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Farmers' Attitudes Towards Organic and Conventional Agriculture: A Behavioural Perspective

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1. Introduction

Using a modified behavioural approach, this chapter examines organic and conventional farmers' relationship with the concept of food security. The World Food Summit (1996) defined food security as existing: 'when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life'. Additionally, the concept is commonly thought of as including both physical and economic access to food that meets people's dietary needs as well as their food preferences. In recent decades, food security has been usually associated with developing countries (Frow et al., 2009). This chapter, however, is primarily concerned with aspects of food security in the UK and thus a European model which expects farmers to provide other societal benefits such as biodiversity, environmental protection and food safety. Such a model aims to satisfy consumers' demand for 'healthier and more flavoursome food of higher nutritional value, produced by more environmentally friendly methods' (Brunori & Guarino, 2010).

This chapter is based on the proposition that the attitudes and behaviours of organic farmers may differ from those of conventional farmers, especially in relation to farming, the environment and food security. A second proposition is that farming systems towards the organic end of the agricultural spectrum may appeal first and most strongly to farmers already attuned to environmental ideas. The chapter aims to compare the perceptions, attitudes and behaviours of those farmers loosely labelled 'organic' and 'conventional' in central southern England, especially in relation to their attitudes and values towards farming, the environment and food security. More specifically, the research has the following supporting and interrelated objectives:

- To evaluate the different environmental cognitions of farmers towards selected key themes related to the concept of food security.
- To investigate and assess the environmental perceptions, attitudes and behaviours of conventional and organic farmers, in central southern England, towards organic farming and the development of more environmentally-friendly farming practices.

Global food prices, of many major food and feed commodities, have increased significantly in recent years (House of Commons, 2009). For example, during 2007 the price of many basic

food staples such as wheat and rice increased by 50 and 20 per cent respectively (Chatham House, 2008:2). Very high price rises across a wide range of food commodities is unusual. Although grain prices subsequently lowered to 2006 levels, a series of violent protests and demonstrations occurred in many countries across the developing world. Estimated population increases suggest that the world population will reach nine billion by 2050 (95 per cent of this growth will occur in the developing world), thereby increasing the long-term demand for food. Peak oil prices are a key reason for recent increases in food production and distribution costs (although petroleum costs do not comprise a major proportion of energy in agricultural production (Dodson et al., 2010)), resulting in high retail food prices and, as a consequence, making it increasingly difficult to provide food security. World oil prices have reached more than \$100 a barrel and, at the time of writing (May 2011), the current price is still averaging in excess of this figure (Mason, 2011). The World Bank suggests that rather than having an agribusiness-based and petrochemical-dependent industrial agriculture, a way of achieving food security is to increase productivity using GM technologies. The claimed environmental benefits of such agricultural methods relate to a reduction in existing high pesticide and fertilizer usage. However, the widespread use of GM technology might further intensify the production of monoculture crops and change some land use from food to fuel production, thereby exacerbating food security problems. Another approach to achieving food security is to adopt the strong science-oriented, or technocentric, concept of sustainable intensification (Godfray et al., 2010). This system attempts to achieve higher yields from the same acreage without damaging the environment. Supporters of this approach claim that substantial increases in crop yield can be provided through science and technology. Examples are crop improvement, more efficient use of water and fertilizers, the introduction of new non-chemical approaches to crop protection, the reduction of post-harvest losses and more sustainable livestock (Maye & Ilbery, 2011). However, it is debatable whether sustainable intensification can be achieved without significant increases in the use of chemical inputs. Yet, such high levels of pesticide usage reduce the ecological bases of sustainable farming, thus damaging prospects of achieving food security.

A contrasting approach to conventional agriculture is organic farming, which can play a role in adapting to and mitigating the impacts of climate change. However, its role in food security debates is far from clear. Organic agriculture is a holistic production management system that promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, recognising that regional conditions require locally-adapted systems (Codex Alimentarius Commission, 1999). More recently, in March 2008, the World Board of the International Federation of Organic Agriculture Movements (IFOAM) approved the following definition:

‘Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and good quality of life for all involved’.

An April 2008 report by the International Assessment of Agricultural Science and Technology for Development (IAASTD) recommended small-scale farmers and agro-ecological methods as the way forward in the current food crisis. Professor Bob Watson,

Director of IAASTD, claimed: 'that continuing to focus on production alone will undermine our agricultural capital ...'. A December 2010 United Nations Special Rapporteur on the Right to Food stated that: 'Moving towards sustainability is vital for future food security and an essential component of the right to food'. The report also recommended the dissemination of knowledge about the best sustainable agricultural practices. However, the concept of agricultural sustainability is a multi-faceted one involving agronomic, ecological, economic, social and ethical considerations (Farshad & Zinck, 2003) and means different things to different people (Redclift, 1987; 1992 and O'Riordan, 1997).

Water management is one of the key determinants of agricultural sustainability and therefore provision of adequate water supplies is an important requirement for the sustainability of organic and conventional farming, the UK's two principal agricultural systems. It is, however, debatable which of these two farming systems is more sustainable, although it is assumed that conventional farming will contribute most to achieving future food security. In the UK, a country which rarely experiences severe water shortages, the driest April on record (2011) resulted in the River Derwent in Cumbria being virtually dry and some reservoirs draining away. The Environment Agency stated in May that: '... if the very dry weather continues we may look at preventing farmers taking water from rivers to irrigate their crops' (Johnston, 2011). The long-term frequency and severity of such extreme climate events in the UK could have serious consequences for food security, potentially causing reduced crop yield, crop failure and farmers having to grow a different variety of crops. Agriculture is the UK's sector most affected by climate change; it also contributes greatly to climate change through the use of fertilisers, fuel and methane from ruminating livestock. Agriculture, therefore, has the greatest need for adaptation. It is also imperative to reduce greenhouse gas emissions produced by the food system, reduce dependency on fossil fuels and stop depleting natural resources such as soil and water upon which food production depends (House of Commons, 2009, p. 13). These requirements may clash with attempts to produce more food.

The five closely related food security themes discussed above (pesticides, fossil fuels, agricultural sustainability, GM crops and global climate change) are difficult to discuss in isolation as there are strong and quite complex connections between them. They can be considered a network of interrelated concepts; for example, it is almost impossible to examine the theme of food security without discussing agricultural sustainability. This crucial relationship between sustainability and food security was emphasised by Lang (2009, p. 30): 'food security can only mean sustainability'.

The rest of the chapter is divided into four sections. The next, conceptual, section outlines the key dimensions of a modified behavioural approach. This is followed by a description of the adopted two-part 'extensive' and 'intensive' research methodology used in the investigation. Section four then provides detailed insights into farmers' environmental behaviour and perceptions, attitudes and behaviours towards key food security themes, as well as appraising the consistency of farmers' environmental attitudes and behaviours. A final section provides a conclusion to the chapter.

