



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Veganism and the 2030 Sustainable Development Goals

By

Nishta Soni

12079848

Submitted in partial fulfilment of the requirements for the degree

LLM Multidisciplinary Human Rights

In the Faculty of Law

University of Pretoria

November 2021

Prepared under the supervision of

Professor M Killander

Contents

Chapter 1: Introduction

1.1. Background	3
1.2. Research Problem	4
1.3. Hypothesis	5
1.4. Research Questions	5
1.5. Literature review	
1.5.1. Research Question 1: What are the health benefits of a vegan diet?	6
1.5.2. Research Question 2: What are the environmental benefits of a vegan diet?	7
1.5.3. Research Question 3: What are the disadvantages of veganism?	8
1.5.4. Research Question 4: Which SDGs are affected by veganism and how?	8
1.5.5. Research Question 5: Should nations encourage a vegan diet and how?	9
1.6. Contribution to Existing Literature	10
1.7. Terminology	10
1.8. Approach and Method	11

Chapter 2: Veganism and Health

2.1. Introduction	12
2.2. The Right to Health	13
2.3. Health Benefits of Veganism	
2.3.1. Type 2 Diabetes	13
2.3.2. Metabolism	14
2.3.3. Increased Cognitive and Mental Health	15
2.3.4. Cardiovascular Health	15
2.3.5. Cancer.....	16
2.4. Health Disadvantages of Veganism	18
2.5. Conclusion	20

Chapter 3: Veganism, the Environment and the Economy

3.1. Introduction 22

3.2. The Right to a Healthy Environment 22

3.3. Environmental Benefits of Veganism

 3.3.1. Pollution Induced Climate Change 23

 3.3.2. Environmental impact of dietary patterns 28

3.4. Biodiversity Loss 29

3.5. Animal Welfare 30

3.6. Economic Disadvantages of Veganism 31

3.7. Conclusion 34

Chapter 4: The Sustainable Development Goals and Veganism

4.1. Introduction 36

4.2. Sustainable Development Goal 2 36

4.3. Sustainable Development Goal 3 37

4.4. Sustainable Development Goal 11 and 13 38

4.5. Sustainable Development Goal 14 and 15 39

4.6. Conclusion 41

Chapter 5: Governments and Diet

5.1. Introduction 43

5.2. Prohibitive Mandates and Restrictions 43

5.3. Incentives 44

5.4. Marketing and Public Information 45

5.5. Conclusion 47

Chapter 6: Conclusion

4.7. Conclusion and Recommendations 48

Bibliography 53

Chapter 1

Introduction

1.1. Background

Veganism is classified as a diet where no meat or animal by-products are consumed.¹ The dietary lifestyle was first followed in 1806 by Dr William Lambe, a fellow of the royal college of physicians.² Concerned about his health, Dr Lambe altered his diet so that it was based solely on plants and contained no animal by products.³

The term 'vegan' was coined in November 1944, when a British national, Donald Watson declared that he would create a new term for people who did not consume meat, dairy or eggs.⁴ The dietary lifestyle spread quickly and in 1948, a Vegan Society was formed in California by Dr Catherine Nimmo and Rubin Abramowitz.⁵ During the 1950s, Vegan Societies were formed in Germany and India, however they were short-lived.⁶

The concept of 'flesh-avoidance' goes back to ancient Indian and Mediterranean cultures.⁷ Vegetarianism was first cited in 300 BCE by Greek philosopher Porphyry in his work 'On Abstinence from Animal Food'.⁸ In 500 BCE, fellow Greek philosopher, Pythagoras followed a vegetarian diet and encouraged kindness and compassion among all living organisms.⁹ It was at this time that, Buddha encouraged a meat-free

¹ D Rogerson 'Vegan diets: practical advice for athletes and exercisers' (2017) 14(36) *Journal of the International Society of Sports Nutrition* 2.

² The Vegan Society 'History' <https://www.vegansociety.com/about-us/history> (accessed 1 September 2021).

³ International Vegetarian Union 'Dr. William Lambe - father of vegan nutrition, and his vegan biographer' <https://ivu.org/index.php/blogs/john-davis/121-dr-william-lambe-father-of-vegan-nutrition-and-his-vegan-biographer> (accessed 22 August 2021).

⁴ B Timmins 'Who were the world's very earliest vegans?' 6 April 2017 <https://www.independent.co.uk/life-style/who-were-world-s-very-earliest-vegans-a7668831.html> (accessed 9 September 2020).

⁵ International Vegetarian Union 'The invention of the vegans' <https://ivu.org/index.php/blogs/john-davis/61-the-invention-of-the-vegans> (accessed 22 August 2021).

⁶ As above.

⁷ C Suddath 'A brief history of veganism' 30 October 2008 <https://time.com/3958070/history-of-veganism/> (accessed 9 September 2020).

⁸ S Lollai & G Pitzianti 'Porphyry, on abstinence from animal food (de abstinentia): the broken alliance between man and animals' November 2013.

⁹ S Keim & J Sosnowski 'Human rights v animal rights: mutually exclusive or complementary causes' (2012) 8(1) *Australian Animal Protection Law Journal* 79 – 80; The Vegan Society (n 2 above).

diet amongst his followers.¹⁰ Followers of Hinduism, and Jainism also encourage vegetarianism in their belief that humans should not harm animals.¹¹ The Ephrata Cloister, a Pennsylvanian religious group founded in 1732, supported vegetarianism.¹² During this time, 18th century utilitarian philosopher, Jeremy Bentham, held that animal suffering was equated to human suffering.¹³ The earliest vegetarian organisation was formed in 1847 in England.¹⁴ Across the globe, the creator of Graham crackers, Reverend Sylvester Graham, co-founded the American Vegetarian Society in 1850.¹⁵

In 2021, despite its initial poor support, vegan diets have become increasingly popular, with people moving to a vegan diet for a number of health, environmental and ethical reasons.¹⁶ The annual 'Veganuary' campaign, which started in 2014, encourages a vegan diet throughout the month of January.¹⁷ The campaign, had a record number of participants in January 2021.¹⁸ The rise in the number of people shifting to a vegan diet can be attributed to an increase in awareness regarding the negative impact of the meat industry, largely due to documentaries such as *Game Changers*, *Forks Over Knives* and *Cowspiracy*.¹⁹

¹⁰ The Vegan Society (n 2 above).

¹¹ E Szűcs et al. 'Animal welfare in different human cultures, traditions and religious faiths' (2012) 25(11) *Asian-Australasian Journal of Animal Sciences* 1500 – 1502.

¹² Britannica 'Ephrata community' <https://www.britannica.com/topic/Ephrata-Community> (accessed 10 September 2020).

¹³ Stanford Encyclopaedia of Philosophy 'Jeremy Bentham' 28 January 2019 <https://plato.stanford.edu/entries/bentham/> (accessed 10 September 2020).

¹⁴ HY Yeh 'Boundaries, entities, and modern vegetarianism: examining the emergence of the first vegetarian organization' (2013) 19(4) *Qualitative Inquiry* 299.

¹⁵ Unpublished: AD Shprintzen 'Abstention to consumption: The development of American vegetarianism' unpublished PhD thesis, Loyola University of Chicago, 2011 1817-1917.

¹⁶ The Vegan Society 'Why go vegan?' <https://www.vegansociety.com/go-vegan/why-go-vegan> (accessed 5 July 2021).

¹⁷ The Vegan Society 'Veganuary' <https://www.vegansociety.com/take-action/campaigns/veganuary-2021> (accessed 25 August 2021).

¹⁸ The Guardian 'Record 500,000 people pledge to eat only vegan food in January' <https://www.theguardian.com/environment/2021/jan/05/veganuary-record-number-people-pledge-eat-vegan-food-january> (accessed 25 August 2021).

¹⁹ H Fletcher 'The 10 films sure to turn meat-eaters vegan' 8 January 2020 <https://www.standard.co.uk/culture/film/the-10-films-sure-to-turn-meateaters-vegan-a3743351.html> (accessed 25 August 2021).

1.2. Research Problem

Research has shown that there are various benefits to adopting a vegan diet.²⁰ These include both environmental and health advantages.²¹ The meat industry is the greatest contributor of air and water pollution as well as one of the largest drivers of climate change.²² A vegan diet would eliminate a significant amount of this pollution.

Research has shown that vegans have a lower chance of developing illnesses such as cancer, diabetes, heart disease, and high blood pressure.²³ Furthermore, the great quantities of energy and resources required to raise animals for food and crops could be used more effectively if they were consumed by people directly.²⁴ This would assist in easing the world hunger issue.²⁵ Given that the 2030 Sustainable Development Goals (SDGs) relate to health, the environment and climate change, it is worthwhile to look into adopting a vegan diet to achieve Goals 2, 3, 11, 13, 14 and 15.

Despite the benefits of a vegan diet and the adverse effects that meat and dairy diets have on our health and the environment, the vast majority of the global population eats meat.²⁶ As such, this has led to a global movement away from achieving the SDGs, more specifically, Goals 2, 3, 11, 13, 14, and 15.

1.3. Hypothesis

Despite the benefits of a vegan diet and the adverse effects that meat and dairy diets have on our health and the environment, the vast majority of the global population eats meat. This has led to a global movement away from achieving several of the SDGs.

1.4. Research Questions

Main research question:

²⁰ PJ Tuso et al. 'Nutritional update for physicians: plant-based diets' (2013) 17(2) *The Permanente Journal* 62.

²¹ Suddath (n 7 above).

²² Food and Agriculture Organisation of the United Nations 'Livestock's long shadow: environmental issues and options' (2006) 267.

²³ Tuso (n 20 above) 62 – 63.

²⁴ D Pimentel & M Pimentel 'Sustainability of meat-based and plant-based diets and the environment' (2003) 78(3) *The American Journal of Clinical Nutrition* 660S.

²⁵ As above.

²⁶ J Piazza et al. 'Rationalizing meat consumption. The 4Ns' (2016) 91 *Appetite* 114.

Can veganism help achieve Goals 2, 3, 11, 13, 14, and 15 of the SDGs?

Sub research questions:

1. What are the health benefits of a vegan diet?
2. What are the environmental benefits of a vegan diet?
3. What are the disadvantages to society becoming vegan?
4. Which SDGs can be achieved with a vegan diet and how?
5. Should nations encourage a vegan diet and how?

1.5. Literature review

1.5.1 Research question 1: What are the health benefits of a vegan diet?

The most well-known benefit of adopting a vegan diet is to that of human health, due to a greater nutrient intake.²⁷ Research has shown that in middle aged persons, the consumption of meat and animal by-products is as harmful to a person's health as smoking is,²⁸ given the consumption of harmful animal proteins.²⁹ Vegan diets are known to be beneficial to cardiovascular health, with vegans having a decreased prevalence of cardiovascular and ischemic heart disease.³⁰ Vegans tend to have reduced levels of bodily inflammation,³¹ with bodily inflammation allegedly being a cause of many illnesses,³² such as diabetes, cancer, as well as cognitive and mental health illnesses.³³ Additionally, vegans tend to have an improved metabolism.³⁴ The

²⁷ FB Hu 'Plant-based foods and prevention of cardiovascular disease: an overview' (2013) 78(3) *The American Journal of Clinical Nutrition* 544; WJ Craig 'Health effects of vegan diets' (2009) 89(5) *The American Journal of Clinical Nutrition* 1627.

²⁸ S Wu 'Meat and cheese may be as bad as smoking: eating animal proteins during middle age makes you a candidate for cancer' <https://news.usc.edu/59199/meat-and-cheese-may-be-as-bad-for-you-as-smoking/> (accessed 20 November 2020).

²⁹ ME Levine et al. 'Low protein intake is associated with a major reduction in IGF-1, Cancer, and overall mortality in the 65 and younger but not older population' (2014) 19(3) *Cell Metabolism* 413.

³⁰ S Ryding 'What are the health benefits of a vegan diet?' <https://www.news-medical.net/health/What-are-the-Health-Benefits-of-a-Vegan-Diet.aspx> (accessed 31 August 2020).

³¹ M Glick-Bauer & M Yeh 'The health advantage of a vegan diet: exploring the gut microbiota connection' (2014) 6(11) *Nutrients* 4832.

³² P Hunter 'The inflammation theory of disease' (201) 13(11) *Embo Reports* 968; J Menzel et al. 'Associations of a vegan diet with inflammatory biomarkers' (2020) 1993 (10) *Scientific Reports* 1.

³³ JT Sutcliffe et al. 'C-reactive protein response to a vegan lifestyle intervention' (2015) 23 (1) *Complementary Therapies in Medicine* 32.

³⁴ Ryding (n 30 above).

most recognised benefit of a vegan diet is the decrease in prevalence of various cancers.³⁵

The alleged health benefits of veganism make the dietary choice essential for good health.

1.5.2 Research question 2: What are the environmental benefits of a vegan diet?

The breeding of animals for the consumption of meat requires immense resources.³⁶ This negatively impacts the environment.³⁷ As such, veganism is less impactful on the environment.

Factory farming³⁸ and the rearing of animals for food is a major source of greenhouse gases³⁹ which is a leading cause of global warming.⁴⁰ In addition, factory farms produce airborne bacteria and fungi which pollutes the air.⁴¹

Water pollution is a further issue. Fertilizer containing chemicals and bacteria often leaks into water sources.⁴² The nitrogen in the fertilizer thereafter causes algae blooms, which have a negative impact on aquatic organisms.⁴³ Furthermore, the poor water disposal of waste by farms tends to contaminate underground water sources.⁴⁴ Factory farming and the livestock industry centre around mass meat production at the

³⁵ As above.

³⁶ People for Ethical Treatment of Animals 'Veganism and the environment' <https://www.peta.org/issues/animals-used-for-food/animals-used-food-factsheets/vegetarianism-environment/> (accessed 31 August 2020).

³⁷ Food and Agriculture Organisation of the United Nations 'Livestock and the environment' <http://www.fao.org/livestock-environment/en/> (accessed 16 September 2021).

³⁸ Factory farming is 'a method of farming in which animals are kept inside in small spaces and are fed special food so that a large amount of meat, milk, etc. is produced as quickly and cheaply as possible' Oxford Learner's Dictionaries 'Factory farming' <https://www.oxfordlearnersdictionaries.com/definition/english/factory-farming> (accessed 7 October 2020).

³⁹ J Turner 'Factory farming and the environment: a report for compassion in world farming trust (1999) 38.

⁴⁰ People for Ethical Treatment of Animals (n 36 above).

⁴¹ Consumers Union SWRO 'Animal factories: pollution and health threats to rural Texas' (2000) 4.

⁴² RS Dungan 'Board invited review: fate and transport of bioaerosols associated with livestock operations and manures' (2010) 88 *Journal of Animal Science* 3702.

⁴³ People for Ethical Treatment of Animals (n 36 above).

⁴⁴ Dungan (n 42 above) 3693.

lowest cost.⁴⁵ This results in poor living conditions for animals,⁴⁶ which is an animal welfare issue.

Shifting to a vegan diet will minimise the global ecological footprint and make the world more cognisant of animal welfare.⁴⁷

1.5.3 Research question 3: What are the disadvantages of veganism?

Despite the numerous benefits, there are disadvantages to adopting a vegan diet. Vegans are deficient in several nutrients found in meat and animal by-products.⁴⁸ Continuous poor nutrition can lead to a variety of health issues, including bone damage and a loss of muscle mass.⁴⁹ Poor nutrition further affects energy levels.⁵⁰ However, a balanced diet should provide adequate energy.⁵¹ Vegans may have an increased risk of illness due to poor nutrition, yet have a decreased risk of illness due to a greater antioxidant consumption and a lower Body Mass Index (BMI).⁵²

If a vegan diet were adopted globally, farmers, especially in developing countries, would be adversely affected.⁵³ It is estimated that the food that would be produced by shifting to a vegan diet could feed millions of additional people.⁵⁴ The gross value of this food may offset any loss from a decrease in meat production.⁵⁵

The numerous health and environmental benefits may overshadow the disadvantages of a vegan diet and possibly outweigh them.

⁴⁵ Unpublished: R Grobler 'Regulating the environmental impact of factory farming in South Africa: legal perspectives' unpublished Magister Legum dissertation, North-West University (2012) 1.

⁴⁶ As above.

⁴⁷ People for Ethical Treatment of Animals (n 36 above).

⁴⁸ L Patton & W Skelly 'Why are plant-based diets not more widely accepted' (2020) 2.

⁴⁹ As above.

⁵⁰ D Azzolino 'Nutritional status as a mediator of fatigue and its underlying mechanisms in older people' (2020) 12(2) *Nutrients* 3.

⁵¹ Rogerson (n 1 above).

⁵² Ryding (n 30 above).

⁵³ SM Galer 'The consequences if the world decided to go meat free' 12 June 2017 <https://www.bbc.com/future/article/20170612-the-consequences-if-the-world-decided-to-go-meat-free> (accessed 1 September 2020).

⁵⁴ V Eswaran 'Vegetarianism is good for the economy too' 18 December 2018 <https://www.weforum.org/agenda/2018/12/vegetarianism-is-good-for-the-economy-too/> (accessed 1 September 2020).

⁵⁵ As above.

1.5.4 Research question 4: Which SDGs are affected by veganism and how?

Globally, we are moving towards a more sustainable society in which various life forms can flourish continually.⁵⁶ An essential step to this sustainable society is a significant shift to a vegan diet.⁵⁷ The benefits of a vegan diet include health, environmental, global food security and animal welfare advantages.⁵⁸ Therefore, veganism is an appropriate means of upholding sustainable development. Given the benefits of a vegan diet, there are several SDGs that can be realised.⁵⁹ The minimal resources required to maintain a vegan diet allows Goal 2 'zero hunger'⁶⁰ to be realised. The extensive health benefits of veganism allow Goal 3 'good health and well-being' to be achieved.⁶¹ Eliminating factory farms will help achieve Goal 11 'sustainable cities and communities'⁶² and address Goal 13 'climate action'.⁶³ Adopting a vegan diet will positively affect all living organisms and assist in realising Goal 14 'life below water'⁶⁴ and Goal 15 'life on land'.⁶⁵

1.5.5 Research question 5: Should nations encourage a vegan diet and how?

The advantages to adopting a vegan diet may outweigh the disadvantages. It is perhaps worthwhile for governments to encourage a vegan diet. Diets are influenced

⁵⁶ AO Salonen & TT Helne 'Vegetarian diets: a way towards a sustainable society' (2012) 5(6) *Journal of Sustainable Development* 10.

⁵⁷ As above.

⁵⁸ CJ Hopwood et al. 'Health, environmental, and animal rights motives for vegetarian eating' (2020) 15(4) *PLoS ONE* 1.

⁵⁹ M Alsaleh 'Changing your diet can help meet sustainable development goals' 16 May 2020 https://www.sa.undp.org/content/saudi_arabia/en/home/blog/2020/changing-your-diet-can-help-meet-sustainable-development-goals.html (accessed 1 September 2020).

⁶⁰ United Nations Development Programme 'Goal 2: zero hunger' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-2-zero-hunger.html> (accessed 5 September 2020).

⁶¹ United Nations Development Programme 'Goal 3: good health and well-being' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-3-good-health-and-well-being.html> (accessed 5 September 2020).

⁶² United Nations Development Programme 'Goal 11: sustainable cities and communities' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html> (accessed 5 September 2020).

⁶³ United Nations Development Programme 'Goal 13: climate action' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html> (accessed 5 September 2020).

