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Justice, Negative GHIs, and the Consumption of Farmed Animal Products

Abstract: In a previous work I argued that all human beings should possess the right to adequate health protection, and that we have good reasons to believe that not all human beings are or will be able to enjoy this right. I introduced the ‘Global Health Impact’ or ‘GHI’ concept as a unit of measurement to evaluate the effects of human actions on the health of human and nonhuman organisms, and argued that the negative GHIs produced by our current generation jeopardise the right to adequate health protection of future generations unjustifiably. In this article, this incomplete theory of human justice is applied to the negative GHIs associated with the consumption of farmed animal products. Since the negative GHIs of such products generally exceed those associated with other diets, I argue that those who exceed their fair share of negative GHIs might curtail their consumption, and that the costs of reducing negative GHIs in this domain might be lower than the costs associated with other things that could be done to reduce negative GHIs.

Key words: animal, diet, environment, global health impacts, justice

Justice, Negative GHIs, and the Consumption of Farmed Animal Products

Introduction

Elsewhere, I introduced the ‘Global Health Impact’ (GHI) concept as a unit of measurement that evaluates the effects of human actions on human and nonhuman health (Deckers 2010b; Deckers 2011b). I also argued that the total negative GHIs of our present generation jeopardise unjustifiably the right to health protection that should be possessed by all human beings, including those who will belong to future generations. Consequently, I argued that our present generation is under a moral obligation to limit its negative GHIs, and that this obligation must be borne primarily by those who exceed their fair share of negative GHIs. In this article this incomplete theory of human justice is used to evaluate which duties might follow from an ethical evaluation of the human health costs and benefits associated with the consumption of farmed animal products.

Several studies have emphasised the role that animal products can play in the human quest for adequate nourishment (Eik et al. 2008; Herrero and Thornton 2010). Since animal products are relatively energy-dense, rich in high-value protein, vitamin B-12 and fat-soluble vitamins, absorbable minerals such as iron and zinc as well as other micronutrients, some have welcomed their inclusion in the diets of people who might otherwise lack adequate nutrition (Leroy and Frongillo 2007; Müller and Krawinkel 2005). However, in recent years the consumption of farmed animal products has also gained increasing recognition as a human health concern. One concern is its connection to obesity. The fact that more than one billion people are now overweight has prompted some to speak of an ‘obesity pandemic’ (McMichael et al. 2007). A recent study by Lloyd-Williams and colleagues estimates that even small reductions in the intake of

animal products within many countries of the European Union could have significant positive health advantages (Lloyd-Williams et al. 2008). The researchers found that reducing saturated fat consumption by 1% and increasing monounsaturated and polyunsaturated vegetable fat consumption by 0.5% each would result in ‘approximately 9800 fewer coronary heart disease deaths and 3000 fewer stroke deaths each year’ in 15 countries of the European Union (Lloyd-Williams et al. 2008, 535). In general, diets that include small quantities of, or no animal products have been associated with lower levels of cardio-vascular diseases, obesity, dyslipidaemia, hypertension, type 2 diabetes, and some types of cancer (Messina and Burke 1997; World Cancer Research Fund and American Institute for Cancer Research 2007). Additionally, the claim has been made that – if carefully chosen – adopting such diets does not produce adverse health effects (WHO 2003). In spite of this, the consumption of farmed animal products remains very high in many Western countries, whereas consumption levels in many other countries, although still modest, are rising at unprecedented rates, with an increase in the consumption of meat from 73 million tonnes in 1990 to 137 million tonnes in 2002 in ‘developing countries’ (Steinfeld et al. 2006, 15).

Apart from containing saturated fats, many farmed animal products include many other substances that are harmful to human health, including antibiotics, hormones, pesticides, dioxins, and metal compounds. Most animals are given antibiotics not because they are ill, but because they live in close proximity to other animals who might be ill, or because it makes them grow faster (Anomaly 2010). Hormones are also given widely to stimulate growth or milk production. Animal products also contain relatively high levels of some pesticides because some of these concentrate up the food chain, a process known

