

Planes, brains and automobiles

A short drive to the supermarket may undo even your most carbon-conscious food purchasing. Sarah Murray explains why

In 1969, Arthur Veysey, the Chicago Tribune's London bureau chief, described a dinner party he had attended. "It was an amazing meal," he told readers. "First there was a choice of melon or avocado from Israel, shrimp from South Africa, or rock oysters from New Zealand. With the Scotch beef came French beans from east Africa, asparagus from Florida, and a salad of lettuce and tomatoes from California." What, no dessert? "The dinner ended with a choice of strawberries from Mexico or mangoes from India, and California celery accompanied the English cheddar cheese." The article was titled: "Jet planes spread the seasonal joys."

Today, such delight would be frowned upon. People point accusingly at long-distance dinners because of the "food miles" collected and carbon emissions released along the way. Newspaper reports talk of dishes "washed down with tanker-loads of diesel" and meals that "cost the Earth". British cooks, meanwhile, avoid beans from Kenya and apples from New Zealand.

In mankind's quest for sustenance, food has always been moved across vast distances. The Romans shifted produce all over their empire. As Monte Testaccio, a giant mound of broken pots in Rome, reveals, an estimated 1.6 billion gallons of olive oil travelled from southern Spain to Italy in the first and second centuries. The Silk Road, the ancient eastern trading con-

duit for tea and spices, among other goods, was at least 7,000 miles long.

The Incas managed their food supply with remarkable efficiency. Tens of thousands of miles of roads built across varied terrains and hundreds of warehouses meant supplies from one part of the South American empire could relieve shortages in another. Chasquis - teams of relay runners nattily dressed in feathered sunhats and slings - pounded along the roads, bringing Inca chiefs in Cusco, the inland capital, fresh fish caught off the coast at Chala, 200 miles away.

Three centuries later, refrigerated ships brought beef from Argentina to Victorian England, and the invention in 1842 of a system of mechanical elevators dramatically sped up the transshipment of Midwest grain from vessels on the Great Lakes to canal boats. These then travelled east on the Erie Canal to New York and across the Atlantic to European markets, turning Buffalo into one of the US's richest cities.

These sorts of logistical achievements were once seen as essential to mankind's progress. "The road from hand to mouth is short and easy enough with men at first," wrote Joseph Dart, the 19th-century entrepreneur behind the first grain elevator, "but as society grows, and division of labor is made, producers and consumers of food become widely separated, and the question of transportation becomes exceedingly important."

Today, of course, the "question of transportation" has become caught up in worries about the quantities of carbon dioxide being generated by an increasingly mobile food supply. The further our food travels, so the theory goes, the more damage it does to the climate through transport-related carbon dioxide emissions. In short, globe-trotting food stands accused of helping destroy the planet.

On a July morning in a branch of Tesco in west London, an astonishing global cornucopia stands on display in the fresh-produce section. Since it is summer, the UK is represented, too (each British product labelled with a Union Jack): strawberries are on offer, as well as the more unlikely British-grown shiitake mushrooms ("ideal for oriental cooking", reads the packet).

But alongside the British fare sit grapes from Egypt and Spain, kiwis from Chile, ginger from China (ideal with those shiitake mushrooms), cherries from Turkey, sweet potatoes from the US, baby baking potatoes from Egypt, butternut squash from Greece, white garlic, peppers and plums from Spain, green chillies from Zimbabwe, pineapples from Costa Rica, Braeburn apples from New Zealand, asparagus from Peru, extra fine beans and tenderstem broccoli from Kenya and snow peas from Zambia.



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The miles collectively clocked up by these products provide local-food proponents with ammunition in their battle against food miles. Why, they ask, are we shipping produce half way round the world when some of it could be grown on our doorstep?

Meanwhile "locavores", as they are sometimes known, are putting theory into practice. In London, a talented young chef, Oliver Rowe, has opened a restaurant, Konstam at the Prince Albert, in which all his ingredients are sourced from within the M25. Farmers' markets have proliferated across the UK, many claiming they are helping the environment by reducing food miles.