2. A modified behavioural approach

The 'behavioural environment' - where the internal or perceptual environment in which facts of the phenomenal world are organized into conceptual patterns and given meaning or values by individuals within particular cultural contexts - was introduced into geography

by William Kirk in 1952. This approach emphasizes the importance of perception in human geography, the significance of subjective experience and the potential of people as active agents in the environment. Fundamental to behavioural approaches is the idea that a crucial distinction can be drawn between the real world – the world as it is in and of itself – and the world as perceived, that is the world as humans believe it to be. The behavioural interface is the black-box within which humans form the image of their world. The schemata, or basic framework, within which past and present environmental experiences are organised and given locational meaning is the cognitive mapping process. The key psychological variables intervening between environment and human behaviour are a mixture of cognitive and affective attitudes, emotions or affective responses, perception and cognition, and learning (Golledge & Stimson, 1987).

Behavioural approaches have been used extensively in agricultural geography (Wolpert, 1964; Gasson, 1973, 1974; Gillmor, 1986; Ilbery, 1978, 1985; Brotherton, 1990; Morris & Potter, 1995; Wilson, 1996, 1997; Beedell & Rehman, 1999, 2000; Burton, 2004; Kings & Ilbery, 2010) and applied to the analysis and ‘explanation’ of farmers’ behaviour. The focus of these approaches on individual decision makers, together with the possibility of formulating relatively ‘simple’ questionnaire and interview-based research methodologies, are the major reasons why behavioural approaches have been adopted by those seeking to ‘understand’ the decision making of farmers. Most importantly, behavioural approaches allow for the recognition of farmers as independent environmental managers who often make decisions about the management of environmental resources on their farms independent from the state or other ‘official’ environmental managers (Wilson, 1997).

An important aspect of the modified behavioural approach adopted in this chapter is the way in which the processes of perception and cognition influence farmers’ environmental attitudes, decisions and behaviours. A specific model of environmental behaviour (a variant of the classic behavioural model) has therefore been developed to facilitate an environmental understanding of five key themes related to the concept of food security: pesticides, fossil fuels, agricultural sustainability, GM crops and global climate change (Fig 1). These closely related agri-environmental topics are associated with the working practices of organic and conventional farmers. Importantly, this type of socio-psychological framework differs from the classic behavioural approach in its focus on the concepts of perception and cognition as key parts of the decision making process.

The starting point for this conceptual framework is taken as the ‘real world’, which is the source of information. Knowledge is filtered through a system of perceptual receptors which are essentially the five main senses. Perception is the term given to the neurophysiological process of the reception of stimuli from an individual’s surroundings (Pocock, 1974). In this process, sight is generally thought to be the major element, but other senses such as hearing and smell may also play their part. Perception is usually regarded as being immediate i.e. it follows directly upon the stimulus, and is stimulus-dependent since the nature and very presence of the perception depends on the existence and type of stimulus.

Cognition is the wider personal context of perception (Pocock, 1974). It is not necessarily immediate in the same way, since it constitutes the means of awareness that intervenes between past and present stimuli and the behavioural responses of the present and the future. The whole complex of cultural response, such as memory, experience, values, evaluation, judgement and discourse, is present in the processes of cognition. Meaning is given to information through an interaction between the individual’s value system and their stored ‘image’ or cognitive map knowledge of the real world. The remaining filtered

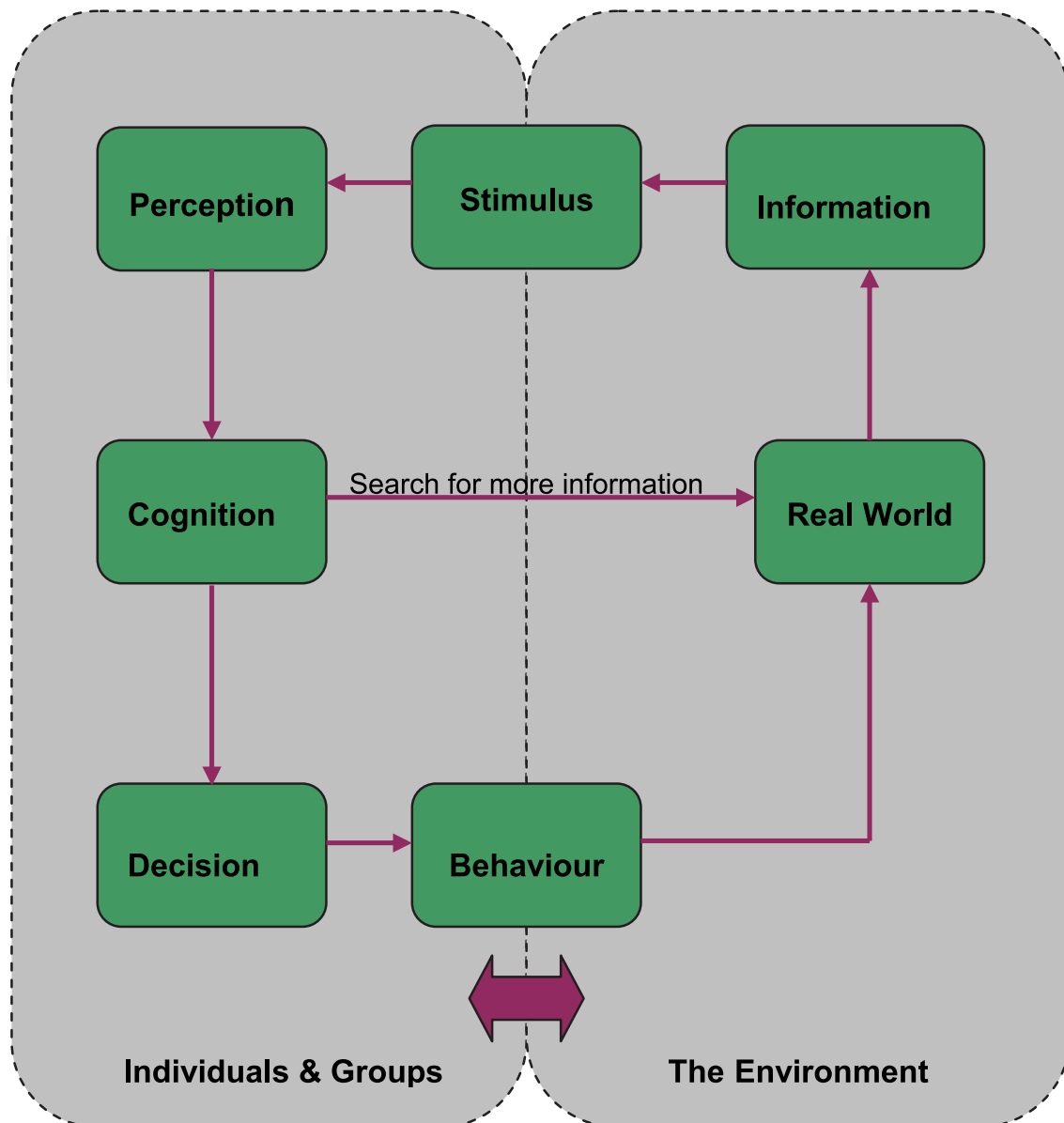


Fig. 1. A model of environmental behaviour

information is then used to update the cognitive map knowledge and to formulate a behaviour decision. This decision leads either to a reiteration of the whole process, creating another search for information from the real world until sufficient information has been acquired or some time/cost limitation acts to constrain the search, or to overt behaviour. As a result of the latter, the real world undergoes a change, fresh information becomes available and the whole process begins again.

