic livestock shall be developed that addresses the operator's compliance to these Standards.
- 23.11.2 Loading facilities must not have parts protruding or sharp edges that can cause injury or damage.
- 23.11.3 Transport vehicles shall be large enough to prevent damage and or bruising.
- 23.11.4 The angle of loading ramps must be no greater than 30 degrees from the horizontal.
- 23.11.5 Yards and loading facilities must be certified.
- 23.11.6 The routine use of electric prods is prohibited.
- 23.11.7 Floors and ramps must be corrugated or suitably designed so the animal does not slip unduly.
- 23.11.8 Gates must be used in transport vehicles to segregate animals into compatible groups and restrict movement of animals that could cause injury or damage.
- 23.11.9 No chemically synthesised tranquillisers or stimulants shall be given prior to or during transport.
- 23.11.10 Certified organic feed and clean water must be available before and after transport.
- 23.11.11 No transport leg should exceed 8 hours. Exceptions to this requirement include those cases where:
 - 23.11.11.1 There is no certified organic abattoir within 8 hours' drive
 - 23.11.11.2 There is no abattoir capable of satisfying national or importing country requirements within 8 hours' drive
- 23.11.12 A responsible agent must accompany the livestock on the journey and be present for loading and unloading.
- 23.11.13 Unfit animals may not be transported unless under the care of a licensed veterinarian.
- ...
- 23.12.1 Trucks and carriages must not be used for the transport of prohibited materials as defined in these Standards.
- 23.12.2 All residues from previous use must be cleaned with a pressurised water flow and brooms if necessary and disinfected before transporting certified product.
- 23.12.3 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.
- 23.12.4 This log should 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 the livestock consignment.
- ...
- 23.13.1 In addition to tags or brands, cattle must wear the NASAA tail tag and be accompanied by documentation listing the description of the livestock along with their organic status. The transport operator will include an organic description in his/her log along with livestock description.

4.3 Farm structures, equipment and storages

4.3.1 Fencing

The fencing layout on an organic farm should be such as to encourage sustainable management of stock and the environs.

Paddock size and layout should take account of natural features such as soil type—ideally, the same soil types should be within a grazing unit—the location of watercourses and other natural features, and the vegetation type.

From a management perspective, it may be preferable to fence off undesirable species such as woody weeds or areas where a particularly palatable (or unpalatable) species dominates, so that grazing can be controlled.

The size of a grazing unit should be determined with a view to optimising pasture and grazing management and livestock health.

Fencing along external boundaries should prevent movement of stock between properties.

Double-fencing is often done along boundaries with non-certified properties to prevent contact with non-certified stock, thus reducing the risk of contamination and lice infestation. This might, however, be impractical because of the cost of fencing large rangeland holdings.

Quarantine paddocks need good fencing to isolate treated and uncertified stock.

Holding yards must be designed and built to minimise the risk of injury to livestock and to facilitate the movement of stock with minimal stress.

BOX 11

ACO's Australian Organic Standard has the following to say about fencing:

- 5.1.35 Pens, stocking yards and transporters shall be free of protrusions and other characteristics such that bruising and trauma is minimised.
- 5.7.12 Fencing management shall be maintained to ensure that mixing with neighbouring stock is eliminated or significantly reduced so as not to pose problems of contamination or identification.

BOX 12

The NASAA standard states:

- 23.8.8 Yards and handling facilities shall be designed and properly maintained to ensure animals are not stressed or injured.

4.3.2 Yards, shearing sheds and dip sites

Organic standards require that holding yards, shearing sheds and dip sites be free of any chemical residues that might have accumulated as a result of past use. Decontamination might be possible, but exclusion of certified stock from these areas is often the only option.

BOX 13

In relation to livestock handling facilities and dip sites ACO's Australian Organic Standard states:

- 5.7.13 All potential contamination sources, such as old dip sites, dump sites, old orchards or holding yards, races and crushes, shall be fenced off or stock prevented from entering where such areas reveal high levels of [organochlorines] or related contaminants which pose risk of chemical residues in certified end products for sale.

BOX 14

The NASAA standard says:

- 23.8.1 Shearing sheds shall be free of contamination from past use and free of all prohibited veterinary input products.
- 23.8.2 The producer shall ensure boards are adequately cleaned by heavy scouring to remove animal and dung residues prior to use.
- 23.8.3 Yards shall be tested to ensure the contamination levels are below the [maximum residue limits] for organophosphates, organochlorines and arsenic.
- 23.8.4 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.
- 23.8.5 Holding paddocks shall be tested to determine whether ... soil contamination levels are within limits. Holding paddocks that do not meet these requirements shall be quarantined from livestock.
- 23.8.6 Dip sites shall be tested and require renovation or quarantine if levels are above [maximum residue limits].
- 23.8.7 Restricted substances must be stored in lockable storage facilities.
- 23.8.9 The vicinity of yards and sheds must be free of materials which may result in chemical contamination or physical contamination of wool clip.
- 23.8.10 Portable dips shall require a written specification for cleaning methods, submitted to and approved by NASAA. Cleaning shall not be conducted on a certified organic farm. A further flush of clean water must be passed through the facility before use with organic livestock.

4.3.3 Feed storage areas

Grain or feed storages such as silos and bunkers can become infested with insects or vermin. To comply with organic standards, non-chemical methods such as controlled-atmosphere disinfestation are used to exclude pests or treat infestations. Storing grain is discussed in Section 5.1.

4.4 Monitoring farm performance

Record keeping is essential. It is a good idea to number all grazing units, and it is important to tag livestock (now a legal requirement for cattle and soon to be for sheep under the NLIS), as well as keep records of stock movements, crops grown, successes and failures, green manures, fertilisers and chemicals applied, and weather data. Information should be recorded immediately after an operation is completed. Any breach of organic standards should be reported to the certifier immediately. If there is doubt about whether a breach has occurred, the certifier should be contacted in any case. Record sheet templates can be downloaded from certifiers' websites.

4.4.1 Assessing stock carrying capacity

The Queensland Government's Agency for Food and Fibre Sciences has developed a computer model that allows producers to protect their properties. 'Safe carrying capacity assessments' allow producers to determine the number of sheep that can be carried sustainably on a particular piece of land. The assessments are based on rainfall records, soil type, the frequency and type of grasses, and the density of trees and shrubs. Under the model, only 20 per cent of the available pasture feed is allocated to livestock; the remainder is left for plant and landscape health



and for native animals such as kangaroos.

The aim of an assessment is to objectively determine the long-term carrying capacity of an individual property. The assessment involves preparation of detailed maps of the paddocks and land systems on a property. After a survey of the land's current condition, average annual long-term forage production (in kilograms per hectare) from the different land systems is estimated. These estimates are the product of the average annual rainfall use efficiency (in kilograms per hectare per millimetre) for each land system and the average annual rainfall (in millimetres) for the property. The rainfall use efficiency values are estimated from primary productivity measurements and pasture growth modelling using the GRASP model. The number of livestock that can be run in order to use a safe portion of this forage is then calculated. The safe use levels were derived from grazing trials in the Charleville area, local knowledge, and grazing practices on 'benchmark' properties. Each property assessed has a unique mix of land systems, so the resultant livestock carrying capacity is unique to the property.

Growers in Queensland's sheep belt monitor changes in vegetation through frequent inspection of their paddocks. This allows them to determine how much feed is available compared with the number of stock they want to run. The number of stock placed in a paddock is then determined by the amount of feed present at the beginning of the year.

4.4.2 Tactical grazing management

Tactical grazing management involves developing and implementing a strategy based on identifying and managing key grazing species to ensure their survival and regeneration. For example, if more than 30 per cent of a key species such as a perennial grass is grazed, the impact can be devastating, so part of the purpose of tactical grazing would be to determine when overgrazing begins to occur.

The overall aim of tactical grazing management is to set objectives, develop strategies, and monitor the system to avoid overgrazing. This ensures sustainable productivity and biodiversity within the enterprise. The following four steps outlines the 'ideal' path to achieving optimal grazing management:

- *Setting management objectives.* This stage generally involves setting objectives for the pasture type that has the most to contribute to pastoral productivity within each paddock. There are two possible objectives—maintenance or restoration. If the desirable pasture type is close to its potential for long-term livestock production and optimal grazing management, the objective would be to maintain the pasture type in its present condition. Restoration of the pasture type would be the objective if the long-term productivity of the pasture has not yet reached its potential but the pasture has the capacity to respond to management. The objectives might change as regeneration occurs or if seasonal conditions improve.
- *Determining a strategy.* A strategy—or a statement of the principles that need to be implemented in order to achieve the desired objective—needs to include the principles that allow managers to take advantage of opportunities. Among these are factors such as favourable seasons (which favour seed set) or avoiding hazards such as drought or excessive rainfall events that promote erosion. There is no set formula for

determining strategies, but the following are some of the factors to be considered:

- the effect of defoliation on the key pasture species' ability to regenerate following drought
 - the effect of soil cover on the potential for erosion
 - identifying opportunities to replenish the seed bank
 - the benefit to be gained, in terms of drought tolerance and the recovery of pasture productivity, by having a range of species
 - the impact of burning on woody shrubs of various ages
 - the impact of heavy grazing on the composition of various species within the pasture—desirable species to maintain the competitive advantage
 - the benefits of periodic resting to maintain pasture vigour and to promote recovery of important pasture species.
- *Day-to-day implementation of the strategy as seasonal opportunities permit.* Management needs to be flexible enough to respond to variable seasonal conditions in order to implement the strategy—for example, adjusting the stocking rate or actions

aimed at managing woody weeds. This capacity for continuous response, guided by an appropriate strategy, is the essence of tactical management.

- *Monitoring the results.* Precise and consistent monitoring is the key to timely and effective management decisions. It allows assessment of the appropriateness of the objectives and, if the objectives are appropriate, whether they are being achieved.

Trying to create a balance between the impact of grazing on land resources and the consequences of seasonal and market risks to which the business is exposed can often mean that the requirements of all paddocks cannot be met simultaneously. In an uncertain environment the tactical management process allows for compromises and informed decisions to be made on the basis of what are thought to be the desirable management practices for land resources.

The Glove Box Guide to Tactical Grazing Management for Semi-arid Woodlands (Campbell and Hacker 2000) describes techniques that will help graziers implement the four steps just described. Part 1 of the guide discusses techniques for assessing landscape, pasture, grazing pressure, soil and animals and how these techniques can be used to set objectives or in tactical decision making. Part 2 outlines a procedure for establishing a comprehensive monitoring system for implementing tactical management on a whole-property basis. Part 3 deals with the most important variable in the management system—the stocking rate. It promotes the idea that short-term variations in the stocking rate, consistent with the principles of tactical management, can be considered and introduced as necessary.



The NSW Department of Primary Industries runs a series of workshops aimed at explaining how to use the guide and the principles and practices behind tactical grazing management. The guide can be viewed at <<http://www.agric.nsw.gov.au/reader/6181>>.

4.5 Pest and disease management

Although maintaining a good field of nutrition can contribute significantly to reducing livestock's susceptibility to disease, steps should also be taken to identify and manage other factors that can play a role in lowering livestock immunity to pests and diseases. Numerous situations and practices can predispose livestock to unwarranted stress:

- birth
- docking and castration
- de-horning
- weaning
- shearing
- poorly disciplined dogs
- transport
- sticks and electric prods
- shouting and beating
- excessive unfamiliar noise
- swimming and high-pressure hosing
- saleyards
- continual disturbance
- mixing mobs and meeting strangers
- mixing age groups
- mixing breeds
- mating
- changes in diet
- summer heat and drought
- no shade
- poor tethering, with a danger of strangulation
- food and water shortage
- the smell of blood.



Organic cattle grazing. Source: Address to Inaugural National Organics Conference 2001. 27–28 August – Sydney, by Simone Tully, OBE Beef

4.5.1 Internal parasites

Conventional drenches cannot be used on a routine basis. If they are used, quarantine procedures must be followed. Use a faecal egg count to determine whether intestinal worms are the cause of poor health; kits are available from NSW Department of Primary Industries offices.

There are also other reasons for ill-thrift—for example, lack of minerals or feed, overstocking, stock that are poor performers, and stress caused by the factors just listed. Use clean pastures, graze sheep in rotation with other stock species (but not goats), use more varied pasture species, use feed crops, wean later, maximise growth weights. Identify danger periods by using faecal egg counts. Breed for resistance or resilience to internal parasites. Select rams with care.

There are on the market organic drenches that may perform well in conjunction with good management practices.

4.5.2 External parasites

Check and remove the cause: it could be stress or feeding. Keep animals in good condition and feed them well. Some organic treatments, such as mineral oils, are available. Note that wool must not carry any residues that will affect market specifications. Vegetable oil and sulphur preparations are used

by some organic farmers. Australian Certified Organic and NASAA permit restricted use of the proprietary products Flockmaster® and Extinosad® for lice control. Note that these products might be excluded from importing countries' lists of permitted substances: if exporting, it is important to check with certifiers before using the substance.

4.5.3 Blowflies

Blowflies are not the primary challenge: they develop because something in the overall management system has been neglected. An autopsy might reveal that the animal was unwell or diseased before it was attacked by flies. Keep sheep in good condition; prevent scouring and keep them clean. Use fly traps around sheep yards and danger sites; clean up carcasses.

Neem and tea tree oil, garlic and pyrethrum have been used successfully to prevent and treat flies. Australian Certified Organic and NASAA permit restricted use of the proprietary product Extinosad®.

4.5.4 Footrot

Again, examine management practices for possible causes. Zinc sulphate and copper sulphate are approved for use. Cull any sheep

that has chronic problems. Select sires carefully.

4.5.5 Pulpy kidney, tetanus, black disease, blackleg and malignant oedema

Pulpy kidney, tetanus, black disease, blackleg and malignant oedema are all bacterial diseases and can be treated with a five-in-one vaccine. If young animals are exposed to them they will build up a natural immunity. Under an organic system a reduction in vaccine use must be implemented, and vaccines should be used on a continual basis only if a need is apparent.

4.5.6 Scabby mouth

Vaccination for scabby mouth can be approved if there is a demonstrable need for it on the farm.

4.5.7 Facial eczema

For facial eczema, start using zinc supplementation at least three weeks before any likely rise in spore counts. Zinc oxide for drenching is allowed, as are homeopathic remedies.

4.5.8 Lambing problems

Keep ewes in good condition during pregnancy—fit but not fat. Reduce their feed intake in the last three weeks of pregnancy, but not drastically. Appetite declines in any case during this period.

4.6 Cropping and seed availability

In the Western Division cropping is largely opportunistic. In perennial lake-bed systems and in other areas where cropping might occur in favourable seasons, there is potential to produce a range of oilseeds, cereals and pulses. This could provide valuable supplementary income or feed for finishing livestock.

