Organic food and farming

myth and reality

Organic vs non-organic : the facts

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Design and production: Soil Association

Organic food and farming is under the spotlight. More people are buying organic products and more questions are being asked about organic food and farming.

This booklet examines some of the key issues around organic food and its production. It takes up the challenge of answering the critics – critics who range from public relations companies defending agri-business, through to the heads of national food authorities and some academics. It exposes the misleading and erroneous statements made against organic food, and provides the facts that prove them wrong.

In particular this booklet examines six myths:

myth Organic foods are no healthier than non-organic foods.
reality Wrong: food produced organically contains fewer contaminants. Some scientific studies have shown that there are more nutrients in organically produced food.

myth Organic farming increases the risk of food poisoning.
reality False: organic farming can actually reduce the risk.

myth Organic farming uses pesticides that damage the environment.
reality Untrue: Organic farming systems rely upon prevention rather than cure, minimising the need for pesticides.

myth Consumers are paying too much for organic food.
reality Not so: crop rotations, organic animal feed and welfare standards, the use of good husbandry instead of agri-chemicals, and the preservation of natural habitats all result in organic food costing more to produce. Non-organic food appears to be cheaper but in fact consumers pay for it three times over – first over the counter, second via taxation (to fund agricultural subsidies) and third to remedy the environmental pollution (or disasters like BSE) caused by intensive farming practices.

myth Organic food cannot feed a hungry world.
reality False: intensive farming destroys the fertility of the land and is unsustainable. Organic methods help labour-rich but cash-poor communities to produce food sustainably.

myth Organic farming is unkind to animals.
reality Far from it: animal welfare and the freedom to behave naturally is central to organic livestock standards.

The myths which damage the organic movement are not conjured out of thin air and they do not arrive in the newspapers by chance. The myths are generated by organisations with particular interests to defend, and they are presented as press releases and prepared articles for publication in the media. This booklet concludes by looking a little more closely at the origins of the myths, and the people who peddle them.

Contents

'Non-organic' farming is the term used in this document to describe all farming systems that are not certified as organic. 'Intensive' farming is used to describe factory-style farms.
The research presented here is based on the standards that exist for organic farming today and, unless otherwise stated, the standards referred to are those of the Soil Association in the UK. All statements concerning the activities of organisations and individuals were correct at the time of going to press.

Introduction

In business, your success can be measured by the number of imitators you have, multiplied by the number of detractors. The veterans of organic food – both the campaigners and the producers – are clearly achieving the greatest success of a generation. Their imitators and followers are swelling their numbers daily. Their critics have never been more vociferous. It is easy to see why.

Between 1990 and 2000 the organic market in Europe grew at average of 25 per cent a year to reach an annual turnover of £6 billion by April 2000.[1] Growth within the UK has been particularly strong in recent years with a five-fold increase in market value in only 5 years. There is a growing shift in consumer purchasing towards organic food.

This trend has developed for a number of reasons :

- Loss of trust in non-organic food products after a long line of food scares.
- Desire to avoid pesticide residues in food.
- Desire to eat food produced without the use of Genetically Modified Organisms (GMOs).
- Demand for the highest possible standards of animal welfare.
- Demand for environmental protection and enhancement.
- Desire to protect the environment from GMO contamination.
- Confidence in the external inspection programme and legal standards for production covering all organic production and processing.
- Health and safety of farm and food workers worldwide.

Policy makers have recognised the potential for organic farming as a means of food production that meets the demands of nature and the marketplace. The benefits of organic management are reflected by government support for conversion, and post-conversion organic management, in all European countries except the UK.

However, the progress and objectives of organic farming have not been welcomed by all. Organic production aims to avoid external inputs in order to achieve sustainability. This conflicts with non-organic agriculture which relies heavily on external inputs to increase yields (particularly pesticides and fertilisers). As a consequence pesticide sales globally are now estimated to be worth over £15 billion a year.[2] There is clearly a strong commercial interest in maintaining this market.

It is therefore no surprise that organic farming has its critics, who are attempting to influence the buying habits of consumers with anti-organic allegations. It is important that these allegations or myths are engaged and refuted rather than ignored and allowed to gain credibility. The myth and reality initiative was launched by the Soil Association and Sustain to provide a well referenced and robust response to these myths. This report aims to educate critics, provide information for the organic sector and the media, and to raise awareness amongst the general public.

Our work has highlighted significant gaps in current research on organic food and farming. These need to be urgently filled. However, emerging research is already beginning to show the benefits of organic production. The results of a major six-year study recently reviewed in *Nature* magazine comparing organic, integrated and conventional apple systems revealed that an organic apple production system has similar yields to conventional and integrated production methods. Importantly, it also has higher soil quality, is better for the environment, produces sweeter and less tart apples, has higher profitability, and achieves greater economic sustainability.[3]

We are confident that more research will yield more evidence that organic food and farming is good for people and good for the planet.

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Food quality and health

myth

‘There is no evidence available at present to be able to say that organic foods are significantly different in terms of their safety and nutritional content to those produced by conventional farming’

Professor Sir John Krebs, Chair, UK Food Standards Agency, 2000[1]

reality

‘It has been demonstrated that organically produced foods have lower levels of pesticide and veterinary drug residues and, in many cases, lower nitrate contents’

UN Food and Agriculture Organization, 2000[2]

Organic food has:

- **Lower levels of contaminants, such as pesticides, antibiotics and nitrates.**
- **Higher levels of a variety of essential nutrients.**

The UK Food Standards Agency has stated there is no difference between non-organic and organic food. However the Agency may have overlooked a study which reviewed 150 research projects comparing organic and non-organic food.[3] This study confirmed that, despite varied research methods, there is a trend towards fewer undesirable components or contaminants, and higher desirable components (such as vitamins) in organic food compared with non-organic food.