as bioaccumulation. The same applies to dioxins (such as polychlorinated dibenzodioxins and polychlorinated dibenzofurans) and polychlorinated biphenyls which are causing a variety of health problems, including cancers, immunologic, and metabolic disorders (National Academy of Sciences 2006; Swedenborg et al. 2009). Whereas dioxins are produced mainly by the incineration of medical and other wastes, including some plastics, and by some methods used to bleach wood pulp, they enter the human body largely by their ability to accumulate in the fatty tissues of animals who are then consumed by humans. Animals can be exposed to these harmful substances in a variety of ways, including their ability to travel in the air and to land on plant foods that are then eaten, and through their presence in rendered animal fats that are used to feed animals (Sapkota et al. 2007, 666). Dioxins and methyl mercury can also be stored inside the bodies of fish, and pose health risks to humans who eat them (Trasande et al. 2005). The feed that pigs and birds who are consumed by humans eat frequently contains organoarsenicals such as roxarsone, which is used to increase feed efficiency and to stimulate growth (Chapman and Johnson 2002). Both inorganic arsenite (As^{III}) and inorganic arsenate (As^{V}) – human carcinogens – can thus be produced inside the animals' digestive tracts and their waste (Sapkota et al. 2007, 665).

Common bacterial pathogens include Salmonella, Listeria, Toxoplasma, Escherichia coli 0157:H7, various species of Campylobacter, Clostridium botulinum (the pathogen that causes botulism), and Hydatid disease. Parasitic diseases include Giardia, Cryptosporidium, Microsporidia, Fasciola, tapeworms, and threadworms. Many bacteria (such as Escherichia coli 0157:H7 and Salmonella) are now becoming resistant to the drugs that have been developed to fight them, and some antibiotic-resistant bacteria have

been transmitted from pigs and birds to humans (Aarestrup et al. 2000; Burkholder et al. 2007; Duffy and Moriarty 2003). Many viral diseases also emerge within the farm animal industry, including various viral haemorrhagic fevers, and the Nipah virus. Another disease is Creutzfeldt-Jakob disease, which can spread not only through eating parts of animals carrying Bovine Spongiform Encephalopathy (BSE), but also through blood transfusions and the use of contaminated surgical and other equipment (Collinge 1999). Whereas diets that exclude farmed animal products are not entirely free from all these health hazards, the nutritionist Tom Sanders (1999, 265) has claimed that ‘most food-borne disease in developed countries is transmitted via meat, eggs, shellfish, and milk.’

Given the wide range of human health concerns that are associated with the consumption of farmed animal products, of which I have provided no more than a concise overview, it seems surprising that relatively little attention has been given to the questions of whether and when the consumption of farmed animal products might survive moral scrutiny in relation to the goal of safeguarding human health. A possible reason for this deficit may be the possibility that many people hold the erroneous view that people who consume harmful farmed animal products primarily harm themselves. The impact of this view on public policy would be particularly strong within liberal societies that give prominence to the view that self-harm should not be given the same level of moral scrutiny compared to the harm that might be inflicted on others, especially when combined with a strong anthropocentric culture that disregards any harm that humans inflict on nonhuman organisms. However, it is becoming increasingly clear that the consumption of farmed animal products can have far-reaching implications for the health of other human beings. This is exemplified by the emergence and spread of zoonoses, the

diseases that are transmitted from nonhuman to human animals, which pose profound ethical questions that have enjoyed very little debate (Deckers 2011a). A review of 1,407 species of human pathogens found that more than half were zoonotic and the same review found that zoonoses account for almost three-quarters of recently emerged human diseases (Woolhouse and Gowtage-Sequeira 2005). Particularly noteworthy are the strains of swine and avian influenza that could result in significant negative health consequences, even for those who play little or no part in their emergence. Whereas a variant of the avian influenza virus may have caused the great influenza epidemic that emerged in 1918, there is real concern that the recently emerged H5N1 and H1N1 strains could affect millions of people living today (Belshe 2005; Fraser et al. 2009). To emphasise this point, Michael Greger (2007, 277) has commented that the ‘same ‘trench-warfare’ conditions’ that existed in 1918 ‘can be thought to exist at present in many respects in industrial poultry production.’ The conditions in which many pigs are farmed might not be much different. In addition, the transmission of these viruses, as well as of many other harmful pathogens, may be enhanced by the increasing urbanisation and globalisation of our increasing human population.

