***Foresight***

# Food Chain and Crops for Industry Panel

# Working Group Report

# on

# Indices for Sustainable Development

**in the Food Chain**

**March 2002**

***Contents***

## *1. Summary*

**Broad aim**

To consider the value of developing a framework, within which indicators could be developed, that reflects a true cradle-to-grave picture for the measurement of the sustainability of a given process

**Issues raised**

- Are there benefits of pursuing a cradle to grave framework?
- Do cradle to grave indicators already exist and are they comprehensive **1**?
- Can sustainable pathways in the food-chain be identified?
- Can progress toward sustainability within the food chain be measured?

**Approach**

There is considerable talk and rhetoric surrounding the concept of sustainability. This group strongly recommends a realistic and practical approach to the issue of "cradle-to-grave" indicators of sustainability in the food chain. Given that many elements of food chains demonstrate aspects of unsustainability, there will be benefits to/in pursuing some form of sustainability framework. Stakeholder consultation is a key element in both the identification of sustainable/unsustainable paths in the food chain and to ensure development moves in a desirable direction. The objectives in relation to sustainability must be negotiated and clearly stated at the outset. Existing international agreements and targets to which the UK is already committed provide a practical starting point for the development of a sustainable food chain framework. Examples include the international conventions on biodiversity and climatic change and the EC Green paper on Corporate Social Responsibility.

Few, if any, existing techniques, frameworks or indicators are currently capable of producing a comprehensive cradle-to-grave analysis across the entire length of the food chain. However, a wide range of benchmarking initiatives, audits and indicators already exist that are applicable to the analysis of sustainability within food chain sub-sectors. Indeed many of these have been introduced and championed by various food-chain sub-sector businesses. These existing tools should be reviewed and assessed for their practicality before any new initiatives are put in place. Further, the impact of such initiatives on the financial viability of different sectors with the food chain needs careful consideration.

**Suggested actions**

- Review current agreements and targets and their likely impact on food chain sustainability. What obligations do/will food chain businesses have under existing and likely future legislation?
- Review and assess existing cradle-to-grave analysis techniques and their current and potential application within and across the food chain.
- Instigate a comprehensive review of existing benchmarking initiatives, audits and indicators relevant to the food chain and identify potential gaps in relation to sustainability objectives for particular aspects of the chain.

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**1** Comprehensive in the sense they can deal with aspects of and interactions between environmental, economic and social perspectives on sustainability.

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## *2. Sustainability*

The concept of sustainability now pervades current policy relating to many aspects of life in the UK and internationally. It is supported by copious amounts of literature, plans and policies and action from international to local level. (See reviews by Clayton and Radcliffe 1996, Rigby, Howlett and Woodhouse 2000 and web pages of organisations listed in appendix 3). There is no consensus on the "definition of sustainability" but the underlying tenet of the Brundtland definition (WECD 1987) of sustainable development that "meets the needs of the present without compromising the ability of future generations to meet their own needs" is representative of much of the thinking on sustainability and is taken as a basis in this document. Governments signed up to the principles of sustainability at the Rio Earth Summit in 1992 and progress will be discussed at the forthcoming Johannesburg Summit in 2002.

To provide a practical handle on sustainability it is common to break the concept down into perspectives or dimensions. The three most commonly referred to are the environmental, economic and social perspectives. Often approaches highlight or focus on the natural science elements of sustainability, although increasingly the social aspects are emphasised (for instance see the DFID Sustainable Livelihoods project **2**). The latter approach also emphasises the role of stakeholders as key participants in the process.

***3. Stakeholder, participation and the food chain***

Stakeholder engagement has been defined by the New Economics Foundation **3** (circa 1999, p84): as a process of "dialogue that draws together the values, issues and indicators relevant to stakeholders in a language that is meaningful, consistent and useful for decision making". The recent report on the Future of Farming & Food **4** provides one way of identifying relevant stakeholders (see appendix 1). The point here is that sustainable food chain development is likely to be more rapid if the stakeholders are participants in the process. Indeed without such participation progress may not be possible. Many food chain stakeholders are already involved in sectoral and cross-sectoral dialogue and action with respect to food chain sustainability.

