



The Carbon Footprint in Agricultural Trade

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1. Abbreviations and Acronyms

AERU	New Zealand Agribusiness and Economics Research Unit
BSI	British Standards Institute
CDM	Clean Development Mechanism
CFA	Chilled Food Association
COLECAP PIP	Pesticides Information Program
DEFRA	Department for Environment, Food and Rural Affairs
DfID	Department for International Development in the UK
EU	European Union
FFV	Fresh fruit and vegetables
FPEAK	Fresh Produce Exporters Association of Kenya
FPJ	Fresh Produce Journal
IPCC	Intergovernmental Panel on Climate Change
LCA	Life Cycle Analysis
LEAF	Linking Environment and Farming
NGO	Non-governmental organization
NPR	Non-product-related
PPM	Production or process methods
SPS	Sanitary and Phyto-Sanitary
SSA	Sub Saharan Africa
TBT	Technical barriers to Trade
UK	United Kingdom
UKERC	United Kingdom Energy Research Center
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
WTO	World Trade Organisation

2. List of Tables

Table 5.1: World fruit and vegetable exports. (Mildon, 2007)

3. Executive Summary

With trade increasing in all sectors of the global economy the focus on the effects of global warming as a result of the increased manufacturing and movement of goods has taken a forefront in discussions about the sustainability and viability of the trade.

Global warming is an ongoing phenomenon that has been accelerated in recent times due to increased levels of CO₂ and other greenhouse gases in the atmosphere resulting from development and industrialization over the last century.

In the last two years focus on carbon emissions arising from transporting agricultural produce around the world from production areas to markets, and in particular by air, has created a lot of debate. Food miles are loosely defined as the distance fresh produce and flowers travel from source to market. This is a very simple definition and needs to be refined to include the complete supply chain from procurement of the seed and planting material through to the eventual consumption and disposal of the food. DEFRA released figures in 2007 that shows carbon dioxide levels are increasing more rapidly than ever and that the UK food transport industry emitted 18m tons of carbon dioxide. A recent study on contributions to UK food transport has showed that airfreight contributes 10 per cent of the CO₂ emissions while heavy goods vehicles were responsible for over 57 per cent. (AEA Technology, 2005). Further data available also shows that CO₂ emissions from shipping are more than double that of airfreight (The Guardian, 2008).

With the global population set to hit eight billion by 2025 and just over nine billion people by 2050 (UN) the amount of food that will have to be produced and moved around the world annually will continue to increase. The debate on food miles needs to be expanded to not just include road and sea transport but to look at the total carbon emissions through the supply chain and evaluate how to reduce these at each stage of the chain to achieve a carbon neutral rating

The drive to eat locally grown produce and to not eat out of season produce is neither realistic nor practical. The demographics in the world have changed and a practical approach needs to be arrived at that ensures agricultural produce is grown in the most suitable climates, without subsidies and as efficiently as possible with a goal to ensure that the total carbon emissions are significantly reduced from the current levels.

4. Introduction

In recent years global warming has become an area of concern as temperatures have risen within the atmosphere, of the land and water mass on earth. This has led to reduced rainfall in parts of the world, melting icecaps, receding glaciers, advancing deserts, a change in weather patterns and associated phenomena. Global warming is a natural phenomenon that has been ongoing since the last ice age but has accelerated in recent times.

A significant part of the greenhouse gases [carbon dioxide, methane, nitrous oxide and other gases] have been generated in recent times and as a result several organisations have started to call for the control, restriction and measurement of the carbon emissions by various industries and sectors and subsequent labeling of their respective carbon footprints. The Kyoto Protocol that has been ratified by most nations requires a mandatory reduction in greenhouse gas emissions worldwide. The awareness of the impact of global warming continues to increase as effects are felt first hand.

The initial focus on just air miles by environmental campaigners and consumers is now taking on a more balanced approach to that of a total measurement of the carbon emissions through the full life-cycle of a product.

A further significant contributor to carbon emissions, in addition to that from the various modes of transport, is the refrigeration and cold chain necessary for and associated with agricultural trade.

As more precise data and information becomes available the trade in carbon credits between sectors and countries will start to gain more ground and could become a significant business as in the drive to become carbon neutral.

