

# Sustainability of sugar supply chains

(SDC report)

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**Sustainable**  
Development Commission

# **Sustainability of sugar supply chains**

**Including a report from the Natural  
Resources Institute to the Sustainable  
Development Commission**

**April 2003**

# Introduction and proposed sustainability checklist

## **The Sustainable Development Commission**

1. The Sustainable Development Commission (SDC) is the Government's independent advisor on sustainable development, reporting directly to the Prime Minister and the First Ministers of the devolved administrations. The Commission's role is to advocate sustainable development across all sectors in the UK, review progress towards it, and build consensus on the actions needed if further progress is to be achieved. Our mission is to inspire government, the economy and society to embrace sustainable development as the central organising principle.

## **Food and Farming work stream**

2. Our work programme comprises five main work streams, one of which is Food and Farming. As part of the Food and Farming work stream, we are exploring how food procurement and supply chains can be made more sustainable. We have undertaken a short project to investigate the sustainability of supply chains for a specific product, sugar. The supply chains have been assessed against the Commission's objectives for sustainable agriculture:
  - Produce safe, healthy food and non-food products in response to market demands, now and in the future;
  - Enable viable livelihoods to be made from sustainable land management, taking account of payments for public benefits provided;
  - Operate within biophysical constraints and conform to other environmental imperatives;
  - Provide environmental improvements and other benefits that the public wants – such as re-creation of habitats and access to land;
  - Achieve the highest standards of animal health and welfare compatible with society's right of access to food at a fair price;
3. By expanding on our objectives for sustainable agriculture, we have also produced a wider set of objectives for a sustainable food chain:
  - Support the vitality of rural economies and the diversity of rural culture;
  - Sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential in order to meet other needs of society.
3. By expanding on our objectives for sustainable agriculture, we have also produced a wider set of objectives for a sustainable food chain:
  - Produce safe, healthy products in response to market demands, and ensure that all consumers have access to nutritious food, and to accurate information about food products;
  - Support the viability and diversity of rural and urban economies and communities;
  - Enable viable livelihoods to be made from sustainable land management, both through the market and through payments for public benefits;
  - Respect and operate within the biological limits of natural resources (especially soil, water and biodiversity);
  - Achieve the highest standards of environmental performance by reducing energy consumption, minimising resource inputs, and using renewable energy wherever possible;
  - Ensure a safe and hygienic working environment and high social welfare and training for all employees involved in the food chain, here and overseas;
  - Achieve the highest standards of animal health and welfare, compatible with society's right of access to food at a fair price;
  - Sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential to meet other needs of society.
4. These principles should apply to all food which is grown and processed overseas, and

consumed here, as well as all food which is grown and processed in this country. They are clearly relevant to sugar supply chains and they have informed the development of a proposed checklist (see below).

### **The Sustainability Analysis of Sugar Supply Chains project**

5. We chose sugar for this project because there are basically two different sugar supply chains in the UK – one local (sugar beet) and one global (sugar cane) – which could provide us with a relatively simple insight into local and global food systems. The aim was to explore the social, economic and environmental impacts of the global and local supply chains and suggest how both could be made more sustainable.
6. The National Resources Institute (NRI) carried out the study in August and September 2002. Interim conclusions were presented at the Commission's 'Having it and eating it' event on 3<sup>rd</sup> September 2002, which aimed to raise awareness of the environmental, social and economic aspects of local and global food production systems and how their sustainability can be improved. Views of stakeholders expressed at this event have been incorporated into the final report from the NRI.
7. Evidence suggests that sugar in excess can have negative impacts on health. However, the NRI were not asked to address this, because the focus of the study was on supply chains, not on the use of sugar, and because the health impacts are identical regardless of whether the supply chain is global or local.

### **Checklist for sustainable procurement**

8. The report concludes with a proposed sustainability checklist for sugar procurement, which aims to enable food purchasers to make more informed decisions when purchasing supplies. This checklist is also set

out in the NRI's summary report to the Commission which follows (see section 7 of the summary report). The full report is available on request from the Commission Secretariat (contact details below).

9. From the proposed checklist, the SDC has drawn out what it feels to be the key issues and developed these into some more straight forward questions that could help large-scale food purchasers to explore the sustainability of supply chains. These questions are relevant to sugar purchasing and to food procurement more widely. The list is not exhaustive, but we hope that this simpler approach will be helpful and less daunting for procurers, and will help them focus on the key sustainability issues. We have grouped the questions under social and environmental (including resource use) considerations, and we have assumed that companies' usual business approaches will take account of the economic viability of the supply chain.

