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How the Vegan Vs. Non-Vegan Diet Affects Strength Training Athletes

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*HOW THE VEGAN
VS. NON-VEGAN
DIET AFFECTS
STRENGTH
TRAINING
ATHLETES*

Departmental Honors Contracted Thesis Work

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Key words: vegan, athlete, activity level, adequate nutrition, malnourished, macronutrient, micronutrient, deficient

Abstract

Today, there are a myriad of diets for consumers to choose from. Some people chose to follow a diet where they exclude certain foods groups, such as meat, and others choose to consume a diet with no moderation whatsoever. This literature review examines the vegan diet, and one that can be portrayed as a healthy standard diet, to analyze dietary needs of a strength training athlete. This review will not conclude which diet is better, rather, an approach for finding gaps within one's diet, relative to their activity level.

Introduction

The Vegan Vs Non-Vegan Diet

In strength training, individuals choose a variety of diets to approach. For example, some athletes choose to eliminate all animal sources completely, and some follow no restrictions within their diets. Based on preference, people may eliminate certain food groups such as dairy and proteins from animal sources. There are many nutritional needs which need to be met daily and having a diet that provides an abundant amount of vitamins and minerals from food is critical. Regarding this thesis, the focus will be placed on the vegan diet, while comparing it to a traditional diet without strict guidelines. Thus, the reader will be able to understand the comparison between a traditional diet and a vegan diet among strength training athletes and understand the impact of the vegetarian diet on performance. To have a rudimentary understanding of the vegan diet followed by strength training athletes one must understand that the vegan diet is one that excludes any animal products, including eggs and dairy¹. To classify the strength training athlete there will be three tiers of exercise level discussed in the following

paragraphs to compare and understand activity levels of athletes. The tiers are general, moderate, and high-volume intense². The knowledge of these tiers is critical to synthesize an athlete's dietary needs.

This thesis will use three terms within the Dietary References Intakes (RDI) such as Recommended Dietary Allowance (RDA), Adequate Intake (AI), Tolerable Upper Intake Level (UL) to provide knowledge on a plate that meets dietary needs for strength training athletes³. The dietary guidelines such as MyPlate will also be discussed so readers can synthesize the information between the vegan and nonvegan diets. The objective of this thesis is to provide understanding to the connection between strength training athletes who follow a vegan diet.

General Activity

The first measurement of activity in relation to this paper is general activity. General activity can be used as a comparison to what the average American is participating in daily. This level can be defined as anywhere from 30- 40 minutes of exercise daily, about three times per week². Individuals that participate in this activity level generally do not need to worry about energy needs since their caloric intake will not exceed their energy level at this tier of intensity². This level of activity will be used to compare higher intensity athletes to in order to understand energy needs based on energy expenditure.

Moderate Activity

Next, Moderate activity level. This activity level can be defined as a person who is participating in intense exercise over the course of 2-3 hours daily, about five times per week². This is a much higher activity level than general activity, thus it requires more attention from the individual to ensure they are meeting caloric demands². Moderate activity athletes typically expend

600 kcals or more during one exercise regimen². Therefore, it becomes critical for the athlete to know how many calories they are consuming, to ensure they have enough energy.

High-Volume Intense Activity

The last activity level is high-volume intense. This level is defined as 3-6 hours of intense activity daily, 5-6 times per week². These athletes expend anywhere from 600 kcals, to 1,200 kcals per workout regimen². Again, at this level it is critical for an athlete to understand what they are consuming within their diet, to ensure they do not have negative energy balance.

What is a *Healthy* Diet

Introducing MyPlate and Different needs

Many people are faced with choosing a healthy food plate that best fits their individual needs. Luckily, there are many resources that can be utilized at no cost to guide readers on what makes a healthy plate. One of the best-known dietary references is *MyPlate*, a government funded resource that is free to users⁴. MyPlate is a visual that outlines five food groups that need to be met within a person's diet. The sections are Fruits, Vegetables, Dairy, Protein, and Grains⁴. Please refer to Appendix A for a visual of the MyPlate logo and explanations of each category. Each food group has a daily requirement for intake based on factors such as a person's sex, their age, and other underlying factors⁴. The values for each section are outlined below from the MyPlate website.

