

- **Veganism and Health: An investigation into the environmental consequences of eating less meat.**

This essay will consider the environmental consequences of the meat and fishing industries. The implications for the planet are dire and human health is inextricably linked to the health of the planet. By cutting meat- and animal-related products out of one's diet and lifestyle serious environmental damage can be avoided. By supporting the meat and fishing industries an individual is complicit in environmental degradation as well as unnecessary suffering of the animals.

Veganism, as a practice, does not condone the use of any animal-derived products. This includes meat, dairy products, eggs, leather, wool etc. Neither does veganism condone the use of animals for vivisection; hence, products tested on animals are often boycotted. This essay will focus on the food aspect of veganism, specifically the ecological implications of raising animals for consumption as well as the ecological effects of fishing industries. Although attention is due to all aspects of complete veganism (such as the health implications of vivisection or the leather trade) these subjects will be left to another essay.

The reasons for veganism are numerous: they include compassionate or ethical reasons, religion, financial position, health and, finally, environmental concerns. This essay will not discuss the ethical or religious reasons behind veganism. The financial position of a person may force them into veganism as meat may simply be outside of their financial reach; hence, this essay will not discuss personal finance as this is not usually open to individual choice.

Ultimately, this essay will focus on one of the two aspects held within individual rational choice. The two main reasons people *choose* veganism are personal health and environmental interests. Personal health cannot be focussed on in this essay due to constraints on the length of this paper; however, the environmental aspects of the exploitation of animals for food will be clearly illustrated and it must be

asserted that the health of the planet influences the health of the individual. To separate these two spheres of health is to remove humanity from its niche *within* nature, and attempt to elevate humanity above the natural world. It is this world view which has allowed humans to exploit the natural resources of the planet to the extent that we have. This exploitation is not sustainable and will soon leave global health in a precarious situation, as will be discussed below.

When referring to the “meat industry”, this essay will be referring to the agricultural sectors involved in the production of livestock for slaughter namely poultry (chicken, duck, turkey), beef (and veal) and mutton (and lamb). Furthermore, “meat industry” does not include dairy and egg production; however, these industries are closely linked. When referring to agriculture in general these industries will also be included, as they too are involved in much environmental damage and health problems associated with cholesterol and other diseases¹. Finally an investigation into the fishing industry and the exploitation of the oceans will occur. This area of meat-consumption carries a large environmental weight, with 70% of world fishing species either fully exploited or depleted².

In order to give this paper a historical perspective, attention will be placed on the development of agriculture in the twentieth century. Added to this, the reader should be alerted to the rise of consumer culture in the twentieth century, as well as correlating environmental degradation and health deterioration. Attention will now turn to the meat industry and its consequences for the environment.

The planet is at a turning point. In 1900 the world population was around 1.65 billion people³, today it stands at over six billion. Much of this incredible growth is attributed to the technological revolution starting with the Haber-Bosch process early in the twentieth century allowing fertilizers to be synthesized and agricultural

¹ For more on the personal health dangers see “Making Sense of Nutrition Research: Issue 6: Vegetarianism, Diet, and Cancer” as well as “Vegan proteins may reduce the risk of cancer, obesity, and cardiovascular disease by promoting increased glucagon production” listed in bibliography below.

² Doyle, M. “Why you can’t eat meat and call yourself an environmentalist: The hidden costs of producing intensively-farmed, animal based foods”, Creative Commons, 2006. p. 10.

³ “The World at six Billion”, a UN report, p. 1.

production to increase drastically. This coupled with an increase in mechanisation following World War 2 allowed for food production to skyrocket with the motivation coming from an increase in demand for meat by wealthy nations⁴. Today food production has stabilised, while population continues to grow. If current population growth continues unrestricted, food production will need to double by 2025 in order for consumption levels to remain stable. Note that this is necessary not even to improve the current world hunger situation, but to keep it at the same level⁵.

What are the possible solutions to this? The ideal situation would include a dramatic decrease in population growth, as it is this growth which necessitates increased agricultural production. This, however, seems an unlikely situation with population being a seemingly taboo subject among policy makers. With an increase in population relatively certain, three courses of action stand as possible solutions. These solutions should not be viewed as isolated, mutually exclusive options: rather they should be considered things which will invariably occur together. The three solutions are (1) extensification, (2) intensification and (3) decrease in consumption of meat.

Firstly, the idea of extending current agricultural land is not an impossibility. There is currently land available in the USA and Europe which has been taken out of cultivation due to economic policy⁶. This land is not cultivated in order to keep crop prices high and ensure profits for farmers, regardless of the world hunger crisis. This land could be brought back into production; however, this land is marginal. When removing cropland from cultivation, it was the least productive land that was allowed to lie fallow. In order to keep up with population growth, more productive land will be required. As it stands, 25% of current cropland should not be under cultivation and the expansion of agriculture would only exacerbate environmental degradation and biodiversity loss⁷. The expansion of cultivated land would more than likely yield greater environmental damage than food gains.