⁶⁴ United Nations Development Programme 'Goal 14: life below water' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html> (accessed 5 September 2020).

⁶⁵ United Nations Development Programme 'Goal 15: life on land' <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-15-life-on-land.html> (accessed 5 September 2020).

by a number of socio-economic factors.⁶⁶ Thus, for a healthy diet to be promoted, all relevant stakeholders, including government need to be involved.⁶⁷ Governments are central to the creation of healthy food practices that allow their citizens to implement and maintain healthy eating habits.⁶⁸

Actions that governments can take to promote healthy food practices include, creating national policies that promote a healthy diet and encouraging a demand for healthy foods.⁶⁹

1.6. Contribution to Existing Literature

There are apparent health and environmental benefits to a vegan diet. While the benefits of adopting a vegan diet have been discussed in the context of sustainable development,⁷⁰ the debate fails to provide adequate attention to the SDGs and how adopting a vegan diet can achieve goals 2, 3, 13, 14, and 15. The contribution that this dissertation will make is outlining how adopting a vegan diet could help achieve goals 2, 3, 13, 14 and 15 of the SDGs. This dissertation examines the health and environmental benefits of veganism. It then discusses the disadvantages of a vegan diet. Thereafter it discusses which SDGs can be positively affected and how. Finally, it discusses whether nations should encourage a vegan diet and how. The aim is to provide insight into how adopting a vegan diet can help achieve the SDGs.

1.7. Terminology

Omnivores refer to people whose diet consists of animals and plants.⁷¹ Vegans do not consume animals or animal by-products, including products that makes use of animals to create a profit.⁷² Lacto-ovo vegetarians do not eat meat or fish, but they do consume

⁶⁶ JA Caswell & AL Yaktine *Supplemental nutrition assistance program examining the evidence to define benefit adequacy* (2013) 99 – 113.

⁶⁷ D Mozaffarian et al. 'Role of government policy in nutrition—barriers to and opportunities for healthier eating' (2018) 361 *Bmj* 1.

⁶⁸ World Health Organisation 'Healthy diet' 29 April 2020 <https://www.who.int/news-room/fact-sheets/detail/healthy-diet> (accessed 5 September 2020).

⁶⁹ As above.

⁷⁰ United Nations 'Flexitarianism: flexible or part-time vegetarianism' <https://sustainabledevelopment.un.org/partnership/?p=2252> (accessed 11 November 2020).

⁷¹ KR Mathis 'The effects of a vegetarian diet' (2017) 3 *Integrated Studies* 6.

⁷² Rogerson (n 1 above).

eggs and dairy products.⁷³ Lacto vegetarians consume dairy, but do not eat meat, fish or eggs.⁷⁴ Pesco-vegetarians or pescatarians do not consume meat but do consume fish.⁷⁵ Pollo-vegetarians do not consume any meat except poultry.⁷⁶ Flexitarians or semi-vegetarians are primarily vegetarian who occasionally consume meat or fish.⁷⁷ Plant based diets are based on plants, fruits, vegetables, legumes, whole grains, seeds and nuts, and excludes all animal meats and by-products.⁷⁸

1.8. Approach and Method

This study is based on a desk top research method, with the use of a socio-legal method. It entails a systematic and detailed analysis of the health and environmental benefits of adopting a vegan diet, as well as the disadvantages of the dietary lifestyle. A legal method is applied in exploring the international law SDGs that would be affected if society were to become vegan as well as the international law rights to health and a healthy environment. A legal method is further utilized in a discussion on whether and how governments should encourage a vegan diet, bringing the dissertation to a conclusion.

⁷³ A Petti et al. 'Vegetarianism and veganism: not only benefits but also gaps' (2017) 19(3) *Progress in Nutrition* 229 – 230.

⁷⁴ As above.

⁷⁵ H Wozniak et al. 'Vegetarian, pescatarian and flexitarian diets: sociodemographic determinants and association with cardiovascular risk factors in a Swiss urban population' 124(8) (2020) *British Journal of Nutrition* 844; Rogerson (n 1 above).

⁷⁶ N Sevmiş & F Ifakat Tengiz 'Vegetarian nutrition and healthy life' (2020) 6(2) *Demiroglu Science University of Florence Nightingale Journal of Medicine* 84.

⁷⁷ EJ Derbyshire 'Flexitarian diets and health: a review of the evidence-based literature' (2017) 3(55) *Frontiers in Nutrition* 1.

⁷⁸ RJ Ostfeld 'Definition of a plant-based diet and overview of this special issue' (2017) 14(315) *Journal of Geriatric Cardiology* 1.

Chapter 2

Veganism and Human Health

2.1. Introduction

A vegan diet has alleged benefits to human health. Research has demonstrated that bodily inflammation is a common symptom of numerous illnesses.⁷⁹ The C-reactive protein (CRP) is a marker for acute and chronic bodily inflammation as well as tissue damage.⁸⁰ CRP circulating in the body has been linked to cardiovascular disease, heart attacks, stroke, diabetes, cancer, as well as cognitive and mental health illnesses.⁸¹ Therefore, inflammatory biomarkers could be risk factors for chronic diseases.⁸² Studies have shown reduced levels of bodily inflammation in vegans.⁸³ Despite the alleged health benefits of adopting a vegan diet, there are disadvantages. One such disadvantage is poor nutrition. Vegans and vegetarians could potentially suffer from malnutrition,⁸⁴ which could lead to a host of health complications and illnesses.⁸⁵ This chapter discusses the international law right to health, how adopting a vegan diet is a major contributing factor in preventing type 2 diabetes, benefitting the body's metabolism, increasing cognitive and mental health, benefitting cardiovascular health and preventing cancer. Thereafter it discusses the health disadvantages, with special emphasis on nutrition.

⁷⁹ D Furman 'Chronic inflammation in the etiology of disease across the life span' (2019) 5(1) *Nature Medicine* 1822 – 1823.

⁸⁰ MB Pepys & GM Hirschfield 'C-reactive protein: a critical update' (2003) 111(12) *Journal of Clinical Investigation* 1805 – 1810.

⁸¹ Sutcliffe (n 33 above).

⁸² S Prasad et al. 'Detection of inflammatory biomarkers in saliva and urine: Potential in diagnosis, prevention, and treatment for chronic diseases' (2016) 241(8) *Experimental Biology and Medicine* 783 – 784.

⁸³ F Haghghatdoost et al. 'Association of vegetarian diet with inflammatory biomarkers: a systematic review and meta-analysis of observational studies' (2017) 20(15) *Public Health Nutrition* 2714.

⁸⁴ Patton (n 48 above).

⁸⁵ J Saunders & T Smith 'Malnutrition can lead to health complications' (2010) 10(6) *Clinical Medicine* 624 – 627.

2.2. The Right to Health

The right to health is a fundamental human right that is vital for the existence of other human rights.⁸⁶ All human beings have the right to enjoy 'the highest attainable standard of health' in order to live a dignified life.⁸⁷ The right to health can be realised by utilising a number of interrelated approaches, such as the implementation of health policies and programmes, as well as the adoption of laws.⁸⁸

The human right to health is recognised in numerous international instruments. The International Covenant on Economic, Social and Cultural Rights states makes provision for 'the right of everyone to the enjoyment of the highest attainable standard of physical and mental health.' Article 25.1 of the Universal Declaration of Human Rights states: 'Everyone has the right to a standard of living adequate for the health of himself and of his family, including food, clothing, housing and medical care and necessary social services.'⁸⁹ In addition, numerous regional human rights instruments recognize the right to health, such as Article 16 of the African Charter on Human and Peoples' Rights of 1981, Article 11 of the European Social Charter of 1961 as revised and Article 10 of the Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights of 1988.

Formatted: Not Highlight

Formatted: Not Highlight

Formatted: Not Highlight

Formatted: Not Highlight

Formatted: Not Highlight

2.2.2.3. Health Benefits of Veganism

2.2.1.2.3.1. Type 2 Diabetes

Type 2 diabetes, also known as adult-onset diabetes mellitus or non-insulin dependent diabetes, has 'reached epidemic proportions' in many developing countries and is the fifth greatest cause of death in developed countries.⁹⁰ It is characterised by an insulin deficiency in the body as well as an insulin resistance.⁹¹ A high intake of saturated fats increases the risk of developing type 2 diabetes, while non-starch polysaccharides

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: English (United States)

Formatted: English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

⁸⁶ Office of the United Nations High Commissioner for Human Rights 'The right to health: fact sheet number 31' <https://www.ohchr.org/documents/publications/factsheet31.pdf>, (accessed 19 November 2021).

⁸⁷ As above.

⁸⁸ Committee on Economic, Social and Cultural Rights General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12).

⁸⁹ Article 25.1 of the Universal Declaration of Human Rights.

⁹⁰ World Health Organisation & Food and Agriculture Organisation of the United Nations 'Diet, nutrition and the prevention of chronic diseases' April (2002) 72.

⁹¹ S Chatterjee et al. 'Type 2 diabetes' (2017) 389(10085) *The Lancet* 2239.

lowers the chance.⁹² Vegan diets are low in saturated fats⁹³ and high in non-starch polysaccharides,⁹⁴ which minimises the risk of developing type 2 diabetes.

In addition, type 2 diabetes patients following a vegan diet have demonstrated an improvement in their glycaemic control.⁹⁵ Research has further indicated that vegan diets are beneficial for the management and development⁹⁶ of type 2 diabetes. Vegan diets have also been known to reverse type 2 diabetes in some patients.⁹⁷

2.2.2.2.3.2. Metabolism

Vegan diets are known to have a positive effect on the body's metabolism. This is due to the increased level of protective nutrients and phytochemicals ingested by vegans, which stimulate the body's metabolism.⁹⁸ This diet has also demonstrated an improvement in energy metabolism,⁹⁹ possibly due to an increase in gut microbiota that arises when meat and animal by-products are not consumed.¹⁰⁰

Veganism may be beneficial to the glucose metabolism of type 2 diabetes patients and overweight or obese persons.¹⁰¹ The glycaemic control improvement is perhaps due to a decrease in body mass as a result of the reduced fat and energy content in vegan diets.¹⁰² Vegan diets, particularly low-fat vegan diets, contain high

⁹² World Health Organisation (n 90 above).

⁹³ M Dinu et al. 'Vegetarian, vegan diets and multiple health outcomes: a systematic review with meta-analysis of observational studies' (2017) 57(17) *Critical Reviews in Food Science and Nutrition* 3648.

⁹⁴ JG Sobiecki et al. 'High compliance with dietary recommendations in a cohort of meat eaters, fish eaters, vegetarians, and vegans: results from the European prospective investigation into cancer and nutrition – Oxford study' (2016) 36(5) *Nutrition Research* 464.

⁹⁵ ND Barnard 'A low-fat vegan diet improves glycemic control and cardiovascular risk factors in a randomized clinical trial in individuals with type 2 diabetes' (2006) 29(8) *Diabetes Care* 1781.

⁹⁶ ND Barnard 'Vegetarian and vegan diets in type 2 diabetes management' (2009) 67(5) *Nutrition Reviews* 260.

⁹⁷ M Ramirez 'How I reversed my diabetes and stopped all medications with a plant-based diet' 29 April 2015 <https://www.forksoverknives.com/success-stories/how-i-reversed-my-diabetes-and-stopped-all-medications-with-a-plant-based-diet/> (accessed 1 September 2020).

⁹⁸ Craig (n 27 above).

⁹⁹ Ryding (n 30 above).

¹⁰⁰ E Medawar et al. 'The effect of plant-based diets on the body and the brain: a systematic review' (2019) 226 *Translational Psychiatry* 12.

¹⁰¹ CO Johannesen et al. 'Effects of plant-based diets on outcomes related to glucose metabolism: a systematic review' (2020) 13(1) *Diabetes, metabolic syndrome and obesity: targets and therapy* 2820.

¹⁰² As above.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

concentrations of plants sterols, nuts, soy, and viscous fibres, all of which improve blood lipids and improve glycaemic control.¹⁰³

2.2.3.2.3.3. Increased Cognitive and Mental Health

The increased concentration of phytochemicals present in vegan diets is associated with increased cognitive and mental health,¹⁰⁴ as well as lower levels of anxiety.¹⁰⁵ Those who suffer from rheumatoid arthritis, multiple sclerosis, fibromyalgia and migraines, and who have shifted to a vegan diet, have demonstrated a slight improvement in their conditions.¹⁰⁶ However, these studies are quite disjointed due to a failure to account for the gluten present in vegan diets and small research sample sizes.¹⁰⁷

2.2.4.2.3.4. Cardiovascular Health

Vegan diets have been linked with atherosclerosis prevention, a lower atherosclerosis risk, as well as a decreased prevalence of ischemic heart disease.¹⁰⁸ Merely eliminating meat and maintaining a lacto-vegetarian diet¹⁰⁹ has cardiovascular benefits¹¹⁰ due to the higher dietary fibre content found in vegetables.¹¹¹ Furthermore, a lower BMI leads to more favourable cholesterol and blood levels, which are major risk factors for heart disease.¹¹² Vegans tend to have lower BMIs due to the lower protein intake and higher fibre consumption.¹¹³

¹⁰³ JF Trepanowski & KA Varady 'Veganism is a viable alternative to conventional diet therapy for improving blood lipids and glycemic control' (2015) 55(14) *Critical Reviews in Food Science and Nutrition* 2004.

¹⁰⁴ Ryding (n 30 above).

¹⁰⁵ B Beezhold et al. 'Vegans report less stress and anxiety than omnivores' (2015) 18(7) *Nutritional Neuroscience* 292.

¹⁰⁶ Medawar (n 100 above) 9.

¹⁰⁷ As above.

¹⁰⁸ KS Woo et al. 'Vegan diet, subnormal vitamin b-12 status and cardiovascular health' (2014) 6(8) *Nutrients* 3259.

¹⁰⁹ Hu (n 27 above) 549.

¹¹⁰ Ryding (n 30 above).

¹¹¹ JL Slavin & B Lloyd 'Health benefits of fruits and vegetables' (2012) 3(4) *Advances in Nutrition* 514.

¹¹² J Brown 'Are there health benefits to going vegan?' 23 January 2020

<https://www.bbc.com/future/article/20200122-are-there-health-benefits-to-going-vegan> (accessed 1 September 2020).

¹¹³ EA Spencer et al. 'Diet and body mass index in 38 000 EPIC-Oxford meat eaters, fish eaters, vegetarians and vegans' (2003) 27 *International Journal of Obesity* 732.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

The consumption of meat, more specifically processed meat, effects cardiovascular health. An increased processed meat intake has been linked to a higher mortality rate.¹¹⁴

Vegan diets have further demonstrated a reduction in the likelihood of several stroke risk factors,¹¹⁵ including high blood pressure, great waist-to-hip ratio, diabetes, poor cardiovascular health and a poor lipid profile.¹¹⁶ In addition vegan diets are rich in fibre and roughage, which promotes good gut health, low cholesterol levels¹¹⁷ and reduced risk of ischemic strokes.¹¹⁸

There is minimal data regarding the potential cardiovascular benefits of a vegan diet¹¹⁹ and more research will have to be conducted to determine the effect of a veganism on cardiovascular health.

2.2.5-2.3.5. Cancer

The decline in prevalence and risk of various cancers is a vital benefit of adopting a vegan diet.¹²⁰ The decrease in occurrence of cancer is due to the high concentrations of phytochemicals present in vegan diets, which interfere with various cancer-causing cellular processes.¹²¹

The increased intake of legumes tends to substantially lower the risk of both colorectal and prostate cancer.¹²² The higher consumption of fruits and vegetables is believed to be protective against oesophageal, mouth and stomach cancers.¹²³ Consuming allium

¹¹⁴ HCJ Godfray et al. 'Meat consumption, health, and the environment' (2018) 361(6399) *Science* 3; S. Rohrmann et al. 'Meat consumption and mortality- results from the European prospective investigation into cancer and nutrition' (2013) 11(63) *BMC Medicine* 7.

¹¹⁵ T Campbell 'A plant-based diet and stroke' (2017) 14(5) *Journal of Geriatric Cardiology* 322.

¹¹⁶ As above.

¹¹⁷ BMI Healthcare 'The pros and cons of a vegan diet' <https://www.bmihealthcare.co.uk/health-matters/health-and-wellbeing/the-pros-and-cons-of-a-vegan-diet#gdpr-ou> (accessed 1 September 2020).

¹¹⁸ Brown (n.112 above).

¹¹⁹ Woo (n.108 above) 3259.

¹²⁰ AJ Lanou & B Svenson 'Reduced cancer risk in vegetarians: an analysis of recent reports' (2011) 3 *Cancer Management and Research* 1 – 2.

¹²¹ RH Liu 'Potential synergy of phytochemicals in cancer prevention: mechanism of action' (2004) 134(12) *The Journal of Nutrition* 3479S – 3484S.

¹²² GE Fraser 'Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists' (1999) 70(3) *The American Journal of Clinical Nutrition* 535S.

¹²³ TJ Key 'Fruit and vegetables and cancer risk' (2011) 104(1) *British Journal of Cancer* 6 – 7.

Field Code Changed

Field Code Changed

Field Code Changed

vegetables prevents stomach and colorectal cancer, while foods containing lycopene, such as papaya and tomatoes, protect against prostate cancer.¹²⁴

Vegans tend to consume more soy products than omnivores.¹²⁵ The consumption of soy, that contains isoflavone, in childhood has shown to protect women against breast cancer in adulthood.¹²⁶ The consumption of soy milk is known to prevent prostate cancer.¹²⁷ High dairy consumption in childhood has been linked to a greater risk of colorectal cancer in adulthood as well as a heightened risk of prostate cancer.¹²⁸ As vegans abstain from animal dairy, this risk can be eliminated.

The sources of protein consumed or avoided have a significant effect on the body.¹²⁹ The consumption of red and processed meats has been associated with an increased risk of colorectal,¹³⁰ oesophageal, liver, and lung cancers.¹³¹ Furthermore, the consumption of eggs has been associated with a higher risk of pancreatic cancer.¹³²

Obesity is a major risk factor for cancer, and given the generally lower BMIs of vegans, they tend to have a lower risk of several cancers.¹³³

To date, studies have yet to yield concrete evidence of a vegan diet providing significant protection against cancer¹³⁴ and there is limited evidence available demonstrating this cancer-preventive theory.¹³⁵

¹²⁴ Craig (n 27 above).

¹²⁵ L Keinan-Boker et al. 'Soy product consumption in 10 European countries: the European prospective investigation into cancer and nutrition (EPIC) study' (2002) 5(6b) *Public Health Nutrition* 1217 – 1225.

¹²⁶ A Warri et al. 'The role of early life genistein exposures in modifying breast cancer risk (2008) 98(9) *British Journal of Cancer* 1485 – 1491.

¹²⁷ BK Jacobsen et al. 'Does high soy milk intake reduce prostate cancer incidence? The Adventist health study' (1998) 9(6) *Cancer Causes Control* 553 – 556.

¹²⁸ JC van der Pols et al. 'Childhood dairy intake and adult cancer risk: 65-y follow-up of the Boyd Orr cohort' (2007) 86(6) *The American Journal of Clinical Nutrition* 1722 – 1729.

¹²⁹ As above.

¹³⁰ World Cancer Research Fund & American Institute for Cancer Research 'Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Continuous update project expert report' (2018) 27; T Norat et al. 'Meat, fish, and colorectal cancer risk: the European prospective investigation into cancer and nutrition' (2005) 97(12) *Journal of the National Cancer Institute* 913.

