Chapter 10

Economic management in organic agriculture

Els Wynen*, Eco Landuse Systems, Australia

*Dr Els Wynen, Eco Landuse Systems, 3 Ramage Place, Flynn, ACT 2615, Australia. Tel/fax: +61 2 6258 3561,
Email: els.wynen@elspl.com.au

Introduction

The old question, 'But is it profitable to farm organically?' will always be with us, at least for those who have not followed organic agriculture closely.

The answer to this question is that 'it depends'. Whether land under organic management can be as productive as conventional farming depends on, among other factors, what is included in the comparison. How long is the time frame under consideration? Looking at any time within the first period of one rotation is not likely to show organic agriculture in a positive light. Similarly, if only the private (on-farm) costs are considered while neglecting the public (off-farm) costs or externalities, such as consumer and environmental health, the organic system may not always compare well. The willingness of some consumers to pay extra for organic produce, or of some governments to support organic agriculture, reflects the thought that these externalities should be counted. The taxing of certain agricultural inputs such as pesticides, as some Scandinavian countries do (Schou and Streibig 1999, Jesper Schou, pers. comm. 2005) is another way in which to acknowledge and force producers to internalise externalities of agricultural activities. It aids in redressing the difference in agricultural production costs between the two systems, thus influencing the answer to the profitability question. But, one may say, even if farmers can make a living when receiving premiums and subsidies, what are the chances that organic farming can feed the world without destroying it – as some would like us to believe that that is what would happen with increasing conversion to organic management (Avery 1995).

Economic management

Established farms

Many in organic agriculture have moved on from whether organic agriculture works to how it works, and finding efficient solutions for if and when it does not work. Already in the 1980s, there was a movement away from comparing farm results between the two systems towards exploring different options on an organic farm (Dlouhy and Nilsson 1983). Despite this resolution, comparisons continued in many countries, if only to provide a reference to changes under organic management.

Klepper *et al.* (1977) published one of the first and best-known economic comparisons between organic and conventional farming in the United States of America (USA), with a follow-up by Lockeretz and Madden (1987). Several other surveys were published, such as in the United Kingdom (UK) by Murphy (1975) and Vine and Bateman (1981). In the early 1990s, Lampkin and Padel (1994) pulled together, in an edited volume, studies in many countries (from Europe, USA, Canada, Australia) and analysed many aspects of organic agriculture. Topics encompassed physical (yield, production) and financial (input costs, output prices, total farm receipts) variables of both established farms and those in conversion. This survey also included modelling widespread conversion to organic farming in different countries. Since then, other studies have been published that consider the differences between the two systems in some or all of those concepts, such as Penfold *et al.* (1995), Smolik *et al.* (1995), Reganold (1995), Wynen (1998), Clark *et al.* (1999), Offermann and Nieberg (2000), Wynen (2000), Stonehouse *et al.* (2001), Butler (2002), Pacini *et al.* (2002), Mäder *et al.* (2002), Nieberg and Offermann (2003), Delate *et al.* (2003), and Smith *et al.* (2004). Nicholas *et al.* (2004) provide an overview of studies carried out in the organic dairy industry. As many different combinations of profitability to different factors (e.g. land, labour) were analysed in Lampkin and Padel (1994), the studies carried out since then have served to highlight prevalent aspects in particular industries, under certain climatic and soil conditions, in particular geographical areas and within a particular policy framework. In some of the later studies particular topics (apart from financial returns) such as measures of sustainability and energy efficiency have received more emphasis.

No attempt is made here to write an exhaustive treatise of the economics of organic agriculture. Rather, the aim is to highlight key issues affecting returns to management in organic agriculture, often comparing them with returns to management on a conventional farm. Production, input costs, output prices, premiums and subsidies are discussed to arrive at the farm profitability on established organic farms.

Production and productivity

Productivity is production related to inputs. Productivity is often equated with production (e.g. tonnes of grain, head of cattle) per unit of land (hectare), but productivity could also be measured as output per unit of labour, energy or water used, or investment. Many assume that agricultural production per hectare under organic management is lower than under conventional management. Although this is often the case, it is not necessarily so. There are some general rules that can be observed.

Yield changes (changes of production per hectare or animal) are often relative to the intensiveness of the enterprise before conversion. This is true within enterprises (e.g. changes on intensively farmed cereals are larger than on extensively farmed cereals after converting to organic management) and between enterprises. For example, changes in yields in intensively run horticultural enterprises may be different from those in intensive cereal–livestock farming after conversion. In countries with a relatively high percentage of agriculture in extensive industries, such as dairy farming as compared with crops only, more farmers tend to convert to organic agriculture (e.g. in Austria and Switzerland), possibly reflecting the ease of conversion within this industry compared with other industries.

As the intensity of agriculture in a certain industry, say cereal–livestock, differs between countries, figures for changes in yield due to a change in management system also differ between countries. For example, reductions in crop yields after conversion were up to 40% in some European countries such as the UK, Germany, Denmark and the Netherlands in the 1990s, while those in Australia, Canada and the USA were between 10% and 20% down and were, in some cases, even higher than those under conventional farming (Lampkin and Padel 1994, p. 202). Mäder *et al.* (2002) mentioned yield decreases of 20% to be normal in organic systems in Switzerland, and Nieberg and Offerman (2002) found typical grain yield decreases of between 30% and 40% in several European countries.

