

# Intensive Livestock Farming: Global Trends, Increased Environmental Concerns, and Ethical Solutions

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**Abstract** By 2050, global livestock production is expected to double—growing faster than any other agricultural sub-sector—with most of this increase taking place in the developing world. As the United Nation’s four-hundred-page report, *Livestock’s Long Shadow: Environmental Issues and Options*, documents, livestock production is now one of three most significant contributors to environmental problems, leading to increased greenhouse gas emissions, land degradation, water pollution, and increased health problems. The paper draws on the UN report as well as a flurry of other recently published studies in order to demonstrate the effect of intensive livestock production on global warming and on people’s health. The paper’s goal is to outline the problems caused by intensive livestock farming and analyze a number of possible solutions, including legislative changes and stricter regulations, community mobilizing, and consumers choosing to decrease their demand for animal products.

**Keywords** Agriculture · Animals · Environment · Ethics · Farming · Livestock · Meat

## Global Trends and Overview

Approximately 56 billion land animals are raised and killed worldwide every year for human consumption (FAO, n.d.).<sup>1</sup> By 2050, global farm animal production is expected to double—growing faster than any other agricultural sub-sector—with most of those increases taking place in the developing world (FAO 2006b, p. 275).<sup>2</sup> This growth has had

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<sup>1</sup> This figure would be even larger if we also looked at fish and other aquatic animals.

<sup>2</sup> According to this report, global meat production will increase from 229 million tonnes in 1999/2001 to 465 million tonnes in 2050, while milk output is expected to go from 580 to 1043 million tones. The Millennium Ecosystem Assessment also expects that global average meat consumption will grow from

dire consequences. According to the United Nation's recently published four-hundred-page report, *Livestock's Long Shadow*, the livestock sector generates 18% of greenhouse gas emissions, more than all transport (FAO 2006a, p. xxi, 272), usually thought to be the largest cause of greenhouse gases. Furthermore, 70% of all agricultural land, and 30% of the Earth's land surface is directly or indirectly involved in livestock production (FAO 2006b, p. 23). As a result, the livestock sector is now one of the top two or three most significant contributors to environmental problems, leading to land degradation, water pollution, and increased health problems (FAO 2006a, p. xx).

These problems will not go away if more farms shift from being traditional, extensive, decentralized family farms to having more and more intensive livestock production and intensive livestock farms. Intensive livestock farms, also called Concentrated Animal Feeding Operations (CAFOs)<sup>3</sup> raise animals in confinement at high stocking density, using economies of scale, modern machinery, and biotechnology. Intensive animal agricultural methods are the norm in Europe and North America and are increasingly common in Asia and Latin America (Nierenberg 2006). Africa and a few parts of Asia are mostly using traditional (extensive or pasture-based) farming methods, although they are also seeing the introduction of intensive farming methods. According to a 2007 report about greenhouse gas emissions from agriculture, globally "in recent years, industrial livestock production has grown at twice the rate of more traditional mixed farming systems and at more than six times the rate of production based on grazing" (Vergé et al. 2007). As the UN report on the environmental effects of livestock production points out, these global trends and the environmental problems that accompany them have not been given enough attention (FAO 2006b, p. 221).

Philosophers have been written extensively about the moral status of animals.<sup>4</sup> Many have also written about the relationship between animals and the environment, and a few have even discussed environmental problems caused by the livestock industry.<sup>5</sup> However, this literature does not incorporate the insights gained from the large number of recently published studies that show the environmental problems caused by intensive livestock production.

It is important for philosophers to pay attention to these problems, because they are essentially ethical problems about moral responsibility, an area of inquiry that philosophers have expertise in.<sup>6</sup> While scientists are in a better position to come up with technical solutions and policy makers are better equipped to make specific policy recommendations,

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Footnote 2 continued

36 kg/person in 1997 to 41–70 kg/person by 2050 (Fisher et al. 2007, p. 185). The Intergovernmental Panel on Climate Change (IPCC), which together with Al Gore received the Nobel Peace Prize in 2007, shows similar results, pointing out that, "further increases in global meat demand (about 60% by 2020) are projected, mostly in developing regions" (Barker et al. 2007, p. 63).

<sup>3</sup> These are also called factory farms or industrial farms. From now on, I will call them intensive livestock farms.