¹³¹ AJ Cross et al. 'A prospective study of red and processed meat intake in relation to cancer risk' (2007) 4(12) *PLoS Medicine* 1973 – 1981.

¹³² JM Chan et al. 'Pancreatic cancer, animal protein and dietary fat in a population-based study, San Francisco Bay Area, California' (2007) 18(10) *Cancer Causes Control* 1153 – 1156.

¹³³ As above.

¹³⁴ Craig (n 27 above).

¹³⁵ DM Parkin & L Boyd 'Cancers attributable to dietary factors in the UK in 2010' (2011) 105(2) *British Journal of Cancer* S19.

Field Code Changed

Field Code Changed

2.3.2.4. Health Disadvantages of Veganism

Vegans tend to be deficient in several nutrients including omega 3 fatty acids, vitamin B12, vitamin D, iron, protein and calcium, all of which are found in meat and animal by-products.¹³⁶

Omega 3 fatty acids are primarily found in fish, eggs and algae.¹³⁷ Diets not containing these foods lead to low levels of omega-3 fatty acids, such as docosahexaenoic and eicosapentaenoic acid.¹³⁸ These fatty acids are vital for cardiovascular health and the development of the brain and eyes.¹³⁹

Seafood, animal meats, eggs and liver are sources of vitamin B12.¹⁴⁰ Vitamin B12 is required for the production of myelin, DNA, haemoglobin, amino acids, and energy.¹⁴¹ A lower intake of vitamin B12, which is often found in vegan diets, has been associated with poor neurologic and cognitive health.¹⁴²

Vitamin D is primarily found in cow's milk, which is not consumed by vegans.¹⁴³ However, serum vitamin D levels depend on the extent of exposure to sunlight and the quantity of food containing vitamin D that is consumed.¹⁴⁴ Vegans can therefore fulfil their Vitamin D requirements without consuming cow's milk. Vitamin D is vital for teeth and bone development as well as for a strong immune system.¹⁴⁵ Vitamin D deficiencies have been linked to a greater risk of cancer.¹⁴⁶

¹³⁶ A Petti (n 73 above) 233.

¹³⁷ As above.

¹³⁸ JP Rocha et al. 'Multiple health benefits and minimal risks associated with vegetarian diets' (2019) 8 *Current Nutrition Reports* 378.

¹³⁹ D Swanson et al. 'Omega-3 fatty acids EPA and DHA: health benefits throughout life' (2012) 3(1) *Advances in Nutrition* 2.

¹⁴⁰ A Vogiatzoglou et al. 'Dietary sources of vitamin B-12 and their association with plasma vitamin B-12 concentrations in the general population: the Hordaland Homocysteine Study' (2009) 89(4) *American Journal of Clinical Nutrition* 1081.

¹⁴¹ Rocha (n 138 above).

¹⁴² E Medawar (n 100 above) 12.

¹⁴³ RR Wier et al. 'Environmental and genetic factors influence the vitamin D content of cows' milk' (2017) 76(1) *Proceedings of the Nutrition Society* 77.

¹⁴⁴ Rocha (n 138 above).

¹⁴⁵ AW Norman 'Vitamin D nutritional policy needs a vision for the future' (2010) 235(9) *Experimental Biology and Medicine* 1034 – 1035; N Maruotti & FP Cantatore 'Vitamin D and the immune system' (2010) 37(3) *The Journal of Rheumatology* 491 – 492.

¹⁴⁶ Craig (n 27 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Iron is found in animal meats, dairy and eggs.¹⁴⁷ The iron obtained from plants is ferric iron, which is unable to be absorbed by the body.¹⁴⁸ For the ferric iron to be absorbed, it must be converted to ferrous iron.¹⁴⁹ The conversion may be inhibited by phytates and oxalates, which are found in abundance in plant-based diets.¹⁵⁰ An iron deficiency will result in inadequate haemoglobin production, which will lead to an insufficient oxygen supply in the body.¹⁵¹

Animal meats, algae, legumes and soy are sources of protein.¹⁵² Vegetarian and vegan proteins contain lower concentrations of amino acids and are allegedly not used as effectively as meat proteins.¹⁵³ Protein is necessary for cell development and repair, as well as blood clotting and immune system responses.¹⁵⁴

Calcium is primarily found in eggs and cow's milk.¹⁵⁵ Vegans tend to have a greater risk of bone fracture due to their lower calcium intake.¹⁵⁶ A calcium deficiency may prevent peak bone mass from being achieved and lead to bone damage once peak bone mass is obtained.¹⁵⁷ This could lead to osteopenia and osteoporosis.¹⁵⁸

Poor nutrition affects energy levels.¹⁵⁹ For most who adopt a vegan or vegetarian diet, a comprehensive diet should offer sufficient energy.¹⁶⁰ A poorly constructed diet and the subsequent unbalanced energy levels may lead to a compromised immune system, which can result in illness.¹⁶¹

¹⁴⁷ National Institutes of Health 'Iron: fact sheet for health professionals' <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/> (accessed 21 June 2021).

¹⁴⁸ A Sliwiska et al. 'Iron status and dietary iron intake in vegetarians' (2018) 27(10) *Advances in Clinical and Experimental Medicine* 1383 – 1389.

¹⁴⁹ T Ems et al. 'Biochemistry, iron absorption' https://www.ncbi.nlm.nih.gov/books/NBK448204/#_ncbi_dlg_citbx_NBK448204 (accessed 16 June 2021).

¹⁵⁰ Petti (n 73 above).

¹⁵¹ National Institutes of Health 'Iron' <https://ods.od.nih.gov/factsheets/Iron-Consumer/> (accessed 21 June 2021).

¹⁵² R Tso 'A critical appraisal of the evidence supporting consumer motivations for alternative proteins' (2021) 10(23) *Foods* 3.

¹⁵³ Petti (n 73 above).

¹⁵⁴ Medical News Today 'How much protein does a person need?' <https://www.medicalnewstoday.com/articles/196279#what-are-proteins> (accessed 16 June 2021)

¹⁵⁵ National Institutes of Health 'Calcium' <https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/> (accessed 21 June 2021).

¹⁵⁶ PN Appleby et al. 'Comparative fracture in vegetarians and nonvegetarians in EPIC-Oxford' (2007) 61(12) *European Journal of Nutrition* 1404.

¹⁵⁷ Rocha (n 138 above) 379.

¹⁵⁸ As above.

¹⁵⁹ Azzolino (n 50 above) 2 – 3.

¹⁶⁰ Rogerson (n 1 above).

¹⁶¹ As above.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Furthermore, despite the decreased levels of anxiety, those who abstain from meat have been known to possess more depressive symptoms than omnivores.¹⁶²

In addition, regardless of studies demonstrating that low cholesterol reduces the risk of ischemic stroke, evidence has shown that the low cholesterol levels may be associated with a risk of haemorrhagic stroke.¹⁶³

While vegans may have a higher risk of illness due to vitamin deficiencies, they have decreased health risks due to a greater antioxidant consumption and lower BMIs.¹⁶⁴ Those who have adopted a vegan diet have to be conscious of what they consume, to ensure that they get all the nutrients that they need.¹⁶⁵

There are some nations, such as Switzerland, that provide guidelines for pregnant women and children on vegan diets.¹⁶⁶ These guidelines discourage strict vegan diets to prevent nutritional deficiencies. A recent study in Switzerland revealed that regardless of the considerable variation in nutrient intake between omnivores, vegetarians, vegans and omnivores, all three diets provide sufficient nutrients.¹⁶⁷ Nations such as Britain claim that a well-balanced vegan diet combined with nutritional supplements is a viable choice for pregnant women and children.¹⁶⁸ A study in Germany showed no significant differences in nutrient intake between omnivorous, vegetarian, and vegan children.¹⁶⁹ Despite this evidence, minimal studies have explored the effect that vegan diets have on children's health. Further studies will need to be conducted on vegan children to assess their health and growth.¹⁷⁰

2.4.2.5. Conclusion

There are several health benefits to adopting a vegan diet, as well as disadvantages to consuming meat. Inflammation is a common symptom of many diseases and

¹⁶² CA Forestell & JB Nezelek 'Vegetarianism, depression and the five factor model of personality' (2018) 57(3) *Ecology of Food and Nutrition* 257.

¹⁶³ As above.

¹⁶⁴ Ryding (n 30 above).

¹⁶⁵ BMI Healthcare (n 117 above).

¹⁶⁶ P Müller et al. 'Handlungsanweisungen vegetarische und vegane ernährung im säuglingsund leinkindesalter' (2020) 31(2) *Paediatrica* 34 – 35.

¹⁶⁷ R Schüpbach et al. 'Micronutrient status and intake in omnivores, vegetarians and vegans in Switzerland' (2015) 56(1) *European Journal of Nutrition* 291 – 292.

¹⁶⁸ DO Sutter & N Bender 'Nutrient status and growth in vegan children' (2021) 91 *Nutrition Research* 14.

¹⁶⁹ S Weder et al. 'Macronutrient intake, and anthropometrics of vegetarian, vegan, and omnivorous children (1–3 Years) in Germany (VeChi Diet Study)' (2019) 11(4) *Nutrients* 13.

¹⁷⁰ Sutter (n 168 above).

Field Code Changed

Field Code Changed

Field Code Changed

illnesses. Vegans tend to have lower levels of bodily inflammation. This is due to the reduced levels of CRP.

The lower levels of bodily inflammation have been known to be beneficial for managing type 2 diabetes as well as reversing it. Vegan diets have also demonstrated benefits to the body's metabolisms. The increased intake of phytochemicals in vegan diets has been associated with improved cognitive and mental health, as well as reduced ischemic stroke risk factors. In addition, vegans demonstrated a lower atherosclerosis risk and a decreased prevalence of ischemic heart disease. The increased nutrient intake of vegans tends to lower the risk of various cancers, and bowel malignancies. Furthermore, red and processed meats have been linked to an increased risk of colorectal, oesophageal, liver, and lung cancers. The consumption of eggs has been linked to a higher risk of pancreatic cancer.

Despite the numerous health advantages to adopting a vegan diet, there are disadvantages. The chief of these is nutritional. Vegans and vegetarians tend to be deficient in several nutrients, all of which are found in meat and animal by-products. Prolonged deficiency can cause a host of illnesses and health complications.

The research concerning the health benefits of veganism is fragmented and inconclusive. More research will need to be conducted to determine whether there are in fact consistent health benefits to adopting a vegan diet. Nevertheless, given the supposed health benefits of veganism, the minimal disadvantages may be negated and the advantages may possibly outweigh them.

Chapter 3

Veganism, the Environment and the Economy

3.1. Introduction

Food and dietary preferences have the propensity to impact the environment in a variety of ways, 'such as climate change, land, water and energy use, biodiversity...and [greenhouse gas emissions].'¹⁷¹ Examining people's diets, and their impact may provide insight into how the livestock industry affects the environment.¹⁷² 'Normal' diets based on chemical-conventional agriculture products tend to have the highest environmental impact, with organic vegan diets having the lowest impact.¹⁷³ In addition, the breeding of animals for food requires great amounts of crops, water, energy and land.¹⁷⁴ In some countries, entire ecosystems are demolished to create space for animals and feed-crops.¹⁷⁵ Veganism, is consequently more beneficial to the environment than a 'normal' omnivorous diet. Despite the environmental advantages of adopting a vegan diet, the livestock and agriculture industries will be at a loss should a vegan diet be adopted globally.¹⁷⁶ This chapter discusses the international law right to a healthy environment, how the breeding of animals and factory farming is harmful to the environment and therefore, by extension, how adopting a vegan diet is beneficial to the environment. Thereafter it discusses how despite the environmental benefits, there are economic disadvantages to adopting a vegan diet.

3.2. The Right to a Healthy Environment

In response to the concerns regarding health, the environment and human rights, several international legal instruments have been implemented.¹⁷⁷ Principle 1 of the

¹⁷¹ JI Macdiarmid 'Is a healthy diet an environmentally sustainable diet?' (2013) 72 *Proceedings of the Nutrition Society* 14.

¹⁷² L Cooper 'A new veganism: how climate change has created more vegans' (2018) *Granite: Aberdeen University Postgraduate Interdisciplinary Journal* 20.

¹⁷³ L Baroni et al. 'Evaluating the environmental impact of various dietary patterns combined with different food production systems' (2007) 61 *European Journal of Clinical Nutrition* 282 – 283.

¹⁷⁴ Pimentel (n 24 above).

¹⁷⁵ As above.

¹⁷⁶ M Chiorando 'Rise of veganism affecting beef farmers as demand for the meat falls' 20 June 2019 <https://www.plantbasednews.org/lifestyle/rise-of-veganism-affecting-beef-farmers> (accessed 1 September 2020).

¹⁷⁷ World Health Organisation 'Human rights, health and environmental protection:

Field Code Changed

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Stockholm Declaration states that 'man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being.'¹⁷⁸ In Resolution 45/94 the United Nations General Assembly recognises that 'all individuals are entitled to live in an environment adequate for their health and well-being.'¹⁷⁹ The wording of Article 12.2 of the International Covenant on Economic, Social and Cultural Rights acknowledges that the right to health 'embraces a wide range of socio-economic factors that promote conditions in which people can lead a healthy life, and extends to the underlying determinants of health, such as food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment.'¹⁸⁰

3-2-3.3. Environmental Benefits of Veganism

3-2-1-3.3.1. Pollution Induced Climate Change

Animal agriculture and farming are major contributors to the degradation of the environment, and significant drivers of climate change due to 'global warming'.¹⁸¹ This is greatly as a result of the water and air pollution of the sectors.¹⁸² The excessive release of greenhouse gases, changes the atmospheric composition and subsequently leads to the heating of the Earth, more commonly known as 'global warming'.¹⁸³ Air and water pollution, as well as water depletion, are key contributors of climate change.¹⁸⁴

linkages in law and practice'

https://www.who.int/hhr/information/Human_Rights_Health_and_Environmental_Protection.pdf, (accessed 28 November 2011).

¹⁷⁸ Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration, 1972).

¹⁷⁹ Resolution 45/94 the United Nations General Assembly.

¹⁸⁰ Committee on Economic, Social and Cultural Rights (n 88 above).

¹⁸¹ Food and Agriculture Organisation of the United Nations (n 22 above) xxi.

¹⁸² Food and Agriculture Organisation of the United Nations 'Livestock a major threat to environment' <http://www.fao.org/newsroom/en/news/2006/1000448/index.html> (accessed 1 June 2021).

¹⁸³ KE Trenberth 'Climate change caused by human activities is happening and it already has major consequences' (2018) 36(4) *Journal of Energy & Natural Resources Law* 467.

¹⁸⁴ JD Sutter '10 climate change villains' 29 August 2019

<https://edition.cnn.com/2015/08/13/opinions/gallery/top-climate-change-contributors/index.html> (accessed 29 August 2021).

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial, English (United States)

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Formatted: Font: (Default) Arial

Air Pollution

Factory farming and the rearing of animals for food is a major source of greenhouse gases, carbon dioxide, nitrous oxide, nitric oxide, methane and ammonia.¹⁸⁵ These greenhouse gases are the leading causes of global warming,¹⁸⁶ and are further linked to ozone depletion, air pollution and soil acidification.¹⁸⁷

The livestock sector is...responsible for 18 percent of greenhouse gas emissions...This is a higher share than transport. [It]...accounts for 9 percent of anthropogenic CO2 emissions... Livestock are...responsible for almost two-thirds (64 percent) of anthropogenic ammonia emissions, which contribute...to acid rain and acidification of ecosystems.¹⁸⁸

The high anthropogenic CO2 levels are due to the change in land-use, such as deforestation, carried out to create feed-crops and pastures.¹⁸⁹ Livestock uses '30 percent of the earth's entire land surface' and '33 percent of the global arable land' is used to produce feed for livestock.¹⁹⁰ In addition to the increased anthropogenic greenhouse gas emissions, animal manure accounts for approximately 20 percent of the annual global methane emissions.¹⁹¹

¹⁸⁵ Turner (n 39 above).

¹⁸⁶ People for Ethical Treatment of Animals (n 36 above).

¹⁸⁷ Turner (n 39 above).

¹⁸⁸ Food and Agriculture Organisation of the United Nations (n 22 above).

¹⁸⁹ J Chang et al. 'Climate warming from managed grasslands cancels the cooling effect of carbon sinks in sparsely grazed and natural grasslands' (2021) 12(118) *Nature Communications* 3 – 8.

¹⁹⁰ Food and Agriculture Organisation of the United Nations (n 182 above).

¹⁹¹ M Gold 'The global benefits of eating less meat: a report for compassion in world farming trust' (2004) 38.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Below is a graphical representation of the average greenhouse gas emissions per food type.

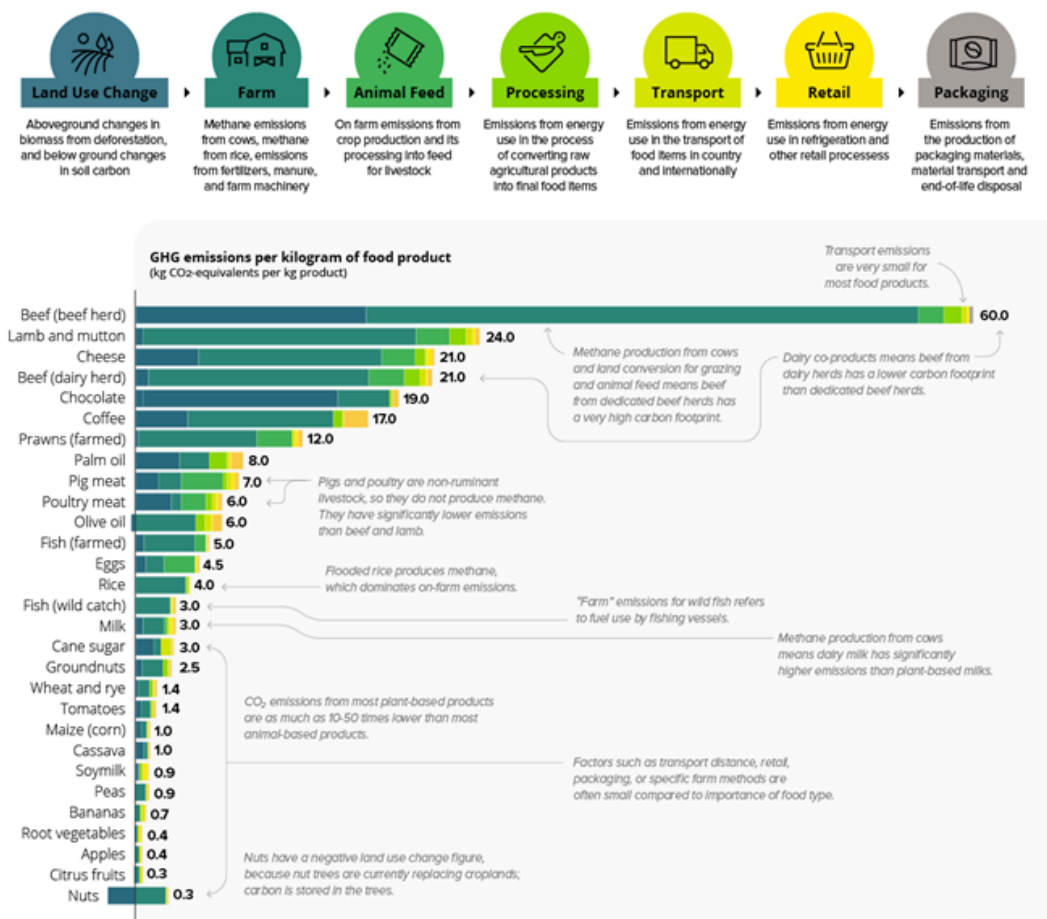


Figure 1: the average greenhouse gas emissions per food type.¹⁹²

Meat and animal by-products can be seen to be greater contributors of greenhouse gases than plants are.

