

# Feeding the future: challenges and limitations

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Despite the apparent abundance of the food supply, we cannot remain complacent, as an ever-increasing global population provides us with a formidable challenge in the coming decades. Currently as we have already noted, global population is estimated to be in the region of 7 billion, and with growth rates of about 80 million people per year this figure is set to rise to about 7.94–8.33 billion by 2030 before trailing off at 2050/60 to between 9.2 and 9.5 billion (ESA, 2007; GEO, 2007; Zhang, 2008). In this regard the true test of our ingenuity will be the extent to which we can find innovative sustainable approaches that will enable us to provide the 70% increase required in agricultural production demand alone to feed these numbers. This is, indeed, a weighty challenge by itself, and to add to this the effect of current trends away from traditional grain-based diets in favor of more meat and animal products and the difficulties are compounded. A change some have suggested could result in a global average per capita calorific increase of 40% from 440 to 620 kcal per day (Smeets et al., 2006). Of course, this is subject to regional variation where through to 2030 Europe and North America's per capita meat consumption is projected to rise to 14% (by weight), while in East Asia consumption these increases will potentially rise by 55% and sub-Saharan Africa by 42% (IMechE, 2013).

While historically we have risen to the occasion of these challenges, we have done so through collaborative advancements in science and technology accompanied by a conducive political will, which gave rise to the green revolution. However, many have criticized this not

so silent revolution as being of the time yet unsustainable in the long term. Instead, many now are looking to a new, more “evergreen” revolution that takes a more holistic consideration of environmental and sustainability issues.

A great example of this new philosophy in action is through the New York Columbia University Millennium Villages project, which has seen a tripling of wheat yields in sub-Saharan Africa. This has taken wheat yields from historic averages in the region of one tons per hectare to over three simply by addressing issues of soil nutrient depletion ([Earth Institute, 2009](#); [Sanchez, 2010](#)). Through closer, more sustainably sympathetic controls of agricultural inputs, and the introduction of high-yielding cultivars and updated technologies, some of these areas are now, for the first time, enjoying annual calorie production in excess of needs. This is just one example and there are many others too benefitting from the application of sustainable ecologically sound “evergreen” principles.

Yet standing in the way of future progress are many obstacles, chiefly among them are the strains on natural resources especially of land and water. This is particularly relevant in regard to the potential reduction in available land due to such factors as environmental degradation; climate change stresses; restrictions aimed at preserving ecosystems; and the inevitable competition with other land-use demands of biofuels, urbanization, industrial, and leisure needs, etc. Likely further hindering future progress too will increase energy costs resulting from greater demand as well as problems of reduced agricultural labor workforce as nations come to rely more and more on industrialization of the sector while the younger generations are simultaneously finding it less and less attractive ([IMechE, 2013](#)).

Importantly, however, all of this of course is predicated on increasing overall food production volumes, and, as has been suggested, increases in food availability can also effectively be achieved through reductions in the 30% or so of global food wasted annually.

## 18.1 Food confused?

Imagine the following: one is having dinner with friends and is about to tuck into a keenly anticipated meal of free range roast rump of New Zealand lamb accompanied by a decadent French foie-gras “pâté en croute,” complemented with UK-grown organic baby carrots, green beans from Kenya, and sauté Ackee from the Caribbean all topped with a subtle truffle and smoke-roasted jasmine tea “jus” from Italy and Japan, respectively. All this global food is paired with a very reasonably priced full-bodied Bordeaux Pauillac red wine. But wait! It doesn’t stop there; for later, the mouth salivates at the thought of fair trade chocolate mousse from South America, Korall shrimp cheese from Russia and a slightly salted African Roumy cheese; then to follow is the hosts’ favorite imported heartwarming, 10-year-old vintage (1992) single-cask Glenmorangie whiskey from Scotland followed by medium-roast Arabica coffee from Vietnam. So, among all of this, one might reasonably ask: where am I? Well, in truth one could be anywhere in the world because the food chain is now a globally functioning network—a largely borderless enterprise where such dinners described above are not uncommon. Indeed, a plateful of sustenance like the one described above can cost anywhere up to tens of thousands of those environmental currency units—“food miles” ([Rae Chi et al., 2009](#)).

Still, as one is about to get stuck into a thoughtfully choreographed, culinary ballet, when a voice from across the table changes the focus of the evenings' soiree with the oft-quoted and—yes in part—smugly annoying "... do you know how far this food has traveled to be here?"