<sup>4</sup> Starting, famously, with Peter Singer's *Animal Liberation* (1975) and continuing with a flurry of books and articles by numerous philosophers including Cora Diamond (1978), Tom Regan (1983), Dale Jamieson (1998a), Rosalind Hursthouse (2000), Cohen (2001), Nathan Nobis (2002), Martha Nussbaum (2006), and many others.

<sup>5</sup> See, for example, Aiken (1984), Alroe et al. (2001), Callicott, (1980), Jensen and Sorenson (1998), Varner (1994) and Wenz (1984). Paul Thompson has a number of relevant articles, including Thompson (2001) and Thompson et al. (1999).

<sup>6</sup> Stephen Gardiner makes a similar point regarding writing about climate change in his well-known article "Ethics and Global Climate Change" (2007), p. 556.

philosophers are in a unique position to engage with questions of an individual's moral responsibility.

While some philosophers, including Peter Singer and Tom Regan,<sup>7</sup> argue that individuals should choose not to eat meat, their arguments hinge on their views about the moral status of non-human animals. My argument is similar in that ultimately I argue that those of us in developed countries that can afford to, have a moral responsibility to reduce our consumption of meat and other animal products. But my argument does not rest on any claims about the moral status of animals; in fact, I will not discuss this topic further. Instead, I look at recently published empirical studies in order to describe the effect of the livestock industry on the environment and people's health and ask what we should do about it.

As numerous reports demonstrate, including those published by the UN and many other organizations—which I will be citing later in the paper—there are a wide variety of problems caused by intensive livestock production, including increased greenhouse gas emissions, increased health risks to workers and those living near intensive livestock farms, land and water shortage and degradation, environmental problems related to the storage and disposal of manure, and health problems caused by the use of hormones and antibiotics. Since it would be impossible to cover all these problems in a short article, I will focus on the first three.

### Increased Emissions

While two decades ago philosophers could have argued that they did not focus on the environmental aspects of meat production because the empirical data was missing, we can no longer make this argument. The increase in greenhouse gas emissions caused by raising animals, especially the increase in concentration of animals in intensive livestock farms, has been well-documented by the UN, the Pew Center on Global Climate Change,<sup>8</sup> and many others. While most people, including many environmentalists, assume that transport is the main contributor to greenhouse gas emissions, as I pointed out at the beginning of this paper, livestock is in fact responsible for a higher share of greenhouse gases: 18% of greenhouse gas emissions, which is more than the whole transportation industry (FAO 2006a, pp. xxi, 272). While all farm animal operations release large amounts of carbon dioxide, intensive livestock farms require more energy than traditional farming methods (FAO 2006b, pp. 88–89). Because intensive livestock farms usually raise animals indoors, they use large amount of energy for heating, cooling, and ventilating as well as for feed production and transportation (FAO 2006b, pp. 88–89). In fact, operating intensive livestock farms produces even more carbon dioxide emissions than does the manufacturing of chemical fertilizer for animal feed (FAO 2006b, p. 88).

But looking only at carbon dioxide emissions is insufficient. The livestock sector also emits 68% of anthropogenic<sup>9</sup> nitrous oxide (most of which comes from manure), which

<sup>7</sup> See for examples, Peter Singer's *Animal Liberation* (op. cit.), and Tom Regan's *The Case for Animal Rights* (op. cit.).

<sup>8</sup> The Pew Commission on Industrial Farm Animal Production was established when the Johns Hopkins Bloomberg School of Public Health received grant from The Pew Charitable Trusts. The Commission has two years "to study the public health, environmental, animal welfare, and rural community problems created by concentrated animal feeding operations and to recommend solutions." The result is a set of reports available at <http://www.ncifap.org/reports/>.

<sup>9</sup> The standard literature on this topic refers to these emissions as "anthropogenic" even though they come from animals because they are the result of a human activity: livestock farming.

stays in the atmosphere for up to 150 years and has 296 times the global warming potential of carbon dioxide (FAO 2006b, p. 103, 114). It adds to global warming, and it adds to the depletion of the ozone layer (FAO 2006b, p. 103). Livestock are also responsible for almost 64% of anthropogenic ammonia emissions, which contribute significantly to acid rain and acidification of ecosystems (LEAD 2006).

