Organic Farming - Its Role in the New Century

A. Litterick[1], S. Brenman[2] and C. Leifert[1]
[1]Abcrdeen University Centre for Organic Agriculture,
MacRobert Building, King Street, Aberdeen, AB24 5UA
[2]Soil Association L Bristol House. 40-56 Victoria Street Bristol. BSI 6BY

Introduction

The post-war agricultural revolution changed the face of agriculture in almost every food producing country in the world. The introduction of farm-based tractor power was followed closely by that of synthetic fertilisers, pesticides and factory farming of livestock. There was a desperate need for food in the recovering economies of the 1940's 50's and 60's, and farmers everywhere were encouraged to rely increasingly on synthetic inputs and intensive production methods in order to maximise yield and product quality.

At the start of the 21st century, we are entering a second agricultural revolution, The world is now experiencing the problems created by industrialised agriculture. Pollution of our lakes and rivers and the loss of biodiversity as a result of industrial farming are now well documented. There have been a number of food scares associated with conventional agriculture involving bovine spongiform encephalopathy (BSE), pesticides in food, food poisoning (E. coli 0157, salmonella, Iisteria, etc.) and hormone and antibiotic residues in meat products. The introduction of GM technology raises further potential problems for agriculture including genetic pollution of wild plant populations, damage to beneficial organisms and wildlife and increased dependence on certain pesticides. Questions are also raised regarding the health effects of GM foods on consumers (HRH The Prince of Wales, 1998).

Organic farming could provide a solution to many of the problems created by industrialised agriculture. It is based on a natural system in which all aspects of that system, (the soil, environment, crops, livestock, farmers and consumers), are considered as part of a holistic unit (Blake, 1994). Organic philosophy recognises that these aspects will, and must be allowed to interact. Up until recently, it was practiced by relatively few farmers and organic produce was consumed mainly by committed environmentalists and green activists. Now, however, the word organic is on everybody's lips. Organic agriculture has matured into a mainstream activity, practiced by thousands, supported by millions.

The Organic Movement Comes of Age

Several factors have contributed to the recent expansion of organic agriculture. Consumers increasingly want to buy it, but there are a number of reasons for this. A survey was carried out by the UK consumer journal _Health Which_ in April 1997. It found that 83% of organic food consumers bought it because they wanted to avoid pesticides; 75% bought it on the grounds that it was kinder to the environment; 70% were concerned about the intensive rearing of animals ; 68% bought it because of the taste; 40% wanted to support local farmers and 36% expressed worries about BSE. A number of other surveys have been carried out yielding similar, though slightly different results (Anon., 1999a). The perception of the benefits is not necessarily accurate, but so long as consumers in increasing numbers continue to perceive these benefits, the organic movement

will continue to grow. And grow it certainly has.
The growth of the organic movement is due not only to the positive force of increased consumer demand, but also to the depressed state of the conventional farming sector. Conventional farm incomes in Europe have rarely been so low, particularly in the livestock industry and many farmers see organic systems as being a more profitable option.

Size of the Organic Sector

In 1985, less than 0.1% of the total agricultural area in Western Europe was farmed organically. By the end of 1997, this figure had increased to over 1.6%, or 2.3 million hectares (Lampkin & Midmore, 1999). It is estimated that by the end of 1998, around 3 million hectares, (nearly 2.1% of the farmland), were managed organically. This average is known to hide significant variations, for example, around 9% of agricultural land in Sweden is organic, but only 0.6% of agricultural land in France is managed organically (Anon, 1999).
The proportion of organic land in the UK is lower than the European average. At the end of 1996, only 0.3% of the agricultural land was registered as either organic or in conversion (Lampkin et al., 1998). This is lower than 11 out of the 15 EU countries. A study by Nick Lampkin of The Welsh Institute of Rural Studies estimated that the figure is now likely to be around 1.2% of agricultural land, or nearly 200,000 Ha. The UK government have estimated a higher figure of 274,519 Ha as of April 1999, (Lampkin & Midmore, 1999). The amount of land being farmed organically increased steadily between 1 985 and 1 995 and is now increasing rapidly, (Fig. 1).
The market for organic foods has increased substantially over the past 5 years. This is reflected in the Soil Association's _Organic Food and Farming Report 1998.In 1997, UK sales of organic food totalled around £260M up from £100M in 1993, (Fig. 2). In the UK, fruit and vegetables are the most important product line and account for 54% of sales, (Table 1). Cereals (14% of sales) remain an important organic commodity, although the fastest growing product line is baby food. Similar trends are observed throughout Europe (Anon.. 1999b). Demand for organic produce has been so strong, that despite the increase in production, organic food still commands substantial premiums in retail outlets. The premium varies between products and between retail outlets, but on average, organic products are sold at approximately 150% of the price of conventional products.

