

Are vegan diets a better alternative to meat eating?

What they said

'The number of animals that die to produce vegan food is astonishing'

Matthew Evans, former chef and food critic

'Around two-thirds of all farm animals are factory farmed worldwide every year. This is nearly 50 billion animals'

Animal welfare group, Compassion in World Farming

The issue at a glance

On November 1, 2019, Vegan Australia announced that over 500 Australian food and other products had passed its strict certification criteria to be able to use the Vegan Australia Certified logo. The organisation further announced that these products now include Vegemite. Vegan Australia stated, 'We're excited that Vegemite has approached Vegan Australia to be certified, ensuring that their customers and the estimated 500,000 vegans who live in Australia know that Vegemite meets the high standards set by Vegan Australia.' In order to achieve such a certification, the item must be free from animal products, not tested on animals and have been made without using animal products in the production process. The organisation went on to claim, 'Research conducted by Roy Morgan has found...the trend in vegetarian eating continues to [be growing], with 2.5 million people in Australia (12.1 percent of the population) now eating all or almost all vegetarian. That's an additional 400,000 individuals choosing meat-free meals in Australia since 2016.'

https://www.veganaustralia.org.au/vegemite_now_vegan_certified

As part of the growing adoption of vegan foods, there has been a significant increase in the production and consumption of synthetic meat products which use plant protein in a way which simulates the taste, texture and appearance of meat products derived from animals. Proponents of these dietary choices stress their health and environmental benefits and the reduction in animal cruelty that results. Their opponents, however, maintain that these supposed advantages are more apparent than real.

Background

(The following information is abbreviated from the Wikipedia entry titled 'Veganism' which can be accessed in full at https://en.wikipedia.org/wiki/Veganism#cite_note-112)

Definition and early history of veganism

Veganism is the practice of abstaining from the use of animal products, particularly in diet, and an associated philosophy that rejects the commodity status of animals.

A follower of the diet or the philosophy is known as a vegan. Distinctions may be made between several categories of veganism. Dietary vegans (also known as "strict vegetarians") refrain from consuming meat, eggs, dairy products, and any other animal-derived substances. An ethical vegan (also known as a "moral vegetarian") is someone who not only follows a vegan diet but extends the philosophy into other areas of their lives and opposes the use of animals for any purpose. Another term is "environmental veganism", which refers to the avoidance of animal products on the premise that the industrial farming of animals is environmentally damaging and unsustainable.

Donald Watson coined the term "vegan" in 1944 when he co-founded the Vegan Society in England. At first, he used it to mean "non-dairy vegetarian", however, by May 1945 vegans

explicitly abstained from "eggs, honey; and animals' milk, butter and cheese". From 1951 the Society defined veganism as "the doctrine that man should live without exploiting animals". Interest in veganism increased in the 2010s, especially in the latter half. More vegan stores opened, and vegan options became increasingly available in supermarkets and restaurants worldwide.

The practice can be traced to Indus Valley Civilization in 3300–1300 BCE in the Indian subcontinent, particularly in northern and western ancient India.[52] Early vegetarians included Indian philosophers such as Mahavira and Acharya Kundakunda, the Tamil poet Valluvar, the Indian emperors Chandragupta Maurya and Ashoka; Greek philosophers such as Empedocles, Theophrastus, Plutarch, Plotinus, and Porphyry; and the Roman poet Ovid and the playwright Seneca the Younger. The Greek sage Pythagoras may have advocated an early form of strict vegetarianism, but his life is so obscure that it is disputed whether he ever advocated any form of vegetarianism at all. He almost certainly prohibited his followers from eating beans and from wearing woolen garments. Eudoxus of Cnidus, a student of Archytas and Plato, writes that "Pythagoras was distinguished by such purity and so avoided killing and killers that he not only abstained from animal foods, but even kept his distance from cooks and hunters". One of the earliest known vegans was the Arab poet al-Ma'arri (c. 973 – c. 1057). Their arguments were based on health, the transmigration of souls, animal welfare, and the view—espoused by Porphyry in *De Abstinentia ab Esu Animalium* ("On Abstinence from Animal Food", c. 268 – c. 270)—that if humans deserve justice, then so do animals.

Alternative food movements

In the 1960s and 1970s, a vegetarian food movement emerged as part of the counterculture in the United States that focused on concerns about diet, the environment, and a distrust of food producers, leading to increasing interest in organic gardening. One of the most influential vegetarian books of that time was Frances Moore Lappé's 1971 text, *Diet for a Small Planet*. It sold more than three million copies and suggested "getting off the top of the food chain". The following decades saw research by a group of scientists and doctors in the United States, including physicians Dean Ornish, Caldwell Esselstyn, Neal D. Barnard, John A. McDougall, Michael Greger, and biochemist T. Colin Campbell, who argued that diets based on animal fat and animal protein, such as the Western pattern diet, were detrimental to health.[98] They produced a series of books that recommend vegan or vegetarian diets, including McDougall's *The McDougall Plan* (1983), John Robbins's *Diet for a New America* (1987), which associated meat eating with environmental damage, and Dr. Dean Ornish's *Program for Reversing Heart Disease* (1990). In 2003 two major North American dietitians' associations indicated that well-planned vegan diets were suitable for all life stages. This was followed by the film *Earthlings* (2005), Campbell's *The China Study* (2005), Rory Freedman and Kim Barnouin's *Skinny Bitch* (2005), Jonathan Safran Foer's *Eating Animals* (2009), and the film *Forks over Knives* (2011).

In the 1980s, veganism became associated with punk subculture and ideologies, particularly straight edge hardcore punk in the United States; and anarcho-punk in the United Kingdom. This association continues on into the 21st century, as evinced by the prominence of vegan punk events such as Fluff Fest in Europe.

Mainstream

The vegan diet became increasingly mainstream in the 2010s, especially in the latter half. The *Economist* declared 2019 "the year of the vegan". The European Parliament defined the meaning of vegan for food labels in 2010, in force as of 2015. Chain restaurants began marking vegan items on their menus and supermarkets improved their selection of vegan processed food.

The global mock-meat [synthetic meat] market increased by 18 percent between 2005 and 2010, and in the United States by eight percent between 2012 and 2015, to \$553 million a year. The Vegetarian Butcher (De Vegetarische Slager), the first known vegetarian butcher shop, selling mock meats, opened in the Netherlands in 2010, while America's first vegan butcher, the Herbivorous Butcher, opened in Minneapolis in 2016. Since 2017, more than 12,500 chain restaurant locations have begun offering Beyond Meat and Impossible Foods products including Carl's Jr. outlets offering Beyond Burgers and Burger King outlets serving Impossible Whoppers. Plant-based meat sales in the U.S have grown 37 percent in the past two years. By 2016, 49 percent of Americans were drinking plant milk, and 91 percent still drank dairy milk. In the United Kingdom, the plant milk market increased by 155 percent in two years, from 36 million litres (63 million imperial pints) in 2011 to 92 million (162 million imperial pints) in 2013. There was a 185 percent increase in new vegan products between 2012 and 2016 in the UK. In 2011, Europe's first vegan supermarkets appeared in Germany: Vegilicious in Dortmund and Veganz in Berlin. In 2017, veganism rose in popularity in Hong Kong and China, particularly among millennials. China's vegan market is estimated to rise by more than 17 percent between 2015 and 2020, which is expected to be "the fastest growth rate internationally in that period". This exceeds the projected growth in the second and third fastest-growing vegan markets internationally in the same period, the United Arab Emirates (10.6%) and Australia (9.6%) respectively. In total, as of 2016, the largest share of vegan consumers globally currently resides in Asia Pacific with nine percent of people following a vegan diet. In 2013, the Oktoberfest in Munich — traditionally a meat-heavy event — offered vegan dishes for the first time in its 200-year history.

