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Veganism: A Flawed Solution

My mother is a functional medicine physician who treats her patients by examining the root causes of their disease and pain. Her holistic approach seeks to explore the internal and external factors which could be causing harm to a human. In doing so, she has found that the food which we consume is vital for both treating a wide variety of diseases and supporting life-long health. While it may be shocking, patients who come to her already on a vegan diet are often the least healthy. This personal experience of hers is contrary to much of the media rhetoric surrounding veganism. A strict vegan diet excludes consumption of all animal-based products, and many claim that it is a solution to the declining health of Americans and the environment. This conflict between my mother's clinical experience and the media portrayal of veganism calls into question the true impacts of a vegan diet. This paper examines the effects of veganism on health and the environment to portray how it is an unsustainable long-term diet. Thus, a more diverse plant-based diet including animal proteins, also known as a "pegan" diet, is healthier and more environmentally sustainable.

Abstaining from meat has been a dietary choice of people since early times. However, the first modern vegans were established in November of 1944 when Donald Watson met with five other non-dairy vegetarians to further delve into vegetarian diets and lifestyles. The group decided to coin the term "vegan" to replace what had been commonly referred to as "non-dairy

vegetarians" ("History"). These pioneer vegans defined their mission as "[seeking] an end to the use of animals by man for food commodities, work, hunting, vivisection, and by all other uses involving exploitation of animal life by man" ("History"). In the early 2000s, there was a rise in media coverage of the environmentally damaging, unhealthy, and inhumane practices of the United States meat industry. Expository works such as *Fast Food Nation: The Dark Side of the All-American Meal*, a novel published in 2001, and *Food, Inc.,* a documentary released in 2008, displayed the horrors of the meat industry. Increased awareness of American food practices combined with the media coverage of declining human and environmental health led to an increase in the popularity of veganism as it promised a solution to health and environmental problems associated with the meat industry. This rise is displayed by a six-hundred percent increase in the number of American vegans from 2014 to 2017 (Forgrieve). Vegans have chosen to modify their diets to follow the founders of modern veganism to reduce animal suffering, improve their health, and support environmental change. Although this appears to be well reasoned, it is essential to examine veganism's impact on a national and individual level.

The absence of dietary animal protein can cause many vegans to struggle with nutritional deficiencies leading to long term health consequences. A study of adult females in Northwest England found that vegans have a significantly lower intake of the critical micronutrients of vitamin D, vitamin B12, selenium, and iodine when compared to the general population (Fallon, et al. E38). These nutritional deficiencies have also been found in Danish vegans who have statistically significant deficiencies in vitamin A, riboflavin, vitamin B12, vitamin D, iodine, and selenium. In contrast, those consuming an omnivorous diet do not have such deficiencies (Kristensen, et al. 6). Vitamin A deficiency can cause night blindness, dry and scaly skin, and decreased immune health in the respiratory tract, gut, and urinary tract. Furthermore, severe

deficiencies of Vitamin A can lead to cancer in these areas of the body. Riboflavin (B2) has been found to negatively impact the reproduction of intestinal cells leading to malabsorption issues in the gastrointestinal tract. Vitamin B12 deficiency can lead to pernicious anemia, a deadly condition characterized by low red blood cells, and polyneuropathy, a form of nerve damage or disease (Kristensen, et al. 6-7). A deficiency in vitamin D can decrease the body's ability to absorb calcium and phosphorus which can impact bone metabolism. The replacement of mature bone tissue with new bone tissue is a dynamic and vital process to ensure bone health, especially at later stages in life (Gani and How 433). Based on the potential for these micronutrient deficiencies to lead to serious health problems, it is clear that a vegan diet is not sufficient to adequately support optimal human health.