¹⁹² H Ritchie 'You want to reduce the carbon footprint of your food? Focus on what you eat, not whether your food is local' 24 January 2020 <https://ourworldindata.org/food-choice-vs-eating-local> (accessed 29 August 2021).

Field Code Changed

In addition, factory farms produce excessive dust, which has been found to contain bacteria, fungi, and other pollutants that contaminate the air.¹⁹³ The farms often spray manure into the air to circumvent water pollution limitations, which is then inhaled by those nearby.¹⁹⁴ This may cause health complications for those who inhale it.¹⁹⁵

Water Depletion and Pollution

The livestock sector is one of the most detrimental to the earth's water resources.¹⁹⁶ Widespread overgrazing disturbs water cycles which reduces the replacement of water resources.¹⁹⁷ Furthermore, significant amounts of water are used to produce feed.¹⁹⁸ Below are tables depicting the drinking requirements for different types of livestock (Figure 2) and the service water requirements of various types of livestock (Figure 3):

Drinking water requirements for livestock

Species	Physiological condition	Average Weight	Air temperature °C		
			15	25	35
			Water requirements		
		(kg)	(..... litres/animal/day)		
Cattle	African pastoral system-lactating – 2 litres milk/day	200	21.8	25	28.7
	Large breed – Dry cows – 279 days pregnancy	680	44.1	73.2	102.3
	Large breed – Mid-lactation – 35 litres milk/day	680	102.8	114.8	126.8
Goat	Lactating – 0.2 litres milk/day	27	7.6	9.6	11.9
Sheep	Lactating – 0.4 litres milk/day	36	8.7	12.9	20.1
Camel	Mid-lactation – 4.5 litres milk/day	350	31.5	41.8	52.2
Chicken	Adult broilers (100 animals)		17.7	33.1	62
	Laying eggs (100 animals)		13.2	25.8	50.5
Swine	Lactating – daily weight gain of pigs 200g	175	17.2	28.3	46.7

Figure 2: Drinking water requirement for livestock

¹⁹³ Consumers Union SWRO (n 41 above).

¹⁹⁴ J Lee 'Neighbours of vast hog farms say foul air endangers their health' *The New York Times* 11 May 2003.

¹⁹⁵ K Wiley *et al.* 'Confined animal facilities in California' (2004) 14.

¹⁹⁶ MM Rojas-Downing *et al.* 'Climate change and livestock: Impacts, adaptation, and Mitigation' (2017) 16 *Climate Risk Management* 148.

¹⁹⁷ L Sun *et al.* 'Hydrological effects of vegetation cover degradation and environmental implications in a semiarid temperate steppe, China' (2017) 9(2) *Sustainability* 2.

¹⁹⁸ PW Gerbens-Leenes *et al.* 'The water footprint of poultry, pork and beef: a comparative study in different countries and production systems' (2013) 1 *Water Resources and Industry* 26; Food and Agriculture Organisation of the United Nations (n 182 above).

Field Code Changed

Field Code Changed

Service water requirements for different livestock types

Animal	Age group	Service water (litres/animal/day)	
		Industrial	Grazing
Beef cattle	Young calves	2	0
	Adult	11	5
Dairy cattle	Calves	0	0
	Heifers	11	4
	Milking cows	22	5
Swine	Piglet	5	0
	Adult	50	25
	Lactating	125	25
Sheep	Lamb	2	0
	Adult	5	5
Goats	Kid	0	0
	Adult	5	5
Broiler chicken	Chick*100	1	1
	Adult*100	9	9
Laying hens	Chick*100	1	1
	Laying eggs*100	15	15
Horses	Foal	0	5
	Mature horses	5	5

Figure 3: Service Water Requirements for different livestock types¹⁹⁹

Cattle are the lowest consumers of water, whereas pigs have the highest drinking and service water requirements. In comparison, research has demonstrated that that plant-based burgers need approximately 75 – 99 percent less water to be produced than beef burgers do.²⁰⁰

The agricultural and livestock sectors, in addition to depleting the global water resources, contribute to water pollution, eutrophication and the deterioration of coral reefs.²⁰¹ The chief pollutants are waste from animals, the antibiotics and hormones fed to the animals, the chemicals used in tanneries, as well as the fertilizers and pesticides that are sprayed on feed-crops.²⁰² The fertilizer that is produced from the animal waste, contains chemicals and bacteria, which often end up in waterways, subsequently polluting the water.²⁰³ Farms often dispose of their waste in landfills,

¹⁹⁹ Food and Agriculture Organisation of the United Nations (n 22 above) 130.

²⁰⁰ United Nations Environment Programme 'What's in your burger? More than you think' 8 November 2018 <https://www.unep.org/news-and-stories/story/whats-your-burger-more-you-think> (accessed 29 August 2021).

²⁰¹ Food and Agriculture Organisation of the United Nations (n 182 above).

²⁰² As above.

²⁰³ RS Dungan (n 42 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

which pollutes the ground water.²⁰⁴ In addition to this contamination, the nitrogen in the fertiliser causes algae blooms, which leaves little oxygen for other organisms.²⁰⁵

3.2.2.3.3.2. Environmental Impact of Dietary Patterns

Evidently, the meat industry and the consumption of meat have an array of negative effects on the environment, and as such, veganism is more beneficial to the conservation of the earth. Below is a graph (Figure 4) reiterating this. It depicts the average environmental impact of various dietary patterns:

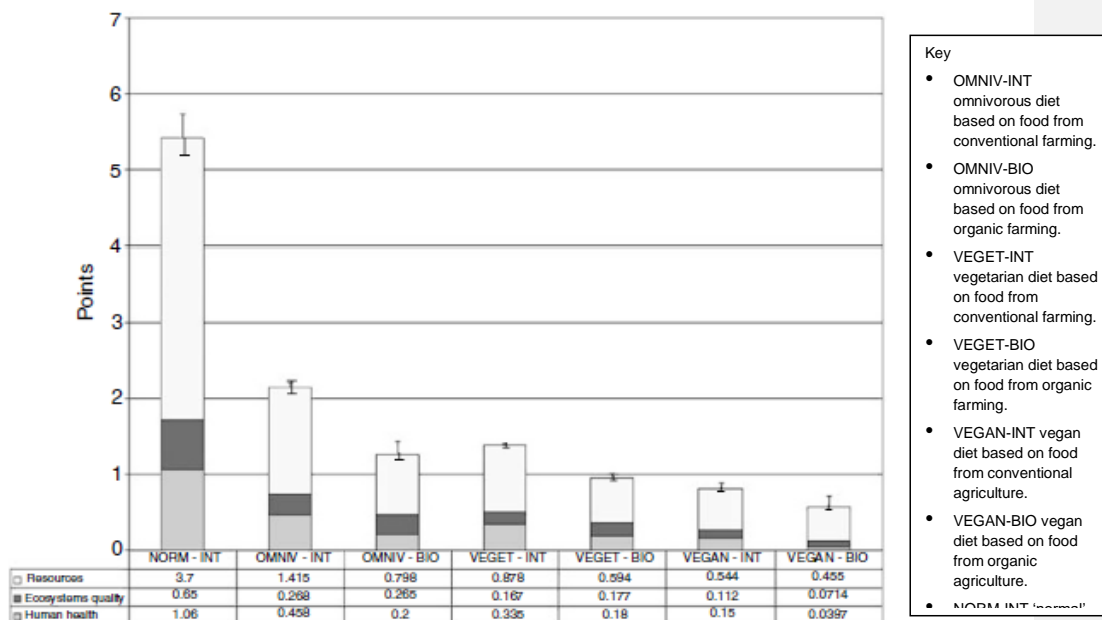


Figure 4: Average environmental impact: comparison among the various dietary patterns, expressed as the average of the results obtained²⁰⁶

The graph examines the following in order to assess the complete environmental impact of each diet:²⁰⁷

²⁰⁴ As above.
²⁰⁵ People for Ethical Treatment of Animals (n 36 above).
²⁰⁶ Baroni (n 173 above) 282 – 284.
²⁰⁷ Baroni (n 173 above) 281.

Field Code Changed
 Field Code Changed
 Field Code Changed

- Health damage including substances that negatively impact climate change, respiration and carcinogenesis
- Ionizing radiations
- Ecosystem damage including ecotoxicity, acidification and eutrophication
- Resource depletion

It is apparent that, a diet that consists of meat and animal by-products has a greater impact on the environment, with vegan and vegetarian diets having a lesser impact.

3.3.3.4. Biodiversity Loss

The livestock sector is a major cause of water pollution from phosphorous and nitrogen, which contributes to loss of marine biodiversity.²⁰⁸

Biological diversity or 'biodiversity' refers to the numerous ecosystems, species and genes found in the environment.²⁰⁹ It is characterized by:

- genetic diversity- the genetic information found in fauna, flora and microorganisms and the variation within these organisms²¹⁰
- species diversity- the range of living organisms²¹¹
- ecosystem diversity- the various ecological processes and habitats on earth.²¹²

Biodiversity is fundamental to human wellbeing, which includes resources for a decent life, freedom of choice, healthy social relations, health and security.²¹³

The agricultural, livestock, fishing and forestry sectors have put significant strain on the earth's biodiversity.²¹⁴ Research has shown that the most prominent drivers of loss of biodiversity and ecosystems are:²¹⁵

- pollution
- climate change

²⁰⁸ Food and Agriculture Organisation of the United Nations (n 182 above).

²⁰⁹ National Geographic 'Biodiversity' <https://www.nationalgeographic.org/encyclopedia/biodiversity/> (accessed 15 June 2021).

²¹⁰ IR Swingland 'Biodiversity, definition of' in SM Scheiner (eds) *Encyclopedia of Biodiversity, Volume 1* (2001) 377 – 388.

²¹¹ JEM Baillie & K Upham 'Species diversity within and among ecosystems' in RA Meyers (eds) *Encyclopedia of Sustainability Science and Technology* (2012) 24.

²¹² Food and Agriculture Organisation of the United Nations (n 22 above) 181.

²¹³ Millennium Ecosystem Assessment Program 'Ecosystems and human well-being' (2005) 24.

²¹⁴ Food and Agriculture Organisation of the United Nations (n 22 above) 181.

²¹⁵ Millennium Ecosystem Assessment Program (n 213 above) 24.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

- habitat change (land use changes, modification of water sources, damage to coral reefs and sea floors)
- alien species
- exploitation of natural resources

The livestock sector plays a major role in the damage to biodiversity, as the sector contributes directly and indirectly to all drivers biodiversity loss.²¹⁶ It is estimated that as a result of livestock's presence, and their demand for feed-crops, fifteen out of twenty four ecosystem services²¹⁷ are in decline.²¹⁸ Removing livestock from grazing pastures could potentially have a negative impact on biodiversity and equilibrium in ecosystems, as their grazing has assisted to form the land.²¹⁹ A balance that does not veer to the overgrazing of land is required in order to maintain biodiversity.

3.4.3.5. Animal Welfare

The main objective of factory farms is to yield the greatest amount of meat and animal by-products as quickly, cheaply and in the smallest space possible, which ultimately results in poor living conditions for animals.²²⁰ The animals are often kept in tiny enclosures, where they are unable to move, and therefore all their energy goes into producing meat and animal by-products.²²¹ In addition, the animals are genetically altered to grow fatter, faster and produce more animal by-products.²²²

Animals in South Africa are chiefly offered protection by the Animals Protection Act,²²³ the Performing Animals Protection Act,²²⁴ the Societies for the Prevention of Cruelty

²¹⁶ Food and Agriculture Organisation of the United Nations (n 22 above) 182.

²¹⁷ Ecosystem Services are 'the benefits provided by ecosystems that contribute to making human life both possible and worth living' UK National Ecosystem Assessment 'Ecosystem services' <http://uknea.unep-wcmc.org/EcosystemAssessmentConcepts/EcosystemServices/tabid/103/Default.aspx> (accessed 25 July 2021).

²¹⁸ Food and Agriculture Organisation of the United Nations (n 182 above).

²¹⁹ ID Lunt et al. 'A framework to predict the effects of livestock grazing and grazing exclusion on conservation values in natural ecosystems in Australia' (2007) 55(4) *Australian Journal of Botany* 402 – 408.

²²⁰ Grobler (n 46 above).

²²¹ People for Ethical Treatment of Animals (n 36 above).

²²² J Calerdone 'The way some meat producers fatten up cattle is more bizarre than you might think' 6 April 2016 <https://www.businessinsider.com/farmers-fatten-cattle-hormone-implants-2016-4?IR=T> (accessed 7 September 2020).

²²³ Animals Protection Act 71 of 1962.

²²⁴ Performing Animals Protection Act 24 of 1935.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

to Animals Act²²⁵ and the Animal Health Act.²²⁶ These Acts do not specifically confer any rights on animals that are under their protection.²²⁷ There are a number of standards by the South African Bureau of Standards (SABS) that apply to farm animals.²²⁸ These standards are not publicly available and must be purchased.

3.5.3.6. Economic Disadvantages of Veganism

Approximately 60 percent of households in developing countries rely on livestock for their livelihoods, including small holding farmers and pastoralists.²²⁹ The sector is a source of income of approximately 1.7 billion people.²³⁰ In addition, fisheries and aquaculture provide employment to approximately 820 million people globally.²³¹ Animal meat and by-products create cash and in-kind incomes.²³² Livestock also provides transport for produce, fuel and people.²³³ The sector therefore plays a major role in poverty reduction, food security, and combating malnutrition.²³⁴

If a vegan diet were to be adopted the world over, farmers, particularly those in developing countries, would be adversely affected.²³⁵

Below is a graphical representation (Figure 5) of the global value of livestock, as a proportion of agriculture, in US dollars:

²²⁵ Societies for the Prevention of Cruelty to Animals Act 169 of 1993.
²²⁶ Animal Health Act 7 of 2002.
²²⁷ NCSPCA v Openshaw (462/07) 2008 ZASCA 78 (RSA) paras 30-39; R v Moato 1947 (1) SA 490 (O) 492; S v Edmunds 1968 (2) PH H398 (N) 758.
²²⁸ South African Bureau of Standards 'Numerical list of standards' https://www.sabs.co.za/Standard-Sales/docs/Numerical_list_SABS.pdf (accessed 31 August 2021).
²²⁹ Food and Agriculture Organisation of the United Nations 'Livestock' <http://www.fao.org/rural-employment/agricultural-sub-sectors/livestock/en/> (accessed 22 June 2021).
²³⁰ As above.
²³¹ Food and Agriculture Organisation of the United Nations 'Fisheries and aquaculture' <http://www.fao.org/rural-employment/agricultural-sub-sectors/fisheries-and-aquaculture/en/> (accessed 17 July 2021).
²³² J Otte & M Upton 'Poverty and livestock agriculture' (2005) 35.
²³³ Food and Agriculture Organisation of the United Nations (n 229 above).
²³⁴ M Upton 'The role of livestock in economic development and poverty reduction' (2014) 3.
²³⁵ Galer (n 53 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

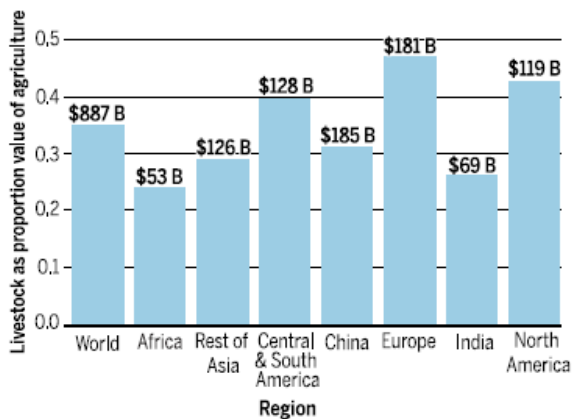


Figure 5: The value of livestock (globally and by region) as a proportion of total agricultural value in 2014²³⁶

In 2014, the value of livestock was estimated at 887 billion US dollars. Africa had the lowest economic value of livestock and Europe had the highest value. In 2018, the global meat sector was valued at approximately 945.7 billion US dollars and by 2021 was forecast to increase to 1142.9 billion US dollars.²³⁷ Eliminating the livestock industry would lead to substantial loss of this economic value. This loss could be offset by the increased production of crops for human consumption.

Should veganism be adopted globally, those who rely on the livestock industry would lose a source of income.²³⁸ A failure to provide alternative livelihoods would lead to unemployment and social disorder, particularly in rural communities that depend on farming practices.²³⁹

Arid and semi-arid lands, such as the Sahel region, are only useful for the rearing of animals.²⁴⁰ Without livestock, living in these regions would be impossible. This is especially true for nomadic pastoralists such as the Mongols and Berbers who would

²³⁶ Godfray (n 114 above) 2.

²³⁷ M Shahbandeh 'Global meat market value 2018 & 2023' 26 July 2021 <https://www.statista.com/statistics/502286/global-meat-and-seafood-market-value/> (accessed 21 June 2021).

²³⁸ R Nuwer 'What would happen if the world suddenly went vegetarian?' <https://www.bbc.com/future/article/20160926-what-would-happen-if-the-world-suddenly-went-vegetarian> (accessed 22 June 2021).

²³⁹ Galer (n 53 above).

²⁴⁰ D Western & V Finch 'Cattle and Pastoralism: Survival and Production in Arid Lands' (1986) 14(1) *Human Ecology* 87 – 89.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

have to settle permanently, should they be deprived of their livestock.²⁴¹ Having to settle in one place would result in them losing their cultural identity.²⁴² Pastoralists who settle permanently often risk being evicted from the land that they choose to settle on,²⁴³ which places stress on already destitute people.

It is estimated that the surplus of food that would be produced by shifting to a vegan diet could feed millions of additional people.²⁴⁴ The overall value of this additional food could offset any loss from a decrease in meat production.²⁴⁵ Below is a graphical representation (Figure 6) of the economic value of the environmental and health benefits of various diets:

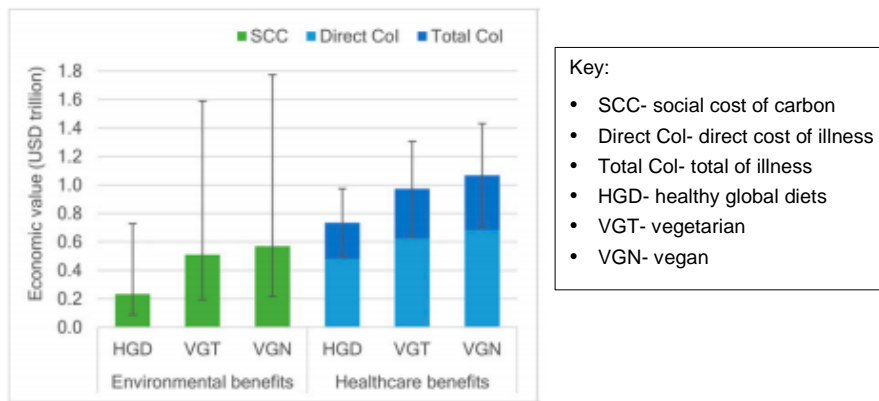


Figure 6: Health and environmental benefits of various diets ²⁴⁶

The social cost of carbon represents the monetary damages associated with a carbon emissions increase.²⁴⁷ Direct cost of illness includes healthcare expenses, health service utilisation and medication.²⁴⁸ Indirect cost of illness includes costs of care, as well as labour costs incurred due to mortality and morbidity.²⁴⁹ A healthy global diet

²⁴¹ Nuwer (n 238 above).