#### Social considerations:

**Reasonable livelihoods** for all involved, back to the source of the product, within a properly organised legal framework; is the producer paid a fair price?

**Decent working conditions;** do all employees, in all parts of the food chain, have the benefits of working within a reasonable set of working standards?

**Health and safety;** is a safe and hygienic working environment provided and are workers protected from contact with pesticides and other chemical inputs?

**Welfare;** does the producer have an anti-discrimination policy?

#### Environmental considerations and resource use:

**Chemical inputs;** are measures taken to reduce, and keep to a minimum, chemical inputs of fertilizers, insecticides and herbicides?

**Energy;** does the production system use energy efficiently at all stages and, wherever possible, energy from renewable sources?

**Water conservation and protection;** does the production system minimise water use and prevent pollution of water sources?

**Ecosystems and habitats;** is the production system aligned with biological diversity and wildlife conservation?

10. It is important to remember that this assessment should include packaging and transportation of the product as well as the product itself.

#### **Your views**

11. The Commission would very much welcome your views on this work. In particular we would appreciate views on the following points:

- Does our proposed set of questions above focus on the right issues?
- Is such a checklist approach helpful for purchasers?
- Could these questions be incorporated into an assurance scheme for sugar, and other food products, and would that be helpful?

12. To give us your opinions, please get in touch with Victoria Read in the SDC Secretariat:

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**Sustainable Development Commission**

**April 2003**



**Natural  
Resources  
Institute**

# **SUSTAINABILITY ANALYSIS OF SUGAR SUPPLY CHAINS**

## **EXECUTIVE SUMMARY REPORT**

**Duncan Burnett, Gill Lavers, Claire Coote, Barry Pound and Robert Ridgeway**

**October 2002**

## MAIN KEY FINDINGS

- Excess sugar consumption is perceived as detrimental to good health. However, the consensus is not universal and research is ongoing. The most prudent attitude seems to be that sugar should be consumed in moderation.
- White sugar is an homogenous product and it is difficult for the consumer to differentiate between origins and supply chains.
- The UK is a relatively minor player in the global sugar market and, over a five- year period, accounted for just over 1% of world production, 3.5% of imports and 1.5% of exports.
- The UK is the only significant European sugar cane importer, with around 50% of its requirements supplied by developing countries; it also has the most efficient sugar production industry in Europe.
- The EU sugar regime is politically driven, and influences issues of sustainability involving matters of food security/self sufficiency, rural employment and “level playing fields.”
- The Swaziland sugar cane industry is 20- 25% more efficient on a Cost of Production (COP) (ex mill) basis than that of the UK, and contributes about 15% of the country’s GDP, whereas the UK sugar beet industry contributes 0.04% of GDP.
- The sustainability of the sugar industry depends on integrating competitiveness, environment and social standards and, in particular, achievement of the following:
  - competitive production;
  - reduced crop inputs;
  - reduced energy inputs;
  - reduced environmental pollution and damage;
  - food safety and traceability;
  - environmental recycling of all co-products;
  - optimum product quality;
  - sustainable livelihoods.
- A voluntary sustainability checklist will raise awareness amongst all stakeholders, including consumers, and assist purchasers of sugar to take account of sustainable development in purchasing decisions.
- The development of an independently-auditable checklist should be co-ordinated by an industry-wide representative.
- Future industry research should concentrate on the cost-benefit aspects of sustainability, including the cost of compliance with sustainability criteria.
- The ISO (International Organisation for Standardisation) should be permitted by its members to involve itself in investigations of environmental and socio-economic sustainability.