Internet information

On February 6, 2020, CNN Health published an analysis explaining some of the adjustments people would have to make if they intended to adopt a vegan diet.

The full text can be accessed at <https://edition.cnn.com/2020/02/06/health/vegan-how-to-food-drayer-wellness/index.html>

On February 2, 2020, the animal rights group People for Ethical Treatment of Animals (PETA) published a series of arguments titled '10 Reasons to Go Vegan in the New Year'. These can be accessed at <https://www.peta.org/living/food/top-10-reasons-go-vegan-new-year/>

On January 15, 2020, The Guardian published a comment by its food and drinks editor Jess Ho titled 'Part-time veganism: the fewer animal products I ate, the less I wanted them'. The reviewer describes her gradual and surprisingly easy transition to a largely vegan diet. The full text can be accessed at <https://www.theguardian.com/food/2020/jan/14/part-time-veganism-the-fewer-animal-products-i-ate-the-less-i-wanted-them>

On January 8, 2020, Phys Org published a report on a British survey which recently found that a majority of those surveyed believed that veganism was ethical and good for the planet. The full text can be accessed at <https://phys.org/news/2020-01-meat-eaters-veganism-ethical-good.html>

On January 7, 2020, The Ecologist published an article titled 'Staying vegan for the planet' which explains that many vegans adopt and retain the diet out of a concern for the wellbeing of the planet.

The full text of the article can be found at <https://theecologist.org/2020/jan/07/staying-vegan-planet>

On January 2, 2020, BBC News published an analysis titled ‘Veganism: Why are vegan diets on the rise?’ which looked at the growing trend toward veganism and what seems to be motivating it.

The full text can be accessed at <https://www.bbc.com/news/business-44488051>

On January 2, 2020, Refinery29 published an article titled ‘Can the Low-Carbon Diet Cure Our Climate Crisis?’ which suggested that reducing meat consumption could help reduce climate change.

The full text can be accessed at <https://www.refinery29.com/en-us/2020/01/8883125/what-is-low-carbon-diet>

On December 10, 2019, Prospect published a comment by Hephzibah Anderson titled ‘Green new meal: the unpalatable truth about veganism and climate change’ which argued that veganism without consideration of the manner in which the plant foodstuffs were grown was not a solution to climate change.

The full text can be accessed at <https://www.prospectmagazine.co.uk/magazine/veganism-veganuary-climate-change-environment-pros-cons>

On November 1, 2019, LiveKindly published a comment titled ‘This Is Why Going Vegan Is Better for the Environment’ which argues that meat production and consumption is a major hazard for the world’s environment.

The full text can be accessed at <https://www.livekindly.co/this-is-why-a-vegan-diet-is-better-for-the-environment/>

On October 3, 2019, The Conversation published an article titled ‘The vegans are coming! What’s fuelling the interest in plant-based eating?’ by Matthew Ruby, Lecturer in Psychology, La Trobe University and Tani Khara PhD student in Sustainability, University of Technology Sydney.

The article argues that a complex of factors including concern for animal welfare, health consciousness and concern to reduce global warming are all acting to prompt an increase in those adopting veganism.

The full text can be accessed at <https://theconversation.com/the-vegans-are-coming-whats-fuelling-the-interest-in-plant-based-eating-123869>

On September 17, 2019, The Telegraph published a comment by Josh Wilson titled ‘Eating some meat is better for the environment than going vegetarian, new study finds’

The article argues that the thoughtful cultivation of food sources both plant and animal with the aim of reducing their environmental impact would be of greater benefit in the battle to reduce climate change.

The full text can be accessed at <https://www.telegraph.co.uk/global-health/climate-and-people/eating-meat-better-environment-going-vegetarian-finds-new-study/>

On September 17, 2019, The HuffPost published an article titled ‘Why Going Vegetarian Isn’t Necessarily The Best Diet For The Planet’ which argued that if enough people adopt a mostly vegan diet that includes small amounts of animal products, it would go a long way toward reducing climate emissions.

The full text can be accessed at https://www.huffingtonpost.com.au/entry/vegan-vegetarian-climate-change-diets_n_5d7fa569e4b03b5fc8873dc7?ri18n=true

On September 8, 2019, Wired published a comment titled ‘How does going vegan help save the planet? Here are the facts’ which explains the environmental impact of the animal-based foods consumed in Western countries.

The full text can be accessed at <https://www.wired.co.uk/article/vegan-diet-environmental-carbon-impact>

On July 3, 2019, the ABC’s News Breakfast interviewed farmer and author, Matthew Evans, about his recently released book, ‘On Eating Meat’. Evans argues that animal products can be produced without cruelty and that growing plant crops inevitably involves a substantial loss of animal life. His comments became the basis of an article published on the ABC News site which can be accessed at <https://www.abc.net.au/news/2019-07-03/vegan-diet-doesnt-mean-no-animals-die-says-matthew-evans/11266420?pfmredir=sm>

On December 6, 2013, Time published a comment and analysis titled ‘The Triple Whopper Environmental Impact of Global Meat Production’ which detailed the damaging environmental effects of meat production.

The full text can be accessed at <https://science.time.com/2013/12/16/the-triple-whopper-environmental-impact-of-global-meat-production/>

Arguments in favour of veganism

1. A vegan diet reduces animal cruelty

Opponents of human beings relying on animal products as a food source argue that an animal-based diet inevitably results in cruelty to the animals that are exploited for this purpose. In addition to the fact that most animal-based foods come from the death of the animal involved, it is also noted that animals are reared in cruel conditions before being slaughtered.

The extraordinarily large number of animals slaughtered for human food consumption has been condemned as a violation of animal rights as sentient beings. The Humane Society International has estimated that over 80.3 billion land animals alone are slaughtered annually for human food consumption. <https://www.hsi.org/issues/plant-based-eating/> It is further claimed that many of these animals are killed under inhumane conditions. The animal rights group, People for the Ethical Treatment of Animals (PETA), has complained about the manner in which animals are transported to slaughter yards. It has stated, ‘Cattle...are crammed onto trucks where they typically go without food, water, or rest for the duration of the journey, which can sometimes be days. Many cows collapse in hot weather... By the time the exhausted cows reach the slaughterhouse, many are too sick or injured to walk. These cows, known to the meat and dairy industries as “downers,” often have ropes or chains tied around their legs so that they can be dragged off the trucks...“Uncooperative animals are beaten, they have prods poked in their faces and up their rectums,” says a former USDA inspector.’ <https://www.peta.org/issues/animals-used-for-food/factory-farming/cows/cow-transport-slaughter/>

The slaughter practices themselves have also been condemned as cruel. PETA has observed, ‘After they are unloaded, cows are forced through a chute and shot in the head with a captive-bolt gun meant to stun them. But because the lines move so quickly and many workers are poorly trained, the technique often fails to render the animals insensible to pain.’ Martin Fuentes, a slaughterhouse worker interviewed by the Washington Post has stated that many animals are still alive and conscious for as long as seven minutes after their throats have been

cut. Fuentes explained, 'The line is never stopped simply because an animal is alive.'
<https://www.peta.org/issues/animals-used-for-food/factory-farming/cows/cow-transport-slaughter/>

It has also been noted that animals are often reared in conditions that involve ongoing cruelty. This claim is made in particular regarding animals that are reared on factory farms. The animal rights group People for the Ethical Treatment of Animals (PETA) has stated, 'Factory farming strives to produce the most meat, milk, and eggs as quickly and cheaply as possible and in the smallest amount of space possible, resulting in abusive conditions for animals.