For dairy, yield changes are more similar between countries. Yield changes per cow per year reported by Lampkin and Padel (1994, p. 203) are about 10% and stocking rate 20% to 30%, resulting in a reduction of milk yields of 30% to 40% per hectare. Nieberg and Offerman (2002, p. 143) mention a decrease of up to 20% in European countries per cow per year, and between 20 and 40 of cows per hectare. In Australia, Wynen (2000) recorded a decrease in milk litres per hectare of between 30% and 35% on seven pairs of farms. In Canada, Stonehouse *et al*. (2001) found average milk sales per cow on 7 organic farms to be 4% down compared with 111 conventional dairy farms, and those per hectare were 41% lower. In the USA, average milk sold per cow was 13% lower on six organic farms compared with 27 conventional enterprises in the same region, while no figures on stocking density were provided (Butler 2002).

In developing countries, where the choice for organic agriculture is often made in the context of no-use of pesticides and fertilisers, the United Nations Food and Agriculture Organization (FAO) mentioned that organic management may even increase yields (FAO 1998, Scialabba and Hattam 2002, see *Chapters 4* and *5*). Very few data are available for developing countries.

The cost of production

Yield is not the only indicator of farm productivity. Inputs used to deliver those yields should also be considered, and can be in the form of materials, as discussed below, but they may also be in different forms. For example, one way to manage soil fertility and pest problems on organic farms is to employ a different rotation from that on conventional farms where synthetic fertilisers and pesticides can perform those tasks. Because of the difference in rotation, which may also mean a larger diversity of crops, the whole farm needs to be considered when determining productivity and profitability.

For the farmer, the net profitability of the farm is important (i.e. what is left of the total receipts when all costs have been paid). For the profitability of the farm, the input costs can be as important an issue as the quantity produced and the prices received for the production.

In many agricultural enterprises, organic farmers may use fewer inputs such as fertilisers and pesticides and sometimes more labour, such as for hand-weeding, than on conventional farms. This is not necessarily the case, as materials to manage nutrients and pests on organic farms such as mineral fertilisers, compost and pheromones can also be costly.

Padel and Lampkin (1994, pp. 206–207) reported total variable costs to be typically 50% to 60% lower for organic cereals and grain legumes; 10% to 20% for potatoes and horticultural crops; and 20% to 25% for dairy cows, mainly due to reduced concentrates. For pigs and poultry, the extra cost of organic feed often means no reduction in average input prices.

Padel and Lampkin (1994) also summarised the fixed costs. Labour (classified as fixed costs) is seen to be mainly higher on organic farms, while other costs including power, repairs, depreciation of machinery, property charges and depreciation and capital costs were reported as similar in most countries, though higher in Germany and lower in Australia. However, in a later survey among Australian cereal–livestock farmers, this difference was much less pronounced than in the earlier study, or non-existent (Wynen 2001).

Labour cost is often controversial as it differs greatly between industries. For example, it is more likely to be similar or higher in intensive industries (e.g. horticulture, where labour can contribute considerably to replace herbicides) than in extensive industries (e.g. large-scale cereal growing). However, there can also be variations within industries. For example, labour costs were found to be similar or lower in studies on dairy farms in Australia (Wynen 2000) and Canada (Stonehouse *et al.* 2001), but higher in the USA (Butler 2002).

Output prices and premiums

In relation to price premiums, it is important to discuss the more recent studies, as this variable is rather dependant on time. Nieberg and Offerman (2002) reported on premium prices on wheat, milk and beef between 1994 and 1997 in several European countries. For wheat, typical premiums were between 50% and 200%; for dairy, between 8% and 36%; and for beef, premiums tended to be between 20% and 30%. For the last two categories, the average premiums were low, at least partly because some of the product was sold on the conventional market without premiums.

Hamm *et al.* (2004) estimated that premiums for cereals in the EU countries in 2001 reached just over 100%. For oilseeds, the premiums were recorded as 70%, for potatoes 166% and for wine 32%.

In Australia, Halpin and Brueckner (2004, p.70) reported average price premiums of all organic goods to be 80%. Several products scored over 100%, such as wholemeal flour, muesli, olive oil, spaghetti (the highest was 287%), several vegetables (beans, zucchini, carrots), hard cheese and minced beef.

However, not all organic products are sold on the organic market, and percentages of produce receiving a premium can vary considerably. For example, the range in Australia was estimated to be between 10% (sheep meat) and 95% (fruit and vegetables) being sold in the organic market in 2000 to 2001, with almost three-quarters of the total grains sold as organic, two-thirds of beef, and half of the organic milk supply (Wynen 2003).

Profitability

A general picture emerges of lower yields and productivity per farm, lower input costs and higher output prices on organic farms than those on conventional comparisons. The results in the different studies included in Lampkin and Padel (1994) ranged from lower net returns in the studies in the USA, UK and Switzerland, similar in Australia and higher in studies from Germany, Denmark and Wales.