Any crop produce that is marketed as organic or fed to organic livestock must, of course, be grown in compliance with organic standards. If the product is processed in any way, a certifier must approve the processing operation. In some instances this may mean the processor has to apply to the certifier for organic certification before they can process products

(see Section 5.7). If organic livestock are turned onto non-organic crop stubble or are fed produce from non-certified land the livestock cannot be sold as organic meat.

Organic certification standards require that first preference be given to planting organically raised seeds or seedlings. (This became a requirement of the National Standard for Organic and Biodynamic Produce on 31 December 2003.)

Open-pollinated and non-hybrid varieties are also preferred but are not essential. Care should be taken to ensure that the seed has an acceptable germination rate: a few seeds planted in a pot before sowing will give an indication of this.

Seed must not be treated with pre-sowing chemicals. Non-treated seed and some organic lines are available from South Pacific Seeds in Griffith, New South Wales. Genetically modified cultivars are definitely not permitted in organic systems.





5. Post-harvest and marketing

Post-harvest management must ensure that the quality and the organic integrity of the product are retained—the ‘from paddock to plate’ mantra.

Organic livestock producers must ensure that their produce does not become contaminated after it leaves the paddock. Finishing of organic livestock off the farm must be done on another organically certified property if the organic status of the product is to be retained.

Vehicles for livestock transportation, particularly if provided by contractors, should be thoroughly cleaned to remove potential contaminants. Certifiers will require that freight transporters be inspected or that information about transportation procedures be provided through documentation.

Any processing of organic livestock must be certified. Certification is sometimes a deterrent to processors, particularly if only a small quantity of organic produce is to be processed. A number of certified abattoirs and processors are available to producers (see Appendix A).

Developing producer market alliances can help alleviate supply constraints. Storage and packaging facilities will require inspection, and documentation describing the handling and segregation strategies for the organic product should be provided to certifiers.

5.1 Grain storage

[This section is based on *On-farm Storage of Organic Grain* by Neeson and Banks (2000).]

Successful storage requires protecting grain from insect or animal pests, preventing



Organic bread found in Woolworths supermarkets.

contamination by moulds and physical contaminants, and maintaining seed viability and its nutritional and processing properties. Organic standards prohibit the use of many chemicals traditionally used to preserve grain quality and storage life. Organic producers do, however, have access to a range of techniques that allow them to maintain grain quality and control pests in on-farm storage.

Retaining grain quality during storage involves monitoring the grain, maintaining hygiene levels, knowing when to use pest control methods and what ones to use, and controlling grain temperature and moisture levels.

Under Australian conditions, storing only dry grain and keeping it dry controls mould. The main pests of dry grain are insects—mainly beetles, moths and psocids (booklice). Reducing the temperature in grain storage to 20°C or less may control these, but a disinfestation stage is usually required to meet trading standards.

A number of factors help maintain the quality of stored organic grain,

among them harvesting strategies, good hygiene before and during storage, monitoring pest incidence, storage design and layout, use of mineral dusts, controlled-atmosphere disinfestation, heating and cooling treatments, and inert-atmosphere vacuum packaging.

5.1.1 Harvesting

Harvesting grain at the correct time can minimise yield losses and post-harvest storage problems. Test the grain before harvest to gauge on-farm storage requirements, so that quality and product grade can be managed. The moisture content can be assessed using a moisture meter or by oven-drying a sample and calculating its moisture content (for a technique for this see <<http://www.ianr.unl.edu/pubs/range/g1168.htm#moisture>>).

Moisture meters usually provide satisfactory estimates of the moisture content of grains and oilseeds when moisture content is below 25 per cent, but large errors can occur with higher moisture levels. If post-harvest drying and conditioning facilities are not available, harvest the grain at or

below the normal receival limits for moisture. Aerate oilseeds if they are to be stored for longer than a month.

5.1.2 Storage hygiene

It is important to maintain good hygiene in grain handling and storage premises, to ensure that grain is not contaminated by insects, rodents or other objectionable matter, as described in the Grains, Plants and Plant Products Orders of the *Export Control Act 1982*, which are complementary to the National Standard for Organic and Biodynamic Produce. Infestation in cereal grains is usually obvious within two to three months.

Good hygiene in grain storage facilities can be achieved by ensuring the following:

- easy cleaning and inspection of storages
- regular equipment maintenance
- removal of grain residues in sheds, around silos, in headers, augers, field bins, trucks and animal troughs, and in silos after emptying
- rotation of stocks to ensure they do not become sources of infestation and destruction of old stocks that are likely to be infested
- provision of training in safety and hygiene for all employees.

Develop a system for recording and checking hygiene procedures and develop action strategies for a situation in which contamination occurs. One such system is the HACCP (or Hazard Analysis Critical Control Point) – based management system.

Using high-pressure air is often the most suitable way of cleaning equipment, although using high-pressure water and vacuum cleaning are also suitable under certain conditions. Plan the cleaning

sequence so that cleaned areas cannot be re-contaminated.

Keep the surrounds of storage areas free of things such as rubbish and long grass to minimise mouse problems. A clear area exposes mice to their natural predators. Check rodenticides before use: some do not conform to organic standards.

Keep the grain temperature as low as possible to reduce the potential for insect infestation, and store the grain as soon as possible after harvest in a sealed, white-painted silo.

Never add freshly harvested grain to silos containing grain from the previous year if the latter has not been treated by controlled-atmosphere disinfestation. Otherwise, thoroughly clean out silos, and preferably leave them empty for a time before storing the new season's grain.

5.1.3 Monitoring pests

Placing traps in and around storages allows for detection of most insect pests at lower population levels than is usually possible by visual inspection or probing and provides an early warning that control is needed.

Various insect traps are available, among them pitfall traps, which trap insects as they fall into a container; crevice traps, which provide a physical environment for insects to crawl into; and bait traps containing food or some other substance attractive to the insect. Simple, effective insect traps can be made from items found in most homes.

5.1.4 Storage design and layout

Poor storage design and layout can affect the quality of stored grain. Plan on-farm storage to allow grain to be segregated and

blended to meet quality and grade specifications.

The only organic-compatible disinfestation process currently available involves the use of sealed storages. A sealed silo prevents re-entry of insects—providing it stays sealed. Check seals regularly and replace them every two years. Check silos for leaks by using a compressor; regularly check the silo's superstructure and pressure-relief valves.

The use of underground storage and bunkers is an effective method for mid- to long-term grain storage. Bunkers can be sealed with tarpaulins and filled with carbon dioxide to kill insects, or they can be built fully gas-tight so they do not need added carbon dioxide.

Heavy reflective white-painted silos reduce heating by sunlight and improve passive cooling. In hot, humid grain-growing regions or with larger storages (more than 100 tonnes capacity) cooling grain by aeration can reduce quality losses resulting from high temperatures. Cooling is essential when grain is stored above established industry receival standards for moisture.

5.1.5 Mineral dusts

Mineral dusts based on diatomaceous earth are permitted as treatments against storage insects. Ask certifiers what products are acceptable.

At present two products that are non-toxic to mammals—Dryacide® and Permaguard®—are registered for application to grain at rates of 1 gram per kilogram (0.1 per cent) and can be used to disinfest empty storages. Either product can be applied using a pickle applicator to whole grain to protect against insect attack for one to two years, provided the grain remains dry. Note, however, that bulk handlers

and grain traders do not accept grain treated with Dryacide® or Permaguard® because it slows grain movement through augers.

5.1.6 Controlled-atmosphere disinfection

Some organic growers have used carbon dioxide in bulk grain storage for many years. The storages have commonly been the larger 50-tonne silos. A well-sealed silo is essential and should be checked for gas-tightness, ensuring that the pressure halving time exceeds three minutes.

The carbon dioxide concentration must remain above 35 per cent for 14 days at all points in the grain bulk to make sure all stages of the insect life cycle are covered. About 1 kilogram of carbon dioxide per tonne of grain is needed if the silo is full of grain; if the silo is partially filled, more gas is needed. The carbon dioxide is introduced to the base of the silo using gas cylinders.

Employers and staff should comply with Australian Standard AS2865, 'Safe working in a confined space', when using controlled-atmosphere disinfection.

5.1.7 Temperature

Aeration cooling involves moving air through stored grain to reduce the rate of deterioration and prevent storage losses. It prevents temperature variation in the bulk and reduces moisture build-up and migration. Low grain temperatures also minimise deterioration by preventing insect development, as well as reducing microbial growth, which can spoil grain, cause bad odours and increase grain temperature.

Heat disinfection is a rapid, chemical-free process. Other techniques are cheaper, but heat disinfection might become a useful strategy as the technology



Organic Fertiliser

improves: at present it is not available commercially for grain.

5.1.8 Vacuum packaging

Some organic growers process and package grain for direct sale, adding value to the raw product. For this market, the grain will be stored in retail outlets, often for a long time, and must retain its freshness and quality and be free of pests. Inert-atmosphere, or vacuum, packaging offers an alternative for small retail quantities of grain. Coffee is often dealt with in this way. The grain must be dry if this method is to be used.

The process involves filling a laminated or polythene package with a mixture of carbon dioxide and nitrogen to kill insect pests and then sealing the package. The packaging must have very low oxygen permeability ('barrier' film) to retain the insecticidal atmosphere and be well sealed to prevent insects laying eggs through the smallest of breaks. Another approach is to pack the product in barrier film and include a sachet of Ageless®, which is a form of modified atmosphere packaging that removes the oxygen from the air in the pack, leaving only nitrogen.

5.2 Quality assurance

Quality assurance of products entering the marketplace is becoming increasingly important. Consumers of agricultural produce need to be assured that the products they buy meet their expectations for safe and wholesome food.

Large supermarket chains and export markets are starting to demand that goods be produced in conjunction with a system that offers full traceability.

As Australia develops new export markets, it must be remembered that many of the countries that import our produce now enforce quality specifications more rigidly than ever before, and failure to meet specifications may see the loss of these markets. This is just as relevant for organic produce as it is for conventional produce.

Organic producers wishing to receive training in quality management can participate in National Organic Auditor Training workshops (accredited by the National Association of Testing Authorities) and the Independent Organic Inspector Association's Organic Training workshops.

Quality assurance of organic products is crucial to ensure that there is no contamination by products excluded from the standard. Among the potential risks are pesticide and microbial contamination and contamination with genetically modified or conventional product.

An important aim of any quality assurance program is to eliminate problems before they occur and, if possible, to reduce reliance on end-point inspection (quality control).

5.2.1 Quality

[This section is reproduced from *Marketing Organic and Biodynamic Products: conference proceedings* (NSW Agriculture 1997). Joseph Ekman, Extension Horticulturist, Quality Assurance, NSW Agriculture, contributed what follows.]

Quality is no accident. Climatic conditions may vary from season to season but product quality is essentially the end result of investment of money, time and labour. Quality can only be achieved consistently and efficiently through managing the activities and inputs that affect quality from the field through to the customer. Consistently achieving the 'right result' requires planning and implementing a quality system.

'Quality assurance' can be defined as 'all the planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality'. Quality assurance requires the planning and implementation of a quality management system.

Every producer has some kind of informal quality system in place. More often than not this information is stored 'in the manager's head'. A formal, auditable

quality system requires production and post-harvest operations to be planned, documented, implemented, verified and certified to a recognised standard.

Management to satisfy a standard is familiar territory for organic and biodynamic producers certified to the National Standard for Organic and Biodynamic Produce or respective group standards. However, there are numerous other quality system standards in operation, all of which are based on similar principles. Figure 4.1 illustrates the principles generic to most quality systems.

Why develop a quality system?

Agriculture in Australia has been changing rapidly in recent years and the pace of change continues to accelerate. These changes include:

- changes in consumer preferences for products
- increased production and geographical spread of many crops
- government retreat from enforcing product quality standards and the push to market self-determination on quality
- increased competition from imports.

These forces are changing the way Australian producers market their crop. Many of the problems facing producers can be tracked down to a failure to research and understand what their customers really wanted. Australia has earned a poor reputation in overseas markets because of variations in product quality, poor or patchy market service history, and a poor understanding of market-specific requirements.

Changes on the domestic marketing scene are also putting greater pressure on producers to supply products of consistent quality.

Chain stores (supermarkets) continue to capture market share in fresh produce retailing, and they prefer to supply of long lines of consistent quality product. As their market share grows, chain stores are demanding rigid standards for the products they buy. They want to know that the products they sell meet their consumers' expectations, in order to gain consumer loyalty and repeat purchases.

Purchasing long lines of consistent quality products can also simplify their handling and distribution logistics, reduce wastage and reduce operating costs.

Rising production costs are also putting pressure on growers to improve their quality consistency to remain competitive.

The threat of an industry collapse from oversupply is forcing producers in many industries to look overseas for new markets. There is no doubt that successful penetration of export markets will require close attention to the needs and expectations of customers.

The major challenge for the future of Australian producers is being able to supply consistent quality products and service to markets.

Forces driving change in agricultural industries

Group marketing

- strength in group marketing
- demand for long lines and continuous supply
- brand establishment—product differentiation

Retailing

- consumers and health authorities demanding safe, quality foods
- less consumer time to shop around—one-stop shopping
- direct sourcing of produce from farms—contract growing/

- alliances
- use of product specifications

International trade

- decreasing tariff and trade barriers (WTO)
- opening of new markets
- competition (domestic and international) and declining global market share

Business environment

- need for profitability/efficiency gains

- increases in production and market saturation
- *quality* replacing *price* as the competitive advantage
- government deregulation of industries

Quality costs

Quality costs! However, the costs of quality and getting it right must be assessed relative to the costs of quality failure. All quality systems are a balance between the cost of getting it right and quality failure.