For fruit, women should consume 1.5-2 cups of fruit daily, whereas men should consume 2-2.5 cups of fruit daily⁴. The fruit can be consumed in frozen, fresh, or 100% fruit juice to make up for this value⁴. As for all sections, if someone is unsure of how to meet their daily values for their sex and age, they can refer to the MyPlate website. For vegetables, women should consume 2-3 cups, and men 3-4 cups of vegetables a day⁴. For grains, women should consume 3-4 ounces

and men 4-5 ounces of grains. Many people are concerned with protein intake, especially regarding strength and weight training. The amounts for protein vary, but at a minimum according to MyPlate, women should consume 5-6.5 ounces daily, and men 6-7 ounces of protein a day⁴. The amounts of protein for athletes will be discussed in the paragraph *Protein*. Finally, dairy. Dairy should be met in the amounts of 3 cups daily for both women and men⁴. For vegans or someone who does not consume dairy, they can opt for a fortified soy product to meet this requirement⁴.

A healthy diet can be defined as one that meets these daily requirements while minimizing consumption of harmful toxins³. Sugar, sodium, saturated fat, and alcohol should be consumed in moderation. With a combination of eating a colorful plate as MyPlate emphasizes, and minimizing harmful toxins to the body, one can consider their diet healthy.

Food Diaries

How Keeping Track Can Keep You on Track

There are several tools that athletes, and people living everyday life can utilize to help maintain their diet. One of the methods used is food diaries. Food diaries are a collection of what a person eats in a day including, breakfast, lunch, and dinner with snacks and drinks are recorded as well ⁵. An example of a food diary template can be found in Appendix B. There are many benefits to keeping a food diary, they help people stay organized and on track with their eating and assists in making efforts to eating the components of MyPlate⁵. The food diary is a great tool since it requires minimal time to record meals, additionally apps for cellular devices have become available to consumers to keep tracking in one place.

Food diaries are beneficial to athletes because they are used as a tool to help maintain body fat and caloric intake³. The food diary works as a resource to calculate calories and

servings from each food group, especially if the athlete is competing on certain days and needs to consume extra calories to ensure ample energy supply³. Furthermore, a vegan can use a food diary to guarantee they meet their minimal amounts of nutrients within MyPlate and making sure they consume enough vitamins and minerals in their diet³. A food diary assists in making connections between a person's diet and dietary needs that need to be met to eliminate the possibility of malnutrition³.

Supplementation vs. Food First Philosophy

A Healthy Plate Over a Pill or Powder

After reviewing the guidelines of MyPlate, a generalized understanding of dietary needs can be understood by the reader. By understanding each category of MyPlate, individuals can recognize that each food group is beneficial and needed within everyone's diet. Although, today, there are many supplements available that provide various amounts of nutrients to consumers. A food first philosophy is a mindset that places food consumption before consuming a supplement to meet dietary needs⁶. Emphasis should be placed on a food first diet for reasons such as, whole foods provide higher nutritional values than supplements, and ingredients must be listed on the nutrition facts label to consumers⁶. As for supplements, they are sold in a number of forms, pills, and powders being most prominent. Emphasis on a diet that places food first is substantial as all foods for consumption need to be approved by the FDA, whereas supplements do not have to meet requirements for all of the ingredients within the supplement to be approved⁶. Therefore, obtaining nutrients from food will be the most beneficial to an athlete, but sometimes supplementation is needed within the vegan diet.

Macronutrients

The Essential Nutrients We Need

The macronutrients are those consumed in larger amounts, and provide most of a human's energy, and will always be consumed in gram amounts². These nutrients include protein, carbohydrates, and lipids². It is essential that an athlete is consuming at the minimum, 500 grams of macronutrients daily³. In the following sections, each macronutrient's function, and consumption amount will be discussed individually.

Protein

The Debated Macronutrient

Proteins are essential and provide many functions within the body. This section will discuss proteins, their functions, and a comparison to plant proteins. Proteins are composed of amino acids². Amino acids in amounts as low as 50, ranging to 200 bind together and function to form proteins². These proteins are then used for many bodily functions. The most relevant to many athletes, forming lean body tissue². Consumption of protein is critical for functions such as blood clotting, hormone production, vision, and transportation within the blood system². Ensuring athletes consume enough protein is critical, along with other nutrients.

Athletes need to consume 1.2-2.0g protein/kg BM/Day to meet adequate intake¹. This can be in any form, such as a protein powder, but emphasizing food first is best. Further explanation can be found in *Supplementation vs. Food First Philosophy* regarding consuming food before supplements.