²⁴² Galer (n 53 above).

²⁴³ F de Weijer 'Towards a pastoralist support strategy background document' https://pdf.usaid.gov/pdf_docs/Pnadg965.pdf (accessed 18 June 2021).

²⁴⁴ Eswaran (n 54 above).

²⁴⁵ As above.

²⁴⁶ M Springmann et al. 'Analysis and valuation of the health and climate change cobenefits of dietary change' (2016) 113(15) *Proceedings of the National Academy of Sciences of the United States of America* 4149.

²⁴⁷ Springmann (n 246 above) 4151.

²⁴⁸ As above.

²⁴⁹ As above.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

includes at least five portions of fruits and vegetables, less than 50 grams of sugar,²⁵⁰ a maximum of 160 gram of cooked red meat²⁵¹ and an age and sex dependent energy content.²⁵² Vegetarian and vegan diets appear to have a greater economic value with regard to the environmental and health benefits than a 'healthy global' diet.

However, insufficient research has been conducted to determine the conclusiveness of the economic value of a vegan diet.

3.6.3.7. Conclusion

There appears to be numerous environmental benefits to adopting a vegan diet, which includes reduced levels of pollution. The majority of the adverse effects to the environment are due to factory farming and the rearing of animals for food. Climate change is one of the major negative impacts of the livestock and agricultural sectors. It is driven by both air and water pollution as well as water depletion, all of which are exacerbated by the livestock and agricultural sectors, and ultimately, the consumption of meat. Climate change and pollution are leading to biodiversity loss, which is not only affecting the earth, but also human wellbeing. It is apparent that the meat industry and the consumption of meat has an array of negative effects on the environment, and as such, veganism is more beneficial to the earth.

There are economic ramifications of society changing to a vegan diet. The livestock and agriculture sectors support billions of people globally, especially those in developing countries. Eliminating the sector would lead to a loss of income for these communities. Should nomadic pastoralists be forced into veganism, they may lose a source of income and their cultural identity. However, continuing with their practices would have a minimal impact given the marginal number of people in this cultural group. The food that would be produced by shifting to a vegan diet could supply food to many more people, which may compensate for any loss due to a decrease in meat production. The exact economic value of adopting a vegan diet as well as the

²⁵⁰ World Health Organisation (n 68 above).

²⁵¹ World Cancer Research Fund & American Institute for Cancer Research 'Diet, nutrition, physical activity and cancer: a global perspective. A summary of the third expert report' (2018) 58.

²⁵² World Health Organisation & Food and Agriculture Organisation of the United Nations 'Human energy requirements: report of a joint FAO/WHO/UNU expert consultation, Rome, Italy, 17 – 24 October 2001' (2004) 39.

Field Code Changed

economic loss that will be suffered if the livestock and agricultural sectors were to be removed is uncertain.

Given the potential economic loss that will be suffered if a vegan diet were to be adopted, a more viable alternative could be to end factory farming as well as scaling down meat and animal by-product production, as opposed to eliminating these industries. This would essentially help conserve the environment, in addition to safeguard the economy.

Chapter 4

The Sustainable Development Goals and Veganism

4.1. Introduction

The SDGs, also referred to as the Global Goals, were adopted in 2015 by the United Nations as a global ‘call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.’²⁵³ There are seventeen goals. They are integrated goals in that they acknowledge that action in one target area affects progress in other areas, and that ‘development must balance social, economic and environmental sustainability.’²⁵⁴ The goals are based on anthropocentric terms, which essentially means that ‘they are to be achieved for the sake of humans.’²⁵⁵ In effect, the SDGs are failing to take into account the interests of ‘non-human animals.’²⁵⁶

As stated, veganism provides a number of health, environmental, food security and animal welfare advantages.²⁵⁷ Therefore, veganism is an appropriate means of upholding sustainable development and a suitable means of realising several SDGs.²⁵⁸ This chapter discusses Goals 2, 3, 11, 13, 14 and 15 of the SDGs as being able to be achieved by shifting to a vegan diet as well as the contribution that biocyclic vegan agriculture²⁵⁹ can make towards achieving the SDGs.

4.1 Sustainable Development Goal 2

Due to vegan and vegetarian diets’ reduced resource requirements, Goal 2 ‘zero hunger’²⁶⁰ can be realised. This SDG strives to end all forms of hunger and

²⁵³ United Nations Development Programme ‘The SDGs in action’ <https://www.undp.org/sustainable-development-goals> (accessed 25 June 2021).

²⁵⁴ As above.

²⁵⁵ O Torpman & H Röcklinsberg ‘Reinterpreting the SDGs: taking animals into direct consideration’ (2021) 13(843) *Sustainability* 2.

²⁵⁶ M Keitsch ‘Structuring ethical interpretations of the sustainable development goals – concepts, implications and progress’ (2018) 10(829) *Sustainability* 7 – 9.

²⁵⁷ Hopwood (n 58 above).

²⁵⁸ M Alsaleh (n 59 above).

²⁵⁹ Biocyclic vegan agriculture is plant-based organic farming which excludes animal husbandry. ‘Special emphasis is placed on the promotion of biodiversity, healthy soil life, the closure of organic cycles and on systematic humus build-up.’ K Jürkenbeck et al. ‘Marketing potential for biocyclic-vegan products? A qualitative, explorative study with experts and consumers’ (2019) 68(4) *German Journal of Agricultural Economics* 290; Biocyclic Vegan Standard ‘Biocyclic vegan agriculture – vegan from field to table’ <http://www.biocyclic-vegan.org/> (accessed 18 July 2021).

²⁶⁰ United Nations Development Programme (n 60 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

malnutrition by ensuring adequate and nutritious food.²⁶¹ This comprises of promoting sustainable agriculture, supporting small-holding farmers as well as equal land access and technology.²⁶²

As stated, the livestock sector is a major consumer of the global water resources.²⁶³ Furthermore, livestock consume approximately 34 percent of the global crop production.²⁶⁴ The livestock industry and meat take a heavy toll on food security. Approximately 30 crop calories are required to produce one meat calorie.²⁶⁵ It is estimated that crops could produce sufficient food to feed the global population with 5 935 kilocalories per person, per day, with humans only needing approximately 2 353 kilocalories per person, per day.²⁶⁶ Shifting to a vegan diet will assist with water and food scarcity.

By improving soil fertility, introducing natural cultivation methods, efficient land use, and producing crops exclusively for human consumption, biocyclic vegan agriculture can substantially contribute to global food security.²⁶⁷ Furthermore, biocyclic humus soil derived from compost production can assist in increasing crop yields and thereby improve agricultural productivity.²⁶⁸

4.2 Sustainable Development Goal 3

The numerous health benefits that veganism provides allows Goal 3 ‘good health and well-being’ to be achieved with a vegan diet.²⁶⁹ Goal 3 has several targets, including significantly reducing the number of illnesses and deaths caused by harmful chemicals and by soil, water and air pollution.²⁷⁰ This goal is quite complex

²⁶¹ As above.

²⁶² United Nations Global Impact ‘Business reporting on SDGs analysis of goals and targets’ 2.

²⁶³ Rojas-Downing (n 196 above).

²⁶⁴ M Berners-Lee et al. ‘Current global food production is sufficient to meet human nutritional needs in 2050 provided there is radical societal adaptation’ (2018) 6(52) *Elementa Science of the Anthropocene* 10.

²⁶⁵ ES Cassidy et al. ‘Redefining agricultural yields: from tonnes to people nourished per hectare’ (2013) 8(3) *Environmental Research Letters* 3.

²⁶⁶ Berners-Lee (n 264 above) 2.

²⁶⁷ Biocyclic Vegan Standard ‘The contribution of biocyclic vegan agriculture to the attainment of the UN Sustainable Development Goals (SDGs)’ <http://www.biocyclic-vegan.org/the-sustainable-development-goals/> (accessed 18 July 2021).

²⁶⁸ As above.

²⁶⁹ United Nations Development Programme (n 61 above).

²⁷⁰ As above.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

and is interconnected with other goals in that climate change, the environment, and illnesses all affect this goal.²⁷¹

The livestock sector contributes significantly to pollution.²⁷² A vegan diet will result in less diseases and illness caused by bodily inflammation. It will also reduce and eliminate a significant amount of pollution, thereby reducing the number of illnesses and deaths caused by pollution.

The absence of animal husbandry and the use of plant-based fertilisers in biocyclic vegan agriculture reduces the risk of food contamination by drug and antibiotics from livestock farming, by pathogens from animals' waste and by a reduction of epidemic and pandemic illnesses, such as COVID-19.²⁷³

Globally, we have taken great strides against many leading causes of disease and death.²⁷⁴ However, we are not on track to achieving Goal 3.²⁷⁵ Despite there being progress, it has not been uniform, with progress being unequal between and within countries.²⁷⁶

4.3 Sustainable Development Goals 11 and 13

Eliminating factory farms will help achieve Goal 11 'sustainable cities and communities'²⁷⁷ and address climate change which is referred to in Goal 13 'climate action.'²⁷⁸ Goal 11 aims to improve efforts to protect and maintain natural heritage, reduce the number of deaths as well as water-related disasters, and limit the environmental impact of cities.²⁷⁹ Sustainable development cannot be realised if the means in which urban spaces are built and managed remains unaltered.²⁸⁰ This includes monitoring air quality and managing waste.²⁸¹ Goal 13's targets include

²⁷¹ Resolution adopted by the General Assembly on 25 September 2015 70/1 'Transforming our world: the 2030 agenda for sustainable development'.

²⁷² Food and Agriculture Organisation of the United Nations (n 182 above); Turner (n 39 above).

²⁷³ Biocyclic Vegan Standard (n 267 above).

²⁷⁴ The Economist 'Great strides have been made against disease and poverty' <https://www.economist.com/international/2017/09/14/great-strides-have-been-made-against-disease-and-poverty> (accessed 7 September 2020).

²⁷⁵ JD Moyer & S Hedden 'Are we on the right path to achieve the sustainable development goals?' (2020) 127 *World Development* 9.

²⁷⁶ United Nations Development Programme (n 61 above).

²⁷⁷ United Nations Development Programme (n 62 above).

²⁷⁸ United Nations Development Programme (n 63 above).

²⁷⁹ United Nations Development Programme (n 62 above).

²⁸⁰ As above.

²⁸¹ As above.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

improving resilience and adapting to climate-related risks and natural disasters.²⁸² The goal further includes acquiring funds to aid developing countries in adjusting to climate change and investing in low-carbon development.²⁸³ This will help achieve Goal 13 as well as other SDGs.

The effect of climate change is being felt globally.²⁸⁴ Greenhouse gas emissions and global warming are causing long term damage to the world's climatic system, which may have irreversible consequences should no action be taken.²⁸⁵

Animal agriculture and farming are major contributors to the degradation of the environment, and significant drivers of climate change due to global warming.²⁸⁶ Should the meat industry be eliminated or reduced, natural heritage such as forests would be better protected, the environmental impacts of cities would be reduced, and the effects of climate change would be mitigated.

Compost and biocyclic humus soil can be generated on large scales and are therefore helpful instruments for effective urban gardening and farming.²⁸⁷ Ceasing the use of livestock for commercial purposes and utilising biocyclic humus or plant-based compost, with their high CO₂ binding capacity, makes biocyclic vegan agriculture a valuable tool to fight climate change.²⁸⁸

4.4 Sustainable Development Goals 14 and 15

Adopting a vegan diet will positively affect the organisms living on our planet and assist in realising Goal 14 'life below water'²⁸⁹ and Goal 15 'life on land.'²⁹⁰ Goal 14 aims to prevent and reduce marine pollution; oversee and safeguard marine and coastal ecosystems; reduce and manage the impact of the acidification of the

²⁸² United Nations Development Programme (n 63 above).

²⁸³ United Nations Development Programme Financing Solutions to Sustainable Development 'Goal 13: climate action' <https://www.sdfinance.undp.org/content/sdfinance/en/home/sdg/goal-13--climate-action.html> (accessed 5 September 2020).

²⁸⁴ T Law 'The climate crisis is global, but these 6 places face the most severe consequences' 30 September 2019 <https://time.com/5687470/cities-countries-most-affected-by-climate-change/> (accessed 5 September 2020).

²⁸⁵ United Nations General Assembly: Seventy-third session, High-level Meeting on Climate and Sustainable Development GA/12131 28 March 2019.

²⁸⁶ Food and Agriculture Organisation of the United Nations (n 22 above) xxi.

²⁸⁷ Biocyclic Vegan Standard (n 267 above).

²⁸⁸ As above.

²⁸⁹ United Nations Development Programme (n 64 above).

²⁹⁰ United Nations Development Programme (n 65 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

oceans; regulate the harvesting of fish and end overfishing.²⁹¹ Goal 15's targets include ensuring the preservation, repair and sustainable use of ecosystems; ceasing deforestation, increasing afforestation and reforestation; combatting desertification; repairing land affected by desertification, floods and droughts; and taking immediate action to cease the loss of biodiversity.²⁹²

The management of the world's oceans is essential for humanity and to offset the side effects of climate change.²⁹³ The world's oceans absorb about 30 percent of human created CO₂.²⁹⁴ Ocean acidification has increased by 26 percent since the beginning of the industrial revolution, which is contributing to climate change.²⁹⁵

Forests provide vital habitats for millions of organisms, are crucial for clean air and water, and imperative for combating climate change.²⁹⁶ Despite their importance, millions of hectares of forests are lost annually for the development of pastures and feed crops.²⁹⁷ The ongoing deforestation leads to excessive desertification, which disproportionately affects poor communities.²⁹⁸

The desertification and water pollution caused by the agriculture and livestock industries has also placed significant strain on the earth's biodiversity.²⁹⁹ Immediate action must be taken to minimize the damage to natural habitats and biodiversity which support food and water security as well as mitigate climate change.³⁰⁰ A global shift to a vegan diet would eliminate these adverse effects to our land and water ecosystems.

²⁹¹ United Nations Development Programme (n 64 above).

²⁹² United Nations Development Programme (n 65 above).

²⁹³ United Nations Development Programme (n 64 above).

²⁹⁴ United Nations 'Goal 14: conserve and sustainably use the oceans, seas and marine resources'

<https://www.un.org/sustainabledevelopment/oceans/#:~:text=Oceans%20absorb%20about%2030%20per.heat%20in%20the%20climate%20system> (accessed 5 September 2020).

²⁹⁵ United Nations Educational, Scientific and Cultural Organisation 'Facts and figures on ocean acidification' <http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/blueprint-for-the-future-we-want/ocean-acidification/facts-and-figures-on-ocean-acidification/> (accessed 5 September 2020).

²⁹⁶ H Wittmer 'The value of nature for local development' in H Wittmer & H Gundimeda (eds) *The economics of ecosystems and biodiversity in local and regional policy and management* (2012) 18 – 21.

²⁹⁷ Food and Agriculture Organisation of the United Nations (n 22 above).

²⁹⁸ United Nations 'Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss' <https://www.un.org/sustainabledevelopment/biodiversity/> (accessed 5 September 2020); S Chakravarty et al. 'Deforestation: causes, effects and control strategies' in CA Okia (eds) *Global perspectives on sustainable forest management* (2012) 15.

²⁹⁹ Food and Agriculture Organisation of the United Nations (n 22 above) 181.

³⁰⁰ United Nations Development Programme (n 64 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Biocyclic humus and mature plant-based compost greatly reduces the leaching of nitrate, which improves the quality of groundwater and reduces eutrophication.³⁰¹ Moreover, the use of aquatic organisms to produce plant-based fertilisers and compost helps recycle nutrients which has leaked into water sources.³⁰²

Establishing ecological balance is essential for the protection of flora as well as for the promotion of biodiversity. Biodiversity grows substantially in regions where biocyclic vegan principles, such as mixed cultivation, crop rotations, and creating habitats within farm areas, are applied.³⁰³ Furthermore, biocyclic vegan farms provide idyllic living conditions for animals and microorganisms.³⁰⁴

4.5 Conclusion

Given the numerous health and environmental benefits of a vegan diet, veganism could be a vital step to achieving the SDGs. Biocyclic vegan agriculture can additionally make a positive contribution towards achieving the SDGs.

Goal 2 can be achieved given the reduced resources required for meat-free diets. The livestock sector is one of the most detrimental to the earth's water resources, a major consumer of the global crop production and major air and water pollutants. Shifting to a vegan diet will reduce and eliminate a significant amount of this pollution, thereby reducing the number of illnesses and deaths caused by pollution. A vegan diet will also result in less disease and illness caused by bodily inflammation, making Goal 3 achievable.

Animal agriculture and farming are major contributors to the degradation of the environment and are significant drivers of climate change due to 'global warming'. Eliminating the meat industry will allow forests to be better protected, reduce the environmental impact of cities and mitigate the effects of climate change thereby achieving Goals 11 and 13.

Due to the livestock industry being a major contributor of water pollution, deforestation, desertification and loss of biodiversity, a global shift to a vegan diet

³⁰¹ Biocyclic Vegan Standard (n 23 above).

³⁰² K Chojnackaa 'Bio-based fertilizers: a practical approach towards circular economy' (2020) 295(1) *Bioresource Technology* 1.

³⁰³ Biocyclic Vegan Standard (n 23 above).

³⁰⁴ As above.

would eliminate these adverse effects to our land and water ecosystems, achieving Goals 14 and 15.

Despite the benefits of veganism, the disadvantages of adopting a vegan diet could possibly prevent the achievement of many of the SDGs. The economic loss that may be suffered by eliminating the livestock and agricultural sectors could exacerbate the global hunger issue. The poor nutrition that can occur if a comprehensive vegan diet is not adopted may lead to poor health, thereby making Goal 3 more difficult to achieve. The disruption to existing ecosystems and biodiversity as a result of eliminating the feed-crops and pastures for livestock may have severe consequences for climate change as well as life on land and below water. Nevertheless, veganism, as a means to achieving the SDGs, is worthwhile exploring.

Chapter 5

Governments and Diet

5.1 Introduction

There are numerous socio-economic factors that influence diet, including occupation, income, the affordability of healthy foods, individual preferences, cultural factors, and geographical and environmental influences.³⁰⁵ Dietary influence and the promotion of healthy diets therefore requires influence from multiple sources including government and the public and private sectors.³⁰⁶ Governments play a critical role in creating healthy dietary choices.³⁰⁷ Given the apparent advantages of adopting a vegan diet, the benefits of veganism may outweigh the disadvantages. It is therefore worthwhile for governments to encourage a vegan diet. This chapter discusses the actions that governments could take to promote a healthy diet, with emphasis on policies namely mandates, restrictions, incentives, marketing and public information.