Cognition is likely to vary from individual to individual and hence from group to group, but most such units seem to have enough in common between their cognitions to make it possible to co-ordinate thought and action (Simmons, 1993). However, there is likely to be a discrepancy between words and deeds. Cognition and perception lead to behaviour itself, which may be considered as the taking of action in regard to some environmental feature such as if, or when, to apply pesticides to a crop. There are psychological differences between individuals (leading, for example, to differences in physical sensation when

exposed to the same stimuli); there are also differences in cognitive attitudes which are related to age, experience and gender. However, attitudes do not directly explain behaviour since it is possible to arrive at an attitude in a number of different ways and from different experiences. Attitudes are highly complex and therefore such a direct link is unrealistic. A simple behaviourist explanation of decision-making is over-generalised in making the assumption that there is a basic stimulus – response in decision making (Walmsley & Lewis, 1984). In order to avoid problems associated with behavioural approaches using only inflexible structured questionnaire methodologies, and which focus on individual decision makers out of their social milieus, this study combines a balance of quantitative and qualitative work (see Burton, 2004).

3. A methodological framework

A two-stage methodology was adopted for an examination of farmers' attitudes towards the five key themes already outlined. As stage one, twenty-five organic farmers and twenty-five conventional farmers – located in central-southern England – were interviewed by telephone for about one hour. Most farmers are accessible by telephone, but may not be listed in business or private telephone directories. The first to be interviewed were organic farmers selected from the official regional Soil Association and Organic Farmers and Growers membership lists. At the end of the interview, they were asked to name a neighbouring conventional farmer, if possible of a similar size and type, who they perceived as a suitable candidate for interview. This method provided dependable geographically linked pairs of farmers for the duration of the study. Some researchers claim that a disadvantage of telephone interviewing is the problem of sample representativeness. However, within the context of this research, a 'truly' national representative sample was not anticipated, as it is limited to a specific geographical area i.e. central southern England, which may or may not be representative of farms and farmers in the UK as a whole.

A questionnaire designed in four sections was used in the 'extensive' data gathering approach. Section one contained six closed questions regarding farm size and type. Section two consisted of twenty-four open questions which explored farmers' attitudes towards farming, the environment and food security in the UK. The third section required five questions to be answered regarding farmers' specific environmental behaviour. The fourth section of six questions was aimed at eliciting personal details about the respondents. The last question asked respondents if they were willing to take part in a follow-up 'intensive' interview, and to confirm their name and address. Basic closed questions, for which response options were mutually exclusive, were included, such as gender, marital status and age, which may help in selecting individuals for future research. Closed questions regarding the type of farming system employed were included to enable examination of possible correlation between this factor and the respondents' environmental perceptions. Other questions related directly to the respondents' attitudes and behaviour in the agricultural work environment. These data were analysed both quantitatively, using summarising statistics, and qualitatively, in the form of farmers' quotations and illustrative farm cameos to emphasise the arguments being developed about organic and conventional farming. This was the most important and interesting analysis and was used to support, illustrate and broaden the impression gained from the statistics. In addition, they demonstrated similarities and differences between the two study groups being examined and gave prominence to the line of reasoning being developed.

Stage two of the methodology consisted of on-farm intensive qualitative/interpretive interviews, with five geographically linked pairs of organic and conventional farmers (selected from the sample frame used for the extensive telephone interviews) for up to 3 hours. It is important to note that the reference codes assigned to the ten respondents in section 4.3 are not (in every case) the same as those used in sections 4.1 and 4.2. The aim was not to choose a representative sample, but rather an illustrative one of different ages who farmed holdings of different sizes and systems. An interview guide was designed which prompted respondents to talk about the following range of topics related to their own farms: most productive areas, the natural environment, best wildlife areas, favourite parts and less favoured parts. The interviews were recorded using a Digital Audio MiniDisc-recorder with stereo microphone and transcribed verbatim for analysis as soon after the interviews as practicable. The data generated from this 'intensive' phase of the methodology were analysed using a textual approach relying on words and meanings, rather than statistics. Another method of analysis was to contrast and compare any interesting or unusual quotations and paraphrases made by respondents, in order to demonstrate attitudinal similarities and differences. Each interview produced contextual findings relating to the 'nature' of the respondent, thereby building up in greater depth a background picture of farmers' perceptions, attitudes and behaviours in central-southern England. The data collected were maximised to provide the broadest picture possible of farming in central-southern England. In recent years, environmental issues have become more technical and removed from everyday sensory experience, thereby posing problems with testing and analysing respondents' 'self-perceived environmental knowledge', which is further complicated by the sometimes contradictory nature of the underlying science.

In the next section, the adopted 'extensive' and 'intensive' research methodology will be used primarily to examine and gain insights into the perceptions, values, opinions and behaviours of organic and conventional farmers in relation to their awareness and understandings of agri-environmental aspects of the five key themes related to food security.

4. Investigating farmers' attitudes and behaviours

The modified behavioural approach is used first, to examine the attitudes, understandings and behaviours of organic and conventional farmers (situated in central-southern England) in relation to food security themes; second, to examine respondents' environmental behaviours; and third, to ascertain if farmers' attitudes are consistent with those expressed in sections 4.1 and 4.2.

4.1 Extensive organic and conventional farmer telephone interviews

One approach to achieving an environmentally sustainable way of producing food is organic farming (Morgan & Murdoch, 2000; Hansen et al., 2001; Lotter, 2003; Darnhofer, 2005; Kings & Ilbery, 2010). However, it seems unlikely that organic methods of food production will be adequate to provide food security in the foreseeable future. This attitude was typified by a quote from one organic respondent who farms 18 ha of arable crops: 'Absolutely, that is why I am doing it' (OF20). The average size of organic farms in the survey was 85.4 ha, which contrasted with an average size for conventional farms of 202.3

ha, although the size of both farm types was extremely variable. In contrast, conventional farmers' replies were generally not in support of those views and are typified by the following comment: 'I think organic grass farmers cause more problems with nitrates than I do, by ploughing clover [into their soil]' (CF13). Grass and fodder enterprises associated with organic livestock were the most popular organic types, occurring on a majority of the organic farms examined in the survey and any cereals grown were normally used as livestock fodder or seed. According to Willer & Gillmor (1992), it is common for farmers to experiment with organic grass production before deciding to fully convert their whole farm to organic food production. In contrast, the conventional respondents in the survey tended to grow more arable crops.

The analysis continued by listing the reasons given by organic farmers for their change to, or adoption of, an organic farming system; this is shown in descending rank order (Table 1a).