When many people think of protein, they automatically think of meat. However, the vegan diet is emphasized throughout this paper, therefore this next paragraph will synthesize what foods within the vegan diet provide protein. All of the major food groups have a food that can provide protein³. The major food groups are those identified by MyPlate. These food groups are dairy, vegetables, fruits, proteins, dairy, and grains. Fruits such as bananas and peaches yield

a little over a gram of protein². In the vegetable category, peas, baked potatoes, brussels, and corn top the list, each containing at least four grams². The grain category contains an excellent array of protein such as, quinoa, oatmeal, and whole grain breads². Quinoa yields about 8 grams of protein in a one-cup serving, making it a great option to have with meals². The dairy section has options such as milk and cheeses yielding in an array of amounts². Finally, the protein category of MyPlate can have values met by consumption of nuts such as almonds or peanuts yielding around 7 grams a serving².

High protein foods for Vegans

Example foods to include within the vegan diet

As previously discussed, vegans need to pay close attention to what they are consuming within their diets. It has been concluded that vegans consume less protein than those who follow other diets, therefore protein becomes substantial to their diets as many athletes get their protein through meats such as chicken⁷. The vegan athlete has a myriad of options for protein such as rolled oats, pumpkin seeds, black beans, tofu, and almonds⁷. There are many plant-based proteins that are available that some athletes may opt for. The current protein consumption recommendation for athletes is 1.2-2.0 g protein/kg BM/day². Athletes that train at a higher intensity may need more protein within their diet due to their higher energy expenditure¹. Understanding protein and its importance within the diet becomes critical for the vegan athlete as they may not be getting sufficient amounts of vital nutrients within their diet.

Carbohydrates

An important energy source

Carbohydrates are a macronutrient that provide energy. They can be identified as: monosaccharides, disaccharides, and oligosaccharides². A monosaccharide is one sugar

molecules (glucose), disaccharide is two sugar molecules (sucrose), and a oligosaccharide is a combination of three to nine sugar molecules (complex)². To outline the principal molecules and their respective groups, please refer to Appendix C.

Carbohydrates become an important energy when they are broken down to glucose through the action of the liver storing the unused glucose into glycogen². Digestible carbohydrates consist of disaccharide, and monosaccharide and can be broken down by digestive enzymes and converted into glucose, fructose, and galactose². When glucose is converted to glycogen, it becomes stored in the liver and muscles, and supplies energy to the body². If energy needs are exceeded by the amount of glucose consumed, the monosaccharide then becomes a fatty acid and gets stored as a triglyceride². This process becomes critical understanding to an athlete as they may need to consume more carbohydrates based on their event and energy expenditure.

For athletes that compete in prolonged vigorous activity, they may consider a diet high in carbohydrates³. The RDA for consumption of carbohydrates in the average individual's diet is 130 grams/day. It should be noted this RDA is for brain function, but it the RDA for carbohydrates regardless³. For someone who participates in general activity, their carbohydrate consumption should be higher, 3-5 grams per kilogram of body weight³. Followed by moderate activity consumption of 5-7 grams per kilogram, and high volume intense which may need up to 12 grams per kilogram of body weight³. Athletes should assess their activity level regardless of their diet to ensure they are consuming an adequate amount of carbohydrates.

There are many sources of carbohydrates within the diet. Please refer to Appendix D for a table that outlines foods that can be consumed by both the vegan diet, and a healthy diet that has no exclusions.

Lipids

Lipids are a vital macromolecule to bodily function. Lipids can be classified into fats, oils, and phospholipids⁸. Emphasis is placed on triglycerides in the diet, which are fats and oils⁸. Triglycerides have multiple functions, “triglycerides store energy, provide insulation to cells, and aid in the absorption of fat-soluble vitamins”⁸. Therefore, it is important to consume triglycerides within the diet because they help keep an individual’s cells alive and healthy. The way that phospholipids are arranged function as a protection layer to cells⁸. Meaning, lipids become an important macromolecule when it comes to protecting cells and keeping them healthy.

Micronutrients

The Essential Nutrients we Need

Vitamins and minerals are classified as micronutrients. These amounts are measured in mg and ug, and are supplied in smaller amounts than macronutrients³. There are 13 essential vitamins: A, C, D, E, K, and B vitamins of thiamine, riboflavin, niacin, pantothenic acid, biotin, B₆, B₁₂, and folate³. Each provides a specific and essential function to the human body. The following paragraph addresses fat-soluble and water-soluble vitamins.