The room quietens and the mood changes. At once mouthwatering anticipation now ceases and saliva dries up while guilt constricts the stomach, reducing one's appetite. Firstly, one is annoyed as, by simply raising the question itself, the guest has assumed the moral high ground. Does he/she think they are the only one who cares about the environment? Indeed, somewhere in the back of one's mind, gremlins are studiously calculating the environmental, social, and ethical impact of this little soiree; however, that's where it was—at the back of the mind—and that's where it was supposed to remain—unencumbered by the reality of this little night's festivities! The dilemma though—should one sit politely and say nothing—holds one's own council while the voice externalizes its own moral fortitude, allowing the speaker to ramble on while patting themselves on the back as they do so? Or should one engage ... hmmm decisions! But it's too late as others have now taken the bait. The dinner dynamics has now changed, and what promised to be a gathering of friends for a light, albeit, slightly extravagant bite and drinks was fast sliding into an ad-hoc save-the-world rally ... the dinner had now been officially hijacked! Yet, the trouble with the topic was it was a free and, dare one say, an easy platform to occupy — everyone knows the validity of the argument ... indeed, there is no argument ... food miles! Indeed, didn't everyone know and care about the food miles' concept. You, me, and the next person, ad infinitum, are all aware and certainly care, but one doesn't need it rammed down one's throat every time he/she sits down to an evening's innocent/guilty pleasure.

"Ah but that's all very well ...," another voice pops up "... if not us, then who would buy this produce from Kenya, from Columbia, who would support these farmers?" The detractor continued:

... can you not see, my friends, food choices are no longer the sole responsibility of the flag-flying environmental stalwarts. And what of fair-trade? The poorer developing countries? And what of the processors, the packers, the importers, the exporters? Would you deny these people a fair and legitimate livelihood? No, my friends, food choices have long-since not been as straightforward as they once were. Over the last few years, they have become social, political and economic bones of contention.

The room was quiet and the message seemed all the more potent for it. And yet despite oneself, one's initial annoyance morphs to one of interest and sincerity as our curiosity is piqued. Others too seemed to take note; their interest also piqued. The rebuff might be onto something here, as it now appears that food miles might not be the only game in town after all. This was the opening gambit and not surprisingly with such an emotive topic, conversation was lively as the party parried and parlayed into the night.

Today's food choices, it would seem, are increasingly seen as convoluted and as complex as the food chain itself. Such choices—once largely based on economic criteria (cheap and value for money)—seem to be ever increasingly wrapped up in wider societal aspirations. What, where, and how we buy our food and how we use it is increasingly indicative of what is important to us in terms of social and ethical values as much as the nutritive value of the food itself.

Take the often-debated food miles as mentioned above for example; on the one hand, consider loud noises of staunch environmentalists whose mantra is to avoid, or at least drastically reduce food miles and its associated carbon footprint, at all costs. On the other hand, we judiciously balance this position with equally self-righteous indignation at the conspicuous lack of “true” global free trade and developmental growth as well as fair and equitable practices as we aggressively encourage the free movement of food trade around the world. So, there are delicate and fine line choices to make before chowing down on the above international gourmet. Indeed, one routinely considers the carbon footprint of the several thousand-mile journeys the carcass has traveled as well as factoring in the various carbon footprint trade-offs between intensive and organically farmed animals; but that’s a separate issue, isn’t it? Well, “no” is the short answer. This is because even this apparently simple trade-off is not that straightforward; many are now realizing that the distance a food item travels—the “food miles”—is only one way to quantify the environmental impact of food produce. And it may be flawed in some very important areas. In fact, of the UK’s food chain—including production, processing, and distribution, for example—only a smallish percentage of total greenhouse gas emissions (including its carbon footprint) are attributed to transportation (Rae Chi et al., 2009). Moreover, the “food miles” mantra has led to a global proliferation of “local is best” whereby many farmer markets and the like are popping up at ever increasing rates. Yet, can one be sure the food miles approach is a suitable means of measuring the products environmental friendliness? Take for instance food, which has been grown or reared in foreign (high food miles) free-range or organic pastures without pesticides, fertilizer use, soil degradation, intensive green housing, and associated labor costs, and which also provides a sustainable living to millions of farmers as well as to those associated people/industries along the entire food chain. Compare this with the same produce grown locally, especially “out-of-season” or “nonnative” produce, which is grown utilizing the latest technology and/or intensive or non-greenhouse gas emissions (GHG) friendly methods and one can reasonably argue that the former scenario, i.e., the all-inclusive approach, is in some (or even many) cases more societally and environmentally friendly than just the food miles approach alone would suggest (Rae Chi et al., 2009). Indeed, while the global food sector accounts for around one-third of total globally produced GHG emissions, transportation of food products in actual fact accounts for only a small proportion of such emissions. So, although without doubt very useful within an arsenal of overarching metrics, the preoccupation with food miles is often misleading as it tends to focus largely on carbon dioxide emissions associated with travel and other lesser voluminous, but no less potent GHG emissions.