Inclusion of premiums is, of course, an important determinant of the results. In some countries, such as those in Europe, premiums were more common than in others. In the Australian study (Wynen and Edwards 1990), for example, very few farmers received premiums at the time of the first survey in the mid-1980s. In a later study, all farmers received premiums though the net farm returns were variable, being similar to those of conventional neighbours in one year and considerably lower in the next (Wynen 2001). Obviously, factors other than price premiums may be of greater significance in the total picture.

In several different studies on both arable and dairy farms in ten European countries, net profits per hectare on organic farms were mainly within 20% of conventional farms (Nieberg and Offermann 2002). When the measure was profit per family work unit, the results for organic farmers were found to be similar or better than for conventional farmers. Profits varied considerably both by locality (country) and type of enterprise. Arable organic farms in particular were doing well, though specialised, highly intensive farms were generally not profitable under organic management. The figures included premium prices and subsidies for organic and conventional farming, which were important contributory factors in the profit figures. Not many data were available for horticultural, pig and poultry farms, possibly indicating that few farmers had converted to organic management in those industries.

In a time series analysis of data for five countries (Switzerland, Germany, Austria, the Netherlands, Denmark) between 1990 and 2001, this same study showed mainly higher profits per hectare on organic farms. Annual results on organic and conventional farms follow very similar patterns, indicating that outside factors such as climate, prices and policies are rather more important for the profitability of the farm than the difference between the two systems.

In the dairy study in Australia, biodynamic farms showed a considerably lower net return over the three years surveyed than their conventionally farming neighbours, though their returns were similar compared with all farmers of the area (Wynen 2000). These results were achieved with no or low premium prices for the biodynamic milk. To reach similar returns to those of their conventional neighbours, the biodynamic farmers would have needed a premium price of about A$0.10 per litre of milk, a premium not considered extravagant in some other countries. The study in Canada (Stonehouse *et al.* 2001) showed a 12% lower net income per hectare on organic farms, though the return was 1 percentage point higher for the organic farms as returns on total assets. The USA study showed 16% lower net income per litre of milk produced (Butler 2002).

Conclusion for established farms

Looking at the different studies over time on the comparability of organic and conventional management systems, the results of the net returns and their components of yield and total production, input costs and output prices are variable. In some studies net returns were found to be lower, and in others similar or higher. The question of comparative profitability is unlikely to be answered definitively, as the results depend on many factors, only some of which are within the farmer's control. The management of the farm and decisions about which crop to grow where, or even which enterprise to include, are somewhat under the farmers' control. Climate and soil type, input and output prices, premiums and subsidies depend on the particular country and time in which the farmer lives, with policies changing over time. Perhaps, the inclination of the organic movement to minimise comparisons of the system in the 1980s was reasonable, especially if they were carried out to convince the conventional sector that investment in this system was warranted, rather than to find where the change in management system impacted most, and how to make the system work better.

In the debate about whether it is financially rewarding to farm organically, the question of what to include in the final analysis remains. The private benefits to the farmer are included. From society's point of view, another relevant factor is the difference in off-farm effects between the two management systems. This is notoriously difficult to quantify but is still relevant for the full picture of the total efficiency of the systems. In some of the studies discussed, this factor is already included in the form of subsidies and premium prices, though these extra revenues must also cover the extra cost of small-scale marketing.

So, the answer is not clear cut. The studies discussed here indicate that the results can be positive for organic farmers, but do not necessarily need to be so. When considering conversion, the farmer would be wise to take several factors into consideration, including the physical attributes of the farm and the farmer, marketing possibilities and the political climate in the country at that time.

Conversion challenges

Whether a farmer can become an established organic farmer and not go bankrupt in the process depends on several factors. Important in this connection is the capacity of the farmer to adapt to a different way of management, and the ability to consider availability of farm resources on the history of the fields, market possibilities and political climate. This last issue involves government support in the form of, for example, production subsidies and research funding or reducing hurdles through regulations that hinder organic production and marketing. Lampkin and Padel (1994) devoted several chapters to the effect of conversion in several countries, and quote several early studies. In Australia, the process of conversion in the cereal–livestock industry was analysed by Wynen (1992).

Whatever the physical and financial problems of transition to organic agriculture may be, possibly one of the most difficult to overcome are the misconceptions about whether organic agriculture could work, and if it does, how. Lack of information about what changes are needed, and how to implement those changes, has always been mentioned as a major problem. Managerial ability, being able to manage the farm in a way appropriate to the system (e.g. handling different varieties, changing seeding dates to beat pests, recognising problems before they cause great damage, and having knowledge about solutions) is an important first requirement.

In the first years of moving towards organic management, most farmers have some special physical problems that they are unlikely to experience once the system is established. A biological change towards a different equilibrium in soil biota is one conversion aspect that may take time. Soil microorganisms essential for organic management need to become established. For example, Australian organic grain farmers reported that as they did not burn straw under the organic system, they experienced problems during transition with planting and germination of seed due to the straw blocking up the machinery, necessitating adaptation of their planting machinery. However, after those first few years the straw did break down considerably faster, presumably as a result of build-up of fungi over time. The absence of specific biological activity may also be part of the cause of yield reductions reported by some farmers in early years compared with yield levels further into the conversion period.