The vitamins are distinguished as either water-soluble, and fat-soluble. The water-soluble vitamins dissolve in water, whereas fat-soluble dissolve in fat³. The water-soluble vitamins are the B vitamins, and vitamin C³. Fat-soluble vitamins include vitamins A, D, E, and K³. It is important to understand these terms because the different vitamins are found in different food sources. Water soluble vitamins are supplied mostly by fruits and vegetables, whereas fat soluble are found in dairy products, oils, seeds, and nuts³. Dependent on the type of vegetarian

diet, there may be no consumption of dairy products, therefore the majority of fat-soluble vitamins would need to be consumed through foods such as nuts and seeds.

As for minerals, there are two different categories: major minerals, and trace minerals³. The major minerals are calcium, chloride, magnesium, phosphorus, potassium, sodium, and sulfur, these minerals are consumed in the amount of 100 or more milligrams per day³. The trace minerals are iron, manganese, copper, iodine, zinc, fluoride, and selenium in the amount of 100 milligrams or less³. It is important to understand minerals as well because many minerals are found in dairy products, and meat, therefore impacting a vegan substantially³.

Iron

Heme-Iron Vs Non-Heme

One of the essential nutrients that is consumed by athletes is iron. Iron can be found in various foods in two different forms: Heme and Non-Heme⁹. Heme iron is found in food sources such as meat, poultry, and fish, whereas non-heme iron is found within plants⁹. Heme iron is well absorbed compared to non-heme iron, which has a lower absorption rate⁹. Therefore, regarding the vegan athlete, they need to be conscious of their iron consumption to ensure adequate intake.

Iron deficiencies in vegans

A common deficiency

As discussed previously, vegan athletes need to be conscious of their iron intake. This is because vegans are at a higher risk for iron deficiency than those following a traditional diet¹⁰. Luckily, there are many foods in the vegan diet that supply iron, such as, legumes, nuts, and green leafy vegetables¹⁰. Not all vegans will become deficient iron, but they should be aware of the risk. One of the measures a vegan can take to ensure adequate intake is have their blood drawn for serum ferritin levels¹⁰. This test evaluates blood stores to see if the individual is deficient

in iron. If deficient, a care plan must be formulated to reverse the deficiency. By educating athletes about foods rich in iron, they are able to make the connection between the importance of iron and their diet.

Basic nutrition requirements that need to be met by all athletes

What we need and how much

Regardless of what diet an athlete follows, there are basic daily values that need to be met by all. Individuals should follow the dietary guidelines which encourages variety balance and moderation to understand how much of a specific nutrient should be consumed³. The average human should consume 2,000 calories daily providing ample macronutrients, micronutrients, and water³. Based on an athletes activity level, these numbers could increase. It is critical to consume the correct amount of calories and nutrients so the athlete does not become malnourished, or see a decline in performance.

Male vs Female Nutrition

Gender needs different daily values

Everyone will have different dietary needs, but by understanding basic measures, individuals can prevent deficiencies and malnutrition. The percent of daily value is different among male and female athletes. Each gender has different criterion for what a person should be consuming within their diet. Unfortunately, there are a limited amount of studies that have observed male and female nutrition and if each gender actually meets its RDA, but by the few performed, the RDA for each can be better understood.

Starting with calories, men require more than women¹¹. On average, men who are active at a moderate intensity should be consuming 19-21 calories per pound in bodyweight, whereas moderate intensity females should be consuming 17-19 calories per pound of body weight¹¹.

Although this measurement does not seem like a huge difference, if one were to compare a female weighing 140 pounds, she would need about 2,400 calories daily, whereas a male weighing around 190 pounds would need to consume around 3,900 calories daily. In general, men will need to intake more protein than women as they have a higher amount of muscle mass naturally¹¹. As for fruits, men need about a cup more than women daily⁴.

One of the largest disparities between men and women's dietary needs is the amount of iron consumption. Women need double the daily value of iron than men during her menstrual years¹¹. Women need about 18 milligrams daily, whereas men require 8 milligrams daily¹¹. As previously noted, iron is especially important to the vegan diet, so understanding minimal daily amount is beneficial to individuals and athletes.

In 2015, a twelve-week study was conducted surrounding male and female nutrition, specifically promoting the Mediterranean diet¹². Although this study was conducted in Canada and surrounding their dietary references, it is still relevant to the United States, and overall nutrition needs of male and females. The study concluded that men have a higher metabolic rate than women, thus they need higher amounts of various nutrients¹². In addition, it was also concluded that men are more likely to adapt to an intervention than women, which means they are more likely to follow an implemented diet that helps better meet daily values¹². This information is beneficial to readers as it provides reasoning as to why men need higher amounts of certain values. It is beneficial to both genders and individuals following a healthy diet to understand the differences between male and female nutrition to ensure daily values are being met.