## 1. Background

- 1.1. Sugar was chosen as a case study because essentially it has two different supply chains, with different social, economic and environmental impacts and benefits. These are (i) a local supply chain involving the production, processing and marketing of sugar beet grown in the UK, and (ii) a global supply chain involving the production, processing and marketing of cane sugar grown, primarily, in developing countries. Sugar was also selected because it is a major consumption product in the UK, sourced both from domestic and developing country production. Sugar is consumed directly, but is also an important ingredient in many popular and widely consumed foodstuffs and beverages, e.g. chocolate, confectionery, soft drinks etc.
- 1.2. The major characteristic of sugar markets is their domination by government policy interventions and preferential trade agreements. Compared to other mainstream commodities, the sugar market is highly complex, which creates difficulties when analysing issues of sustainability. Furthermore, white refined sugar is a homogenous product which makes it difficult for the consumer to differentiate between sugar originating from cane production, probably in a developing country, and beet sugar grown in the developed world. An exception is unrefined cane sugar, a speciality product, which is marketed as a substitute for refined sugar of either origin.
- 1.3. Links have been made between sugar intake and several chronic medical conditions and diseases, e.g. diabetes, coronary heart disease, obesity, hyperactivity in children and dental decay. In the light of current knowledge and research the most appropriate attitude may be that sugar, when taken in moderation, is not, in itself, harmful to human health. However, research is ongoing into this aspect of sugar consumption.
- 1.4. For the purposes of this project we have used the Sustainable Development Commission (SDC) definition and objectives for sustainable agriculture, and the NRI definition of sustainable supply chains.
- 1.5. The SDC's objectives for sustainable agriculture are as follows:
  - Produce safe, healthy food and non-food products in response to market demands, now and in the future;
  - Enable viable livelihoods to be made from sustainable land management, taking account of payments for public benefits provided;
  - Operate within biophysical constraints and conform to other environmental imperatives;
  - Provide environmental improvements and other benefits that the public wants - such as re-creation of habitats and access to land;
  - Achieve the highest standards of animal health and welfare compatible with society's right of access to food at a fair price;
  - Support the vitality of rural economies and the diversity of rural culture;
  - Sustain the resource available for growing food and supplying other public benefits over time, except where alternative land uses are essential in order to meet other needs of society.
- 1.6. The Natural Resources Institute (NRI)'s definition of a sustainable sugar supply chain is one that: 'maintains a viable income to industry stakeholders, under good health and safety conditions, with



minimal detrimental effect to the environment, at the same time preserving for future generations the opportunity of continuing an economically viable sugar industry'.

1.7. Sugar supply chains are defined as comprising those stakeholders involved in converting an agricultural crop into a packaged product available for sale to consumers. At each stage along the chain various activities are undertaken that can add value to the product, but can also have measurable socio-economic and environmental impacts. A "responsible" chain will optimise the expectations of each stakeholder without jeopardising the viability of the supply chain as a whole and without putting unfair degrees of risk or hardship on any particular stakeholder or adding cost to the consumer.

## **2. UK Involvement in the Global Sugar Market**

2.1. Sugar production in the UK is divided approximately 50%-50% between sugar produced from domestically grown beet and sugar produced from imported cane. The UK's involvement in the global sugar market is largely determined by the EU sugar regime, which also embraces its historic relations with its cane producing former colonies. Current UK cane imports are mainly under preferential trade terms and regulated by import quotas. The EU Sugar Regime was introduced in 1968, and currently provides for the following policy interventions:

- Mechanisms to support and stabilize EU sugar prices, e.g. intervention prices for raw and white sugar; base prices for sugar beet; adjustment aid for raw sugar refiners; import and export levies; and import quotas for raw sugar.
- Mechanisms to control EU sugar production, e.g. quotas.

- Mechanisms to finance "within quota" exports, e.g. production levies.

2.2. The EU plays a key role in the global sugar market. It represents the world's largest sugar beet producer, and its second largest overall sugar producer, importer, consumer and exporter

2.3. In 2000/2001 the UK produced 1.325 million tonnes of sugar from sugar beet. This represented just under 1% of total global sugar production of 130.6 million tonnes and 7.5 % of the total EU sugar beet production quota of 17.85 million tonnes.

2.4. Over the same period UK consumption was estimated to be 2.188 million tonnes. In any one year the shortfall in sugar availability is met by imports of cane sugar from African Caribbean and Pacific (ACP) countries, together with a small quantity of imports from the EU. The UK is by far the largest importer of sugar of all EU countries. In calendar year 2001 the total imports of all sugar by the UK mounted to 1.336 million tonnes, with over 90% coming from non EU, mainly developing country origins.

2.5. In calendar year 2001 the UK exported a total of 631,000 tonnes. These exports comprise mainly over quota or, "beet sugar exports that do not benefit from export refunds and re exports" of sugar refined from raw sugar. Under the Uruguay Round Agricultural Agreement (URRA), the EU's exports are now capped in volume and value terms.

2.6. In global trade terms the UK is a relatively minor player in the world sugar market. Taken over a five year period, the UK accounted for just over 1% of world

production, 3.5% of imports and 1.5% of exports.