A change in farm layout is often advisable when changing management systems, and would require resources. For example, changes in rotations and livestock use within the rotation may require extra capital expenditure for fencing and livestock purchase. However, on farms where livestock require concentrates that are sourced off-farm, the change may mean some form of decrease in stocking rate.

Extra farm storage to cope with a change in marketing strategy can be another reason why more investments are needed. Buyers of farm produce may not have separate storage space for organic products, although this problem may decrease over time.

At the same time as the issues of change need attention and action, farmers can usually not count on premiums for the products. In the first phase of organic management, a farmer can be certified only as being in conversion. This means that during this time, premiums are less certain than at a later stage when the farm is certified as fully organic. The length of this period differs between countries, but is typically between one and three years.

Whatever problems arise, the farmer needs to plan well ahead, and analyse possible scenarios under conversion that encompass changes, including the use of existing resources, the need for investments, possible changes in yields and total productivity, availability of labour and machinery, accessibility to markets and likely output prices and cash flow.

Risk and uncertainty

Changing from conventional to organic agriculture means taking risks and facing different uncertainties. The risk during conversion is made up of the factors just discussed (see *Conversion challenges*), changes to the soil biota resulting from farming system changes, a steep learning curve for farmers regarding general organic farm management with particular emphasis on the characteristics of each particular farm, and a possible need for more investments in machinery, fencing, livestock and storage while outputs and marketing may be in flux. These risks can be expected to decrease over time as the physical processes settle down and the farmer learns more about the management system requirements.

However, differences in production variability may be a more permanent feature of the two management systems. Yields on organic farms that are closer to the average in extreme years are mentioned in the early literature (e.g. Klepper *et al*. 1977), but not always found (Padel and Lampkin 1994, p. 216). One study that did find a correlation between organic management and decreased variability of wheat yields was carried out in Australia (Wynen 1994), where extremes in weather conditions are not uncommon. Almost a decade later, Lotter *et al.* (2003) concluded that in plots with two organic systems at the Rodale Institute in the USA, yields were higher in four of the five drought years, while the fifth year gave mixed results. The authors attribute the difference in yields under extreme conditions between the systems to the higher water-holding capacity of the soils in the organic plots.

Variability in output prices for organic products depends on local arrangements, with possibilities ranging from fixed prices for a particular period, to a fixed percentage or amount on top of conventional prices, to a totally deregulated market. Variability in income resulting from changes in farm output prices is determined more by outside factors than by organic management *per se*.

Large-scale conversions

What happens when many farmers move towards organic agriculture? This question usually centres around the assumption of collapsing premiums, leading to lower farm incomes. Several studies on large-scale conversion in Germany, the German state of Baden-Wuertenberg, England and Wales are detailed in Lampkin and Padel (1994). Other studies are also discussed or summarised in that work. Later, Wynen (1997) conducted a study on a large-scale conversion in the cereal–livestock industries in Australia, its largest agricultural industry, and on the whole of the Danish agricultural sector (1998).

These studies must make assumptions about changes in, for example, future input and output prices, yields, subsidy and premium levels, the way consumers and producers will react to changes in prices (price elasticities of demand and supply), population increase or decrease and level of adoption. The possible outcomes are too numerous to summarise here, so only a few results are presented as examples.

Farm incomes are the variable considered most often in this respect, but they are not the only variable affected by a large-scale change to organic farming. As organic management requires a change in rotation for soil fertility and pest management reasons, a change of management system by many farmers would make a substantial change to the land use of a whole country. Hence, there will be a change in the relative importance of total output of different products and in output prices at the national level, and effects on farm incomes at state and individual levels. Other factors not discussed here that are sometimes analysed include food security, employment and income in related industries, environmental and social benefits and public expenditure (Midmore and Lampkin 1994).

The direction and magnitude of the changes in production and returns will differ between countries. In the UK, for example, Lampkin (1994) estimated that with a 10% increase in organic agriculture, there would be a decrease in wheat, barley, potatoes, sugar beet, oilseed and livestock and an increase in oats and field beans. In Australia, on large-scale cereal–livestock farms, large-scale conversion would lead to decreased total production of all cereals (wheat, oats, barley, canola), and an increase in sheep (Wynen 1997).

The same Australian study estimated total farm incomes under the assumption of an adoption rate of 30%. Under the worst-case scenario, where premiums for crops were assumed to decrease from 15% to 0% with no premiums for livestock products at all stages (extreme assumptions) total returns to the sector would drop by 7% when 30% of farmers had converted. In the best-case scenario, with premiums decreasing from 15% to 7.5% (probably more realistic), total returns to the cereal–livestock sector would have a 3% decrease at the 30% adoption rate.