In reality, the ecological footprint is another metric that comprises so much more than just a foods CO<sub>2</sub> position; instead it takes into account emissions of nitrous oxide, methane, and industrial gases such as hydrofluorocarbons as well as environmentally friendly concepts (ecological accounting), sustainability, fair trade, organic, local versus global many other concepts. As far as agricultural GHG is concerned, Fig. 18.1 gives a general overview of agricultural GHG emissions by type. Ultimately when it comes to environmental metrics, many researchers and policymakers are questioning whether the “food miles” approach is suitably robust to judge whether what’s on one’s plate is in fact socially and environmentally friendly or not. Ecological accounting might very well be the better option.

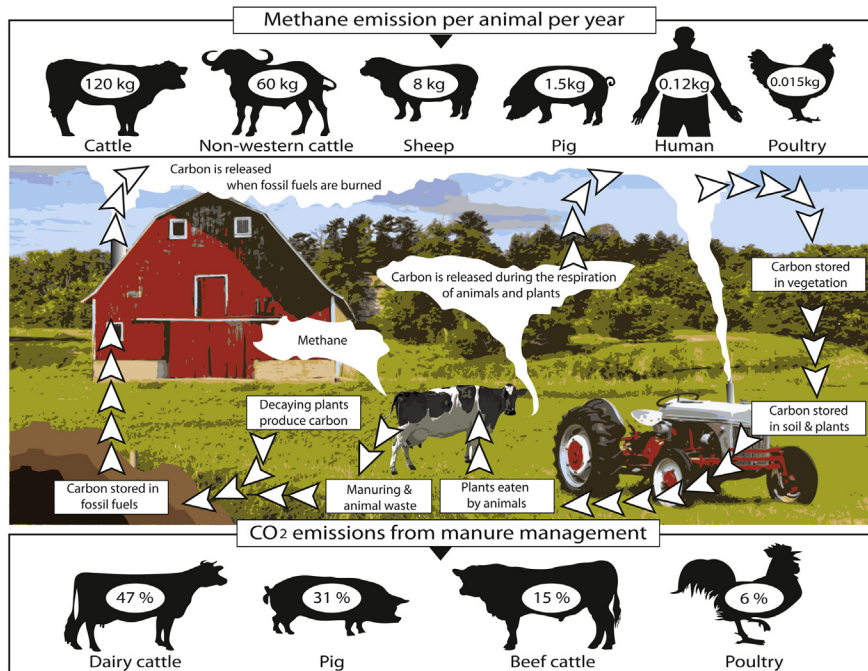


FIGURE 18.1 Agricultural greenhouse gases emissions by source. *Source: Courtesy of Pat Newsham*

In light of such challenges, OXFAM along with the International Institute for Environment and Development (IIED) is modifying the food miles concept in favor of a “fair miles” approach. This relatively new concept takes these challenges and recognizes that there is an environmental–economic trade-off, which on occasion suggests that local is not always or necessarily better (DeWeerd, 2009; Williamson and Young, 2012). This leads us to the question of whether or not we, as consumers, are willing participants, exercising free choice, or simply sheep towing the line in an ever-changing social landscape. The following section elaborates.