Whereas these issues seem sufficiently important to demand greater scrutiny of the consumption of farmed animal products, those who have questioned current consumption and production patterns out of human health concerns have done so predominantly out of concern for the more indirect ways in which the consumption of farmed animal products might jeopardise human health, with a particular focus on climate change and our use of resources. Particularly noteworthy in this respect is an influential report with the title ‘Livestock’s Long Shadow’, published in 2006 by the Livestock,

Environment, and Development Initiative, a group co-ordinated by the Food and Agriculture Organization of the United Nations (henceforth: the LEAD study) (Steinfeld et al. 2006). The report claims that the ‘livestock sector enters into more and direct competition for scarce land, water and other natural resources’ and that ‘the environmental impact of livestock production will worsen dramatically ... in the absence of major corrective features’ (Steinfeld et al. 2006, xxi, 275). Whereas the authors of this report do not use their findings to argue for a reduction in consumption, but predict that it will rise to unprecedented heights, their findings have inspired others to do so (Compassion in World Farming 2007; Garnett 2009; Goodland and Anhang 2009). Recently, the author of an influential review on the economic costs of climate change, Nicholas Stern (2006), is reported to have claimed that vegetarian diets should be advocated on the basis of the view that farm animals put great pressure on our resources, and that dietary changes must be considered ‘for the world to break free from its catastrophic current trajectory’ (Pagnamenta 2009). If these claims are correct, we have good reasons to be concerned about the farm animal sector if we want to safeguard the right to adequate health protection for all human beings. In what follows I shall examine these claims to address whether, by curtailing their consumption of farmed animal products, people might be able to reduce their negative GHIs where they are required to do so by the demands of justice.

Farmed animal products, greenhouse gas emissions, and negative GHIs

Whereas the LEAD study claimed that the farm animal sector produced 18% in CO₂-equivalents of all anthropogenic greenhouse gas emissions in 2002 (Steinfeld et al. 2006),

a more recent study claims that the data provided by the LEAD study were a gross underestimate and that the total emissions of the sector amounted to 51% in CO₂-equivalents in 2009 (Goodland and Anhang 2009). The main reasons for this significant difference are attributed to the following: that the former study did not include respiration as a source of emissions; that it did not factor in the opportunity costs associated with the fact that a lot of land (26 % of grassland and 33% of arable land) that is used by the farm animal sector could regenerate as forest and capture much more carbon through photosynthesis; that it undercounted the number of farm animals (for example by excluding farmed fish) and overlooked some emissions produced by the production, distribution, and disposal of animal products, their byproducts, and their packaging; that it ignored the emissions produced by the pharmaceutical and medical industries in their fight against diseases associated with the farm animal sector; and that an inappropriate ‘global warming potential’ (a measure that calculates the amount of heat trapped by a quantity of gas as a factor of the heat trapped by one unit of a similar mass of CO₂ gas) of 23, rather than the more appropriate figure of 72 was used for methane. With regard to this last reason, the authors justify their figure by pointing out that a 20-year timeframe (with global warming potential of 72) must be used rather than a 100-year timeframe ‘because of both the large effect that methane reductions can have within 20 years and the serious climate disruption expected within 20 years if no significant reduction of greenhouse gases is achieved’ (Goodland and Anhang 2009, 13). I have reported elsewhere how emissions from the farm animal sector will escalate in the future if current emissions data from the latter study are combined with the growth projections of the former study (Deckers 2010a). While I shall not discuss which of these studies is most

likely to be correct, it is clear that both studies agree that the farm animal sector presents significant human health concerns because of its contribution to climate change.

To assess how dietary changes could reduce overall emissions, however, we need to develop some idea of how the emissions produced by different diets compare with one another. In this respect, a study carried out in the United States of America (USA) revealed that the mean diet of a USA citizen, which includes 27.7% of calories from animal sources (comprising 41% from dairy, 5% from eggs, and 54% from a range of meats), produces at least 1.5 tonnes more emissions (measured in CO₂-equivalents) per year compared with the emissions produced by a vegan USA citizen (Eshel and Martin 2006, 13). To obtain some idea of how this compares with the emissions produced by personal transportation, the authors point out that the per capita car miles travelled by the average USA citizen in 2003 were 8332 miles, producing between 1.19 and 4.76 tonnes of CO₂ emissions, depending on which vehicle was used (Eshel and Martin 2006, 2-3). The authors draw on their knowledge of the emissions produced by different car models to make an interesting analogy. If we imagine that a person adopting the mean diet of the USA citizen drives an averagely efficient car (Toyota Camry) and that a vegan compatriot drives one of the most energy-efficient hybrid vehicles (Prius) on the USA market in 2006, the difference in diet-related emissions (for a given quantity of food with equal caloric intake) amounts to the difference in emissions produced by the former driving 143 miles in the less efficient car and the latter driving 100 miles in the more efficient car (Eshel and Martin 2006, 2-3). Or, to use a different analogy, the difference in emissions between the person adopting the mean USA diet and the person adopting the vegan diet also corresponds to the difference in emissions between driving 8332 miles