Many studies have been based on the assumption that a very large proportion of the farming sector becomes organic – often 100%. However, this is rather unlikely, and would certainly not happen under conditions that are easily imaginable. More likely is that when, say, 10% or 20% of farmers have converted, political pressure may result in, for example, more research relevant to organic farming, information systems more readily accessible to organic farmers, decreased consumer prices as a result of decreased marketing costs (economies of scale) with a resulting increase in demand for organic food, and confidence of conventional farmers to convert. The detailed study on the Danish agricultural sector assumed initially that 80% of farmers converted to organic agriculture, and also analysed what happened at lower levels of conversion (Wynen 1998). The results showed that with prevalent input and output prices, and assumptions of reducing premiums with an increasing number of farmers across all industries, the total receipts to the farming community would start to fall only after about 25% of farmers had moved to organic farming. If that situation were reached, the political and social climate within the agricultural sector would have changed substantially, warranting new estimations with assumptions closer to reality than those available now.

In summary, studies have been undertaken to examine the consequences of large-scale changes towards organic management among farmers. Total production is usually the main factor considered, although total returns to farming and to farmers were also analysed. Studies mentioned here indicate that conversion to organic management, especially when the conversion rate is not taken to extremes, would generate few changes that cause adjustment problems to the agricultural sector.

SWOT analysis

The market for organic produce has developed considerably. In 2000, the global retail market was estimated to be around US$16 billion, with an estimated annual growth in demand of about 15% to 20% in several markets. Estimates for 2001 were closer to US$20 billion, and forecasts for 2003 for the world organic food and beverages market were between US$23 billion and US$25 billion (ITC 2005). Organic food and non-food sales grew by about 20% during 2003, and reached US$10.8 billion in one of the main markets, the USA (Organic Trade Association 2004). The ITC estimate for the organic retail market reached US$30–32 billion in 2005 (Kortbech-Olesen 2006). A general upward trend can be detected, which shows that both the demand and supply of organic products are growing.

Strengths and opportunities

Significant body of knowledge and expertise

Organic farming has become more popular since the 1980s (Foster and Lampkin 1999, Tuson and Lampkin 2006). This growth has been stimulated by, and has stimulated, an increase in know-how and managerial skills on farms. Although globally there may not yet be many people who have a profound knowledge of organic agriculture, experience in many kinds of applicable disciplines such as farm management (farmers), soil science, plant pathology, entomology, veterinary science, plant and animal husbandry, marketing, economics and political and social science is now available.

Standards and certification in many countries

For farmers to be able to sell their products, consumers require sufficient confidence in the organic production and marketing processes to be willing to buy. Over the last 20 years, considerable effort has been expended by both public (state authorities) and private (e.g. farmers' associations) organisations into developing a well-functioning certification scheme. As a result, many countries have credible organic standards and certification procedures.

Availability of markets

The demand for organic products has increased especially during crises in conventional agriculture. Examples include 'mad cow disease' since the late 1980s, the presence of dioxin in feed in Belgium in 1999, and foot and mouth disease in the UK in the early 2000s. The increase in demand in many places, especially Japan and China, should provide future opportunities for organic production.

Weaknesses and threats

Standards and certification

Keeping to standards

Just as organic agriculture benefits from food scandals in the conventional market, it also suffers when a scandal occurs in the organic market, for example with producers, certification offices and through accidental problems.

With organic produce commanding premium prices, unscrupulous conventional farmers may be tempted to sell their produce on the organic market. This is a potential problem especially in markets where the word 'organic' is not legally defined. In Australia, for example, the potential for two problems arises because standards cover requirements for the export market, but the term 'organic' has not been defined for the domestic market. The first is the possibility of fraud in the domestic market, where there is little possibility of recourse; and other problems could occur in the import market where, due to World Trade Organization rules relating to national treatment, the Australian government cannot prohibit imports and sales of non-certified products labelled as organic. Second, certification organisations may be tempted to cut corners. In a market where all produce needs to be certified and certification organisations vie for business, such behaviour is conceivable in a bid to provide the cheapest certification service. Third, accidents can also be problematic. In mid-2002, poultry feed on more than 100 German organic chicken farms was contaminated with the pesticide nitrofen. The feed had been stored in a warehouse previously used for pesticide storage (Deutsche Welle 2002).

International trade

Standards and certification for organic agriculture have developed over time. Originally, many countries, or organisations within countries, developed standards and systems suitable for their local circumstances. These were not necessarily based on scientific principles, or principles that were accepted in the scientific community. Although such problems are slowly being addressed, many remain.

The differences between standards and compliance systems among countries can make international trade problematic for exporters because exporting countries need to comply with the requirements of the importing countries. As the main importing countries have different standards and certification requirements (see e.g. Schmid 2003, Commins and Kung Wai 2003), complying with the requirements of the importer can become costly. This issue is one that the International Task Force set up by the United Nation's Conference for Trade and Development (UNCTAD), the FAO and the International Federation of Organic Agriculture Movements (IFOAM) has been trying to solve since 2002. The problems can be daunting for farmers in many countries, especially developing countries that do not have their own certification schemes (Wynen 2005).