Pesticide residues

The latest annual report on pesticide residues in the UK showed that about half the fresh fruit and vegetable samples tested contained pesticide residues.[4] Safety has only been established for individual pesticides in certain circumstances. The long-term effects of pesticide residues and the implications of 'cocktail effects' on human health have not been established. The Food Standards Agency states that 'pesticide residues should be as low as is reasonably practical'.[5]

Pesticide residues may reduce the fertility of humans and animals and the health of their offspring, as well as disrupting the chemical communication systems that regulate the reproductive cycle.[6] A 17-year study carried out at the University of Denmark has shown that women with higher than average levels of pesticides such as dieldrin in their bloodstream have double the risk of breast cancer.[7] Dieldrin is an organo-chlorine pesticide which is now banned for use in the UK but which, as with many other pesticides, persists for many years in the environment and in animal tissues.

The UK government advises consumers that by peeling the skin of fruit and vegetables they can reduce their consumption of pesticide residues.[8] Although pesticide residues are occasionally found in organic food (largely as a result of pesticide spray drift from neighbouring farms), a diet based on organically produced food can significantly reduce the amounts of pesticide consumed and consequently any damaging effects of these chemicals.[9] [10] [11]

A growing body of scientific evidence implicates certain pesticide groups in a range of damaging health effects. For example, 45 pesticides are known or suspected hormone disrupters.[12] These compounds have been found to affect reproduction and the immune system in fish, alligators, seals, birds and snails.[13] There is increasing concern over the effects of exposure of pregnant women to these chemicals. The Royal Society states 'It is prudent to minimise exposure of humans, especially pregnant women, to endocrine disrupting chemicals.'[14]

Antibiotics

Antibiotics are an essential element of modern medicine, and are used to reduce the chance of potentially fatal infections even in routine operations.

In the UK, the House of Lords select committee on science and technology report in 1998 on antibiotic resistance concluded that the use of antibiotics in animal feed for growth promotion should be banned. The report indicated that 'there is a continuing threat to human health from the imprudent use of antibiotics in animals', and that 'we may face the dire prospect of revisiting the pre-antibiotic era. Misuse and overuse of antibiotics are now threatening to undo all their early promises and success in curing disease'.[15]

Despite the findings of the House of Lords, it has been common for antibiotics to be used as growth stimulators and for disease suppression by their routine addition to the feed of non-organic livestock. This regular use of antibiotics encourages the emergence of antibiotic-resistant organisms that pass to humans, via the meat. This results in some cases of salmonella, and other microbiological diseases being untreatable by antibiotics.[16]

In 1998 the House of Commons agriculture committee recommended tighter restrictions on their use for prophylactic purposes.[17] Under organic farming standards antibiotic usage is restricted to the treatment of illness. Disease is minimised by practising good animal husbandry and avoiding dense stocking levels. Organically produced foods have lower levels of antibiotic drug residues.[18]

Food quality and health

Nitrates

A number of studies show that when nitrates, a common element of artificial fertilisers, are converted to nitrosamines they may be carcinogenic.[19] The nitrate content of organically grown crops is significantly lower than in conventionally grown products.[20 21 22]

Nutritionally desirable components

Several studies have found that organic food contained more nutrients than conventional food, with higher levels of various minerals and vitamin C.

- A 12-year German study found that organic food contains higher levels of minerals. The largest differences were for potassium and iron, but magnesium, calcium, phosphorus and vitamin C levels were also higher in organic vegetables.[23]

- An American study found that organically grown food contained much higher average levels of minerals than non-organic food. For example, there was 63 per cent more calcium, 73 per cent more iron, 125 per cent more potassium and 60 per cent more zinc in the organically produced foods. There was also 29 per cent less of the toxic element mercury.[24]

- Several studies have found more dry matter (less water) in organically produced food than in non-organically grown produce.[25 26] This means that there are more nutrients per unit weight of food.

- A UK MAFF shopping basket study revealed significantly higher levels of dry matter content in organic apples and carrots as well as more vitamins and potassium in other fruits and vegetables[27] Both organic and non-organic production will be affected by the selection of more nutritious varieties instead of selecting the ones with the highest yields, and by shorter food chains with less nutrient loss during transport and storage.

But do these differences make a significant contribution to health? Animal feeding trials may provide the answer to this question, and a recent review of 14 studies confirmed significant health benefits from organic diets, especially in the areas of reproduction, early development, recovery from illness and overall health.[28] It is important to note that these animal feeding studies were not peer reviewed and deserve to be replicated given the significance of their findings.

More research is needed to understand fully the effects of the difference in nutrients in organically produced food and non-organically produced food. Few long-term research studies have been done, as research into organic farming is under-funded internationally. In the UK for example, just 1.8 per cent(£2 million) of MAFF's research and development budget for 2000 has been allocated for organic research, while the remaining 98.2 per cent is used for research on non-organic agriculture, including £26 million, equivalent to 24 per cent of the budget, for genetic engineering and biotechnology.[29]

The Soil Association is currently preparing a major report: *Organic Farming, Food Quality and Human Health*, for publication later in 2001.

Conclusion

Food produced organically contains fewer contaminants. Some scientific studies have shown that there are more beneficial nutrients in organically produced food. More research is clearly needed.