The three categories of quality costs are:

- prevention costs—the costs of preventing quality failure, including the planning and maintenance of a quality management system and certification
- appraisal costs—the quality control costs of ongoing monitoring of products and services such as product testing and inspection from production

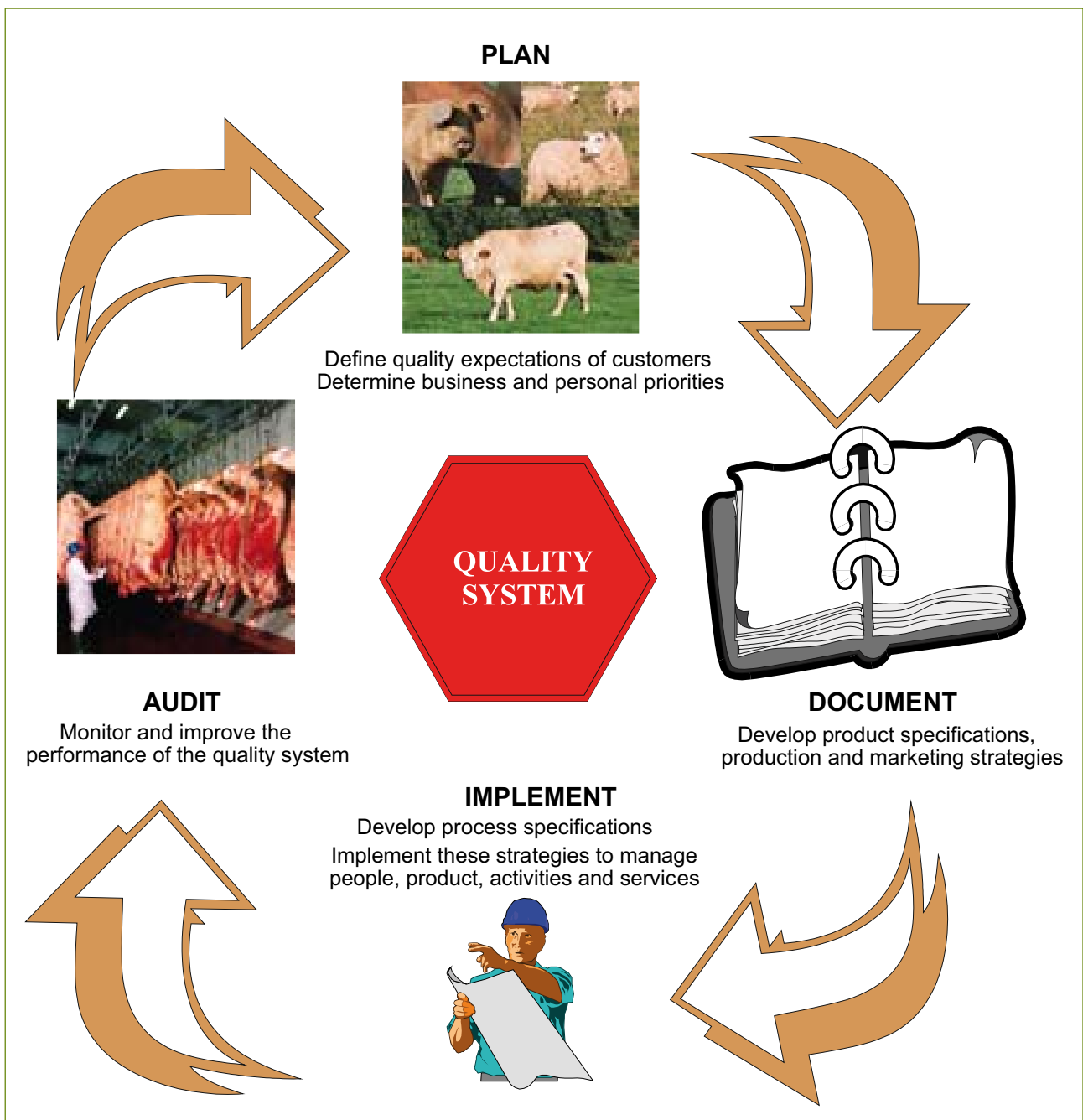


Figure 5.1 The quality system cycle. Source: Adpated from Ekman 1997

to marketing

- failure costs—the cost of final products or services that do not satisfy customer requirements. Failures detected before the product reaches the consumer are termed ‘internal failure costs’. Failures that result in dissatisfied customers are ‘external failure costs’.

Quality costing provides a basis to assess the value of a quality system to an organisation and to assist management to identify opportunities for efficiency gains and cost reductions. The key to improving quality and profitability is failure prevention.

A quality management system increases the prevention costs in a business but, when the system is implemented effectively, the cost is more than compensated for by reduced failure costs, operational efficiency gains and increased competitive potential in the market.

Quality system benefits

The following are some of the main benefits of failure prevention achieved through quality management:

- improvement in product consistency
- improved competitiveness and ability to adjust to market change
- enhanced reputation in the market
- reduction in liability risks
- reduced wastage and rework of products
- process efficiency gains
- decrease in labour and material costs
- improved employee involvement and morale
- improved return on investment.

Quality systems are a tool businesses can use to provide the assurance customers want. By

focusing on managing activities that affect safety and quality, the quality system helps organise the way things are done and provides organisational confidence in the ability to consistently provide the goods and services customers require.

Elements of quality management systems

Quality plans. A quality plan (manual) sets out the policies, resources, practices and responsibilities for the business to meet its customers’ requirements for products and service. Appropriate quality system plans can make the difference between an easy-to-use system and one that sits on the shelf.

Product specifications. Specifications are a tool for improving customer–supplier relationships. The important feature of specifications is that they objectively define the requirements of a product, thereby avoiding confusion. They also provide a means of objectively monitoring performance in meeting the specifications.

Management and staff.

Improvements can be achieved only if management and staff are working toward similar goals. A successful business—with a reputation for quality—provides better job security and job satisfaction for employees. When the whole organisation runs smoothly and everyone is involved the success helps build confidence and teamwork. Management must ensure staff have a clear understanding of what is required of them. Many managers often underestimate the contribution staff can make to the business when given the opportunity. Being part of the quality system from the beginning lowers staff resistance to any improvements or changes to be made and often improves morale.

Customers and suppliers. Customers and suppliers are other links in the production, delivery and marketing ‘supply chain’. It is important that suppliers know what their customers want if they are to reliably supply products of the quality expected. Often it is the supplier who must ask the customers what they require and seek feedback on how well the requirements are being met. Most unhappy customers don’t complain—they simply don’t come back. In the same way that a business needs to understand what its customers’ requirements are, the business must also define the qualities of products it uses and communicate its expectations of quality to its suppliers via specifications.

Documentation. Documentation can help make decisions, assist in running the business, and help staff do their job. More paperwork does not, however, mean better systems. One of the aims of a quality system is to reduce wastage, so it is important not to create excessive paperwork. People drive a quality system—not paperwork. One of the main functions of documentation is to help improve communication. This overcomes problems of poor verbal communication and memory failures. Documents are valuable tools in that they record what has to be done and what has been done.

Quality system standards

There are a number of quality, food safety and environmental management systems that affect Australian agricultural industries. Key established and emerging standards and codes of practice include:

- ISO 9000:2000 and ISO14001
- Safe Quality Food 2000 and 1000
- Woolworths Vendor Quality Management Standard

- CATTLEcare/FlockCare, Freshcare, Graincare, and so on—HACCP-based codes of practice
- EUREPGAP—for suppliers to European retailers
- many other industry-specific standards and approved supplier programs.

The systems implemented by a business will need to satisfy the requirements of its customers. Businesses need to expand their definition of ‘satisfied customers’ to include regulatory authorities in regard to food safety and phytosanitary requirements. Food Standards Australia New Zealand (previously known as the Australian and New Zealand Food Authority) is implementing new national food standards in the food service and processing sectors. It is also developing a framework for the establishment of ‘Primary Production Standards’.

HACCP

Food safety plans are conventionally developed in food industries using the HACCP technique. HACCP stands for the Hazard Analysis and Critical Control Point method of food safety management. It is a step-by-step risk analysis and control technique used in food industries worldwide to analyse processes and so identify food safety risks. It is a pro-active management technique for preventing hazards from occurring and reaching consumers, rather than reactive (fire-fighting) management methods of damage control. HACCP requires an objective assessment of all biological, chemical and physical hazards to human health throughout a business’s operations and the development of appropriate control, monitoring and data recording strategies. As a risk management tool, HACCP can also be used to assess risks to product quality and

environmental risks. The HACCP technique applies the following seven principles:

- Conduct a hazard analysis—identify all biological, chemical, physical and quality hazards.
- Determine the critical control points—the points in the process where risks are likely to occur.
- Establish critical limits—boundaries/tolerances for safe operation at the critical control points.
- Establish a system to monitor control of the critical control points.
- Establish the corrective action(s) to be taken when monitoring indicates that a particular critical control point is not under control.
- Establish procedures for verification to confirm that the HACCP system is working effectively.
- Establish documentation concerning all procedures and records appropriate to these principles and their application.

A HACCP plan essentially requires asking at each point in the process:

- What safety or quality hazards are associated with this process?
- Which of these hazards are significant and likely to occur if not controlled?
- What must be done to control these hazards to an acceptable level?
- What records or evidence are needed to demonstrate that the hazards have been controlled?

Implementation of HACCP is guided by scientific evidence of the risks. The intent of HACCP is to focus control at critical control points. The individual operations within a business are identified, and HACCP principles are applied to

each specific operation separately. Consideration must also be given to raw material inputs such as water, fertilisers, packaging materials, and so on, which may be the source of problems. Hazard control measures may potentially introduce new hazards of their own and must also be considered.

When a significant hazard is identified in a specific operation, control measures must be established that prevent, eliminate or reduce the hazard to an acceptable level. The critical limits (tolerances or safe operating limits) for that operation must be established to maintain control of the hazard, and an appropriate monitoring and recording procedure must be developed to confirm that hazard control is achieved. Sometimes the monitoring may indicate that hazard control was not effective—that is, the operation exceeded critical limits for safety or quality—and corrective actions are required. Corrective actions are planned responses to a breach of safety or quality limits and the response must:

- identify the affected product
- determine what is to be done with affected product after assessing the severity of the problem
- determine the origin of the problem
- take the necessary action to prevent the problem from occurring again.

The intent of HACCP is to systematically build safety and quality into a food operation to minimise the chances of unsafe product entering the market. HACCP plans are fully compatible with quality management standards in food businesses for ‘control of production’ requirements. HACCP plans can work in combination with other support programs such as:

- good manufacturing practices
- pest control programs
- staff training
- cleaning and sanitation procedures
- calibration programs
- preventative maintenance programs
- document and record control

They can also constitute a business's Food Safety Plan.

Development of a HACCP plan will identify the requirements of a business to implement these support programs. The food standards will require all food production and handling businesses to develop an auditable food safety plan. The degree of complexity required in a food safety plan will reflect the complexity of business operations and the type of product and its associated risks; that is, the food safety plan for a small grower may be far simpler than that for a larger, more complex operation, although the same principles apply.

5.3 Environmental management systems

[This section is reproduced from *Marketing Organic and Biodynamic Products: conference proceedings* (NSW Agriculture, 1997). Genevieve Carruthers, Environmental Management Systems Specialist, NSW Agriculture, contributed what follows.]

Environmental management systems (EMSs) are based (in general) on the principles of total quality management (Netherwood 1996). The British Standards Institute (1994, cited in Netherwood 1996) defines an environmental management system as 'the organisational structure, responsibilities, practices, procedures, processes and resources for determining and implementing

environmental policy'.

This definition, describing British Standard 7750 (which has now been withdrawn with the ratification of ISO 14000), is similar to that which could be applied to the Eco-Management and Audit Scheme (EMAS) and to Canadian and Irish environmental management standards and guidelines. All these schemes follow the total quality management loop approach—that of plan, do, check and act. A feature of the ISO 14000 standards is the requirement to achieve continual improvement of the system and therefore in the environmental management overall.

Whereas quality control and assurance programs have focused mainly on the production of consistent goods and services, environmental management schemes have a broader focus—that of examination of the whole process of production of goods and services and the effect of that production on the environment. That is, not only will goods be produced according to the same set of standard procedures, but the effects of producing that product, be they pollution, use of resources, or transport of the completed object or delivery of the service, are also taken into account.

In agriculture, the growing of beef cattle is an example. Not only does (or should) the farmer want to be able to produce a consistently high quality product, but s/he should also consider the way in which the cattle are treated during the production period, the effect they have on the soil, water and air quality on and off the farm, ways in which the cattle are transported, the potential impact other farm activities might have on the cattle (use of pesticides, for example), packing of beef produced, and so on.

In their development, environmental management systems

all follow much the same path. In the case of ISO 14000, there are five steps to developing and using an EMS:

- *Commitment and policy.* Here commitment is developed at all levels of the business or enterprise, from management down to the most junior levels. The policy is defined and developed.
- *Planning.* This is where the policy is translated into things to be done. A number of steps are usually involved, from a review of the environmental aspects and impacts of the business, the identification of legal requirements for compliance and the setting of objectives and targets through to establishing the environmental management program.
- *Implementation.* This is the 'doing' of the plan. This phase requires the provision of resources and support mechanisms to ensure that the environmental management plan is achieved and may include staff training programs to ensure that the objectives of the policy and plan can be met.
- *Measuring and evaluation.* This phase checks to see if the objectives and targets previously established are being met. Such methods as environmental performance evaluation, laboratory analyses of emissions, financial records examination and staff understanding of training programs may be used to assess whether the environmental plan is being met.
- *Review and improvement.* Here the data gathered in the previous phase are put to use. Were targets met? If not, why not? What can be improved? What worked well and why? ISO 14000 specifies that continuous improvement of

the management system—note: not the environmental performance—is required.

The various environmental management systems differ in how prescriptive they are with regard to the ways to achieve improved environmental management. ISO 14000 does not specify particular environmental targets; these are set by the person/company/business setting up the EMS. However, all schemes do require that the EMS developed must use as minimum standards legislated requirements and/or (if available) industry codes of practice or best management practice.

In the case of an organic farmer, the required specifications would be one of the AQIS-accredited organic certifying organisations' standards, in addition to any current legislation (federal or state), as well as industry codes of practices to suit the particular enterprise.

Use of EMSs and organic farming to achieve environmental health

The use of EMSs is one tool in a range of methods designed to facilitate the management of agricultural land, using a system-based approach rather than focusing on crisis management. Organic farming is also a way of examining the whole system of farm operations, starting with soil health and its overall effects on farm components through to all facets of production. The difference really is one of degree: use of an EMS is not prescriptive in terms of what can be used on the farm but does specify that all operations and processes used on the farm need to be considered in the light of their potential impact on the environment—the so-called cradle-to-grave approach.

Organic farming may look at all those elements but, to gain organic certification, there are a number of

products and farming practices that cannot be used. This does not mean that use of an EMS cannot be made effective on an organic farm, but it does mean that using ISO 14000 as a guide will not result in an organic approach, unless that is the stated intention of the system in the first place and actions are matched to the chosen organic standard.

5.3.1 Conclusion

Changes in the expectations and buying behaviour of consumers are affecting agricultural producers. The globalisation of food supply and the changing structure of fresh produce retailing in response to consumer trends are creating new challenges and dilemmas throughout the food supply chain. Research indicates that buyers are becoming more discerning about quality from the health and eating perspectives, with food safety increasingly the primary concern.

Opportunities exist for organic and biodynamic producers to capitalise on these market trends through their 'clean and green' image. But close attention to customer requirements for quality and consistency, coupled with the need to satisfy food regulatory authorities in relation to food safety, are needed if this potential is to be realised.