Cows, calves, pigs, chickens, turkeys, ducks, geese, rabbits, and other animals are kept in small cages or stalls, where they are often unable to turn around. They are deprived of exercise so that all their energy goes toward producing flesh, eggs, or milk for human consumption. They are fed drugs that fatten them more quickly, and they are genetically manipulated to grow faster or produce much more milk or eggs than they would naturally.'

<https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/>

It has been estimated that around two-thirds of all farm animals are factory farmed worldwide every year. This is nearly 50 billion animals. <https://www.ciwf.org.uk/factory-farming/animal-cruelty/>

The Australian animal welfare group Voiceless has noted, 'According to scientific research, farmed animals are sentient, emotionally complex, intelligent and have rich experiences of the world. On factory farms, animals experience numerous impacts on their welfare, including permanent confinement in cages or in sheds in such large numbers that they struggle to find space to move or reach their food. [They are also subject to] mutilation of sensitive areas without pain relief – the tails, teeth and genitalia of piglets and the beaks of chicks are clipped, as well as the horns, tails, and testicles of calves – because it is practical, cheap and, alarmingly, lawful to do so.' <https://www.voiceless.org.au/hot-topics/factory-farming>

The British animal rights group Compassion in World Farming, has noted, 'Factory farming systems demand fast-growing or high-yielding animals. They achieve this through selective breeding and the use of concentrated feed. This puts the animals at risk of developing often-painful physiological problems. Lameness, weakened, or broken bones, infections and organ failure are common health problems for factory farmed animals. Antibiotics or other growth-promoting treatments are used in some countries to encourage even higher yields.'

<https://www.ciwf.org.uk/factory-farming/animal-cruelty/>

It has been claimed that factory farmed meat chickens grow so fast that 25 percent suffer from painful lameness. It has further been noted that though the use of antibiotics to promote farm animal growth is outlawed in the European Union, it is legal in a number of countries.

In the United States, around 80 percent of all antibiotics are believed to be used on farm animals. <https://www.ciwf.org.uk/factory-farming/animal-cruelty/>

Compassion in World Farming has also noted, 'To save space, factory-farmed animals are crammed together in barren pens, crates or cages, preventing normal behaviours such as nesting or foraging. This often causes the animals to inflict injuries on each other out of sheer boredom, frustration and stress. To reduce these injuries, mutilation has become commonplace.

Compassion in World Farming has observed (as the Australian animal welfare group, Voiceless, also noted), 'Animals have their teeth clipped, tails docked, and beaks trimmed - all usually carried out without pain relief. The European Food Safety Authority reported that over 90 percent of Europe's pigs are tail-docked despite [this procedure] being illegal to perform routinely.' <https://www.ciwf.org.uk/factory-farming/animal-cruelty/>

2. A vegan diet draws on fewer natural resources

Opponents of the use of animals as a food source claim that rearing animals for this purpose uses huge quantities of natural resources and relying on plant products for food would be less wasteful.

The animal rights group People for the Ethical Treatment of Animals (PETA) have claimed ‘Raising animals for food requires massive amounts of land, food, energy, and water... As the world’s appetite for meat increases, countries across the globe are bulldozing huge swaths of land to make more room for animals as well as crops to feed them... According to scientists at the Smithsonian Institution, seven football fields’ worth of land is bulldozed every minute to create more room for farmed animals and the crops that feed them.’

<https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/>

PETA have further claimed, ‘Of all the agricultural land in the U.S., 80 percent is used to raise animals for food and grow grain to feed them—that’s almost half the total land mass of the lower 48 states. In the “finishing” phase alone, in which pigs grow from 100 pounds to 240 pounds, each hog consumes more than 500 pounds of grain, corn, and soybeans; this means that across the U.S., pigs eat tens of millions of tons of feed every year.’

<https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/>

PETA have supplied additional statistics demonstrating the manner in which rearing livestock draws on huge quantities of natural resources. PETA have noted, ‘Chickens, pigs, cattle, and other animals raised for food are the primary consumers of water in the U.S.: a single pig consumes 21 gallons of drinking water per day, while a cow on a dairy farm drinks as much as 50 gallons daily. It takes more than 2,400 gallons of water to produce 1 pound of cow flesh, whereas it takes about 180 gallons of water to make 1 pound of whole wheat flour.’

<https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/>

Mood Foods, a food manufacturer which stresses environmentally sound means of producing food, has noted the enormous pressure which currently exists on human water sources. They have stated, ‘Only 2.5 percent of all water on our planet is fresh water, and only 30 percent of that is available to us and not frozen as ice. Water scarcity is a very real issue, with over a billion people living without sufficient access to clean water.’ Mood Foods goes on to explain how much more water is used in the production of animal-based food than it is in the production of food based on plant products. They state, ‘Unlike the majority of plant-based foods, raising animals requires vast amounts of water. This is because animals need water to drink, wash, clean their living spaces and cool themselves during hot periods¹. In fact, a study comparing the water footprint of different foods found that whilst a soy burger has a water footprint of 158 litres, a beef burger has a water footprint of 2,350 litres, which is over 14 times as big.’ <https://www.ombar.co.uk/blogs/news/3-environmental-benefits-of-going-vegan>

The Vegan Society has similarly noted, ‘Meat-heavy, Westernised diets are a waste of resources we desperately need to conserve. This is because farmed animals consume much more protein, water and calories than they “produce”. Most of the protein from vegetable feed is used for the animal’s bodily functions and not “converted” to meat, eggs or milk.’

<https://www.vegansociety.com/resources/environment/food-security>

It has also been noted that a diet based on animal products requires far more land. The British Vegetarian Society has noted, ‘More agricultural land is used to raise cattle than all other domesticated animals and crops combined. A vegetarian diet requires two-and-a-half times less the amount of land needed to grow food, compared to a meat-based diet.’

<https://www.vegsoc.org/info-hub/why-go-veggie/environment/>

The veganism promotion website, I Love Vegan, has stated, '60 percent of worldwide deforestation results from land being converted for use as agricultural land, much of which is used for grazing cattle. An estimated 14 percent of the world's population (over 850,000,000 people) suffer from undernourishment while we continue to waste valuable agricultural land and resources to produce animal products, therefore obtaining only a fraction of the potential caloric value.' <https://www.ilovevegan.com/resources/benefits-of-a-vegan-lifestyle/>

Many conservationists claim that the growing number of human beings occupying the planet demands that we find means of feeding ourselves that are as resource efficient as possible.

The Vegan Society has noted, 'Quite simply, we do not have enough land to feed a growing population on an animal-based diet. While 800 million people do not have enough food, we continue to waste valuable agricultural land by obtaining only a small fraction of its potential caloric value.' <https://www.vegansociety.com/resources/environment/food-security>

Richard Waite, an associate with the World Resource Institute's food program, has explained, 'It takes more land or more water, or causes more greenhouse gas emissions to grow [animal-based] food...Animal-based foods are usually more resource-intensive than plant-based foods. Generally, diets that contain more dairy, meat, eggs and fish will have a higher environmental impact than diets centered on plant-based foods such as fruits and vegetables. That's basically because animals first need to eat plants to grow. So, you're introducing inefficiency into the system.' <https://health.usnews.com/wellness/food/articles/best-diets-for-the-environment>

In 2010, the United Nations released a report encouraging a global move away from animal products. The report states, 'Impacts from agriculture are expected to increase substantially due to population growth increasing consumption of animal products. Unlike fossil fuels, it is difficult to look for alternatives: people have to eat. A substantial reduction of impacts would only be possible with a substantial worldwide diet change, away from animal products.' <https://www.ilovevegan.com/resources/benefits-of-a-vegan-lifestyle/>

3. A vegan diet is less ecologically damaging

Proponents of vegan diets often argue that diets based on animal products cause far more ecological damage than the vegan alternative.