Listed in rank order by reason for adoption	Frequency	Percentage
Environmental reasons including pesticide concerns	12	48
Considered they had always farmed organically	5	20
Financial reasons including customer requirements	4	16
Not in farming previously	1	4
Small scale - needed to go intensive or organic	1	4
Had farmed organically on a previous farm	1	4
The challenge	1	4
Total	25	100

Table 1. (a) Reasons for adoption of an organic farming system

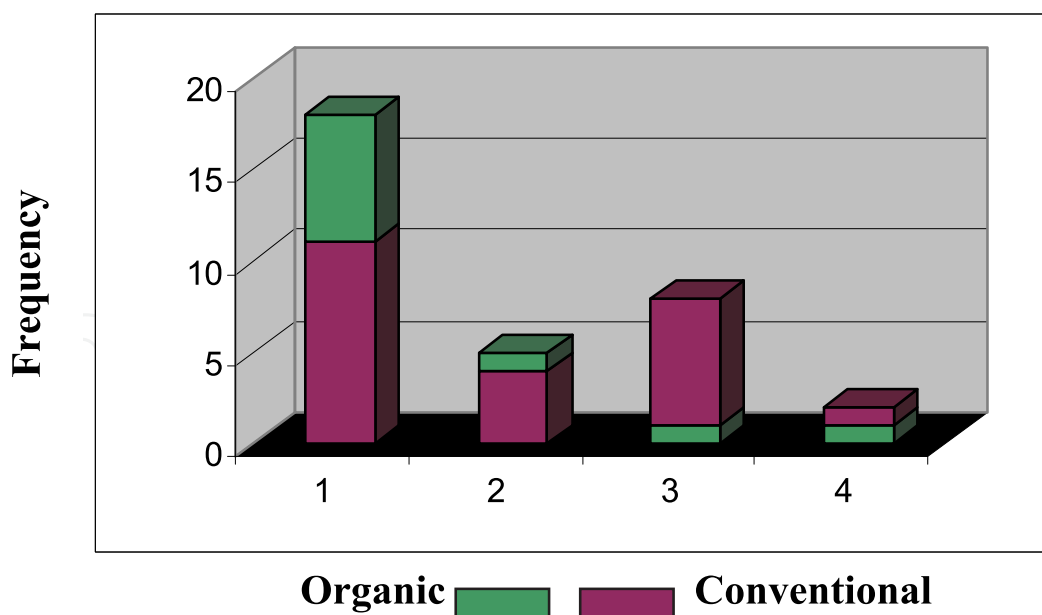
Listed in rank order by reason for non-adoption	Frequency	Percentage
Wouldn't suit the ground/way we farm	7	28
Financial reasons - producer and buyer	6	24
Cramping, restrictive and ruling out modern science	5	20
Don't think it always works	4	16
Would consider changing to organic	1	4
No, but no reason given	1	4
My farm is organic for all intents and purposes	1	4
Total	25	100

Table 1. (b) Reasons for non-adoption of organic farming

Table 1a shows that 48% of organic farmers adopted organic methods of food production because of environmental concerns such as high pesticides usage and a further 20% consider they have always farmed organically. One 45 year old owner-occupier farmer claimed: 'the

toxicity of the pesticides used in my intensive agriculture made me feel quite poorly ...', demonstrating his deep concerns with health problems associated with the pesticides used in conventional farming (OF10). Of those twelve farmers who gave environmental reasons for changing to organic, three are unqualified, one has a certificate, two have a diploma, four a degree, one a higher degree and one a Doctorate; this suggests a link between higher education and environmental awareness. In contrast, Table 1b provides a list of reasons provided by conventional farmers (currently the largest contributor to food security in the UK) for their non-adoption of organic farming, shown in descending rank order. Four key findings emerge from Table 1b: first, 28% of conventional respondents said organic farming wouldn't suit their type of land; second, 24% gave financial reasons for their non-adoption; third, 20% gave technocentric reasons; and fourth, only one conventional farmer said he would consider changing to organic. It is likely that, within this study group, most conventional farmers who had the propensity to change to organic have already done so. Analysis proceeded by asking respondents what they know about the amount of fossil fuels used by some organic farmers in the mechanical weeding processes. The key finding is that almost all the organic respondents said organic arable farmers use a lot of fossil fuels. This practice contributes to climate warming and is therefore liable to have a detrimental effect on food security through reduced crop yield and/or failure. However, several organic respondents declined to comment possibly because they were aware that more fossil fuels are used in mechanical weeding processes than chemical methods of weeding. Most conventional farmers in the survey were not critical of organic farmers in relation to this issue.

The diversity of farmers' attitudes and cognition in relation to whether organic agriculture is an environmentally sustainable method of food production is demonstrated in Figure 2.



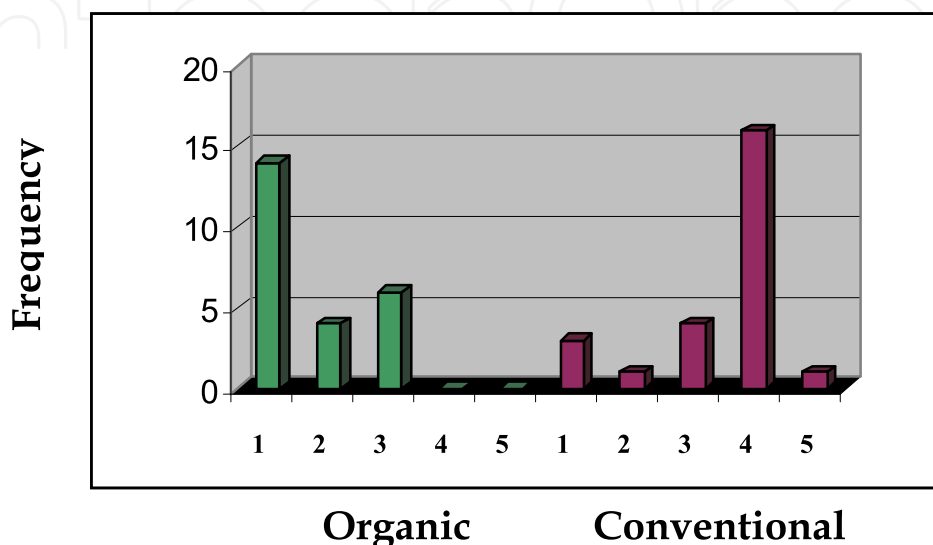
1. Sustainable. 2. Could be sustainable. 3. Not sustainable. 4. Don't know.

Fig. 2. Frequency of farmers' opinions on sustainability of organic farming

Unsurprisingly, more organic (72%) than conventional farmers (44%) felt that organic agriculture is a sustainable form of food production. Another 20 per cent of organic

respondents and 16 per cent of conventional farmers thought that it could be. Agricultural sustainability is crucial for maintaining long-term food security. Thirty-two per cent of conventional farmers said that organic food production is unsustainable in comparison with only four per cent of organic farmers.

Both survey groups were asked if they thought conventional food production was having negative environmental impacts. The frequency of farmers' responses have been categorised under the five headings graphically detailed in Figure 3.