The food chain is pivotal to UK society. As well as supplying consumers with food, it has direct effects on the health of the nation, employment and general economic well being. Figure 1 provides an overview of the UK food chain as defined by the *Food Chain Group (FCG).* The report of the FCG, "Working Together for the Food Chain" provides a useful overall review of the food chain **5**.

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**2** See http://62.189.42.51/DFIDstage/AboutDFID/files/rld/whatwedo2.html
**3** See http://www.neweconomics.org/
**4** See http://www.cabinet-office.gov.uk/farming/index/CommissionReport.htm
**5** See www.defra.gov.uk/foodrin/fdchain/fdchain.pdf

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***4. Indicators***

Attempts to operationalise the concept of sustainability immediately raise questions of indicators to evaluate success or at least movement in a desirable direction. A wide range of institutions and public bodies have proposed and developed indicators. Further, there are many definitions of what an indicator is (Gallopin 1997; Woodhouse, Howlett and Rigby 2000). Bell and Morse (1999) provide a comprehensive review of issues associated with "sustainability indicators", as do several other publications. Overall, indicators are usually regarded as variables which can be used to measure or reflect the state of or rate of change of a system (or part there of) for some assessment purpose. Indicators can be classified within frameworks such as the Pressure-State-Response Framework as used by the OECD. The Driving force-State-Response framework is similar to the PSR and has been adopted by The World Bank. Woodhouse *et al* (2000) provide a useful review.

