Geofile Online
APRIL 2001
398

PAUL WARBURTON

ISSUES IN COMMERCIAL INTENSIVE FARMING: ORGANIC FARMING – AN ALTERNATIVE?

Agriculture in Britain changed dramatically during the last century. In the period before the Second World War, things remained much as they had been in the 19th century. A lot of work on farms was still done by hand or using horses, fields were irregular and relatively small, few chemicals were used and yields were low by today's standards. British farmers had to compete with cheap imports of grain, meat and dairy produce from Australia, New Zealand, the Canadian prairies and elsewhere in the Empire, so times were hard.

The War, and particularly the sinking of so many merchant ships by German U-boats, brought about the realisation that Britain had to produce more of its own food and become less reliant on imports.

The post-war period witnessed the increasing application of science and technology to farming to maximise yields and to increase profitability. The European Common Agricultural Policy (CAP), which aimed to stabilise commodity prices and guaranteed a market, within certain quotas, for agricultural produce, also encouraged farmers to increase inputs into their farming in order to achieve greater outputs. Farmers were also given grants from the EU to improve their farms, for example by increasing herd sizes and buying new machinery. Latterly, however, concern about over-production – the creation of 'butter mountains', 'wine lakes' and so on – has led to initiatives to scale down production. **Set-aside**, whereby farmers are paid to keep land fallow, is one such initiative.

During the 1980s and 1990s there was increasing unease about the intensification of farming (Figure 1), with its reliance on chemical fertilisers and pesticides. Public perceptions of modern farming have undoubtedly been influenced by the ongoing furore concerning BSE, and also by the campaigns led by certain pressure groups against genetically modified crops.

The growing interest in organic farming reflects an environmentalist sentiment that foods should be produced in a sustainable way that causes no harm to the environment, including the wellbeing of livestock, and which arguably is better for the health of consumers. Most supermarkets now offer various types of 'organic produce', which sell at premium prices. People choose such products either because they find they taste better, or because they are distrustful of intensively produced foodstuffs and prefer to support what they see as a more 'ethical' approach to farming.

Figure 1: Newspaper headlines reflecting opposition to changes in farming

Beef war as French keep ban
Daily Telegraph 11.11.1999

US alarm over GM foods
Daily Telegraph 10.10.1999

Family trust forces reluctant farmer to destroy GM crop
Daily Telegraph 8.6.1999

Piling pesticides on to our plates
Daily Telegraph 15.5.1999

In this **Geofile** we will examine the main aspects of commercial farming, particularly those which have proved to be controversial. We will then look at the nature of organic farming and consider its future.

Commercial intensive farming

Commercial intensive farming involves practices whose purpose is to maximise yields, and thus profit when produce is sold to the market; this generally means supermarket chains and food processing companies. Intensive farming essentially involves a high investment of capital per unit area of land, this investment generally taking the form of machinery and chemicals, but sometimes including greenhouses and ventilation and irrigation systems.

Machinery

Farm machinery developed rapidly after the war, to the extent that most tasks previously done by hand or using horses are now mechanised. The use of farm machinery is not without problems. Heavy tractors and machinery can create furrows in the soil. In wet conditions these can concentrate run-off, and there have been cases where these have deepened over a season, concentrating flowing water and contributing to soil erosion. Solutions to soil erosion can be as simple as ploughing or operating along the line of contours, rather than at right angles to them. Tractors are now much more powerful than the simple pre-war variety but, at the same time, have become increasingly heavy. This can cause problems of soil compaction, impeding the infiltration of rainwater (and thus contributing to surface run-off) and reducing the flow of nutrients within the soil.

The steady increase in the size of machines has brought about the need for bigger fields, so that tractors, combine harvesters and other equipment may be used more efficiently. As a result the rural landscape has changed dramatically in some parts of the country.

Field size and hedgerow removal

The extent of hedgerow removal is difficult to assess, as there are no official records. The period of most extensive removal was during the 1950s and 1960s, to create larger fields in which farmers could operate larger machinery and also gain more land to increase yields.

Hedgerow removal is now a very emotive issue, with concern expressed over the impact on the landscape and loss of habitats for birds and other small creatures. There is a noticeable difference between species diversity in an old hedgerow compared with new.

The extent of removal has perhaps been rather exaggerated, however. Removal was carried out extensively in the eastern counties and in parts of the Midlands, but less so elsewhere in the country. In many counties, much remains of the traditional farming landscape. Many farmers have realised that there are advantages to having smaller fields, such as reduced wind erosion.