As the UN report on livestock shows, worldwide, farm animals are also the most significant source of anthropogenic methane, responsible for 35–40% of global methane emissions (FAO 2006b, p. 112). Methane has 23 times the global warming potential of carbon dioxide (LEAD 2006). Farm animal operations lead to increased methane emissions because of the animals' diet, which causes the ruminants to develop a number of illnesses (Smith 1998; Russell and Rychlik 2001) and to generate 50% more methane emissions than cattle raised on grasses in the United States (US EPA 1998).<sup>10</sup> The reason behind this is that animals raised in intensive livestock farms are given large amounts of concentrated, high-protein feeds made from corn and soybeans—50% of corn and 80% of soy are used for animal feed according to the United States Department of Agriculture (USDA) and the World Wildlife Fund (USDA n.d.; WWF n.d. a). This food is cheap, easy to produce, and ruminants—especially cattle—gain weight faster when eating it than when they consume a traditional diet. The problem with methane emissions is only compounded by the increasing number of animals raised for food. According to the United States Environmental Protection Agency, in the last 15 years, greenhouse gas emissions have risen dramatically; methane emissions from pigs have increased by 37% and those from dairy cows by 50% in the United States (US EPA 2007). This amount of greenhouse gas emitted will continue to increase as intensive livestock farms spread to more and more developing countries.

As numerous philosophers writing about climate change have pointed out,<sup>11</sup> poorer people, especially those in developing countries, will suffer the most from the impact of climate change. They are at increased risk for hunger and disease due to climate change because, as the Intergovernmental Panel on Climate Change (IPCC) points out, “they tend to be concentrated in relatively high-risk areas, have more limited coping capacities, and can be more dependent on climate-sensitive resources such as local water and food supplies” (IPCC 2008, p. 359). Climate change could result in food shortages for 130 million people in Asia alone by 2050 (Casey 2007). Severe flooding and storms, the erosion of coastlines, the loss in biodiversity, degradation to land, air and water pollution, affect those in developing countries much more than those in developed nations because of existing poverty, health issues, and infrastructure problems. Henry Miller of Stanford University says in a recent *New York Times* article, “like the sinking of the Titanic, catastrophes are not democratic ... A much higher fraction of passengers from the cheaper decks were lost. We'll see the same phenomenon with the effects of global warming” (Revkin 2007).

## Stricter Regulations

What can we do about the increase in greenhouse gas emissions and other environmental problems caused by animal production? It is very tempting to think that all we need is increased regulations. If the regulations were stricter, it is assumed that we could contain air, land, and water pollution and use fewer natural resources.

<sup>10</sup> Humans, pigs, chickens, and other monogastric farm animals also produce methane during digestion, but in much smaller quantities than ruminants.

<sup>11</sup> See, for example, Stephen Gardiner (op. cit.), Singer (2002), Jamieson (1998b) and Jamieson (2001).

Having strict regulations will be hard to implement for three reasons. First, the industry is largely unwilling to limit emissions and upgrade technology, especially since this requires significant money and effort on their part. As the UN report on livestock points out, powerful and “well-connected large scale commercial productions often escape environmental regulations” (FAO 2006b, p. 222). Second, small-scale farmers are often unable to make the investments necessary. Third, while it has been done to some extent in the European Union, putting restrictions on agriculture is very difficult. Even the “Climate Matters Cap-and-Trade Legislation” introduced in the US House of Representatives in June 2008 explicitly excludes agriculture industries from the emissions cap proposed (Van Hollen 2008). As the USDA itself points out, the United States government has not been good at implementing appropriate legislation to deal with manure lagoons (Ribaudo 2003). One can argue that this is just another case where the United States is lagging behind the European Union. But United States is not an exception when it comes to its treatment of animals; it is the European Union that is rather exceptional in the number of laws and regulations it has, and its willingness to enforce these laws and regulations. Most developing countries are closer to the United States than to the European Union in this regard, and there is little reason to believe that in the near future, the governments of developing countries will be willing and able to do what the European Union has done.

Someone might object that it is possible to pass some laws and public policies even in the United States that force the agricultural industry to make some changes, especially if the industry is given a number of years to implement these changes. The European Union has decided to phase out battery cages—cages in which egg laying hens are raised in intensive livestock farms—by 2012; they are also phasing out the use of gestation crates—cages in which sows are confined during pregnancy in intensive livestock farms—by 2013. But Florida residents also voted to outlaw gestation crates for pigs, people in Arizona voted to ban both gestation crates and veal crates, and the Oregon state legislature banned gestation crates in June 2007 with a 6 year phase out. Most recently, in November 2008, a ban on battery cages, gestation crates, and veal crates also passed in California by a large margin.

