Traceability and ethical concerns in the UK wheat–bread chain: from food safety to provenance to transparency

David Barling*, Rosalind Sharpe and Tim Lang

Centre for Food Policy, City University, London EC1V 0HB, UK

Traceability systems that track both physical entities and their less tangible attributes are increasingly widely used in contemporary food supply to meet a range of regulatory and commercial objectives, including a growing number of ethical concerns. Even with a traditional combinable and blended food crop such as wheat to bread there is clear evidence of traceability from the variety and crop in the field through to the mill to the bakery to the shelf. This study examines the traceability systems that have emerged in the wheat to bread supply in the UK, and the ethical concerns that have emerged within this supply process. The study reveals that these ethical concerns are dynamic and evolving and are contested. In the case of the supply chains studied, a priority concern with safety aspects has been followed by an emerging greater focus upon the provenance of the wheat and flour and upon the environmental impacts of the more industrialized supply chains. A study of the traceability schemes in the chains and the views of the stakeholders reflects quite restricted ‘fields of ethical vision’. The governance and the transmission of information along the chains to the final consumer are quite restricted and partial, inhibiting transparency. The realization of greater transparency and ethical traceability to address different moral perspectives will need further changes in the governance and operation of the supply chains.

Keywords: bread, ethics, supply chain governance, traceability, wheat

Introduction

Ethical concerns are becoming increasingly visible in the offerings of food to consumers and along the supporting supply chains. Ethical concerns appear also in the EU policy agenda evolving around sustainable agriculture and food. The 2003 reforms of the Common Agricultural Policy (CAP) linked farm support payments to regulatory compliance around a range of environmental, food safety and animal welfare regulations that embrace ethical concerns about agricultural practice and food supply, and also figure in debates about what comprises sustainable food. Traceability has been introduced as a legal provision to underpin the transfer of accurate records about the history of a food from field to shelf and so plays a key link between state support for agriculture and regulatory compliance. Traceability is also a key tool in the operation of privately regulated and certified food supply chains from organic food to fair trade to animal welfare certified foods (Barling, 2008).

This paper focuses upon the wheat to bread supply chains in the UK to illustrate some of the ways in which traceability systems are operating within these supply chains and the extent and form in which ethical concerns arise and are addressed within these supply chains and traceability systems. Some of the empirical data is
derived from an EU-funded research project which integrated philosophical studies of ethics and food with empirical studies of traceability and ethical concerns along three national food supply chains: wheat through to bread in the UK, olives to olive oil in Crete within Greece, and pigs to bacon meat in Denmark (Coff et al., 2008a).1

Wheat provides a challenging commodity for both traceability and ethical concerns. This commodity avoids any of the direct concerns over animal welfare, and is a large-scale commodity that goes through a blending process that diminishes its identity from the field. The transition of wheat first into flour and then as a key ingredient for bread militates against precise forms of traceability as the grain goes through its processes of blending and conversion. Nonetheless, there is clear evidence of both traceability schemes in existence for wheat and of the incorporation of some ethical concerns within these traceability schemes. Also, as a staple food in the UK diet and one predominantly grown in the UK, it provides a good national-based commodity study for the interaction of ethical concerns in food supply and the workings of traceability systems.

From the empirical study along the wheat to bread supply chain some key interrelated themes emerge. First, ethical concerns exist but their presence often exists only at some specific stages of the supply chain. The incorporation of ethical concerns within traceability systems is an area of action and of governance that is evolving and changing; it is far from settled. A similar observation can be made about the evolving development of environmental sustainability criteria along food supply chains. Second, there emerge from the actors or stakeholders in the chain differing ‘fields of ethical vision’ depending upon where the stakeholder sits in the chain and how far along the chain their responsibility reaches, which is reflected to a certain extent by the reach of the different traceability schemes along the chain. The dynamic nature of the traceability requirements is illustrated by the fact that the main traceability schemes along the bread to wheat supply chain originated from food safety concerns and the requirement of actors along food supply chains to prove ‘due diligence’ under the 1990 UK Food Safety Act. More recently, there has been the emergence of provenance schemes to identify the UK-based origins of the wheat in industrially produced bread sold in particular UK supermarkets. Finally, the governance of ethical concerns and traceability is an area that is open to further investigation. Who decides how ethical concerns are governed and reported in the chain? How great is the transparency along the chain? How much information is actually conveyed to consumers? How is a concern such as provenance framed? Does the need to fulfil regulatory requirements lead stakeholders to consider such compliance as addressing any concerns about issues like food safety? Where stakeholders who control traceability systems sit in the chain may decide the information conveyed to the public and how it is conveyed.

**Food traceability**

Since January 2005, EU law has required all food businesses to operate a basic level of traceability – so-called ‘one step forward, one step back’ traceability, which involves keeping a record of where goods are bought from (i.e. name and address of supplier and transaction date), and where they are sold on to (name and address of customer and transaction date) (EC, 2002). Traceability is defined by the International Organization for Standardization (ISO) as ‘the ability to trace the history, application or location of an entity by means of recorded identifications’ (ISO, 2007). In terms of applying traceability to food, this is covered under the quality management systems standards for food and the international standard agreed in 2007 for: ‘Traceability in feed and food chain – General principles and basic requirements for system design and implementation’ (ISO 22005). The text explains that: ‘A Traceability system is a useful tool to assist an organization operating within a feed and food chain to achieve defined objectives in a management system’ (ISO, 2007, p. iv). In other words, the objectives of food traceability will differ according to the defined need.

Four main objectives of food and feed traceability can be identified as it operates in contemporary food supply chains. First, supply chain efficiency and management as reflected in just in time systems of stock ordering and delivery. Second, product verification and control such as through identity presentation. Third, the risk management of food safety and to aid public health recalls. Finally, traceability enables the verification of
systems for quality assurance and provenance of food. To this end, traceability systems are used to track not only products (such as wheat or yeast) but also more intangible or process-based attributes (such as the absence of pesticide residues in organic certification systems). The procedures used range from paper trails to complex IT systems using bar codes, radio tags or other mechanisms to identify ‘lots’ of product, attach bundles of information to them, and track them along the chain.