2.7. Direct home consumption of sugar in the UK is declining from 9.5 kg per head in 1989 down to 5.4 kg per head in 2000<sup>1</sup>. Nearly 50% of all UK households are classified as light users, consuming one 500g pack or less every month. The health lobby and the media have had a strong impact on sugar consumption which is believed to have acted as a major constraint to the sugar industry's capacity to promote sugar consumption. However, when sugar used in sugar-coated cereals, confectionery and soft drinks is taken into account, people may not actually be consuming less sugar but obtaining it from different sources, such as artificial sweeteners.<sup>2</sup>

2.8. This reduction in demand for natural sugar, as well as declining sugar prices, is threatening the profitability of sugar producing companies. As well as having to cut costs to improve efficiency, the sugar companies are attempting to secure future growth by adding value to their production through, for example, supply of organic, low-calorie and tooth-friendly sugar.

### 3. Comparative Sugar Supply Chains

3.1. In order to provide an illustration of the two sugar supply chains, we have chosen to compare the UK beet industry with a representative developing country cane industry. In this, the data are fairly indicative of the type and quantity of inputs applied in a number of irrigated cane industries in central and southern Africa. Details of the two supply chains are given in sections 3 and 4 and an analysis of comparative sustainability in section 5 of

the main report. The differences in input / output flows between raw sugar produced from sugar beet and sugar cane are much more marked at field level than they are at factory level, where despite the differences in raw material, the processing technology is broadly similar.

3.2. The key comparative sustainability features of the two supply chains are summarised in Table 1 below.

3.3. The main inputs in both the cane and beet factory process are; energy and chemicals. The main outputs, including recycled inputs, are; beet pulp, bagasse (cane), steam and electricity, beet and cane molasses, mud, lime waste, electricity, and refinery molasses.

3.4. The main field factors affecting sustainability are as follows:

**Fertiliser and pesticide usage:** quantities have been reduced through improved application of fertilisers and pesticides.

**Water usage:** agronomic needs of the sugar plant, minus water supplied by natural rainfall.

**Energy usage:** Tractor/vehicle hours used to haul cane/beet from field to factory – man hours/fuel used per hectare.

**Industry efficiency:** Quantity of sugar hauled per kilometre in terms of sucrose content, with the main variables being, distance hauled and the size of loads. The industry can increase its efficiency by raising sucrose content, minimising distances travelled and/or increasing load size.

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<sup>1</sup> National Food Survey, MAFF 2000

<sup>2</sup> Sugar and Artificial Sweeteners, Mintel International Group Ltd., 2001

**Table 1: Environmental and socio- economic comparison of sugar beet and sugar cane**

COMPARISONS	UK Sugar Beet	Swaziland Sugar Cane
Field water usage	> 95% rain fed	100 % irrigated
Mechanisation	Almost 100% mechanised	Almost 100% manual labour
Non sugar outputs & re cycled inputs	<ul style="list-style-type: none"> <li>- “Limex” for raising soil PH</li> <li>- Mud (tare) for topsoil application</li> <li>- Stones for construction/road works</li> <li>- Beet pulp for animal feed</li> <li>- Beet tops for in situ sheep feeding</li> </ul>	<ul style="list-style-type: none"> <li>- Factory filter mud for topsoil</li> <li>- Cane tops for cattle feed</li> </ul>
Chemical inputs	- Pesticides, herbicides & fungicides used and usually applied by spraying	- Occasionally ripeners (not widespread) / Nb. aerial spraying Nb. pesticides /fungicides not widely used in the cane industry
Fertiliser inputs	UK industry use + 55% more than the Swaziland industry	
Domestic haulage efficiencies	Little difference, but UK tends to more efficiency due higher sucrose content of sugar beet	Little difference, but Swaziland tends to less efficiency due lower sucrose content of sugar cane. However, yields per ha are higher
Overseas transport / Food Miles	UK sugar production is primarily for domestic consumption	The Swaziland sugar industry caters to the export market, with consequent high-use ocean-going shipping
Energy use	100% purchased energy	Virtually 100% self sufficient from use of factory by-product (bagasse) for factory steam & electricity needs
Sucrose & sugar yields	9.5 mt sucrose per hectare per annum	13 mt sucrose per hectare per annum
Contribution to GDP	0.04%	15%
Employment (total formal direct employment)	> 0.5%	> 10%

3.5. The main differences and similarities between the beet and cane industries, which have an impact on sustainability, relate to the following:

- Non sugar outputs and recycled inputs;
- Machinery inputs versus labour inputs;
- Chemical inputs;
- Fertiliser inputs;
- Sucrose and sugar yields;
- Domestic haulage efficiencies;
- Ocean transport / food miles.

3.6. The key difference at sugar factory level relates to the energy source. The by-product of the cane milling process is bagasse, which is used as fuel in the factory and should be available in sufficient quantity to eliminate the need to purchase energy, except for start up purposes. The by-product of beet processing is beet pulp, which has an alternative value as an animal feed. Therefore, beet factories must purchase all their energy requirements.