This paper looks at the impact of carbon labeling of agricultural produce and the legal issues surrounding these private label requirements, the possible effects on the trade in line with international rules and agreements and proposing approaches that would be just and equitable to all. The potential impact of labeling produce from a developing country, Kenya, is also discussed.

5. Literature Review

There is considerable resource on the FFV trade and in recent years many publications and reports that address the issues of emissions, the associated carbon footprint and labeling.

This chapter looks at the global trade in FFV, looks at labeling and discusses how data on carbon emission should be gathered, actual data that has come about from research, the legalities surrounding labeling, possible solutions and briefly touches on the social and economic benefits derived from the trade in the case of Kenya.

5.1 Trade in Fresh Fruits and Vegetables

The world trade in fresh fruits, fruit products, vegetables and vegetable products has more than doubled over the past two decades between 1982-1984 and 2002-2004 (Mildon 2007).

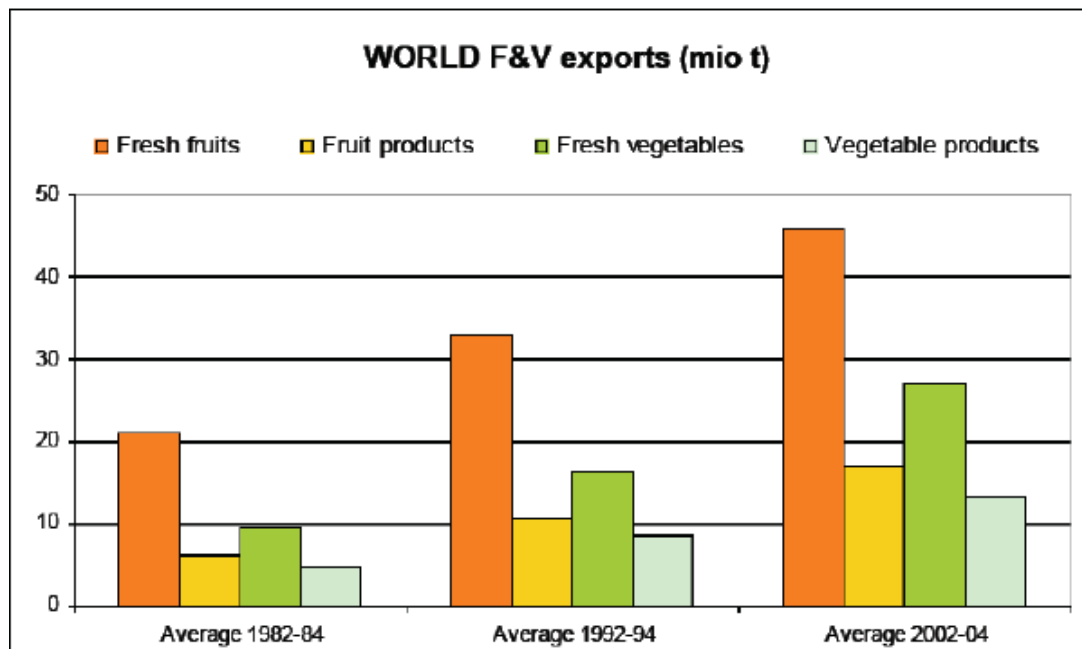


Table 5.1: World fruit and vegetable exports. (Mildon, 2007)

The value of the global trade in fruit and vegetables is estimated to be around US\$45 billion with over 73 million tons moving around the world (Legge et al. 2006). Developing countries export a third of the total of which eight countries account for two-thirds of the total. These are countries that have aggressively developed their agricultural sectors with high levels of technology transfer and competent Sanitary and Phyto-sanitary (SPS) protocols that have allowed them access to lucrative markets. Some of these countries, like Chile, Ecuador and Mexico have access to the US market, while China has access to the EU and Japan. They also have conducive climates, cheaper labour and improved logistics and transport chains.

As the global population continues to increase to eight billion by 2025 and over nine billion by 2050 (UN) the value and amount of trade will continue to grow

substantially. Per capita consumption is increasing possibly due to a growing awareness of the nutritional benefits associated with fresh produce and as populations become affluent and are exposed to a range of fruits and vegetables that were not part of the daily palate in the past.

The social and economic benefits of this trade to developing nations are crucial as it generates income and jobs. According to MacGregor and Vorley (2006) in their report, over one million people in rural Africa are supported by FFV exports to the UK alone and the trade returns an estimated UK£200 million pounds to the rural economy.