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Food poisoning

myth

‘This organic food was probably fertilised with animal manure containing dangerous pathogens. Be especially worried about the virulent E. coli O157:H7, found mainly in cattle manure’

Dennis Avery, Director, Center for Global Food Issues, Hudson Institute, 2000[1]

reality

‘It can be concluded that organic farming potentially reduces the risk of E.coli infection’

UN Food and Agriculture Organization, 2000[2]

Food poisoning

The evidence shows:

- **Food poisoning rates have increased across Europe for two decades.**
- **There is no more risk of pathogen contamination of organic food than non-organic food; Indeed many organic practices reduce risk.**

Food poisoning cases have been increasing in the UK and in Europe at an alarming rate. Total cases in the UK have risen from 10,000 in 1982 to almost 50,000 cases notified in England and Wales by the end of the 1990s, an increase of 400 per cent.[3]

All types of food poisoning are increasing, including cases of salmonella and campylobacter. In the European Union in 1998 there were 188,000 reported cases of the former and 130,000 of the latter.[4] These figures, moreover, were held to 'hugely underestimate the true extent of these diseases'.[5] But the bacteria that has caused the most controversy for organic food, and has been linked to organic farming by the free-market think tank, the Hudson Institute in the US, is E.coli.

E.coli bacteria are found everywhere – in cups of tea, on our hands, in the air and in our intestines. Most of the E.coli varieties are harmless, but types of E.coli called VTEC (Verocytotoxin-producing E.coli) produce potent toxins and can cause severe disease and even death in humans. The commonest VTEC strain is O157.[6]

It is thought that the misuse of antibiotics in modern agriculture and medicine led to the rapid development from the 1970s and 80s of more aggressive strains of E.coli that are immune to therapeutic drugs.[7] The most common cause of E.coli 0157 infection for humans is eating contaminated foods, particularly inadequately cooked minced beef (often in the form of beef burgers) and milk.[8] The US Center for Disease Control (CDC) 'identifies the main source for human infection with E.coli as meat contaminated during slaughter'.[9]

'If you took meticulous time with every single carcass to vigorously clean it, scrub it, and wash it down, you could probably eliminate it, [E.coli].' R Elder, USDA Meat Animal Research Center, 1999.[10]

But how are the foods contaminated with the bacteria in the first place? Critics of organic farming assert that because organic farmers use farmyard manure there is a greater risk of pathogen contamination on organic crops. However, manure is also used widely in non-organic agriculture, with 80 million tonnes applied in the UK each year.[11] Furthermore there are no restrictions on the treatment and application of manures by non-organic farmers.

Cases of E.coli 0157 wrongly associated with organic farming

The supermarket chain Tesco removed organic mushrooms from their stores in May 2000 as a result of a test that showed 'possible presence of E.coli 0157.'[12] Five days later the Public Health Laboratory Service (PHLS) admitted that there had been an error in the laboratory testing of the mushrooms and the contamination had probably been caused by the laboratory. The PHLS stated 'there is absolutely no risk to public health from this incident'.[13]

In the United States forty-seven people reported food poisoning from a batch of Californian organic lettuces. In fact, the source of the contamination was not the lettuces themselves, nor any manure used to produce them, but the water supplied to the packing house. The water had been contaminated by a pen of non-organic cattle next to the site.[14]

A survey conducted by the PHLS of over 3,000 ready-to-eat organic vegetables found no evidence of dangerous microbes that might cause desease in humans, 'indicating that overall agricultural, hygeine, harvesting and production practices were good'.[15]

Minimising risk from manure

Organic food must meet all quality and safety standards that apply to non-organically produced food. But the standards for manure and soil health in organic farming go much further than the MAFF codes of good agricultural practice.[16] The UK Food Standards Agency recognises that there are likely to be lower levels of pathogens (harmful organisms) in manure used on organic farms:

'The Soil Association recommendations for manure storage and treatment (solid manure composting and slurry aeration) on organic farms, are likely to lead to enhanced reductions in the levels of pathogens in stored manures which are destined to be spread to land.' Food Standards Agency, 2000[17]

Food poisoning

Four factors influence the potential transfer of pathogens from manure to humans:

- Pathogen levels in animal faeces.
- Treatment, storage and processing of manure.
- The biological activity of the soil to which the manure is applied.
- The timing of manure application in the crop rotation (the interval between application and harvest).

We will look at each of these four factors in turn.

Pathogens in manure To reduce the level of pathogens in animal faeces it is important to optimise animal health.[18] Organic systems do this by allowing access to pasture at all times in the grazing season, preventing over-stocking and allowing animals constant access to water. Organic systems also prohibit the routine use of antibiotics. This allows animals to build up natural immunity and makes them less prone to re-infection from pathogens such as E.coli.[19] In addition, a grass, rather than a grain-based diet, results in less E.coli bacteria in a cow's gut.[20] Organic farming standards state that a minimum 60 per cent of all feed for ruminants (cattle and sheep) has to be grass, hay or silage ('forage'). In contrast, ruminants in non-organic farming are fed a higher proportion of grain to increase production potential, as no limits apply.

Treatment of manure Organic standards require composting or other treatment of manure of non-organic origin to optimise fertility and kill off pathogens, pests, or antibiotic residues. Composting is defined as a process of aerobic fermentation which involves a substantial temperature increase.[21] After an initial heating the compost heap must be turned, preferably covered and maintained for at least three months. This greatly reduces pathogen levels in manure.[22] For non-organic manure to be brought into an organic farm, permission must be granted by the organic certification body. Manure from intensive rearing units and human sewage sludge is not permitted under any circumstances in organic systems.[23] Both are allowed in non-organic farming.