#### **4. Socio-economic and Environmental Benefits**

4.1. The sustainability of the sugar industry depends on integrating competitiveness, environment and social standards and, in particular, the achievement of the following:

- Competitive production;
- Reduced crop inputs (especially pesticides and nitrogen);
- Improved environmental impacts (including biodiversity and bird life);
- Food safety and traceability;
- Environmental recycling of all co-products produced by the industry;
- Optimum crop quality;
- Sustainable livelihoods.

4.2. Details of environmental legislation and the performance of the two industries are given in sections 3 and 4 of the main

report. It has not been possible to give an in depth analysis of industry performance due to time constraints. In general, UK producers are subject to stricter environmental law compliance than sugar producers in Swaziland. The most significant issues regarding environmental legislation and performance are summarised below:

#### **4.3. Water quality**

*UK beet production:* Groundwater protection and the prevention of contamination of land are important issues for the future. The key legislation controlling water use that affects beet processing is the Water Resources Act, 1991. All discharges from factories to controlled waters (rivers, lakes, groundwater etc) must not be poisonous, noxious or polluting, and must be subject to Consent. The Environment Agency oversees discharges to rivers and groundwater, and local water companies oversee discharges to sewerage.

*Swaziland cane production:* Swaziland cane growers expect to be affected by the monitoring of water quality and use in the future through a proposed Water Act, which will set minimum standards of water quality and use. Processors expect in future that results of water quality will need to be submitted to the Swaziland Environment Authority (SEA), who will conduct spot checks and penalise offenders.

#### **4.4. Air quality**

*UK beet production:* Between 1982 and 1998 there was a 52 percent reduction in total volume used of aerially sprayed pesticides and 95 percent reduction in organochlorine, organophosphate and carbamate insecticides. Seventy per cent of the crop now receives no aerially sprayed

insecticide. In the UK no legal limits are set for carbon dioxide emissions from factories. **Swaziland cane production:** Aerial spraying is minimal and there are no legal limits set for carbon dioxide emissions from factories.

#### 4.5. Soil conservation

**UK beet production:** The UK beet industry will have to assess and analyse its soil quality and fertility, and possibly remediate deteriorating soils. Some 350,000 tonnes of soil adhering to beet roots is received annually by the sugar beet factories (dirt tare), representing considerable soil loss from beet fields. Nevertheless the UK still has the lowest beet dirt tare in the EU. Dirt tare is recovered and marketed under the "topsoil" brand for agricultural land improvements. Around 50 per cent is returned to agricultural land. Some 70,000 tonnes of stones adhering to beet roots are recovered annually and marketed for civil engineering, road building and construction applications. £1m has been invested to date to improve stone separation, washing and quality control.

**Swaziland cane production:** Standards are being formulated under the Swaziland Environmental Authority Act, whereby there will be no adverse environmental impacts on the soil. The Swaziland Environmental Authority will be the organisation enforcing the legislation.

#### 4.6. Chemical use

Improvements in technology have been widely employed in the UK beet industry to ensure that inputs such as sprays and fertilisers are applied more accurately.

#### 4.7. Solid waste disposal

**UK beet processing:** In the UK the Environmental Protection Act of 1990 ensures that waste handling, disposal and recovery operations do not harm the

environment. The laws are routinely enforced, and their contents were influenced by processors' representations.

**Swaziland cane processing:** In Swaziland, the Waste Regulations of 1998 control the management and regulation of cane solid waste from factories. Currently the regulations are not enforced.

### 5. Sustainable Livelihoods

5.1. The sustainable livelihoods approach is used to investigate the socio-economic issues involved in sustainability. The approach, used extensively by the Department for International Development (DfID), is a different way of thinking about the priorities for development, putting people, rather than resources or governments, at the centre. The focus is on the families involved in the production, processing and distribution of sugar and its by-products. It contrasts the ways in which the UK and Swaziland food systems impact on employment, education, health, food security and financial security. The analysis leads to an overall indication of how rural poverty is affected by the sugar component of the food system, and what impact future trends might have on rural livelihoods. Details are given in sections 3 and 4 of the main report, and key elements are summarised Table 2 below.