In a vegan diet, soy, corn, and wheat are staple products and are often necessary for vegans to receive adequate daily protein and other macronutrient intakes. As a result, the food industry has begun to create plant-based meat substitutes that provide crucial protein. For example, a recent innovation in vegan alternatives is the Impossible Burger, a soy-based substitute that tastes and bleeds like beef, thus appealing to those focused on making plant-based ethical food choices. Impossible Foods Inc., the producer of the impossible burger, aims to reduce the destructive impact of the meat industry on the environment. However, the production of staple vegan crops like soy is not conducive to sustaining the planet. Insects are vital players in the Earth's ecosystem, and Francisco Sánchez-Bayo, an environmental scientist and ecologist at the University of Sydney, headed a study examining the extinction of insects worldwide and found that "over 40% of insect species are threatened with extinction." The primary drivers of this decline are "habitat loss and conversion to intensive agriculture and urbanization… [which increase] pollution, mainly that by synthetic pesticides and fertilizers" (Sánchez-Bayo and

Wyckhuys 8). Intensive agriculture and synthetic pesticides and fertilizers relate directly to the production of the infamous Impossible Burger and other soy plant-based protein substitutes. According to the United States Department of Agriculture, 94 percent of soybeans in the United States are herbicide-tolerant ("Recent Trends in GE Adoption"). Thus, the soybeans which almost all vegans are consuming are genetically engineered to be resistant to toxic chemicals like Roundup. Clearly, the production of these "eco-friendly" burgers has a more significant environmental cost than initially perceived, as their production eliminates insects that are essential in ecosystems as these insects are food for other organisms, pollinators, and recycle nutrients back into ecosystems.

Veganism does not optimally utilize all of the Earth's land to feed growing populations. The land which is used to produce food is different in its biological make-up; therefore, the assumption that intensive agriculture is environmentally sustainable on all lands is false and actually leads to inefficient and potentially harmful food production. There are three primary types of land: grazing land where animals are raised in open pastures and grass-fed; perennial cropland where longer growth crops are harvested multiple times before they die; and cultivated cropland where vegetables, fruits, and nuts can be produced (Purdy). When examining the land impact of 10 different American diets in the study "Carrying capacity of U.S agricultural land: Ten diet scenarios," the vegan diet was found to be less efficient in food production than a 40 percent omnivorous diet, a 20 percent omnivorous diet, an ovo-lacto-vegetarian diet which includes egg and dairy products, and a lactovegetarian diet which only includes dairy products (Peters, et al. 11). The vegan diet was found to be capable of utilizing approximately 71 percent of the available cropland in the United States and completely fails to use any perennial cropland or grazing land (Peters, et al. 10). While one may assume that decreasing land usage is positive

and will allow vegan food production to flourish in the future, it is important to understand that the lands which vegans currently do not use cannot be utilized for healthy sustainable vegetable production in the future. While open pasture animal grazing utilizes "the largest fraction of land … [they] are often grown on non-arable land. Thus, reducing the most land-intensive products in the diet does not necessarily equate to freeing up land for cultivation" (Peters, et al. 2). Veganism's ability to sustain high levels of food production is contingent on healthy croplands which must yield high amounts of produce. This lack of diversity and ability to expand vegan crop production makes matching increasing food demand associated with the United States and world population growth difficult and unpredictable. If farming techniques are not properly controlled and lands are over-plowed, crops are not properly rotated, or there is a natural disaster, food production would significantly decline and negatively impacting large populations. Also, the impact of herbicides and pesticides on food production is relevant when examining quantities of vegan food production. The use of dangerous chemicals is widespread in the United States, and food production has become dependent on these chemicals to maintain high crop yields ("A Look at Fertilizer and Pesticide Use in the US"). Since vegan food production cannot efficiently or sustainably occur on these differing land types, more pesticides, herbicides, and genetically modified food sources must be utilized to meet demand. If this diet is adopted on a widespread basis, food production could fall below demand, requiring an increase in the production of unhealthy genetically modified foods to match demand.

Veganism is not the solution to improving human and environmental health. However, the meat industry in the United States is also not environmentally sustainable or healthy. Livestock production in the United States is dominated by large corporations that prioritize profits over human and environmental health. The primary environmental impacts which are

associated with the production of meat are greenhouse gas emissions and water usage. Worldwide livestock production accounts for approximately 14.5 percent of the total emissions of these harmful gasses (Grossi et al. 69). Meat production consumes around one-third of all water used for agriculture. According to the Food and Agriculture Organization of the United Nations from 2013 to 2017, the agricultural sector in the United States accounted for 40 percent of overall water withdrawal in the United States. This means that approximately 12 percent of the water used in the United States is for livestock (*AQUASTAT*). While there are many other negative environmental impacts associated with the meat industry, it is important to understand how consuming the meat produced in the United States is damaging to human health.