Critics of animal-based agriculture argue that it has an enormously deleterious effect on the ecosystems of the planet and the creatures and plant life that attempt to co-exist within them.

A recent United Nations environmental report found that around one million species are at risk of extinction and that much of the blame can be placed on animal agriculture. The report stated that the meat industry has a 'particularly heavy impact'. Of all the major causes of biodiversity loss listed by the report (such as destruction of forests and wetlands, overfishing, climate change and pollution), animal agriculture is the primary cause of the deterioration.

https://www.veganaustralia.org.au/animal_agriculture_causes_biodiversity_loss_un_report

The same report also found that livestock production (grazing and feedstock) is the single largest driver of habitat loss; that farmed animals now account for over 90 percent of all large land animals; and that the demand for grain-fed meat is one of the main drivers of global biodiversity loss.

https://www.veganaustralia.org.au/animal_agriculture_causes_biodiversity_loss_un_report

It has also been noted that the fishing industry is having a disastrous impact upon the world's oceans. Pachamama Alliance, a global lobby group campaigning for sustainability, has noted, 'For every pound of fish caught, 5 pounds of unintended marine species are caught and discarded as by-kill. On top of this, over 70 percent of the world's fish species are either fully exploited or depleted. Not only are species that the industry is actively producing suffering, but unintended species are being killed each day at an alarming rate. Some estimates show

that we could see fishless oceans by 2048.’ <https://blog.pachamama.org/how-animal-agriculture-affects-our-planet>

In an article published in The Conversation on April 26, 2017, Francis Vergunst, Postdoctoral Fellow in Developmental Public Health, Université de Montréal and Julian Savulescu, Visiting Professor in Biomedical Ethics, Murdoch Children's Research Institute, stated, ‘Livestock farming has a vast environmental footprint. It contributes to land and water degradation, biodiversity loss, acid rain, coral reef degeneration and deforestation.

Nowhere is this impact more apparent than climate change – livestock farming contributes 18 percent of human produced greenhouse gas emissions worldwide. This is more than all emissions from ships, planes, trucks, cars and all other transport put together.’

<https://theconversation.com/five-ways-the-meat-on-your-plate-is-killing-the-planet-76128>

The British animal welfare group Compassion in World Farming has explained in detail some of the ways in which intensive animal farming practices contribute to greenhouse gas emissions. The group states, ‘Factory farming produces greenhouse gases throughout the “supply chain”. For example, forest clearance to grow the crops and rear the animals reduces vital carbon “sinks” and releases gases previously stored in the soil and vegetation.’

<https://www.ciwf.org.uk/factory-farming/environmental-damage/>

Compassion in World Farming has also noted the extent which factory farms are energy-intensive enterprises, releasing large amounts of carbon dioxide via the petrol and coal driven engines upon which they rely. The group states, ‘Factory farming also requires large amounts of energy in order to function. This isn't just to rear the animals, but also to grow the vast amounts of feed they need. According to a study published by The Royal Society, feed is the dominant energy user, taking around 75 percent of the total energy required. The rest is needed for factors such as heating, lighting and ventilation.’ <https://www.ciwf.org.uk/factory-farming/environmental-damage/>

Compassion in World Farming has further observed, ‘It's not just carbon dioxide that's the problem: gases including methane and nitrous oxide, also produced in significant quantities, are released through various sources including animal waste and fertiliser use. Livestock farming produces 37 percent and 65 percent of our global methane and nitrous oxide emissions respectively. Both gases are much more potent than carbon dioxide.’

<https://www.ciwf.org.uk/factory-farming/environmental-damage/>

Conservation groups are consistently warning that meat-eating trends have to be reversed in developed countries if the planet's ecology is to be preserved. A comment published by the conservation group Down to Earth stated, ‘Global production of meat has increased dramatically from 130 million tons in the late 1970s to 230 million tons in the year 2000. Meat is now the single largest source of animal protein in all affluent nations and demand for animal flesh is expected to more than double by the year 2050. In order to meet this growing appetite, animals will no doubt be reared more intensively and cheaply with factory farming and aquaculture (fish farming) causing further pollution, water demand and land usage. If nothing is done, the environmental impact of meat production can only increase.’

<https://www.downtoearth.org/go-veggie/environment/top-10-reasons>

4. A vegan diet is beneficial to human health

Those who support a vegan diet as opposed to one substantially based on animal products argue that a vegan diet is better for human health.

An article published in Medical Health Today noted that one of the primary reasons for the health benefits of a vegan diet is that it allows consumers to avoid animal fats. The article noted, ‘Animal fats have been linked to a range of illnesses and conditions, including diabetes, rheumatoid arthritis, hypertension, heart disease, and various cancers. Animal

sources are likely to account for 13 of the top 15 sources of cholesterol-raising fats in the United States.

By cutting these from the diet, the risk of many health issues can be greatly reduced. Animal fats may also transfer industrial cancer-linked chemicals and toxins from their environment. Healthy, plant-based oils and fats, such as olive oil, provide necessary fatty acids without raising levels of low-density lipoprotein (LDL) cholesterol.'

<https://www.medicalnewstoday.com/articles/149636#benefits>

It has further been suggested that a plant-based diet can help protect against genetic propensities toward certain diseases. An article published in Medical Health Today stated, 'Plant-based diets can counteract an individual's genetic likelihood of developing a chronic disease, such as type 2 diabetes.

A 2008 study explains that bioactive compounds in plant foods can control biological factors that may work against the genetic factors linked to some chronic diseases. The researchers maintain that the antioxidants in plant-based foods can combat free radical cells that cause cell damage and inflammation.

Other plant compounds can help to control different genes linked to cardiovascular disease, arterial plaque, and tumor growth.'

<https://www.medicalnewstoday.com/articles/149636#benefits>

It has been noted that meat-based diets are harmful not merely because of the composition of the food but also because of the manner in which the animals have been reared. In an article published in The Conversation on April 26, 2017, Francis Vergunst, Postdoctoral Fellow in Developmental Public Health, Université de Montréal and Julian Savulescu, Visiting Professor in Biomedical Ethics, Murdoch Children's Research Institute, stated, 'At the production level, industrial livestock farming relies heavily on antibiotic use to accelerate weight gain and control infection – in the United States, 80 percent of all antibiotics are consumed by the livestock industry.

This contributes to the growing public health problem of antibiotic resistance. Already, more than 23,000 people are estimated to die every year in the United States alone from resistant bacteria. As this figure continues to rise, it becomes hard to overstate the threat of this emerging crisis.'