Standard Exercise vs Strength Training

Knowing the difference between the two for a better understanding of dietary needs

There are needs that need to be met by any person regarding exercise which can be used as a baseline when compared to a strength training athlete. It is recommended that any adult participates in 150 minutes of moderate intensity exercise per week¹³. In addition, people should spend minimal time sitting, and be conscious of when their daily routine is becoming sedentary¹³. These measures can be compared to a strength training athlete in the sense they are receiving much more movement than the general requirements based on their workout regime. Athletes expend higher amounts of energy, and therefore can have imbalances, and often need to consume more calories for energy³. This becomes critical as their dietary intakes will need to be elevated based on their activity level and how many calories they are burning while competing or training.

Why Might Someone Choose to Consume a Vegan Diet

Different views may mean different diets

There are several reasons why people may choose the vegan diet, whether it be personal beliefs, or for health reasons. The most common reasons are religious beliefs, sustainability beliefs, perceived health benefits, contamination beliefs, and athletic gain beliefs¹. For example, religions such as Hinduism, Jainism, and Buddhism adopt vegan diets to follow religious structures and beliefs (religion)¹. Several athletes choose veganism because they think it could help them maintain their health and have more natural gains within their competition¹. It is important to note that this paper does not promote or discourage the idea of veganism among competitive athletes.

Various Diets for Strength Training Athletes

Understanding the various vegan diets

Today, vegetarian diets have become a widely adopted way of life. Many athletes have followed these types of diets and have found them to be a great way to maintain their wellness¹.

Vegetarian diets can be broken into many categories, the most popular being Vegan, Lacto-Vegetarian, Ovo-vegetarian, and Lacto-Ovo-Vegetarian¹. Understanding the different types of diets that do not consume meat can help one understand what diet may be best for them.

In the following table, each diet is outlined.

TYPE	ANIMAL FOOD INCLUDED	FOODS EXCLUDED
Semi-vegetarian	Dairy products, eggs, chicken, fish	Red Meats
Pesco-vegetarian	Dairy products, eggs and fish	Beef, Pork, Poultry
<u>Lacto-ovo vegetarian</u>	Dairy products, eggs	Any Animal Flesh
Lacto-vegetarian	Dairy products	Eggs, All Animal Flesh
Ovo-vegetarian	Eggs	Dairy Products and Animal Flesh
Vegan	NONE	All Animal Products
Fruitarian	NONE	All Foods Except Raw Fruits, Nuts, and Green Foliage

Laquale, K. *Vegetarian Slides* (2022).

In comparison, there is the Mediterranean diet. This type of diet will be used to connect male and female health concepts in paragraph, *Male vs Female Nutrition*. The Mediterranean diet originated in the Mediterranean region, and places emphasis on living a life based around physical activity, paired with intuitive eating³. The meals are consumed with a focus on fruits, whole grains, seeds, nuts, legumes, vegetables, with seafood consumed at least twice a week, poultry and eggs every couple day, and yogurt and cheese daily³. The outcomes of this diet

typically yield a longer life, and less risk for chronic illness³. This diet differs from the vegan diets and others as it has a physical activity component, and a model to follow for dieting. By understanding the various diets, readers should be able to make connections between the disparities among each.

How the Vegan Diet Affects a Strength Training Athlete

Observing macronutrients and micronutrients to understand our needs

Aside from the many benefits such as lower BMI and fulfillment of religious beliefs that come to vegan eating, there are also downfalls. If an athlete does not understand their diet, they may find themselves lacking certain nutrients, and even becoming deficient within a certain nutrient¹. It is important to understand that these diets can lead to inadequate amounts of nutrient intake. There are four nutrients vegan athletes may lack: Protein, Vitamin D, calcium, and Vitamin B₁₂¹. This may require the athlete to record what they are eating in a food diary so they can keep track of their protein intakes. This matter was discussed in the *macronutrient* and *micronutrients* sections previously. Examples of high protein foods for vegans can be found in the section *High protein foods for Vegans*. Adequate amounts of calcium intake at 1,200-1,500mg/day is crucial for the athlete¹. To have the correct calcium absorption, adequate amounts of Vitamin D have to be met (About 1,000mg). Then there is, Vitamin B-₁₂ which is prominently found in animal products¹. This makes it difficult for vegan athletes to obtain an adequate intake of Vitamin B₁₂¹. Most athletes have found they need to take a supplement to meet adequate intake¹. Finally, iron, which many athletes have an issue with meeting adequate intakes of Iron, this was previously discussed in *Iron Deficiencies in Vegans*. Knowing the nutrients an athlete lacks is crucial to maintaining overall health within an athlete's diet. Using food diaries and other tracking systems will help the athlete meet adequate nutrient intake.