The problem of different organic standards and certification for imports is compounded in some countries by private certification schemes that convince local supermarkets to accept only products certified by the particular private certification scheme. A similar effect is achieved by local certifiers promoting produce from local producers, such as the UK Soil Association, which mentions in the Organic Action Plan a target of 70% of organic primary products to be sourced from the UK (Defra 2005). Thus, not surprisingly, the contention of some exporting countries is that organic import requirements aim to keep competition out and benefit local producers rather than to provide consumers with a guarantee that the product was organically grown, which was the main aim. The issue of regional standard appropriateness is not controversial. The problem is, however, to find efficient ways to facilitate international trade in the presence of regional standards and certification procedures.

The issue of acceptable differences in standards is also an area that needs more attention, as many standards are not based on scientific considerations. One example is the conversion period, which determines the time farmers have to wait before they are eligible to be called organic. This provides easier access to premium prices. At the international level, the conversion period is set in different ways. For example, IFOAM has a conversion period of 12 months for plant production, while the EU and the Codex Alimentarius Commission (part of the FAO and World Health Organization's food and veterinary standards activities) require a minimum of between two and three years, although the conversion period can be reduced to one year if certain requirements are met (Schmid 2003). Importing countries that set the conversion period at a certain level do not take into account the possibly legitimate claim by some exporters that a decrease in conversion for their local circumstances may be appropriate. For example, if the conversion period is meant to provide time for the breaking down of substances that have no place in organic agriculture or for positive agents to build up, this process will be influenced by local conditions, such as climate. Variable conversion periods in countries with different climates would be appropriate.

Consumer prices

Apart from the importance of consumer confidence in the product, which is encouraged through a trustworthy and known certification scheme, a stable supply (e.g. through the involvement of supermarkets) and relatively low prices are important for organic agriculture to expand (Michelsen *et al.* 1999).

In general, produce sold as organic commands higher prices than conventionally grown produce of equal quality. Many surveys have shown that consumers are willing to pay more for these products, though the demand is highly price sensitive (see Weir *et al.* 2003, and references therein). Demand rapidly shifts towards conventional products with increasing prices for organic products.

Though output premiums for farmers are often blamed for high consumer prices, for many products the farm price is only a small part of the final consumer price. Other components such as transport, wastage, processing, handling and sales also influence the retail price. One would expect that for many products with low sales volumes, costs would be relatively high per unit; however, the lack of institutional facilities for organic products is also likely to affect costs. This has been recognised by for example the Dutch and Danish governments who devote a relatively large part of their organic agriculture support in encouraging and promoting the increased efficiency of the supply chain for organic products.

Governmental regulations

Differences in government support between countries can lead to an unfair advantage for producers in countries with regulation compared with those where no regulations exist. For example, subsidies for organic farming in one country, be it in the form of direct payments for farmers, research subsidies, or the development of a national certification scheme, can affect the price and the quantity of production in that country. This means that producers in other countries will need to produce more efficiently in order to be able to export to those countries. In other words, an advantage for farmers in some countries means a disadvantage for some farmers in other countries. Some governments, especially those of EU countries, support organic agriculture (see EUROPA 2005 for the European Action Plan).

Subsidies have an additional benefit to increasing farmers' income – farmers are able to sell their produce more cheaply, thereby reducing consumer prices and therefore demand. However, the potential for price reduction is likely to be tempered by increased input costs, especially those of land.

Conclusions

In this chapter, the economics of organic agriculture for farmers is considered, which includes issues surrounding yields, inputs, outputs and returns to farming. Off-farm effects are not considered here. In general, the financial results can be positive for organic farmers, but are not necessarily so. Details about the local situation are important for the results, such as the history of the farm, the particular enterprise, prevailing input and output prices, and domestic and international policies. The question also arises how easy it is to get to the state of organic management without failing financially in the first (transitional) stage. Important factors for success include planning for conversion related to the use of existing resources, the need of investments, changes in yields and total production, input availability and prices, marketing opportunities and cash flow. As whole-country transition to organic farming would influence such measures as input availability and prices and output prices, studies have been undertaken to model the effects of such changes. No disasters are obvious, though studies heavily depend on assumptions.

For the future, one of the strengths of the industry can be found in an increasing body of knowledge, not only on organic practices, but also on the effect of policies. Other strengths include the established standards and certification systems, and the existing market. Weaknesses or threats seem more numerous. The first is related to standards, including fraud, both by producers and certification agencies, and the possibility of accidents. The second is in the area of international trade, where the proliferation of standards and compliance schemes can make trade difficult for exporting countries. The desire of some countries to restrict international trade, and the absence of a scientific approach in some of the criteria are two more issues in the arena of international trade. Other threats concern consumer prices and governmental regulations. High consumer prices are a deterrent to growth in demand of organic products, and government regulations in one country cause a non-level playing field for producers in other countries.

References

Avery, D. 1995. *Saving the Planet with Pesticides and Plastics*. Hudson Institute, Indianapolis.

Butler, L. 2002. The economics of organic milk production in California: a comparison with conventional costs. *American Journal of Alternative Agriculture* 17(2): 83–91.