Biological activity of the soil A biologically active (living) soil reduces the risks of harmful organisms in manure surviving and being transferred to humans. Pathogens will not thrive if there is strong competition from other soil-borne organisms.[24] Several research studies have shown that biological activity is higher in organically managed soil, leading to less persistence of harmful micro-organisms. A 21-year-study at the Swiss Research Institute of Organic Agriculture (FiBL) found that biological processes in the soil were improved under organic management and, conversely, that mineral fertilizers used in non-organic farming systems actually decrease biological activity in the soil.[25]

Manure application in crop rotation As an extra safety measure new guidelines are being introduced with the Soil Association standards giving time intervals between application of manures and harvesting of crops.[26]

Mycotoxins

Certain moulds of fungi can produce poisons (mycotoxins) which are harmful to humans and animals. Some claims have been made linking mycotoxins to organic foods, yet the UK Food Standards Agency has noted that evidence does not support this link.[27]

There is no evidence to suggest that consumption of organic foods has caused mycotoxin poisoning in humans.[28]Mycotoxins can affect both non-organic and organic crops and further research is required to determine how they can be prevented. Preliminary work suggests that some agronomic strategies used in organic agriculture could lead to less fungal contamination: long crop rotations which avoid the accumulation of crop-species-specific mould, and lower nitrogen application rates which decrease the likelihood of fungal pathogens on crops.[29]

Furthermore there is evidence that farming systems which do not till the earth between crops, and which use fungicides to reduce fungal spores in the soil, serve to increase toxin production in cereals.[30] In organic systems, tilling is indispensable as a weed control technique and the use of fungicides is prohibited. Therefore, organically grown cereals may be less prone to mycotoxin contamination prior to harvest than non-organically grown grains.

Conclusion

Organic farming practices reduce the risk of pathogens such as E.coli in food as well as potentially reducing the risk of mycotoxin contamination.

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Pesticides

myth

‘Organic farmers are allowed to use a number of toxic chemical pesticides, and many organic crops are routinely sprayed with pesticides’

Alex Avery, Director of Research & Education, Center for Global Food Issues, Hudson Institute, 2001[1]

reality

‘Pollution of air and water is found to be reduced on organic farms, soil health improves, and the number and variety of wild species, such as plants, butterflies and spiders is enhanced’

Economic & Social Research Council, Global Environmental Change Programme, 1999[2]

The evidence shows that:

- **Pesticides have a harmful impact on human health, the environment and the farm.**
- **Plant health and pest control can be promoted without the use of agrochemicals.**
- **Pesticide and fertiliser use forces farmers into a cycle of dependence known as the 'agro chemical treadmill'.**

Pesticides and human health

Pesticide exposure An estimated 20,000 accidental deaths occur worldwide from pesticide exposure each year.[3] The UK's Health and Safety Executive (HSE) reported that over a twelve-month period, five per cent of agricultural pesticide users reported visiting their GP with symptoms thought to be caused by pesticide exposure. A further ten per cent reported symptoms but did not consult a doctor.[4]

More profound effects of pesticide exposure are also apparent. A recent study involving nearly 700 women carried out by the University of North Carolina showed that mothers who lived near crops where certain pesticides were sprayed faced a 40 to 120 per cent increase in risk of miscarriage due to birth defects.[5] A second study of the functional performance of pre-school children exposed to pesticides in Mexico demonstrated decreases in stamina, gross and fine eye-hand co-ordination, 30 minute memory and the ability to draw a person when compared to 'unexposed' children.[6] See also *Pesticide residues* in Myth 1, above.

Pesticides and the environment

Aquatic ecosystems Inorganic chemicals leaching into ground water and waterways can cause substantial damage to aquatic ecosystems through the process of nutrient enrichment.[7] Furthermore direct toxic effects of pesticides have also been shown to damage aquatic life.[8] To reduce the costs of cleaning nitrates and pesticides from water Wessex Water has launched a scheme which provides financial support for farmers to convert to organic production.[9]

Birds and mammals In non-organic agriculture the use of pesticides and herbicides in the UK has been a key factor in reducing the abundance of insects, wild plants and seeds and, in turn, in the decline of farmland bird species.[10]

Impact on the farm – 'the agrochemical treadmill'

Resistance development Pesticide resistance has reached crisis proportions on a worldwide scale as a consequence of excessive pesticide use. More than 500 species of insects and mites are resistant to one or more insecticides.[11] At farm level this can lead to increased pesticide use to compensate for reduced product performance.

Reduced nutrient cycling Pesticides, soil fumigants and inorganic fertilisers have profoundly damaging effects on microbial soil communities and, in turn, organic matter degradation.[12] Pesticides have been shown to reduce earthworm populations by 60-90 per cent, with effects lasting for 20 weeks.[13] This can lead to a cycle of dependence on fertilisers and pesticides to counteract the symptoms of reduced soil-nutrient availability, thus leading to further environmental damage.

Decline in natural biological controls Pesticides can reduce populations of a pest's natural enemies.[14 15] This reduces the natural biological control mechanisms operating within the system and leads to a heightened reliance on chemical intervention to prevent excessive crop damage.

Increased crop susceptibility to pest and disease Higher nitrogen concentrations in the plant sap and thinner cell walls are a consequence of the use of soluble nitrogen fertilisers. This increases the susceptibility of crops to pest and disease attack.[16]

Preventing the need for pesticides

Organic farming systems use a variety of natural processes to enhance the health of crops and the soil and reduce the incidence of pests, diseases and weeds, thereby minimising the need for chemical inputs.