A fifth objective, which as yet is only episodically or partially realized, can also be identified. This objective can be termed as the identification and communication of the information that the public as consumers and citizens desire to be communicated about their food. Currently, such communication is dominated by the stakeholders along the supply chain, with some civil society organizations intervening as brokers for citizens’ interests (Barling, 2008). Ethical traceability as a concept remains an aspiration and its fuller implementation points to much more upstream involvement by the public in food production systems. This is the realization of the concept of co-production, where the consuming public are much closer to and more aware of the production of the food – as with more artisan or craft-produced bread (see Beekman et al., 2008). If traceability systems were designed or harnessed to accomplish this, consumers might not only be able to identify more clearly the types of food that embody their own values (e.g. locally produced or more fairly traded foods), but also, by having more say in the sort of information to be communicated, be able to participate in and influence food supply chains. This notion immediately raises important questions about who decides what information is to be communicated along the chain, and how far along, about who can access the information (many traceability systems are currently designed to be useful to stakeholders but indecipherable to consumers, such as through information storage on barcodes), and about the difficulties of integrating the roles of consumer and citizen.

Traceability has come to the fore as a key requirement to realize the evolving EU regulatory goals about food. Within the EU, traceability as defined in Regulation 178/2002 of the General Principles and Requirements of Food Law Regulation ‘means the ability to trace and follow a food, feed, food producing animal or substance intended to be or expected to be incorporated into a food or feed, through all stages of production, processing and distribution’ (EC, 2002, Article 3(15)). There is a full food and animal feed chain approach, as the stages are defined as originating with primary production and the regulation includes imports, and extends ‘up to the final consumer’ (Article 3(16)). However, in terms of its operation and implementation it is a one-step-back and one-step-forward approach to record keeping (Article 18). Nonetheless, this effectively transfers responsibility to each stage of the food chain back as far as the farm. The priority of traceability in the general principles regulation was to enhance risk management procedures for food with food safety as the paramount concern (Arienzo et al., 2008). However, there are a range of other demands upon traceability within EU regulation. For example, food provenance schemes for Geographical Indications demand forms of traceability and verification as do certification schemes for organic food (Arienzo et al., 2008).

EU agricultural policy reform: linking sustainability to ethics

The reforms to the CAP in 2003 linked the regulation of agriculture and food production to the distribution of supports for farming, with the introduction of cross compliance (EU Regulation 1782/2003). In order to receive the Single Payment Scheme (SPS) recipients have to keep their agricultural land in ‘good agricultural and environmental condition’, which is broadly defined by standards developed at Member State level. Also, importantly, farmers have to observe certain standards in the areas of the environment, public, animal and plant health and animal welfare as laid out in 19 Statutory Management Requirements based on existing EU legislative requirements. Under the 2008 Health Check of the CAP, the European Commission stated that cross-compliance is, and will remain, an essential element of the CAP with ‘two stated objectives: firstly, to contribute to the development of sustainable agriculture; and, secondly, to make the CAP more compatible with the expectations of society at large’ (Defra, 2008).
The European Commission’s ambitions to use regulatory compliance to enhance both the public approval of farm supports and to contribute to sustainability policy goals are also depicted in terms of market value. Addressing a meeting on Food Ethics and Traceability, the Agriculture Commissioner Mariann Fischer Boel incorporated the concerns around food ethics under the aims of quality food production:

When applied to food and drink, the term ‘quality’ means different things to different people. It can certainly carry ‘ethical’ connotations – telling consumers about production methods and a product’s relationship to animal welfare and the environment. It can refer to geographical origin. And of course, it can refer to that specific tang of a good cheese, or the way in which a good red wine goes down so smoothly. It’s essential for us to know what qualities consumers are looking for in food, and which ones will persuade them to pay higher prices… (Fischer Boel, 2008).

Furthermore she made it clear that in order to receive the Single Farm Payment under the 2003 CAP reforms:

farmers do not have to farm a given product. Instead, they must meet high standards of environmentally friendly land management, animal welfare and public health. … Obviously, this is a very strong incentive for more ‘ethical’ farming. Another effect of the new system is that farmers have much greater freedom to focus on product quality.

According to the Agriculture Commissioner’s assessment, consumers’ desires for food quality incorporate a range of ethical concerns. These raise questions about what is meant by ethics and the scope and nature of ethical concerns around food. Ethical concerns around food arise about the morality of the workings of food production and food supply systems through to consumption and their after-effects. Any human intervention has the potential to give rise to ethical concerns, i.e. to impact upon others, including humans but also other living things, and so food ethics can cover a wide range of issues. Ethics involve subjective judgements as well as objective as they can reflect differing combinations of values when applied to practical situations. A concern over a food may involve a combination of ethical and other concerns. So the provenance of a food, in terms of origin and place of production, may be linked to other considerations such as methods of production, as with regulations for Geographical Indications (Coff et al., 2008b). The focus here is upon the types of ethical concerns that have arisen over the food production and along supply chain systems in the case of the UK wheat to bread supply chain.

**Wheat into bread: the UK wheat–flour–bread chain**

In the UK, most bread is the product of intensive cultivation and a concentrated and highly industrialized manufacturing and distribution system. Coexisting with this dominant chain (and dependent on it for some inputs and services) is a comparatively small ‘craft’ chain (or series of chains) characterized by smaller production units, less mechanized and more time-consuming manufacturing methods, and less use of inputs or additives to facilitate production. Figure 1 outlines a diagrammatic overview of the wheat to bread chain as a whole and indicates concentration at various stages. Clearly, more specific chains operate within this whole picture as is explained in more detail below.

Wheat is the UK’s most important cereal crop, with an average annual harvest of around 15 million tonnes, most of it grown by around 10,000 of the 28,000 farmers who grow some wheat. The harvested area is approximately 1.8 million ha (more than 40 per cent of the total arable area), almost all of it used for intensively cultivated winter wheat. The wheat has a relatively low protein content (less than ideal for breadmaking) but unusually high average yields of 7.5–8 tonnes per ha (cf. 2.2 tonnes per ha in Canada), achieved through heavy use of fertilizers and pesticides. (The average crop is treated with three herbicides, three fungicides, two insecticides, one growth regulator, plus fertilizer.) The area of the organic wheat crop is comparatively tiny, at 15,000 ha. More than 40 per cent of the wheat harvest is used for animal feed. Around one-third is milled into flour, and
Figure 1 UK wheat–flour–bread chain
Note: mt = million tonnes.
around 15 per cent exported, mainly to the EU (Table 1) (CSL, 2005; Defra, 2005, 2006).