(the distance travelled by the average USA citizen in a year) in one of the most efficient cars and not driving at all.

If we now assume that a (not very) enlightened omnivore would be willing to use no more than half of the animal products consumed in the mean USA diet and that the proper and large-scale use of new technologies could reduce the greenhouse gas emissions related to the production of farm animal products by 20%, enlightened omnivores living in the USA would still produce 0.6 tonne more greenhouse gas emissions per year compared to their vegan compatriots (which comprise no more than 1.4% of the population according to a poll carried out in 2006) (Stahler 2006). Similar results were found in a more recent Swedish study, where the greenhouse gas emissions of three Swedish meal options were compared. The difference between the hypothetical vegan meal and the two hypothetical meals that included animal products varied between a factor of three and a factor of eleven, depending on which kinds of animal products were chosen (Carlsson-Kanyama and González 2009, 1708S). In spite of these significant differences, the authors comment that ‘research is needed to understand why dietary change is not on the climate change agenda’ (Carlsson-Kanyama and González 2009, 1704S). I argue the more important moral point that diet should be on our moral agenda, and that it is highly relevant when it comes to determining what our duties are in relation to climate change. To avoid dangerous climate change, which – so it has been argued – would violate human rights (Caney 2009; Bell, 2011), the Intergovernmental Panel on Climate Change (2007, 20) has claimed that a reduction in CO₂ emissions of up to 85% relative to 2000 levels may be required by 2050. On this basis, Rosales (2008, 1414) has

calculated that this leaves no more than an average of 0.8 tonne per capita per year, a threshold that many people exceed by their diet-related emissions alone.

It is on the basis of the greenhouse gas emissions produced by different diets that a research team led by Anthony McMichael has proposed that the global per capita consumption of meat should drop from the current average of 100 g per person per day to an average of 90 g of meat per person per day (with less than 50 g coming from red meat from ruminants) (McMichael et al. 2007). Henceforth, I simply refer to this team by the name of McMichael. McMichael argues that all countries should eventually converge to a per-capita consumption level of 90 g per person per day which would stabilise greenhouse gas emissions from the farm animal sector by 2050 relative to its contribution in 2005, subject to the global human population not having increased by more than 40% by 2050 and current emissions being reduced by 20% per unit of meat.

This proposal raises a number of concerns. One concern is the question whether a 20% reduction per unit of production could be achieved. This has been doubted as it would require the rapid, full implementation of all available technologies on a global scale (Weidema et al. 2009). A further issue is that the expected reduction would not occur unless it would be accompanied by similar reductions in the consumption of all other farmed animal products apart from meat. Another issue is that this proposal fails to take into consideration the different circumstances in which people living in different countries may find themselves. Some countries may rely more on the consumption of farmed animal products because some of their inhabitants may lack sufficient alternatives that are suitable for human consumption, which questions the desirability of the view that consumption levels between people living in different countries should eventually

converge. A more fundamental problem is the question why McMichael only seeks a stabilisation of emissions from the farm animal sector, whereas many have argued that significant cuts in overall emissions are required to avoid dangerous climate change. For example, by passing the Climate Change Act 2008, the UK Parliament (2008) adopted the view that a reduction of at least 80% is required by 2050. Also, both the Climate Change Act 2008 and the Kyoto Protocol take the 1990 emissions as the baseline level, whereas McMichael's team merely seek for emissions to stabilise relative to the 2005 level. This reduces the contribution of this sector to climate change abatement strategies even further, especially since the global consumption of farmed animal products increased significantly between 1990 and 2005. Indeed, the LEAD study has estimated that, whereas the consumption of meat levelled off in 'developed countries', total meat consumption in 'developing countries' almost doubled between 1990 and 2002 (Steinfeld et al. 2006, 15).