5.2 Labeling

Labeling of FFV with certain information has become a legal requirement throughout the world. Basic information about contents, weight, best before, nutritional values and origin are standard. Over the years the retailers have added on more information to the label for the benefits of the consumers such as traceability, recipes and different accreditations such as Fair Trade, Organic and Environmental such as LEAF.

5.2.1 By Air logo

Initial labeling of imported produce that was air flown was proposed by the leading two food retailers in the UK (Tesco and Marks and Spencer) in early 2007. This was implemented in April 2007 when 3 tons of labels were initially stuck on to the packs of imported vegetables. The airplane logo has subsequently been incorporated into the existing labels. The idea was to give consumers further information on the product and for them to decide whether to buy air-flown imported produce or not. Both retailers admitted seven months later that the controversial stickers have had no impact on sales and that there was no direct evidence to suggest that consumers were so concerned about their footprints that they turned away from air flown imports (Fresh Produce Journal, 2007).

5.2.2 The Carbon Reduction Label

According to Bingley (2008) the Carbon Trust (2008) has defined a carbon footprint as:

“The total set of greenhouse gas emission caused directly and indirectly by an [individual, event, organisation, product] expressed as CO_{2e}”

After much discussion and debate to come up with a comprehensive method to measure a carbon footprint consistently the Carbon Trust has developed with the British Standards Institute (BSI) the Carbon Reduction Label that will inform consumers of the amount of carbon dioxide and other greenhouse gases produced during the full life-cycle analysis (LCA) of the product, including use and disposal.

Tesco is starting the first trial using the Carbon Reduction Label on its own-brand products and two of the four products chosen are potatoes and orange juice. For the orange juice the most carbon intensive stage is the production part of the crop (Fresh Produce Journal 2008).

According to Bingley (2008) Tesco (2007) announced that in future they would restrict air freight to no more than 1 per cent of their imports with a bias in favour of sourcing from developing countries. Marks and Spencer also had similar sentiments. Casino, a leading French supermarket, has advised that they will initially focus on the airfreight and packaging aspects of the trade.

The effects of this can be significant and damaging to exporter countries if consumers start to become truly concerned about their footprint.

5.2.3 The views of other markets and sectors

Other significant retail outlets in the UK and Europe have taken a more practical and realistic approach. Waitrose will examine operations along the supply chain and introduce measures to reduce the carbon footprint within the UK from transport optimisation and the use of green refrigerants (Bingley 2008). The Co-op, in a response to the Soil Association's call for reducing air flown organics and linking it ethical trade standards, states “... *focusing on airfreight is a very poor proxy for the environmental impact of a product, and also does not adequately deal with other social and/or economic consequences of disincentivising airfreight, particularly for producers in the developing world...*”. The UK minister of trade and development Gareth Thomas expressed similar sentiments when he said: “*UK consumers should not assume that buying food from abroad is worse for the environment than buying from the UK. The livelihoods of a million African farmers are threatened by a misinformed food miles debate*” (FPJ 2008).

The Chilled Food Association (CFA) is against carbon footprint labeling of products as it is misleading and that any labeling should apply to businesses and not the products (FPJ 2008).

5.3 The Facts

A number of studies undertaken over the last few years have brought out interesting data & revelations.

FFV exports from Sub Saharan Africa (SSA) to the UK account for a maximum 0.1 per cent of total UK emissions (COLEACP PIP 2007). A Cranfield University study found that the carbon footprint of roses produced in Holland was over 5.8 times that of roses produced in Kenya even after including the emissions from air freight (Williams, 2007). However a simple comparison of outdoor, field grown green beans in the UK and Kenya showed that the overall CO_{2e} footprint was higher for Kenyan beans because of the air freight emissions. However field grown green beans can only be produced in summer in the UK and any year round production would have to be in heated and lit glasshouses and that would bring about a similar scenario to the roses. According to a report from the New Zealand Agribusiness and Economics Research Unit (AERU), the carbon footprint of sea freighted New Zealand milk solids, lamb and apples sold in the UK is up to four times lower than that of their locally produced equivalent even with the emissions from transport included (Muller, 2007).