During the 1980s and 1990s hedgerow removal occurred almost exclusively in connection with construction projects such as new housing estates or road building. Even in Suffolk, sometimes called 'the prairies of England', in recent decades hedgerow planting in places has exceeded removal. The set-aside scheme has also encouraged farmers to plant areas of land as woodland.

Chemicals

Undoubtedly the use of chemicals is one of the most controversial issues in farming. Most crops in this country and in other economically developed countries are grown using chemical controls. Chemicals are used to enable farmers to increase yield and profits and to meet the demands of consumers in terms of the size, appearance and quality of foods they buy. Pesticides are a special group of chemical substances covering herbicides (to control weeds), fungicides (moulds and fungi) and insecticides (insect pests).

In the early post-war period there were severe problems with chemicals, particularly insecticides. For instance the insecticide DDT accumulated in the food chain, having a damaging effect on wildlife and a widespread environmental impact. Such chemicals are now banned or their use strictly controlled.

The most notable effects of herbicides have been on certain plant species. Plants like poppies, thistles, cornflowers and scabious are less widespread in arable areas, particularly on chalk downland and grassland areas. The reduction in these plant species has led to a marked change in butterfly and moth populations which rely on flowering weeds as a source of food at vital points in their life cycle. Insecticides have also affected butterflies and moths but not to the same degree. Although intensive farming has overall had a damaging effect on wildlife, in many cases insect populations may only be temporarily set back, and populations grow again unless the breeding population is drastically reduced. Farmers often spray a field and reduce insect numbers locally, but numbers on nearby farms or open land may remain unchanged.

(a) Chemicals and food
It has been said that there is no such thing as a harmless chemical, only a harmless dose. Although chemical residues have been found on foods, generally speaking the amounts have been small and there is no evidence to support the argument that, at least in this country, where controls on residues are very strict, there are dangerous residues on the food we eat. Rigorous checks are made by food stores and supermarket chains and by government inspectors. The nature of the chemical must also be considered. Chemicals that accumulate in the body are banned; Dieldrin (used in sheep dipping) is one such example, after it was found that it accumulated in the food chain.

(b) Chemicals in watercourses
Pollution of watercourses has occurred from time to time as a result of inappropriate disposal of chemical containers, careless spraying and applications that have been too heavy. In Britain today there is no strong evidence of serious generalised watercourse pollution. Farmers have become more careful and are using more efficient formulations and application techniques.

The use of nitrogenous fertiliser, however, remains an area of concern. When considerable amounts leach into watercourses, **eutrophication** – loss of oxygen from the water, due to excessive plant growth – can result. Concerns have also been expressed about the effects on human health of nitrogen in drinking water. Wessex Water has found that since 1950, there has been a seven-fold increase in the use of nitrogen fertilisers in the region. They have recently started to encourage a change to organic farming in the region, in an effort to reduce the leakage of fertilisers into watercourses. The Ministry of Agriculture, Fisheries and Food (MAFF) has organised a number of research projects into this issue. The use of nitrogenous fertilisers can be banned in an area, if monitoring shows that a watercourse is being seriously damaged.

(c) Chemicals and soil
There is no evidence that soil is harmed by the use of chemical fertilisers; if anything, biological cycles are speeded up. If soil were to become biologically 'dead', then crop residues would accumulate and this is not the case. There is no solid evidence that chemicals, when used correctly, have deleterious effects on the soil's living systems.

Drainage and wetlands

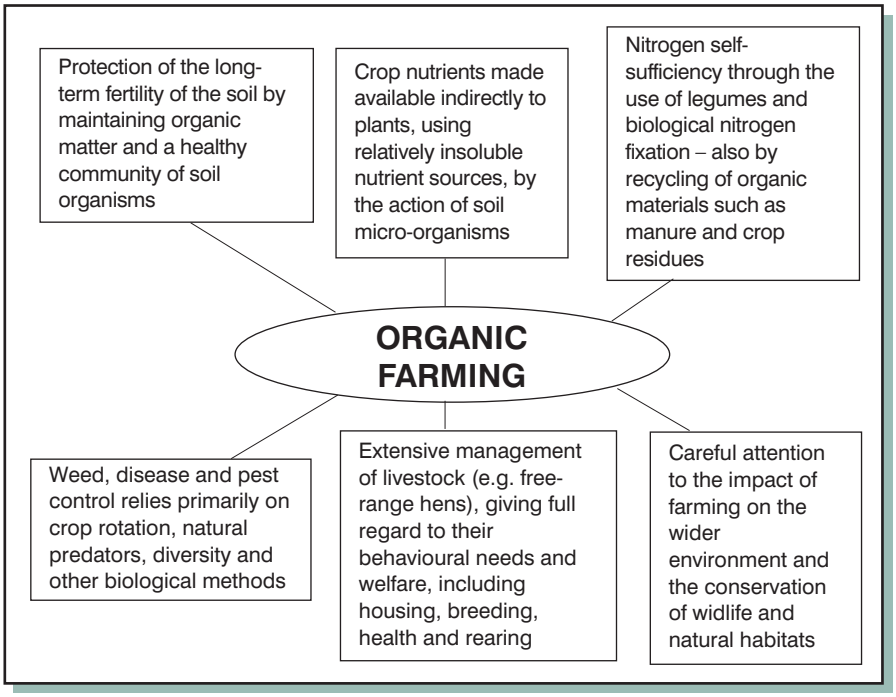
Low-lying areas near rivers and the coast have seen considerable change as a result of intensification in farming. Notable examples include the wetlands of Somerset and the Norfolk marshes. These areas were traditionally used for grazing cattle and sheep, with meadows producing hay. Farmers wanting to increase their profits turned to the production of cereals; wheat grows well in these areas. To convert to arable farming, however, the land had to be drained. So-called improvements to the land led to disquiet on environmental grounds. Not only does a unique type of landscape disappear, but with it many rare species of plants and wildlife adapted to the special conditions. There is a notable impact on both local and migratory birds.