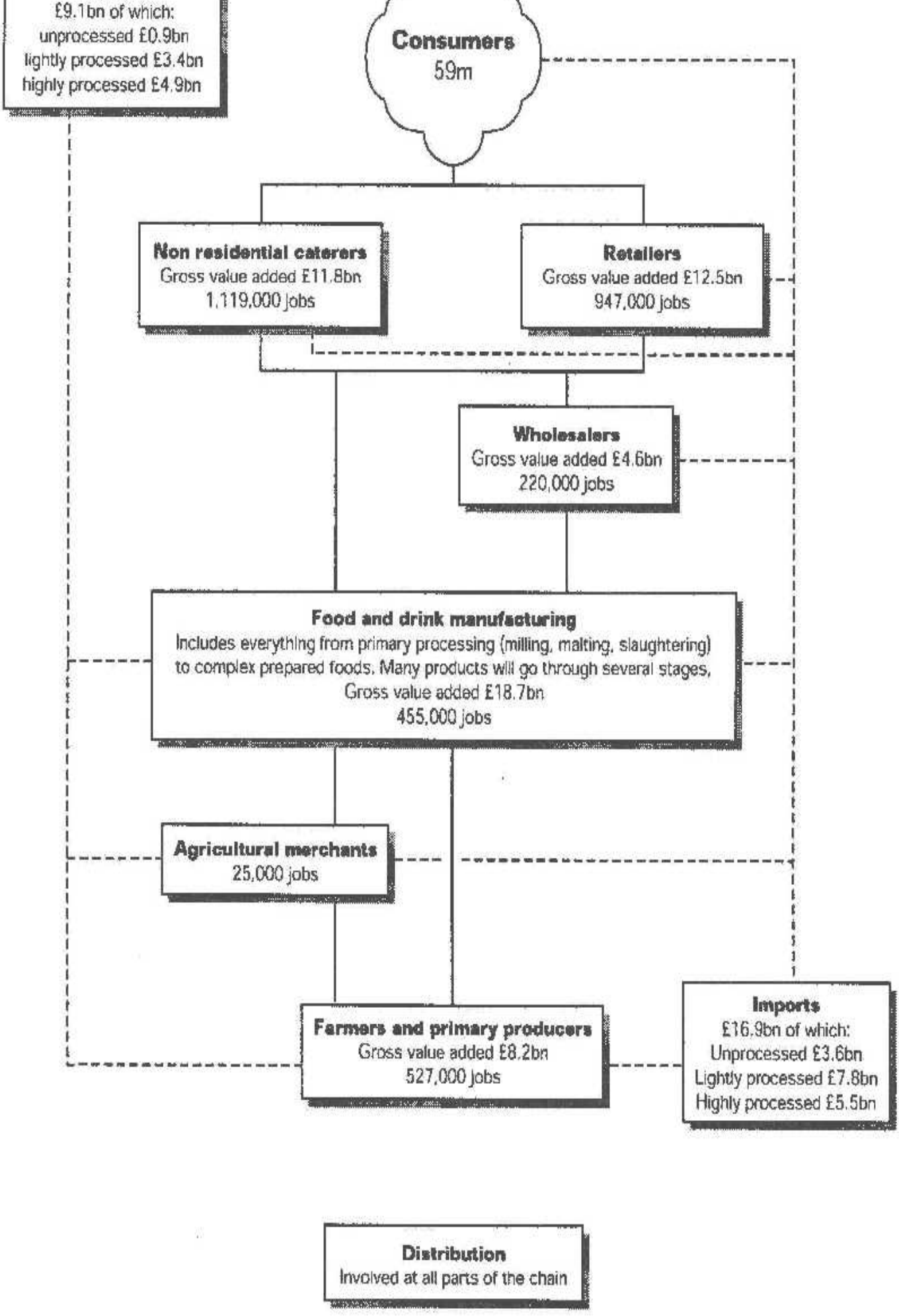



Figure 1: The UK Food Chain (from Working Together for the Food Chain)

Spatial and temporal issues associated with sustainability are discussed by Fresco and Kroonenburg (1992) whose work implies that indicators should reflect the level at which a system is to be analysed. Figure 2 illustrates a hierarchy of levels (from individual enterprises within a business to national level) in relation to the three principal dimensions of sustainability.

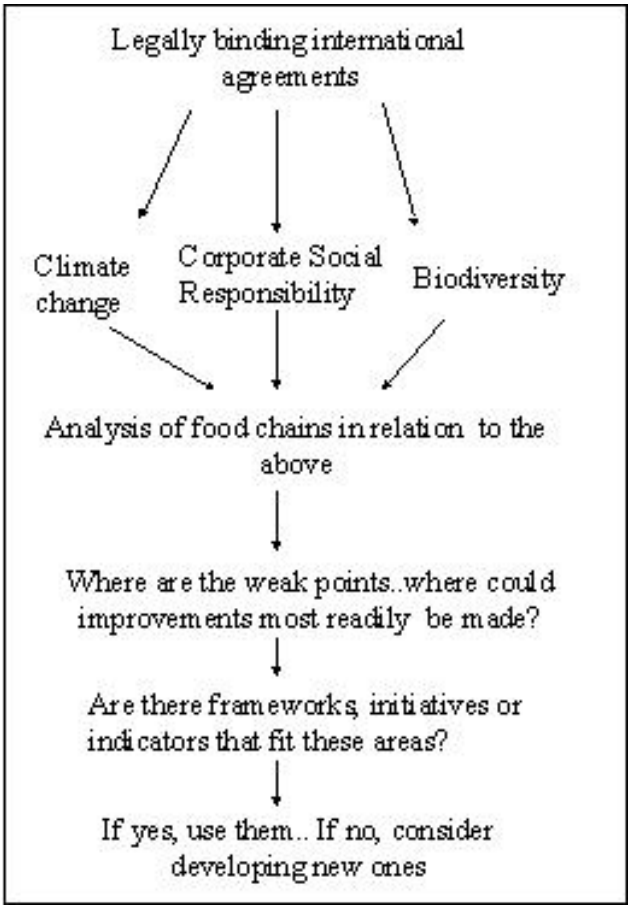
Figure 2: Example of sustainability indicators for different dimensions and levels of the food chain.

| | **Enterprise** | **Business** | **Sector** | **Food industry** | **National** |
|---|---|---|---|---|---|
| **Economic** | Cost per unit | Level of gearing | Number of SMEs | Average business size | Contribution to GDP |
| **Environment** | Waste output | Amount of recycling | Number of envl audits | Energy use | % food to landfill |
| **Social** | Working conditions | Working hours | % female employees | Number employed | Incidence of poisoning |

Inevitably indicators try to illustrate complex process in a simple manner. The issue is whether the simplification chosen is capable of representing the desired change in the process under investigation. Bell and Morse (1999) argue that we must accept that the identification and use of indicators is different, but not inferior to the rigorous approaches of science. If we accept this premise then the next step in the process is to identify the key issues relating to sustainability in the food chain. This is an important step as it will set the agenda for change and thus the objectives related to a food chain framework and subsequent indicators.