The emissions from airfreight will constitute the highest proportion of the LCA and a UK study focusing exclusively on the transportation of lettuce, apples and cherries found that UK and Spanish grown lettuces had the lowest average CO₂ emissions whilst the air freighted cherries that had traveled 7,751 kms from North America emitted 80 times more CO₂ than the lettuce. The sea freighted apples that had traveled over 8,000 kms emitted 2.4 times more CO₂.

The handling and storage aspect for perishable agricultural produce after post harvest also utilizes a lot of energy. Research conducted on UK and New Zealand onions shows that the CO₂ emissions associated with the UK storage of locally produced onions is greater than the emissions from sea freighting New Zealand onions to the UK (Saunders, Barber and Taylor, 2006).

Part of the LCA would have to include the consumer's shopping trip, the cooking of the produce and final disposal of the waste. According to van Hauwermeiren, Coene, Engelen & Mathijs (2007) a consumer's shopping trip of more than 10 kms to solely purchase one kilogram of fresh produce will generate more CO₂ emissions than the air freighting of the same produce from Kenya.

It is therefore important that a full life-cycle analysis of the product, including use and disposal is undertaken over a series of different production periods and cycles to ensure the information is correctly captured. Identifying and defining the full scope of a LCA is also complex and will need agreement from producers through retailers on each stage. Should certain stages in a LCA receive greater weight for accounting purposes? Once these stages have been defined the costs of conducting complete LCA's for each stage will need to be calculated. These will be considerable and the total cost implications for a LCA for each product will be significant. Initial funding has been committed by some of the retailers but the eventual costs will have to be passed on the consumers. In the interim funding of these LCA's will require resources that a number of developing countries do not have available.

5.4 The example of Kenya as a developing nation

Developing countries like Kenya are still primary agricultural based economies and cannot stop producing and exporting fresh produce. The economic and social ramifications would have a major impact on the economy were this to happen. Kenya is the largest supplier of horticultural produce from SSA and earns over US\$750 million in revenue annually. The industry provides jobs to over 150,000 people directly and supports over 4 million people directly and indirectly (EurepGAP, 2007) and (FPEAK, 2007).

Currently Kenya supplies one out of every three roses sold within the European Union. On a land mass the size of Texas or France, the country is endowed with a range of altitudes and growing climates that allow for year round production with very little need for additional heating or lighting. The majority of the land has only been farmed in the last 100 years and that too with a sustainable approach. The use of fertilisers and agrochemicals is extremely prudent and two rain seasons a year and 12 hours of daylight every day with constant temperatures requires no heating or light. The majority of the power generated in the country is either hydro-electric or geothermal. The soils are not deep and do not require any intensive machinery nor equipment. Agriculture & farming in Kenya is extremely labour intensive and creates employment for over one million Kenyans in horticulture, tea, coffee and other perennial cash crops. The horticulture industry is also the largest employer of women and of university graduates annually.

Kenya is one of the few countries that is ideally suited for year round farming activities which have a minimal impact on carbon emissions in the production stages of a LCA.

5.5 Policy issues and possible solutions

What effect will labeling have? Since these are private sector initiatives and not national legal requirements it is difficult to control what the retailers want. Only one third of the shoppers are aware of the concept of food miles (MacGregor and Vorley, 2006) and there is little evidence at present that consumers have significantly changed their behaviour and are purchasing more locally produced food (International Trade Center 2007). A recent report from the United Kingdom Energy Research Center (UKERC) highlighted that shoppers may be confused by the information contained on the labels. In some cases the consumer may be unaware of the issue highlighted by the label, or overwhelmed by the amount of information provided (UKERC 2007). The expense of doing the LCA's on products will have to initially be borne by the producers in conjunction with the retailers with the eventual cost being passed on to the consumers. Therefore even though the labeling may seem protectionist and against the spirit of the World Trade Organisation (WTO) rules as long as the customers have a choice to buy between labeled and non-labeled product then there is no infringement on fundamental rights. The WTO law could be interpreted as not allowing a government to require labels specifying greenhouse gas content in the production process but there is nothing stopping the private sector from asking for the same. The Technical Barriers to Trade (TBT Agreement does discourage any methods that would give domestically produced goods an unfair advantage but it clearly allows non-discriminatory labeling. However once retailers insist on having only product that has a specific label then there is no product differentiation and this now inhibits free trade and market access becomes an issue. The private standards are taking on quasigovernmental roles as food safety issues are the prerogative of national governments and when the standards take over these issues they can interfere with free trade and can become technical barriers to trade and not comply with the spirit of the rules of the WTO. Similarities can be drawn to the private Globalgap standards that retailers have endorsed. Produce that is now not certified under Globalgap does not have access to a number of leading supermarkets and this effectively goes to block producers from market access and free trade and does not give consumers a choice.