## 18.2 Food choices: evolution or moral and ethical blackmail?

Although, as a counterbalance to the previous view, one needs to be aware that when it comes to food and society, as of the last two decades or so, people are becoming more knowledgeable, more discerning, and certainly more interested in the values, cultural diversity, and health and sustainability of food and food products among other things. In short there has been something akin to a social awakening regarding such considerations. Indeed, this “awakening” incorporates a much broader scope in which food’s environmental impact is taken into account vis-à-vis other such laudable aims such as: food and economics; sociocultural food; food in relation to population size and growth; food and globalization; urbanization; wastage; environmental resources concerned with food; and human capital

development among others. All in all, food is having something of a mini social revolution. Indeed, so much has changed when it comes to food choices, that people are nowadays routinely making selections based not only on price or value for money but also on the many ethical and environmental aspects some of which are described above (Gibson, 2016). Consequently, this means that people are now more engaged than ever in the role of food and society. Having said that, one could rationally argue whether such choices are made wholly independently or whether such apparent free choice has been morally hijacked by an increasingly “opinionated” population at large. Take the following example from the author’s viewpoint: I, like many others, make food choices daily—but in this regard I find myself pondering the question of whether my food-based decisions are evolving or whether they are being morally hijacked by a growing almost subliminal moral/ethical movement? Indeed, one only needs to look around at the current state of affairs in the environmental impact of food, and it becomes fairly obvious to see that food choice decisions, once largely driven by economic considerations, are now increasingly reflecting wider society’s collective social aspirations. And yes of course, even now I—“Homo Ignoramus”—find my ever-mindful food shopping mantra “cheap and cheerful” being challenged. Today, the food choices I make seem to be less to do with direct costs or a particular foods nutritive value per se, but rather, increasingly reflective of where it came from; how the food was grown; and what my purchases say about me. Indeed, vis-à-vis my food shopping, I now find myself asking some very challenging questions about whom or what my purchases support in terms of financial, political, ethical, cultural, and social aspects and of the environment as a whole. Yes, I fear to add that my food shopping has fast become a not-so-silent exercise in political activism. Yet within these considerations, whatever my choice trends, I still expect safe, wholesome, and healthy food (cravings notwithstanding). However, with all of this, nowadays my choices, once unencumbered by moral and ethical dilemmas, are not necessarily what they seem and sometimes the trade-offs leave me feeling a touch confused.

When it comes to *nutrition*, for example, I might want food that is sometimes low in salt and fat and sometimes with minimum or at least reduced additives, depending on how I feel I might even question the inclusion of genetically modified (GM) ingredients such as pesticide and herbicide residues—all this on top of the nutritive values of the food in question. Referring back to food additives, it is understood that this particular trade-off is not always that straightforward as some of these additives are natural commodities and can be very beneficial; while even some GM products although perhaps are socially distasteful among the wider population, in some instances they might also very well be ethically up there with fair trade. Continuing on the *ethical* front too, I might consider animal welfare or organic and free-range standards when it comes to my food choices as they are safe bets: Aren’t they? Well yes and no; on the plus side, good animal welfare practices ensure a higher standard of quality of life throughout the animals rearing, while, on the downside, farm animals, particularly the bovine species, are major contributors of GHG (methane gas). Also, on the ethical front, I occasionally opt for the safe, fair trade choice which is usually ethically correct but one which might also be rather heavy on the food miles! This brings me to the “local versus global” debate? As mentioned previously, while sourcing local produce in support of reduced food miles and adding to the intrinsic benefits of local and national businesses, sometimes such choices come, confusingly, with a higher environmental price tag. On the flip side, globally sourced produce can and does (under the right circumstances) support



poorer farmers and others along the food chain in developing countries. There are also considerations of *cultural* aspects too, which might be influenced by the economic maturity of a region or country, etc. And how do I contend with the perception of quality and freshness too as manifest in the simple appearance of food? In this little trade-off, it is worth noting that the more demanding our standards are in terms of uniformity of say fruit and vegetables, the greater the potential for more waste at the end of production of the chain. What is the paradox of slow traditional foods versus modern fast foods? Do we have the luxury of time in this particular trade-off or, in spite of the semantics, is “time” not the issue here? And how tempting is it to take up the offer of “buy one get one free,” only to see the second item rot in the fridge, only to be thrown away at a later date? This also touches on the *economics* of food choices, which might be concerned with the cost of food comparative to our income, etc. In this scenario, the question here is can I comfortably buy the cheaper version when I know for a couple of cents/pence more, can I help the local butcher remain in the high street or the organic farmer stay in business or the African grower earn a living. When it comes to *environmental* factors these also weigh quite heavy on the social conscience. Such issues cover a plethora of related topics, including things like the ecological footprint, food miles, land degradation, climate change, water resources, and agricultural inputs such as fertilizer use, herbicides, pesticides, and other associated inputs within the sector. Moreover, the profligacy of our packaging habits or perhaps other general, natural resource squandering habits that seem pervasive might also be called into question in the choices of the food we buy.