**Table 2: Effects on rural livelihoods**

	<b>UK Sugar Beet</b>	<b>Swaziland Sugar Cane</b>
Employment	7,000 farmers - < 1.1% of the UK agricultural workforce 23,000 jobs indirectly	16,000 workers directly (15% of the formal sector) 80,000 workers indirectly
Education	British Sugar (BS) has launched a £2.5 million engineering apprenticeship scheme	Education up to high school level provided by sugar estates. On-the-job training for farming families
Health and safety	Professionally qualified safety advisor and nurses/doctors	Free medical services to estate workers Input to HIV/AIDS awareness
Financial security	The subsidised industry is profitable to both BS and farmers	Mainstay of the Swaziland economy contributing about 14% of GDP
Rural Poverty contribution	Not a major contributor	A major rural employer

## 6. Sustainability of Sugar Production Systems

6.1. The sustainability of the UK sugar beet and Swaziland sugar cane production systems is assessed against the SDC's sustainability criteria in annexes 1 and 2 of this summary.

## 7. Suggested Sustainability Checklist

7.1. A key objective of this project is the production of a sustainability checklist, which will enable food purchasers, such as retailers and caterers, to make informed decisions and choose the most sustainable option when purchasing sugar. The following proposed checklist sets out the main sustainability issues for purchasers to consider.

### *Fair price*

- Are producers (farmers/smallholders) paid a fair price for their produce, commensurate with quality?
- Are contract agreements with growers honoured?
- Are payments to growers made on time?

### *Employment*

- Is child labour involved in the production of sugar?
- Is there any forced, bonded or involuntary prison labour involved?
- Are workers required to lodge "deposits" or their identity papers with their employers, and are they free to leave their employer after reasonable notice?
- Is regular employment being provided?

### *Freedom of Association and the right to collective bargaining*

- Do workers, without distinction, discrimination or disciplinary action, have the right to join or form trade unions of their own choosing and to bargain collectively?

### *Working conditions*

- Is a safe and hygienic working environment provided?
- Are adequate precautions taken to prevent accidents and injury arising out of, or occurring in the course of work, by minimizing, so far as is reasonably practicable, the hazards inherent in the working environment?

- Do workers receive regular and recorded health and safety training?
- Is access to clean toilet facilities and to potable water provided?
- Is accommodation, where provided, clean, safe and does it meet the basic needs of the workers?
- Are reasonable standards of air, noise and odour pollution in the working environment observed?

#### ***Wages and benefits***

- Do wages and benefits meet minimum national legal standards or industry benchmark standards, whichever is higher, and are they always enough to meet basic needs and provide some discretionary income?
- Are all workers provided with written and understandable information about their employment conditions?
- Are deductions from wages as a disciplinary measure permitted?

#### ***Working hours***

- Do working hours comply with national laws, and not exceed legal limits?
- Are workers provided at least one day off for every 7-day period on average?
- Is overtime voluntary, and within national legal limits?

#### ***Training***

- Is training provided that enables workers to carry out their tasks safely and effectively?

#### ***Welfare***

- Do employers provide schemes that assist workers in times of trouble, where national welfare schemes do not apply?
- Are pension schemes provided for permanent and long-term employees?

#### ***Discrimination***

- Is there any discrimination in hiring, compensation, access to training, promotion, termination or retirement based on race, caste, national origin, religion, age, disability, gender, marital

status, sexual orientation, union membership or political affiliation?

#### ***Physical, verbal and sexual abuse***

- Is physical abuse or discipline, the threat of physical abuse, sexual or other harassment and verbal abuse or other forms of intimidation officially prohibited?

#### ***Security of tenure***

- Do sugar growers have security of tenure over the land that they cultivate?

#### ***Water conservation and protection***

- Do sugar production systems minimise water use and prevent pollution of water sources?

#### ***Soil conservation***

- Do sugar production systems control erosion and conserve or enhance soil structure and fertility by techniques such as:
  - On-farm sources of nutrients: organic fertilizers / cover crops / mulch and compost
  - Planting techniques: Contour planting / windbreaks / terracing (where appropriate)?

#### ***Energy conservation***

- Do sugar production systems use energy efficiently at all stages of the supply chain and, wherever possible, renewable sources of energy?

#### ***Waste management***

- Do sugar production systems manage waste to minimize environmental impacts through applying principles of reduction, reuse and recycling?

#### ***Pest and diseases / Fertilizers***

- Do sugar production systems reduce, to the extent possible, inputs of chemical pesticides, fungicides and herbicides?
- Are steps are being taken to avoid the use of synthetic agrochemicals and introduce and develop organic management techniques?

***Ecosystems and biodiversity***

- Are sugar production systems aligned with biological diversity and wildlife conservation?

***Global warming / climate change***

- Are sugar production systems contributing to possible climate change through unacceptable levels of carbon emissions during the process?

that in other trades and industries, e.g. the Tea Sourcing Partnership, the Marine Stewardship Council.