It is true that some changes are possible in the United States, and these recent ballot measures are a sign of this. But although these laws are a step in the right direction, they may have the unintended consequence of pushing the production of meat, eggs, and milk to countries where there is almost no oversight. As long as people demand these products, production will continue. Furthermore, using intensive livestock farming techniques reduces the cost of animal products; while demand for these products remains, there will be economic incentive to produce them as cheaply as possible. If costs rise in the US and Europe due to environmental restrictions, production will likely be shifted overseas where products are generally cheaper to produce. A similar process has certainly happened with many other industries—from clothes to electronics to kids’ toys—and it is hard to imagine that it would not happen with this one. Thus, stricter regulations are not likely to work without a decrease in the demand for animal products. I will come back to this argument in Sect. 7.

## **Working and Living Near Intensive Livestock Farms**

While small-scale livestock agriculture can cause environmental damage, the health of the people raising the livestock is not usually harmed. This is not the case with intensive livestock farms. As the Pew Commission on Industrial Farm Animal Production

demonstrates, both workers in and those living in the vicinity of an intensive livestock farm experience “high levels of respiratory problems, including asthma” (PEW 2008, p. 5).

Working in intensive livestock farms is particularly risky. As the American Public Health Association notes:

Numerous studies document serious respiratory problems among CAFO workers, including chronic bronchitis and non-allergic asthma in about 25% of confinement swine workers (Thorne et al. 1995; Donham 2000). Workers exposed to the potent neurotoxin hydrogen sulfide at levels only slightly higher than those at which its odor becomes detectable, have been found to have accelerated deterioration of neurobehavioral function (Kilburn 1999).

Working in modern slaughterhouses—where animals are processed at high speed—is one of the most dangerous jobs in the United States, mostly because of the high number of accidents and injuries. But diseases can be a problem here too. A February 2008 *Neurology Today* article, for example, reported a recently discovered neurological problem affecting slaughterhouse workers in Minnesota who “worked in an area where swine heads were processed and the brains removed” (Samson 2008, p. 4). They had neurological symptoms that were “severe enough to limit many daily activities” (Samson 2008, p. 4).

While the European Union has been more effective in implementing restrictions to limit the negative effects of the livestock industry, as I mentioned before, it is unlikely that many developing countries will be equally successful. As intensive livestock farms and the high-volume slaughterhouses that go along with them spread to developing countries, we can expect to see increasing health problems among local people who work in them, as well as among those who just live near them. Scientists convened first by the Centers for Disease Control and Prevention (CDC) and, more recently, by the University of Iowa and Iowa State University agree air emissions from intensive livestock farms may constitute a hazard to public health in addition to workers’ health. The latter report points out that the eye and respiratory health risks of those living near intensive livestock farms can be similar to those working in intensive livestock farms (Thu et al. 1997; Wing and Wolf 2008). One study found that those living near intensive livestock farms “experience lower secretion and concentration of an immune system protein during odor episodes; another reported livestock odor as having a negative impact on adult levels of tension, depression, and anger” (Barrett 2006, p. 591). Those who live near intensive livestock farms have other respiratory problems as well as more headaches (Barrett 2006, p. 591). Another recent study that looked at 339 schools in North Carolina showed that exposure to airborne pollution is associated with increased symptoms of asthma in adolescents attending schools located near intensive livestock farms that raise pigs (Mirabelli et al. 2006a, b). They also found that non-Caucasian students and students of low socioeconomic status were the most affected (Mirabelli et al. 2006b). As Julia Barrett points out:

Their results confirm and expand previous research describing racial and economic disparities in exposure to CAFO emissions...CAFOs are disproportionately sited in communities of color and areas of poverty. These populations may be more susceptible to the ill effects of airborne exposures owing to existing health challenges such as higher-than-average disease rates and inadequate health care access (Barrett 2006).

In their “Moratorium on New Confined Animal Feeding Operations,” the American Public Health Association (APHA) also points out that CAFOs (or intensive livestock farms) are associated with “declines in local economic and social indicators ... particularly in poor and African American rural communities” (APHA 2003).