***5. A pragmatic approach- setting objectives***

Figure 3: A pragmatic approach to food chain sustainability




Objectives will help to frame analysis within the food chain, so determining the type of framework and the

indicators that could be useful. Initially, these primary objectives of food chain sustainability should be set in relation to key international obligations. In the first instance we recommend objectives related to:

- The Convention on Biodiversity **6**
- The Convention on Climatic Change **7**
- The EC Green Paper on Corporate Social Responsibility **8**

Figure 3 illustrates an approach in which objectives are initially set in relation to international objectives. Cradle-to-grave analysis can then be used to compare the relative sustainability of different food chains and to highlight areas within given food chains where changes in processes would engender the most rapid/economic or desirable results. In practice, there are only a few techniques capable of providing comprehensive cradle to grave analysis. For instance, energy or carbon analysis, life cycle analysis and some techniques within the field of environmental economics (see appendix 2 and papers by Korijman 1993; Doners et al 1993; Carlson-Kanyama 1998; Wackernagel and Rees 1996, for examples). The use of such techniques could allow more targeted action. Action could well be implemented or monitored through frameworks, initiatives and indicators which already exist within the food chain.

***6. Existing indicators and frameworks relevant to the food chain***

Many international organisations have published work on sustainability indicators (see appendix 3 for outline list). Sustainability in the UK has now moved beyond the research agenda to become a concept which has considerable influence on political initiatives and decisions. The publication of the quality of life counts (DETR 1999) document demonstrates one important way in which sustainability is pervading political thinking. The pilot set of agricultural indicators is another (MAFF 2000).

In terms of the food chain a range of indicators and frameworks have been proposed. For instance the Organisation for Economic Cooperation and Development has developed agri-environmental indicators (AEIs). These are important not only because of the range of thought and discussion that has gone into them, but because other organisations will interpret and disagregate the indicators at different levels. The EU has reviewed indicators based broadly on the UN Commission for Sustainable Development. In the UK the government has been active in the publication of indicators such as "Quality of life counts" and a number of NGOs such as the New Economics Foundation and Sustain have been looking specifically at food chain indicators.

Further, a large number of benchmarking initiatives, audits and indicators (some of which are referred to below) are already in place across the food chain which utilise process-based measures within their frameworks, although sustainability may not always be the driving motivation. However, some of the variables measured have the potential for use within a sustainability framework. At the farm level, schemes such as the Assured Combinable Crops Scheme **9** and Linking Environment and Farming **10** (LEAF) provide standards and indicators. The LEAF audit provides the basis for farm level analysis and for monitoring improvements across a

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**6** See http://www.biodiv.org/
**7** See http://unfccc.int/
**8** See http://www.societyandbusiness.gov.uk/about/eu_greenpaper.htm
**9** See http://www.assuredcrops.co.uk/ACCS/
**10** See http://www.leafuk.org/LEAF/

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range of business aspects. Organisations such as the Soil Association have standards for a number of elements within the food chain.

In relation to food processors, existing hygiene regulations could provide a basis for further development. The European Food Safety Inspection Service Accreditation (EFSIS) is another audit procedure which covers about 35 factors or elements of the food processing business. ENDS (2001) provides a number of best practice case studies in relation to food processors.

Similarly at the retail level a number of initiatives are either in place or proposed. For instance Sainsbury has a "Raising the Standard" programme to assess and raise the level of environmental awareness among its own brand suppliers and Tesco has very high levels of traceability in all its product lines. Labelling schemes such as the Little Red Tractor, and Fair and Ethical Trade are also important initiatives. The Race to the Top initiative aims to benchmark supermarket companies based on their performance in driving social and environmental improvements for the people and places that put the food on their shelves. The report by SUSTAIN on food miles provides a simplistic but useful cross-sectoral analysis in relation to the distance food

travels before reaching the consumer.