Quality systems cost time and money, although these costs must be weighed against the substantial

financial and potential legal costs of getting it wrong. Quality management is pro-active. Use of HACCP-based quality systems can accommodate food safety, food quality and business objectives.

The pace of implementation of formal quality management systems for quality assurance in agricultural industries is rapidly increasing. Quality assurance does not guarantee market premiums but increasingly will determine market accessibility. Quality management is rapidly becoming an essential tool for producers in all food industries who want to remain in the food industry and stay competitive.

5.4 Marketing

Organic producers use a variety of marketing techniques. The market destinations are domestic (local and interstate) and export sales. The following are among the domestic distribution channels for organic produce:

- direct farm sales
- local, regional and city farmers' markets
- wholesale and retail
- processors
- home delivery
- internet sales
- mail order.

Some producers add value to their farm produce on the farm. Others tend to do little on-farm value-adding. Some farmers cooperatively



Value-adding expands the range of products but requires extra marketing focus. Photo: MacDonald (2002)

sell their produce to processors, who then add value by processing (snap freezing, for example) and packaging the product.

Quality, continuity of supply, product range and service are central concerns for purchasers of organic products. Many consumers bemoan the fact that a regular, year-round supply of consistent-quality product is often unobtainable.

The Hot 50 Farm Marketing Tips (Australian New Crops Newsletter)



Issue No 11, January 1999.

NOTICE: Hard copies of the Australian New Crops Newsletter are available from the publisher, Dr Rob Fletcher. Details of availability are included in the [Advice on Publications Available](#).

12. The Hot 50 Farm Marketing Tips

[From: 'Sell What You Sow! The Grower's Guide to Successful Produce Marketing,' by Eric Gibson. Published and available from:

New World Publishing
3037 Grass Valley Highway 98185
Auburn California 95602 USA
Price: \$US22.50 + 2.50
Telephone: 1 530 823 3886
Email: egibson@jps.net
Web Site: <http://www.jps.net/grower>
Free catalog available: 'Books To Grow On'

1 Sell before you sow!

Don't plant one seed until you know who your customers will be. Match your sales volume to the market, plan ahead and anticipate what you can sell to your outlets.

There's nothing worse than producing a crop, only to find out that you can't sell it.

<http://www.newcrops.uq.edu.au/newslett/ncn1112.htm> (1 of 1917/01/2007 11:18:55 PM)

An excellent read is Eric Gibson's *Sell What You Sow! The Grower's Guide to Successful Marketing*. Eric provides 50 farm marketing tips that should be compulsory reading for marketers. They can be found at the Australian New Crops website <<http://www.newcrops.uq.edu.au/newslett/ncn1112.htm>>.

5.4.1 Production and supply pathways need to be defined

[This section is from a presentation by Barry MacDonald, formerly Market Development Officer, NSW Agriculture, to the Organic Production Workshop (Rangeland Livestock), Hay, September 2002.]

Focus on pathways

Consumers are the focus of production pathways. Consumer protection is paramount. Pathways need to be defined. This includes on-farm practices. The direction of

pathways needs to be determined, and guidelines and specifications need to be developed to meet these requirements.

Communications

Communications/documentation must be developed to facilitate the marketing process. The origin of the product needs to be verifiable, so a system of full traceability is essential. Organic producers need to be able to prove the organic history of the product in order for consumers to have confidence in the product. Accreditation and certification will achieve this. Marketing and promotion of the product should be undertaken by the producer or supplier. Use personalised logos on labelling; tell 'your story'.

Substitution

Substitution is occurring in the marketplace—non-organic meat being sold as organic, mislabelling of cuts, and so on. Producers must have confidence they can prove their accreditation and the authenticity of their product. Truth in labelling and the correct naming of the product are essential.

Processing specifications

Processing specifications for a product involve establishing guidelines at key points in the production pathway. These include the farm, transport, slaughter, boning room, during any further processing, packaging, distribution, at the retailer or purchaser, and during the display of your product. Feedback sheets provide an opportunity to gauge consumers' response to the product but can also be included at other key points in the pathway. Maintaining awareness of how the product is performing at all key points is essential.

Further processing (value-adding)

As a producer, you need to determine if you will produce traditional market cuts and/or

value-add to product cuts. Value-added products include prepared meals, heat-and-serve cuts, pan-ready cuts, and oven-prepared and gourmet (for example, pate) products. If the product contains other ingredients, such as herbs, and is being marketed as organic, proof of the other ingredients' organic certification is also required.

The consumer

Consumers must be willing to pay for the organic product. This will tend to limit markets to health-conscious, middle and upper class consumers. It is important to identify where the greatest demand will be—for example, in affluent suburbs. Currently there is a limited variety of organic meat products in the marketplace. Your product needs to have purchasing appeal (presentation, and so on) and you need to instil confidence in your product to consumers. Information such as cooking methods can accompany the product. A consumer who is happy with the product will come back for more.

Conclusion

Yes, there is a market. Pathways between the producer and consumer need to be defined and developed. Market specifications, codes of practice and quality assurance need to be developed. It is important to gain credibility with your product in the marketplace. Marketing alliances allow producers to supply year round. These will work, however, only if the producers work together to develop the market pathway, become involved and are aware of the program. Communication is essential throughout all of the supply chain. The New South Wales Department of Primary Industries Lamb Development Team can help producers establish alliances and develop market specifications and pathways.

5.4.2 Developing supply chain alliances

Producers can benefit from developing marketing alliances. Such alliances allow producers to work together to research, locate and gain access to markets.

Production alliances give purchasers of organic products access to a range of goods through one avenue and the potential for a year-round supply.

The group must be active and maintain communications and interest in the entire marketing process. Follow the product throughout the marketing pathway—all the way to the consumer, to track its performance. Be prepared to diversify.

Supply chain management: the key to successful marketing

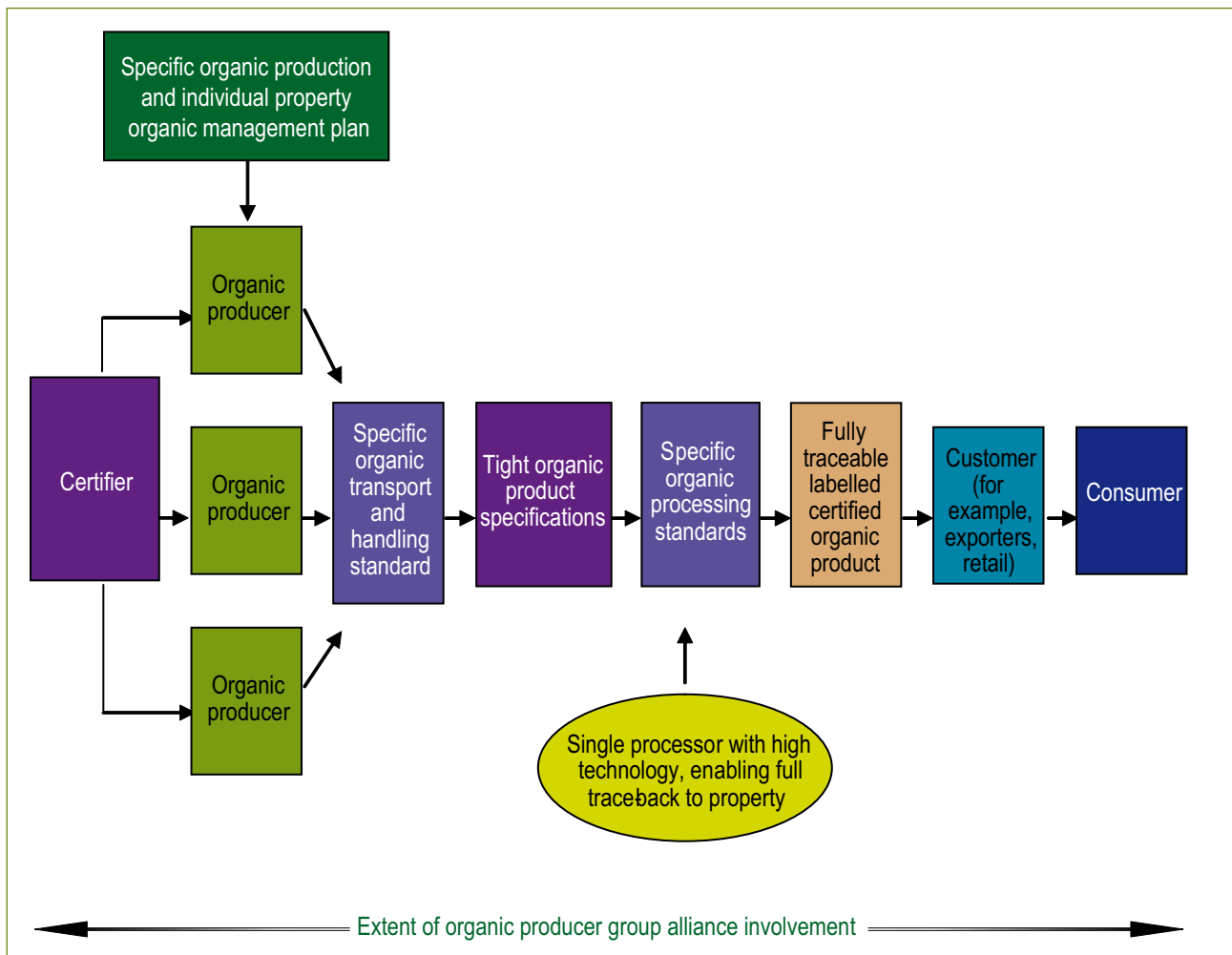
The key to successful marketing, whether as an individual or as a group, is effective supply chain management. Figure 5.2 shows a supply chain model for organic livestock products. Supply chain management can be defined as ‘an integrated approach that aims to satisfy the expectations of consumers, through continual improvement of processes and relationships that support the efficient development and flow of products and services from producer to consumer’ (Department of Primary Industries and Energy 1998).

The following are important considerations for organic producer alliances seeking to export organic meat:

- organic credibility
- year-round supply
- selection of a processor sympathetic to their aims
- selection of suitable trading partners.

Organic credibility

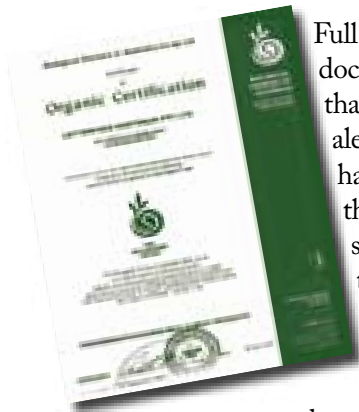
Producers must understand and implement an organic certification scheme that meets their requirements as well as those of their customers. Ideally, a single certifier should certify each property in the producer alliance. Not all importing countries or customers recognise the standards of each Australian certification organisation, so it is important to choose a certifier whose standards are recognised by the country where or the customer to whom the product will be sold.



Source: Adapted from Pahl (2000).

Figure 5.2 The supply chain model concept for organic livestock products

Specific standards may need to be developed, and endorsed by the certifier, for the transportation and handling of livestock. It is advisable to conduct trial runs of produce to expose any potential problems that could breach its organic status.



Full documentation that clearly alerts stock handlers to the organic status of the system is also needed. Clear

and precise documentation will assist with the marketing of the product, and the group will be able to demonstrate to potential customers the full traceability of the organic product.

Year-round supply

Consumers are unlikely to be interested in a product for which year-round supply cannot be guaranteed.

Cooperation between members

in a producer alliance is the key to obtaining a year-round supply of quality product. Finishing of livestock needs to be scheduled within the capacity of each individual property: people will manage their operations to grow and finish within the capability of their resource base. This might, however, vary from season to season and locality to locality.

In order to have a year-round supply, year-round production data for each property should be thoroughly assessed and all options should be investigated. Agistment on other group members' properties might be necessary if feed is low or unavailable. Alternatively, other members might have the capacity to produce hay to supply others in the group.

Choosing a processor

The processor chosen must understand the requirements of the group and the product. They need to be innovative and accept that the producers want to be involved throughout the entire supply chain. They also need to agree to be certified to process the organic product and have the requisite

export clearances for the markets the group is targeting.

If not already certified to process organic products, the processor should establish procedures and standards that ensure the segregation of the organic product throughout the processing plant, including packaging and storage for shipment. Full traceability to each farm, and even paddock, will need to be demonstrated. Table 5.1 lists some criteria to consider when selecting a processor.

The right customer partnership

Exporting product requires selecting a partner in the country of destination who meets the needs of the group and the product to be marketed. Travel to the importing country is essential to research partnership options and to ensure the product is delivered in the right manner. The producer group will need to determine if it will deal with a trading house or direct with wholesalers, supermarkets, food service chains or some other distribution outlet. When selected, prospective partners should be formally presented with product samples at a product launch.

Table 5.1 Criteria for choosing a processor

Criterion	Comment
Export clearances (non-European Union)	General export, US Department of Agriculture, and so on
European Union export clearance	Able to trade in European Union markets
Halal certified	Able to process for Muslim markets
Adequate chiller storage space	Capacity of chilled storage
Access—involves minimal steps to get animals to plant and good direct rail access	Location vis-à-vis railheads since some will travel by rail
Current technology and processing capability	Current level of technology, standard of facilities, equipment, systems
Capable and willing to implement state-of-the-art packaging and other systems	Attitude towards implementing new packaging and other systems if these are needed
Marketing expertise and networks—international and domestic	Level of demonstrated marketing (as against commodity selling) and the scope of in-market networks evident
Financial stability and long-term viability	Financial stability and capitalisation
Able and willing to process small volumes or lots competitively	Attitude towards starting small in order to build business later on
Able and willing to implement full traceability and chain audit systems	Attitude and technical capacity to provide full trace-back on all products processed
Willingness to comply with stringent testing regimes	Attitude towards the flexibility needed to comply with organic testing requirements
Ability to achieve organic accreditation according to certifiers standards	State of plant and procedures and attitude in terms of ability to pass certifier's audit and gain organic accreditation
Sound image and high standard of facilities	Company's reputation and standing in the markets
Sound ethics and business practices	Business ethos, ethics and credibility
Motivated, open-minded and able to share the group's vision	Ability to see the potential and get involved in building new business in organics
Experience with alliances with producer groups	Past experience and attitude to working with producers who want to maintain ownership and have transparent systems
Innovative and willing to be proactive about change and new technologies	Attitude to change and doing something new and different, willingness to proactively find a new model

Source: Pabl 2000

5.5 Product promotion, packaging and presentation

[This section is reproduced from *Marketing Organic and Biodynamic Products: conference proceedings* (NSW Agriculture 1997). Catriona Macmillan, Heaven & Earth Systems P/L, contributed what follows.]