## Community Mobilizing

In Sect. 3, I discussed the idea of instituting stricter regulations to prevent the health and environmental problems caused by intensive livestock farms, and I highlighted some problems with this approach. There are similar problems with another possible solution – community mobilizing. This involves focusing on areas where intensive livestock farms may be built, and mobilizing the community in order to prevent intensive livestock farms from being built in that particular community. The idea here is that if every community did this, we may be able to prevent intensive livestock farms from being built altogether. In the United States, a number of groups including Land Stewardship Project, Humane Society of United States, and the Sierra Club have initiated campaigns aimed at this goal. Because of the negative effects of intensive livestock farms on neighboring communities, it is not very hard to mobilize the community in which the intensive livestock farm is expected to be built. However, while it can be effective to let the industry know that the community does not want the intensive livestock farm built near their property, we should be careful about this ‘Not In My Back Yard’ (NIMBY) approach. As Robert Bullard points out in “Overcoming Environmental Racism,” the result of middle class and affluent communities keeping polluting industries away from their backyards is that they are located in areas where the poor and racial minorities live (Bullard 1994). These minorities do not have the power or political clout necessary to prevent intensive livestock farms from being built where they live. And these vulnerable groups already suffer from unjust health inequities, as numerous philosophers have pointed out.<sup>12</sup> Furthermore, we are back to the problem I highlighted in Sect. 3: if Americans and Western Europeans push intensive livestock farms out, we are likely to see them being built in developing countries where there is even less oversight.

Another potential solution is to work on an international level to prevent the spread of intensive livestock farming to developing countries. Such campaigns are initiated by a number of groups, most notably Compassion in World Farming (CIWF) which co-ordinates its worldwide campaigns with over 150 other groups (CIWF n.d.). While these campaigns may be effective, it is extremely difficult to do this work in developing countries, especially in places where people are desperate for any job and where there are high levels of corruption. Even CIWF focuses most of its efforts on Europe, where they are most likely to have success. It is tremendously hard to mobilize local communities in the United States and Western Europe; it is even harder to work at the international level.

## Land Degradation and Water Shortage

In the last section of this paper, I will argue that a better solution is to cut down on our consumption of animal products. In that section, I will present my argument, as well as a number of different objections against it. But before I present this solution, I will show two other serious problems with the production of animal products, regardless of whether they are produced in intensive livestock farms or small-scale farms: land degradation and water shortage.

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<sup>12</sup> A good discussion of the difference between health inequalities and health inequities, as well as the relationship between environmental factors and health risks is found in David Resnik and Gerard Roman’s “Health, Justice and the Environment” (2007).

Land degradation—primarily due to deforestation—is a major problem.<sup>13</sup> Farm animals raised for their meat, egg, and milk already cover one-third of the planet’s total surface area and use more than two-thirds of its agricultural land (de Haan et al. 1997). Farm animals are a major cause of deforestation because forests are cut down to make room for grazing animals, and to plant animal feed. The recent UN report on livestock found that cattle ranching is one of the main causes of deforestation in Latin America. In a paper titled “Hamburger Connection Fuels Amazon Destruction,” researchers from The Center for International Forestry Research (CIFOR) have also documented the way in which increasing larger areas of the Amazon rainforest have been cut down in order to provide land for beef production, most of which is exported (Kaimowitz et al. 2004). Again, the demand for meat in developed countries is having a large negative impact in other countries due to both deforestation and soil erosion. According to CIFOR, from 1990 to 2000, “an area twice the size of Portugal was lost, most of it to pasture” (Kaimowitz et al. 2004). This is not an isolated incident; the UN report on livestock states that 70% of former forests in the Amazon have been transformed into pastures (FAO 2006b, p. 256). Not surprisingly, given the global trends in meat consumption I highlighted earlier, the UN report on livestock predicts that deforestation due to the conversion of forest to cropland will continue to increase in Central and South America (FAO, 2006b, p. 160, 190).

Grazing is not the only cause of land degradation. Another cause of deforestation is the production of animal feed. Intensive livestock farms grow large number of animals and feed them a high protein diet consisting mostly of soy and corn.<sup>14</sup> As pointed out in Sect 2, more than 50% of the corn and at least 80% of the soy grown worldwide is fed to farm animals (USDA n.d.; WWF n.d. a), and this number will only increase with the spread of intensive livestock farms. Using large areas of land for animal feed can result in major biodiversity losses, such as those occurring in the Cerrado region in Brazil, the world’s most biologically diverse savanna. Half of Brazil’s soy is grown in Cerrado (WWF n.d. a), an area the size of Alaska and the second-largest major biome in Brazil (WWF n.d. b; Klink and Machado 2005).