Of the 30,000 varieties of wheat, only a few dozen are commercially grown in the UK. In experiments, biotechnology has improved wheat protein quality, but there is currently no genetically modified wheat in commercial cultivation anywhere (Curtis, 2002; Pena, 2002; BSPB, 2006; HGCA, 2006).

The UK is currently a net exporter of wheat, a reversal of the dependence on imports that prevailed from the late 19th century until the 1970s. By that point, developments in breadmaking technology, coupled with agronomic and varietal improvements, had made it possible to include a higher proportion of low-protein British wheat in commercial breadmaking ‘grists’ (the mixture of grain fed into the mill). When the UK joined the European Union in 1973, high import tariffs provided a further incentive to choose home-grown wheat. As a result, the proportion of domestically grown wheat in the milling grist has doubled since the 1970s to more than 80 per cent. The balance continues to be imported, because all industrial millers add some imported, high-protein wheat to improve the flour’s baking properties. For organic wheat, the proportion of home-grown grain in the grist is much lower, at less than 50 per cent. Just 2 per cent of flour and 1 per cent of bread is exported. (Burnett, 1968; Defra, 2005, 2006; Cauvain & Young, 2006; Nabim, 2006a; FoB, 2007).

In spite of this currently high level of self-sufficiency, a number of global factors have an impact on UK wheat production. As wheat is a globally traded commodity, UK prices fluctuate according to global forecasts of supply and demand, and speculative trading contributes to price volatility. World wheat production is strongly affected by weather, and the recent drought in Australia contributed to price rises for UK wheat in 2007. In the longer term, climate change is likely to alter the distribution of wheat-producing regions. The increasing use of wheat in animal feed has expanded demand, which in recent years has often exceeded supply. Most recently, the demand for biofuels (backed by government targets in the US and EU) has threatened the supply of wheat for food use. These factors put pressure on world stockpiles, which were reported in 2006 to be at their lowest level for 25 years (Table 2) (Curtis, 2002; USDA, 2006; FT, 2006; Finch, 2006).

Around a third of the wheat harvest is bought by millers. Almost all of this is processed at 59 large, continuous-process, electrically driven roller mills, to produce around 4.5 million tonnes of flour a year. The grain is delivered to the mills by road, and on arrival is tested to determine its physical and chemical properties. The wheat is then blended, stored and blended again, as millers manipulate the grist to control the quality, cost and functionality of the flour. The main by-products are bran for human consumption and ‘wheat feed’ for livestock; there is little solid waste, and the main environmental impacts are from energy use and

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Table 1 UK wheat supply and use, 2005

<table>
<thead>
<tr>
<th>Production</th>
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<tbody>
<tr>
<td>Area (000 ha)</td>
<td>1,867</td>
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<tr>
<td>Yield (tonnes/ha)</td>
<td>8</td>
</tr>
<tr>
<td>Volume of harvested production (000 tonnes)</td>
<td>14,735</td>
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<tr>
<th>Prices</th>
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<tr>
<td>Milling (£/tonne)</td>
<td>83</td>
</tr>
<tr>
<td>Feed (£/tonne)</td>
<td>78</td>
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</tbody>
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<tr>
<th>Imports/exports (000 tonnes)</th>
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<tbody>
<tr>
<td>Imports from the EU</td>
<td>662</td>
</tr>
<tr>
<td>Imports from the rest of the world</td>
<td>500</td>
</tr>
<tr>
<td>Exports to the EU</td>
<td>2,161</td>
</tr>
<tr>
<td>Exports to the rest of the world</td>
<td>11</td>
</tr>
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</table>

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<thead>
<tr>
<th>Total domestic uses (000 tonnes)</th>
<th>13,559</th>
</tr>
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<tbody>
<tr>
<td>Of which: Flour milling</td>
<td>5,578</td>
</tr>
<tr>
<td>Animal feed</td>
<td>6,890</td>
</tr>
<tr>
<td>Seed</td>
<td>254</td>
</tr>
<tr>
<td>Other uses and waste</td>
<td>837</td>
</tr>
<tr>
<td>% home-grown wheat in milling grist</td>
<td>82</td>
</tr>
</tbody>
</table>

Mill workers traditionally suffered from dust-related respiratory illness, but great efforts have been made to eliminate dust from modern mills, because of both health and fire risks. The mills produce up to 400 different types of flour, with minute variations to suit clients' needs. Most of this flour is white (i.e. up to 30 per cent of the grain, usually including the bran and germ, is removed during milling). Unlike stone milling, which grinds the entire grain, roller milling removes the outer bran and oily germ from the grain, and then reduces the starchy endosperm to fine particles. When roller milling was introduced in the 1870s, it was not understood that many important nutrients were discarded with the bran and germ. To remedy this loss, UK law has since the 1950s required some of these nutrients to be added back into white flour, in a process known as 'fortification'. These so-called 'statutory additives' need not be listed on product labels (Burnett, 1968; David, 1979; FAB, 2006; Nabim, 2006a, 2007). UK bakers produce 4.4 billion units of product per year, the equivalent of over 12 million loaves and packs every day. Around 80 per cent of the bread is sold wrapped and sliced, and is produced in 51 factories (called 'plant bakeries') which use a system called the Chorleywood Bread Process (CBP) developed in the 1960s at the Flour Milling and Baking Research Association at Chorleywood, Hertfordshire. In the CBP, the traditional lengthy fermentation of the yeasted dough is replaced by a short period of mechanical agitation in the presence of an increased quantity of specially adapted yeast and other chemical 'improvers' to stimulate and regulate the action of the main ingredients. The CBP made it possible to produce large quantities of uniform loaves in a much shorter time. A further 17 per cent of bread is made in 'in-store bakeries' (ISBs), which often use doughs pre-made using the CBP and then 'baked off' in retail or food service outlets. Just 3 per cent is produced by traditional methods through the craft or artisan chains. The overwhelming bulk of bread (87 per cent) is sold through multiple retailers (supermarkets, co-ops and convenience stores). Around 6 per cent is sold through specialist bakeries, and the remainder via an array of retail and food service outlets. Bread is delivered to these outlets daily, almost every day of the year, in fleets of vans still largely operated by the bakeries themselves (Cauvain & Young, 2006; Dove's Farm, 2009; Whitley, 2006; FoB, 2007).