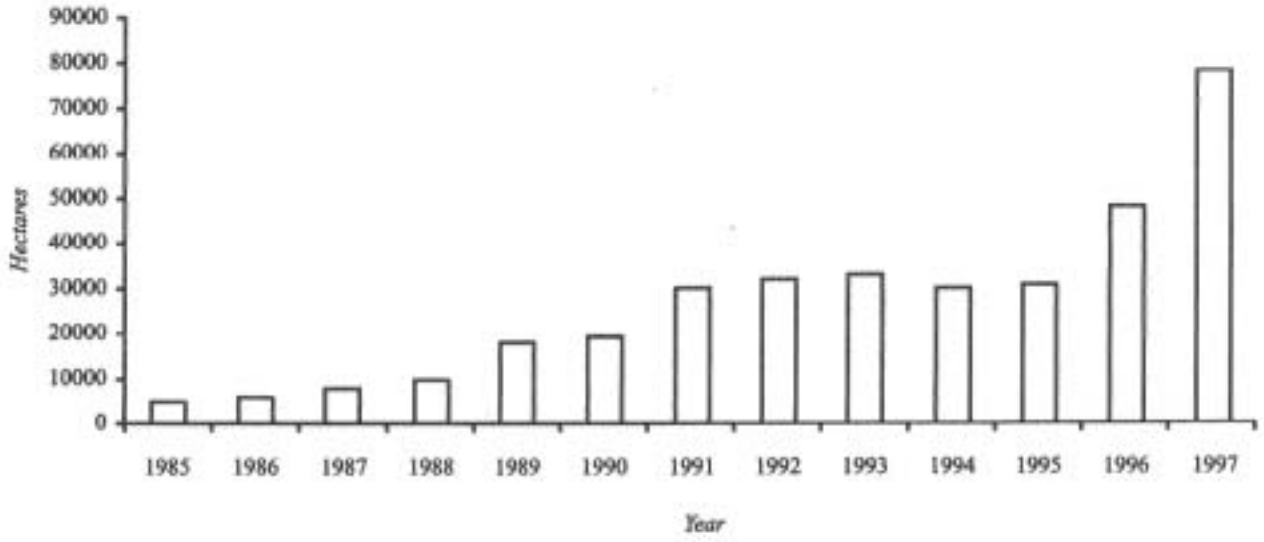

Figure 1: 1985-1997 Organic and in conversion land areas

Source: Soil association Organic Food and Farming Report 1998

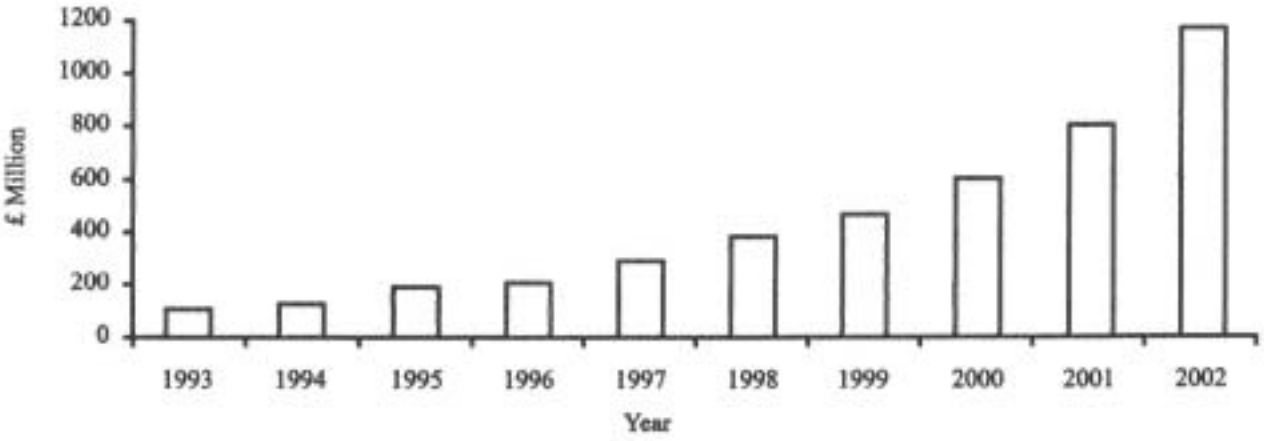

Figure 2: UK retail market growth-actual and projected

Source: Mintel and Soil Association Estimates

Table 1: Share of total UK organic retail sales

Fruit and vegetables	54	%
Cereals	14	%
Dairy	7	%
Meat	5	%
Eggs	2	%
Beverages	6	%
Baby foods	3	%
Multi-ingredient foods	75	%
Other	2	%

Source: Soil association Organic Food and Farming Report 1998

Organic foods are increasingly being traded between countries within Europe. It is estimated that the UK imports between 60 – 70% of its organic products, (Table 2). Other countries tend to import a lower proportion of their total organic consumption, for example, Italy imports only 10% of the total organic produce consumed,

Table 2: European Overview: Share of Imported Organic Products in Total Organic Sales, 1998

Austria	30 %
Denmark	25 %
France	20 %
Germany	50 %
Italy	10 %
Sweden	35 %
UK	65 %

Source: Corporate Intelligence on Retailing, London

Future Growth

Organic agriculture has growth rapidly in the past 10 years. It is estimated that there has been a 30-fold increase in organically farmed land in the past 13 years (Soil Association, 1998). The Soil Association predicted that, based on the current average growth rate of 25% per annum, organic farming would account for 10% of European agricultural land by 2005. Others are more conservative and estimate, (based on a 15% annual growth rate), that around 5% of agricultural land may be farmed organically by the year 2005 (Anon, 1999a). The organic retail market is also expected to increase significantly over the next 5 years, for example the Soil Association predict that the UK market for organic products will be worth in the region of £1,100M by 2002 (Figure 2).

Increased Support for Organic Farming in Europe