Whether this is in the form of a supplement, or naturally from food, it is important to meet the daily intake values.

Plant-Based Diets and their Effects on BMI and Body Weight

Do these diets help individuals maintain a healthy body weight?

Various studies have been conducted on vegan diets and body composition. In general, it is concluded that individuals that follow a vegan diet tend to have a lower BMI and weight significantly less than those who do not follow a vegan diet¹⁴. In a study conducted in 2018, measuring the effects of the vegan diet in males and females, vs omnivore diets, it was found that vegans have a lower body weight¹⁴. Furthermore, in a literature review published by the National Library of Medicine, a metanalysis published between 1991-2019 were studied and concluded that individuals who follow a vegan diet have lower body weight than those who do not follow a vegan diet¹⁵.

The BROAD study was published in 2017 and followed groups who were using a whole-food plant diet to reduce obesity and other diseases. The study concluded that consuming a plant-based diet leads to lower BMI and ultimately healthy weight loss¹⁶. It was noted that the outcome could have been affected by an increase in exercise by participants, although there were improvements in BMI regardless of exercise regiments¹⁶.

After participants of the BROAD study consumed a plant-based diet for 12 weeks, it was found there was a decrease in BMI, alongside leaner body mass¹⁶. Some argue this is not surprising since past research has shown that by consuming less meat, body mass becomes leaner¹⁶. By having a leaner body mass, research suggests athletes meet peak performance¹⁷. Therefore, an athlete who wants to achieve a leaner body mass may benefit from consuming a

well-monitored vegan diet. These studies provide important information to vegans as they need to ensure they are within a healthy weight.

Bone Health and the Correlation to Diet

How our diet affects our bones

As discussed, an individual's diet can impact many functions of the body. One of which is bone mass. In a literature review published in 2017, the target question of the association between bone health and dietary patterns were analyzed¹⁸. It was found that in individuals who consume foods rich in nutrients such as manganese, calcium, phosphorous, potassium, iron, folate, B₁₂ and protein have the lowest incident of bone fractures¹⁸. Furthermore, there seems to be correlation between higher bone density in adolescents who consume milk, compared to those who consume more processed food¹⁸.

Contrary, it was concluded that those who consume high levels of processed foods, and high sugar foods and beverages such as candy and soda, were more likely to have poor bone health¹⁸. It is important to note these studies all observed different groups, so the concluded data comes from various types of studies. This review of literature assisted in findings between diet and bone health.

What a Plentiful Meal May look like for a Vegan

Creating a nutrient dense plate

Creating a plate that is nutrient dense is the goal for any individual when preparing a meal. The term nutrient dense means an individual is consuming a meal or food that supplies an abundant amount of nutrients relative to calories³. As discussed previously in, *How the Vegan Diet Affects a Strength Training Athlete*, athletes are more likely to become deficient in nutrients such as Protein, Vitamin D, calcium, and Vitamin B₁₂¹. Many people that are in the

contemplation phase of switching to a vegan diet are highly concerned about how they will meet their nutrient intake¹⁷. Therefore, it is often critical for a vegan to consume foods and meals high in nutrients such as calcium, protein, Vitamin D, and B₁₂. Please refer to Appendix E for examples of nutrient dense meals for a vegan. It is important to note there are many other possibilities, but Appendix E is a great example.

Can I afford the Vegan Diet?

People think they cannot afford different diets

Often, people are discouraged from changing their diets because they do not want to change their budget. Although, eating a vegan diet vs a nonrestrictive diet is comparable in price. In fact, it is often cheaper since meat comes with a price tag¹⁹. In a study from the Journal of Hunger & Environmental Nutrition, it was found that consumers save just over 700 dollars annually from consuming a plant-based diet¹⁹. The study compared a plant-based diet, and one including meat, both totaling 2,000 calories and concluded that the plant-based diet is cheaper. Many may find this surprising as the stigma is that plant-based diets are consumed by those that can afford them but turns out that most can afford either diet¹⁹.