<https://theconversation.com/five-ways-the-meat-on-your-plate-is-killing-the-planet-76128>

Further it has been claimed that some of the deficiencies that might occur in a purely plant-based diet can be readily overcome by thoughtful food selection or by taking supplements. One of the queries often raised about vegan diets is that plant-based protein sources do not supply all the necessary amino acids necessary for human beings to synthesise proteins for growth and cell repair. Jan Deckers' wide-ranging 2016 study of the suitability of plant-based diets states, 'Peas, lentils, and beans are good sources of protein that are readily available and relatively easy to grow in many parts of the world. It is important that vegans consume protein foods that contain the full range of essential amino acids overall; although there is no need for the full range of essential amino acids to be part of every meal.'

<https://www.ncbi.nlm.nih.gov/books/NBK396513/>

Deckers' study also defends vegan diets against concerns that it may not supply sufficient calcium to maintain healthy bones or might prevent sufficient calcium from being absorbed.

Deckers states, 'Green leafy vegetables that are low in oxalate, including broccoli, kale, spring greens, and cabbage, tend to be high in calcium, as well as in vitamin K, another important contributor to bone health.'

<https://www.ncbi.nlm.nih.gov/books/NBK396513/>

Finally, Deckers also notes that though the essential vitamin B12 is not contained in plant food sources it can be readily acquired by taking supplements or eating fortified plant foodstuffs such as fortified cereals. <https://www.ncbi.nlm.nih.gov/books/NBK396513/>

5. A vegan diet is not too expensive to maintain

Those who favour a vegan diet dispute the claims sometimes made that it is prohibitively expensive to buy the range of plantstuffs needed to live healthily on an exclusively vegan regimen.

The vegan lifestyle promotion site, I Love Vegan, states, 'Veganism can easily be tailored to fit into most people's lives, regardless of income. It's a myth that eating a vegan diet is expensive by nature. In fact, vegan diets in particular are very accommodating to budget living and eating. Many of the foods considered to be staples in a typical, healthy vegan diet are very affordable – grains, beans, seeds, and legumes are all good examples. You can make a lot of delicious vegan food on a budget!' <https://www.ilovevegan.com/resources/vegan-lifestyle-on-a-budget/>

Vegan Australia has examined the cost of maintaining a vegan diet from an Australian perspective. Their Internet site states, 'Australians, on average, spend around \$15 per person per day on their food and drink. Almost half of the world's humans live on less than US\$2.50 a day, and more than three quarters on less than US\$10 a day. If you are one of the more than 2.5 million people in this country living below the poverty line, or even if you're experiencing the squeeze of the modern cost of everything, you're likely to identify more with the latter group, and the need to find nourishing food that is cheap is a very real and pressing issue...

In an average Australian supermarket, 5kg of brown rice will set you back \$13.50, 4kg of potatoes \$8, 1kg of polenta \$5.60, 500g of tofu \$3.45, 375g of lentils \$2.30 and 100g of borlotti beans \$2.69. There are, of course, many other starches available, including in combinations like soup mixes. These alone would fill someone up for many days and, providing you were supplementing your vitamin B12, would keep you in good health, although we would recommend also including as much green leafy and other vegetables, seasonal fruit, mushrooms and seeds as you could afford, and monitoring/supplementing your vitamin D levels.' https://www.veganaustralia.org.au/living_vegan_on_a_budget

It has further been claimed that plants are actually a cheaper source of protein than meat sources. The United States based website, No Meat at the Table, has noted, 'Meat is one of the more expensive items in the grocery store. There's usually some waste associated with that as well. Replacing it pound-for-pound with beans (just a simple example, but not too different from what many new vegetarians do) would result in significant savings.'

<https://www.nomeatathlete.com/save-money-vegetarian/>

Defenders of the affordability of a vegan diet note that claims about excessive expense usually come from those referring to recently developed synthetic meat substitutes. The first cultured meat burger famously cost \$280,000 to produce. Though costs have come down significantly since, price remains a challenge. The major production expense in cultured meat is the growth medium, which can cost around \$400 a litre with it sometimes requiring up to 600 litres to produce a kilogram of meat.

<https://www.foodnavigator.com/Article/2019/12/17/Cultured-meat-and-the-long-road-to-market>

Defenders of the cost of vegan diets note two things. Firstly, these expensive meat-substitutes are not the current emphasis in vegan diets. Those following a vegan diet are looking to substitute plant-based foods for meat products, not to have plant-based foods replicate meat products in taste and appearance.

Secondly, it has been noted that even for those who may want to consume plant-based synthetic meats the cost is declining. A number of synthetic meat manufacturers are refining their processes and this together with increasing demand and economies of scale is hoped to make the cost of synthetic meat comparable to that of the conventional product. The Israel-based startup Future Meat Technologies aims to cut the cost to about \$2.30 to \$4.50 a pound by 2020. <https://www.agweb.com/article/will-lab-meat-get-cheap-enough-to-buy>

Arguments against veganism

1. A vegan diet does not prevent the loss of animal life

Those who defend human consumption of meat argue that growing plant crops inevitably involves a substantial loss of animal life. Rather, they claim, large numbers of animals lose their lives as part of the production of all plant-based foods.

Matthew Evans, author of the book 'On Eating Meat', has claimed that just in Australia about 40,000 ducks are killed each year to protect rice production. He further notes a billion mice are poisoned every year to protect wheat in Western Australia alone and that apple growers can kill 120 possums a year to protect their orchards. <https://www.abc.net.au/news/2019-07-03/vegan-diet-doesnt-mean-no-animals-die-says-matthew-evans/11266420?pfmredir=sm>

In his book, 'On Eating Meat', Evans cites the case of a mixed farm in Tasmania where the farmers grow beef cattle, sheep, barley and peas. Referring to the peas grown, Matthews observes that each year the farmers protect their pea crop by having some 150 deer shot and killing some 800-1,000 possums and 500 wallabies. Evans concludes, 'So, more than 1500 animals die each year to grow about 75ha of peas for our freezers. That's not 1500 rodents, which also die, and which some may see as collateral damage. That's mostly warm-blooded animals of the cute kind, with a few birds thrown in.'

<https://www.theaustralian.com.au/weekend-australian-magazine/eating-vegan-the-big-picture/news-story/4945cb421c44440be96e3646c9ed942d> Evans has made similar claims about wheat growing. He has written, 'The number of animals that die to produce vegan food is astonishing. Consider wheat, a common crop in Australia. And let's look at the nutrient density of the food in question, because not all foods are created equal. According to an article by Mike Archer, Professor in the Faculty of Science at the University of NSW, roughly 25 times more sentient beings die to produce a kilo of protein from wheat than a kilo of protein from beef.'

<https://www.theaustralian.com.au/weekend-australian-magazine/eating-vegan-the-big-picture/news-story/4945cb421c44440be96e3646c9ed942d> Referring to the impact of just one plant crop on birdlife, Matthew Evans has stated, 'Let's look at birds. Over a five-year period up to 2013, rice farmers in NSW killed nearly 200,000 native ducks to protect their fields. That's right, to grow rice. That's in addition to the animals indirectly affected, such as those that once thrived in the waterways drained by such a heavily irrigated crop on a dry continent. That's how farming works. To grow something, other things are affected. Sometimes it's an animal, sometimes it's a helluva lot of animals.'

<https://www.theaustralian.com.au/weekend-australian-magazine/eating-vegan-the-big-picture/news-story/4945cb421c44440be96e3646c9ed942d> Evans has summed up his position, stating, 'So a duck dying to protect a rice paddy for me is not much different from a cow dying to produce a steak. They are both animal deaths that happen in the name of us being able to eat. So, there is nothing that we can do that doesn't have an impact on animals.'