Key elements in selling organic products are promotion, packaging and presentation. Organic products generally command a premium in the marketplace. Consumers paying a premium price expect a quality product that looks well packaged and presented. Further, the consumer needs to be educated about why they are buying a premium product—promotion. Consider a number of promotional ideas:

- *The product being sold is organic, so put the word 'organic' on the label.* Research has shown that 12 per cent of Australian consumers are interested in organics. It is up to you to harness that interest into profitability. The competition is tough, a world of multinational companies who can and do spend millions trying to convince the consumer their product is what our product really is—environmentally responsible, natural, clean and green. Organic is unique product and needs to be promoted as such.
- *Participate in joint promotional opportunities.* Organic farmers have regularly participated in and promoted their produce at the Royal Easter Show in Sydney, which over 1.7 million people visit each year. Your participation not only gives your products and produce exposure but educates the consumer.
- *Tell your story; this is what makes your product interesting.*



Organic farmers selling their produce at Lismore's Rainbow Region Farmers' Market. Farmers' markets offer producers a personal approach to selling their produce. Photo: R. Lines-Kelly

Consumers love to hear your story. The consumer wants to be able to say, 'I made this little dish out of organic rice. The rice farmer doesn't burn the stubble, just allows it to build soil fertility', and so on. Remember you are selling your product/produce to processors, exporters, wholesalers and the consumer, whether it is a brochure, a label or your letterhead, the consumer wants a story. Why do you grow? Why do you care? How do you grow? You don't have to reveal all. A graphic and a few words can say a lot.

- *Promote your farm using farm tours, open days and school tours.* Excellent examples of farm tours are Montrose farms, Kiwi Down Under and Glenbye. Montrose farms offers 'pick up your own berries in picking season', 'tour of the charming 1860s homestead' and 'bed and breakfast'; they also offer 'afternoon teas, with hot country-style scones and homemade berry jam' and you can hold your 'wedding reception on the lawns'. Kiwi Down Under has won numerous tourist awards, and 12 000 people go through a year. It

has a tea house, organic food market, informative farm tours, animal feeding and nature walks. Another highly innovative farm, Glenbye offers 'Glenbye Getaway Tours', a package including air fares for parties of ten. Riverina organic rice farms regularly host tours for Japanese farmers and overseas trade delegations.

- *Promote your farm and produce.* Send brochures or newsletters to your local library, schools and tourist office. Advertise with your state tourist board and holiday magazines. Develop a mailing list, including everyone who has visited your farm in the past, and post a newsletter ... to inform people of new products or dates for the next 'pick-your-own weekend'. You could include some other local events or sights in your area. Investigate any ecotourism projects in your area. Do you have any features that the Eco Tourism Association of Australia would endorse? Hold open days and field days: organise your own or look for opportunities, for example, in 2001 ABC open farm schemes

held their annual farm open day with four Victorian organic farms. Let the local paper know of any special events, attach a brochure or newsletter to a very brief and simple press release. Start a school farming project to encourage visits.

- *Mail order delivery.* In the United States and the United Kingdom a great deal of trading in organics is done by mail order. Producers advertise in the major health and gourmet magazines.
- *Promote yourself on the world wide web.* American and European companies have mail order, home delivery and promotions on the web. If you have a website, you could include your web address on your label. In Australia some trading and information sites are being developed.

What product?

Identify the trends, choose the market for your product, and package and present your product in a way that will sell it. In other words, are you planning the right product, and are you growing produce that will sell next season?

Note what organic products Australia is importing—for example, organic cornflakes

from the United States and the United Kingdom. We also import tomato sauces, salsas, olive oil and Californian dates, and we pay a premium for them. Note how these products are presented. Why will a consumer pay \$6.50 for imported organic cornflakes? The packaging and quality account for a lot.

Remember, fads and fashions change. Investigate, look at conventional models: pasta sauces hardly existed on supermarket shelves in the early 1990s, but look in the supermarket now. Chilled, and partially prepared, dishes are filling the shelves. Consumers even want to buy salad dressing ready to pour. As Reg Clairs, CEO of Woolworths, said, 'Meal solutions will be the single most important revolution for supermarkets over the next five years'. People want dinner on the plate, not the ingredients in the shop.

As organic producers, are you investigating organic meal solutions, frozen meals, frozen vegetables, salad mixes, dips, deserts, pasta meals, chilled vegeburgers, as well as the more traditional deli ranges of chutneys, jams, sauces and pickles? What about frozen juices, fruit juices, muesli bars and cornflakes?

If you are investing in labour and machinery, invest in research and advice too. Include packaging and marketing in your costing.

Farmer and consumer need to get together: look for every opportunity to find out what the consumer buys. Ask your friends, everyone you meet; ask them why they buy. Visit the city.

What supermarkets need

Recently a spokesman for Coles Myer Ltd said they were now working closely with smaller food companies in a bid to offer a wider range of products, particularly at the gourmet fresh food end of the market. Unlike the big brand names, which offer special marketing deals to the supermarkets to claim the best shelf positions for their products, organic businesses have not spent millions on advertising and promotion. Some supermarkets will expect you to give in-store demonstrations and food tastings.

Supermarkets usually trial a line for a season to see if it sells: if not, it is out. They also have specific packaging needs—for example, barcodes and particular sizes and shapes for stacking.

A reliable and regular supply

In Britain the success of fresh organic fruit and vegetables in supermarket chains was the result of a wholesaler checking what the supermarkets needed. The wholesaler packaged the produce so that it could be easily identified as organic and stacked easily and also provided efficient and reliable delivery system. Sainsburys, a UK supermarket chain, has sponsored major organic industry events and has a program in operation to encourage conventional farmers to convert.

When Sainsburys advertises nationally it simply lets consumers



Organic meal solutions: heat and serve, a trend for the future? Photo: MacDonald (2002).

know it sells organic as part of its range. It also sponsors the organic industry to promote and educate the public on the value of organics.

What department stores need

Packaging, shelf life and presentation are just as important to department stores. David Jones is very interested in a line of organic flour that comes in calico bags. It thought the 'calico' look outweighed the problem of stacking and shop soiling—that is, the bag looking grubby from dust—although the top-stitching has to be sewn straight and parallel to the edge. The buyers for David Jones have said they would order more organic products if the labelling and packaging were improved.

Myers' preferred packaging for Glenbye's organic wool quilts is a firm, transparent plastic case rather than a calico case. Why? Plastic will not become shop soiled, it can be dusted, it can stay neatly stacked, and it can be handled and still look bright and shiny over time. Using plastic rather than calico may seem an environmental contradiction, but shop soiled means selling at a discount.

What small shops need

Customers like variety. They come in to be entertained: a fruit and vegetable shop is like a theatre with live daily performances—the display. What is needed is a constant supply of quality staples plus something new and seasonal. Find ways to have your produce tasted.

Brochures, newsletters and logos

Prepare a simple but professional-looking brochure explaining what your farm sells, plus 'your story' and who you are certified by. Use it like a business card. Or send a leaflet providing recipes out with consignments.

Newsletters could be posted,

perhaps quarterly. Tell readers about the harvest, any new products, what is in season, field days, and so on. Select dates for farm tours, explain why you dug in your lettuces, as opposed to spraying after a bug invasion; and why there were no carrots last month. Do you do mail order? Include your latest product list with your newsletter. Macro Wholefoods is a large Sydney wholefood store; its newsletter acted as a brochure and contained a recipe, some Christmas shopping ideas, the business's mission statement, and a map showing the business's location. A newsletter can cost less than a glossy brochure, especially if printed in one colour, and can be more readable, with new ideas presented in each issue.



(Photo: MacDonaid (2002).)

Logos can be a powerful tool for recognition. Personalise them and they can leave a lasting impression. Note that, when selling to different cultures, a healthy green image or name could translate into an inauspicious image. It is also possible to label individual pieces of fruit, to distinguish them from conventional produce.

Seasonality

Some organic food is not available year round. In both Europe and the US 'being in season' has become a selling point. Extending supply could include processing the product or specialised storage. The Earth Food store in Sydney sells an organic apple pie. As soon as the new apples are in season the regular customers start anticipating the arrival of these freshly baked pies. Consumers need to understand why product is not always available, so it is important to

communicate with the retailer.

The environmental predicament

When it comes to packaging and presentation, there are conflicts between organic principals and retail demands.

- Consumers have high expectations and unrealistically want perfect-looking produce.
- Consumers assume that if it looks hygienic it must be healthy that sterility equates with goodness, and that soil on potatoes and lettuces means germs and work to clean. Fear of food contamination is also a great concern for retailers and consumers.
- Organic broccoli travels better in ice and polystyrene, but what does the polystyrene do for the environment? The consumer wants fresh-tasting and -looking broccoli.
- Some consumers want 'environmentally friendly' claims—such as 'dolphin safe', 'chemical free', 'phosphate free' and 'recycled paper'—because these claims inundate retailers' shelves already.

We need to find ways of responsibly managing these conflicts when labelling and packaging.

Labelling

Following are a few pointers for successful labelling:

- Often the label is built into the packaging, as opposed to being stuck on.
- Always identify your certified ingredients as certified organic.
- Labels need to be attractive: bring in a designer.
- Sell the positives, not the negatives—for example, 'we build soil fertility'.
- Every label tells a story: let your label tell your story.

- Include 'free range' when applicable. The customer often assumes that free range is as good as organic, so explain what your organic poultry and livestock are fed—for example, organic grain on an organic farm. Another misconception is that 'tree ripened' and 'sun-dried' mean organic-type harvesting and no chemical preservatives.
- Take pride in your product. Label and box your produce, and each time your name and product are displayed check the standard.
- Try out a label and package and gauge the responses in the real market—in Bondi, not Bourke. Ask your friends in the city.
- Check packaging and labelling laws in your state. The New South Wales Department of Fair Trading can direct you to the relevant government departments and statutory bodies.

A basic checklist for packaged food:

- name of the food
- the ingredients, in order of

volume

- the name and address of the maker, packer, vendor or importer
- the country of origin
- the batch code
- the sell-by date or a date stamp
- sugar-free, low-fat, and so on, nutritional content—keep claims and information simple, realistic and relevant
- claims that can be verified
- a notice to refrigerate after opening where relevant

If you are exporting, some countries might require additional nutritional information, and the label might need to be in a language other than English.

Promotion and the media

If a story about your organic produce and how healthy it is is published nationally, suddenly consumers want organic. When promoting nationally, promote realistically.

Australia has a small population spread over a large land, so how

can we promote a relatively small industry nationally when it is spread over such an expanse? Industry promotion such as an 'organic harvest' provides an opportunity to promote locally and nationally. Its main purpose is to educate consumers. The organic harvest is a national event where the focus is on promotional events at the local level. Activities are held over a month and can include everyone, no matter how small. Publicity for such events can be generated through networking, coordinated media releases, using celebrities and linking with other promotions.

Assistance with and information about organising these activities can be obtained through specialised marketing and promotions businesses such as Heaven and Earth Systems Pty Ltd, a consultancy specialising in wholefood and organic products and services. It can organise events, show stands, labelling, newsletters, product research and sales and has a team of creative designers, copywriters and marketers on call.



Organic produce in a Woolworths supermarket

5.6 Export help

[This section is reproduced from *Marketing Organic and Biodynamic Products: conference proceedings*, (NSW Agriculture 1997). Jim Murison, Manager, Agsell*, NSW Agriculture, contributed what follows.]

When thinking about export, the first step is to examine the reason for exporting. What are you going to achieve by exporting rather than selling in Australia? Do you have goals you wish to achieve, and within what timeframe do you plan to achieve them? Do you have the funds and time to devote to this project and, importantly, enough product to satisfy the market if you become successful? Can you obtain more product from others if you are not able to meet the requirements yourself? These questions must be part of your evaluation.

Having evaluated your position and decided to proceed, the next step is to select the markets you are interested in and find out if they are interested in you and your product. There may be no demand for what you produce if it is not part of that nation's culture. You also need to determine if the importing country recognises your certifier's logo or if it requires you to carry its logo, in which case there will need to be an agreed equivalence with your certification organisation.

Austrade can provide general information—for example, information on price, packaging, suitability and trends—on the market in locations throughout the world. The information is provided on a fee-for-service basis ... If you have difficulty in meeting this initial cost, exporting is most likely out of your range of options.

Once the market needs are known it is time to inspect the chosen market personally. Taking samples



Display of organic meat products in an Asian supermarket

of your product is suggested if it is possible. Business cards and a brochure in the local language are needed. Introductions to businesses that are interested in your product can be made by Austrade and, in some areas, by the Department of State and Regional Development, as well as Agsell.

Another way of meeting people who could be interested in buying your product is to exhibit at a trade fair. Many are held throughout the world each year. There are often state-organised displays at these fairs, and this can offset the costs involved in mounting a display by yourself. Agsell has organised such displays at selected trade fairs in Japan and Korea, with success for the participants.

Once the contacts have been made the difficult part begins. It involves trial shipments, altering the packaging, changing the size and a number of ingredients, and many other incidentals. A freight forwarder conversant with the rules of your chosen market is essential for forwarding samples and product to your overseas representative.

It will be invaluable in handling problems of customs, quarantine and officials involved in gaining entry to a market. The fee is well worth the service provided. Before agreeing on final orders, a number of trips by both parties to each other's business is essential. Then the real price of each unit can be negotiated.

Often Australians give a price on a take-it, leave-it basis, while Asians will ask for alterations on the assumption that the price offered will cover the alterations. It is also important to keep your brand on a product for as long as possible, so there is no confusion about the product's origins. Follow-up information is highly recommended to keep final sellers informed that it is your product they are selling.

Vital for any producer is a quality assurance scheme that will guarantee to the purchaser of your product that it is safe and of the best quality. It also assures the buyer that what they are buying is the same as the last purchase, since success is based on people returning to buy more.

*Agsell is now known as Primex

New exporters often fear not being paid. Your bank can help in this regard by nominating a number of ways to ensure that you get your money. There is a charge involved, but it is one way to be confident about being paid when you first start exporting. Methods of guaranteeing payment range from letters of credit secured against your consignment to cash transfers, insurance coverage, and even banks paying you the agreed price and then recovering the money from the buyer. Being paid is not usually a problem in most Asian markets.

Agsell's role in the export business is to assist exporters and buyers. It can introduce an Asian buyer to a producer of a product such as organic pasta and assist in overcoming problems with exporting that product. Many overseas groups like to deal with government agencies as a first step in contacting suppliers. Agsell is that first port of call for intending buyers of New South Wales produce.

The same conditions apply to organic products for export as for any other product for export. There must be a market for the product and the price must be high enough for the exporter to make a profit



Organic beef packed and ready for export. Source: Address to Inaugural National Organics Conference 2001. 27-28 August - Sydney, by Simone Tully, OBE Beef

from the sale.