The Strength Training Athlete Connection

The Big Picture

After discussing the various types of diets and different activity levels, the knowledge can be applied to strength training athletes. As discussed, there are multiple activity levels, and types of activity that classifies the strength training athlete. By educating any athlete on the macronutrients and micronutrients in correspondence with MyPlate, strength training athletes have a better idea of what they need to consume within their diet. Alongside, they may even explore different diets such as the vegan diet for its perceived benefits. By understanding the

different methods such as creating a food diary, and learning the RDA's, athletes can make better choices to assist their performance. Some athletes may not be able to make the connection that their diet may reflect their performance, therefore consuming a diet that provides ample nutrients from all the food groups becomes important.

Strength training athletes need to ensure they do not become deficient in a nutrient as well, because it may have effect on performance¹. Athletes must understand that proper nutrition is correlated to performance⁶. If an athlete thinks they may have gaps within their diet, they can utilize an athletic trainer at their facility to get the information they may need⁶. To assist the athlete in proper nutrition, the food first philosophy should be exhausted before applying supplementation⁶. The bottom line is, athletes must be aware of their nutritional intakes to better satisfy performance needs.

Athletes and Their Vegan Diet Experiences

One's Success May Inspire Another's Victory

Often times when people are in the contemplation phase, they want to see how other people have reacted to the change they want to make. It should be noted there are many athletes at the competitive level that have found success in consuming a vegan diet while training. There are hundreds of successful athletes, both male and female, who practice veganism in multiple sports. Some bodybuilding, others in competitive endurance sports.

One of the most notable vegan athletes is Patrik Baboumian, a successful bodybuilder who has broken world records²⁰. Baboumian has competed in multiple strength training events while promoting veganism, thanking his diet for his success. Another successful athlete, Laura Klein has concluded her diet supports her success in the duathlon, an event which requires

incredible endurance and intense strength training²⁰. Both athletes prove that the vegan diet can provide success when consumed correctly and carefully.

To the contrary, many people think popular Superbowl Champion, Tom Brady consumes a vegan diet, although this is not entirely true. Brady consumes a colorful plate, but it is actually, eighty percent plant-focused, and consuming meat in the other twenty percent¹⁸. Tom Brady has advertised his success through his brand TB12, and many have become intrigued by his diet and workout regimen, which could perhaps inspire some.

Case Study

Observing Activity Level to Understand the Vegan Diet

The below case study was written by Kelsey Craig, Guided by reference 2 and Dr. Laquale

Colin is a 21-year-old male collegiate wrestler who has recently switched to the vegan diet. He weighs 180 pounds and currently consumes 2300 calories daily from the schools dining hall. Colin practices 5 times a week (M-F) from 6pm-8pm and states during practice they participate in cardio exercises and wrestling maneuvers, but it varies daily. Colin states he has been feeling more fatigued since switching to the vegan diet and has a feeling it may be because he is unsure about what he should be eating, and how many calories he needs. He has provided his sample meal plan below.

Colins Meal Plan:

Breakfast (8am)	2 Vegan pancakes with ¼ cup of home fries and 2 tablespoons of sugar free syrup
Snack (11 am)	1 Bag of Cape Cod Original Chips (portion sized)
Lunch (1pm)	Peanut Butter and jelly sandwich with 1 cup of veggie sticks and an apple

Snack (3pm)	½ cup of trail mix
Dinner (5pm)	Pasta with salt and pepper and a sliced fresh pepper with a slice of white bread

What Colin's Diet is Missing

Colins diet is lacking nutrient dense foods, and an ample amount of snacks that provide nutrients opposed to empty calories. The reason Colin may be feelings fatigued is due to the lack of calories he is consuming. Colins activity level is high-volume intense, therefore he should be consuming about 3,600 calories/ daily. He needs to find foods to fulfill his caloric needs, that are also nutrient dense to improve his performance. By making these changes, Colin should see an improvement in performance, and feel less fatigued. A sample meal plan has been created and shown below.

Breakfast (8am)	2 slices whole wheat toast topped with 1 teaspoon of avocado, and tomato paired with a banana with 1 teaspoon of almond butter Drink: 8 ounces of Oat milk with one scoop of pea protein powder
Snack (11 am)	Hummus with celery sticks and one fig newton bar
Lunch (1pm)	1 cup of tofu, 1 cup of vegetables, vegan cheese, and whole grain rice
Snack (3pm)	½ cup of trail mix, and an orange
Dinner (5pm)	Spinach salad with vegetarian meatballs and chickpea pasta with a sliced apple
Snack (After practice)	12 ounce Fruit smoothie with ½ cup of oat milk and a portion sized bag of cashews

Total Calories: 3,600

How the Diets Compare

Concluding the Above

After researching the effects of the vegan vs non vegan diet, it is conclusive that each diet is just as beneficial, or harmful as the other. The mechanics break down that with a well monitored, plentiful diet, an athlete should be able to reach their full potential. Regardless of diet, athletes need to be responsible for their intake values to confirm they are achieving their highest performance potential. Whether it be through a diet such as the vegan diet where meat and dairy are excluded, or through a plentiful diet where meat is included, athletes should be aware of what nutrients they may be lacking. By taking responsibility of one's diet, an athlete can expect maximal performance, regardless of what diet they choose to consume.