Clark, S., Klonsky, K., Livingston, P. and Temple, S. 1999. Crop-yield and economic comparisons of organic, low-input, and conventional farming systems in California's Sacramento Valley. *American Journal of Alternative Agriculture* 14(3): 109–121.

Commins, K. and Kung Wai, O. 2003. Regulations of imports into major markets. In: Westermayer, C. and Geier, B (eds.) *The Organic Guarantee System – The Need and Strategy for Harmonisation and Equivalence*. IFOAM/ FAO/ UNCTAD, Bonn. pp. 112–117.

Defra 2005. *Organic Food and Farming: Action Plan to Develop Organic Food and Farming in England*. Department for Environment, Food and Rural Affairs, London. http://www.defra.gov.uk/farm/organic/actionplan/actionplan.htm.

Delate, K., Duffy, M., Chase, C., Holste, A., Friedrich, H. and Wantate, N. 2003. An economic comparison of organic and conventional grain crops in a long-term agroecological research (LTAR) site in Iowa. *American Journal of Alternative Agriculture* 18(2): 59–69.

Deutsche Welle 2002. *Nitrogen Scandal Reveals Historical Traces*. Deutsche Welle, Bonn. http://www.dw-world.de/dw/article/0,1564,568009,00.html.

Dlouhy, J. and Nilsson, G. (eds.) 1983. *Comparisons between Farming Systems*. Swedish University of Agricultural Sciences, Uppsala.

EUROPA 2005. *European Action Plan for Organic Food and Farming*. European Commission, Brussels. http://europa.eu.int/comm/agriculture/qual/organic/plan/index_en.htm.

FAO 1998. Evaluating the potential contribution of organic agriculture to sustainability goals. *IFOAM Scientific Conference, Mar del Plata, Argentina, 16–19 November*. http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/AC116E/AC116E00.HTM.

Foster, C. and Lampkin, N. 1999. *European Organic Production Statistics*. University of Hohenheim, Stuttgart.

Halpin, D. and Brueckner, M. 2004. The retail pricing, labelling and promotion of organic food in Australia. In: DAFF. *The Australian Organic Industry: A Profile*. Department of Agriculture, Fisheries and Forestry (DAFF), Canberra. pp. 64–93.

Hamm, U., Gronefeld, F., Weinreich Hansen, M., Kristensen, N., Nielsen, T. 2004. *The Organic Food Market and Organic Marketing Initiatives in Europe: An Update Study*. Organic Marketing Initiatives and Rural Development (EC initiative), University of Wales Aberystwyth.

ITC 2005. *Market Development Section – Organic Products Home Page*. International Trade Centre, Geneva. http://www.intracen.org/mds/sectors/organic/welcome.htm.

Klepper, R., Lockeretz, W. Commoner, B., Gertler, M., Fast, S., O'Leary, D. and Blobaum, R. 1977. Economic performance and energy intensiveness on organic and conventional farms in the Corn Belt: a preliminary comparison. *American Journal of Agricultural Economics* 59(1): 1–12.

Kortbech-Olesen, R. 2006. *Demand for Organic Products from East Africa*. International Trade Centre (ITC), Geneva.

Lampkin. N. 1994. Estimating the impact of widespread conversion to organic farming on land use and physical output in the United Kingdom. In: Lampkin, N. and Padel, S. (eds) *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford. pp. 343–359.

Lampkin, N. and Padel, S. (eds) 1994. *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford.

Lockeretz, W. and Madden, P. 1987. Midwestern organic farming: a ten-year follow-up. *American Journal of Alternative Agriculture* 2(2): 57–63.

Lotter, D., Seidel, R. and Liebhardt, W. 2003. The performance of organic and conventional cropping systems in an extreme climate year. *American Journal of Alternative Agriculture* 18(3): 146–154.

Mäder, P., Fließbach, A., Dubois, D., Gunst, L., Fried, P. and Niggli, U. 2002. Soil fertility and biodiversity in organic farming. *Science* 296: 1694–1697.

Michelsen, J., Hamm, U., Wynen, E. and Roth, E. 1999. *The European Market for Organic Products: Growth and Development*. University of Hohenheim, Stuttgart.

Midmore, P. and Lampkin, N. 1994. Modelling the impact of widespread conversion to organic farming: an overview. In Lampkin, N. and Padel, S. (eds) *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford. pp. 371–380.

Murphy, M.C. 1975. *An Economic Appraisal of Organic Farming Systems*. Department of Land Economy, Cambridge.

Nicholas, P., Padel, S., Cuttle, S., Fowler, S., Hovi, M., Lampkin, N. and Weller, R. 2004. Organic dairy production: a review. *Biological Agriculture and Horticulture* 22(3): 117–149.

Nieberg, H. and Offermann, F. 2003. The profitability of organic farming in Europe. In: OECD (ed.) *Organic Agriculture: Sustainability, Markets and Policies*. CAB International, Wallingford. pp. 141–151.

Offermann, F. and Nieberg, H. 2000. *Economic Performance of Organic Farms in Europe*. University of Hohenheim, Stuttgart.