To avoid health problems with a range of foods, consumers in Europe and Japan are buying organic food in the belief that it will overcome food contamination. But organic production cannot guarantee that protection. A quality assurance scheme is required.

The experience in European markets has been that customers want blemish-free products at about the same price as other products. Many supermarkets found this was impossible to sustain and reduced their organic section. The smaller retailer is better placed to source

such products, and it is through these outlets that organic produce has found its market.

The Japanese market is going through an 'organic' phase. Japanese purchasers will want only certified organic products. Suppliers in Japan do not meet the high standards set in Australia. The price offered will often not reflect the fact that the product is certified organic by a recognised Australian organisation. Japan is the largest market for organic produce. There is a limited market in Singapore and Hong Kong, but the rest of Asia is still coming to terms with supermarkets and year-round fresh food.

European markets are large and, because of the wealth and number of consumers, there is demand for organic products during the northern winter. Competitors would be Mediterranean and African countries that are close to the cities of Germany, Holland and the United Kingdom. Many of these producing countries have preferred entry to the European Union, so competing on an equal basis might not be possible.

Agsell is often asked to seek a source of product that is not grown in New South Wales. There could be a need to import planting



Woolworths supermarket shelf with organic cheese and pâté products

material and work closely with research staff to develop the product to meet the buyer's requirement. The intending buyer might also contribute to the research work to help speed up the process of developing a crop.

Export is not for everyone, and a strong domestic base is almost essential before moving to export. Most exporters use the export market for their top-grade product, seeking a higher price than the domestic market. Export can also be used to reduce an oversupply on the home market and establish price stability in the home market. Sending product to export markets on an infrequent, or 'spot', basis rarely pays in the long term, and it does very little to develop a long-term profitable business domestically or overseas.

5.7 Processing requirements

The processing, packaging and labelling of organic product must conform to organic standards. Commonwealth and state or territory health and food safety laws

must also be adhered to.

The national standard states that, in order to be sold as organic, products produced organically '... must be handled in a manner which would prevent contamination or substitution with substances or products not compatible with this Standard'. This means that processing facilities must be pre-cleaned of substances not compatible with the standard prior to processing of organic products and that storage areas for organic and non-organic products must be segregated. Careful identification is also required to ensure that mixing of organic and non-organic products does not occur. To assist with this, the national standard states, 'An operator should have in place a quality management system as an integral part of the organic production system ... and ... this should be compatible with Hazard Analysis Critical Control Point (HACCP) principles'.

The national standard requires that off-farm processing facilities be inspected and certified. Processors must apply for and undergo an

inspection before processing an organic product. On-farm processors of organic products must be inspected and are required to provide a quality management manual for the operation.



Processing and food preservation techniques must comply with organic standards. The use of additives and processing aids is restricted to situations of demonstrated technological need, where food safety might be compromised or where the aids are essential in order to prepare, preserve, or minimise physical or mechanical effects to a product. Sometimes Commonwealth and state or territory law requires the use of such additives.





6. Regulatory considerations

6.1 Export requirements and the National Standard for Organic and Biodynamic Produce

[This section is reproduced from *Marketing Organic and Biodynamic Products: conference proceedings*, (NSW Agriculture 1997). Ruth Lovisollo, then Manager, Food Standards Policy, Australian Quarantine and Inspection Service, contributed what follows.]

The potential for exports of organic produce has increased from a niche market in Europe to wide interest from consumers among a number of Australia's trading partners. To ensure that the integrity of organic produce is not compromised and to meet the requirements of importing countries the Australian Quarantine and Inspection Service requires all organic certification organisations to be accredited for the purpose. A national standard and legislation underpin the third-party accreditation program and provide the mechanism for approved certification organisations to issue certificates to accompany organic produce to importing countries.

The stimulus for introducing an export facilitation program in Australia was created by the increasing world demand for organic produce and the need to provide assurances about the integrity of the product. The European Commission regulations for the import of organic produce into countries of the European Union require the competent authority in the exporting country to oversee the organic industry.

By 1990 Australia had achieved a niche market in the European

Union for organic produce. This market has continued to grow and since that time other markets for organic produce have also opened up. These include Switzerland, Japan, the United States, Singapore, and Hong Kong. All countries are being encouraged to harmonise their import controls for organic produce through the work of the FAO-WHO Codex Alimentarius Commission.

Producers intending to export food or fibre that claims to be organic or biodynamic need to know the following.

The National Standard for Organic and Biodynamic Produce

The Federal Minister for Primary Industries introduced the National Standard for Organic and Biodynamic Produce on 10 February 1992. The 3rd edition of the standard is currently available in draft form.

The standard sets out the minimum requirements for production, processing and labelling of organic produce. It also establishes the minimum requirements for inspection of individuals producing organic products and the minimum requirements for certifying such operators. Any producer or processor who wants to export produce that is labelled organic or biodynamic must demonstrate compliance with at least the requirements of the standard. This is achieved by being certified by one of the AQIS-accredited organisations.

AQIS accreditation

The national standard sets out requirements for industry organisations seeking to become 'approved certifying organisations'.

This is achieved through a system of third-party accreditation. The basic approach to the audit program has been developed by AQIS in conjunction with the industry. The Administrative Arrangements describe how certifying organisations apply to AQIS for accreditation.

Each certifying organisation is audited annually, as required by the European Union. The audit process involves a number of steps to ensure that the organisation and its members meet the requirements of the national standard. Individuals may be involved in one of these steps when AQIS verifies the inspection reports of an organisation on the farm or in the processing plant. By April 2007 AQIS had accredited eight organisations to provide inspection and certification services for a range of organic or biodynamic commodities and production practices. Certifying organisations that are accredited by AQIS are listed in Appendix A.

Legislation

The Export Control (Organic Certification) Orders give 'prescribed goods' status to organic produce under the *Export Control Act 1982*. Any person producing organic goods for export is required to have a quality management system that is audited by AQIS as part of a third-party arrangement with certifying organisations.

All product leaving Australia that is identified by the trade description 'organic' or 'biodynamic', or with words of similar intent, such as 'biological', must be accompanied by an Organic Produce Certificate. The Orders provide the necessary authority for AQIS to delegate the issue of certificates to accredited



AQIS: <http://www.daff.gov.au/aqis>

organisations. Certifiers issue export certificates to the exporter of the organic product.

Cost recovery

Government policy requires that AQIS fully recover its operational costs. These costs are met by the certifying organisations. AQIS recognises the impact of such charges on the industry and has undertaken to minimise such costs wherever possible.

More information

Further information about the export facilitation program for organic produce can be obtained from AQIS (phone 02 6271 6638).

6.2 Permitted inputs

Although organic production standards promote non-reliance on external inputs, they do acknowledge that some intervention might be required at certain times during production. This could particularly occur during the conversion phase. The national standard provides lists of permissible substances for correcting soil fertility, for combatting pests and diseases, for sanitation, storage and handling, and as processing aids.

Requirements for use of inputs are defined in the standard. Inputs are classified as permitted without restrictions on use or permitted providing specific conditions of use are met. Appendix B lists the permitted inputs.

Various commercial products containing the permitted substances have been developed, and certifying organisations have approved the use of some of these substances. All inputs must be recorded in the farm diary, and it is advisable to have any input approved in writing by the certifying organisation before using it.

6.3 Other regulatory considerations

As is to be expected, organic farmers are subject to the same legal requirements as other farmers. State, territory and federal laws relating to things such as health and food safety, noxious weed control, fruit fly, feral animal control, exotic pest and disease outbreaks, and pesticide use must all be obeyed.

In some instances the use of chemical controls might be the only option for an organic producer. If a non-permitted chemical must be applied, the certifier must be notified immediately and, although certification will be withdrawn, it might occur for a limited time only or apply only to a specific part of the farm. In some instances the certifier might be able to negotiate with the statutory body responsible for administering the law to find a solution to the problem. Sometimes a non-chemical solution is possible. This needs to be clearly explained to the responsible statutory body, and a 'win-win' outcome will have to be demonstrated.

6.3.1 Vertebrate pest control

Vertebrate pests such as pigs, goats, foxes, kangaroos and rabbits can cause economic loss and environmental degradation if their numbers are not contained.

Some Western Division producers are managing feral animals to their economic advantage.

Pigs shot in the wild can be used for their meat if the appropriate facilities are nearby: in 1990 Australia exported more than 1500 tonnes of wild pig meat to European countries.

Goat meat production has replaced sheep production on some holdings and targets local and export markets. Feral goat exports in recent years have been valued at about \$26 million.

Kangaroos are harvested for meat for human consumption and pet food and for their skins.

Wild pig, goat and kangaroo could have potential for premium organic markets. There is, however, a trade-off between managing pest species in order to avoid environmental degradation and turning the pest into a staple farm enterprise.

Australian Certified Organic permits farming of feral animals such as pigs and goats provided that property management is good. The products of these animals may be sold as certified organic only if the product is derived from progeny with a detailed and verifiable organic life history.

Other animals may be breeders only (A Monk, pers. comm., December 2003).

Kangaroo populations must be regulated if they are to be used sustainably. There are four main methods of regulating the harvest of

a renewable resource:

- limiting entry
- resource or harvest taxes
- individual transferable quotas
- total allowable catch quota.

For more information on these methods, see *Roos News*, Issue 3, NSW Agriculture, October 2000, <<http://www.agric.nsw.gov.au/ap/vpru/issue3.pdf>>.

Currently, use of kangaroos for consumption is regulated using a total allowable catch quota. Under such a system harvesters must compete for a share of the total quota. If the quota is regularly taken there will be competition between harvesters, which may lead to the entire annual quota being taken over a short period. This can lead to rapid reductions in the size of some kangaroo populations, which then remain unharvested until the next annual quota is allocated. Recently, however, the quotas for all harvested species have not been reached. In this situation, the number of animals taken is much less than the number available under the quota, and the harvest is limited by the demand for kangaroo products. The NSW Department of Primary Industries is evaluating alternative management strategies for kangaroos in the Murray–Darling Basin.

The organic standards clearly state that feral animals should be contained and destroyed, so any income derived from this activity should be seen as largely opportunistic. Where statutory authorities require the destruction of feral animals, the use of baits such as 1080 is permitted, provided the baits are checked regularly and clearly marked and poisoning of non-target species is avoided. Baits can be buried to reduce the likelihood of their being taken by native animals. The Department of Primary Industries has developed packages—using

videos, CD-ROMs, slides and written material—for best-practice management of foxes, rabbits, pigs and goats.

BOX 15

In relation to controlling feral animals, ACO's Australian Organic standard states:

- 5.7.8 Ferals shall be actively contained and destroyed in compliance with this Standard.
- 5.7.9 Baiting for ferals shall only take place where required by statutory authority. Baiting shall take place and be monitored by the operator in such a way as to maintain target species success and to eliminate non target species deaths.

BOX 16

The NASAA standard (2002) states:

- 24.5.1 Physical exclusion, chasing and guard dogs are approved.
- 24.5.2 Trapping of individuals and herds using traps with humane destruction is permitted.
- 24.5.3 Shooting of ferals or wildlife under licence is a restricted activity and assessed by NASAA on a case by case basis. Criteria for assessment will include effect on non-target species and consideration of environmental impact.
- 24.5.4 Poisoning of proscribed ferals is restricted to declared pest species. The use of 1080 only is restricted to baiting carried out under best management practice, which will be assessed by NASAA. (eg. baits buried, marked, mapped, routinely checked and unused baits retrieved).
- 24.5.5 Other poisons for control of rodents or ferals in the field are prohibited.

6.3.2 Plague locust control

The Australian Plague Locust Commission is responsible for reducing the threat that locusts breeding in one state pose for agriculture in other states. So, for example, it controls locusts in western New South Wales in order to reduce the threat to crops in Victoria and South Australia. The commission targets only the largest infestations—those that are obviously beyond farmers' ability to control. Landholders are responsible for the control of hopper bands on their properties. The Grains Research and Development Corporation's Farmer Alert *Locusts on the Move* provides a useful reference. Producers should alert both the Rural Lands Protection Board and the Australian Plague Locust Commission to their organic status and outline their strategy for managing locust incursions on their property.

The Australian Plague Locust Commission has worked with CSIRO for several years to develop a bio-pesticide based on the native fungus *Metarhizium anisopliae*. Trials have demonstrated that this fungus can effectively control plague locusts, spur-throated locusts, migratory locusts and wingless grasshoppers and is harmless to all other organisms. It has been developed for use in situations where conventional insecticides are inappropriate—for example, on organic farms, in conservation areas, near waterways, and in other environmentally sensitive areas. The so-called Green Guard® fungus is commercially produced by Seed, Grain & Biotechnology Pty Ltd in Wodonga. Organic producers should check the availability of Green Guard® well before an outbreak: supplies of the product have been limited.