The concept of food miles has raised awareness of the environmental impact of an essential aspect of our daily lives: eating.

And locally produced food has all kinds of benefits, such as fostering biodiversity and variety. In France's mountainous Ardèche region, virtually every village seems to have its own type of cheese, for example. Moreover, locally grown fruits and vegetables often taste better than their well-travelled counterparts. And some food-watchers argue that relying on imports undermines food security. But would returning to a local diet put less carbon dioxide into the atmosphere? Not necessarily.

In a study published last year, New Zealand's Lincoln University measured everything from electric fences to farm sheds, tractors and animal feed, and found that dairy and lamb production in New Zealand was more energy efficient than the British equivalent, even when the 12,000-mile trip to the UK was included.

While New Zealand, whose agricultural exports represent a big chunk of the country's revenues, has good reasons for making such an assertion, others have reached similar conclusions. "Transport has been taken out and highlighted," says Rebecca White, a researcher at Oxford University's Environmental Change Institute (ECI). "But you can't single out one part [of the food system] and say something that's come from thousands of miles away is automatically less sustainable - it's much more complicated than that."

Ken Green would agree. With a team of researchers at Manchester Business School, he recently completed a report for the UK's department for environment, farming and rural affairs (Defra), assessing the environmental impact of 150 top-selling food items. After 199 pages of detail on everything from

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automatic picking machines to consumer packaging, the researchers find no strong evidence that locally sourced foods are better, in environmental terms at least, than global produce – and in some cases the opposite is true.

The report drew sharp responses, particularly since it also claimed that the environmental benefits of organic food production were not clear-cut. The Soil Association, which campaigns for organic food, said that the Manchester team had used the wrong model of organic farming, so the findings were "irrelevant". The Western Morning News, the Plymouth-based regional daily, declared its conclusions to be "potentially very damaging" and suggested Defra "send this report back to where it came from".

This sort of impassioned comment does not surprise Green. What he finds more curious is the strength of views on food and sustainability given the dearth of hard data and comparable studies. "The volume of opinion on this is phenomenal, and you'd think that there was going to be some substance behind it," he says. "There's a lot of noise but it's based on rather a little information."

Misperceptions about how food travels persist. Jim Anderton, New Zealand minister of agriculture took issue with a comment attributed to former minister Stephen Byers that flying 1kg of kiwi fruit from New Zealand to Europe caused 5kg of carbon to be released into the atmosphere. "No New Zealand kiwi fruit for retail sale is flown to Europe," wrote Anderton in a letter to the Guardian in November. "Instead, our kiwi fruit exports are shipped by sea to markets throughout the world. Shipping is commonly acknowledged as one of the most carbon-efficient forms of transport."

Once you consider the many energy sources in food production, transport starts to look less important as a source of greenhouse gas. On the farm, vehicles and machines all consume fossil fuels, as do agricultural practices such as drying and cooling crops, keeping poultry in heated buildings and cultivating fresh fruit and vegetables in hot-houses. The manufacturing of animal feeds and fertilisers also generates carbon dioxide – 6.7 tonnes for every tonne of nitrogen fertiliser, according to the Soil Association.

What's more, the environmental trade-offs can be perplexing. While water conservationists point out that pressurised sprayers and drip irrigation systems distribute water to crops more efficiently than

traditional gravity-based methods, they require mechanical pumping and therefore consume more energy.

Along with the carbon dioxide emissions generated by agriculture come other, more potent, greenhouse gases. Animal manure, soil management and heavy use of synthetic nitrogen fertilisers in crop production all contribute to an increase in nitrous oxide emissions, which are up to 300 times more effective at heating the atmosphere than carbon dioxide.

And farm-generated greenhouse gases come from the most unlikely places. Cow flatulence and sheep burps produce large amounts of methane – which warms the planet more than 20 times faster than carbon dioxide. When emissions from land use are also accounted for, livestock, which now occupies about 30 per cent of the planet's land surface, generates more greenhouse gas emissions than transport, according to the UN's Food and Agriculture Organisation.