Bread consumption is declining, but it is still eaten several times a week by 96 per cent of the UK population, who consume an average of 750 g each per week. More than 76 per cent of this is white, with lower-income families less likely than higher-income families to consume wholemeal bread, which is more nutritious than white and also usually more expensive. Although the bread market is shrinking in volume, it is increasing in value, a result of a switch away from economy lines towards premium, ethnic or specialty breads (such as ciabatta or white with added bran) which can now be produced by the CBP. The sandwich market is another growth area (Mintel, 2005).

### Table 2 World wheat production, consumption and trade, 2003–2006

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<th></th>
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<tbody>
<tr>
<td><strong>Million tonnes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>555</td>
<td>627</td>
<td>616</td>
<td>-11</td>
</tr>
<tr>
<td>Consumption</td>
<td>589</td>
<td>609</td>
<td>624</td>
<td>+15</td>
</tr>
<tr>
<td>Trade (July/June)</td>
<td>105</td>
<td>113</td>
<td>110</td>
<td>-3</td>
</tr>
<tr>
<td>Ending stocks</td>
<td>132</td>
<td>150</td>
<td>142</td>
<td>-8</td>
</tr>
</tbody>
</table>

Traceability and ethical concerns along the wheat to bread chain

Most forms of traceability arguably have ethical origins (such as the prevention of fraud or food poisoning). While many traceability systems now have primarily commercial or regulatory objectives such as legal compliance or stock control, the underlying purpose may still be seen as ethical. Other traceability systems have the specific purpose of tracking ethical aspects of production. This section discusses examples of traceability systems in the wheat chain that either directly or indirectly trace ethical aspects of production. Table 3 tabulates the information, with the terms in parentheses in the final column referring to the particular types of ethical concerns.

Inputs

Seed supply in the UK has been regulated since the early 20th century to control quality and consistency, with regulation latterly taken over by the EU. The requirement for traceability is inherent in these regulations to prevent fraud. Seed varieties can only be marketed if they are listed in the EU Common Catalogue of Agricultural Plant Species or its national equivalent, the National List. To be listed, new varieties must undergo several years of testing to demonstrate that they are ‘distinct, uniform and stable’ (DUS) and have ‘value for cultivation and use’ (VCU). In the UK, there are further tests for inclusion on the Recommended List, produced by the UK cereals advisory body, the Home Grown Cereals Association (HGCA). Varieties are selected for the Recommended List by a standing committee of stakeholders and experts, who look for traits desired by growers and processors, such as yield or suitability for breadmaking, or by policy makers, such as disease resistance (to enable less pesticide use). Recommended List varieties account for 95 per cent of UK wheat production. The 2006–2007 Recommended List included nine varieties of winter wheat for milling into bread flour. To be sold, the seed itself must be ‘certified’, meaning it meets statutory quality specifications relating to variety, germination capacity and purity. The EU registration process for agrochemicals requires traceable records to support claims on, for example, environmental impacts, effective dosage and safe exposure levels for users and bystanders. Manufacturers are required to supply information on safe use and storage to customers, including end users (BSPB, 2006; HGCA, 2006; PSD, 2007).

Farm

All wheat destined for human consumption in the UK is now covered on farm by ‘assurance schemes’, which are private regulatory systems defined and policed by stakeholders in the sectors concerned. Their aim is to demonstrate that specified standards of food safety and quality are being met, partly to meet due diligence requirements mentioned previously and partly to increase consumer trust in food. In effect, therefore, the schemes provide a form of ethical traceability – though the choice of issues covered and the level of the standards has been contested, e.g. in relation to Assured Food Standards (AFS), the main umbrella scheme for British produce, which was criticized for its weak animal welfare standards (CIWF, 2002) and poor environmental sustainability criteria (SDC, 2005). The schemes are generally based on current standards of good agricultural practice, though some schemes ‘gold plate’ baseline standards. The main wheat scheme is the Assured Combilable Crops Scheme (ACCS), launched in 1997 and now part of the AFS. Participating farmers are annually inspected by third-party agencies to verify practice and record keeping in areas such as storage and application of agrochemicals, grain storage and vermin control. AFS also manages the Red Tractor logo, which is intended to communicate to consumers that the product meets specified standards (AFS, 2006; ACCS, 2007; CMI, 2007).

Farm to mill

Another assurance scheme, the Trade Assurance Scheme for Combinable Crops (TASCC), covers grain between farm and mill. Managed by the trade association of UK agricultural suppliers, the Agricultural Industries Confederation (AIC), the scheme is made up of four codes of practice covering storage, haulage, merchants and testing facilities. Wheat merchants can also contract to supply wheat with specified, traceable attributes,
Table 3  Ethical traceability in UK wheat–flour–bread chain