High consumption of factory-farmed red meat and processed meat is associated with increased rates of cancer and chronic disease. In the United States, 58 percent of U.S meat consumption is red meat and 22 percent is processed (Daniel, et al. 5). Due to the production of mass volumes of meat, these products are more likely to carry dangerous foodborne illnesses. In addition, antibiotics are used aggressively to produce more meat and decrease production time. The use of antibiotics can lead to antibiotic resistance which can lead to the development of deadly human pathogens. (Godfray, et al. 4). The damaging environmental and health effects of the meat industry are apparent and must be addressed fundamentally at a national level. However, to facilitate much-needed change, an initial solution to this problem is one rooted in a diet that promotes long term sustainability and prioritizes human and environmental health.

The diet which best promotes human health and environmental sustainability is the pegan diet. This diet is a mix between a paleo diet and a vegan diet and was crafted by Dr. Mark Hyman, an American physician who is the Head of Strategy and Innovation at Cleveland Clinic's Center for Functional Medicine and is the founder of The UltraWellness Center. The

pegan diet incorporates the benefits of vegan and paleo diets. Paleo dieters eat primarily animal proteins and attempt to follow the pre-agriculture diets of our ancestors. A vegan diet is absent animal product consumption and relies on vegetables, legumes, grains, fruits, soy, nuts, and seeds. The pegan diet combines these two diets but does not split them directly down the middle. The pegan diet consists of 75 percent low glycemic vegetables and fruit, which promote a gradual rise in blood sugar as the food digests. The other 25 percent of the diet consists of naturally and sustainably sourced animal-based protein and healthy fats such as olive oil, coconut oil, and avocados. This diet allows for small portions of low glycemic grains such as black rice, and quinoa. Gluten consumption is limited as it has been shown to cause inflammation, autoimmunity, digestive disorders, and even obesity. Pegans avoid all diary as it is difficult for many to digest, and soy is eliminated from the diet as it is highly processed and genetically modified. The pegan diet calls for natural, organic, grass-fed, and non-genetically modified food to provide the body with an optimal nutritional balance and eliminate non-natural products that are commonplace in our current diets such as chemicals and additives (Gold 17-18).

From an environmental perspective, the pegan diet utilizes the varied types of land to which a vegan diet fails, providing a more sustainable future for food production. An omnivorous diet which is based on consuming 20-40 percent animal meat used between roughly 88% and 97% of available cropland in the United States and makes use of grazing land, perennial cropland, and cultivated cropland (Peters, et al. 10). The ability to utilize more of the available land allows this diet to yield a higher amount of produce. Food production is not currently an issue as the U.S Department of Agriculture estimates that between 30 and 40 percent of the food in the U.S is wasted (“Food Waste FAQs). However, diversifying the sources of food production and land used allows America to match its growing population and food demand

better. By having a more diversified food production system, the United States is better able to adapt to unpredictable environmental events, as the varied food sources on different types of land can provide food if other lands are negatively impacted.

The positive impact of consumer demand drives the environmental benefits of adopting a pegan diet. Pegans focus on eating natural, real foods and seek to eliminate chemicals and highly processed human-made foods. In addition, the diet itself eliminates all processed grains and soy - staple crops in the current American diet, which are predominantly genetically modified and utilize pesticides and herbicides. 94 percent of the soy and 90 percent of the corn produced in the U.S is genetically modified, and, as a result, pesticides and herbicides are sprayed on all of the acres of land which are used to produce these products ("Recent Trends in GE Adoption"). These herbicides and pesticides are often more environmentally damaging than perceived. According to a study headed by Dr. Wasim Aktar, an employee of the Department of Agricultural Chemicals, "pesticide residues are found in soil and air, and in surface and ground water… [it also] poses significant risks to the environment and non-target organisms ranging from beneficial soil microorganisms, to insects, plants, fish, and birds" (Aktar, et al. 8). The study also found that herbicides can be especially problematic and environmentally damaging because of their use in large quantities. The pegan diet eliminates the demand for genetically modified foods such as soy and corn, reducing the use of harmful pesticides and herbicides. This change in food production is vital to maintaining the environment and reducing the damage caused by current pesticide and herbicide use in food production.