1. Yes
2. Yes with specific reason
3. Not always/depends on farmer
4. No
5. No with specific reasons

Fig. 3. Frequency of farmers' response to the environmental impacts of conventional food production

The figure shows that fewer conventional than organic respondents perceive conventional food production to have negative environmental impacts. Fourteen (56%) organic farmers thought that conventional agriculture is harmful to the environment in contrast to three (12%) conventional farmers. Another four (16%) organic farmers said yes, but qualified their answer with specific reasons for their environmental concern such as: 'high levels of nitrate and pesticides on crops'. High pesticide usage can lead to further pest resistance and farmers' reliance on agribusiness, thereby creating significant environmental costs and adversely affecting food security. Only one organic farmer (OF3) thought conventional food production is not having negative impacts compared with 16 (64%) of conventional farmers who agreed with that statement. One 45 year old owner-occupier organic farmer with a post graduate degree replied: 'not always, like anything at its worst it depends on the farmer and his attitude ...' (OF10). Earlier analysis showed that, although the two survey groups were relatively evenly matched in the number of vocational qualifications, organic farmers have more qualifications towards the upper end of the education spectrum and it is only organic farmers who have a higher degree. Dunlap et al., (2000) found that environmental concern was correlated with variables such as age and education. However, a different picture is

revealed if the qualifications relating specifically to agriculture are examined i.e. more conventional than organic farmers have a national certificate in agriculture.

Analysis shows that the organic farmers in the survey are very critical of pesticide use. This contrasts with conventional farmers, who said they need to use pesticides to produce their crops but, nevertheless, are aware of the dangers of over-use of such chemicals. One 54 year old owner/tenant organic farmer said: 'If you read the magazine that the conventional farmers read, the *Farmers Weekly*, you will notice that the magazine is paid for by pesticide adverts. The biggest adverts saying this is the time to spray with this or that. This is the way [conventional] farmers are being educated ...' (OF5). Some conventional farmers agreed with organic farmers that conventionally produced crops sometimes use high levels of pesticides, which is an unsustainable method of seeking continual productivity gains to mitigate food insecurity. Three recent independent studies, carried out in the USA, found that children whose mothers are exposed to common agricultural pesticides are more likely to experience a range of deleterious effects in their cognitive development, including lower IQ, as well as impaired reasoning and memory (Eskenazi, 2011).

Many of the organic and conventional respondents perceive GM food production as an integral part of conventional agriculture. This view is supported by Lawrence et al. (2010). GM crops were investigated in two broad, but overlapping, categories: first; those concerning environmental issues; and second, those which relate to public health concerns. More conventional farmers have technocentric attitudes and a greater acceptance of GM crops than the organic respondents in the survey, typified by organic farmers' comments: 'I think it's tampering with nature ...' (OF19). Most conventional farmers in the survey seemed more accepting of GM technology, typically saying: 'I haven't a huge fear of them as long as we observe the science ...' (CF24). However, it may be unwise to believe that science and technology are a panacea, as new technologies often raise further questions and complications of their own (Frow et al., 2009). Conventional farmers are usually less critical of GM crops than the organic respondents, and seem to place their main emphasis on the potential environmental benefits to be gained from a reduction in pesticide usage. But, as discussed earlier, greater use of GM technology is likely to further intensify the production of monoculture crops and change some land use from food to fuel production, thereby jeopardising food security.

Analysis reveals that more organic than conventional farmers have concerns about the potential health risks associated with eating GM food. Other organic respondents have some misgivings and perceive that there will be future public health concerns. However, a number of organic farmers could not think of any health issues. Generally, the conventional farmers seem to have fewer health concerns relating to GM food. A key finding is that more conventional than organic farmers believe that GM farming will be necessary to feed a growing world population. This could help alleviate problems of food insecurity, but with the loss of some agricultural biodiversity and therefore sustainability. A number of organic farmers have concerns about GM crops epitomised by the following: 'It's [GM] not necessary [to feed a growing world population] - it's an argument used by the chemical companies' (OF25).

Global climate change (with increasing frequency of extreme weather events) is a particularly important issue to many UK farmers who perceive that their future livelihood will be endangered by crop reduction/failure causing food insecurity. In July 2011, the Energy Secretary Chris Huhne agreed: 'A changing climate will imperil food, water, and

energy security...’ (Anon, 2011). Climatic change is characterised by a rapid increase in global temperature and is changing at an unprecedented rate (Pulido & Berthold, 2006). The evidence for such rapid recent climate change is now compelling (IPCC, 2007). A number of conventional farmers perceived that changes in weather patterns are part of the normal course of events. In contrast, some organic respondents said that global warming was primarily caused by burning fossil fuels but, as shown earlier, organic farmers admit to using large amounts of fossil fuels, thereby contributing to climate change. Interestingly, only one respondent (OF1) specifically referred to agriculture affecting climate change although, as discussed in Section 1, agriculture is the UK’s sector most affecting climate change. In common, all respondents said that they may have to grow a different variety of crops if the climate gets warmer and some referred to the expansion of growing maize in the UK as evidence of global warming taking place.

This section has demonstrated significant differences, but also similarities in the perception and cognition of members of the two survey populations in relation to environmental aspects of the five closely related food security themes. It proved difficult to discuss any of the five food security themes in isolation as there are strong and quite complex connections among many of these issues. Examination of the environmental behaviour of the same two groups of farmers carries forward the analysis in the following section.

4.2 Farmers’ environmental behaviour

To gain a greater understanding of farmers’ perceptions, attitudes and values, this section examines the respondents’ environmental behaviour in the countryside. Again, these relatively simple data are supported by qualitative data in the form of farmers’ quotations. An important part of this analysis is concerned with the way in which organic and conventional farmers make sense of environmental issues through the processes of perception and cognition.

Analysis proceeds in two stages: first, respondents’ membership of agri-environmental schemes, including their participation in conservation work and membership of environmental organisations; and second, their ‘readership’ of agri-environmental journals and magazines and how they believe farmers should behave in the countryside. A number of key differences emerged between the two survey groups.

Seventeen (68%) organic and thirteen (52%) conventional farmers participate in agri-environmental schemes; the remainder of respondents do not belong to any schemes. Two key points emerged from the analysis: first, considerably more organic than conventional farmers are members of an agri-environmental scheme; and second, three times more organic than conventional farmers belong to more than one scheme. Organic farmers’ high membership of agri-environmental schemes supports the finding shown in Figure 2 - that organic respondents perceive organic agriculture to be an environmentally sustainable means of food production, although such methods are unlikely to mitigate problems of food insecurity. Over half of the organic farmers were in the Countryside Stewardship Scheme, contrasting significantly with just over one tenth of conventional farmers. Until the launch of Environmental Stewardship, Countryside Stewardship was the government’s principal scheme. Farmers entered 10-year agreements to manage their land in an environmentally friendly way in return for annual payments (DEFRA, 2002). There were equal numbers of both types of farmer involved with the set-aside scheme. The European Union (EU) introduced set-aside of arable land in 1988 as part of a package of measures designed to

reduce over-production in member states to allow reductions in the costs of agricultural price support (Floyd, 1992). In contrast to organic farmers' high membership of Countryside Stewardship, there were twice as many conventional as organic farmers involved with the ESA scheme. Similar to Countryside Stewardship, government offered financial incentives to farmers and other land managers who agree to undertake environmentally beneficial practices under the ESA scheme.