These areas illustrate the vital role of legislation relating to **environmentally sensitive areas** (ESAs). Agreements are made between the MAFF and farmers to farm in an environmentally friendly way. Farmers may have to reduce inputs into their land and change the nature of farming practices, receiving lower financial returns. The government helps by subsidising farmers after calculating the difference between what a farmer obtains in income and what their income might have been otherwise.

Organic farming

Definition and features
Organic farming is an approach to agriculture with the aim of achieving integrated, humane, environmentally and economically sustainable production. The principle of **sustainability** is at the heart of organic farming. In its widest sense, sustainability covers conservation of non-renewable resources (soil, energy, minerals)

Figure 2: Characteristics of organic farming



and also economic, environmental and social issues.

With organic farming, maximum reliance is put on locally or farm-derived renewable resources and the management of self-regulating ecological and biological processes to provide acceptable levels of crop, livestock and human nutrition. Sound organic practices should provide protection from pests and disease while also ensuring an appropriate return to the human and other resources employed. Students should be familiar with the main characteristics of this form of agriculture (Figure 2).

Organic farming is just one approach to sustainable agriculture, and it should be noted that many of the techniques involved, such as crop rotation, mulching and integration of crops and livestock, are practised in other agricultural systems. What makes organic agriculture unique is that under various laws and certification procedures, almost all synthetic inputs are prohibited and 'soil building' crop rotation is enforced.

Organic farming is still only a small sector of the industry in MEDCs, but it is rapidly growing – at rates of 20% annually in countries like the USA, France and Japan. In Austria and Switzerland, organic agriculture represents about 10% of the agriculture system. Organic exports are typically 20% higher than comparable products and many countries are expanding into this lucrative market.

The future of organic farming

So far, there have been few studies to assess organic farming's long-term prospects. It is very unlikely that organic farming could ever be the only form of farming in Britain. Yields are generally lower than from more intensive commercial farming, due to lower soil fertility (although this may only be in the short term), losses resulting from pests and diseases and generally less intensive methods. Some studies, however, have shown that overall financial results for organic production can be better than for conventional farming (Figure 3). Organic farming does not have all the economies of scale enjoyed by commercial intensive farming at the moment, products therefore are generally more expensive. For farmers, there is generally a high price for conversion from conventional to organic farming, and no certainty of a high level of income for those making the change. Current problems that face farmers trying to covert or enter organic farming are a lack or information and shortage of suitably trained personnel. The quality of institutional support also varies between countries. Land tenure is critical; it is unlikely that

Figure 3: Comparison of gross margins from organic and conventional cereals

	ORGANIC	CONVENTIONAL
Yield tonne / acre	1.49	2.98
Price £ / tonne	220	102
Sales £	328	304
Area Aid £	107	107
TOTAL SALES	435	411
VARIABLE COSTS		
Seed £	25	19
Fertiliser £	NIL	30
Sprays £	NIL	52
TOTAL VARIABLE COSTS	**25**	**101**
GROSS MARGIN £	**410**	**310**

Source: Soil Association – average figures for wheat for the period 1995–97, for Duchy Home Farm and neighbouring conventional farm, from Highgrove Farm accounts.

Figure 4: GM foods – pros and cons

Genetically modified foods have traditionally involved selective and cross-breeding – e.g. wild grasses have been cross-pollinated to produce edible grains like wheat. but more recently, genetic modification has involved implanting genes from one speces of plant or animal into another to select desired characteristics, e.g. genes from a type of fish that can survive in cold water have been implanted into tomatoes and strawberries to increase their frost resistance.