Sustainable crop rotations Effective crop rotations are fundamental to both fertility and pest and disease control in organic farming.[17] Rotations provide an obstacle to pest and disease life-cycles by removing crops for prolonged periods of time.[18]

Maintenance of biodiversity Crop rotation also creates a more diverse ecosystem which helps to build populations of a pest's natural predators.[19] The encouragement and enhancement of biological cycles within the farming system is one of the fundamental principles of organic agriculture. Avoiding biocides,[20] maintaining diverse habitats[21] and supporting microbiologically rich soils[22] all encourage inherent biological protection within the system.[23]

Optimum crop health and vigour Microbial activity within the soil is vital to provide the range and quantity

of nutrients required by the crop,[24] enabling the plant to maximise its ability to combat pest and pathogen attack. A number of studies have found pest densities to be higher on crops fed with inorganic nitrogen fertiliser compared to those fed with compost and manure.[25 26 27]
Composting and good hygiene Composting serves two important purposes: it builds and maintains organic matter levels in the soil (enhancing soil microbial communities) and removes pests, weed seeds and pathogens. The role of compost in suppressing disease is also becoming more apparent.[28] Good crop hygiene, such as the removal and destruction of crop debris, is important to clear potential reservoirs of pests and diseases.

Permitted pesticides

The emphasis of organic farming is firmly on prevention rather than cure. However, in certain circumstances, with severe restrictions, specific inputs with pesticidal properties may be used. In such circumstances organic farmers in the UK can choose from six different active ingredients (all permitted in non-organic agriculture). In contrast non-organic growers have over 450 pesticides to choose from.[29]

The International Federation of Organic Agriculture Movements specifies the criteria for evaluating the suitability of any input for organic farming. The following six aspects must be examined and found to be satisfactorily fulfilled before an input can be accepted.[30]

- Necessity.
- Nature and way of production.
- Impact on the environment, including: environmental safety, degradability, acute toxicity to non-target organisms, long-term chronic toxicity, chemically synthesised products and heavy metals.
- Human health.
- Ethical aspects – animal welfare.
- Socio-economic aspects.

Pesticides approved for use in organic farming in the UK

In addition organic farmers have to justify the requirement for use prior to using four of the permitted compounds (only soft soap and sulphur can be used without prior permission). These restrictions do not exist in non-organic agriculture.[31]

Active ingredient	Category	Comments
Copper ammonium carbonate Copper suplhate Copper oxychloride	These compounds are restricted and will be prohibited from March 2002	Copper salts effective against some fungal disease, particularly potato blight which is endemic in the UK
Sulphur	Permitted	Used for control of some fungal diseases
Soft soap	Permitted	Used for aphid control to coat leaf surface and block aphid spirocles
Rotenone	Under review	Naturally occuring plant based insecticide that decomposes rapidly in the environment. Use is currently under review
No herbicides are allowed. None of the insecticides permitted have systemic activity (get absorbed by the crop to work from the inside out). Biological control agents such as predatory lace wings are permitted. The use of *Bacillus thuringiensis*, a microbial insecticide with selective activity on caterpillars, is restricted		

Organic farmers must also comply with all the statutory regulations set out by government. Organic standards are constantly evolving in the light of improvements in best practice and research findings. For example, the use of copper salts as fungicides is scheduled to be prohibited in organic farming across Europe from March 2002. They are still likely to be used by the non-organic farming industry as a growth stimulator in pig production.

Conclusion

Organic systems rely on prevention rather than cure. They minimise the need for chemical inputs, thereby limiting damage to human health and the environment.

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Value for money

myth

‘They’re not getting value for money...
if they think they are buying food with extra
nutritional quality or extra safety’
Professor Sir John Krebs,
Chair UK Food Standards Agency, 2000[1]

reality

‘We need to learn the lessons
of the real cost of production. We need to
ask ourselves not just why organic prices are
so high, but why conventional prices are so low’
Alan Wilson, Senior Agronomist, Waitrose[2]

The true cost of a food product is not simply the price for which it is sold. The evidence shows that:

- **Non-organic food carries hidden costs, paid from public taxes.**
- **High animal welfare standards and protection and enhancement of the environment mean that organic food costs more to produce.**
- **Non-organic food production increases the need for, and costs of, water treatment and environmental protection measures.**
- **Economies of scale and technical innovations can help to lower organic costs of production as the sector develops.**

Crop rotations which maintain soil fertility, higher animal welfare standards and the restricted use of chemical inputs means that organic food costs more to produce. This makes it less accessible to many people, particularly those on low incomes. The organic market is growing and can start to benefit from economies of scale, reducing some of its costs. However, a co-ordinated approach with a government action plan and targets are needed to smooth out some of the bottle-necks that are currently holding back the organic sector, to support market development and to maintain a consistent level of support.

In addition, non-organic food is not as cheap as it appears. Consumers are paying for non-organic food three times over – first over the counter, second via taxation which mainly subsidises non-organic farming, and third to remedy the damage that farming and food production has done to the environment and human health.[3]

Subsidies and taxation

The European Union pays €40 billion (£25 billion) a year towards agricultural subsidies under the Common Agricultural Policy. In the UK, €4.3 billion (£2.7 billion) a year is paid in subsidies to farmers who mainly use non-organic farming practices.[4] The taxpayer gains little in terms of environmental or health benefits. This support should be diverted away from production-linked aid towards support which encourages all farmers to adopt more environmentally friendly forms of farming, such as organic, which can enhance rural development. The current allocation for the rural development programme, which embodies some of these objectives, is just five per cent of the total CAP budget, a figure too low to ensure value for money for the taxpayer.