Further significant differences between organic and conventional farmers were found in relation to carrying out conservation work. First, more organic than conventional farmers undertake conservation work, with a much higher proportion involved with hedge laying and wood planting. Secondly, conventional farmers see the creation of pheasant cover as conservation works. Carr & Tait (1991, p. 286) found that conventional farmers tended to perceive pheasants as a: 'wildlife species beneficial to farming'. The organic farmers' conservation behaviours support their environmental attitudes shown in Table 1a which provided environmental reasons for their adoption of 'sustainable' organic methods of food production although, as discussed previously, such methods are unlikely to provide a permanent solution to food insecurity.

Both groups of respondents were asked if they were members of any environmental organisations such as their local wildlife trust. Their responses are listed in rank order in descending frequency of mention by both groups of farmers (Table 2). The table shows that less than half of both categories of farmers are members of environmental institutions and organic farmers prefer the Wildlife Trust, Woodland Trust and Friends of the Earth, whereas conventional farmers prefer the Game Conservancy Trust. The same number of organic as conventional farmers claims to be members of environmental organisations. However, this raises the important question about what an environmental organisation is and just how 'green' their credentials are. For example, Table 2 shows that the Game Conservancy Trust was the most frequently mentioned agency by respondents. However, of those, over three quarters were conventional farmers which, when cross-tabulated with their main countryside leisure pursuit, were found to be shooting. The Game Conservancy Trust, now renamed – the politically more acceptable – Game & Wildlife Conservation Trust (GWCT) claims to be the leading UK charity conducting scientific research to enhance the British countryside for public benefit. A recent impartial report of Grouse shooting commented: 'The bloodlust is extraordinary. I sense it in myself, but it is obvious in these alpha males with their fingers on the trigger' (Hollingshead, 2010). Organic farmers' membership of 'truly green' environmental organisations is consistent with their concerns regarding the sustainability and health issues related to the food security themes, pesticides and GM crops.

When examining these results in relation to the readership of magazines and journals, it was found that a total of 27 different periodicals were mentioned. *Farmers Weekly* and *Farmers Guardian* dominate conventional farmers' reading. The most popular magazine with interviewees is *Farmers Weekly*, which is 'read' by just over three quarters of organic farmers and almost all conventional farmers. Earlier in the analysis, OF5 criticised *Farmers Weekly* for influencing the quantity of pesticides used by conventional farmers. The second most popular magazine 'read' by over a quarter of conventional farmers – and no organic farmers – is *Farmers Guardian*. The *Living Earth* and *Organic Farming* were read by 88 per cent of organic farmers but by no conventional respondents. Similarly, no conventional farmers

read *The Ecologist* which was read by 8 per cent of organic respondents. The last three periodicals have a strong focus on rejection of pesticide use and GM technology which have adverse effects on agricultural sustainability and food security. Organic farmers read much more widely and seemed more critical in their reading tastes than conventional farmers which may be related to organic farmers on average having higher academic qualifications than the conventional respondents.

Descending rank order in Frequency of membership	Organic farmers		Conventional farmers	
	Frequency	Percentage	Frequency	Percentage
Game Conservancy Trust	2	8	8	32
Wildlife Trust	5	20	1	4
Woodland Trust	4	16	0	0
National Trust	3	12	3	12
Friends of the Earth	3	12	0	0
RSPB	2	8	2	8
Wildfowl and Wetland Trust	1	4	0	0
Greenpeace	1	4	0	0
Rare Breeds Survival Trust	1	4	0	0
FWAG	0	0	1	4
LEAF	0	0	1	4
None	14	56	14	56
Total participating	11	44	11	44

Table 2. Frequency of farmers' membership of environmental organisations

Respondents were asked the loosely worded question about how they thought farmers should 'behave' in the countryside, to ascertain which agri-environmental issues they perceive as important. The answers were analysed by means of using the 'frequency of mention' of key environmental/agricultural words/concepts used as indicators of the respondents' level of environmental behavioural awareness. These words/concepts are listed in an order loosely linked to adjacent themes in order to gain a progression of ideas throughout the analysis (see Table 3). Four key findings emerge from the analysis: first, the term 'behave responsibly' is used by over a quarter of organic farmers and somewhat fewer conventional farmers; second, almost a quarter of organic farmers, contrasting with less than a tenth of conventional farmers, use the words 'stewards, keepers, custodians or protectors'; third, the same number, in both survey groups, use the terms 'pride, respect or sensitivity towards the environment'; and fourth, more conventional than organic farmers use the words looking after, care and good condition. Interestingly, only a fifth of conventional farmers referred to 'producing food' contrasting with fewer organic farmers' specific reference to the 'quality' and 'locality' of food produced. These comments suggest that although organic food may be available, it could be too expensive for increasing numbers of low-income families who will possibly experience some food insecurity.

Key agri-environmental words	Organic farmers		Conventional farmers	
	Frequency	Percentage	Frequency	Percentage
Behave responsibly	7	28	4	16
Stewards/keepers/custodians/protectors	6	24	2	8
Pride/respect/sensitivity to environment	6	24	6	24
Looking after/care/good condition	4	16	5	20
Future generations/family/children	2	8	4	16
Community	0	0	1	4
Quality of life	0	0	1	4
The farm in its own right	2	8	2	8
Sustainability	1	4	1	4
Environmentally friendly	1	4	1	4
Quality of food/local food	2	8	0	0
Behave the way organic farmers behave	1	4	0	0
As they have always behaved	0	0	2	8
Produce food/customer/right job/a living	0	0	5	20
Open minded	2	8	0	0
Do more for their image	0	0	1	4
Shoot on site	1	4	0	0
Inappropriate answers	1	4	1	4
Can't think of an answer	2	8	2	8
Total	23	92	23	92

Table 3. Frequency of mention of key-environmental words

This section has demonstrated some significant differences, similarities and overlap in environmental behaviours between members of the two survey populations. To add depth to the analysis, the final stage of the research explores environmental aspects of the five related environmental farm themes by means of intensive on-farm interviews with selected conventional and organic farmers.

4.3 On-farm qualitative interviews

This section seeks to ascertain if respondents' understandings of the five food security themes, and their environmental behaviour, are compatible with their cognition of their own farm environments. This is achieved through discussion of a range of related farm topics listed below:

- Most productive areas
- The natural environment
- Best wildlife areas
- Favourite parts
- Less favoured parts

A number of similarities and differences emerged between case study respondents' understandings of these associated themes, when related to their cognition of the five core themes examined in section 4.1 and their environmental behaviour detailed in section 4.2. All conventional farmers said that some parts of their farm are more productive than others and related productivity to practical issues such as field size, their farming practices, relative

field heights, drainage, 'natural' differences in soil fertility and, in some instances, the quantity and type of fertilisers used. In comparison, several organic farmers seemed proud of their soil's lack of productivity as it produces an abundance of wild flowers. Although soil fertility was not measured, respondents perceived considerable variability within and between fields on farms of different sizes, types and altitudes. Although in this limited survey sample the conventional respondents are on average less well qualified academically than the organic farmers, CF1 and CF4 equated soil fertility to technical issues such as field heights combined with high levels of fertilisers and the resulting crop income. This contrasted with discussions of the 'natural' differences in soil fertility (OF2) and pride in lack of fertiliser use (OF1). Additionally, the discussions revealed significant diversity of opinion to the resulting plant species due to differences in field productivity. For example, wild flowers were thought of as weeds by (CF2) contrasting with the chalk-loving wild flowers of (OF1). Conventional farmers tended to optimise yields (to maximize their income) which is important for maintaining food security, whereas, the organic respondents seemed to place less importance on this issue. This is likely to be related to some of the organic farmers having off-farm income.

