# Food Transport

It is generally considered better to buy locally grown food i.e.to avoid foods that have been transported any great distance and this note looks at the benefits of doing this, primarily from the point of view of greenhouse gas emissions.

To put this into perspective - according to Mike Berners-Lee, in his book *How Bad are Bananas?* - overall, 8.6% of the carbon footprint of food, as it leaves a UK supermarket, is due to transport. Some may be surprised at the fairly low figure.

Not surprisingly, “buying local” and “food miles” are not as straightforward as they might seem.

For instance, tomatoes are grown in the UK all the year round. However, out of season, say, November to May, the greenhouses require heating. Meanwhile tomatoes from Spain and Morocco are available at this time, and these are grown using the sun’s heat, but are transported to the UK by road. Which are better?

Lamb? There are reports available that show New Zealand lamb has a lower carbon footprint than UK produced lamb on arrival in the UK, and reports that show the reverse. It’s presumably a close run thing.

***Transport emissions***
The following emissions figures have been produced by the Department of Energy and Climate Change (DECC):-

- Air freight – long haul — 1,419 gm $CO_{2e}$ per tonne per km
- Container ship — 19 gm $CO_{2e}$ per tonne per km
- Container ship (refrigerated) — 34 gm $CO_{2e}$ per tonne per km
- Van up to 3.5T Gross weight (Average payload) — 645 gm $CO_{2e}$ per tonne per km
- Large Truck
  - (Average all Heavy Goods Vehicles (HGVs), fully laden) — 106 gm $CO_{2e}$ per tonne per km
  - (Artic. truck, fully laden) — 76 gm $CO_{2e}$ per tonne per km
- Large Truck (refrigerated)
  - (Average all HGVs, fully laden) — 124 gm $CO_{2e}$ per tonne per km
  - (Artic. truck, fully laden) — 89 gm $CO_{2e}$ per tonne per km

Using these figures, one can estimate emissions for a number of well used freight routes for fruit and vegetables, as follows:-

- Produce from Almeria, in southern Spain (a large source of salad and other fruit and vegetables), trucked to Dover by refrigerated HGV gives rise to **260 gm $CO_{2e}$ per kg**.
- If this produce was shipped from Miami to Southampton, it would give rise to **241 gm $CO_{2e}$ per kg**
- If shipped from Haifa, or Alexandria, the emissions would be **197 gm $CO_{2e}$ per kg**.

Clearly there is likely to be further transport within the countries to be added, sometimes over significant distances.

Emissions for smaller road vehicles are much higher per tonne than for larger ones. In fact the DECC figures give emissions of 745 gm $CO_{2e}$ per tonne per km for an averagely laden small diesel van of up to 1.3 T gross weight, almost ten times the emissions using a fully laden articulated truck. This makes it difficult to estimate emissions from transporting produce within UK. A small van travelling 200 km will give rise to **149 gm $CO_{2e}$ per kg** of produce, only a little less than the **197 gm** due to shipping from Haifa!

As wealthy people demand out of season produce, it is becoming increasingly common to airfreight fruit and vegetables. Freight from Kenya gives rise to **9,600 gm $CO_{2e}$ per kg**: from Cape Town it is **13,500 gm $CO_{2e}$ per kg**.

So, to estimate transport emissions the distance travelled is obviously important, and it is not normally difficult to find out the country of origin of food. However, the method of transport is just as important, and that is not so easy to ascertain. Shipping from Egypt or Israel gives rise to lower emissions than trucking from

southern Spain, and possibly even from trucking inefficiently for a comparatively short distance within the UK. Airfreight emissions are clearly far higher than those from any other form of transport.

***Tomatoes***

Back to the tomatoes, which we like, but can only produce in the UK from about June to October without the help of artificial heat. Commercially they are grown under plastic or glass. It is estimated that emissions due to growing tomatoes commercially out of season in Northern Europe, is between **2,000 and 4,000 gm $CO_{2\,e}$ per kg**. This is due almost entirely to the need to heat the greenhouses. In season, emissions are small, as for any other or vegetable grown using sunlight, of the order of **250 to 500 gm $CO_{2\,e}$ per kg**, due to pesticides, fertiliser and glass or plastic housing. Home grown can have a very low carbon footprint.

So we can see that the emissions due to carrying tomatoes from anywhere in the rest of Europe, by land or sea, are far less than those produced by growing them in heated greenhouses in UK. Or are they? Not always, because now there are facilities that produce electricity and use the resulting heat of the generator's cooling water, which would probably have been wasted otherwise, to heat greenhouses (Combined heat and power (CHP) plants). One might argue that there are no additional emissions to heat the greenhouses in this situation, in which case perhaps the Almeria tomatoes have a higher carbon footprint.

This example demonstrates how complicated "food miles" can be!

***What should one do?***

- **Buy fruit and vegetables only when they are in season, particularly those that grow in northern Europe. Buy produce as locally grown as possible within the UK**. If a product obviously has a short shelf life – salad crops, asparagus, strawberries, for instance - and it is available out of season it has either been grown in a heated greenhouse or travelled a long way, quite likely by air.
- **Find out where it was grown, particularly if you feel the need to buy out of season produce.** It will be written on a supermarket packet, and if a market stallholder doesn't know, you can usually find the box that it was carried in. You can make an assessment as to whether it is likely to have travelled by air, sea or land or indeed been grown in a heated greenhouse.
- **Fruit such as oranges and bananas, though grown long distances from the UK, are not normally transported by air, and so their transport gives rise to comparatively low emissions;** similarly for out of season apples. Grapes are also generally seafreighted, or trucked, from within Europe. It is more difficult to find out how some tropical fruit travel. Papaya and mango appear to be airfreighted generally, while avocado pears are increasingly being moved by sea, as storage techniques improve.
- **Buy local or frozen fish and shellfish. Fresh fish or shellfish from outside Western Europe are likely to have travelled by air**. Though this note only concerns transport, buying Marine Stewardship Council (MSC) certified produce ensures that it is from a sustainable fishery.
- **Meat is not generally airfreighted because of its weight and the fact that it can be frozen. So the additional emissions due to its transport do not tend to add significantly to its overall impact.** The same applies to most dairy products. However, the production of meat and dairy gives rise to large emissions, which is not the subject of this note.

***To conclude***

As can be seen, buying food in a way that minimises greenhouse gas emissions from transport is not as straightforward as might be thought.

The production of most meat and dairy products gives rise to high levels of greenhouse gas, even without transport emissions. The production of most grain, pulses, fruit, vegetables and fish does not need to give rise to high emissions; but it probably does when grown very intensively, or out of season.

Eating fruit and vegetables when they are in season in the UK is the best way to minimise their emissions; concentrate on those grown locally within the country. Assessing emissions from out of season produce can be tricky, as the production process and emissions of different transport modes, as well as the distance transported, can be very significant.

*Brian Shorter, October 2015*