Converting land to pasture or fields of soy and corn used to feed animals grown for meat and milk results in deforestation, biodiversity losses, worsened soil erosion, and increased carbon emissions (Kaimowitz and Smith 2001). The impact this is having will only worsen with the increased demand for animal products per capita, the spread of intensive livestock farms, and population growth.

The other problem with both intensive livestock farms and traditional livestock farming methods is water pollution and water shortage. The US Geological Survey shows that intensive livestock farms are “a significant factor behind poor water quality in several areas of the country” (Ribaudó 2003); the United States Department of Agriculture (USDA) also points out that “nutrients from livestock and poultry manure are key sources of water pollution ... caused by *ever-growing numbers of livestock and poultry per farm and per acre*” in intensive livestock farms (Ribaudó 2003; italics mine). The recently published UN report on livestock shows that “the livestock sector is a key player in increasing water use and water depletion” (FAO 2006b, p. 272). Irrigating feed crops alone uses seven percent of the global water use (FAO 2006b, p. 272). While animals used in extensive livestock systems use more water per animal (FAO 2006b, p. 229), intensive

<sup>13</sup> Soil erosion is another serious problem. For more information, see Sect. 2.13 of the UN report (FAO 2006b, pp. 74–82).

<sup>14</sup> Recently this issue has received a lot of publicity. See, for example, Pollan (2007) and the documentary *The King of Corn* directed by Woolf (2008).



systems allow for a much larger number of animals to be raised, thus using more water. Furthermore, the livestock industry affects water quality “through the release of nutrients, pathogens and other substances into waterways, *mainly from intensive livestock operations*” (FAO 2006b, p. 273; italics mine). The spread of intensive livestock operations will only increase water pollution.

The Stockholm International Water Institute (SIWI) argues that that there is a problem caused by the shift in dietary trends “away from cereals toward livestock products, where diets based on meat from grain-fed cattle may take two times more water than pure vegetarian ones” (WWW 2007). Because of increasing consumption of animal products—meat, fish, milk, eggs—more and more water will be needed to produce food. The problem is only compounded by the fact that the world population is increasing.<sup>15</sup> SIWI also documents the impact of increasing meat consumption, pointing out that “a kilo of grain takes 500–4,000 liters, a kilo of industrially produced meat 10,000 liters” (WWW 2006)<sup>16</sup> (so, 2.5–20 times more); then, they go on to ask “Where will that water come from? Will it reach the poor and hungry? Will it produce enough food? Will it continue to sustain the environment?” (WWW 2006).

This global trend has a negative impact on ecosystems and on water resources, especially in developing countries that export animal feed (WWW 2006b):

The world is moving towards increasing problems of freshwater shortage, scarcity and depletion, with 64% of the world’s population expected to live in water-stressed basins by 2025. The livestock sector is ... probably the largest sectoral source of water pollution, contributing to eutrophication, “dead” zones in coastal areas, degradation of coral reefs, human health problems, emergence of antibiotic resistance and many others (LEAD 2006).<sup>17</sup>

Because American diets are heavily dependent on meat, more so than even other European nations, their water footprints are much higher. Just because of the difference in the amount of meat they consume, “the average water footprint of the American is 2483 m<sup>3</sup>/capita/year, while that of the Swedish is 1621 m<sup>3</sup>/capita/year” (Al-Zahrani et al. 2007). And the Swedish water footprint itself is much higher than the world average of 1243 m<sup>3</sup>/capita/year (Al-Zahrani et al. 2007). The global increase in meat consumption means that this world average will further increase. As the UN and SIWI point out, developed countries use a lot more water than developing countries, yet the impact of water shortage is felt most by those in developing countries. The UN report on livestock estimates that “more than 1 billion people do not have sufficient access to clean water (FAO 2006b, p. 126) and “by 2023, 33% of the world’s population will live in absolute water scarcity” (FAO 2006b, p. 127).

The research documented in the UN report on livestock and in SIWI documents on the effect of meat production and water shortages has reached the popular media. For example, the tagline of a BBC article, “Hungry World Must Eat Less Meat,” is “World water supplies will not be enough for our descendants to enjoy the sort of diet the West eats now, experts say” (Kirby and Alex 2008). The author begins the article by saying that “the

<sup>15</sup> I will discuss this problem later in the paper too.

<sup>16</sup> A different document says, “But to produce a kilogram of meat takes anywhere between 5,000 to 20,000 liters per kilogram, mainly to grow feed. The water requirements of livestock products highly depend on how the cattle are fed” (Al-Zahrani et al. 2007).