<https://www.abc.net.au/news/2019-07-03/vegan-diet-doesnt-mean-no-animals-die-says-matthew-evans/11266420?pfmredir=sm> Evans argues that farming animals specifically for food is unjustly focused upon as a source of animal deaths. He has stated, 'It does seem that food production gets unfairly singled out for killing animals, when every human activity has an effect on other living things. We kill animals when we drive. We kill animals when we fly, or transport goods by plane. We kill when we build railway tracks, when we farm grain, grow apples and mine sand. We alter ecosystems when we put up new housing developments, build -bicycle factories and ship lentils. We push native animals out of their environments all the time, with the resultant pain and suffering you'd expect.'

<https://www.theaustralian.com.au/weekend-australian-magazine/eating-vegan-the-big-picture/news-story/4945cb421c44440be96e3646c9ed942d>

It is argued that feeding human beings using meat protein from livestock results in far less loss of animal life than using plant proteins. Professor Mike Archer, of the Evolution of Earth & Life Systems Research Group, University of New South Wales, has stated, 'To produce protein [for human consumption] from grazing beef, cattle are killed. One death delivers (on average, across Australia's grazing lands) a carcass of about 288 kilograms. This is approximately 68 per cent boneless meat which, at 23 per cent protein equals 45kg of protein per animal killed. This means 2.2 animals killed for each 100kg of useable animal protein produced.'

Professor Archer has contrasted the loss of animal life resulting from meat consumption with the far greater death animal rate caused through eating plant proteins. He notes, 'Producing protein from wheat means ploughing pastureland and planting it with seed. Anyone who has sat on a ploughing tractor knows the predatory birds that follow you all day are not there because they have nothing better to do. Ploughing and harvesting kill small mammals, snakes, lizards and other animals in vast numbers...' Archer concludes 'at least 55 sentient animals die to produce 100kg of useable plant protein: 25 times more than for the same amount of rangelands beef.' <https://www.sbs.com.au/news/insight/ordering-the-vegetarian-meal-there-s-more-animal-blood-on-your-hands>

2. Animal farming can be conducted without cruelty

Those who defend human consumption of meat argue that animal farming can be conducted without cruelty.

Matthew Evans, author of the book 'On Eating Meat', claims that most of the cruel and 'absolutely abhorrent' animal husbandry practices such as the battery farming of hens and the stall rearing of pigs are a direct response to consumer demand for cheap meat.

Evans notes that Australians are the largest meat consumers in the world and yet the amount that the Australian consumer spends on meat products is relatively low. He claims, "'The average Australian spends about 4 per cent of their income on meat today. The average Sydneysider spends 3 per cent of their income on international holidays.'

<https://www.abc.net.au/news/2019-07-03/vegan-diet-doesnt-mean-no-animals-die-says-matthew-evans/11266420?pfmredir=sm>

Evans's position is that if Australians were prepared to eat slightly less meat yet buy meat harvested from more expensively and humanely reared animals than most of the questionable animal husbandry practices could be removed. Evans has stated, 'If we want to spend a little bit more or buy less of it and spend the same amount, farmers will do a better job on our behalf.' <https://www.abc.net.au/news/2019-07-03/vegan-diet-doesnt-mean-no-animals-die-says-matthew-evans/11266420?pfmredir=sm>

It has similarly been argued that large-scale factory farming of the type usually associated with inhumane conditions is not the only option available to food producers. United States consumer analyst, Phil Lempert, has noted that farming sufficient to meet the demands of a mass market and ensure a reasonable profit to the producer does not have to take place at on a scale which contributes to animal suffering.

In an article published in Forbes on June 15, 2015, Lempert noted, 'It is therefore possible for a factory farm to both be profitable and be considerate towards the animals' life-quality.'

Lempert argues that all that is needed is a more effective system for relaying to consumers the conditions under which animals have been reared. Lempert has noted, 'According to American Humane's survey nearly 95 percent of participants are "very concerned" about the welfare of farm animals and 69 percent of consumers responding to a Context Marketing survey (2010) said they would be willing to pay more for food that "promises to be produced to higher ethical standards", showing that this is an issue that consumers truly care about.'

<https://www.forbes.com/sites/phillempert/2015/06/15/why-factory-farming-isnt-what-you-think/#4ff8ec016065>

Lempert claims that customer demand for the humane treatment of livestock would drive the less careful farmers and producers out of the market. He concludes, 'By reinforcing transparency of our food supply, supermarkets will earn a better reputation and more trust with their shoppers...and at the same time empower customers to make educated decisions. It comes down to promoting a system that would make it easy for customers to choose more humane alternatives.' <https://www.forbes.com/sites/phillempert/2015/06/15/why-factory-farming-isnt-what-you-think/#4ff8ec016065>

Large sections of the food production industry worldwide maintain that they are currently operating under standards designed to ensure animal welfare through their humane treatment at all stages of the production process. For example, Dairy Australia's website states, 'Australia's animal welfare system aims to ensure all animals receive an acceptable level of care and treatment including a suitable environment, husbandry, nutrition, water, prevention from disease, veterinary care and protection from extreme conditions.

The Australian Animal Welfare Standards and Guidelines for Cattle have been developed to safeguard the welfare of cattle on farms across Australia. The Standards have been developed by the Australian and State governments in consultation with Australian Dairy Farmers (ADF), Dairy Australia, other livestock organisations and animal welfare groups. The dairy industry works with farmers to help ensure these standards are met and supports appropriate actions taken by state authorities who regulate the standards.' <https://www.dairy.com.au/our-commitments/animal-welfare>

Those who defend the human consumption of meat products note that in most jurisdictions animal handling standards extend to the slaughter process with regulations governing pre-slaughter handling, stunning and slaughter. In the United States the humane treatment of animals during each of these stages is required by the Humane Slaughter Act. <https://www.britannica.com/technology/meat-processing/Livestock-slaughter-procedures>

3. Plant-based agriculture is damaging to the environment

Those who defend using animal protein to feed human populations argue that plant-based agriculture represents at least as great a risk to ecosystems and the environment as animal-based food production.

It has been claimed that the overall impact of human settlement and food production on wildlife is so great as to have resulted in the wholesale destruction of species. A report released by the World Wildlife Fund (WWF) in 2018 involving the work of 59 scientists from around the world, The Living Planet Index, produced for WWF by the Zoological Society of London, uses data on 16,704 populations of mammals, birds, fish, reptiles and amphibians, representing more than 4,000 species, to track the decline of wildlife. Between 1970 and 2014, the latest data available, wildlife populations fell by an average of 60 percent. <https://www.theguardian.com/environment/2018/oct/30/humanity-wiped-out-animals-since-1970-major-report-finds>

A subsequent report released in May 2019, by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has found that more than a third of the world's land surface and nearly 75 percent of freshwater resources are now devoted to crop or livestock production. <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

Professor Sandra Díaz, who co-chaired the Assessment has stated, 'The diversity within species, between species and of ecosystems, as well as many fundamental contributions we derive from nature, are declining fast...'