5.2 Prohibitive Mandates and Restrictions

Mandates are the most restrictive policy tools applied by governments and are effective drivers of change in both industrial and individual behaviours.³⁰⁸ An example of a South African government mandate is Section 2 of the Regulations Relating to Trans-Fat in Foodstuffs in regard to the Foodstuffs, Cosmetics and Disinfectants Act³⁰⁹ which limits the trans-fat content of any oils and fats to two grams per 100 grams. A trans-fat content limitation is perhaps not as effective as a total trans-fat ban would be, when aiming to instil healthy dietary practices. New York City has banned restaurants from cooking with trans fats.³¹⁰ The law was passed based on research indicating a link between cardiovascular disease and consuming trans-fats.³¹¹

In order to encourage a vegan diet, a ban on meat and animal by-products such as dairy milks could be implemented. The sales of alternative dairy such as almond and

³⁰⁵ Caswell (n 66 above).

³⁰⁶ D Mozaffarian (n 67 above).

³⁰⁷ World Health Organisation (n 68 above).

³⁰⁸ MT Gorski & CA Roberto 'Public health policies to encourage healthy eating habits: recent perspectives' (2015) 7(1) *Journal of Healthcare Leadership* 83.

³⁰⁹ Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972.

³¹⁰ Section 81.08 of the New York City Health Code, Rules of the City.

³¹¹ SM Teegala et al. 'Consumption and health effects of trans fatty acids: a review' (2009) 92(5) *Journal of AOAC International* 1251 – 1256.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

soy milks and meat-replacements could be promoted. However, this is quite an extreme measure.

Governments could further impose compliance policies on government funded organisations, such as prisons, public schools and hospitals.³¹² For example, they may require these institutions' food programmes to strictly comply with a comprehensive vegan diet. Countries such as Peru, Uruguay, and Costa Rica have placed a ban on all 'junk food' in public schools.³¹³ In the United Kingdom, the school food standards limit fried foods and desserts, and emphasize the importance of drinking water and consuming whole grains, fruits and vegetables.³¹⁴

Policies may additionally restrict the sale of food stuffs with poor nutritional value or foodstuffs with unhealthy ingredients to vulnerable persons, such as children. Lithuania and Latvia have banned the sale of energy drinks to those under the age of 18.³¹⁵ Restricting the sale of food stuffs with poor nutritional value is less imposing than restricting the sale of non-vegan foods, however, it is less effective.

In order to encourage a vegan diet, governments could restrict the sale of meat and meat by-products until a time where it is eliminated from diets completely.

5.3 Incentives

The successful pricing policies regarding the control of tobacco has garnered interest in the role that economic incentives could play in changing dietary habits.³¹⁶ Research has indicated that a change in food and beverage prices affects consumption, with greater price changes being linked to more significant changes in consumption.³¹⁷

Many countries have imposed additional taxes on foods that have poor nutritional value, including sugary beverages, chips, sweets, and products with a high fat

³¹² Gorski (n 308 above).

³¹³ B Fraser 'Latin American countries crack down on junk food' (2013) 382(9890) *World Report* 385.

³¹⁴ Department for Education 'Revised standards for food in schools government response to the consultation on revised school food standards' (2014) 16 – 20.

³¹⁵ W Schroeder 'Age restrictions on the sale of energy drinks from an EU law perspective' (2016) 11(5) *European Food and Feed Law Review* 400.

³¹⁶ D Mozaffarian et al. 'Population approaches to improve diet, physical activity, and smoking habit' (2012) 126(12) *Circulation* 1526.

³¹⁷ LM Powell & JF Chriqui 'food taxes and subsidies: evidence and policies for obesity prevention' in J Cawley (ed) *The Handbook of the Social Science of Obesity* (2011) 2.

Field Code Changed

content.³¹⁸ South Africa is one such country. In support of the South African Department of Health's goal to reduce the prevalence of diabetes, obesity and other related diseases, a Health Promotion Levy on sugary beverages has been implemented.³¹⁹

A vegan diet can be encouraged by charging additional tax on meat and animal by-products and reviewing the price of vegan meat alternatives and granting subsidies to make them more affordable.

Further motivations could include economic incentives for farmers and vendors to grow and sell fresh fruits and vegetables; incentives for the food sector to decrease and cease the production of meat foods; and incentives for restaurants and caterers to decrease and eliminate the meat and animal by-product options on their menus as well as increase the nutritional value of their food.³²⁰

5.4 Marketing and Public Information

Research has shown that advertising influences society's food preferences, purchases, beliefs, as well as diet.³²¹ As a result of this influence, many countries have placed restrictions on products that are marketed to more vulnerable populations, such as children.³²² Studies have indicated that a ban on food advertising directed at children could reduce the prevalence of childhood obesity,³²³ which many countries have done.³²⁴ South Korea has banned television advertisements of 'energy-dense and nutrient-poor foods' aimed at children.³²⁵ A ban on advertising of meat and animal

³¹⁸ MF Jacobson & KD Brownell 'Small taxes on soft drinks and snack foods to promote health' (2000) 90(6) *American Journal of Public Health* 854.

³¹⁹ South African Revenue Service 'Health promotion levy on sugary beverages' <https://www.sars.gov.za/customs-and-excise/excise/health-promotion-levy-on-sugary-beverages/> (accessed 2 July 2021); Schedule No. 1/ Part 7/ Section A Health Promotion Levy on Sugary Beverages of Act 14 of 2017.

³²⁰ World Health Organisation (n 68 above).

³²¹ EJ Boyland & JCG Halford 'Television advertising and branding: effects on eating behaviour and food preferences in children' (2012) 62(1) *Appetite* 1 – 5.

³²² Gorski (n 308 above) 84; C Hawkes 'Marketing food to children: changes in the global regulatory environment 2004-2006' (2007) 14 – 19.

³²³ B Kelly et al. 'Global benchmarking of children's exposure to television advertising of unhealthy foods and beverages across 22 countries' (2019) 20(2) *Obesity Reviews* 117 – 118.

³²⁴ Mozaffarian (n 316 above) 1542.

³²⁵ S Kim et al. 'Restriction of television food advertising in South Korea: impact on advertising of food companies' (2012) 28(1) *Health Promotion International* 17 – 18.

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

by-products could be placed in order to prevent the more vulnerable populations and perhaps encourage a vegan diet among adolescents.

Policies that inform the public are one of the less restrictive interventions. One of these interventions is the labelling of calorie content of food on restaurant menus and on packaged food.³²⁶ The USA has implemented this policy and requires chain restaurants to label the nutritional and calorie content of their food.³²⁷

An additional information policy regarding diet is the ‘traffic light’ labelling system, which has been adopted by the United Kingdom.³²⁸ The ‘traffic light’ labels have been implemented as a means for consumers to visually recognise the nutritional content of food which promotes healthy food choices.³²⁹ This labelling system found on packaged food and beverages, identifies whether the products have high (red), moderate (yellow), or low (green), levels of fats, salt, sugar, and saturates.³³⁰ Studies have shown that infographics demonstrating the amount of exercise required to burn the calorie content of a product, could reduce the number of sugar sweetened beverages that are purchased.³³¹ Perhaps visualising the nutritional content and minutes of exercise required to burn the calories in meat, animal by-products and vegan alternatives, will encourage a vegan diet, as vegan diets have a lower calorie content.³³² Labelling therefore appears to be a simple, cost-effective means to encourage healthier food purchases.³³³

The most common information policy that nations have is the publishing of food-based dietary guidelines. South Africa’s guidelines, published in 2012, encourages eating a variety of foods, eating sufficient fruit and vegetables, eating sugary and salty foods

³²⁶ Gorski (n 308 above).

³²⁷ S 4205 Patient Protection and Affordable Care Act. Public Law 111-148, 111th Congress, enacted March 23, 2010.

³²⁸ N Triggles ‘Food labelling: consistent system to be rolled out’ <https://www.bbc.com/news/health-22959239> (accessed 4 July 2021).

³²⁹ S Kunz et al. ‘Beyond healthiness: the impact of traffic light labels on taste expectations and purchase intentions’ (2020) 9(2) *Foods* 12.

³³⁰ Triggles (n 328 above).

³³¹ SN Bleich et al. ‘Reduction in purchases of sugar-sweetened beverages among low-income Black adolescents after exposure to caloric information’ (2012) 102(2) *American Journal of Public Health* 330 – 334.

³³² P Clarys et al. ‘Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet’ (2014) 6(3) *Nutrients* 1319.

³³³ Gorski (n 308 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

sparingly and being active.³³⁴ The guidelines do not encourage a vegan diet. In fact, there is no nation in the world that encourages a vegan diet, despite the numerous benefits of this lifestyle and the number of disadvantages of consuming meat and animal by-products.

5.5 Conclusion

The variety of health and environmental benefits of a vegan diet, as well as the numerous disadvantages of the livestock sector, make a vegan diet a favourable dietary choice. It is therefore worthwhile for governments to encourage a vegan diet.

Governments can take several actions to promote a healthy diet. The most important of these actions are policies which include mandates, restrictions, incentives, marketing and public information.

To encourage a vegan diet, governments could ban dairy milks and other dairy products and mandate the sales of alternative dairy such as almond and soy milks. In addition, governments could restrict the sale of meat and meat by-products until a time where it is eliminated from diets completely. Additional tax on meat and animal by-products could be charged as well as reviewing the price of vegan meat alternatives to make them more affordable. Economic incentives for farmers and vendors to grow and sell fresh fruits and vegetables could be applied as well as incentives for restaurants and caterers to reduce and eliminate their meat and animal by-product options. A ban on advertising of meat and animal by-products could be placed in order to protect the more vulnerable populations and perhaps encourage a vegan diet among adolescents. 'Traffic light' labels could be implemented as a means for consumers to visually recognise the nutritional content of food and thereby create and encourage healthy food choices. Governments could also influence positive dietary choices and a vegan diet with national dietary guidelines.

Despite the numerous benefits of the dietary choice, vegan diets are not promoted by any state. Governments encouraging a vegan diet is potentially the first step to achieving the SDGs.

³³⁴ HH Vorster et al. 'Food-based dietary guidelines for South Africa: An introduction to the revised food-based dietary guidelines for South Africa' (2013) 26(3) *South African Journal of Clinical Nutrition* S6.

Chapter 6

Conclusion and recommendations

'My own view is that being a vegetarian or vegan is not an end in itself, but a means towards reducing both human and animal suffering and leaving a habitable planet to future generations' – Peter Singer

This study is centred around Peter Singer's notion that plant-based diets reduce human and animal suffering as well as have environmental benefits. As such, the role of a vegan diet in relation to the SDGs is deliberated.

Veganism has the potential to be beneficial to human health. Research has shown that vegans have reduced levels of bodily inflammation.³³⁵ Vegans therefore tend to have less illnesses and diseases³³⁶ such as cardiovascular disease, heart attacks, stroke, diabetes, cancer, as well as cognitive and mental health illnesses.³³⁷

Despite the alleged health benefits of adopting a vegan diet, there are disadvantages. Vegans and vegetarians could suffer from malnutrition,³³⁸ which may lead to a host of health complications and illnesses.³³⁹ Vegans and vegetarians tend to be deficient in omega 3 fatty acids, vitamin B12, vitamin D, iron, protein and calcium, all of which are found in meat and animal by-products.³⁴⁰ Dietary supplements may be utilised together with a diet plan should the needs for specific nutrients not be met by diet alone.³⁴¹

The research that advocates for the health benefits of veganism is disjointed and inconclusive. More research will need to be conducted to determine whether there are in fact consistent health benefits to becoming vegan. Nevertheless, the supposed health benefits of veganism may possibly outweigh the disadvantages.

Food and dietary choices play a role in climate change, land, water and energy use, biodiversity, as well as greenhouse gas emissions.³⁴² Diets based on chemical-

³³⁵ Haghighatdoost (n 83 above).

³³⁶ Furman (n 79 above).

³³⁷ Sutcliffe (n 33 above).

³³⁸ Patton (n 48 above).

³³⁹ Saunders (n 85 above).

³⁴⁰ Petti (n 73 above) 233.

³⁴¹ MJ Bruins et al. 'Considerations for secondary prevention of nutritional deficiencies in high-risk groups in high-income countries' (2018) 10(1) *Nutrients* 6.

³⁴² Macdiarmid (n 171 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

conventional agriculture products have the greatest environmental impact and organic vegan diets have the lowest impact.³⁴³ The breeding of animals for food requires excessive resources including food, water, energy and land,³⁴⁴ making veganism less impactful on the environment.³⁴⁵ Despite the environmental advantages of veganism, there are economic ramifications of a vegan diet being adopted globally.³⁴⁶ The livestock and agriculture industries sustain billions of people, particularly those in developing countries.³⁴⁷ Eliminating these sectors would lead to a loss of income for these communities. Nomadic pastoralists would also be adversely affected and would lose their cultural identity.³⁴⁸

The additional food that could be produced by shifting to a vegan diet may possibly feed millions of more people, which may offset any economic loss that would arise from a decrease in meat production. The exact economic value of adopting a vegan diet as well as the economic loss that will be suffered if the livestock and agricultural sectors were to be removed is uncertain, and more research will have to be conducted to determine this value.

Given the potential economic loss that will occur if a vegan diet were to be adopted, perhaps a more viable alternative to eliminating omnivorous diets could be to end factory farming and scale down meat and animal by-product production, as opposed to completely eliminating these industries. This would aid in conserving the environment, in addition to protecting the division of the economy that benefits from the agricultural and farming sectors.

The SDGs are a global 'call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.'³⁴⁹ Action in one SDG affects the outcomes of other areas. An essential step to a sustainable society is shifting to a vegan diet.³⁵⁰ Research has demonstrated that veganism can be beneficial to human health, the environment, food security as well as the welfare of animals.³⁵¹ A vegan

³⁴³ Baroni (n 173 above).
³⁴⁴ Pimentel (n 24 above).
³⁴⁵ Baroni (n 173 above) 282 – 284.
³⁴⁶ Chiorando (n 176 above).
³⁴⁷ Galer (n 53 above).
³⁴⁸ As above.
³⁴⁹ United Nations Development Programme (n 253 above).
³⁵⁰ As above.
³⁵¹ Hopwood (n 58 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

diet is therefore a suitable means of achieving several of the SDGs.³⁵² Biocyclic vegan agriculture can additionally make a positive contribution towards achieving the SDGs.³⁵³

The decreased resources required for a vegan and vegetarian diet make achieving Goal 2 possible. Goal 3 can be achieved by eliminating the livestock sector, which is a major source of water pollution and depletion as well as air pollution.³⁵⁴ Shifting to a vegan diet will reduce the number of illnesses and deaths caused by pollution, as well as bodily inflammation. Animal agriculture and farming are major contributors to the degradation of the environment, and significant drivers of climate change. Eliminating the meat industry will allow land to be better protected, reduce the environmental impact of cities and mitigate the effects of climate change, thereby achieving Goals 11 and 13. A global shift to a vegan diet would eliminate the water pollution, deforestation and desertification³⁵⁵ caused by the livestock and agricultural industries, achieving Goals 14 and 15.

While the benefits of veganism may aid in achieving the SDGs, the disadvantages of adopting a vegan diet could pose a barrier to it. The financial ramifications of eliminating the livestock and agricultural sectors could exacerbate the global hunger issue. The potential malnutrition due to an unbalanced diet may lead to poor health, thereby making Goal 3 more difficult to achieve. The disruption to existing ecosystems and biodiversity due to eliminating feed-crops and pastures for livestock may adversely affect the environment, including life on land and below water. Nonetheless, veganism, as a tool to be used to achieve the SDGs is worthwhile exploring.

Given that diets are influenced by several social and economic factors³⁵⁶ all relevant stakeholders must play a role in encouraging a healthy diet.³⁵⁷ Governments are central to the creation of healthy food practices.³⁵⁸ The alleged environmental benefits of a vegan diet, as well as the disadvantages of the livestock and agricultural sectors,

³⁵² M Alsaleh (n 59 above).

³⁵³ Biocyclic Vegan Standard (n 252 above).

³⁵⁴ Food and Agriculture Organisation of the United Nations (n 245 above).

³⁵⁵ Food and Agriculture Organisation of the United Nations (n 18 above); Chakravarty (n 295 above).

³⁵⁶ Caswell (n 66 above).

³⁵⁷ D Mozaffarian (n 67 above).

³⁵⁸ World Health Organisation (n 68 above).

Field Code Changed

Field Code Changed

Field Code Changed

Field Code Changed

make a vegan diet a favourable dietary choice. It is therefore worthwhile for governments to encourage a vegan diet.

Governments can take several actions to promote a healthy diet. These could include mandates, restrictions, incentives, marketing and public information. To encourage a vegan diet, governments could ban meats and animal by-products, and mandate the sales of meat alternatives such as almond and soy milks. Alternatively, governments could restrict the sale of meat and animal by-products until a time where it is eliminated from diets completely. Additional tax on meat and animal by-products could be charged together with making meat alternatives more affordable. Economic incentives for farmers and vendors to grow and sell fresh fruits and vegetables could be imposed as well as incentives for restaurants to reduce and eliminate their meat and animal by-product options.³⁵⁹ A ban on advertising of meat and animal by-products could be placed in order to limit influencing vulnerable persons' diets. Implementing 'traffic light' labels will assist in consumers visually recognising the nutritional content of foods and making more informed decisions.³⁶⁰ Governments could further impose national dietary guidelines, where they encourage veganism. Despite the benefits of veganism, and the disadvantages of an omnivorous diet, there is no country in the world that encourages a vegan diet. Governments promoting veganism is perhaps a crucial step to achieving the SDGs.

The aim of this dissertation is to determine whether veganism can help achieve the 2030 SDGs. It appears that given the environmental and health benefits of adopting a vegan diet, the dietary choice is a viable means to achieving several of the SDGs.

However, the disadvantages of adopting a vegan diet may make achieving the SDGs challenging. At present, the research demonstrating the health benefits of adopting a vegan diet is inconclusive. Further research will have to be conducted to determine whether there are consistent health benefits of veganism. In addition, further research will have to be conducted to determine whether the additional food that will be produced by utilising crops only for human consumption really will feed more people. The exact revenue that will be lost as a result of eliminating the agricultural and

³⁵⁹ World Health Organisation (n 68 above).

³⁶⁰ S Kunz (n 329 above).

Field Code Changed

Field Code Changed

livestock industries will have to be determined to ensure that adopting a vegan diet is not doing more harm to the global economy than good.

It is worthwhile for governments to encourage and possibly mandate a comprehensive diet. This includes eliminating processed foods and meats. Imposing policies that ban meat and animal by-products is quite a harsh measure and will undoubtedly lead to social turmoil and unrest. Governments could conduct their own research, develop more comprehensive dietary guidelines, and encourage citizens to follow them using the incentives discussed.

The efficacy of veganism as a tool to achieving the SDGs is going unnoticed and there is great potential in this dietary choice. Immense progress can be made once further research is done to determine the certainty of the benefits and disadvantages of adopting a vegan diet. This will undeniably require some time and the SDGs may not be able to be achieved by the year 2030, however, more progress in achieving the goals may be able to be made.

Bibliography

Acts

- Animal Health Act 7 of 2002.
- Animals Protection Act 71 of 1962.
- Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972.
- New York City Health Code, Rules of the City.
- Patient Protection and Affordable Care Act. Public Law 111-148, 111th Congress, enacted March 23, 2010.
- Performing Animals Protection Act 24 of 1935.
- Societies for the Prevention of Cruelty to Animals Act 169 of 1993.