Organic agriculture is now an important agricultural sector within its own right. It is no longer regarded as a non-commercial, fringe activity practiced by those who were thought to be radical environmentalists. It is a modem, progressive industry that is rapidly becoming more technically advanced. At long last we are beginning to see increased support for organic farming in Europe. The UK Ministry of Agriculture (MAFF) last year doubled its conversion support payment for farmers, (although the amounts available are still pitifully inadequate). Farmers in England and Wales who were accepted into the support scheme will receive up to £450 /Ha over 5 years. Other countries in Europe tend to give greater financial incentives for their farmers to convert and many countries offer continued support once conversion is complete. Research funding for organic agriculture is now gradually increasing. The UK MAFF will spend around £2.1M in £1999/2000 and plans to gradually increase its spend in this area. Research is now being carried out on a wide range of aspects within organic farming, including crop and animal production systems, economics, marketing and the supply chain, food quality and traceability.

Organic farming has gained great numbers of converts including consumers, policy makers, researchers and farmers, who are now waiting to see the benefits from their decision to convert. The role of organic agriculture in the new century is broad and varied. Widespread take-up of

organic farming practices will result in significant benefits to soil, plants, animals, humans and the environment.

The Role of Organic Agriculture

Organic farming is already delivering benefits to human and animal populations world-wide, but it can and will do much more. As the pressures and problems from industrialised agriculture increase, it's role is set to expand greatly. The opportunities for organic agriculture to affect our planet and its occupants in the new century will be many and varied.