According to Appleton (Business Law Brief Fall 2007), the debate can only be cleared when the definitions of a "technical regulation" and a "standard" in Annex 1 of the TBT Agreement are amended. Annex 1(1) and Annex 1(2) both use the phrase "related production methods" in their first sentence, but fail to use the term "related" in their second sentences which governs the "labeling" of a product, process or production method. This omission leaves room to argue that labeling requirements need not be "product-related". The interpretation accepted by most WTO Members is that Annex 1(1) and (2) signify that only "product-related" production or process methods (PPMs) are covered by the TBT Agreement, and that only labeling requirements that are product-related fall within the Agreement. Carbon emissions from the transport of produce are classified as non-product-related (NPR) PPMs as they cannot be detected in the product and so technically are not covered under the TBT Agreement. Since emissions for produce are primarily in international jurisdiction WTO Members technically cannot govern nor apply their laws. Can therefore WTO Members govern the labeling advocated by these private sector initiatives? At the moment not, unless the private sector initiatives are fully sanctioned by WTO Members. This debate is ongoing in the SPS committee but it is highly unlikely that developed country governments would take on the responsibility of private sector codes.

Reduction in carbon dioxide and other greenhouse gases is of paramount importance and continues to grow in importance. The UNFCCC and more recently the Kyoto Protocol have legally binding measures in place to ensure that nations reduce their emissions over a set period of time. However airfreight and sea transportation have been excluded from the reductions required under the protocol (Rigby and Brown, 2003). It is difficult to agree upon how gases emitted by ships should be allocated between countries as they sail in international waters outside national jurisdictions.

At the same time the Kyoto Protocol recognizes the need for equity and non-restrictive economic development in developing countries in the transition to low-carbon future. The majority of the agricultural producer nations are developing countries. Their national carbon dioxide emissions on a per capita basis are far below the global average of 3.6 tons. The UK per capita emission is 9.2 tons and that of Africa, 1 ton (MacGregor and Vorley, 2007). As such most developing countries are not subjected to mandatory emission reduction obligations.

The Clean Development Mechanism (CDM) is an arrangement under the Kyoto Protocol allowing Annex 1 industrialised countries to invest in projects that reduce emissions in developing countries as an alternative to more expensive emission reductions in their own countries. Developing countries could still continue to voluntarily work towards a reduction where possible in the production of their overall carbon dioxide and other greenhouse gases and trade their carbon credits.

The issue needs to be addressed rationally and not emotively as has been the case with a number of NGO's and environmental campaigners.

It is quite clear that a full life-cycle analysis, and not just the air freight component of the product, including use and disposal is undertaken over a series of different production periods and cycles to ensure the information is correctly captured before labeling. Air freight will always contribute significantly to the emissions in a LCA though they would be similar to the emissions attributed to internal transport in the importing country. Emissions from sea freight will play a much smaller role in the LCA.

A complete ban on imports is not practical and advocating consumption of locally grown food year round is unlikely as a large number of products cannot be grown efficiently nor cost effectively without setting up expensive growing environments that would be inefficient and high energy users. We live in a global economy that trades globally and it is not possible to replace all imports with locally produced substitutes. Farming in the developed countries is highly subsidised and when the subsidies are removed and the farmers correctly taxed for their contribution to carbon emissions imports would still be competitive. It may be an idea to look at labeling subsidized production in developed countries and letting consumers then decide whether they want to buy heavily subsidized domestic production or opt for product that has been produced efficiently and with no support.

Should LCA be expanded to include the economic and social aspects as well? Should developing countries be involved in defining the carbon footprint, the methodology of measuring it and in the labeling, dissemination and education of the information? Who will bear the costs of the LCA's in the immediate short term? The answers are

not obvious and it is important that clear policy and decisions are arrived at sooner than later that capture and convey the correct information in the labeling. What needs close scrutiny is that the labeling does not become protectionist or a barrier to free trade and when it does, the appropriate mechanisms are in place to ensure that the global movement of agricultural produce continues uninterrupted.

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