Books

- Caswell, JA & Yaktine, AL (2013) *Supplemental nutrition assistance program examining the evidence to define benefit adequacy* Washington DC: The National Academies Press.

Case law

- NCSPCA v Openshaw (462/07) 2008 ZASCA 78 (RSA).
- R v Moato 1947 (1) SA 490 (O) 492.
- S v Edmunds 1968 (2) PH H398 (N) 758.

Chapters in books

- Baillie, JEM & Upham, K 'Species diversity within and among ecosystems' in Meyers, RA (eds) (2012) *Encyclopedia of Sustainability Science and Technology* Springer: New York.
- Chakravarty, S; Ghosh, SK; Suresh, CP; Dey, AN & Shukla, G 'Deforestation: causes, effects and control strategies' in Okia, CA (eds) (2012) *Global perspectives on sustainable forest management* Department of Forestry: India.
- Powell, LM & Chriqui, JF 'Food taxes and subsidies: evidence and policies for obesity prevention' in Cawley, J (eds) (2011) *The Handbook of the Social Science of Obesity* Oxford University Press: USA.

- Swingland, IR 'Biodiversity, definition of' in Scheiner, SM (eds) (2001) *Encyclopedia of Biodiversity, Volume 1* Academic Press: USA.
- Wittmer, H 'The value of nature for local development' in Wittmer, H & Gundimeda, H (eds) (2012) *The economics of ecosystems and biodiversity in local and regional policy and management* Routledge: London.

Journal articles

- Appleby, P; Roddam, A; Allen, N & Key, T 'Comparative fracture in vegetarians and nonvegetarians in EPIC-Oxford' (2007) 61(12) *European Journal of Nutrition* 1400.
- Azzolino, D 'Nutritional status as a mediator of fatigue and its underlying mechanisms in older people' (2020) 12(2) *Nutrients* 1.
- Barnard, ND 'A low-fat vegan diet improves glycemic control and cardiovascular risk factors in a randomized clinical trial in individuals with type 2 diabetes' (2006) 29(8) *Diabetes Care* 1777.
- Barnard, ND 'Vegetarian and vegan diets in type 2 diabetes management' (2009) 67(5) *Nutrition Reviews* 255.
- Baroni, L; Cenci, L; Tettamanti, M & Berati, M 'Evaluating the environmental impact of various dietary patterns combined with different food production systems' (2007) 61 *European Journal of Clinical Nutrition* 279.
- Beezhold, B; Radnitz, C; Rinne, A & DiMatteo, J 'Vegans report less stress and anxiety than omnivores' (2015) 18(7) *Nutritional Neuroscience* 289.
- Bleich, SN; Herring, BJ; Flagg, DD & Gary-Webb, TL 'Reduction in purchases of sugar-sweetened beverages among low-income Black adolescents after exposure to caloric information' (2012) 102(2) *American Journal of Public Health* 329.
- Boyland, EJ & Halford, JCG 'Television advertising and branding: effects on eating behaviour and food preferences in children' (2012) 62(1) *Appetite* 1.
- Campbell, T 'A plant-based diet and stroke' (2017) 14(5) *Journal of Geriatric Cardiology* 321.
- Chan, JM; Wang, F & Holly, EA 'Pancreatic cancer, animal protein and dietary fat in a population-based study, San Francisco Bay Area, California' (2007) 18(10) *Cancer Causes Control* 1153.

- Chang, J; Ciaia, P; Gasser, T; Smith, P; Herrero, M; Havlík, P; Obersteiner, M; Guenet, B; Goll, D; Li, W; Naipal, V; Peng, S; Qiu, C; Tian, H; Viovy, N; Yue, C; & Zhu, D 'Climate warming from managed grasslands cancels the cooling effect of carbon sinks in sparsely grazed and natural grasslands' (2021) 12(118) *Nature Communications* 1.
- Chatterjee, S; Khunti, K & Davies, MJ 'Type 2 diabetes' (2017) 389(10085) *The Lancet* 2239.
- Chojnackaa, K 'Bio-based fertilizers: a practical approach towards circular economy' (2020) 295(1) *Bioresource Technology* 1.
- Clarys, P; Deliens, T; Huybrechts, I; Deriemaeker, P; Vanaelst, B; De Keyzer, W; Hebbelinck, M; & Mullie, P 'Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet' (2014) 6(3) *Nutrients* 1318.
- Cooper, L 'A new veganism: how climate change has created more vegans' (2018) *Granite: Aberdeen University Postgraduate Interdisciplinary Journal* 16.
- Craig, WJ 'Health effects of vegan diets' (2009) 89(5) *The American Journal of Clinical Nutrition* 1627.
- Cross, AJ; Leitzmann, MF; Gail, MH; Hollenbeck, AR; Schatzkin, A & Sinha, R 'A prospective study of red and processed meat intake in relation to cancer risk' (2007) 4(12) *PLoS Medicine* 1973.
- Derbyshire, EJ 'Flexitarian diets and health: a review of the evidence-based literature' (2017) 3(55) *Frontiers in Nutrition* 1.
- Dinu, M; Abbate, R; Gensini, GF; Casini, A & Sofi, F 'Vegetarian, vegan diets and multiple health outcomes: a systematic review with meta-analysis of observational studies' (2017) 57(17) *Critical Reviews in Food Science and Nutrition* 3640.
- Dungan, RS 'Board-Invited Review: Fate and Transport of Bioaerosols Associated with Livestock Operations and Manures' (2010) 88 *Journal of Animal Science* 3693.
- Forestell, CA & Nezelek, JB 'Vegetarianism, depression and the five factor model of personality' (2018) 57(3) *Ecology of Food and Nutrition* 246.

- Fraser, B 'Latin American countries crack down on junk food' (2013) 382(9890) *World Report* 385.
- Fraser, GE 'Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists' (1999) 70(3) *The American Journal of Clinical Nutrition* 532S.
- Furman, D 'Chronic inflammation in the etiology of disease across the life span' (2019) 5(1) *Nature Medicine* 1822.
- Gerbens-Leenes, PW; Mekonnen, MM & Hoekstra, AY 'The water footprint of poultry, pork and beef: a comparative study in different countries and production systems' (2013) 1 *Water Resources and Industry* 25.
- Glick-Bauer, M & Yeh, M 'The health advantage of a vegan diet: exploring the gut microbiota connection' (2014) 6(11) *Nutrients* 4822.
- Godfray, HCJ; Aveyard, P; Garnett, T; Hall, JW; Key, TJ; Lorimer, J; Pierrehumbert, RT; Scarborough, P; Springmann, M & Jebb, SA 'Meat consumption, health, and the environment' (2018) 361(6399) *Science* 1.
- Gorski, MT & Roberto, CA 'Public health policies to encourage healthy eating habits: recent perspectives' (2015) 7(1) *Journal of Healthcare Leadership* 81.aboveaboveaboveaboveaboveaboveaboveabove
- Haghighatdoost, F; Bellissimo, N; Totosty de Zepetnek, JO & Rouhani, MH 'Association of vegetarian diet with inflammatory biomarkers: a systematic review and meta-analysis of observational studies' (2017) 20(15) *Public Health Nutrition* 2713.
- Hopwood, CJ; Bleidorn, W; Schwaba, T & Chen, S 'Health, environmental, and animal rights motives for vegetarian eating' (2020) 15(4) *PLoS ONE* 1.
- Hu, FB 'Plant-based foods and prevention of cardiovascular disease: an overview' (2013) 78(3) *The American Journal of Clinical Nutrition* 544.
- Hunter, P 'The inflammation theory of disease' (201) 13(11) *Embo Reports* 968.
- Jacobsen, BK; Knutsen, SF & Fraser, GE 'Does high soy milk intake reduce prostate cancer incidence? The Adventist health study' (1998) 9(6) *Cancer Causes Control* 553.
- Jacobson, MF & Brownell, KD 'Small taxes on soft drinks and snack foods to promote health' (2000) 90(6) *American Journal of Public Health* 854.

- Johannesen, CO; Dale, HF; Jensen, C & Lied, GA 'Effects of plant-based diets on outcomes related to glucose metabolism: a systematic review' (2020) 13(1) *Diabetes, metabolic syndrome and obesity: targets and therapy* 2811.
- Jürkenbeck, K; Schleicher, L & Meyerding, SGH 'Marketing potential for biocyclic-vegan products? A qualitative, explorative study with experts and consumers' (2019) 68(4) *German Journal of Agricultural Economics* 289.
- Keim, S & Sosnowski, J 'Human rights v animal rights: mutually exclusive or complementary causes' (2012) 8(1) *Australian Animal Protection Law Journal* 78.
- Keinan-Boker, L; Peeters, PH; Mulligan, AA; Navarro, C; Slimani, N; Mattisson, I; Lundin, E; McTaggart, A; Allen, NE; Overvad, K; Tjønneland, A; Clavel-Chapelon, F; Linseisen, J; Haftenberger, M; Lagiou, P; Kalapothaki, V; Evangelista, A; Frasca, G; Bueno-de-Mesquita, HB; van der Schouw, YT; Engeset, D; Skeie, G; Tormo, MJ; Ardanaz, E; Charrondière, UR & Riboli, E 'Soy product consumption in 10 European countries: the European prospective investigation into cancer and nutrition (EPIC) study' (2002) 5(6b) *Public Health Nutrition* 1217.
- Keitsch, M 'Structuring ethical interpretations of the sustainable development goals – concepts, implications and progress' (2018) 10(829) *Sustainability* 1.
- Kelly, B; Vandevijvere, S; Ng, S; Adams, J; Allemandi, L; Bahena-Espina, L; Barquera, S; Boyland, E; Calleja, P; Carmona-Garcés, IC; Castronuovo, L; Cauchi, D; Correa, T; Corvalán, C; Cosenza-Quintana, EL; Fernández-Escobar, C; González-Zapata, LI; Halford, J; Jaichuen, N; Jensen, ML; Karupaiah, T; Kaur, A; Kroker-Lobos, MF; Mchiza, Z; Miklavc, K; Parker, WA; Potvin Kent, M; Pravst, I; Ramírez-Zea, M; Reiff, S; Reyes, M; Royo-Bordonada, MÁ; Rueangsom, P; Scarborough, P; Tiscornia, MV; Tolentino-Mayo, L; Wate, J; White, M; Zamora-Corrales, I; Zeng, L & Swinburn, B 'Global benchmarking of children's exposure to television advertising of unhealthy foods and beverages across 22 countries' (2019) 20(2) *Obesity Reviews* 116.
- Key, TJ 'Fruit and vegetables and cancer risk' (2011) 104(1) *British Journal of Cancer* 6.

- Kim, S; Lee, Y; Yoon, J; Chung, SJ; Lee, SK and Kim, H 'Restriction of television food advertising in South Korea: impact on advertising of food companies' (2012) 28(1) *Health Promotion International* 17.
- Kunz, S; Haasova, S; Rieß, J & Florack, A 'Beyond healthiness: the impact of traffic light labels on taste expectations and purchase intentions' (2020) 9(2) *Foods* 12.
- Lanou, AJ & Svenson, B 'Reduced cancer risk in vegetarians: an analysis of recent reports' (2011) 3 *Cancer Management and Research* 1.
- Levine, ME; Suarez, JA; Brandhorst, S; Balasubramanian, P; Cheng, C; Madia, F; Fontana, L; Mirisola, MG; Guevara-Aguirre, J; Wan, J; Passarino, G; Kennedy, BK; Wei, M; Cohen, P; Crimmins, EM & Longo, VD 'Low protein intake is associated with a major reduction in IGF-1, Cancer, and overall mortality in the 65 and younger but not older population' (2014) 19(3) *Cell Metabolism* 407.
- Liu, RH 'Potential synergy of phytochemicals in cancer prevention: mechanism of action' (2004) 134(12) *The Journal of Nutrition* 3479S.
- Lunt, LD; Eldridge, DJ; Morgan, JW & Witt, GB 'A framework to predict the effects of livestock grazing and grazing exclusion on conservation values in natural ecosystems in Australia' (2007) 55(4) *Australian Journal of Botany* 401.
- Macdiarmid, JI 'Is a healthy diet an environmentally sustainable diet?' (2013) 72 *Proceedings of the Nutrition Society* 13.
- Maruotti, N & Cantatore, FP 'Vitamin D and the immune system' (2010) 37(3) *The Journal of Rheumatology* 491.
- Mathis, KR 'The effects of a vegetarian diet' (2017) 3 *Integrated Studies* 1.
- Medawar, E; Huhn, S; Villringer, A & Witte, AV 'The effect of plant-based diets on the body and the brain: a systematic review' (2019) 226 *Translational Psychiatry* 1.
- Menzel, J; Biemann, R; Longree, A; Isermann, B; Mai, K; Schulze, M; Abraham, K & Weikert, C 'Associations of a vegan diet with inflammatory biomarkers' (2020) 1993 (10) *Scientific Reports* 1.
- Moyer, JD & Hedden, S 'Are we on the right path to achieve the sustainable development goals?' (2020) 127 *World Development* 1.

- Mozaffarian, D; Afshin, A; Benowitz, NL; Bittner, V; Daniels, SR; Franch, HA; Jacobs, DR Jr; Kraus, WE; Kris-Etherton, PM; Krummel, DA; Popkin, BM; Whitsel, LP & Zakai NA 'Population approaches to improve diet, physical activity, and smoking habit' (2012) 126(12) *Circulation* 1514.
- Mozaffarian, D; Angell, SY; Lang, T & Rivera, JA 'Role of government policy in nutrition—barriers to and opportunities for healthier eating' (2018) 361 *Bmj* 1.
- Müller, P, Rose, K; Hayer, A; Petit, L & Laimbacher, J 'Handlungsanweisungen vegetarische und vegane ernährung im säuglingsund leinkindesalter' (2020) 31(2) *Paediatrica* 1.
- Norat, T; Bingham, S; Ferrari, P; Slimani, N; Jenab, M; Mazuir, M; Overvad, K; Olsen, A; Tjønneland, A; Clavel, F; Boutron-Ruault, MC; Kesse, E; Boeing, H; Bergmann, MM; Nieters, A; Linseisen, J; Trichopoulou, A; Trichopoulos, D; Tountas, Y; Berrino, F; Palli, D; Panico, S; Tumino, R; Vineis, P; Bueno-de-Mesquita, HB; Peeters, PH; Engeset, D; Lund, E; Skeie, G; Ardanaz, E; González, C; Navarro, C; Quirós, JR; Sanchez, MJ; Berglund, G; Mattisson, I; Hallmans, G; Palmqvist, R; Day, NE; Khaw, KT; Key, TJ; San Joaquin, M; Hémon, B; Saracci, R; Kaaks, R & Riboli, E 'Meat, fish, and colorectal cancer risk: the European prospective investigation into cancer and nutrition' (2005) 97(12) *Journal of the National Cancer Institute* 906.
- Norman, AW 'Vitamin D nutritional policy needs a vision for the future' (2010) 235(9) *Experimental Biology and Medicine* 1034.
- Ostfeld, RJ 'Definition of a plant-based diet and overview of this special issue' (2017) 14(315) *Journal of Geriatric Cardiology* 1.
- Parkin, DM & Boyd, L 'Cancers attributable to dietary factors in the UK in 2010' (2011) 105(2) *British Journal of Cancer* S19.
- Pepys, MB & Hirschfield, GM 'C-reactive protein: a critical update' (2003) 111(12) *Journal of Clinical Investigation* 1805.
- Petti, A; Palmieri, B; Vadalà, M and Laurino, C 'Vegetarianism and veganism: not only benefits but also gaps' (2017) 19(3) *Progress in Nutrition* 229.
- Piazza, J; Ruby, MB; Loughnan, S; Luong, M; Kulik, J; Watkins, HM and Seigerman, M 'Rationalizing meat consumption. The 4Ns' (2015) 91 *Appetite* 114.

- Pimentel, D & Pimentel, M 'Sustainability of meat-based and plant-based diets and the environment' (2003) 78(3) *The American Journal of Clinical Nutrition* 660S.
- Prasad, S; Tyagi, AK & Aggarwal, BB 'Detection of inflammatory biomarkers in saliva and urine: Potential in diagnosis, prevention, and treatment for chronic diseases' (2016) 241(8) *Experimental Biology and Medicine* 783.
- Rocha, JP; Laster, J; Parag, B & Shah, NU 'Multiple health benefits and minimal risks associated with vegetarian diets' (2019) 8 *Current Nutrition Reports* 374.
- Rogerson, D 'Vegan diets: practical advice for athletes and exercisers' (2017) 14(36) *Journal of the International Society of Sports Nutrition* 1.
- Rohrmann, S; Overvad, K; Bueno-de-Mesquita, HB; Jakobsen, MU; Egeberg, R; Tjønneland, A; Nailler, L; Boutron-Ruault, MC; Clavel-Chapelon, F; Krogh, V; Palli, D; Panico, S; Tumino, R; Ricceri, F; Bergmann, MM; Boeing, H; Li, K; Kaaks, R; Khaw, KT; Wareham, NJ; Crowe, FL; Key, TJ; Naska, A; Trichopoulou, A; Trichopoulos, D; Leenders, M; Peeters, PH; Engeset, D; Parr, CL; Skeie, G; Jakszyn, P; Sánchez, MJ; Huerta, JM; Redondo, ML; Barricarte, A; Amiano, P; Drake, I; Sonestedt, E; Hallmans, G; Johansson, I; Fedirko, V; Romieu, I; Ferrari, P; Norat, T; Vergnaud, AC; Riboli, E & Linseisen, J 'Meat consumption and mortality- results from the European prospective investigation into cancer and nutrition' (2013) 11(63) *BMC Medicine* 1.
- Rojas-Downing, MM; Pouyan Nejadhashemi, A; Harrigan, T & Woznicki, SA 'Climate change and livestock: Impacts, adaptation, and Mitigation' (2017) 16 *Climate Risk Management* 145.
- Salonen, AO & Helne, TT 'Vegetarian diets: a way towards a sustainable society' (2012) 5(6) *Journal of Sustainable Development* 10.
- Saunders, J & Smith, T 'Malnutrition can lead to health complications' (2010) 10(6) *Clinical Medicine* 624.
- Schroeder, W 'Age restrictions on the sale of energy drinks from an EU law perspective' (2016) 11(5) *European Food and Feed Law Review* 400.