Food quality

Consumers of organic food widely perceive it to be nutritionally better and tastier. In fact, there have been few sound, scientific studies in this area to prove any of these perceptions. There is some evidence of differences between organic and conventionally produced foods , but there is no proof that these represent differences in food quality. A detailed review of over 1 50 investigations which compared organic and conventional foods concluded that there were some differences in food quality (Woese et al., 1997). In vegetables there was a trend towards more nutritionally desirable and less undesirable components. Further work reported by Stonehouse (1981, Fig. 3) showed that organic vegetables contained higher levels of minerals and essential amino acids. Higher dry matter levels and lower pesticide levels were also found in fruit and vegetables. In cereals, there were differences in processing properties: conventionally produced cereals were better suited to modem baking requirements. In animal feed preference trials, livestock showed a clear preference for organic feed.

The visual quality of organic fruit and vegetables is improving at present, but overall it is still lower than in conventional crops. Not all consumers of organic fruit and vegetables insist on the high visual quality that we have come to expect in conventional produce (Anon, 1 997) and many feel that flavour and taste are more important. However, the major UK retailers will almost certainly begin to demand increasingly high quality standards in organic produce as supply improves. Research into production, storage, packing and processing systems is necessary in order to enable organic growers to produce merchandise that is of equivalent visual quality to conventional produce.

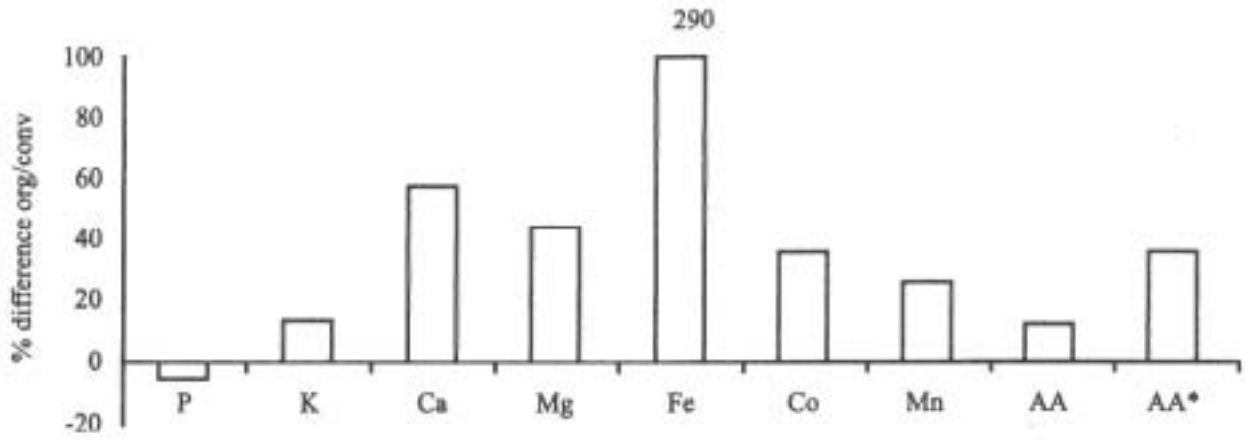

Figure 3: Nutritional Differences between organic and conventional vegetables

AA*= essential amino acids

Source: B.Stonehouse(1981)Biological Husbandry, a Scientific to organic farming. Billings & Sons Ltd., London

Food safety

The question of food safety is increasingly important following a number of European _food scares_. There have been incidences of gastroenteritis caused by both conventionally and organically produced foods. The recent problems of BSE in cattle, (which would not have occurred if conventional agriculture had followed organic farming standards concerning the use of animal proteins in ruminant feeds,) and the introduction of genetically modified food products has raised further questions concerning the safety of conventionally produced foods.

Because synthetic pesticides are not permitted, organically produced foods contain fewer (or no) residues of agrochemicals and by definition can not be genetically modified, or contain any elements which have been subject to genetic modification. Claims have been made as to the positive health benefits of organic vegetables which may be due to the presence of increased levels of secondary metabolites which can protect against certain cancers, but these are mainly unsubstantiated.