**7. *Further considerations***

For practical reasons, it is likely that many sustainability initiatives will target specific aspects of the food chain in isolation, rather than the food chain as whole. It will therefore be important first to consider each initiative in its wider context, to avoid unforeseen adverse impacts on other parts of the chain. Further considerations include:

*The issue of imports:* If further legislation and regulation is placed on UK businesses to comply with sustainability criteria then this may increase production costs. This is likely to make some imported foodstuffs more competitive with knock-on ramifications for UK businesses. One mechanism to avoid such a scenario, if it is possible, is to ensure that imported foodstuffs have to meet the same criteria as home produced products.

*Progress towards sustainability will create some losers:*Inevitably there will be some losers if sustainability within the food chain is given higher priority. Many businesses within the food chain already take the issue of sustainability seriously and some are managing to turn it to their advantage (for instance, with products that are marketed as environmentally friendly). If meeting sustainability criteria incurs significant additional cost without some form of financial reward then there will inevitably be losers. Further, if the potential losers have the power to exert influence the rate of change is likely to be slow.

*Hidden stakeholders:*This report stresses the importance of stakeholder consultation. However, there are some stakeholders who will be difficult or impossible to consult. A sustainability criterion related to, for instance, energy consumption in relation to transport may have a severe impact on farmers in developing countries who produce crops for export, and in turn this may impact on the economies of those countries.

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**11** See http://www.soilassociation.org/sa/saweb.nsf/Standards/standards.html
**12** See http://www.doh.gov.uk/foodhaz.htm
**13** See http://www.littleredtractor.org.uk/default.asp
**14** See http://www.racetothetop.org/
**15** See http://www.sustainweb.org/

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*The importance of technological innovation:*Technological innovation has the potential to play a key role in improving the sustainability of food chains. Examples include IT, precision farming techniques, robotics and new biotechnogical products. The impacts of individual technologies on sustainability is not always clear and often surrounded by controversy. It is essential that controversial technologies, such as GM crops, are considered in relation to the three dimensions of sustainability. Some new technologies will enable rapid sustainability gains which would be otherwise slow to achieve via regulation.

*The role of the consumer :* In retailing the importance of the customer is continually stressed. However, it is arguable whether the public at large has embraced the concept of sustainability or is willing to act in a more sustainable manner. Moving the food chain along more sustainable pathways may require quite fundamental changes to the way in which the majority of people live and feed themselves and the amount they are willing to pay for their food.

***8. Concluding comments***

The group believes that food chain sustainability can be improved considerably. However, the diverse nature of the food chain, the different sizes and types of businesses and processes involved mean that expectations in relation to sustainability must be realistic. The group suggest the following:

A practical and realistic approach to sustainability by concentrating on the current and likely future obligations that Government and food chain businesses have to meet. This gives a broad context in which clear sustainability objectives can be set and thus indicators to measure progress towards sustainability developed.
**Suggested action:** *Review current agreements and targets and their likely impact on food chain sustainability. What obligations do/will food chain businesses have under existing and likely future legislation?*

There are sustainability benefits that can accrue from a cradle-to-grave analysis of food chains. However, there are only a few techniques capable of providing such an analysis in a way that can provide useful information to decision makers.

**Suggested action:** *Review and assess existing cradle-to-grave analysis techniques and their current and potential application within and across the food chain.*

There are a wide range of existing benchmarking initiatives, audits and indicators within the food chain which already contribute, or have the potential to contribute, to food chain sustainability. Only a small number have been referred to in the report.
**Suggested action:** *Instigate a comprehensive review of existing benchmarking initiatives, audits and indicators relevant to the food chain and identify potential gaps in relation to sustainability objectives for particular aspects of the chain.*