Peganism can also reduce and reverse many of the negative impacts of the current meat industry. The pegan diet uses meat products as a complement to a varied plant-based plate which would decrease the demand for mass production of meat in the United States. With a reduction in

demand for meat, water overconsumption and greenhouse gas emissions would reduce. Also, reducing overall meat demand would allow meat production to focus less on volume and more on quality. This is consistent with the pegan focus of only eating meat which is naturally and sustainably sourced. Meat production would ideally become completely grass-fed, allowing meat producers to focus on humane practices that promote optimal grazing of animals. According to the journal, Global Biogeochemical Cycles, "implementing moderate grazing intensity can sequester substantial amounts of atmosphere C[arbon] in grassland soils" (Conant & Paustian 95). By properly grazing animals on open grassland soils, carbon is pulled out of the atmosphere and stored in the soil. Storing carbon in the soil provides vital nutrients for soil fertility, and proper grazing of animals improves the biodiversity of these lands (Conant & Paustian 98). Reduction of meat in the everyday pegan diet drives demand for meat production down while the consumer focus on natural and organically sourced meat will drive the industry to focus on proper grazing and feeding practices.

In addition to the wide range of positive environmental impacts of pegansim, it is also beneficial for human health. While scientific studies are relatively limited, the pegan diet is similar to a Mediterranean diet that prioritizes vegetables, whole grains, and healthy fats with small portions of fish, beans, eggs, poultry, and limited amounts of red meat. A study published in the European Journal of Clinical Nutrition found the Mediterranean diet provides important "vitamins, minerals, antioxidants, fiber, omega-3 fatty acids (from fish) and monounsaturated fatty acids (from olive oil), whose beneficial effects on health have been widely demonstrated" (Sánchez, et al. 364). A different article published in the Oxford journal, BioFactors, pooled together the results of various studies of the Mediterranean diet and found it significantly reduced cardiovascular disease, slightly reduced neurodegenerative diseases such as

Alzheimer's, reduced obesity, and reduced overall mortality (Sofi 336-341). Although pegans avoid dairy products and the Mediterranean diet is more limiting in the consumption of red meat, the total nutrient consumption is similar in both diets. Red meat and dairy have nearly identical nutrient properties, and therefore pegans higher consumption of meat balances out their lack of dairy consumption, especially considering that Mediterranean dairy consumption is relatively low. Ultimately, these studies demonstrate the evident benefits associated with following a pegan diet and improving one's health.

Though veganism appears, particularly through media coverage, to be the one-stop solution to declining health and environmental issues in the United States surrounding meat production, it has many flaws that offset the potential benefits of the diet. Given that vegans no longer consume meat, which contains a variety of pertinent vitamins for human health, many vegans experience significant vitamin deficiencies. Secondly, given that crop demand, when applied to the economics of scale, significantly increases the use of pesticides, many insects face global extinction, thus causing more environmental harm than the benefits associated with veganism. Next, the lack of optimized land use prevents veganism from being a global-scale diet alternative. Unfortunately, the current meat industry, regardless of providing vitamin-rich products, is one of the most environmentally devastating industries on the planet. While no diet is perfect for everyone, peganism offers a general outline of eating habits and consumer choices which can lead to improved human health and drive food production in America to be more environmentally sustainable. It is essential to understand that while the vegan diet is well-intentioned, the media portrayal overemphasized its positive impacts and fails to explore the damaging results of eliminating meat consumption. As consumers, our choices at the market heavily influence food production nationwide; accordingly, all consumers must be informed

about the individual and nationwide impacts of diets that they choose to adopt. The consequences of poorly informed consumer choices can have devastating consequences for everyone. Although the situation may appear to be helpless, as consumers, by being conscious about the actual impacts of our diets we can make the necessary change to create a healthier and more sustainable future.

"I pledge my honor that I have neither received nor provided unauthorized assistance during the completion of this work."

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