The limited work done has suggested that it is likely that there are significant health benefits from the consumption of organic food, but extensive research is needed to prove it. Research and detailed quality assurance schemes are also necessary to minimise the risks that result from the inappropriate use of farmyard manure and slurry, (and possibly in future domestic and industrial wastes), in conventional and organic systems. Human, animal and plant pathogens must be destroyed by effective processing, (e.g. stockpiling or composting), before such fertilisers are applied to land, especially prior to the production of crops that may be consumed raw.

A cleaner, better environment

The widespread practice of industrialised agriculture has resulted in serious pollution of lakes, rivers and seas and in some cases, soils (Anon., 1999c). It has resulted in a decline in soil structure and soil organic matter in some areas. It has left us with fewer trees, hedgerows, ponds and bogs and this loss of habitat has in turn resulted in a dramatic decline in the numbers of wild plant and

animal species. Organic agriculture will provide an important means to enable us to start to clean up and improve our environment.

Soil management is of a high priority within organic systems. The building of organic matter levels, (resulting from good soil management practices), will help to prevent soil erosion and drought sensitivity, which are becoming serious problems in the UK, particularly in the light sandy soils in the south east of England. The regular addition of farmyard manure and composts to the soil is known to aid structure (Cook & Lee, 1993). This practice encourages earthworms and other soil fauna. which provide food for larger animals and also improve soil structure.

Contamination of soil and pollution of water from pesticides is almost completely absent in organic systems, since there are very few permitted pesticides and their use is severely restricted (Anon,, 1999d). The level of leaching and therefore water pollution from a farm will depend not only on the management system, but also on the crops grown, the topography, soil type(s) and the weather patterns. However, several studies have shown that pollution of water by fertilisers, (particularly nitrates and phosphates), is greatly reduced on land under organic management (Anon., 1999a). The UK Environment Agency have stated that, to date, the low take up of organic farming, (in the UK) has meant that it has had a limited impact on water quality improvement strategies. However, it acknowledges that there are large potential benefits in pollution reduction to bc gained if significant numbers of farmers convert to organic systems (Anon.. 1999d). Some UK water companies now acknowledge that organic farming brings great benefits in terms of reduced pollution and reduced water treatment costs. For example, Wessex Water, which supplies parts of Southern England provides support payments to farmers converting from conventional to organic production systems.

A number of environmental organizations have published information on the decline in wildlife species numbers present on intensively farmed land. English Nature, the government body responsible for the natural environment in England, reported that organic farming provided a real opportunity for reversing some of the catastrophic declines in farmland biodiversity which have been seen in recent decades (Anon., 1999e). There is a great deal of evidence that higher numbers and a greater range of species of birds, invertebrates and wild plants occur on organic farms. Following research, The British Trust for Ornithology reported that, an expansion of organic farming would be a valuable component of any strategy seeking to enhance biodiversity on agricultural land (Chamberlain et al., 1999). Reclamation of lost species diversity may be one of the most important contributions which organic agriculture can make in future years.

The Countryside Commission of England and Wales considered that in lowland areas, the management practices of mixed organic farms had noticeable positive effects on the aesthetic quality of the surrounding landscape (Anon, 1999f). Traditional features including smaller fields, hedgerows, woodland, wetland and ponds were being appropriately maintained or re-introduced. Organic farming provides the reasons to return these features to farmland, thereby making the countryside a more attractive place to live and work.

Improved animal welfare

Organic systems provide better welfare than most conventional systems for domestic animals, with lower stocking densities and living conditions which are as near to natural as possible for each species. Such systems result in naturally better animal health and a greatly reduced need for

veterinary medicines. Routine use of antibiotics and growth hormones is prohibited within organic systems and many scientists have argued that this rule has clear benefits for human and animal medicine (Harvey and Mason, 1998). For example, the routine use of antibiotics is suspected to increase the speed at which pathogenic organisms become resistant to antibiotics (Anon.,1999g). There is also evidence that some growth or yield promoting hormones used in livestock production, (e.g. bovine somatotrophin, otherwise known as BST) can have adverse human health effects (Kingsnorth,1998). Organic systems will provide a high welfare, natural alternative to conventional livestock systems, whilst greatly reducing our dependence on veterinary drugs and hormones, (most of which are un-natural and many of which have unknown or deleterious effects).