<sup>17</sup> This is due to a variety of reasons, including the fact that intensive livestock production uses large quantities of corn, as pointed out earlier.

growth in demand for meat and dairy products is unsustainable” (Kirby and Alex 2008). He adds, “Scientists say the world will have to change its consumption patterns to have any realistic hope of feeding itself” (Kirby and Alex 2008). This is exactly the sort of solution I want to propose in the next section.

## Decreasing Demand

In previous sections, I argued that solving the problems caused by the spread of intensive livestock farms *solely* by having stricter regulations and mobilizing local communities against the building of new intensive livestock farms will not work; we also need to see a decrease in the demand for animal products. I will expand on this argument here and respond to some powerful objections.

Animal agriculture, like many other industries, works on the principles of supply and demand. By decreasing the demand for these products, those of us who live in the United States, Canada and Western Europe can decrease their production.<sup>18</sup> Individuals can do this by becoming vegetarian or vegan, but also by simply cutting down one’s consumption of meat, eggs, and milk produced in intensive livestock farms. Although this is not realistic for those who are starving or are very poor, those of us living in developed countries can do this. Individuals in a number of other countries, including those of Eastern Europe, can also decrease their intake of animal products; like Americans, Eastern Europeans also eat very large amounts of meat, dairy, and eggs (FAO 2006b, pp. 340–2, 362). But even if only the global rich in North America and Western Europe reduced the amount of animal products they eat, there would be a lot of progress. Less meat would be produced, and thus there would be fewer greenhouse gas emissions, less harm to local communities, and less damage to our water supplies. Fewer intensive livestock farms would be built, locally or internationally.

Researchers at the University of Chicago have shown that an American’s choice to eat just 20% less meat is equivalent to switching from a standard American sedan to a Prius (Eshel and Martin 2006). Eating two or three pounds less cheese or beef may not sound like much; however, to produce 1 kg (2.2 pounds) of cheese we need 5000–5500 kg of water and for 1 kg of beef we need in average 16,000 liters of water (Chapagain and Hoekstra 2003).<sup>19</sup> Environmentalists are used to thinking that the amount of driving they do and the kind of light bulbs they use makes a big difference. However, they are starting to pay more attention to food choices. Even the media has picked up on scientific articles to stress that, for example, just 1 kg (2.2 pounds) of beef “is responsible for the equivalent amount of carbon dioxide emitted by the average European car every 155 miles, and burns enough energy to light a 100-watt bulb for nearly 20 days” (Bittman 2008<sup>20</sup>). People are starting to

<sup>18</sup> For the last 35 years, philosophers have debated whether we have an obligation to become vegetarian in order to bring about an end to CAFOs. Peter Singer (op. cit.) has argued that there are good consequentialist reasons for becoming vegetarian or vegan, or at the very minimum, cutting down one’s support for animal products produced in factory farms. Others have contested this. Nathan Nobis (op. cit.) and Frey (2004), for example, attack this argument from very different angles. There are similar debates among environmentalists about what individuals should do in light of what we know about global warming. While no consensus exists in the philosophical literature, I am clearly on the side of those who argue that individual consumer preferences can make a difference. Providing arguments for this general point is beyond the scope of this paper though.

<sup>19</sup> Others claim that the figure is even higher: 43,000 liters of water (see Pimentel et al. 2004).

<sup>20</sup> Bittman is citing Ogino et al. (2007).

realize that individual choices to reduce the amount of animal products one eats can make a significant difference.

However, one might reasonably ask if it is too expensive to make this switch. Meat is certainly not easy or cheap for some people in some parts of the world. But even in the US, it is not necessarily cheaper when all the costs—including health care costs—are taken into account. As nutritional experts from the World Health Organization and the UN recommend, most people should consider decreasing their consumption of animal products and instead increase consumption of fruits and vegetables to 40 g a day for health reasons alone, something that only a small minority of the world's population does (WHO/FAO 2002). And there is plenty of proof that even vegetarian and vegan diets can be just as healthy as a “regular” diet (Messina 1998).<sup>21</sup>

Although this might be true, many would argue that becoming vegan is too difficult, and we cannot expect people to make the switch to such a diet. But I am not proposing that people become vegan; I have been careful to argue for a decrease in the consumption of animal products, not a switch to veganism. Furthermore, this solution is a flexible one, allowing people to make changes at their own pace and according to their life circumstances (e.g., it would be very difficult for someone who is starving to turn down meat if offered some, but it is fairly easy for me). This solution is not about “purity”; rather, it is about doing what we can—within reason—to remove our support of destructive and harmful practices.