<table>
<thead>
<tr>
<th>Stage in chain</th>
<th>Traceability systems with ethical aspects</th>
<th>Information/attributes traced</th>
<th>Ethical concerns addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inputs: Seeds</td>
<td>National or Recommended List (BSPB, 2006).</td>
<td>Variety, attributes (e.g. yield, straw strength).</td>
<td>To ensure wheat supply meets quality standards and policy goals, e.g. reduced use of pesticides (Quality, Methods of Production).</td>
</tr>
<tr>
<td></td>
<td>Only certified seed can legally be sold (BSPB, 2006).</td>
<td>Variety, purity, seed producer, growing conditions.</td>
<td>To safeguard quality of seed supply (Quality).</td>
</tr>
<tr>
<td>Inputs: Agrochemicals</td>
<td>Pesticide registration process; requirement to supply information on safe use and storage (PSD, 2007).</td>
<td>Active ingredients; toxicity effects; safe handling, storage and transportation procedures; usage and dosage instructions; residues, environmental effects; hazard warning.</td>
<td>To safeguard health of users and bystanders, and limit damage to environment (Human Health, Methods of Production).</td>
</tr>
<tr>
<td>Farm</td>
<td>Assurance schemes cover various aspects of cultivation and on-farm practice, e.g. Assured Combinable Crops Scheme (ACCS) (AFS, 2006).</td>
<td>Use of agrochemicals (seed treatment, storage, date of application, reasons for use, weather conditions and dosage details); grain storage and handling (condition of buildings, use of post-harvest treatments, vermin control, cleaning procedures); transport (condition of vehicles, previous loads); insurance.</td>
<td>Environmental impacts of cultivation (e.g. water pollution, harm to wildlife); operator hazard; food safety (e.g. contamination after harvest); to restore consumer trust (Methods of Production, Human Health, Trust).</td>
</tr>
<tr>
<td>Organic certification systems (e.g. Soil Association, Demeter).</td>
<td>Compliance with certifier’s standards and EU organic regulations.</td>
<td>(Methods of Production, Human Health).</td>
<td></td>
</tr>
<tr>
<td>Farm to mill</td>
<td>Trade Assurance Scheme for Combinable Crops (TASCC) covers storage, analysis, merchanting and transportation (AIC, 2006).</td>
<td>Storage (condition of buildings, previous contents, cleaning procedures, vermin control, pesticides/fumigants); haulage (condition of lorries, previous loads); testing (facilities, staff training, sampling, analysis methods); trading (marketing, specifying, sampling, rejection procedures, record keeping).</td>
<td>Food safety; standardization and verification of testing procedures to eliminate variation from lab to lab; transparency in trading process (Human Health, Methods of Production, Terms of Trade, Transparency).</td>
</tr>
<tr>
<td>Assurance via contract: merchants negotiate individual contracts to supply wheat with specific attributes (including ethical attributes) and traceability.</td>
<td>Traceable provenance from a specified region or cultivation method.</td>
<td>Specified concerns (e.g. Methods of Production, Origin and Place).</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
Table 3 Continued

<table>
<thead>
<tr>
<th>Stage in chain</th>
<th>Traceability systems with ethical aspects</th>
<th>Information/attributes traced</th>
<th>Ethical concerns addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milling</td>
<td>Assured grain delivered to mill must be accompanied by a ‘Post Harvest Declaration’ or ‘grain passport’ and a unique farm identification number (AFS, 2006).</td>
<td>Unique number identifies farm. Passport includes information on post-harvest treatments and haulier’s details, including declaration of previous three loads carried by vehicle.</td>
<td>Food safety (Human Health, Methods of Production, Origin and Place, Quality).</td>
</tr>
<tr>
<td></td>
<td>Tested at mill to assess quality and conformance with specifications.</td>
<td>Specific quality parameters for e.g. protein content, protein quality, moisture content, specific weight – predictors of milling and baking quality.</td>
<td>(Quality, Terms of Trade).</td>
</tr>
<tr>
<td></td>
<td>Regulations govern the permitted maximum residue levels (MRLs) of pesticides in wheat (SI, 1999).</td>
<td>Residue levels of specified pesticides.</td>
<td>(Human Health).</td>
</tr>
<tr>
<td></td>
<td>Assurance via contract: millers negotiate individual contracts to keep supplied consignments of wheat (e.g. kosher) separate during milling process.</td>
<td>Traceable provenance, quality characteristics affecting milling process (e.g. variety, moisture content).</td>
<td>(Quality, Origin and Place).</td>
</tr>
<tr>
<td>Level in chain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baking</td>
<td>Detailed specification to miller.</td>
<td>Specifies ‘functionality’ of flour – characteristics required for different baking purposes.</td>
<td>Food safety; quality (Human Health, Methods Of Production, Quality).</td>
</tr>
<tr>
<td></td>
<td>ETI audit (ETI, 2006).</td>
<td>Working conditions along supply chain, if company uses ETI code of Practice.</td>
<td>(Working Conditions).</td>
</tr>
<tr>
<td></td>
<td>Traceability required on additional ingredients.</td>
<td>Composition, provenance; possibly also working conditions in supply chain, if company uses ETI code of practice.</td>
<td>Food safety, working conditions (Human Health, Working Conditions, possibly Origin and Place).</td>
</tr>
<tr>
<td>Retailing</td>
<td>Detailed specification to baker.</td>
<td>Specifies quality characteristics of bread (and flour), e.g. ingredients, provenance of ingredients, physical characteristics, shelf life, etc.</td>
<td>Food safety (Human Health, Methods of Production, Quality).</td>
</tr>
<tr>
<td></td>
<td>Detailed specification with miller, merchants and farmers (e.g. Sainsbury’s/Camgrain/ Whitworths &amp; Co-operative Retail and Co-operative Farms).</td>
<td></td>
<td>Place and origin – provenance.</td>
</tr>
</tbody>
</table>

(Continued)
which may be ethical, such as organic, or coming from a specified location (AIC, 2006).

Interviewees stressed that traceability back to farm was obstructed in this chain by the standard practice of blending wheat in storage and at mills. However, examples were found in which traceability was maintained back to farms, and in one case to specific fields. In the largest example, a major baker chose to source a relatively high proportion of its wheat from contracted farmers in Canada and transport it to the UK via a dedicated logistics system, on the basis that this sourcing policy was integral to its definition of the quality of its products. In other instances, the motive for maintaining traceability back to farm was more explicitly ethical. The Soil Association’s organic certification scheme is one example. In another, a supervisor of a kosher bakery producing matzos (unleavened wheat bread) explained that a mill had facilities to keep selected wheat, designated as kosher, separate from other wheat throughout the whole process of storage and milling, and that in order to select the wheat for Passover matzos he was able to accompany the farmer on the combine harvester to decide which wheat to harvest.