While it is, therefore, unlikely that McMichael's proposal goes far enough, it must be recognised that the fact that many people's diets are associated with relatively large amounts of greenhouse gas emissions need not necessarily be a moral problem. The issue of what counts as a fair greenhouse gas allowance should be considered as an important part of, yet not as a substitute for, the more general question of what counts as a fair threshold of negative GHIs. Likewise, the issue of what counts as a fair diet should not be treated in isolation from the question of what counts as a fair threshold of negative GHIs. Many people may well prefer either to reduce their negative GHIs elsewhere, for example by reducing the emissions produced by the consumption of domestic energy or transport, or to offset some of their negative GHIs by producing positive GHIs, for example by

planting trees. Therefore, some people might justifiably be allowed to emit a relatively larger share of greenhouse gas emissions or to eat more farmed animal products than the amount proposed by McMichael, provided that their threshold allowance of negative GHIs is not exceeded.

Farmed animal products, dietary ecological footprints, and negative GHIs

To obtain a better idea of the negative GHIs associated with the consumption of farmed animal products, it is clear that we must move beyond the question of how many diet-related greenhouse gas emissions each person produces. The ecological footprint concept might be useful here (Wackernagel and Rees 1996). Whereas the GHI concept measures the impact of human actions on human health in one unit, the ‘ecological footprint’ concept measures the impact of human activities on the nonhuman environment in one common unit, the use of bioproductive space.

Ecological footprint calculators have been developed to estimate the ecological footprints of different categories of individuals living in different parts of the world. The Global Footprint Network, an organisation set up in 2003 to promote sustainability, is updating its footprint calculator at the time of writing, and therefore data can only be obtained for people living in a few countries. If the calculator is used, for example, to calculate the footprint of a USA citizen who lives in a free-standing home with running water and electricity where three people live together and where mean values (as indicated) are chosen for all remaining categories, a marked difference can be observed between the ecological footprint of a male person who eats ‘meat a few times a week and eggs/dairy almost daily’ and a male person who never eats animal products. The former

would use about 8.5 global ha (21.1 global acres) whereas the latter would use about 7.3 global ha (18.1 global acres) (Global Footprint Network 2009). Some ecological footprint calculators can also be used to measure dietary ecological footprints in isolation of other components. The Earth Day Network (2008), an organisation based in the USA to promote, together with an international network of partners, their belief in a moral human right to a healthy and sustainable environment, has developed such a calculator. The calculator can be used, for example, to measure the dietary ecological footprint of a male person, aged between 36-50, living not far from Edinburgh (Scotland), who eats very few foods that are processed, packaged, or imported. To satisfy his dietary needs, such a person would require 0.5 global ha if he never eats animal products, 0.9 global ha if he eats such products occasionally (defined as: no meat or occasionally meat, but eggs/dairy almost daily), or 1.4 global ha if he eats meat very often (defined as: daily). Whereas these findings cannot be generalised across different countries because of ecosystemic and technological differences, several studies carried out in various countries have concluded that the ecological footprints of many diets that include farmed animal products exceed those of many other diets (See e.g.: Carlsson-Kanyama and González 2009; Baroni et al. 2007; Reijnders and Soret 2003; Peters et al. 2007; Eshel and Martin 2009).

While the main focus of this article is on farmed animal products, it is worth mentioning that many products derived from animals who have not been farmed do not fare much better. In this respect, the ecological footprints associated with the consumption of fish are particularly worth mentioning. The argument has been made that the costs related to the environmental degradation (and species losses) caused by