<https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

It has been argued that when assessing the level of ecological damage attributable to human food production, crop growing causes far greater environmental damage and harm to other species than using the land as pasture to rear livestock. In an SBS Insight report written by Professor Mike Archer, of the Evolution of Earth & Life Systems Research Group, University of New South Wales, updated and republished on April 23, 2019, it was stated regarding Australian land use, 'Most cattle slaughtered in Australia feed solely on pasture. This is usually rangelands, which constitute about 70 per cent of the continent. Grazing occurs on primarily native ecosystems. These have and maintain far higher levels of native biodiversity than croplands.' <https://www.sbs.com.au/news/insight/ordering-the-vegetarian-meal-there-s-more-animal-blood-on-your-hands>

In contrast, Professor Archer has stressed the far greater level of environmental damage wrought by crop growing. He has stated, 'Grazing can...cause significant damage such as soil loss and erosion. But it doesn't result in the native ecosystem "blitzkrieg" required to grow crops.' <https://www.sbs.com.au/news/insight/ordering-the-vegetarian-meal-there-s-more-animal-blood-on-your-hands>

A 2015 study of the impact on natural ecosystems of the growing of food crops in Sub-Saharan Africa and South Asia outlined the extent of the damage caused. The study concluded that clearing exposes land to physical and chemical degradation, as well as contributing to air pollution. The over-cultivation and tillage of degraded and marginal lands damages soil structure drives soil loss through erosion processes and reduces water retention capacity. The loss of vegetative cover also worsens wind and water erosion on sloping uplands. It was also found that cropland expansion, cropping intensification and repeated plantings can negatively affect wild biodiversity directly through habitat loss, or pesticides killing target and non-target animals and other organisms.

<https://link.springer.com/article/10.1007/s12571-015-0478-1>

It has further been noted that plant-based agriculture gives rise to similar environmental problems to those commonly attributed exclusively to animal-based agriculture.

One of the frequent criticisms made of rearing beef cattle and dairy cows is that the animals release significant quantities of methane from their digestive tracts. (Methane is a gas with a more long-lasting and deleterious impact on global warming than carbon dioxide.) However, those who challenge the supposed environmental benefits of plant-rearing and consumption argue that various forms of plant-based agriculture, particularly rice growing, result in significant methane pollution. Submerging the rice crop in flooded paddy fields to inhibit weed growth is a wide-spread form of cultivation and results in the release of methane through the decay of plant matter. It has been claimed that growing the crop in flooded conditions causes up to 12 percent of global emissions of methane, a gas blamed for about one quarter of global warming caused by humans.

<https://www.bloomberg.com/news/articles/2019-06-03/your-bowl-of-rice-is-hurting-the-climate-too>

It has also been claimed that using grazing practices such as mob-grazing which does not require the use of greenhouse gas producing nitrous fertilizers and which encourages denser pastures which capture more carbon dioxide is a means of reducing greenhouse gas emissions. A 2007 study by the Intergovernmental Panel on Climate Change estimates that these improved grazing methods could mitigate around 90 percent of livestock-based agriculture's contribution to climate change.

Wildlife ecologist Allan Savory has claimed that managing livestock on rotation via mob-grazing can take enough carbon out of the atmosphere to return the atmosphere to pre-

industrial levels. <https://www.independent.co.uk/life-style/food-and-drink/cows-beef-farming-reverse-climate-change-global-warming-a8202121.html>

It has been claimed that a range of reforms are available that will completely eradicate the impact livestock currently has on the world's greenhouse gas emissions. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), for example, has predicted that Australia's cattle and sheep industries, which produce almost 70 percent of the nation's agriculture's greenhouse gas emissions, could be carbon-neutral by 2030.

<https://www.smartcompany.com.au/startupsmart/op-ed/meat-substitute-market/>

4. A vegan diet may not be a healthy alternative

There is concern that a healthy vegan diet including all necessary constituents may be too difficult to sustain over time and that vegans may develop deficiency-related diseases in later life. It has also been suggested that in an attempt to mimic some of the features of meat enjoyed by former meat consumers, synthetic meats may actually have adverse health effects. There have been two population studies that have monitored vegans over time, one following Seventh Day Adventists in the United States and Canada, and the EPIC-Oxford study, which tracked the health of nearly 50,000 meat-eaters, vegetarians and vegans across the United Kingdom. Scientists involved in the latter found that while consuming vegetables rich in calcium, such as kale and broccoli, can protect bones, many vegans did not actually meet their calcium requirements. As a result, the researchers found a 30 percent increased risk of fracture in vegans compared to vegetarians and meat eaters.

<https://www.theguardian.com/lifeandstyle/2019/dec/29/is-veganism-as-good-for-you-as-they-say>

Another British study was conducted of more than 48,000 men and women with no history of heart disease or stroke over about 18 years. Vegetarians were found to have a 13 percent lower risk of heart disease than meat eaters. However, they also had a 20 percent higher rate of stroke than meat eaters. That translated to three more strokes for every 1,000 people over 10 years. Tentative conclusions were drawn that a vegetarian diet may have adverse effects re propensity to stroke and it was recommended that further studies should be undertaken.

<https://www.webmd.com/diet/obesity/news/20191104/are-there-health-downsides-to-vegetarian-diets>

It has also been suggested that the trend toward vegetarian diets may lead to a 'choline crisis.' Choline is a nutrient that is important for brain health and other functions. It is found in meat and poultry, and the body cannot make all that humans need. Liz Weinandy, a registered dietitian at The Ohio State University Wexner Medical Center, has stated, 'Vegetarian diets are definitely lower in choline.' <https://www.webmd.com/diet/obesity/news/20191104/are-there-health-downsides-to-vegetarian-diets> Nutritionist Emma Derbyshire has also told the British Medical Journal that vegans may find themselves deficient in choline, a crucial nutrient for brain health commonly found in eggs, milk and beef that influences memory, mood and muscle control. <https://www.goodfood.com.au/good-health/why-going-meatfree-could-damage-your-health-20190909-h1hupr>

Helen Bond, another registered dietitian, has noted that meat-free diets are usually devoid of vitamin B12, which is found only in animal products. Without B12 people have a greater risk of becoming fatigued and of developing a weakened immune system. Sophie Medlin, a lecturer in nutrition and dietetics at King's College London has further warned, 'Anyone following a plant-based diet is likely to have suboptimal levels of vitamin B12 and an essential fatty acid called DHA [a type of omega-3]. These are vital for the health of our neurons or brain cells. When we are deficient, we suffer symptoms such as brain fog, short-term memory loss, changes in mood, difficulty sleeping, agitation, and anxiety.'

<https://www.goodfood.com.au/good-health/why-going-meatfree-could-damage-your-health-20190909-h1hupr>

Bond has also warned of the risks of vitamin D deficiency among those who do not consume animal products. Vitamin D is important for the health and strength of bones, teeth and the immune system, and can be difficult to include in a vegetarian or vegan diet. Bond has stated, 'Vitamin D-rich foods are mainly oily fish, eggs and things like that. There is some in mushrooms, but sadly [it is in] very few foods.' <https://www.goodfood.com.au/good-health/why-going-meatfree-could-damage-your-health-20190909-h1hupr>

It has further been noted that in an attempt to attract current meat-eaters to a vegetarian or vegan diet some synthetic meat producers are adding constituents to their products which are far from healthy. An article published by Harvard Medical School in August 2019 noted, 'Along with the ambition to replicate hamburgers comes a comparable amount of saturated fat. Since diets higher in saturated fat are associated with increased rates of both heart disease and premature death, they may not be the type to opt for if your ambitions are purely health related. They are also a significant source of sodium, particularly for those on salt-restricted diets.' <https://www.health.harvard.edu/blog/impossible-and-beyond-how-healthy-are-these-meatless-burgers-2019081517448>

5. A diet relying on synthetic meat substitutes is too expensive for many people to sustain. There have been numerous recent developments in synthetic meats (meat substitutes which attempt to replicate the taste and appearance of animal-derived meat products) which their designers and producers claim will ultimately make it possible for all people, including those who prefer a meat-based diet, to become vegan. They claim that meat alternatives offer health, ecological and ethical advantages. Their critics claim that irrespective of these supposed benefits these meat alternatives are too expensive for many people to be able to consume them as a major component of a long-term diet.