- Schüpbach, R; Wegmüller, R; Berguerand, C; Bui, M & Herter-Aeberli, I 'Micronutrient status and intake in omnivores, vegetarians and vegans in Switzerland' (2015) 56(1) *European Journal of Nutrition* 283.
- Sevmiş, N & İfakat Tengiz, F 'Vegetarian nutrition and healthy life' (2020) 6(2) *Demiroglu Science University of Florence Nightingale Journal of Medicine* 83.
- Slavin, JL & Lloyd, B 'Health benefits of fruits and vegetables' (2012) 3(4) *Advances in Nutrition* 506.
- Śliwińska, A; Luty, J; Aleksandrowicz-Wrona, E & Małgorzewicz, S 'Iron status and dietary iron intake in vegetarians' (2018) 27(10) *Advances in Clinical and Experimental Medicine* 1383.
- Sobiecki, JG; Appleby, PN; Bradbury, KE; & Key, TJ 'High compliance with dietary recommendations in a cohort of meat eaters, fish eaters, vegetarians, and vegans: results from the European prospective investigation into cancer and nutrition – Oxford study' (2016) 36(5) *Nutrition Research* 464.
- Spencer, EA; Appleby, PN; Davey, GK & Key, TJ 'Diet and body mass index in 38 000 EPIC-Oxford meateaters, fish-eaters, vegetarians and vegans' (2003) 27 *International Journal of Obesity* 728.
- Springmann, M; Godfray, HC; Rayner, M & Scarborough, P 'Analysis and valuation of the health and climate change cobenefits of dietary change' (2016) 113(15) *Proceedings of the National Academy of Sciences of the United States of America* 4146.
- Sun, L; Yang, L; Hao, L; Fang, D; Jin, K & Huang, X. 'Hydrological effects of vegetation cover degradation and environmental implications in a semiarid temperate steppe, China' (2017) 9(2) *Sustainability* 1.
- Sutcliffe, J; Wilson, L; de Heer, HD; Foster, R & Carnot, MJ 'C-reactive protein response to a vegan lifestyle intervention' (2015) 23 (1) *Complementary Therapies in Medicine* 32.
- Sutter, DO & Bender, N 'Nutrient status and growth in vegan children' (2021) 91 *Nutrition Research* 13.
- Swanson, D; Block, R & Mousa, SA 'Omega-3 fatty acids EPA and DHA: health benefits throughout life' (2012) 3(1) *Advances in Nutrition* 1.

- Szűcs, E; Geers, R; Jezierski, T; Sossidou, EN; & Broom, DM 'Animal welfare in different human cultures, traditions and religious faiths' (2012) 25(11) *Asian-Australasian Journal of Animal Sciences* 1499.
- Teegala, SM; Willett, WC and Mozaffarian, D. 'Consumption and health effects of trans fatty acids: a review' (2009) 92(5) *Journal of AOAC International* 1250.
- Torpman, O & Röcklinsberg, H 'Reinterpreting the SDGs: taking animals into direct consideration' (2021) 13(843) *Sustainability* 1.
- Trenberth, KE 'Climate change caused by human activities is happening and it already has major consequences' (2018) 36(4) *Journal of Energy & Natural Resources Law* 463.
- Trepanowski, JF & Varady, KA 'Veganism is a viable alternative to conventional diet therapy for improving blood lipids and glycemic control' (2015) 55(14) *Critical Reviews in Food Science and Nutrition* 2004.
- Tso, R 'A critical appraisal of the evidence supporting consumer motivations for alternative proteins' (2021) 10(23) *Foods* 1.
- Tuso, PJ; Ismail, MH; Ha, BP & Bartolotto, C 'Nutritional update for physicians: plant-based diets' (2013) 17(2) *The Permanente Journal* 61.
- van der Pols, JC; Bain, C; Gunnell, D; Smith, GD; Frobisher, C & Martin, RM. 'Childhood dairy intake and adult cancer risk: 65-y follow-up of the Boyd Orr cohort' (2007) 86(6) *The American Journal of Clinical Nutrition* 1722.
- Vogiatzoglou, A; Smith, AD; Nurk, E; Berstad, P; Drevon, CA; Ueland, PM; Vollset, SE; Tell, GS & Refsum, H 'Dietary sources of vitamin B-12 and their association with plasma vitamin B-12 concentrations in the general population: the Hordaland Homocysteine Study' (2009) 89(4) *American Journal of Clinical Nutrition* 1078.
- Vorster, HH; Badham, JB & Venter, CS 'Food-based dietary guidelines for South Africa: An introduction to the revised food-based dietary guidelines for South Africa' (2013) 26(3) *South African Journal of Clinical Nutrition* S1.
- Warri, A; Saarinen, NM; Makela, S & Hilakivi-Clarke, L. 'The role of early life genistein exposures in modifying breast cancer risk (2008) 98(9) *British Journal of Cancer* 1485.

- Weder, S; Hoffmann, M; Becker, K; Alexy, U & Keller, M 'Macronutrient intake, and anthropometrics of vegetarian, vegan, and omnivorous children (1–3 Years) in Germany (VeChi Diet Study)' (2019) 11(4) *Nutrients* 1.
- Weir, RR; Strain, JJ; Johnston, M; Lowis, C; Fearon, AM; Stewart, S & Pourshahidi, LK 'Environmental and genetic factors influence the vitamin D content of cows' milk' (2017) 76(1) *Proceedings of the Nutrition Society* 76.
- Western, D & Finch, V 'Cattle and Pastoralism: Survival and Production in Arid Lands' (1986) 14(1) *Human Ecology* 77.
- Woo, KS; Kwok, TC & Celermajer, DS 'Vegan diet, subnormal vitamin b-12 status and cardiovascular health' (2014) 6(8) *Nutrients* 3259.
- Wozniak, H; Larpin, C; de Mestral, C; Guessous, I; Reny, JL & Stringhini, S 'Vegetarian, pescatarian and flexitarian diets: sociodemographic determinants and association with cardiovascular risk factors in a Swiss urban population' 124(8) (2020) *British Journal of Nutrition* 844.
- Yeh, HY 'Boundaries, entities, and modern vegetarianism: examining the emergence of the first vegetarian organization' (2013) 19(4) *Qualitative Inquiry* 298.

Internet sources

- Alsaleh, M 'Changing your diet can help meet sustainable development goals' 16 May 2020
https://www.sa.undp.org/content/saudi_arabia/en/home/blog/2020/changing-your-diet-can-help-meet-sustainable-development-goals.html (accessed 1 September 2020).
- Biocyclic Vegan Standard 'Biocyclic vegan agriculture – vegan from field to table' <http://www.biocyclic-vegan.org/> (accessed 18 July 2021).
- Britannica 'Ephrata community' <https://www.britannica.com/topic/Ephrata-Community> (accessed 10 September 2020).
- Brown, J 'Are there health benefits to going vegan?' 23 January 2020
<https://www.bbc.com/future/article/20200122-are-there-health-benefits-to-going-vegan> (accessed 1 September 2020).

- BMI Healthcare 'The pros and cons of a vegan diet'
<https://www.bmihealthcare.co.uk/health-matters/health-and-wellbeing/the-pros-and-cons-of-a-vegan-diet#gdpr-out> (accessed 1 September 2020).
- Calerdone, J 'The way some meat producers fatten up cattle is more bizarre than you might think' 6 April 2016 <https://www.businessinsider.com/farmers-fatten-cattle-hormone-implants-2016-4?IR=T> (accessed 7 September 2020).
- Chiorando, M 'Rise of veganism affecting beef farmers as demand for the meat falls' 20 June 2019 <https://www.plantbasednews.org/lifestyle/rise-of-veganism-affecting-beef-farmers> (accessed 1 September 2020).
- de Weijer, F 'Towards a pastoralist support strategy background document'
https://pdf.usaid.gov/pdf_docs/Pnadg965.pdf (accessed 18 June 2021).
- Ems, T; St Lucia, K and Huecker, MR 'Biochemistry, iron absorption'
https://www.ncbi.nlm.nih.gov/books/NBK448204/#_ncbi_dlg_citbx_NBK448204 (accessed 16 June 2021).
- Eswaran, V 'Vegetarianism is good for the economy too' 18 December 2018
<https://www.weforum.org/agenda/2018/12/vegetarianism-is-good-for-the-economy-too/> (accessed 1 September 2020).
- Fletcher, H 'The 10 films sure to turn meat-eaters vegan' 8 January 2020
<https://www.standard.co.uk/culture/film/the-10-films-sure-to-turn-meateaters-vegan-a3743351.html> (accessed 25 August 2021).
- Food and Agriculture Organisation of the United Nations 'Fisheries and aquaculture'
<http://www.fao.org/rural-employment/agricultural-sub-sectors/fisheries-and-aquaculture/en/> (accessed 17 July 2021).
- Food and Agriculture Organisation of the United Nations 'Livestock a major threat to environment'
<http://www.fao.org/newsroom/en/news/2006/1000448/index.html> (accessed 1 June 2021).
- Food and Agriculture Organisation of the United Nations 'Livestock'
<http://www.fao.org/rural-employment/agricultural-sub-sectors/livestock/en/> (accessed 22 June 2021).
- Food and Agriculture Organisation of the United Nations 'Livestock and the environment'
<http://www.fao.org/livestock-environment/en/> (accessed 16 September 2021).

- Galer, SM 'The consequences if the world decided to go meat free' 12 June 2017 <https://www.bbc.com/future/article/20170612-the-consequences-if-the-world-decided-to-go-meat-free> (accessed 1 September 2020).
- International Vegetarian Union 'Dr. William Lambe - father of vegan nutrition, and his vegan biographer' <https://ivu.org/index.php/blogs/john-davis/121-dr-william-lambe-father-of-vegan-nutrition-and-his-vegan-biographer> (accessed 22 August 2021).
- International Vegetarian Union 'The invention of the vegans' <https://ivu.org/index.php/blogs/john-davis/61-the-invention-of-the-vegans> (accessed 22 August 2021).
- Law, T 'The climate crisis is global, but these 6 places face the most severe consequences' 30 September 2019 <https://time.com/5687470/cities-countries-most-affected-by-climate-change/> (accessed 5 September 2020).
- Livestock Welfare Coordinating Committee 'Livestock industry codes' <http://lwcc.org.za/approved-codes/other-codes/> (accessed 31 August 2021).
- Medical News Today 'How much protein does a person need?' <https://www.medicalnewstoday.com/articles/196279#what-are-proteins> (accessed 16 June 2021).
- National Geographic 'Biodiversity' <https://www.nationalgeographic.org/encyclopedia/biodiversity/> (accessed 15 June 2021).
- National Institutes of Health 'Calcium' <https://ods.od.nih.gov/factsheets/Calcium-HealthProfessional/> (accessed 21 June 2021).
- National Institutes of Health 'Iron: fact sheet for health professionals' <https://ods.od.nih.gov/factsheets/Iron-HealthProfessional/> (accessed 21 June 2021).
- National Institutes of Health 'Iron' <https://ods.od.nih.gov/factsheets/Iron-Consumer/> (accessed 21 June 2021).
- Nuwer, R 'What would happen if the world suddenly went vegetarian?' <https://www.bbc.com/future/article/20160926-what-would-happen-if-the-world-suddenly-went-vegetarian> (accessed 22 June 2021).

- Oxford Learner's Dictionaries 'Factory farming'
<https://www.oxfordlearnersdictionaries.com/definition/english/factory-farming>
(accessed 7 October 2020).
- Office of the United Nations High Commissioner for Human Rights 'The right to health: fact sheet number 31'
<https://www.ohchr.org/documents/publications/factsheet31.pdf> (accessed 19 November 2021).
-
- Ramirez, M 'How I reversed my diabetes and stopped all medications with a plant-based diet' 29 April 2015 <https://www.forksoverknives.com/success-stories/how-i-reversed-my-diabetes-and-stopped-all-medications-with-a-plant-based-diet/> (accessed 1 September 2020).
- Ritchie, H 'You want to reduce the carbon footprint of your food? Focus on what you eat, not whether your food is local' 24 January 2020.
<https://ourworldindata.org/food-choice-vs-eating-local> (accessed 29 August 2021).
- Ryding, S 'What are the health benefits of a vegan diet?' <https://www.news-medical.net/health/What-are-the-Health-Benefits-of-a-Vegan-Diet.aspx>
(accessed 31 August 2020).
- Shahbandeh, M 'Global meat market value 2018 & 2023' 26 July 2021
<https://www.statista.com/statistics/502286/global-meat-and-seafood-market-value/> (accessed 21 June 2021)
- South African Bureau of Standards 'Numerical list of standards'
https://www.sabs.co.za/Standard-Sales/docs/Numerical_list_SABS.pdf
(accessed 31 August 2021).
- South African Revenue Service 'Health promotion levy on sugary beverages'
<https://www.sars.gov.za/customs-and-excise/excise/health-promotion-levy-on-sugary-beverages/> (accessed 2 July 2021).
- Stanford Encyclopaedia of Philosophy 'Jeremy Bentham' 28 January 2019
<https://plato.stanford.edu/entries/bentham/> (accessed 10 September 2020).
- Suddath, C 'A brief history of veganism' 30 October 2008
<https://time.com/3958070/history-of-veganism/> (accessed 9 September 2020).

Formatted: Font: 12 pt, Not Highlight

Formatted: Font: 12 pt, Not Highlight

- Sutter, JD '10 climate change villains' 29 August 2019
<https://edition.cnn.com/2015/08/13/opinions/gallery/top-climate-change-contributors/index.html> (accessed 29 August 2021).
- The Economist 'Great strides have been made against disease and poverty'
<https://www.economist.com/international/2017/09/14/great-strides-have-been-made-against-disease-and-poverty> (accessed 7 September 2020)
- The Guardian 'Record 500,000 people pledge to eat only vegan food in January'
<https://www.theguardian.com/environment/2021/jan/05/veganuary-record-number-people-pledge-eat-vegan-food-january> (accessed 25 August 2021).
- The Vegan Society 'History'
<https://www.vegansociety.com/about-us/history> (accessed 1 September 2021).
- The Vegan Society 'Veganuary'
<https://www.vegansociety.com/take-action/campaigns/veganuary-2021> (accessed 25 August 2021).
- The Vegan Society 'Why go vegan?'
<https://www.vegansociety.com/go-vegan/why-go-vegan> (accessed 5 July 2021).
- Timmins, B 'Who were the world's very earliest vegans?' 6 April 2017
<https://www.independent.co.uk/life-style/who-were-world-s-very-earliest-vegans-a7668831.html> (accessed 9 September 2020).
- Trigg, N 'Food labelling: consistent system to be rolled out'
<https://www.bbc.com/news/health-22959239> (accessed 4 July 2021).
- UK National Ecosystem Assessment 'Ecosystem services'
<http://uknea.unep-wcmc.org/EcosystemAssessmentConcepts/EcosystemServices/tabid/103/Default.aspx> (accessed 25 July 2021).
- United Nations 'Flexitarianism: flexible or part-time vegetarianism'
<https://sustainabledevelopment.un.org/partnership/?p=2252> (accessed 11 November 2020).
- United Nations 'Goal 14: conserve and sustainably use the oceans, seas and marine resources'
<https://www.un.org/sustainabledevelopment/oceans/#:~:text=Oceans%20about%2030%20per,heat%20in%20the%20climate%20system> (accessed 5 September 2020)

- United Nations ‘Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss’
<https://www.un.org/sustainabledevelopment/biodiversity/> (accessed 5 September 2020).
- United Nations Development Programme ‘Goal 11: sustainable cities and communities’ <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-11-sustainable-cities-and-communities.html> (accessed 5 September 2020).
- United Nations Development Programme ‘Goal 13: climate action’
<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-13-climate-action.html> (accessed 5 September 2020).
- United Nations Development Programme ‘Goal 14: life below water’
<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-14-life-below-water.html> (accessed 5 September 2020)
- United Nations Development Programme ‘Goal 15: life on land’
<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-15-life-on-land.html> (accessed 5 September 2020).
- United Nations Development Programme ‘Goal 2: zero hunger’
<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-2-zero-hunger.html> (accessed 5 September 2020).
- United Nations Development Programme ‘Goal 3: good health and well-being’
<https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-3-good-health-and-well-being.html> (accessed 5 September 2020).
- United Nations Development Programme ‘The SDGs in action’
<https://www.undp.org/sustainable-development-goals> (accessed 25 June 2021).
- United Nations Development Programme ‘The SDGs in action’
<https://www.undp.org/sustainable-development-goals> (accessed 25 June 2021).
- United Nations Development Programme Financing Solutions to Sustainable Development ‘Goal 13: Climate action’
<https://www.sdfinance.undp.org/content/sdfinance/en/home/sdg/goal-13--climate-action.html> (accessed 5 September 2020).

- United Nations Educational, Scientific and Cultural Organisation 'Facts and figures on ocean acidification' <http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/blueprint-for-the-future-we-want/ocean-acidification/facts-and-figures-on-ocean-acidification/> (accessed 5 September 2020).
- United Nations Environment Programme 'What's in your burger? More than you think' 8 November 2018 <https://www.unep.org/news-and-stories/story/whats-your-burger-more-you-think> (accessed 29 August 2021).
- World Health Organisation 'Healthy diet' 29 April 2020 <https://www.who.int/news-room/fact-sheets/detail/healthy-diet> (accessed 5 September 2020).
- World Health Organisation 'Human rights, health and environmental protection: linkages in law and practice' https://www.who.int/hhr/information/Human_Rights_Health_and_Environmental_Protection.pdf (accessed 28 November 2011).
- —

Newspapers

- Lee, J 'Neighbors of vast hog farms say foul air endangers their health' *The New York Times* 11 May 2003.

Reports

- Consumers Union SWRO 'Animal factories: pollution and health threats to rural Texas' (2000).
- Department for Education 'Revised standards for food in schools Government response to the consultation on revised school food standards' (2014).
- Food and Agriculture Organisation of the United Nations 'Livestock's long shadow: environmental issues and options' (2006).
- Gold, M 'The global benefits of eating less meat: a report for compassion in world farming trust' (2004).

- Hawkes, C 'Marketing food to children: changes in the global regulatory environment 2004 – 2006' (2007).
- Lollai, S & Pitzianti, G 'Porphyry, on abstinence from animal food (de abstinentia): the broken alliance between man and animals' (2013).
- Millennium Ecosystem Assessment Program 'Ecosystems and human well-being' (2005).
- Otte, J & Upton, M 'Poverty and livestock agriculture' (2005).
- Patton, L & Skelly, W 'Why are plant-based diets not more widely accepted' (2020).
- Turner, J 'Factory farming and the environment: a report for compassion in world farming trust (1999).
- Upton, M 'The role of livestock in economic development and poverty reduction' (2014).
- Wiley, K; Vucinich, M; Miller, J & Vanzi, M 'Confined animal facilities in California' (2004).
- World Cancer Research Fund & American Institute for Cancer Research 'Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Continuous update project expert report' (2018).
- World Cancer Research Fund & American Institute for Cancer Research 'Diet, nutrition, physical activity and cancer: a global perspective. A summary of the third expert report' (2018).
- World Health Organisation & Food and Agriculture Organisation of the United Nations 'Diet, nutrition and the prevention of chronic diseases' April (2002) 72.
- World Health Organisation & Food and Agriculture Organisation of the United Nations 'Human energy requirements: report of a joint FAO/WHO/UNU expert consultation, Rome, Italy, 17–24 October 2001' (2004).

Theses and dissertations

- Unpublished: Grobler, R 'Regulating the environmental impact of factory farming in South Africa: legal perspectives' unpublished Magister Legum dissertation, North-West University (2012).

- Unpublished: Shprintzen, AD 'Abstention to consumption: The development of American vegetarianism' unpublished PhD thesis, Loyola University of Chicago (2011).

Other

- Committee on Economic, Social and Cultural Rights General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12).
- Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration, 1972).
- Resolution 45/94 the United Nations General Assembly.
- Resolution adopted by the General Assembly on 25 September 2015 70/1 'Transforming our world: the 2030 agenda for sustainable development.
- Schedule No. 1/ Part 7/ Section A Health Promotion Levy on Sugary Beverages of Act 14 of 2017.
- United Nations General Assembly: Seventy-third session, High-level Meeting on Climate and Sustainable Development GA/12131 28 March 2019.
- Universal Declaration of Human Rights
- ~~Resolution adopted by the General Assembly on 25 September 2015 70/1 'Transforming our world: the 2030 agenda for sustainable development.~~
-