Discussing natural environment aspects of respondents' farms revealed significant differences in focus and cognition between the 'two' farmer types. For example, most conventional respondents associated the natural environment with creating suitable conditions for hunting and/or shooting. But, in accord with most organic respondents, (CF1) professes to see the natural and farmed environments as one and the same and believe that it is important for someone to 'own' the land. Table 3 showed that twice as many conventional as organic farmers are concerned with future generations and children. This contrasts with three times as many organic as conventional farmers' concern with being 'stewards' or 'custodians' of the countryside. Most organic farmers saw a direct relationship between the natural and farmed environment and emphasised the conservation work they have carried out to increase their farm's biodiversity, thereby positively influencing the sustainability of their agricultural food production system. Some conventional respondents place equal importance upon a range of what would seem to some organic respondents as irreconcilable and conflicting countryside issues, such as looking after the landscape, giving access to the public, looking after pheasants, hunting and shooting. However, some diversity of focus and understanding was shown within the conventional farmer group.

Hedgerows were considered one the best areas for wildlife by most conventional farmers. All references made about hedges by conventional respondents were regarding cost, maintenance, or lack of, in contrast to some organic farmers' reference to planting these linear strips of woodland which are important for increasing the biodiversity and sustainability of the agri-environmental food production system. The value of the whole farm for wildlife was also made by respondents OF5, OF3 and OF2 who supported such viewpoints with examples of specific farm habitats with their associated mammals, birds and invertebrates. Respondents' comments demonstrate a continuum of environmental attitudes, ranging from mixed (CF3), who claims there is no difference in environmental quality in various parts of his land, to mixed (OF1), who emphasises the total biodiversity of his farm holding. These attitudes may be related to CF3 leaving school without formal qualifications and gaining his 'education' 'on the job'. This contrasts with OF1 who, although his 'A' levels were too weak to enter university, gained a Diploma in Agriculture and has since pursued an academic interest in specific research on his farm.

While discussing favourite parts of the farm, one farmer focused his observations, and indeed anger, on one of his neighbour's - the Woodland Trust - lack of action and illustrated his extreme tidy-ness by passing adverse comments on their policy of allowing fallen trees to remain on the woodland floor (CF1). The Woodland Trust is a conservation charity concerned with the protection and sympathetic management of native woodland heritage. Such fallen dead timber in the food chain becomes resources for other organisms such as decomposers (bacteria and fungi) thereby ultimately aiding biodiversity, agri-environmental sustainability and food security. The respondent's tidiness is in line with the findings shown in Table 3, that more conventional than organic farmers use the words looking after, care and good condition of their land. He uses words like 'production' to describe wildlife which is a word that suggests the process of being manufactured, especially in large quantities, rather than natural processes, thereby further revealing his technocentric attitudes and criticises his neighbours for their lack of management [shooting] of woodland 'vermin'. Other conventional respondents emphasised their appreciation of the isolation and tranquillity of some less accessible parts of their farms. In contrast, two organic interviewees were very specific about their favourite areas of their farms and focused on environmental aspects of wildlife sites and the beauty of those habitats thereby demonstrating their agri-environmental awareness. This discussion has revealed a range of differences between interviewees' views of their favourite farm parts, which provided further insights into their agri-environmental attitudes and behaviours by demonstrating what is important to them.

Discussing least favourite farm parts revealed some similarities and differences in the attitudes of the respondents. Some conventional interviewees associated the term 'least favourite' with specific farm problems such as changing his stocking regime from cows to sheep. Equally pragmatic, OF5 dealt with her problem of a poor quality field by disposing of it to another local landowner. In contrast, OF1 said that he found almost all parts of his land pleasing; however, he did comment that his arable fields were the most boring parts of the farm holding, possibly due to his enthusiasm and focus on his wildlife habitats. This discussion has shown similarities in the focus of some respondents, such as the practical approaches of CF1, CF4 and OF5 in dealing with less favoured parts of their farms. In contrast, OF1 claims to favour all parts of his land thereby suggesting an appreciation of his farm's biodiversity which, as discussed earlier, is crucial for the sustainability of food production and food security.

A diverse range of attitudes and behaviours emerged from the farmers' discussions - whether loosely labelled conventional or organic - when asked to talk about the five related themes, thereby providing some insight into their agri-environmental perceptions, attitudes and behaviours relating to biodiversity, sustainability and food security. For example, the comments of mixed tenant farmer (CF1) revealed his business-like attitude, tidiness and technocentric nature towards food production and his propensity for hunting. However, some of his farm behaviours are at variance with his opinions, as exemplified by his criticism of large fields when he manages the largest, and still growing, farm holding in the survey. However, it is common for there to be no simple relationship between verbal and non-verbal indicators of an attitude. Such extremely large fields reduce crop diversification by relying on planting of monocultures over large areas and reduce biodiversity by excluding many species which may otherwise have been present. In contrast, mixed tenant farmer (OF1) has a less tidy approach towards farming and seems to have a more ecocentric

attitude and a very different cognition of, and relationship with, the farm environment and food production, exemplified by the use of terms such as 'loving hay meadows'.

5. Conclusion

This chapter aimed to compare the cognition, attitudes and behaviours of farmers loosely labelled 'organic' and 'conventional', in central southern England, especially in relation to farming, the environment and five key themes related to the concept of food security. Using a modified behavioural conceptual framework revealed a spectrum of agri-environmental perceptions, attitudes and behaviours among farmers in relation to five key food security themes. However, farmers' behaviours cannot be directly explained by their attitudes because it is possible to arrive at an attitude in a number of different ways and from different experiences. Attitudes are highly complex and therefore such a direct link is unrealistic.