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**Appendix 1: Stakeholders groups and drivers identified by the Food and Farming Commission (2002)**

| **Stakeholders** | **Drivers of the "Supply Chain"** |
|---|---|
| Farmers<br>- UK based (local, regional, national)<br>- International | Consumer trends<br>Consumer demand<br>Consumer lifestyles<br>Efficiency<br>Standards – quality<br>Supply contracts<br>Communications<br>Marketing<br>CAP subsidiaries<br>Regulation<br>Price / Cost<br>Exchange rate<br>Industry consolidation<br>Crises: BSE, F&M<br>Farming's share of retail food price (declining)<br>Local sourcing<br>Organic<br>Fair Trade |
| Catering industries | |
| Food processing | |
| Food marketing departments and agencies | |
| New technology providers | |
| Retail industries (including farmers markets) | |
| Communications | |

Opinion formers on

- nutrition
- health
- food safety
- animal welfare
- environmental protection

Tourism

Country side/Rural

Town/urban

Social fabric/community

Employees of the industry

Trade unions

Waste industry

Pesticides/fertiliser producers

Universities/education

Current "schemes" e.g. Red tractor

The Institute of Grocery Distribution (IGD)

**Appendix 2. Potential "cradle to grave" techniques**

**Life cycle analysis:**

LCA is becoming an increasingly important tool to support decision-making. It can be used within the food chain to provide an insight into sustainability of a whole food chain. Indeed the term "cradle to grave" is synonymous with LCA. It is one of only a number of methods that could be used to identify specifics aspects of food chains that require closer scrutiny and focus with respect to sustainability. However, it is not an all-inclusive approach and tends to deal with flows of materials or substances about which value judgements often have to be made. A recent report by the Swedish Institute of Food and Biotechnology (SIK 2000) discusses the application of LCA to the dairy chain. A more comprehensive review of the use of LCA applied to the industrial cropping for oils is provided by Carruthers *et al.* (1999).

**Carbon and energy budgets**

Energy budgeting was popular in the 1970s and has since gained favour in the context of climate change and resource use issues at the end of the 20$^{th}$ century. Energy budgets can be converted to carbon budgets which are relevant with respect to the Climate Change Convention. They are easily measurable and understandable across a wide range of processes, so can be useful for comparisons., As with LCA, they can be used in ‘scoping’ exercises, to identify priorities for action. Carbon budgets can be extended to calculate the "greenhouse gas cost" (sum of $CO_2$, $N_2O$, $CH_4$) for different systems. Given the imperative to cut greenhouse gas emissions, this has the potential to provide a ‘common currency’ for comparing different products or practices. It also integrates different parts of the food chain – e.g. is it really logical to fly "organic" vegetables from South America to Europe in view of the fuel used? How much energy (or other resource) could be saved by decreased processing or packaging? However, one key limitation is its omission of the social, cultural or ethical issues associated with sustainability… the perspective is heavily biophysical.

**Environmental Economics**

This specialist area of economics deals with issues such as natural resource use, pollution, biodiversity and conservation. The principle that the general environment forms a sink for a wide range of unwanted outputs (referred to as externalities) often forms the basis for estimating costs and benefits to society of given actions. Concepts of attributing values to natural capital, the principle of the polluter pays, and tradable pollution rights are just a few of the issues addressed by environmental economics. As with other techniques there are many benefits to this approach, not least that it allows monetary comparisons and has as its base a unit which can be compared across sectors (see Pretty *et al*. 1999,2000)

**Appendix 3: Examples of organisations involved with indicators and sustainability**

- Commission for Sustainable Development http://www.sd-commission.gov.uk/
- Dow Jones Sustainability Indices http://www.sustainability-index.com/
- Food and Agriculture Organisation http://www.fao.org/
- Food Standards Agency http://www.foodstandards.gov.uk/
- FTSE 4 GOOD http://www.ftse4good.com/frm_home.asp
- International Institute for Environment and Development http://www.iied.org/
- International Institute for Sustainable Development http://www.iisd.org/default.asp
- Organisation for Economic Co-operation and Development http://www.oecd.org/
- World Bank http://www.worldbank.org/

**Appendix 4: Membership of working group**

Dr Susan Carr Open University

Dr Peter Carruthers The Countryside Agency

Jane Fiona Cumming Article 13

Dr Julian Park University of Reading

Professor David Powlson Institute of Arable Crops Research

Professor Jules Pretty University of Essex

David Richardson White Rails Farm

Professor Joyce Tait SUPRA