⁴ Sapp, A. "Production and Consumption of Meat: Implications for the Global Environment and Human Health" in *Human Health and Environmental Change*. (Massachusetts: 2001). p. 2.

⁵ Goodland, R. "Environmental sustainability in agriculture: diet matters" in *Ecological Economics*, 23, 1, 1997. p. 191.

⁶ Goodland, R. "Environmental sustainability", p. 191.

⁷ Goodland, R. "Environmental sustainability", p. 192.

Secondly, there is the option of intensification: producing more food on the same amount of land. Historically speaking, the first and greatest boom of intensification was linked with the development of fertilizer and mechanised farming in the early to mid twentieth century. The second rise in production per hectare came after the genetic revolution in the 1970s⁸. Crops were engineered to withstand drought, bacteria, funguses and insects. Food production began to rise rapidly throughout the 1980s; however, by the early 1990s, new crop varieties were being introduced less often and development and progress slowed. Between 1990 and 1993 crop-yields actually began to falter and fall, exposing some of the dangers of genetically modified crops⁹. These crops are problematic in several ways. They represent problems pertaining to the reliability and sustainability of harvests, but could also lead to currently unknown health dangers. In addition to this, they are incredibly expensive to develop.

Another means of intensification would be to increase irrigation to currently un-irrigated lands. This, however, is an extremely environmentally-unfriendly method, as it often involves expansion of waterways and dams which wreak havoc on eco-systems in the name of development. Furthermore, constructing irrigation schemes, as well as powering the required pumps, uses a large amount of fossil fuels. The impact of fossil fuels will be examined later; however, it takes little qualification to assert that fossil fuel usage is environmentally hazardous.

Another method of increasing production without increasing land use is by establishing factory farms with cramped conditions and many animals. This has been done in many countries: most infamously, in the USA. These factory farms carry with them their own environmental hazards, as well as health hazards for the consumers of factory-farmed animals. As this essay progresses, it will become apparent that farming animals on a large scale should not be encouraged. The reasons for this will be expanded on shortly; however, it should be noted that factory farming is a new development when looking at the history of food production. It had its roots in the industrial revolution of Europe in the early nineteenth century, but was never really

⁸ Goodland, R. "Environmental sustainability", p. 192.

⁹ Goodland, R. "Environmental sustainability", p. 193.

possible until the advent of nitrogenous fertilizers at the beginning of the twentieth century. Factory farming as we know it today was only truly necessitated after World War II, when population began growing more rapidly, placing additional pressure on land¹⁰. When looking at older farming practices (which proved their sustainability by operating almost unchanged for hundreds of years) it is clear that livestock played a different role. Traditionally animals were left at pasture and fed surpluses or waste. They acted as valuable buffers against fluctuations in food supply and their manure was a valuable fertilizer returning nutrients to the soil¹¹. Today the intensity of factory farming means that animals are no longer marginal but central. Their high density means grazing is no longer possible, and food must be transported to them while the great amounts of manure are a curse rather than a blessing. Thus it may be provisionally concluded that factory farming is not the answer to world food problems.

Exactly why animal farming negatively effects environmental health is extremely complex; however, in order to get to the heart of the issue one need only look at so-called conversion rates. What follows is a brief foray into science in order to gain a better understanding of the situation.

The second law of thermodynamics states that no process is perfectly efficient and the energy expended is always greater than the work produced. This discrepancy is caused by the diffusion of energy in order to bring about equilibrium within a closed system. This process is known as entropy¹². An example would be a race car driving on a track. The friction of the tires on the track, along with the wind resistance, ensures that the vehicle uses more fuel than it would to move along a theoretical frictionless plane. The same holds true for any organism. An animal eating food produces heat, as the metabolism of the animal quickens in order to digest the food. This heat energy is lost to the animal and it dissipated into the surroundings. This, along with normal bodily functions and movements, account for much loss of energy and this loss of energy explains the low conversion rates of certain animals. This will be explained below.

¹⁰ "A Brief history of Factory Farming in the U.S."

¹¹ Goodland, R. "Environmental sustainability", p. 194.

¹² Sapp, A. "Production and Consumption of Meat", p. 10-11.