**8. Recommendations for Future Action**

8.1. Those sugar purchasers in favour of developing the checklist-approach to ensuring a sustainable industry should consider setting up a partnership similar to

8.2. It is preferable that the development of an independently auditable checklist be coordinated by a recognised industry representative such as the Food and Drink Federation.

8.3. Future industry research should concentrate on the cost-benefit aspects of sustainability including the cost of compliance with sustainability criteria.



## Annex 1 – Sustainability Criteria: Sugar Beet

Criterion	Significance	Comments
<b>1. Produce safe, healthy food and non-food products; make a healthy, nutritious and enjoyable diet available and affordable to everyone</b>		
Food security, incl short chain between producer and consumer		Meets 50%+ of UK needs; short chain - farmers have direct supply contracts with processor/marketer
Food health and safety		Good, though some problems with organic sugar processing
Food affordability	Low	Affordable though less refined sugar is more expensive
Non-food products	Medium	Beet tops plus molasses and molasses products
<b>2. Enable viable livelihoods to be made from sustainable land management</b>		
Number/security of jobs in rural areas	Medium	Sugar beet currently keeping many farms afloat and maintaining farming and haulage jobs; Provides around 23,000 jobs in individually and commercially-owned farms; Provides winter rural employment in beet factories
Value-added processing near producers	Medium	Rationalisation of processing plants means greater haulage distances
Tourism	Low	
International competitiveness of UK farming sector	Medium/high	Yields around EU average
<b>3. Provide environmental improvements and other benefits</b>		
Access to countryside, recreation	Low	
Landscape	Low	
Public value placed on benefits provided by farming	Low	Crop in field not particularly interesting but strong contribution to farm incomes helps keep farmers in business to provide other benefits
<b>4. Minimise the total public funding needed</b>		
Opportunity cost of rural policies, e.g. subsidies	High	Sugar beet would probably not be profitable without production subsidy
<b>5. Support the vitality of rural economies and the diversity of rural culture</b>		
Vitality of rural economies	High	
Economic autonomy/control by farmers/rural		Beet farmers have to follow strict controls - but may not be worse than for other crops

residents		
Education and training of rural workforce	Medium	Some training necessary for operation and maintenance of expensive harvesting equipment
Vitality of rural communities, age balance	Low/medium	
Ability to sustain services, access to services	High	
Quality and affordability of housing	Low/medium	Aim of industry is to reduce labour force, therefore less need for housing
Index of local/multiple deprivation; indicators of success in tackling poverty and social exclusion		
Diversity of rural traditions/cultures	Low	
<b>6. Operate within biophysical constraints and conform to other environmental limits</b>		
Energy balance (energy produce (biomass, windfarm etc.) minus energy used): emissions of greenhouse gases	High	Highly mechanised production; Energy consumed in processing
Energy: road transport	High	Long haulage distances
Energy used/food unit produced/transport consumed	Medium/high	Need comparison with other major crops
Biodiversity: populations of wild birds		Spring-sown beet encourages bird life
Populations of rare species		
<b>7. Sustain the resource available for growing food</b>		
Water quality and quantity: rivers of good or fair quality	Low/medium	Amino nitrogen testing at beet factories - penalties apply for over application of nitrogen
Soil quality and quantity	Medium/high	Positive impact of rotation systems; Soil loss on farm has reduced dramatically but high rates of soil loss on individual farms
Waste arising and management	Low	
Air pollution, odours, nuisance, acidification: days when air pollution is moderate or higher	Medium	Odours from factory pollution have been reduced due to use of odourless chimney stacks and reduced particulate emissions
Genetic impacts		Not known
<b>8. Achieve high standards of animal health and welfare</b> Not relevant		

<b>9. Allow use of undeveloped land for development that genuinely meets human needs</b>		
Hard development: new homes built on previously developed land	Low	
<b>10. Be resilient to future changes</b>		
e.g. climate/flooding/drought, subsidies, petrol prices, availability of resources from abroad	High	
<b>Interest groups</b>	<b>Winner/loser, importance</b>	<b>Comments</b>
Farming sub sectors	Loser	If subsidies reduced
Farm sizes/types: family farm		Many family farms
Farm tenure: owner, tenant	Mixed	
Other rural dwellers		Some employment opportunities
Recreational: walkers/cyclists/horse riders, drivers, hunters, fishermen,	Medium	
Consumers (choice, empowerment, quality, affordability)	Winner	If subsidies reduced
Other interests: landscape, environmental etc		
Taxpayers		
International: fair access to/from international markets, fair trade on equal terms		Fair trade not currently possible