Hidden costs

A study carried out by Professor Jules Pretty calculated that the total hidden or 'external' cost of non-organic farming in the UK to the environment and to human health was £2.34 billion per year (based on 1996 data), or £208 a hectare.[5] Organic farming has, by contrast, only one third of the hidden costs of non-organic agriculture, and would reduce the external costs of agriculture by £1.6 billion, to £120 - £140 a hectare.[6]

- Pesticide manufacturers pass on the costs of cleaning up pesticides to farmers, who pass it on to water companies, who in turn pass it on to consumers via water bills. In effect the polluter gets a hidden subsidy from anyone who pays a water bill. The non-polluter – the organic farmer – receives no such subsidy.[7] The yearly total cost of removing pesticides from the water supply in the UK is £120 million.[8]

- To reduce the costs of production, cows in non-organic farming systems have been fed on rations which include meat and bone meal. This led to the disastrous consequence of BSE in cattle and vCJD in humans. The cost of BSE has been put at £4.5 billion, in addition to the emotional and physical toll on the victims and their families.[9]

'BSE developed into an epidemic as a consequence of an intensive farming practice - the recycling of animal protein in ruminant feed. This practice, unchallenged over decades, proved a recipe for disaster.' Lord Phillips, BSE Report, 2000.[10]

All the apparent savings or efficiencies in non-organic farming incur costs in terms of human health problems, endangering natural resources or using nature as a 'sink' for pollution.[11] They are hidden costs because they are not included in the final retail price of the product.

If these hidden costs were included in the shelf price, consumers would be paying the real costs of food. Organic food would be cheaper, because its hidden costs are much lower.

Conclusion

Crop rotations, animal feed and welfare standards, the use of husbandry instead of agrochemicals, and the preservation of natural habitats all result in organic food costing more to produce. Non-organic food appears to be cheaper, but in fact consumers pay for it three times – first over the counter, second via taxation (to fund agricultural subsidies) and third to remedy the environmental pollution (or disasters like BSE) caused by intensive farming.

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myth

‘Intensive agriculture is good for health and the environment and is essential if the world's population is to be fed without converting vast areas of biodiverse ecosystems into cropland, which would be necessary if organic agriculture, with its lower yields, were used’

Institute for Economic Affairs, 1999[1]

reality

‘The world already produces enough food to feed the people who inhabit it today... It is clear that there is no single prescription for combating hunger’

J Diouf, Secretary General,
United Nations Food and Agriculture Organization, 2000[2]

Feeding the world

The long-term security of our food supply relies on sustainable forms of food production. The evidence shows:

- **Intensive farming destroys the fertility of the land.**
- **Sustainable farming helps communities to produce food at low cost.**

Unsustainable farming

Ultimately most life depends on the soil, but there is a worrying trend of soil erosion and declining soil fertility. Soil erosion is a major problem in non-organic agriculture and results from typical arable cropping regimes. A series of experiments comparing soil qualities under organic and non-organic management in the US led researchers to conclude that all topsoil in the non-organic managed areas would be lost in 50-100 years unless topsoil management practices were improved. In the organic system however, the soil management minimised erosion by using cover crops and green manures (plants that help fertilize the soil).[3]

In addition, non-organic farming relies on soluble fertilizers to maintain fertility of the soil, while organic farming relies on a high level of biological activity in the soil and nitrogen-fixing crops. For example, beneficial fungi such as mycorrhiza are more common and more active in organically managed compared to non-organically managed soils.[4] Plants benefit from mycorrhizal colonies through improved take-up of minerals, crop vigour and higher resistance to soil-borne pests and diseases.

Farmland habitats in the UK 'have been eroded at an increasing rate with modern agriculture identified as a major cause of growing losses'.[5] Many of the declines in butterfly species can be blamed on misguided agricultural policies.[6] English Nature (the UK government's advisor on nature conservation) believes that organic farming has benefits for wildlife through reduced agro-chemical use.[7] Agrochemicals associated with non-organic farming can reduce botanical diversity, restrict the base of wildlife food chains and reduce wildlife populations directly or by restricting their food supply.[8]

Sustainable farming

Sustainable agriculture is already feeding people successfully around the world:

- In China, farmers doubled their rice yields by planting a mixed crop of rice, rather than just one variety. The yields increased because the disease, rice blast, was unable to spread through susceptible rice plants, as the barrier of other rice varieties halted it. The farmers no longer need to buy fungicides to control the disease.[9]

- In Ethiopia, 12,500 farm households adopted sustainable agriculture methods, resulting in a 60 per cent increase in crop yields as well as a 70 per cent improvement of overall nutrition levels.[10] Some of the farmers also sell excess crops in the local market. This area was once reliant on food aid but can now feed itself.

- Cuba faced serious hunger in 1989 when the collapse of the Soviet Union meant the withdrawal of Soviet aid. Thousands of city plots were handed over to local people who turned them into vegetable gardens. By 1998 more than 8,000 urban farms and community gardens were being run by more than 30,000 people.[11] The food produced is almost entirely organic and pest problems have diminished. Studies suggest that food security in Cuba has improved as a result.[12]

More food is not needed

There is already enough food produced to feed the world. Grain produced in the last year could have sustained eight billion people, two billion more than the current world population.[12] It did not do so because the grain was not evenly distributed and much of it was fed to animals, lost to pests or rotted between harvest and consumption. Some 790 million people in the southern hemisphere do not have enough to eat.[13] In the industrialised countries of the northern hemisphere, surplus production is the norm and farmers are paid not to farm some land (to 'set aside' the land) in order to reduce food output and surpluses.