To apply the above to the current topic we need to look at energy going into an animal and the resulting energy available to consumers. Numbers vary, but a generally accepted equation dictates that for 1kg of protein from poultry, 3 kg of protein is consumed by the fowl. For 1 kg of protein from pork, 5.5 kg of protein is consumed by the swine. By far the most inefficient, for 1 kg of protein from beef, 10kg of protein is consumed by the cow¹³. This 10:1 conversion rate is extremely environmentally unfriendly. The consequences of this are that people in wealthier nations who eat large amounts of meat consume 800kgs of grain indirectly every year, while people in poorer nations whose diet consists mainly of grain eat around 200kgs of grain each year¹⁴. This has crucial implications. The grain used to feed the USA's livestock could feed the nation five times over, while a decrease in just 10% of meat consumption would allow enough surplus grain to feed 60 million people (close to the number of starving people on the planet)¹⁵. Much of this is the result of using non-ruminant food for cattle. Non-ruminant foods are grains and cereals (generally grown elsewhere in the world) which are used instead of grazing¹⁶. Such food is essential to factory farming as it allows for cattle to be fed in feed lots rather than the large pastures required for grazing. Unsurprisingly, the excess production required to sustain the system of excess consumption has an environmental price.

This environmental price will now be considered, starting with the consumption of fossil fuels. In the USA one third of all raw materials and fossil fuel are used for animal production¹⁷. The link between fossil fuels, rising carbon dioxide levels, and changes in world temperature and climate are now widely accepted and understood. With the consequences of global warming in mind, a few startling statistics should be considered. An average American farm uses 3 kcal of fossil fuel to produce 1 kcal of food suitable for vegan consumption. In order to produce meat 35 kcal of fossil fuel is required to produce 1 kcal of food energy¹⁸. This is simply

¹³ Doyle, "Why you can't eat meat", p.12.

¹⁴ Goodland, R. "Environmental sustainability", p. 194.

¹⁵ Moncrief, D. "Rethinking Meat: Recentering World Hunger paradigms: A Standpoint Critique of Food choice, Food Policy, and Overconsumption", Masters Thesis, Columbian School of Arts and Sciences, George Washington University, 2001, p. 43-44.

¹⁶ Ibid., pp. 43.

¹⁷ Ibid., p. 45.

¹⁸ Doyle, "Why you can't eat meat", p. 14.

another angle on the low energy conversion rates involved in producing meat. The fossil fuel consumption of the twentieth century cannot continue and oil reserves are being depleted rapidly, causing the rapid rise in fuel costs. Not only are fossil fuels becoming more expensive, but their role in greenhouse gas production is becoming more important.

Livestock contributes to global warming in other ways. Much land is cleared for either the planting of crops which will be used to feed livestock (non-ruminant food mentioned above) or to provide grazing for animals themselves¹⁹. It is not uncommon for this land to have been previously forested, which has a twofold effect on global warming: firstly, the trees which once helped combat global warming by absorbing carbon dioxide are lost and can no longer act as a planetary “lung”. Secondly, the trees themselves are burnt producing more greenhouse gases. The effects of deforestation are immense, and land is often only used for a few years before nutrients are lost due to “leaching” of the soil²⁰. During this process nutrients are lost during periods of heavy rain because vegetation which had previously ensured slower drainage and the retention of nutrients has been eliminated. This gives such farms a low life expectancy before the soil becomes nutritionally depleted and erosion begins.

Another aspect of livestock’s contribution to greenhouse gases is in their capacity to produce large amounts of methane and nitrous oxide. These gases are even more destructive than carbon dioxide, given in equal quantities²¹. Methane arises mainly out of enteric fermentation (the digestive process in ruminant animals which chew the cud)²². Animals raised for food produce 115 billion kilograms of methane every year²³. Nitrous oxide is the result of the manure from animals fed on a diet consisting of food grown with the use of nitrogenous fertilizers. The animals’ dung has a higher than normal nitrogenous content, which is then released into the environment with negative effects. Agricultural run-off is the number one source of

¹⁹ “Global benefits of eating less meat”, p. 38.

²⁰ Reiners, p. 370.

²¹ Doyle, “Why you can’t eat meat”, p. 5.

²² Ibid., p. 5.

²³ Moncrief, D. “Rethinking Meat”, p. 46.

pollution in the USA's waterways²⁴. This will be investigated shortly with a more extensive examination of water pollution.

Intensive factory farming has its own health problems, which arise because of the animal density and resulting concentration of animal waste. These diseases include foot and mouth disease, mad cow disease, avian flu and pfiesteria, a deadly microbe that in 1991 alone killed one billion fish²⁵. Mad cow disease as well as foot and mouth gained some prominence in the late 1990's and beginning of the twenty-first century. Avian flu has continues to pose as a health risk with United Nations reports from as recent as 21 October 2008 warning of a possible pandemic that could result in as many as 70 million deaths²⁶. Clearly the consequences of intensive farming are not as appealing as they first appear, as such diseases not only negatively affect the environment but pose serious threats to human wellbeing as well.