### Mill and bakery

Wheat is generally blended, processed and sold on the basis of its inherent characteristics, not on the basis of origin, variety or production system. This blending is a barrier to traceability of these attributes. The millers work to detailed product specifications supplied by the plant bakers. The bakers, in turn, work to detailed specifications supplied by their clients (e.g. retailers). These specifications may include ethical issues, e.g. in relation to pesticide residues. Some companies require their suppliers to participate in the Ethical Trading Initiative, an industry-led ethical traceability scheme focusing on working conditions in international supply chains, which usually involves suppliers filling in a questionnaire (ETI, 2006).³

### Retail

The obligation to provide ‘one step forward’ traceability ends with the retailer. However, labelling regulations, which determine the nature and amount of information presented to consumers, have ethical aspects, for example in relation to health. Some production systems use logos to communicate to consumers that goods have been produced to specified standards, which may have ethical aspects (such as the AFS Red Tractor logo) or claim to have higher ethical standards than conventional production systems (such as the Demeter biodynamic logo or RSPCA Freedom Foods label). However, bread does not carry the red tractor label as the scheme requires that the final product has 95 per cent or more UK ingredients which is not the case with ‘plant-baked’ bread as explained above. A small number of brands of flour and bread are sold on the basis that they are identified with a particular place of origin. For example the Watermill, in Cumbria, produces flour made exclusively from organic English wheat. Another mill, Dove’s Farm, produced a brand of flour which carried the Soil Association’s pilot ‘Ethical Trade’ logo, signifying the company and product met standards of ethical trading specified and audited by the Soil Association, relating to the price paid to

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Table 3  Continued

<table>
<thead>
<tr>
<th>Stage in chain</th>
<th>Traceability systems with ethical aspects</th>
<th>Information/attributes traced</th>
<th>Ethical concerns addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labelling, promotional material, websites, point-of-sale information.</td>
<td>Ingredients, nutritional information, name of manufacturer, use-by information, provenance.</td>
<td>Food safety, nutritional value, other ethical attributes (Human Health, Methods of Production, Origin and Place, Terms of Trade).</td>
<td></td>
</tr>
</tbody>
</table>
farmers, the treatment of workers, and community support (Soil Association, 2009; Dove’s Farm, 2009).

The UK multiple retailer Sainsbury’s signed an agreement with the East Anglian wheat farmers cooperative Camgrain and the regionally based miller Whitworths to provide 80 per cent of the flour to the supermarket’s in-store bakeries from 2008 (Davies, 2007). By mid-2009 all 400 in-store bakeries were receiving 100 per cent of their flour from this source to bake the bread from scratch (Sainsbury, 2009). For Sainsbury’s the motivation was reported to be market research from their customers who wanted more information about the origins of their food. Sainsbury’s proclaimed that: ‘We are the first supermarket to have fully traceable flour from farm to bakery bringing the customer closer to the farmer’ (Davies, 2007). Underpinning this development is the Sainsbury’s British Flour Development Group, composed of retailer, miller, cooperative and its farmers, and the cereal merchant Openfield, which provides a forum for agreement over quality standards among the wheat suppliers (Davies, 2007; Sainsbury, 2009). For Camgrain and its 300 farmers, large size and critical mass are key factors in being able to provide the storage and highly technical quality control facilities necessary for such a large contract (Camgrain, 2007).

The Co-operative Food Stores began a line of foods branded as ‘Grown by Us’ sourced from their extensive farm holdings on the Co-operative Farms of some 60,000 acres (Tacon, 2009). However, the blending of flour was identified as a potential problem where performance attributes of the project might conflict with provenance attributes:

Packet flour is a good example, where protein levels in the wheat can vary significantly year-on-year, so wheat other than our own may be needed to get the right performance of the end product. In these circumstances we agree with our retail colleagues a minimum percentage for Co-operative Farms product and clearly label this on front of the pack (Tacon, 2009).

A survey of consumers for the Home Grown Cereals Authority (HGCA) in 2009 identified potential routes for cereal producers to add value through provenance marketing of their food products. Two of the areas identified were: first for the supply chain to demonstrate the heritage/tradition, product origins and links with British farmers to attract market demand for local and British foods; and second, the potential to communicate the environmental measures being taken by supply chains to attract ‘green’ consumers (HGCA, 2009). The shift to such provenance marketing in the industrialized wheat to bread supply chain cuts across the more specific and individual provenance narratives associated with the minority craft wheat to bread chains. However, two characteristics emerge from these recent initiatives with supermarkets. First, there are still problems to overcome with performance attributes for flour and plant-baked bread based on industrial baking techniques such as the CBP, which can lessen the degree to which provenance can be marketed. Second, the scale of supermarket retail demands a large and dedicated grain supply and thus a concentrated supply chain such as that provided through Camgrain cooperative with its large storage and quality control facilities and by the Co-operative Farms. In the latter cases the advantages of grower cooperatives are clear.

Views on ethical concerns from the chain

The stakeholders in the wheat to flour to bread supply chain identified methods of production and human health as the most important areas for ethical concern in the chain. This agreement emerged in spite of many interviewees’ comments that ethics are diverse and subjective, and that ‘as a society we have no ethical consensus’ (official from agrochemicals company).

Methods of production was collectively seen by stakeholders as the most important concern, and illustrated how interpretations varied depending upon the respondent’s position along the chain. Thus, input suppliers and farmers focused on agricultural impacts, bakers and millers on the impacts of their factories (notably noise and energy use), and the retailers on packaging and distribution. Interviewees pointed out that some concerns in this category are already addressed by regulation or law. An interviewee from an
assurance scheme commented that his organization was increasingly being expected to incorporate environmental concerns, and provided an insight into the process by which concerns are converted into measurable standards:

We believe that controlling the negative impacts of farming is something we must take on board. But then you might say that taking 30 cm out of the hedge at nesting time is bad, or you might want to preserve footpaths – these are desirable. But these are not the same as limiting the negative impacts of farming itself (assurance organization).

As this quote implies, the pressure for further environmental improvements in farming and along food supply chains is increasing, with growing pressure coming from carbon and other greenhouse gas reduction targets, and for better use and recycling of waste and water. The policy and regulatory pressures upon improved environmental sustainability will continue to increase into the foreseeable future and present a similar trajectory to the dynamic and evolving nature of ethical concerns around the food supply.

Among the consumers interviewed, human health was seen as the most important issue, and they saw it in terms of their personal health. Stakeholders also saw it as important, but interpreted it in terms of food safety (i.e., preventing contamination) and worker safety. Both groups tended to see bread as a safe, nutritious, staple food, though consumers expressed anxiety about additives and pesticide residues. In contrast with the consumers’ generalized suspicions, stakeholders identified specific health risks (e.g., from mycotoxins – fungal infections of grain which can be fatal to humans), but felt that the risks were well understood and controlled: ‘By and large, in the UK all food is safe. This is not an ethical issue in this marketplace’ (grain merchant).