(over)fishing are significant, and routinely undervalued (Myers and Worm 2003; Worm et al. 2006). Having examined the energy costs of fishing, Gidon Eshel and Pamela Martin (2006) conclude that typical Western diets which include fish are more inefficient compared to plant-based diets, especially since long-distance boat journeys are associated with the catching of fish preferred by Western customers. This is confirmed by Reijnders and Soret (2003, 667S), who claim that the fossil fuel requirements for trawler fishing – the prevailing fishing method in Western Europe – is 14 times larger than the amount needed to produce an equal amount of plant protein in Western Europe. This excludes the high emissions that are frequently used to process fish, for example the emissions produced by canning and refrigeration. High emissions for cod fishing were also calculated by Carlsson-Kanyama and González (2009, 1707S). Whereas many aspects of the fishing industry are associated with relatively large ecological footprints, it must be pointed out that the consumption of some fish (e.g. herbivorous fish kept in nearby ponds) can be associated with relatively small ecological footprints, but their potential to contribute to a substantial part of the diets of the growing human population may be limited due to space, time, and ethical constraints. Whereas some methods to farm fish are associated with relatively small footprints, other methods used in aquaculture have been associated with relatively large ecological footprints because of their use of pesticides, prophylactic antibiotics, eutrophying nutrients, and their use of other fish as feed (Cole et al. 2009). With regard to this last factor, one study estimates that about one third of all the fish who are caught is used to feed farm animals (Goldburg and Naylor 2005, 23). A different study, however, estimates that the aquaculture industry used as

much as 68.2% of all fish meal and 88.5% of all fish oil that was produced from the bodies of fish in 2006 (Tacon and Metian, 2008)

Whereas the ecological footprint is a more inclusive measure than the measure provided by greenhouse gas emissions alone, it was not designed to be a tool to measure the moral character of human actions. This is so for good reasons. While some activities may use relatively few resources and produce little waste, they might nevertheless undermine human and nonhuman health. And vice versa, a relatively large ecological footprint need not necessarily be associated with relatively large negative GHIs, for example in situations where activities that have relatively large ecological footprints produce relatively large health benefits. Whereas it may be more difficult to quantify GHIs as people may have widely differing ideas about what should count as a health impact and about how they should be measured, this shows why we need such a measure. It is impossible to say categorically that those who produce relatively large amounts of greenhouse gas emissions or those who have relatively large ecological footprints act immorally. In order to evaluate the morality of their actions with regard to their impacts on human beings, we must examine whether the negative GHIs that are produced by their actions violate any human being's right to health protection.

In spite of their limited use to evaluate the moral character of human actions, those who have relatively large ecological footprints would have relatively large negative GHIs unless they produce relatively large quantities of positive GHIs by their actions. This must be concluded if William Rees (2006) is correct that the ecological footprint of the global human population today jeopardises the availability of sufficient resources to meet the basic health needs of those who will be living in the future. Whereas some of the

negative GHIs associated with the production systems that underlie omnivorous diets might be offset by the positive GHIs that they produce (including potential non-food related benefits), it must be questioned whether diets that exclude farmed animal products are more likely to protect the right to health protection than diets that include them. Whereas people may have widely different views about the scope of such a right (i.e., in relation to the question of what health is, and whether a distinction between basic health protection and non-basic health protection should be made), about what should count as a negative and a positive GHI, and about how to measure the relative merits and demerits of different diets, the analysis presented above suggests that the answer to this question may be positive for people living in a wide range of different locations. Whereas a more developed theory would include an account of how negative and positive GHIs might be quantified, this need not exclude the possibility of taking into consideration those negative and positive GHIs that are difficult to quantify, say for example the amount of pleasure people derive from eating particular foods, the degree of importance they give to particular risks and uncertainties (e.g. related to zoonotic diseases), the benefits that some people derive from the traction power or the aesthetic value that some animals may provide, or the need to consider deontological constraints apart from the human right to health protection, for example in relation to the question of whether any nonhuman animals should be given a similar right.

Why some people might need to curtail their consumption of farmed animal products

If the analysis presented above is plausible, many people could reduce their negative GHIs by reducing their intakes of farmed animal products. Therefore, if people who exceed their fair share of negative GHIs are morally obliged to reduce them, they might consider making dietary changes. In this light, a more radical proposal than McMichael's has been put forward by Compassion in World Farming (2007, par. 6.1), who claim that those living in 'developed countries should reduce production and consumption of meat and milk to at least 60% below current levels by 2050'. My view is that this should be a moral obligation only for those people (whichever country they live in) who would exceed their fair share of negative GHIs if they failed to do so, and who prefer this method of reducing their negative GHIs over any other methods that might be available.