Appendix A. Sources of information and other contacts

A.1 AQIS-approved certifying organisations

Bio-Dynamic Research Institute
Post Office
Powelltown Vic 3797
Phone: 03 5966 7333
Fax: 03 5966 7433

Australian Certified Organic Co-operative Ltd
Post Office Box 530
L1 766 Gympie Rd
Chermside Qld 4032
Phone: 07 3350 5716
Fax: 07 3350 5996
Email: info@bfa.com.au
Web: <http://www.australianorganic.com.au/>

National Association for Sustainable Agriculture (Australia) Ltd
PO Box 768
Stirling SA 5152
Phone: 08 8370 8455
Fax: 08 8370 8381
Email: enquiries@nasaa.com.au
Web: <http://www.nasaa.com.au>

Organic Growers of Australia
PO Box 6171
South Lismore NSW 2480
Phone: 02 6622 0100
Fax: 02 6622 0900
Email: admin@organicherbs.org
Web: <http://www.organicherbs.org/>

Organic Food Chain
PO Box 2390
Toowoomba Qld 4350
Phone: 07 4637 2600
Fax: 07 4696 7689
Email: organicfoodchain@hotmail.com
Web: <http://www.organicfoodchain.com.au/>

Tasmanian Organic-dynamic Producers, P.O. Box 13
CAMPBELL TOWN TAS 7210
197 Wilks Road LORINNA TAS 7306
Phone: 0 3 6363 5162 or 0427 613 697
Fax: 03 6363 5162
E-mail: info@tasorganicdynamic.com.au
Internet: www.tasorganicdynamic.com.au/

Safe Food Production Queensland
Spring Hill Qld 4004
55 McLachlan St
Fortitude Valley Qld 4004
Contact: Phil Pond
Phone: 07 3253 9800
Free Call: 1800 300 815
Fax: 07 3253 9824
Email: info@safefood.qld.gov.au
Web: <http://www.safefood.qld.gov.au/home.html>

AUS-QUAL
P.O. Box 3175
SOUTH BRISBANE QLD 4101
Phone: 07 3361 9200 or 1800 630 890
Fax: 07 3361 9222
E-mail: ausqual@ausqual.com.au
Internet: www.ausqual.com.au

A.2 Australian organic industry

Organic Federation of Australia
PO Box 166
Oakleigh South Vic 3167
Andre Leu, Chair
Phone: 07 4098 7610
Mobile: 0400 075 869
Email: chair@ofa.org.au
Website: <http://www.ofa.org.au/>

A.3 Export requirements

Australian Quarantine and Inspection Service
Program Management and Operations
Phone: 02 6271 6638
Policy and Market Access
Phone: 02 6272 3509
Fax: 02 6272 3238
Email organic@aqis.gov.au

A.4 Other organic and bio-dynamic groups

Henry Doubleday Research Association of Australia
3 Paget Street
Richmond NSW 2753
Phone: 02 4578 2640

Bio-Dynamic AgriCulture Australia
PO Box 54

Bellingen NSW 2454
Phone: 02 6655 0566

Natural Produce Network
c/- Sam Statham
Rosnay Organic Farms
Canowindra NSW 2804
Phone: 02 6344 3215

Tweed Richmond Organic Producers Organisation
PO Box 5076
East Lismore NSW 2480
Phone: 02 6663 5224

Northern Rivers Biodynamic Group
Ambrosia Farm
Lot 6 English's Road
Upper Coopers Creek NSW 2480
Phone: 02 6688 2003

Sapphire Coast Producers Association
Graham Gerrard
Phone: 02 6494 1191

Riverina Organic Farmers Organisation
c/- Judy Brennan
Clifton
Brocklesby NSW 2642
Phone: 02 6029 4237

Floodplains Organic Growers Group
c/- Frank Old
Balranald NSW 2715
Phone: 03 5020 1770 Hunter Organic Growers Group and the Hunter Biodynamic Group
Phone: 02 4938 5308

Canberra Organic Growers Society Inc.
Elizabeth Palmer
PO Box 347
Dickson ACT 2602
Phone: 02 6248 8004

Organic Producers of the East Coast
Fiona Scott
Phone: 02 6492 4244

A.5 Diagnostic and analytical services

NSW Department of Primary Industries diagnostic and analytical laboratories are located at Lismore, Wollongbar, Menangle, Orange and Wagga Wagga, supporting the department's research and extension programs. The laboratories also provide commercial services to industry and the public, including tests for agricultural water, animal disease, soil fertility, plant nutrition, chemical residues, and insect and plant pathogen identification. For further details, see <<http://www.agric.nsw.gov.au/reader/das-laboratory>>.

For soil biological assessment, the following organisation also provides services:

Soil Foodweb Institute Pty Ltd
1 Crawford Rd
East Lismore NSW 2480
Phone: 02 6622 5150
Fax: 02 6622 5170
Email: info@soilfoodweb.com
Web: www.soilfoodweb.com

A.6 Consultants

Tim Marshall
PO Box 207
Stirling SA 5152
Phone/fax: 08 83391250
Mobile: 0412473230
Email: timmar@box.net.au

John Melville
Bioterm
Mobile: 0417 662 709
Email: johnwm@bigpond.net.au

Adam Willson
Soil Systems
267 Oxley Road
Graceville Qld 4075
Phone: 07 3716 0688
Fax: 07 3716 0677

Janie McClure
Organics for Rural Australia
Phone: 03 9819 2224
Website: www.ruralorg.com.au

NASAA consultants

Steven David
Organic Farming Systems
PO Box 419
Cottesloe WA 6911
Phone: 08 9384 3789
Fax: 08 9384 3379
Email: admin@organicfarming.com.au
Web: www.organicfarming.com.au

Kenneth Scott
Piber Pastoral Company
Piber
Roma Qld 4455
Phone/Fax: 07 4623 0213
Email: piber@ripmet.com.au
Web: www.maranoa.org.au/kenscott

A.7 Institutional support

Universities, colleges and TAFE offering courses relevant to organic agriculture

Charles Sturt University
Leeds Parade
PO Box 883
Orange NSW 2800
Phone: 1800 334 733
Email: inquiry@csu.edu.au
Website: www.csu.edu.au/campus/orange

Relevant courses offered:

- Master of Sustainable Agriculture
- Graduate Diploma in Sustainable Agriculture
- Graduate Certificate in Sustainable Agriculture
- Bachelor of Land Management (Ecological Agriculture)
- Advanced Diploma of Land Management (Ecological Agriculture)

Murrumbidgee College of Agriculture
Yanco Agricultural Institute
Yanco NSW 2703
Phone: 02 6951 2696

and
CB Alexander Agricultural College
Tocal
Paterson NSW 2421
Phone: 02 4939 8888

Relevant courses offered:

- organic and biodynamic courses offered on demand

TAFE NSW
Web: www.tafensw.edu.au

Relevant courses offered:

- Organic Farming nos. 652 and 653

Government

- NSW Department of Primary Industries:
Robyn Neeson, Yanco
Agricultural Institute—phone
02 6951 2611
Karen O'Malley,
Bathurst Agricultural Research
Station—phone 02 6330 1200
- Department of Natural
Resources and Environment,
Victoria
Agriculture Victoria, Rutherglen
Viv Burnett—phone 02 6030
4500
- Australian Quarantine and
Inspection Service
Ian Lyall, Manager, Organic and
Biodynamic Program—phone
02 6271 6638 or 0417 667 040

Farmer information group

Kondinin Group
Wagga Wagga NSW 2650
Phone: 02 6921 4047
Web: <http://www.kondinin.com.au>

A.8 Journals and newsletters

Acres Australia. The national
newspaper of sustainable
agriculture. Published monthly.
Phone 07 5449 1884. Available
through newsagents.

Acres USA[®]. Subscribe by email
<info@acresusa.com>.

Going Organic. Official newsletter
of the Tweed Richmond Organic
Producers Organisation. Phone the
editor, Wendy Seabrook—02 6682
8148.

News Leaf. Journal of the Bio-
dynamic Farming and Gardening
Association of Australia.
Phone: 02 6655 0566.

Canberra Organic. Quarterly
publication of the Canberra
Organic Growers Society.
Phone: 02 6258 2811.

NASAA Bulletin. Official Journal
of the National Association of
Sustainable Agriculture Australia.
Phone NASAA—08 8370 8455.

Australian Organic Journal. Produced
by Biological Farmers of Australia.
Contact BFA—07 3350 5716.

A.9 Useful websites

- www.nal.usda.gov/afsic/afslinks.htm
- www.efrc.com/
- www.fao.org/organicag/
- www.organic-research.com/
- www.ofa.org.au
- www.bfa.com.au
- www.nasaa.com.au
- www.soilfoodweb.com/
- www.ofrf.org/
- www.geocities.com/opaq2001/

A.10 Other contacts, by chapter

Chapter 2

WEST 2000 Plus
PO Box 1840
Dubbo NSW 2830
Phone: 1800 068 072, 02 6883
3072
Fax: 02 6883 3099
Web: www.west2000plus.org.au

Chapter 3

Organics for Rural Australia
Phone: 03 9819 2224
Web: www.ruralorg.com.au

Chapter 4

Queensland Centre for Climate
Applications
Department of Primary Industries
and Fisheries
PO Box 102
Toowoomba Qld 4350
Phone: 07 4688 1200
Fax: 07 4688 1477
Email: qcca@dpi.qld.gov.au
(for safe carrying capacity
assessments)

Country Heritage Feeds
Katrina Hobbs
Highfields Qld 4352
Phone: 07 4630 8571
Fax: 07 4630 8926
Email: katrina@organicstockfeed.com

Rivcow Environmental Pty Ltd
PO Box 135
Yanco NSW 2703
Phone: 02 6953 5985, 0419 748
269
Fax: 02 6953 5986
(for composted cow manure)

Green Guard[®] (locust bio-pesticide)
SGB Australia
PO Box 387
10 Bradford St
Wodonga Vic 3690
Phone: 02 6024 5595

South Pacific Seeds
48 Willandra Ave
Griffith NSW 2680
Phone: 02 6962 7333
(for some organic seed lines)

Chapter 5

Suppliers: grain storage and packaging

Permaguard D-10 Insecticide®

Ultimate Health.com.au Pty Ltd
Unit 19, 46 Abel Street
Penrith NSW 2750
Phone: 02 47325811
Fax: 02 47325833
Email: lanco@bigpond.com

Cryovac packaging and Ageless®

Victoria

- Fawkner
Phone: 03 9359 2244
Fax: 03 9358 2329
- Seaford
Phone: 03 9358 2637
Fax: 03 9358 2329

New South Wales

- Regents Park
Phone: 02 9721 8900
Fax: 02 9743 8580

Queensland

- Brisbane
Phone: 07 3347 1333
Fax: 07 3849 6955

South Australia

- Holden Hill
Phone: 08 8266 6344

Western Australia

- Kewdale
Phone: 08 9353 5200
Fax: 08 9353 2052

Tasmania

- Sandy Bay
Phone: 03 6224 0415
Fax: 03 6223 8222

National organic auditor training workshops

- Michael Blakeney
General Manager,
Biological Farmers of
Australia
Phone: 07 3350 5716
- NATA
Phone: 02 9736 8222
www.nata.asn.au

Independent Organic Inspector Association organic training workshops

NASAA office
Phone: 08 8370 8455

Genevieve Carruthers

Environmental
Management Systems
Specialist
NSW Department of
Primary Industries
Wollongbar Agricultural
Institute
Wollongbar NSW 2477
Phone: 02 6626 1237

Joseph Ekman

Extension Horticulturist,
Quality Assurance
NSW Department of
Primary Industries
National Centre for
Greenhouse Horticulture
Locked Bag 26
Gosford NSW 2250
Phone: 02 4348 1900

Marketing advice and promotions

Philip Armbruster
Project Manager
Primex
Phone: 02 8289 3939
Catriona Macmillan
Heaven & Earth Systems
P/L
PO Box 3335
Tamarama NSW 2026
Phone: 02 9365 7668
Fax: 02 9365 7828
Mobile: 0402 404 361

Wholesalers specialising in organics

Back to Eden
PO Box 4
Waverley NSW 2024
Phone: 02 9746 0070
Fax: 02 9746 0040

Eco Farms
PO Box 71
Flemington Markets
NSW 2129
Phone: 02 9764 2833

Organic Wholesalers
Box 37, Stores 386–389,
Melbourne Wholesale
Markets, 542 Footscray
Rd., West Melbourne VIC
3003
Ph: 03 9687 6388,
F: 03 9689 4742
sales@organicwholesalers.com.au

Organics Direct Produce
Building Q
Sydney Markets NSW
2000
Phone: 02 9746 0046
Fax: 02 9764 2130

Export

Organic Connection
Australia P/L
PO Box 573
Kew Vic 3101
Phone: 1300 303601
Fax: 1300 303 602

Distributors to health food stores, supermarkets and delicatessens

Macro Wholefoods
31–37 Oxford Street
Bondi Junction NSW
2022
Phone: 02 9389 7611
Fax: 02 9389 0707
Web: www.
macrowholefoods.com.au

Melrose Health Supplies
25 Lexton Road
Box Hill Vic 3128
Phone: 03 989 89571
Fax: 03 9899 6653

Nature's Fare (Lotus
Organic)
PO Box 170
Milperra NSW 2214
Phone: 02 9792 7522
Fax: 02 9792 7451

Pagle
PO Box 60
Five Dock NSW 2046
Phone: 02 9736 1800
Fax: 02 9736 3133
Pureharvest
PO Box 187
East Bentleigh Vic 3165

Phone: 03 9574 3422
Fax: 03 9579 3312
Select Foods P/L
2 Tarlington Place
Smithfield NSW 2164
Phone: 02 9725 5499
Fax: 02 9725 5790

Spiral Foods
3 Wentworth Street
Chullora NSW 2190
Phone: 02 9642 8022
Fax: 02 9742 5893

Wholeharvest
8–10 Point Street
Pymont NSW 2009
Phone: 02 9552 1595
Fax: 02 9660 1095

Buying groups

The Green Line
PO Box 1010
Hartwell Vic 3125
Phone: 03 9889 2299
Fax: 03 9889 1399

Livestock and meat

Prime Quality Meats P/L
(David Jones)
Suite 1, Level 1, Shaw
House
49–51 York Street
Sydney NSW 2000
Phone: 02 9299 7054
Fax: 02 9299 7048

Cleavers Meats
Phone: 02 4322 4528

AC Butchery P/L
Shop 174, Marion Street
Leichhardt NSW 2040
Phone: 02 9560 5278

The Organic Meat
Company
PO Box 4279
Sydney NSW 2001
Phone: 02 9258 8333
Fax: 02 9252 3555
Email: sales@
theorganicmeatcompany.com.au

Griffith Butchery
10 Barker Street
Griffith ACT 2603
Phone: 02 6295 9781

Marketing groups and farmer alliances

TROPO—Tweed
Richmond Organic
Producers Organisation
PO Box 5076
East Lismore NSW 2480
Phone: 02 6684 5396
Fax: 02 6684 5395

Flood Plains Organic
Grain Group Pty Ltd
Frank Old
Emu Park
Balranald NSW 2715
Phone: 03 5020 1770
Fax 03 5020 1262

Riverina Organic Farmers
Organisation
Judy Brennan
Phone: 02 6029 4237

Meat and wool

Australian Organic Meat
and Australian
Organic Woolgrowers
Bye Downs
Elong Elong NSW 2831
Phone: 02 6886 6212
Fax: 02 6886 6212

Fletchers International
Exports
Yarrandale Road
Dubbo NSW 2830
Phone: 02 6884 5833

Australian Fibre Spinners
Hamilton Vic 3300
Phone: 03 5571 1046
Fax: 03 5571 1046

Elite Fibre Australia Pty Ltd
Charles and Trisha Esson
Breakwater Vic 3219
Phone: 03 5346 1436
Organic Plus (Australia
Pty Ltd)
Toowoomba Qld 4350
Phone: 07 3392 0608
Fax: 07 3391 4460

The Australian Organic
Red Meat Association Inc.
PO Box 316
Mount Barker SA 5251

Phone: 08 8391 6458
Fax: 08 8391 1937
Email: contact@aorma.
org.au

Certified abattoirs and meat processing facilities

QUEENSLAND

Chaplain Abattoirs (ACO
10181P)
MILES, QLD
Contact: Mr. John
Chaplain
T: 0427 017517
E: jschaplain@bigpond.
com
Beef, Goat, Lamb, Pork

Thomas Borthwick And
Sons Pty Ltd
(ACO 480P)
Via MACKAY, QLD
Contact: Mr. Scott Craw
T: 07 4952 1377
E: tbsqa@easynet.net.au
Beef

Western Exporters
(ACO 10573P
USDA)
CHARLEVILLE, QLD
Contact: Tony Lofthouse
T: 07 46543311
Sheep, Goats