The problem can be serious. Residents in the San Joaquin valley in California's agricultural heartland, which is home to more than 2.5 million cattle, complain of a thick cloud of smog that hangs over the valley (not all animal-generated, granted), making the air quality unhealthy – and very smelly.

Like much human activity, the environmental impact of food production is often driven by inefficient systems. "We found that a key element of carbon embedded in a crisp is the energy required to fry the potato," says Tom Delay, chief executive of the Carbon Trust, which studied the carbon footprint of

Walkers crisps. Because farmers sell to Walkers on the basis of weight, explains Delay, they humidify potatoes with water, which requires energy to remove when frying the crisp. The Carbon Trust, a government-funded consultancy, reckons that simply changing the way potatoes are traded would allow Walkers to cut emissions generated in potato frying by up to 10 per cent.

Soon shoppers may be able to play a more active part in the carbon debate. In March, the Carbon Trust launched a label it says reflects the "embodied carbon" of a product: the amount of carbon dioxide emitted during its lifetime. Walkers crisps are among the foods in the trial, but the idea is to apply the scheme to a wide range of products. Duchy Originals, the company owned by Prince Charles, is also starting to measure how much greenhouse gas is released into the atmosphere in the making of its foods.

And Tesco, too, has embarked on an ambitious labelling initiative that will eventually allow shoppers to compare all its products on their emissions levels in the same way they look at price or nutritional value. "The carbon footprint is really what counts," says Trevor Datson, a Tesco spokesperson. "Carbon footprint labelling is a much more sophisticated tool than saying: 'This has come from Buenos Aires or Wellington.'"

The company has enlisted the ECI to assist in the process – and it will need all the help it can get. Calculating the carbon footprint of consumer products is a complex endeavour that may raise many more questions than it answers. For a start, just how far back will the measurement of carbon go? Today's food often passes through several steps in a complex chain in which it is handled by a number of suppliers and processors before ending up on the supermarket shelf. And small farms may lack the resources to provide details on their energy use. "Big companies will usually have energy managers because of the cost of energy and the climate change levy," says the ECI's White. "But when it gets to on-the-farm, measuring things like methane and nitrous oxide is a lot to ask."

Another big question is to what extent consumer actions should be counted in the carbon assessment. Cooking, for example, is an energy-intensive activity. Take potatoes. By the time a packet of processed dried mashed potato reaches the supermarket, it would have a far heavier carbon weighting than raw potatoes, particularly those grown in the UK. Yet if the energy use of the potato after it left the supermarket were



included, the picture would be different since boiling a potato is the most energy-intensive part of its life cycle.

Even when considering transport-related emissions alone, simply measuring the distance food has covered does not accurately reflect the energy consumption of its journey. Different vehicles have wildly varying levels of fuel efficiency. Generally speaking, water and rail transport are the most efficient, with trucks and planes the heaviest polluters.

And it turns out our own part in the chain is often the most damaging, since when we drive to the supermarket, we might come back with only a few of bags of food in the car boot. Such a trip is far less fuel efficient than the one taken by that same food on its way to the supermarket in a truck packed with the assistance of load-optimisation software, which determines how to stack cargo so that barely an inch of empty space is left in the back of the vehicle.

A more realistic assessment would be how many pounds of carbon dioxide are generated by transport for each pound of food carried. By this measure, ocean cargo vessels do relatively well, particularly the newer models.

The world's biggest ship, the Emma Maersk, is immense - 397m long, with a beam of 56m and 21 storeys between the bridge and the engine room. Alongside the docks, she looks more like a floating industrial plant than a ship. The Emma Maersk can carry a whopping 11,000 steel shipping containers. A single one of these containers could hold about 48,000 bananas. So, in theory, the ship could transport about 528 million bananas in a single voyage - enough to give everyone in Britain a banana for breakfast for almost nine days.