ADVANTAGES

- Increased crop yields (without the need for additional farm land).
- Food can stay fresh for longer.
- Food may taste better.
- It could be possible to produce food that is better for us, e.g. higher starch content potatoes that absorb less fat when cooked to make chips.
- Herbicide0resistent crops could reduce the need for chemicals that contribute to environmental damage.

DISADVANTAGES

- Genetic modification exposes genes to nature and to evolution: 'It is possible to predict what will happen in the future, there is therefore a risk. What has been proved safe today may not be safe tomorrow' Professor Steve Jones, Head of Genetics, University College London.
- Doctors and scientists are worried about the effects on health – particularly a possible link with cancer.

tenant farmers will be prepared to put up the cost of converting without some assurance of access to the land in the future.

Conclusions

Commercial farming has brought about many changes in MEDCs like Britain, often leading to a hostile reaction by the public, environmental groups and other organisations. Sometimes the evidence to support opposition to commercial farming practices cannot be found, or is not persuasive. It is clear too, that as technology and environmental monitoring progresses that there will be considerable reductions in impacts in the years ahead.

It is impossible at the moment to maintain supplies in Britain and certainly to meet the demand for food by a growing world population, without adhering to intensive farming practices. In this context genetically modified (GM) foods are being hailed as a new way to improve food output with reduced levels of chemicals being required (Figure 4). The jury is still out on the safety of GM foods and much research is still being done. Certainly there is considerable concern over the impacts on the natural environment were genetically modified plants or animals to escape and breed with the natural populations. Many people are also worried that they are not always aware when foods they buy in a supermarket contain genetically modified material. These concerns have helped the cause of organic farming, which not surprisingly opposes GM foods.

Organic farming has the potential to feed the world population. It is important to remember, however, that the world's food problems are more related to issues of debt, political decisions and an emphasis on cash instead of food crops rather than any differences between organic or commercial farming systems.

It will be important in the future for farmers to maintain good practices and to avoid controversy over issues like pollution and rights of access to rural land. Consumers, environmental groups and governments must also recognise the enormous problems facing the farming community, the difficulties of balancing rising costs with falling incomes. Many farmers in Britain are converting to organic farming to improve economic viability.

References

Pickering, W. R. (1997) *Conservation in Britain*, Willmot Pertwee Conservation Trust.
RSPB (1994) *Ecosystems and Human Activity*, Collins Educational.
Soil Association (2000) Executive Summary from report on 'Biodiversity'.
Soper, M. H. A. and Carter, E. S. (1991) *Farming and the Countryside*, Farming Press.

There are a number of useful web-sites dealing with commercial and organic farming. The following were used in compiling this **Geofile**:

Encarta.msn.com/index/conciseindex/6F/06F3B000.htm
(Encarta Encyclopaedia Article)

www.wirs.aber.ac.uk/research/organic.shtml
(Organic Farming; WIRS Research, University of Wales, Aberystwyth).

www.soilassociation.org

Acknowledgements

The author would like to acknowledge information and help provided by the Elm Farm Research Centre and the Soil Association.

Focus Questions

1. Find out more about the set aside scheme and environmentally sensitive areas. Use the following as a guide: When was the policy established? What are its aims? How is the policy implemented? Assess its success.

2. Develop some case studies for the main issues relating to commercial farming, particularly drainage of wetlands and hedgerow removal.

3. When Wessex Water became concerned about the leakage of nitrogen fertilisers into watercourses, they considered three courses of action. Firstly, to import water from an adjacent authority to dilute water in Wessex rivers; secondly, to invest in capital equipment to clean the water; and thirdly (the option they went for) to bring about a change in land use and to encourage more organic farming. Suggest arguments for and against each alternative. Why do you think Wessex Water went for the option they chose?

4. Carry out some further research on organic farming using the Internet.
(a) Compile a table summarising the advantages and disadvantages of organic farming.
(b) Compile tables giving the arguments for and against:
(i) hedgerow removal
(ii) inorganic fertilisers (against will cover organic fertilisers)
(iii) pesticides (against will cover biological controls).
(c) Try to find the rate at which farms have converted to organic farming in Britain.
(d) What are main obstacles facing farmers wanting to convert to organic farming?

5. What conclusions can you reach about organic farming from the data in Figure 3?

6. Write a summary of the BSE crisis. Focus on: What is BSE? The causes and results of BSE. The reaction of the public, organisations and government.

7. (a) What are GM foods?
(b) Use the internet to develop a fuller list of arguments for and against GM foods. Suggest why it is so difficult to reach a conclusion on this issue.