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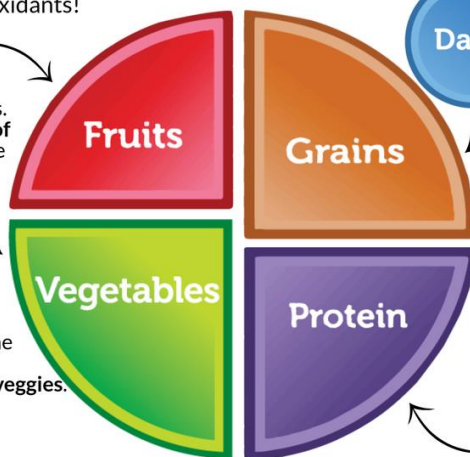
Appendix A

MyPlate: A Guide

Make half your plate fruits and veggies. They're packed with fiber & antioxidants!

Fruit:
Eat fruits of all colors. Go for **fruit instead of juice**, which has more fiber and fewer calories.

Vegetables:
The more colors and types that you eat, the better! Aim to get mostly **non-starchy veggies**.



Dairy:

3 servings per day gets you the calcium you need. Choose low-fat for fewer calories.

Grains:

Eat mostly **whole grains**. Refined grains, like white bread and white rice, have less nutrition. Whole grains have more **fiber**, iron, and B vitamins.

Protein:

A palm-sized amount at lunch and dinner is all you need. Beans, nuts, fish, and chicken are good, lean choices.

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Appendix B

My Food Diary

Date:

Monday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Tuesday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Wednesday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Thursday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Friday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Saturday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Sunday	
Breakfast	
Snack	
Lunch	
Snack	
Dinner	
Snack	

Notes:

Learn more at https://www.cdc.gov/healthyweight/losing_weight/eating_habits.html



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Appendix C

Table 5-1 Classes of Carbohydrates

Class	Principle Examples
Monosaccharides (one sugar molecules)	Glucose, fructose, galactose
Disaccharides (two sugar molecules)	Sucrose Maltose Lactose
Oligosaccharides (three to nine sugar molecules)	Inulin, fructo-oligosaccharides, raffinose, stachyose, and verbacose
Starch polysaccharides (more than nine sugar molecules) Broken down by digestive enzymes to produce glucose.	Amylose, amylopectin
Nonstarch polysaccharides (more than nine sugar molecules) Not digested in small intestine.	Cellulose, hemicelluloses, pectins, and gums
Polyols (sugar alcohols)	Erythritol, maltitol, mannitol, polydextrose, sorbitol, xylitol

Mangels, R., Messina, V., Messina, M. (2022). *The Dietician's Guide to Vegetarian Diets* (4th ed.). : Jones and Bartlett Learning.

Appendix D

Table 5-2 Total Carbohydrate Content of Selected Plant Foods

Food	Carbohydrates in Grams
Legumes	
Cooked dried beans, ½ cup	18–22
Edamame spaghetti, 1 serving	20
Boca Burger Chik'n patty	14
Edamame, ½ cup	10
Tempeh, 4 oz	8.6
Peanut butter, 2 Tbsp	6.8
Boca Burger Original	6
Firm tofu, 4 oz	4.3
Lupini beans, ¼ cup	3
Soy protein powder 1 oz	0.5
Nuts and Seeds	
Cashews, ¼ cup	8.6
Almonds, ¼ cup	6
Walnuts, ¼ cup	4
Sunflower seeds, 2 Tbsp	3.5
Flaxseed, ground, 1 Tbsp	2.5
Fruits	
Banana	27
Orange	15
Strawberries, halves, 1 cup	12

Mangels, R., Messina, V., Messina, M. (2022). *The Dietician's Guide to Vegetarian Diets* (4th ed.). : Jones and Bartlett Learning.

Appendix E

Breakfast	Rolled oats with fresh fruit topping
Lunch	Salad with carrots, cucumbers, and black beans
Dinner	Pasta with tomato sauce and a side salad
Snacks	Carrots and Hummus, nuts, plant-based protein drink

Craig, K. 2022