"Consider how amazingly well packed all those containers are, how many they get on one ship and how good modern transport systems are at rapidly and cheaply handling huge volumes," says Green, "compared with the totally inefficient way you and I move things about in the back of a car."

Of course, not all food travels in giant container vessels. As demand for fresh fruits and vegetables year-round has risen, a growing amount of space beneath airline passengers' feet is being taken up with shipments of food. Unlike their ocean-borne counterparts, these products have been in transit for a matter of hours, not weeks. At



British Airways' Perishables Handling Centre at Heathrow airport, the turnaround of what are known as "global perishables" is astonishing. Soon after the plane touches the tarmac, edible cargo is moved out of the aircraft's belly on to steel roller beds and into the back of refrigerated vehicles, which speed them off to the centre.

There, giant ceiling units ensure that the temperature inside is permanently chilly. Bright red forklifts buzz around, while workers in thick fluorescent jackets and woolly hats break bulk shipments up into individual orders and watch over the machines that deposit labels bearing the right brand, weight and price on to punnets of strawberries and boxes of cherries before packing them in lorries heading to distribution centres around the UK.

While this sort of cargo represents only a tiny proportion of the produce imported into Britain (with most travelling by road or sea), it is generating growing concern. Air freight emits far more carbon dioxide per unit of cargo than ocean liners, and aircraft burn high-quality kerosene jet fuel that, on international flights, is artificially cheap compared with other fuels, since it is not subject to tax.

Moreover, contrails - those white streaks painted across the sky by the condensation of water vapour in the plane's exhaust - are thought to have a potent effect on the environment because they are released at a high altitude. And while technological fixes are emerging in other forms of transport, those solutions cannot be used in aviation; ethanol is not dense enough to replace kerosene and biodiesel could clog the engines of aircraft.

Yet air-freighted food has its advantages in other areas. Britain's voracious appetite for fresh fruits and vegetables supports the livelihoods of more than 1 million Africans, according to the International Institute for Environment and Development (IIED). And transporting this produce by plane, says the IIED, accounts for less than 0.1 per cent of

UK carbon emissions. Moreover, development experts point out that, without access to this income from overseas, people in developing countries are more likely to tap into their natural resources, felling forests or emptying lakes and rivers of fish, reducing biodiversity and creating long-term environmental degradation, as well as air and water pollution.

"In the big picture, the environmental cost of international food transport is trivial compared with UK domestic food miles," write James MacGregor and Bill Vorley in a paper published recently by the institute. "Plus, air-freight is the only possible mode of transport for some highly perishable produce where no other infrastructure exists. It is time to look to the huge impacts of the food system at home, rather than pull up the drawbridge on Africa."

The prospect of UK shoppers cutting back on vegetables imported by air certainly sent a chill wind through the Kenyan press. "How British Consumers Are Back-Stabbing Kenya", read a headline in *The Nation* in February. African countries have fought back, arguing that being able to raise produce in a warm climate, rather than in a heated greenhouse, offsets the emissions generated by air-freighted food. Producers in Kenya are even pushing for the development of a "green label" with which to market their goods overseas.

Quite how many labels you can squeeze on to a packet of beans or an apple is another matter, of course. And labelling schemes are notoriously complex and tricky to implement. Even the relatively simple "traffic light" system of denoting a food's fat, salt and sugar content has triggered fierce debate. What seems clear, however, is that the days when food miles were used as the sole indicator of food's environmental impact are numbered.

The next step - carbon labelling - will be much harder, as researchers ponder whether or not to include the car journeys of farm workers or the decision by cooks to boil or bake their potatoes in their calculations. Green believes that such challenges are no reason to abandon efforts to measure food's environmental impact. "It's all very difficult to work out on paper, let alone in the context of the world as it is," he says. "But it's important to open up and keep talking about it, rather than assuming that there are a series of easy things to do." ■

Sarah Murray's "Moveable Feasts: The Incredible Journeys of the Things We Eat" (Aurum Press) will be published in May.