The differences detected between the survey populations were epitomised by some conventional farmers' high levels of pesticide usage, concern with keeping the land in suitable condition for growing crops, their belief in the necessity of conventional farming methods to feed a growing world population, an anthropocentric acceptance of GM crops and the belief that changes in weather patterns are part of the normal course of events. This contrasted significantly with many organic farmers' more ecocentric approach to agri-environmental issues and belief in the need for a biodiverse and sustainable countryside whilst, at the same time, producing locally grown and consumed healthy foods which should be able to accommodate population increases. The organic respondents also had concerns about the potential health risks associated with GM crops and the belief that global climate change is principally caused by burning fossil fuels. Unsurprisingly, more organic than conventional farmers said that organic agriculture is a sustainable form of food production which, if correct, will help mitigate food security problems. Other researchers also describe organic farming as a more sustainable method of agricultural food production than most conventional farming systems (Lampkin et al., 1999; Grey, 2000; Edwards-Jones & Howells, 2001; Michelsen, 2001; Mader et al., 2002). In contrast, some writers have raised concerns that organic farming is itself becoming conventionalised (Buck et al., 1997; Tovey, 1997). But, there are different types of organic farming systems; for example, commercial organic food production has less environmental benefit than organic farming methods practised on a small scale by philosophically committed farmers. Although organic production methods are considered a useful way of reducing the current impact of agri-food production systems (Lockie et al., 2006; Schahczenski & Hill, 2009; Scherr & Sthapit, 2009), it seems unlikely that peak oil prices, combined with the need to reduce dependency on fossil fuels, will be helped greatly by organic methods of food production. Some researchers claim that organic production methods have out-performed productivist approaches by providing environmental benefits such as water retention and improved soil fertility, thereby reducing the impact of agri-food production systems on the environment (Altieri, 1998; Environmental News Service, 2009). In contrast, it has been argued that abandoning productivist methods of food production will increase global food insecurity, resulting in millions of people dying of starvation (Avery, 1995).

In common, all respondents said that they may have to grow a different variety of crops if the climate gets warmer and some referred to the expansion of growing maize in the UK as evidence of global warming taking place. However, maize is not the greenest biofuel in

terms of CO₂ emissions reduction (International Energy Agency, 2004) and, used as biofuel, puts food security at further risk of leaving less food for human consumption. But climate has always changed and it is likely to do so in the future. Some researchers (more in line with the cognition of conventional farmers) suggest that fear of global warming derives from politics and dogma rather than scientific proof (Plimer, 2009).

Examination of farmers' environmental behaviour also revealed some interesting differences between the two survey populations. For example, conventional farmers are less interested in joining environmental schemes than organic farmers but, significantly, more organic than conventional farmers belonged to more than one scheme. More organic than conventional farmers carry out conservation work such as hedge laying and wood planting contrasting with conventional farmers who see creation of pheasant cover as conservation works. Membership of environmental institutions was not high among either group, with conventional farmers preferring the Game Conservancy Trust while organic farmers preferred the Wildlife Trust, Woodland Trust and Friends of the Earth. Further significant differences between organic and conventional farmers were found in relation to the readership of magazines and journals. Thus while *Farmers Weekly* and, to a much less extent, *Farmers Guardian* dominate conventional farmers' reading, the *Living Earth* and *Organic Farming* were the most widely read among organic farmers. The most popular magazine overall was *Farmers Weekly*, but organic farmers read more widely and seemed more critical in their reading habits than conventional respondents. The most significant difference between the two groups of respondents is that almost two thirds of conventional farmers shoot regularly (if only what they perceive as vermin), contrasting with less than one third of organic farmers. In response to the loosely worded question about how they thought farmers should 'behave' in the countryside, the term 'behave responsibly' was used more by organic than conventional farmers. Organic farmers also tended to use the words 'stewards, keepers, custodians or protectors', in contrast to conventional farmers who preferred to use the words 'looking after, care and good condition'. As a rule, organic respondents' agri-environmental behaviour, such as high membership of environmental organisations and participation in conservation work, supported their ecocentric attitudes expressed about the five key food security themes.

For the most part, the on-farm qualitative interviews supported the findings from the two previous sections. For example, conventional farmers tended to optimise yields using chemical inputs in order to maximize their income which, although important for achieving food security, also has damaging effects on agricultural sustainability and is therefore simultaneously detrimental to food security. This contrasted significantly with some organic farmers' pride in lack of fertiliser use and what they perceived as natural difference in their soil.

Advocates of organic farming systems – which receive substantial financial support in the form of subsidy payments – claim they are 'sustainable' and see them as a potential solution to the continued loss of biodiversity. Contrary to many published studies, however, it remains unclear whether such 'holistic' whole-farm approaches, exemplified by organic farming systems, provide such benefits for biodiversity due to the lack of longitudinal studies to 'fully' appraise their potential role as sustainable producers of healthy nutritious food. However, throughout the three stages of the analysis, generally the perceptions, attitudes and behaviours of the organic farmers in the survey demonstrated an ecocentric approach to the environment, farming and food production. Nevertheless, some organic

respondents admitted using high levels of fossil fuels thereby contributing to global climate change, which subsequently has an adverse effect on food security. If in the future, however, an alternative renewable form of energy – not dependent on oil – could be found for agricultural use, then organic food production would seem appropriate to provide sustainable farming in the UK. Contrasting significantly, conventional farmers' more anthropocentric attitudes and behaviours towards producing food using high levels of pesticides cause a reduction in agricultural biodiversity thereby putting at risk the long-term sustainability of food security. One method of assuaging food insecurity is to increase the area of land under cultivation to include 'unproductive' or 'marginal land' such as set-aside (prior to abolishment in 2008); however, such thinking overlooks the important contribution set-aside makes to agricultural sustainability. Land available for cultivation is a key limiting factor for achieving food security as arable land per person shrank 40 per cent from 0.43 ha in 1962 to 0.26 ha in 1998 (FAO, 2003). In contrast, some researchers claim that organic agriculture has the potential to produce enough food on a global per capita basis to sustain the human population without increasing the agricultural land base (Badgley et al., 2007). The challenge of ensuring food security for a growing population is to produce sufficient food in a more sustainable way using resources less exploitatively, while simultaneously minimising detrimental environmental impacts such as greenhouse gas emissions.

The modified behavioural approach used in this chapter has helped to provide an awareness, sensitivity and understanding of farmers' behaviour in their geographical world. However, this was not achieved without problems such as the discrepancies experienced between respondents' attitudes and their actual farm behaviour. The research provides a conceptual and empirical contribution to geographical study and knowledge regarding the environmental perceptions, attitudes and behaviours of farmers in central-southern England.

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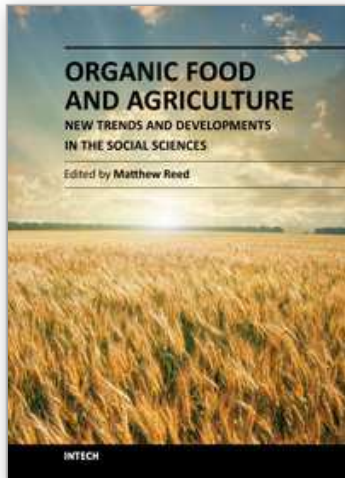
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The global phenomenon of organic food and farming, after three decades of progress, faces new challenges as markets mature and the impacts of the global recession start to change consumers and farmers' expectations. This global survey of the organic food and farming considers how the social sciences have come to understand in what way consumers make their choices as they shop, and how new national markets evolve. It also surveys how established organic sectors in North America and Europe are changing in response to the changes, that in part, the organic movement has created. Moving from a wide range of social science disciplines, methodologies and perspectives, this book represents an excellent starting place for new readers, and offers innovation to those already familiar with the literature.

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