A knock-on effect of livestock is their role in water use (read waste) and pollution. As mentioned above, animal waste is highly nitrogenous. This waste is often washed into water systems, which raises the nitrogen levels, increases algae production and starves the water of oxygen. This also results from run-off from fields which are over-fertilized or fertilized at a poor time (before heavy rain for example). Oxygen-starved water is not conducive to sustaining life and results in many deaths, predominantly of fish.

Another angle on the problem of water pollution is the consequences of over-exploiting water as a natural resource. As it is South Africa's demand for water will exceed possible supply by 2025²⁷. Such environmental restrictions should be noted. Conservative studies indicate that in order to produce 1kg of beef, 3700 litres of water is required²⁸. This includes the water the animal will drink, water used in food production to feed the animal, water for slaughtering, butchering and packaging. In order to clearly illustrate the difference made by converting to a meat-free diet

²⁴ Doyle, "Why you can't eat meat", p. 9.

²⁵ Sapp, A. "Production and Consumption of Meat", p. 4

²⁶ "UN Expert warns of Avian Flu epidemic" *Prensa Latina: Latin American news agency*.

²⁷ Jacobs, D. "The Future of Water in S.A"

²⁸ Doyle, "Why you can't eat meat", p. 8.

consider that vegetarians will indirectly consume 136.08 litres of water a day, while a meat eating person will indirectly consume 18184.38 litres a day²⁹.

Clearly fresh water is a vulnerable and valuable commodity. Equally, so are our planet's oceans. Already they are badly polluted with effluent from intensive farming operations, as well as run-off from fertilized cropland. Liquid waste from dairy farms is substantially more polluting than human sewage, and every day hundreds of tons make their way into watercourses³⁰. What is released into rivers will inevitably reach the ocean.

One of the most environmentally degrading activities is the exploitation of our marine resources. Our oceans are cleared at twice the rate of forests³¹. Fish is primarily used for two things: food for humans, and food for the food of humans. What is meant by this point is that many fish caught are not of desirable quality or species for direct human consumption, but are used to manufacture animal feed given to terrestrial livestock³². These animals fed on fish meal are then slaughtered and fed to humans.

Fish are relatively good converters of protein: for 1 kg of fish, 2 kilograms must be consumed. This is much more desirable than the 10 kilograms required for beef. Fish are therefore relatively cheap, environmentally speaking, as their base food-source is plankton which feeds on sunlight and water and is widely dispersed³³. Tragically however, their numbers are dwindling fast. Alternatives must be considered and one possibility could be aquaculture.

Fish farms are more productive than beef farming, and could be done more sustainably with increased productivity through intensification. This could raise food production without using much more space. Another environmental benefit of

²⁹ Moncrief, D. "Rethinking Meat", p. 45.

³⁰ Gold, M. "The Global Benefits of Eating Less Meat", a report by Compassion in World Farming Trust (2004), p. 36.

³¹ Doyle, "Why you can't eat meat", p. 10.

³² Ibid., p. 10.

³³ Goodland, R. "Environmental sustainability", p. 193.

aquaculture is that it uses up waste as food for the fishes³⁴. There are, however, negative aspects to aquaculture. High density fish farming leads to stress and disease among fish. To combat this, high levels of antibiotics are used. The use of chemicals always has some environmental cost and this is especially true of aquaculture as the water used in the farms mixes with water from the ocean or is released into waterways that eventually feed into the ocean. Once in the water these antibiotics have knock-on effects as they indiscriminately affect natural biological actions³⁵.

To return to the three methods of managing food resources for an ever-increasing population, it seems only reasonable to conclude that the best course of action would be to cut down on meat consumption. Clearly, the expansion of current farming practices has its limitations and environmental costs. Furthermore, it has become apparent that the scope for intensifying agricultural production is limited, and generally comes at an unsustainably high environmental cost. By cutting down meat-consumption (ultimately by adopting a vegan diet) more food will be available with the same amount of production. It is not difficult to see that this has positive environmental consequences.

With the above in mind it is clear that the environmental implications of supporting the meat industry are shameful. This environmental degradation is not sustainable. Following from this, it must be concluded that a shift to a vegan diet is the best option. It must be noted that the World Health Organisation has deemed a vegan diet nutritionally adequate for a healthy individual and active lifestyle³⁶. More than being just adequate, vegan infants are often better off than their meat eating counterparts³⁷. It may be argued that a diet including moderate consumption of meat may yield health benefits; however, this essay has argued that, given the environmental expense of meat, it is an unnecessary and environmentally expensive addition to our diet. The future environmental concerns can easily be limited if not averted by a simple shift in individual consumption by the wealthier people of the planet.

³⁴ Ibid., p. 193.

³⁵ Doyle, M. "Why you can't eat meat", p. 11.

³⁶ Ibid., p. 12.

³⁷ Goodland, R. "Environmental sustainability", p. 200.

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Word Count: 3709