In terms of trading relationships along the chain (a long-held concern of farmers in relation to actors such as the supermarkets) quite emotional responses were elicited. Again, perspectives varied depending on place in the chain, with the stakeholders at successive stages of the chain feeling disadvantaged by unfair terms of trade. An organic farmer said, ‘All farmers get worked up about this, farmers struggle to make a living.’ Millers complained of stringent specifications imposed by bakers, and an industrial baker complained of punishing penalties imposed by retailers if, for example, deliveries were not made correctly. Several stakeholders made the point that ‘a sustainable supply base’ (i.e., a system in which the farmer could expect to sell above cost), was a prerequisite for an ethical supply chain. But others distanced themselves from responsibility for unfair terms of trade.

Quality generated some discussion with some stakeholders challenging its place as an ‘ethical’ concern. For consumers, quality was variously defined as good flavour and texture, nutritional value, freshness, keeping qualities and ‘naturalness’, and generally incorporated the idea that bread should be produced to reliably high standards. For many stakeholders, quality was partly defined as a checklist of attributes specified by the client. Thus, to an industrial miller, it meant producing flour with the ‘assured functionality’ demanded by his industrial baker clients. To the industrial baker, it meant ‘meeting customer requirements’, as set out in specifications. A mass retailer distinguished between ‘legal compliance and compliance plus’, explaining that quality attributes which were ‘optional’ and added cost, such as some ethical quality attributes, might be included in premium products but excluded from cheaper versions. This tendency to standardize quality was more marked in the industrial than the craft chain. In the industrial chain, consistency was highly valued and producers saw it as their job to eliminate variation. In the craft chain, variation was valued.

In order to make a consistent product in as highly controlled a process as baking, and to give the uniformity our customers demand, then we need consistent raw materials (industrial baker).

The artisan process admits a range of variations, reflecting variations in the ingredients, temperature, handling – that is the joy of it. We wouldn’t want perfect consistency (craft baker).

In terms of provenance, based upon place of origin, the general response from stakeholders was that consumers are not interested in where the wheat in their bread comes from:

Bread is just an ordinary, everyday commodity. Customers look for consistency, it doesn’t matter whether it comes from Timbuktu or Tooting (industrial baker).
Among farmers, there was a resigned acceptance that wheat and flour cannot usually be identified with the primary producer: ‘You just have to accept that your wheat goes into a bag and is marketed under the miller’s label’ (organic farmer). But all the farmers interviewed regretted this and wished that wheat could be more associated with its place of origin. However, the subsequent introduction of the Camgrain/Sainsbury supply and the Co-operative Farms’ brands illustrates the growing and dynamic nature of provenance as an ethical dimension.

The issue of trust was discussed at some length by stakeholders. While stakeholders saw this particular chain as relatively safe, several made the point that the food system as a whole was not trusted. While many mechanisms in this chain are designed to substitute for trust – e.g. audits and laboratory tests – personal trust was still felt to play an important part:

Trust is very important between me and the no more than six people I buy and sell from. I know them all (conventional farmer).

Similarly, transparency was talked about at length by stakeholders. For some interviewees, traceability and transparency were inseparable: ‘There’s no point having traceability if there’s no transparency’ (organic farmer). But stakeholders’ views on the desirability of transparency varied, although there was a common view that the chain was having to become more transparent. Craft-scale enterprises tended to see transparency as a useful way of differentiating themselves from industrial-scale producers:

I was very happy to say as much as I possibly could about what was in the products, because by being so transparent we were poking a finger at others, who were less transparent. We had no advertising budget, but we always hoped that that when we said, ‘we use no additives’, it would prompt people to ask why others did ... when you’re a small company, transparency is all you’ve got (organic craft baker).

An interviewee from the millers’ trade association implied that it was naive to assume that all chain partners would wish for transparency, and argued that one point of industry forums was to provide a place where problems could be discussed and resolved in privacy, without the need to make issues public and thereby cause alarm. For stakeholders, a major barrier to increased transparency was cost, and the danger that this extra cost could tip farms out of viability. This was reinforced by doubt as to whether consumers would pay more:

The principal obstacle is pitching a standard of production, a specification, that can be delivered cost-effectively by the producers within a global market. I honestly don’t think some of the lobbyists understand what a knife-edge it is. We have welfare standards in the UK that go beyond EU standards and the industry is not now competitive (farm assurance organisation).

Another barrier was the major retailers’ dominance of the food supply chain. Interviewees expressed resentment at what they saw as the retailers’ arrogance and double standards, which they felt not only penalized their own businesses but also blocked change towards a more equitable or sustainable supply chain:

When you get a letter from a major multiple saying that organic products should henceforth only carry a 15 per cent premium, it shows they don’t understand organic production systems (craft baker).

The supermarkets say they want British produce, but import at the drop of a hat, often stuff produced to lower standards (organic farmer).

The supermarkets are a big problem. I don’t think they want to get into a complex debate with their customers, they are too busy fighting for floor space with their rivals. We went to [a major retailer]. We said we can produce wheat in a more safe way. We could organize a chain where we could guarantee that the wheat was of the highest safety, in terms of chemicals. We already do this for baby food contracts. They said, all food is safe, we don’t want to get involved in debates that some food is more safe than other food. They live in the fluffy world of consumerism. Facts are less important than feeling (merchant).

Between actors at different stages in the chain, and between stakeholders and consumers, there was some lack of knowledge of others’ activities and perspectives, some examples of stages working...
together for mutual advantage, and some instances of resentment or hostility. Overall, the picture was of a chain in which information flows were uneven and discontinuous. It was striking that while stakeholders felt they had good access to high-quality information, consumers felt the information available to them was inadequate, manipulated and untrustworthy. However, they did not go to great lengths to inform themselves better. They were poorly informed about how bread is manufactured, and few read labels or looked at websites. This supported the stakeholders’ unanimous view that consumers have a ‘very inaccurate’ or ‘romanticized’ view of how food is made. This led several stakeholders to argue that there should be more ‘education’ of consumers about how food is produced. But some stakeholders took the view that consumers did not want or need to have accurate knowledge of the food chain:

Most consumers don’t want to be thinking exactly how their food has got to them (millers’ trade association).

It can be a disservice to provide people with information if they are not equipped to understand it (seed breeder).