Reduced energy consumption

Organic farming uses less fossil fuel than conventional fanning, mainly because manufactured fertilisers are not used in organic systems, and the manufacturing process is very energy intensive. The amount used in fertiliser manufacture would greatly outweigh the fuel used by farm machinery for example (Besson & Niggli, 1991). However, a complete assessment of all the energy used in conventional versus organic farms would be very complex. Many organic farmers use cultivation machinery more often than their conventional counterparts, for example to control weeds. Furthermore. there is a great deal of support energy used during the harvest, processing and marketing of food. Food miles, (i.e. the distance food travels before consumption) are rapidly becoming an issue in organic production systems, because some of the more specialist lines such as tropical fruits may have to travel thousands of miles prior to consumption. Organic production systems have the potential to greatly reduce energy consumption, but farmers and policy makers must bear in mind the total amount of energy needed from sowing to consumption in order to minirmse energy use.

Recycling and disposal of waste on land

The human population is having increasing problems disposing of their industrial and domestic wastes. Paradoxically, in most western countries, they are also having problems sourcing enough bulky organic manures to satisfy the needs of their organic crops. This problem will increase as more farmers convert their land to organic systems. Following the necessary research, organic agriculture must provide a system where we can recycle and use on land our unwanted non-polluted domestic (and some non-polluted agricultural) waste products following composting. We must develop the technology to turn our waste products into a safe and invaluable resource.

Increased employment increased farm profitability?

The profitability of any finning system depends on the return from the market place exceeding the costs of supplying that market. In organic farming, input costs such as fertilisers and crop protection chemicals are lower, but the overhead costs of land, labour and capital are often higher. In the IJK, these costs are usually up to 20% higher than on conventional holdings, (Lampkin, 1999). Yields, and the proportion of premium crop are generally lower, therefore the price per unit of produce must be higher.

It has been argued that organic fanning results in significant job creation, although most of it is in

on-farm marketing and processing. It is estimated that organic farms need on average 30% more labour than conventional (Anon., 1999a). Pig and poultry farms tend to need more than that and arable farms less. Opinions differ on whether increased employment in agriculture is a good thing or not. In terms of economic analysis, it has been suggested that increased labour is a cost not a benefit and would leave European agriculture vulnerable to imports from countries with lower labour costs. If organic production systems were widely adopted, there may be a small increase in overall employment in agriculture: a reduction in employment in the input industries would be more than compensated for by an increase in the employment on farm-based marketing/ processing.
In the current marketplace, organic produce is estimated to cost the consumer 50 – 60% more than its conventional counterparts (Anon., 1999b). However, the retail price is not the same as that received by the producer and it is the farm gate price that determines farm profitability. There is significant concern in the European farming community regarding the current organic premiums. At present the market is heavily under-supplied, therefore there is little danger of over production. However, there is doubt about whether the premiums will remain indefinitely, for example in difficult economic circumstances or when the market becomes saturated with produce. The UK Soil Association feels that as the market for organic produce grows, closing of the differential between organic and conventional would be in the interests of both producers and consumers. They believe this can be achieved through efficiencies that flow from economies of scale at processing, distribution and marketing tiers as well as production improvements resulting from increased research and development.
Significant alterations to the entire farming system are required when converting from conventional methods and many farmers find these changes difficult or impossible to make. For an organic system to be successful and profitable, the farmer must understand his crops, livestock and soil. Organic production systems can give rise to greater farm profitability in many farming businesses, but organic farming is not guaranteed in the long term to be a better financial option than conventional. Most importantly, conversion will not automatically make an unprofitable farm into a profitable one. However, if or when all external costs, (e.g. to rectify problems such as BSE, pesticide and fertiliser pollution of water etc.) are taken into consideration, it is a more profitable food production system for society as a whole.

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