Some readers might still be wed to the solutions that I proposed earlier—stricter regulations, legislative bans, community mobilization—and think that individuals do not need to change their personal diets; systemic, top-down changes are sufficient. These are important *partial* solutions. However, as I argued in previous sections, these measures cannot work alone, and some of them may actually be harmful (given the NIMBY effect, for example). Without a decrease in the demand for animal products, intensive livestock farms will just move to developing countries where there will be fewer regulations and more difficulty in enforcing the few regulations that exist there. And even in the US and other developed countries, politicians will not pass laws if the public is not in support of stricter regulations that increase the price of most people's dinners. We need individual citizens to send a clear message to politicians that they are willing to see prices rise and to eat less meat.

Some object that preventing intensive livestock farms from spreading to developing countries will be worse for poor people. Intensive livestock farms, the argument goes, lower the cost of animal products and thus increase people's intake of calories and protein, which is a big advantage for people in developing countries who are undernourished. This may be true. However, as explained earlier in the paper, intensive livestock farms have numerous negative effects on the workers and the surrounding communities. For poorer people and those with no health insurance, the injuries encountered at work, and the respiratory and neurological illnesses caused by working and by living near an intensive livestock farm can have devastating, long-term consequences. Furthermore, as the American Public Health Association has argued, the use of hormones and antibiotics, which are routine in American intensive livestock farms, can cause long-term health problems (APHA 2003).

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<sup>21</sup> Some people think that a vegan diet is not healthy. However, the American Dietetic Association and Dietitians of Canada (2003) have shown that “well-planned vegan and other types of vegetarian diets are appropriate for all stages of the life cycle, including during pregnancy, lactation, infancy, childhood and adolescence” (p. 748).

Thus, even if intensive livestock farms offered advantages, which they may, it is important to remember that these advantages come at a price. Rather than building (often foreign-owned) factory farms in developing countries, it might be better to support local agricultural industries and local farmers. Unlike some industries, intensive livestock farms create very few jobs; in fact, they drastically reduce jobs when they replace family farms. And, as a Pew study shows, individual farmers in the US have suffered:

The [intensive livestock farming] system, as it exists today, too often concentrates economic power in the hands of the large companies that process and sell the animal products, instead of the individuals who raise the animals. In many cases, the “open market” for animal products has completely disappeared, giving the farmer only one buyer to sell to, and one price to be received (PEW 2008, pp. 1–2).

The well-being of the local people is not likely to be the concern of those owning large, intensive livestock farms, and the profits made are not likely to go into the hands of the poor.

Some might also argue that population increase is a problem, not our consumption of meat. This is in some ways true; if the world population was 1,000,000, we could surely all eat as much meat as we wanted in a fairly sustainable way. However, the opposite is also true: the planet could sustain a larger world population if we all lived simply and consumed very little. A more realistic approach may be to ask what we can do to (a) attempt to lower world population and (b) decrease our consumption of animal products that are so environmentally damaging. The first is a good idea, but it is surely beyond the scope of this paper. As highlighted in the previous section, land degradation and water shortages due to livestock production make it more difficult for us to sustain our current population. Furthermore, “if present trends of meat-eating continue, then by 2050 the world’s livestock will be consuming as much as 4 billion people do” (Tudge 2003, p. 145). We could use our resources more wisely and feed more people if we cut down on meat, dairy, and egg consumption.

There is another reason to favor cutting down our consumption of animal products. It is sometimes difficult to figure out what to do about all the suffering in the world. We each have limited time, energy, and money to offer. The causes and cures of human suffering are complex, often distant, and difficult to address, especially by an individual. Most of us are not legislators or owners of intensive livestock farms. But all of us have a choice about what we put on our dinner—and lunch and breakfast—plates. Making the choice to consume fewer animal products can have a far-reaching effect on reducing suffering in the world.

Livestock production is leading to numerous environmental problems, including increased greenhouse gas emissions—more than the whole transport industry, land degradation, water pollution, and increased health problems. As pointed out earlier, the UN report identifies livestock production as one of the three most significant contributors to environmental problems. Working on legislative changes and mobilizing communities negatively affected by intensive livestock farms are effective partial solutions. However, without a decrease in the demand for animal products, these farms will continue to exist and they will just move to developing countries.

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