## Annex 2 – Sustainability Criteria: Sugar Cane

Criterion	Significance	Comments
<b>1. Produce safe, healthy food and non-food products; make a healthy, nutritious and enjoyable diet available and affordable to everyone</b>		
Food security, incl short chain between producer and consumer	Medium	Normally meets local demand; overseas transport and refining lengthens international supply chain
Food health and safety	Low	All refining of white sugar undertaken in UK; Unrefined sugar considered healthier
Food affordability	Low	Due to EU pricing and support structure sold at same price as beet sugar
Non-food products	Low	Molasses by-product available for animal feed
<b>2. Enable viable livelihoods to be made from sustainable land management</b>		
Number/security of jobs in rural areas	High	Provides significant employment for smallholders, field and factory workers
Value-added processing near producers	Medium-high	Could be higher if refined sugar could be exported to EU
Tourism	Medium	Attractive crop, often grown in areas of great beauty
International competitiveness of farming sector	Medium-high	Swaziland very low cost of producer of sugar
<b>3. Provide environmental improvements and other benefits</b>		
Access to countryside, recreation		See tourism, above
Landscape		See tourism, above
Public value placed on benefits provided by farming	High	Frequently few alternative sectors developed
<b>4. Minimise the total public funding needed</b>		
Opportunity cost of rural policies, e.g. subsidies	Low	Some government involvement (national development companies) along with multinational investment
<b>5. Support the vitality of rural economies and the diversity of rural culture</b>		
Vitality of rural economies	High	
Economic autonomy/control by farmers/rural residents	Medium	Smallholders have to meet production standards; few alternative sources of employment
Education and training of rural workforce	High	Sugar estates provide primary schooling and train apprentices
Vitality of rural communities, age balance	High	See point above - wide range of ages assisted
Ability to sustain services, access to services	High	Housing and services on sugar estates normally better than in neighbouring rural areas
Quality and affordability of housing	Medium	Offered / provided by company
Index of local/multiple deprivation; indicators of		Sugar estate employees often better off than other nationals

success in tackling poverty and social exclusion		
Diversity of rural traditions/cultures	Medium	Danger of erosion of local traditional cultural practices due to sugar expansion
<b>6. Operate within biophysical constraints and conform to other environmental limits</b>		
Energy balance (energy produce (biomass, windfarm etc.) minus energy used): emissions of greenhouse gases	Low	Sugar processing is normally energy self-sufficient and sometimes a net energy provider; Fossil fuels used in cane harvesting and application of chemicals
Energy: road transport	Medium	Cane transport to mills usually by road - some estates have used rail transport in the past
Energy used/food unit produced/transport consumed	Low	
Biodiversity: populations of wild birds	Medium	Creation of dams and irrigated areas may increase bird life
Populations of rare species	Medium	Opportunities for providing secluded, secure habitats though habitats may have been destroyed in the past due to bringing land into cultivation
<b>7. Sustain the resource available for growing food</b>		
Water quality and quantity: rivers of good or fair quality	High	Although environmental legislation normally exists, implementation may not be rigidly controlled; where crop has to be irrigated and water is in limited supply water shortages may be an issue
Soil quality and quantity	Low	Soil quality and quantity may be improved by continuous cropping; Firing the cane may be deleterious to soil quality
Waste arising and management	Possibly high	A proposed Water Act in Swaziland will set minimum standards of water quality and use
Air pollution, odours, nuisance, acidification: days when air pollution is moderate or higher	High	Legislation in force in Swaziland to control smoke emissions from cane burning
Genetic impacts		
<b>8. Achieve high standards of animal health and welfare</b>		
<b>9. Allow use of undeveloped land for development that genuinely meets human needs</b>		
Hard development: new homes built on previously developed land	Low	
<b>10. Be resilient to future changes</b>		
e.g. climate/flooding/drought, subsidies, petrol prices, availability of resources from abroad	Low/medium	Some sugar cane producing countries would not be able to produce sugar profitably without supported prices/special access to EU
<b>Interest groups</b>	<b>Winner/loser, importance</b>	<b>Comments</b>

Farming sub sectors		
Farm sizes/types: family farm		Smallholder growers of increasing importance
Farm tenure: owner, tenant		
Other rural dwellers		
Recreational: walkers/cyclists/horse riders, drivers, hunters, fishermen,		
Consumers (choice, empowerment, quality, affordability)		
Other interests: landscape, environmental etc		
Taxpayers		
International: fair access to/from international markets, fair trade on equal terms	High	
Animal welfare		