Churchill Abattoir P/L
(ACO482P)
IPSWICH, QLD
Contact: Barry Moule
T: 07 38129000
E: info@churchillabattoir.
com.au
Cattle

Oakey Abattoir Pty Ltd
(ACO 467P)
OAKEY, QLD
Contact: Mr. Kurt
Wockner
T: 07 4691 1277
E: kwockner@
oakeyabattoir.com.au
Beef

Killarney Abattoir
(ACO4010P)
KILLARNEY, QLD
Contact: Mr. Paul Morrish
T: 07 4664 1244
E: paul@killarnyabattoir.

com.au
Beef, Goat, Lamb, Pork,
Veal

South Burnett Beef
(ACO CP USDA)
MURGON, QLD
Contact: Peter Gall
T: 0427 574 941
F: 07 4659 8898
E: plgall@bigpond.com
Beef

NEW SOUTH WALES

Kurri Meats
(ACO 2026P)
KURRI, NSW
Contact: Mr. Graham
Rees
T: 02 4937 1644
E: kurrimeats@bigpond.
com
Beef, Lamb

Bindaree Beef P/L
(ACO CP USDA)
INVERELL, NSW
Contact: Peter Gall
T: 0427 574 941
F: 07 4659 8898
E: plgall@bigpond.com
Beef

Rockdale Beef Pty Ltd
(ACO 10592P USDA)
YANCO, NSW
Contact: Gary Shanley
T: 02 69511104
E: gshanley@rockdale.
com.au
Beef

Cassino RSM Processing
(ACO 2005P)
Via LISMORE, NSW
Contact: Mr. Garry Lees
T: 02 6629 1376
F: 02 6629 1304
E: booyong@cassino.com.
au
Pigs

Southern Meats
(ACO 10644P)
GOULBURN, NSW
Contact: David Conliffe
T: 02 48240033
E: david@southernmeats.
com.au
Sheep

Northern Co-Operative
Meat Co
(ACO 269P)
CASINO, NSW
Contact: Mr. Dennis
Wyatt
T: 02 6662 2444
E: cassino@cassino.com.au
Beef, Veal

Buronga Pastoral Co/
Cootamundra
(ACO CP)
COOTAMUNDRA,
NSW
Contact: David Booth
T: 02 6942 2115
F: 02 6942 2664
E: info@burongaorganic.
com.au
W: www.burongaorganics.
com.au
Sheep, Beef
June Abattoir
(ACO CP)
June, NSW
Contact: Ken Taylor
T: 02 4322 4528
F: 02 4322 4350
ken@organicmeat.com.au
Sheep

DA Holdings
(ACO 245P)
Moruya, NSW
Contact: Graeme Afflick
T: 02 4474 2596
F: 02 4474 3998
E: afflicksds@acr.net.au
Sheep, Pigs, Beef

SOUTH AUSTRALIA

Dalriada Meat Pty Ltd
(ACO 10603P)
KIETH, SA
Andrew Martin
T: (08) 8755 1134
F: (08) 8755 1134
E: travis.munday@
bigpond.com.
Beef
Loxton Abattoir
(NASAA 5138P)
LOXTON, SA
T: (08) 8584 1203
F: (08) 8584 1203
E: christel@riverland.net.
au
cattle, pigs and sheep

VICTORIA

GH Keily Meat Exporters Pty Ltd
(ACO CP USDA)
MOE, VIC
Contact: Peter Gall
T: 0427 574 941
F: 07 4659 8898
E: plgall@bigpond.com
Beef

Norvic Food Processing
(ACO 10122P)
WODONGA, VIC
Contact: Mr. John Hayes
T: 02 6055 0226
F: 02 6024 5295
E: norvic@norvic.com.au
Beef, Goat, Lamb

Loddon Country Lamb Pty Ltd
(ACO CP USDA)
PYRAMID HILL, Vic
Contact: Peter Gall
T: 0427 574 941
F: 07 4659 8898
E: plgall@bigpond.com
Sheep

Grain processors

Green Grove Organics
18 Lord Street
Junee NSW 2663
Phone: 02 69 243574

Kialla Pure Foods
Greenmount Qld 4359
Phone: 07 4697 1170

Soybean milling

Australian Natural Foods
Caringbah NSW 2229
Phone: 02 9526 2555

Annand, Robinson & Co.
Toowoomba Qld 4350
Phone: 07 4632 2688

Biodynamic Marketing Co.
Powelltown Vic 3797
Phone: 03 5966 7370

Four Leaf Farms
Tarlee SA 5411
Phone: 08 8528 5330

Kialla Pure Foods
Greenmount Qld 4359
Phone: 07 4697 1170

Pure Harvest
East Bentleigh Vic 3165
Phone: 03 9579 3422

Soil Systems Pty Ltd
Kiraby Qld 4112
Phone: 07 3841 8888

Soy Products Aust.
Bayswater Vic 3153
Phone: 03 9729 1099

Spiral Foods
Strathfield NSW 2135
Phone: 02 9642 8022

Vitasoy (Soybeans)
Australian National Foods
Ken Spence (General Manager)
Melbourne Vic 3000
Phone: 0419 417915

Packaging and labelling laws

Department of Fair Trading
Measurement and Technical
Services
77 Lakemba Street
Belmore NSW 2192
Fax: 02 9758 2691

Trade Marks Office
PO Box 200
Woden ACT 2606
Phone: 02 6293 7444

Organic state promotions

Organic Expo
Smeaton hackett Events
PO Box 498
Frenchs Forest NSW 1640
Phone: 02 9451 4747
Fax: 02 9453 3499
Email: mary@shevents.com.au

The Ecotourism Association of
Australia
GPO Box 268
Red Hill Qld 4059
Phone: 07 3229 5550
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Chapter 6

Vertebrate pest management

Kangaroos

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Industries
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Vertebrate Pest Research Unit
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Industries
Orange Agricultural Institute
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Invasive Species
Environment Australia
GPO Box 787
Canberra ACT 2601
Phone: 02 6274 1111

Training packages for vertebrate pest management

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Vertebrate Pest Research Unit
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Appendix B. Farming inputs

The following information comes from the National Standard for Organic and Biodynamic Produce (3rd edn, Dec. 2002 AQIS, Canberra.)

Requirements for use

General principles

- i. Where inputs are required they should be used with care and with the knowledge that even permitted inputs can be subject to misuse and may alter the soil and/or water ecosystems or the farming environment.
- ii. Use of any product has the potential to introduce unwanted residues and contaminants.

Standards

1. A developed organic or biodynamic farm must operate within a closed input system to

- the maximum extent possible.
2. External farming inputs must be kept to a minimum and applied only on an 'as needs' basis.
3. Inputs must not be used as a permanent measure to support a poorly designed or badly managed system. Non-essential use of inputs is counter to organic and biodynamic farming principles. The approved certifying organisation must give approval for their ongoing use.
4. The following lists are subject to review, and inclusion of a material does not imply that it is safe in all circumstances. Any additions or changes to the lists will be made where it can be demonstrated that they satisfy the requirements of this Standard.

5. Liquid preparations, including products of the sea must be used with care as some preparations can be easily applied in concentrated forms and in high quantities.
6. The use of trace elements must be on the basis of a demonstrated deficiency.
7. Use of any input must be based on an assessment of need and with knowledge of the origin and/or analyses of the material for contaminants.
8. The use of any materials/inputs will be recorded in the farm diary or logbook and repeated use must be justifiable.
9. Federal, state/territory and local laws must be adhered to at all times ...

Permitted materials for soil fertilising and conditioning

Substances	Specific conditions/restrictions
Animal manures	Application must be composted or followed by at least two green manure crops in cropping system.
Blood and bone, fish meal, hoof and horn meal, or other waste products from livestock processing	Application must be composted or followed by at least two green manure crops in a cropping system.
Compost	Should be produced in accordance with Australian Standard 4454-1999 or recognised equivalent system.
Minerals and trace elements from natural sources, including: <ul style="list-style-type: none"> • calcium (dolomite, gypsum, lime) • clay (bentonite, kaolin, attapulgite) • magnesium • phosphate (rock phosphate, phosphatic guano) • potash (rock and sulphate potash) • elemental sulphur 	Must not be chemically treated to promote water solubility
Epson salt—magnesium sulphate)	None
Microbiological, biological and botanical preparations	Products derived from genetic modification technology are prohibited
Mined carbon-based products	Peat to be used for plant propagation only
Naturally occurring biological organisms (e.g. worms) and their by-products	None
Plant by-products	From chemically untreated sources only
Perlite	For potting/seedling mixes only
Sawdust, bark and wood waste	From chemically untreated sources only
Seaweed or algae preparations	None
Straw	From chemically untreated sources only
Trace elements and natural chelates, (e.g. ligno) sulphonates and those using the natural chelating agents (e.g. citric, maleic and other di-/tri-acids)	Not synthetically chelated elements
Vermiculite	For use in potting/seedling mixes only
Wood ash	From chemically untreated sources only
Zeolites	None

Permitted materials for plant pest and disease control

Where wetting agents are required, caution needs to be exercised with

commercial formulations as these may contain substances prohibited under this Standard. Acceptable wetting agents include some

seaweed products, plant products (including oils) and natural soaps.

Plant pest control

Substances	Specific conditions/restrictions
Ayurvedic preparations	None
Baits for fruit fly	Substances as required by regulation. Baits must be fully enclosed within traps.
Boric acid	None
Biological controls	Naturally occurring cultured organisms (e.g. <i>Bacillus thuringiensis</i>)
Diatomaceous earth and naturally occurring chitin products	None
Essential oils, plant oils and extracts	None
Homeopathic preparations	None
Hydrogen Peroxide	None
Iron (III) phosphate	None
Light mineral oils, such as paraffin	None
Lime	None
Natural acids (e.g. vinegar)	None
Natural plant extracts excluding tobacco	Obtained by infusion and made by the farmer without additional concentration
Pheromones	None
Potassium permanganate	None
Pyrethrum	Extracted from <i>Chrysanthemum cinerariaefolium</i>
Quassia	Extracted from <i>Quassia amara</i>
Rotenone	Extracted from <i>Derris elliptica</i>
Ryania	Extracted from <i>Ryania speciosa</i>
Seaweed, seaweed meal, seaweed extracts	None
Sea salts and salty water	None
Sodium bicarbonate	None
Sterilised insect males	Need recognised by certification organisation where other controls are not available.
Stone meal	None
Vegetable oils	None

Plant disease control

Substances	Specific conditions/restrictions
Ayurvedic preparations	None
Biological controls	Naturally occurring cultured organisms only
Copper (e.g. Bordeaux and Burgundy mixture)	Hydroxide is the preferred form, Bordeaux only on dormant tissue. Annual copper application must be less than 8kg/ha.
Essential oils, plant oils and extracts	None
Granulose virus preparations	Need recognised by certification organisation.
Homeopathic preparations	None
Light mineral oils (such as paraffin)	None
Lime	None
Lime-sulphur	None
Natural plant extracts excluding tobacco	Obtained by infusion and/or made by the farmer without additional concentration
Potassium permanganate	None
Potassium soap (soft soap)	None
Propolis	None
Seaweed, seaweed meal, seaweed extracts	None
Sea salts and salty water	None
Skim milk or skim milk powder	None
Sodium bicarbonate	None
Sodium silicate (water-glass)	None
Sulphur	In wettable or dry form only
Vegetable oils	None
Vinegar	None

Permitted materials for livestock pest and disease control

Where wetting agents are required, caution needs to be exercised with

commercial formulations as these may contain substances prohibited under this Standard. Acceptable wetting agents include some

seaweed products, plant products (including oils) and natural soaps.

Livestock pest control

Ayurvedic preparations	None
Biological controls	Naturally occurring organisms and cultured organisms
Boric acid	None
Clay	None
Diatomaceous earth	None
Essential oils, plant oils and extracts	None
Garlic oil, garlic extract or crushed garlic	None
Homeopathic preparations	None
Hydrogen peroxide	None
Natural plant extracts obtained by infusion	Excluding tobacco
Magnesium sulphate (Epsom salts)	None
Methylated spirits	None
Monosodium fluorosilicate	None
Potassium permanganate	None
Pyrethrum	Extracted from <i>Chrysanthemum cinerariaefolium</i>
Quassia	Extracted from <i>Quassia amara</i>
Rotenone	Extracted from <i>Derris elliptica</i>
Sea salts and salty water	None
Seaweed, seaweed meal, seaweed extracts	None
Sodium Bicarbonate	None
Sulphur	None
Vinegar (e.g. cider)	None

Livestock disease control

Substances	Specific conditions/restrictions
Ayurvedic preparations	None
Calcium salts	None
Charcoal	None
Clay	None
Copper sulphate	None
Diatomaceous earth and naturally occurring chitin products	None
Essential oils, plant oils and extracts	None
Homeopathic preparations	None
Hydrogen peroxide	None
Natural plant extracts obtained by infusion	Excluding tobacco
Magnesium sulphate (Epsom salts)	None
Methylated spirits	None
Potassium permanganate	None
Sea salts and salty water	None
Seaweed, seaweed meal, seaweed extracts	None
Sodium bicarbonate	None
Trace elements	To correct identified deficiencies only
Vaccines	May be used only for a specific disease, which is known to exist on the organic farm or neighbouring farms and which threatens livestock health and which cannot be effectively controlled by other management practices. Vaccines must not contain genetically modified ingredients or by-products.
Vitamins	Natural sources only
Vinegar (e.g. cider)	None
Zinc sulphate	None

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Going Organic

Organic Livestock Production

A conversion package for organic livestock production in the rangelands of western New South Wales

By Robyn Neeson

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This information is for producers wishing to convert to organic production and for producers already involved in organic production but keen to diversify their production. It provides a framework for organic conversion and diversification and suggests possible strategies and pathways for moving forward.

This valuable information will help make the transition to organic production or to diversified organic production a smooth one.

Organic products are the fastest growing food sector worldwide. Growth of new farms, products and consumers has been steadily increasing over the last 20 years. In the last 10 years the rate of growth has consistently increased in all of the advanced economies.

Market analysts forecast annual growth rates between 10% and 30% around the world. The United States Department of Agriculture expects the organic industry to be worth US\$100 billion by 2010 in America, Europe and Japan.

Major international food corporations are developing organic product lines.

The Australian organic sector is worth between \$250 - \$400 million per annum at retail level and demand outstrips supply. Domestic production is increasing at between 6 -15% per annum and consumption is growing at between 25-40%—the balance is imported. Australia is one of the world's leading grain exporters but organic grain is imported to meet the shortfall in production. Rising domestic and overseas demand for Australian organic products is prompting more conventional farmers and processors to consider and adopt organic systems.

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