However, when we compare the potential of reducing or eliminating farmed animal products from our diets with some alternative methods that we could adopt to reduce our negative GHIs, two striking differences can be observed. Firstly, while it might take many years before we have developed and implemented more sustainable energy and transportation technologies, dietary changes can be made right now. We need not await the arrival and implementation of new technologies. This is highly relevant since people who exceed their fair share of negative GHIs are in debt right now, and therefore must act immediately to reduce their negative GHIs. A second difference is that, whereas a reduction in the intake of animal products is associated with health benefits for many people who can obtain adequate alternative foods, significant costs are associated with most other methods we have at our disposal to reduce our negative GHIs at the present time.

To illustrate the latter, I shall give four examples from sectors that contribute significantly to people's negative GHIs. Firstly, if we cannot heat our buildings without making significant cuts in our use of resources, we shall have to lower our heating requirements if we want to reduce our consumption in this sector. For those who have them, the use of a range of electrical appliances, for example washing machines, kettles, lighting, audiovisual equipment, and computers could also be curtailed. A third area where we could reduce our energy-consumption is in the purchase of non-food items, especially those items that require a lot of resources and energy in their life-cycles. A fourth sector that dissipates a lot of energy is the transport sector. We could reduce the transportation of goods that do not satisfy vital interests and limit private transportation, for example by limiting air and car travel. Alternatively, people could use cleaner fuels to reduce their greenhouse gas emissions. However, whereas reducing greenhouse gas emissions per se would be positive, the cleaner fuels that replace them might not necessarily decrease negative GHIs. For example, even if biofuels were grown without the use of chemicals (such as synthetic fertilisers and pesticides) produced from fossil fuels, their production might still incur relatively large amounts of negative GHIs. The land on which biofuels can be grown could be used for other purposes that might produce relatively fewer negative GHIs per unit of benefit.

Whereas Simon Caney (2009, 179) has claimed that cuts in greenhouse gas emissions 'from driving cars, taking plane flights, poorly insulated housing, and inefficient energy use ... cannot be said to compromise any human rights', no leap of imagination is required to suspect that for many people who exceed their fair share of negative GHIs it may be very demanding to make significant cuts in these areas, as well

as more generally in any of the four sectors I have mentioned. If this is so, they might agree with the view that they are under a moral obligation to limit their negative GHIs to what is their fair share by restricting the consumption of farmed animal products where doing so would not compromise their ability to access adequate nutrition. Doing so might be far less costly and provide not only social, but also individual and environmental gains (Eshel and Martin 2009, 1713S).

Conclusion

Calculations of greenhouse gas emissions and ecological footprint calculations reveal that, in most contexts, diets that include the consumption of farmed animal products produce more greenhouse gas emissions and have larger ecological footprints compared to other diets. Whereas these calculations are important, it has been argued that they must be seen as important aids to decision-making, rather than decision-making tools themselves. More specifically, I have argued that, in order to evaluate dietary choices, these choices must not be treated in isolation from the other choices we make. While obtaining accurate information about the greenhouse gas emissions and ecological footprints of different dietary options is important, this knowledge does not tell us anything about why some diets might be more problematic than others.

To answer this question, I applied an incomplete theory of human justice that focuses on the negative duty we have to make sure that our actions do not jeopardise the health of human others unfairly. In order to measure how human actions influence health, I applied the ‘Global Health Impact’ concept, a novel unit of measurement that I introduced in previous work (Deckers 2010b; Deckers 2011b). I argued that diets that

include farmed animal products are – in many situations – associated with more negative GHIs compared to alternative diets. While many different strategies could be adopted by those who are under a moral obligation to constrain their negative GHIs, I have suggested that curtailing the consumption of farmed animal products might be an option that is less demanding and even beneficial compared to the alternative options that may be available.

In this article I have ignored the question of what the negative GHIs of different human diets are on the organisms that make up the nonhuman world. I have argued elsewhere, however, that we should also consider the health impacts upon the nonhuman world when we determine what counts as a fair share of negative GHIs, and that – in many situations – the negative GHIs on the nonhuman world that are associated with diets that include farmed animal products exceed those that are associated with diets that exclude them (Deckers 2011c). If the argument developed there survives ethical scrutiny, it adds further weight to the argument that, in many situations, the negative GHIs of the former are considerably greater than those of the latter.

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