The high processing cost involved in the production of meat substitutes, as compared to natural meat, has led to the high price of meat substitute products, like Tofu, Tempeh, and other protein alternatives, and this is expected to hinder the market growth, especially in countries, like India, Brazil and Mexico. <https://www.mordorintelligence.com/industry-reports/meat-substitute-market>

On November 13, 2019, intelligence analysts, CB Insights, released a report titled 'Our Meatless Future: How The \$1.8T Global Meat Market Gets Disrupted'. Among the areas the report considered was the current cost of synthetic meats, products made from vegetable protein which seek to replicate the taste and appearance of animal derived meat products. The report noted, 'While the environmental benefits of lab-grown meat are potentially dramatic, meatless products are still significantly more expensive on a per-pound basis than animal alternatives.' The report concluded that synthetic meat products are currently some twelve times more expensive to produce than traditional animal-derived meat products.

https://www.cbinsights.com/research/future-of-meat-industrial-farming/?utm_source=CB+Insights+Newsletter&utm_campaign=62b8d278c2-Top_Research_Briefs_03_30_2019&utm_medium=email&utm_term=0_9dc0513989-62b8d278c2-90155369

It has been claimed that in the dining out market meat substitute products are unlikely to be more than an occasional indulgence for most consumers, despite their growing popularity. In an article published in Forbes on April 29, 2019, referring to the United States restaurant market, it was claimed, 'The average price restaurants have paid for a case of meat alternatives has gone up 29 percent, to \$80, in the past two years, faster growth than in other categories.' <https://www.forbes.com/sites/andriacheng/2019/07/29/beyond-meat-q2-sales-quadruples-but-replacing-meat-thats-a-different-story/#55fa9b776f4f>

Similar price differences have been noted in United States supermarket prices for meat substitute products. Forbes has noted, ‘Nielsen data also showed that at supermarkets, plant-based meat cost 10 cents per gram, more than double the 4 cents for beef and 2 cents for chicken, pork and turkey.’ <https://www.forbes.com/sites/andriacheng/2019/07/29/beyond-meat-q2-sales-quadruples-but-replacing-meat-thats-a-different-story/#55fa9b776f4f>

It has been suggested that the cost of the product is likely to mean that it will be far less readily taken up by those on lower incomes. In an article published in The Washington Post on September 10, 2018, it was noted, ‘Households earning over \$75,000 per year were nearly twice as likely to say they’d purchase cultured meat (47 percent), compared with those in households earning less than \$25,000 per year (26 percent). It seems that the more people earn, the more likely they are to switch from being undecided about cultured meat to being willing to give it a try.’ https://www.washingtonpost.com/national/health-science/burgers-grown-in-a-lab-are-heading-to-your-plate-will-you-bite/2018/09/07/1d048720-b060-11e8-a20b-5f4f84429666_story.html

It has further been argued that synthetic meats are unlikely to become a major food source in countries with a relatively depressed standard of living. In an analysis and comment written by Isabelle Baltenweck and published in The Financial Times on September 16, 2019, it was claimed, ‘For the one in ten people living on less than \$2 a day, “alt-meats” are unlikely to be a viable dietary solution for the simple reason that most people would be unable to access or afford them. Samburu livestock herders in northern Kenya, for example, live in rural areas with little access to grocery stores that might sell plant-based meat or soymilk. Instead, they rely on their cows, goats and sheep for both food and income.’

<https://www.ft.com/content/cca976ec-d623-11e9-8d46-8def889b4137>

Baltenweck further claims, ‘Meat and dairy alternatives do little to address the nutritional challenges faced by the poor in Africa and Asia. The most common diet-related health problem there is not overconsumption of animal-source foods but “hidden hunger”, a form of malnutrition characterised by deficiencies in the essential nutrients found in milk, meat and eggs.’

Baltenweck she concludes, ‘Rather than trying to replace all of the world’s meat, milk and eggs with alternatives, we should be improving husbandry systems and protecting these living assets for the most vulnerable.’ <https://www.ft.com/content/cca976ec-d623-11e9-8d46-8def889b4137>

Further implications

Human impacts upon the environment are having a dire effect with species loss, mass extinctions, and the rapidly accelerating impacts of climate change leading many people to search for ways in which they can alter their lives and reduce their deleterious effect.

It is in this context that veganism is gaining in popularity; however, an examination of the facts suggests that merely turning away from animal-based products may not be enough. The manner in which food is produced, as well as whether that food is plant or animal sourced, dramatically affects its impact on the world’s ecology.

In a comment published in Prospect on December 10, 2019, Hephzibah Anderson explained the complexity of the situation, arguing that how a food product (or indeed any product) was sourced may turn out to be more significant than the label, vegan or otherwise, that is attached to it. There are vegan products that have greater adverse impacts upon the environment than animal-based ones. The solution appears to reside in the detail. The following arguments are extracted from Anderson’s article.

<https://www.prospectmagazine.co.uk/magazine/veganism-veganuary-climate-change-environment-pros-cons>

‘A 2019 Imperial College study did find that your diet is where you can make the biggest difference. The trouble is, while certain facts are indisputable—for instance, the amount of soya fed to a cow to produce a litre of milk is several times that used to produce a litre of soya milk—the more granular the focus, the murkier the picture becomes. Industrially farmed soya is one of the worst crops in any quantity because it’s what is known as a monocrop, one that is planted in the same field year after year, causing soil depletion and also enhancing vulnerability to famine, Irish potato-style. So, sure, you’ve embraced a plant-based diet, but if you’re indulging every week in jackfruit tacos, prefer almond milk to oat milk [with almonds requiring much more water to grow], and aren’t yet sick of avocados, then your diet is hardly carbon-neutral. Even fruitarians have been found to have a high environmental impact... As for “clean” meat (and the term is obviously contested by livestock farmers), there are other studies suggesting that while “fake” beef would have less environmental impact than the real thing, “fake” chicken might turn out to be more impactful than real chicken. Besides, for all the hype, the technology is still not mature—much could yet go wrong... Moreover, a vegan diet is rich in maize and grains, and those crops tend to be industrially grown using fertiliser, fungicides, pesticides and herbicides. One detail that’s consistently overlooked in the vegan debate is how your food is farmed. In the rush to embrace veganism, yesterday’s trend for organic foods has been all but forgotten... The reality is that every choice to consume that we make—even if it’s an alternative choice—has drawbacks. Electric cars, for instance: it turns out that their future may depend on mining critically important metals on the ocean floor. The painful truth of it is that if we are to fix a problem as vast as climate change, every choice is going to have to be thoughtful—much more about carbon and much less about what flatters our ideas about who we are.’

The same arguments can be made regarding the impact of veganism upon human health. It is not enough that a food be derived from a plant source. The manner in which it is cooked [or preferably not cooked] and the variety and quality of other plant sourced foods with which it is consumed (over a lifetime not just a day) all dramatically affect the extent to which it can be considered a healthy choice.

Veganism, to be an effective partial answer to the problems confronting the world’s ecology, its climate and to those problems confronting human health, must be a highly informed and considered lifestyle choice. Consumers must act with conscious awareness of the wide-reaching impact of their food selections upon themselves and the world. Ill-informed veganism is a gesture not effective action.