Yet even with a smidgen of social awareness or more simply a fair understanding of what good choices are, where is my guiding light in all of this? Once I have deliberated, cogitated, and agonized over the many, often contradictory or mutually exclusive options and finally made my food choices, in whom can I trust to provide me with honest, unbiased environmentally friendly advice? Do I rely on government labeling initiatives, and if so which government or agency do I take notice of? Local? The exporting government? Are standards comparable across the varied regions and even countries? Or do I pay attention to benchmarks of the various stakeholder industries and NGO’s like the World Health Organization (WHO); the Food and Agricultural Organization of the United Nations (FAO); the American Food and Drug Administration (FDA); the Food Standards Agency (FSA). And if so, are any of these standards national or global in coverage? Do I trust a fair trade labeled product to live up to its promise and ensure more income is shared out among the primary producers? or the locally grown stamp? the organic standard? the free-range mantra? Farm Assured Labels? The Red Tractor promises? The Leaf Mark? The Plan A? Freedom Food? and so on. Furthermore, do I trust in hearsay or anecdotal evidence or are the reams of so-called “factual and honest” advertisements and websites to be trusted? Indeed, while I am not wholeheartedly a cynic in these matters, I am also not naive enough to realize that some of these self-aggrandizing messages are simply mere marketing tools or marketing spin—spin that ultimately shapes, affects, and dare I say hijacks my food choices with an emotional barrage of “do-the-right-thing” messages.

Yet, even in spite of all of the above, what of my guilty craving for chocolate?—Especially when, knowing such desires are contrary to those high standards we, I or society, self-righteously set for ourselves. When knowing this I still chow down on that scrumptious morsel of 77% pure cacao chocolate. In such cases, am I deliberately contributing toward a descending

spiral of societal responsibility? Or am I (or we) left feeling guilty; and if so, guilty of what? Increasing GHG emissions? a burgeoning waste line? or can I judiciously throw caution to the wind and enjoy my chocolate—guilt free? Is this why such cravings are called guilty pleasures?

In the end, I, like many others, desire food that not only tastes good but also makes me happy, without excessively troubling my health or, more importantly these days, my conscience. In all of this, the question begs: Are the days of guilt-free, cheap food, fast coming to an end? Because, if I were to take all these choices into consideration in everything I bought—food-wise, I might be forgiven for failing under the weight of indecision or, in the words of Lucas Hollweg:

Everything is fraught with ethical complications. If I tried to follow all of them, I'd end up an oxygenarian [eating] ... nothing but air. [Hollweg \(2007\)](#).

"In the end, the dilemma boils down to several key questions; firstly, can I contentedly accept the fact that on certain levels I can be hypocrite? Like enjoying a bowl of shark's fin soup while simultaneously espousing the virtues of animal welfare? Or can I seriously chow down on a treat of foie gras pâté giving little thought to the cruel way in which the animal is reared? Furthermore, while taking this standpoint, on many of the other issues at hand, can I convincingly adopt the highest of moral standards? Or are these ideological polar opposites genuinely mutually exclusive?

So, where does it go from here? While I am loath to generalize, on this occasion, I must make a rare exception. We humans are not devoid or ignorant of the big picture, nor are we inconsiderate sentient beings. Yet even in spite of such generous human traits, we are not blameless either. As such we are confronted daily with sustenance versus moral and ethical trade-offs, many of which have repercussions and consequences beyond our immediate satiation. In this respect I cannot advocate a one-size-all policy. In the end, it is your food and hence your choice!

Yet, having outlined many of the seemingly contradictory issues at hand, when it comes down to it, I am still left with one nagging doubt—an uncomfortable feeling that will not go away. That is, even for those of us who can afford to spend an increasingly smaller proportion of our salary on food than in the developing countries, and in spite of the fact that we often know or can guess what the right choices are, I am still left wondering just how many of us still make many of our food selections based largely on cost and economic considerations rather than the more moral and ethical taxing ones? For me—for my money—ashamedly I still do. Does that make me, you, and us hypocrites? Sadly, I think it does? But that's just my thoughts—what about you? Well, in answer, I reiterate an earlier point—it's your food, it's your choice."

*Source: WorldChefs.org; ([Gibson, 2012](#)).*

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