In summary, the study found that stakeholders had a strong and nuanced awareness of the relevance of ethical concerns to food production systems. Despite some scepticism about the practicality of capturing ethical concerns within traceability systems – partly because ethics are diverse, subjective and hard to measure and partly because there are some interests in the chain that would resist greater transparency or fuller communication – the study also found that considerable traceability of aspects of ethical concern already exists in the chain studied (and indeed that many traceability systems originally had the aim of tracking ethical aspects of food production). It also found broad agreement about the ethical concerns thought to be most important (Methods of Production and Human Health). While traceability systems are rapidly increasing in technical sophistication and physical reach, there is a prevailing assumption that these systems are owned by (and for) stakeholders. There is little effort to make the information the systems collect available to consumers, or to consult consumers about the type of information they would wish to see traced or the means by which they would like to access it.

Reinforcing their comments about the subjectivity of ethics, interviewees’ priorities and interpretations of ethical concerns were found to vary depending on their place in the chain. We referred to these varying perspectives as ‘fields of ethical vision’. The narrowness of these fields (determined by lack of knowledge, self interest or other factors) contributed to the fragmentary nature of ethical traceability in the chain. Hence, in the chain studied, efforts to trace ethical aspects of food production both across a range of issues and along the length of the chain have been patchy. The study found that although some traceability of some ethical attributes was present in most stages of the chain, this information was not gathered systematically and was not transmitted along the whole chain in a meaningful or coherent way. Importantly, the process by which the attributes were selected was rarely transparent, did not necessarily involve all relevant stakeholders, and very rarely involved consumers. In general, because traceability is currently strongly driven by commercial and regulatory requirements, these stakeholders define and constrain both the selection of attributes to be traced and the methods by which the information is communicated. It is difficult for consumers (and less powerful stakeholders) to have a voice in this process. There was no forum open to all stakeholders and consumers for discussing ethical aspects of production that may arise in this chain. Stakeholders’ assumption that they can and should control the information flow is a barrier to achieving greater transparency of information and openness to the wishes of consumers. The recent research for the HGCA was instructive in its attempt to alert cereal producers to the potential value-added gains to be made from provenance attributes of cereals, based upon location and place of origin. However, this type of engagement with consumers remains a market research-based and essentially unidimensional form of communication and information gathering. The Sainsbury’s British Flour Development Group provides a forum for standards to be discussed and negotiated by the key players in that supply chain and to embed trust within these relationships, albeit with the retailer as the effective chair. Here the retailer acts as a broker for the
consumer interest, or more specifically for Sainsbury’s customers.

Conclusions

The study confirmed that ethical concerns arising from food production (which we have argued as appearing in EU policy actions around sustainability of food and farming) are dynamic and evolving. Ethical concerns along the wheat to bread supply chains vary among actors in the supply chains and the concerns evolve and change over time. A challenge for greater transparency is to identify the areas where ethical concerns arise and how they are being addressed. Also greater involvement of different stakeholders, notably the consuming public, is needed if the ethical concerns are to be more fully addressed, not least through better availability and fuller communication of information about the actions taken along the food supply chain to end consumers. Establishing more inclusive processes of communication and dialogue are important in order to allow supply chains to address changing values and priorities as they appear, and to enable clarification and negotiation to take place among all concerned parties. Ethical traceability, underpinned by greater transparency facilitating the transmission of accurate, relevant and meaningful information along chains to consumers, can help identify issues of conflict and engage both consumers and stakeholders in the process of negotiating resolutions to moral choices.

To this end, it can be noted that some of the ethical concerns – notably Working Conditions and the food safety aspect of Human Health – were often implied, especially by stakeholders, to be ‘not ethical issues’ because they had already been addressed by regulation. Interviewees commented that whereas food safety had once been the overriding goal of food chain quality control procedures, food safety precautions were now well enough established that they could be taken for granted, and other factors, such as the negative environmental impacts of agriculture, could be looked at. In other words, satisfying regulatory requirements meant that no further dissemination of information was needed to consumers and the general public. However, commercial advantage could be exploited from the establishment of regulatory requirements as with the existence of baseline and ‘gold plated’ food assurance standards. Hence, a retailer interviewee commented that he could ‘add’ ethical values to products selling at a higher price (by providing ‘compliance plus’, rather than basic legal compliance). However, food safety reforms are themselves not static. Just as these concerns were themselves once contested so the regulatory settlements that have resulted may be subject to further regulatory review and adaptation. Indeed, private governance and regulation can lead the way to higher standards emerging. In turn, these ‘higher’ standards may be supported by state regulation, or they may be left by the state to work on their own with the state playing a low-key monitoring role of private governance forms.

The ethical concerns in the wheat to bread supply chain have seen provenance emerge in the larger more industrial chains, mirroring some of the key characteristics of origin and place found in the smaller craft or artisan bread chains. The shift of attention to provenance among retailers and the growing awareness of the marketing potential of provenance among producers have led to some innovative responses in the large-scale supply chains. However, the evidence highlights the limits of the CBP in providing 100 per cent UK-grown wheat and also the large-scale supply demanded by multiple retailers who are the main marketplace for bread sales. Meeting the ethical concerns for origin and place of production may lead to further concentration of suppliers who can provide the critical mass such for such large contracts as the larger cereal grower cooperatives. The shift to greater transparency where it is occurring is happening in a slow and partial manner. Ethical traceability has some way to go in the wheat to bread supply chain, with the exception of some smaller artisan bread producers. The governance of the supply chain will need to alter further for ethical traceability to come to the fore and reach beyond the existing more limited fields of ethical vision.

Notes

1. This article draws upon the interview data from this project. The wheat to bread study involved
34 in-depth stakeholder interviews and 15 consumer interviews completed between 2004 and 2006.

2. The statutory additives are thiamine (vitamin B1), nicotinic acid, iron and calcium carbonate. In May 2007, the Food Standards Agency recommended adding folic acid to the list, to reduce the incidence of congenital neural tube defects. Whitley (2006, p. 23) lists 19 vitamins and minerals which are lost to varying degrees when flour is milled to a 70 per cent extraction rate, meaning the finished flour contains 70 per cent of the original grain (SI, 1998; FSA, 2007).

3. The ETI base code seeks to guarantee that: employment is freely chosen; freedom of association and the right to collective bargaining are respected; working conditions are safe and hygienic; child labour is not used; living wages are paid; working hours are not excessive; no discrimination is practised; regular employment is provided; and no harsh or inhumane treatment is allowed (ETI, 2006).

References