Organic Trade Association 2004. *The OTA 2004 Manufacturer Survey Overview*. Organic Trade Association, Greenfield. <http://www.ota.com/pics/documents/2004SurveyOverview.pdf>.

Pacini, C., Wossink, A., Giesen, G., Vazzana, C. and Huirne, R. 2003. Evaluation of sustainability of organic, integrated and conventional farming systems: a farm and field-scale analysis. *Agriculture, Ecosystems and Environment* 95(1): 273–288.

Padel, S. and Lampkin, N. 1994. Farm-level performance of organic farming systems: an overview. In Lampkin, N. and Padel, S. (eds) *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford. pp. 201–219.

Penfold, C., Miyan, M., Reeves, T. and Grierson, I. 1995. Biological farming for sustainable agricultural production. *Australian Journal of Experimental Agriculture* 35: 849–856.

Reganold, J. 1995. Soil quality and profitability of bio-dynamic and conventional farming systems: a review. *American Journal of Alternative Agriculture* 10(1): 36–45.

Scialabba, N. and Hattam C. (eds) 2002. *Organic Agriculture, Environment and Food Security* Food and Agriculture Organization of the United Nations, Rome.

Schmid, O. 2003. Comparison of EU Regulation 2092/91, Codex Alimentarius Guidelines for Organically Produced Food 1999/2001, and IFOAM Basic Standards 2000. In Westermayer, C. and Geier, B. (eds) *The Organic Guarantee System – The Need and Strategy for Harmonisation and Equivalence*. IFOAM/FAO/UNCTAD, Bonn. pp. 41–51.

Schou, J. and J. Streibig 1999. Pesticide taxes in Scandinavia. *Pesticide Outlook*. December 227–229.

Smith, E., Clapperton, M. and Blackshaw, R. 2004. Profitability and risk of organic production systems in the northern Great Plains. *American Journal of Alternative Agriculture* 19(3): 152–158.

Smolik, J., Dobbs, T. and Rickerl, D. 1995. The relative sustainability of alternative, conventional, and reduced-till farming systems. *American Journal of Alternative Agriculture* 10(1): 25–35.

Soil Association 2002. *Soil Association response to NFU survey of organic farmers*. Soil Association, Bristol. <www.soilassociation.org/sa/saweb.nsf/848d689047cb466780256a6b00298980/80256ad80055454980256c010045b622?OpenDocument>.

Stonehouse, P., Clark, A. and Ogini, A. 2001. Organic and conventional dairy farm comparisons in Ontario, Canada. *Biological Agriculture and Horticulture* 19(2): 115–126.

Tuson, J. and Lampkin, N. H. (eds.) 2006. *Organic farming policy measures in pre-2004 EU member states and Switzerland*. EU-CEE-OFP project report European Commission. University of Wales, Aberystwyth.

Vine, A. and Bateman D. 1981. *Organic Farming Systems in England and Wales: Practice, Performance and Implications*. Department of Agricultural Economics, University College of Wales, Aberystwyth.

Weir, M., Hansen, L., Andersen, L. and Millock, K. 2003. Consumer preferences for organic food. In: OECD (ed.) *Organic Agriculture: Sustainability, Markets and Policies*. CAB International, Wallingford. pp. 257–271.

Wynen, E. 1992. *Conversion to Organic Agriculture in Australia: Problems and Possibilities in the Cereal–Livestock Industry*. National Association for Sustainable Agriculture, Sydney.

Wynen, E. 1994. Economics of organic farming in Australia. In: Lampkin, N. and Padel. S. (eds) *The Economics of Organic Farming – An International Perspective*. CAB International, Wallingford. pp. 185–199.

Wynen. E. 1997. *Impact on Australian Broadacre Agriculture of Widespread Adoption of Organic Farming. Resource and Environmental Studies No. 14*. Centre of Resource and Environmental Studies, Australian National University, Canberra.

Wynen, E. 1998. *Organic Agriculture in Denmark – Economic Implications of a Widespread Change*. Danish Institute of Agricultural and Fisheries Economics, Copenhagen.

Wynen, E. 2002. *Bio-dynamic and Conventional Irrigated Dairy Farming in Australia: An Economic Analysis*. *Australasian Agribusiness Perspectives, Paper 50*. University of Melbourne, Carlton.

Wynen, E. 2001. The economics of organic cereal–livestock farming in Australia revisited. In: RIRDC (ed.) *The Organic Challenge: Unity through Diversity. RIRDC's Inaugural National Organics Conference 2001. Darling Harbour, Sydney, Australia, 27–28 August 2001.* Rural Industries Research and Development Corporation, Barton. pp. 89–100.

Wynen, E. 2003. *Organic Agriculture in Australia – Research Levies and Expenditures*. RIRDC, Barton.

Wynen, E. 2005. *Effects of Non-Harmonization on Production and Trade of Organic Products. Report for the International Task Force on Harmonization of Organic Standards and Certification*. IFOAM/FAO/UNCTAD, Bonn.

Wynen, E. and Edwards, G. 1990. Towards a comparison of conventional and chemical-free agriculture. *Australian Journal of Agricultural Economics* 34 (1): 39–55.