The main cause of hunger is poverty. In the 1980s, Ethiopia was a net exporter of grain despite famine among its own population. Nearly 80 per cent of malnourished children in the southern hemisphere live in countries that have food surpluses.[14] Where hunger exists, what is often lacking is not food but access to it – either having the money to buy it or the land to grow it.[15]

Failure of high-tech solutions

Technical fixes, such as genetically engineered (GE) seeds, are not the answer either. Given that hunger is largely caused by poverty, how can a hungry person afford GE seeds and the pesticides and herbicides they are designed to depend upon? Around 1.4 billion farmers in the southern hemisphere save seed from one harvest to the next, but as GE seeds are patented farmers will not be able to save GE seed. Instead they risk becoming caught up in a 'chain of biological and licensing controls'.[16]

The 'green revolution', which aimed to replace traditional farming methods with high-yielding crop varieties and reduce hunger, has been detrimental to human health.[17] Far from helping hungry people, the high-yielding green revolution varieties of seed led to dietary deficiencies that 'can be directly linked to the increased consumption of green revolution crops'.[18]

Genetic engineering (GE) has been held up as a panacea for world hunger as it will supposedly increase yields. But it is just the latest in a long-line of high-technology 'silver bullets' that started with the invention of expensive chemical inputs and green revolution crop varieties in the 1960s. Like its predecessors, the GE silver bullet may hit its target but, at the same time can cause immense 'collateral damage' to people and the environment.

Conclusion

There is already enough food to feed the world. Hunger will be alleviated when poverty is alleviated. Intensive farming destroys the fertility of the land and is unsustainable. Organic methods help labour-rich but cash-poor communities to produce food sustainably.

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Animal welfare

myth

‘Organic farming principles may well have positive effects on people, the environment and livestock. But such benefits are almost impossible to quantify. In many cases, the philosophy is not yet matched by current knowledge and until they are, claims such as those made by the Soil Association [regarding animal welfare benefits] are ill-informed and misleading to the consumer’

Roger Cook, Director, National Office of Animal Health, 2000[1]

reality

‘Any significant increase in organic farming should … improve animal welfare’

Professor Sir Colin Spedding, Former Chair of Farm Animal Welfare Council, 2000[2]

Animal welfare

The health and welfare of livestock is a key indicator of a good farming environment. The evidence shows :

- **Animal welfare is one of the basic principles of organic farming upheld through organic standards.**
- **Good husbandry minimises the need to treat disease.**

Animal welfare forms one of the 17 basic principles of organic agriculture in the International Federation of Organic Agriculture Movements (IFOAM) *Basic Standards*, which states the requirement 'to give all livestock conditions of life with due consideration for the basic aspects of their innate behavior.'[3] For example, Soil Association standards recommend almost three times the weaning period for piglets compared to intensive pig production.[4]

Under organic standards, animal health is maintained by good animal husbandry (low stocking rates, access to the outdoors, appropriate diet, good handling) and by veterinary treatment if the animal does fall ill.

As a result of organic standards, Compassion in World Farming, a leading UK animal welfare organisation, recommends that their supporters buy organic food as 'it has been produced to higher welfare standards'.[5]

Antibiotic use in organic farming

Concerns have been raised that organic farmers restrict the use of antibiotics, even when animals are sick, to avoid losing organic certification.[6] Critics imply, but rarely state, that this means organic farmers allow their animals to suffer needless pain. In fact, if necessary medication is ever withheld then organic certification will be removed from the farmer.[7]

In the event of disease organic farmers are encouraged to use homeopathic medicines. However antibiotics can and should be used if recommended by a vet 'in order to save life, to prevent unnecessary suffering, or to provide the only way to restore the animal to full health'.[8]

Poultry welfare in organic systems

Lower stocking rates apply to all animals in organic farming, and this helps to limit diseases.[9] In non-organic intensive production of chickens for meat ('broiler' systems), overcrowded conditions facilitate the rapid spread of bacteria in the animals' cramped housing. Birds often have to spend their entire life indoors.[10] The stocking rate for housed broiler chickens is 34 kg/m2 in non-organic farming[11] but 21kg/m2 for organic systems.[12] Organic standards also stipulate that birds should have access to open-air runs throughout the day.[13]

In the most intensive farming systems, chickens are bred to develop quickly. The chickens reach slaughter weight in 42 days. The body muscle of the bird grows fastest, while the limbs and vital organs of the bird grow at a slower rate. This means that often the legs of the chicken cannot support its body and millions of chickens in the UK die of heart disease before they reach slaughter weight.[14]

In organic farming the chicken has a minimum slaughter age of 81 days, allowing more balanced growth of muscle, bone and vital organs and virtually doubling their life span compared to intensively farmed chickens.[15]

Antibiotics are still frequently added to feed or water to control disease in intensively farmed animals and virtually all chickens additionally receive other antimicrobials in their feed throughout their lives to prevent illness.[16] While the sales of the licensed growth promoting antibiotics have recently fallen, the use of some therapeutic antibiotics and microbials also have a growth promoting effect.[17]

Livestock transportation

Transportation is an essential element of livestock production and has major implications for animal welfare. Organic farming standards have been developed to minimise the negative welfare effects of transportation as far as possible.

Most organic farms breed and rear their own stock and usually deal direct with other organic farmers if new stock to replace animals leaving the farm are required. Soil Association standards prohibit live exports of

animals from organic farms, preventing excessive transport and ensuring that any export of livestock products is in carcass or processed form.[18]

Transport times for all species do not exceed eight hours from loading to unloading[19] and the use of electric goads are prohibited under all circumstances including use in abattoirs.[20]

Organic farming standards for poultry require that during loading and transport birds should be protected from the weather, undue fluctuations in temperature, humidity and air pressure and have sufficient space. Ventilation must be provided if vehicles are left stationery.[21]

Conclusion

Animal health in organic farming is based on prevention rather than cure. Good husbandry and high standards of welfare ensure that animals are less susceptible to disease. Homeopathic remedies are recommended when an animal falls ill, but no animal is denied proper veterinary treatment, including antibiotics, if required.

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The attacks on organic farming have come from several sources, including free-market think tanks, a small number of academic institutions, non-organic farming associations and fringe groups at both ends of the political spectrum. Here we name some of the organisations.

The Hudson Institute, US
The Hudson Institute in the US, widely known as a free market, pro-globalisation think-tank, was probably the original source of the E.coli myth.[1]

'Organic foods offer more danger for both your family and the environment.' D. Avery, *The Sunday Gazette Mail*, 9 July 2000.[2]

The funders of the Hudson Institute include some of the world's largest biotechnology and agrochemical companies:[3]
Biotechnology companies: Agrevo Canada, Monsanto, Novartis Crop Protection, Zeneca.
Agrochemical companies: Global Crop Protection Federation, Pfizer, Union Carbide.

There are many articles on the Hudson Institute website that are critical of organic food, such as 'The hidden dangers of organic food'.[4] In their annual report, they announce that they have 'countered many false food scares on pesticide residues, nitrates [and] endocrine disrupters'.[5]

In particular, the Hudson Institute has asserted that 'people who eat organic and "natural" foods are eight times as likely as the rest of the population to be attacked by a deadly strain of E.coli bacteria (0157:H7)'.[6] However, the research to support this view does not exist. The Center for Disease Control, which the Hudson Institute claimed had done the research, had to issue a statement to set the record straight.

'The Center for Disease Control and Prevention has not conducted any study that compares or quantifies the specific risk for infection with Escherichia coli 0157:H7 and eating either conventionally grown or organic/natural foods' Dr M. Cohen, Center for Disease Control, 1999.[7]

Institute for Economic Affairs, UK
The Institute for Economic Affairs (IEA) in the UK has perpetuated myths spread by the Hudson Institute.

- 'According to a study based on the US Centers for Disease Control data, individuals consuming products made with these [organic] techniques are eight times more likely to contract the potentially fatal strain of bacteria E. Coli O157:H7, which killed hundreds in the United States in 1998 and left thousands with permanent organ damage. It was also responsible for the widely reported 21 deaths in Lanarkshire in 1997.' Institute for Institute for Economic Affairs, 1999.[8]

- 'Organic food may well present a danger to children, the elderly and the sick; i.e. people with underdeveloped or weakened immune systems. Such people should be discouraged from eating so-called "organic" or "natural" foods.' Institute for Economic Affairs, 1999.[9]

This free market think-tank was founded in the 1950s by Antony Fisher who 'became a highly successful businessman by founding Britain's first broiler-chicken farm which mass-produced Buxted Chickens'.[10]

The IEA has links to the Hudson Institute in the US. In 1999 it published a book entitled *Fearing Food: Risk, Health and the Environment* with a contribution from Dennis Avery of the Hudson Institute on 'The fallacy of the organic utopia'.[11] The press release to accompany the launch of the book was entitled 'Londoners demand regulation of potentially deadly organic food' and was based on a survey of just 121 people in London.[12]

80 per cent of the Institute's funding currently comes from membership fees, the rest mainly from publication sales and conferences.[13]

The Institute contributed to the 'Counterblast' broadcast on BBC 2 on 31 January 2000, which argued that organic foods were more dangerous than non-organic foods.[14]

Scottish Crop Research Institute (SCRI), UK

'Organic farming… raises risk of faecal contamination not only of foodstuffs but also of waterways, food poisoning, high levels of natural toxins and allergens… production of blemished, diseased and irregular produce of low consumer and food processor acceptability and creation of reservoirs of pests and diseases.' Professor Hillman, SCRI, 1999.[15]

This institute is largely funded by public bodies, including the Biotechnology and Biological Sciences Research Council (BBSRC). The chair of the BBSRC is Dr Peter Doyle, who used to work for Zeneca.[16] The director of SCRI is also on the board of directors of the BioIndustry Association, whose mission is 'encouraging & promoting the biotechnology sector of the UK economy'.[17]

National Office of Animal Health (NOAH)

NOAH represents the UK's animal pharmaceutical industry. Its aim is 'to provide safe, effective, quality medicines for the treatment and welfare of animals'.[18] Members of NOAH include Monsanto Europe and Novartis Animal Health Ltd.

NOAH lodged a complaint to the Advertising Standards Authority against a Soil Association leaflet *'Five Reasons to go Organic*'.

***Last Magazine* or '*LM*'**

Formerly known as *Living Marxism*, the journal *Last Magazine* or *LM* made a series of attacks on organic farming and the environment movement as a whole. *LM* claimed that 'small-scale farming is quite as exploitative as agribusiness' and that environmentalists 'see all creativity and innovation as suspect'.[19]

The organisation arose from the Revolutionary Communist Party in 1976. More recently they were linked to a range of political groups, including the free market Institute for Economic Affairs.[20]

Following a libel case which awarded ITN £375,000, *LM* went into liquidation. Their views are still reflected in today's media. Former editor Mick Hume is a columnist for *The Times* and an *LM* supporter was the director of the anti-environment Channel 4 series 'Against Nature'.[21]

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Organic food and farming is under the spotlight. More people are buying organic products and more questions are being asked about organic food and farming.

This booklet examines some of the key issues around organic food and its production. It takes up the challenge of answering the critics – critics who range from companies defending agri-business, through to the heads of national food authorities and some academics. It exposes the misleading and erroneous statements made against organic food, and provides the facts that prove them wrong.

The Soil Association

The Soil Association is an educational membership organisation which promotes sustainable relationships between the soil, plants, animals, people and the environment. It is the UK's foremost charity campaigning for organic food and farming and sustainable forestry, and works to raise awareness of the benefits of organic agriculture. It trains and advises organic farmers and its trading arm is the leading inspection and certification body in the organic marketplace.

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