



THE NASM GUIDE TO

PROTEIN INTAKE FOR VEGAN DIETS



Contents

Welcome	1
About NASM	2
Getting the Most From This Guide	2
Introduction	3
What Is Protein and Why Is It Important?	3
Vegan Diets and Protein Intake	4
Plant-Based Protein vs. Animal-Based Protein	6
Complementary Proteins	8
Plant-Based Protein Sources	9
Protein Intake for Weight Loss on a Vegan Diet	10
Protein Intake for Active Vegans and Vegan Athletes	12
Protein Requirements Across Sports	12
Conclusion	14
What You Can Do Now	15
Online Resources	15
References	16

Disclaimer

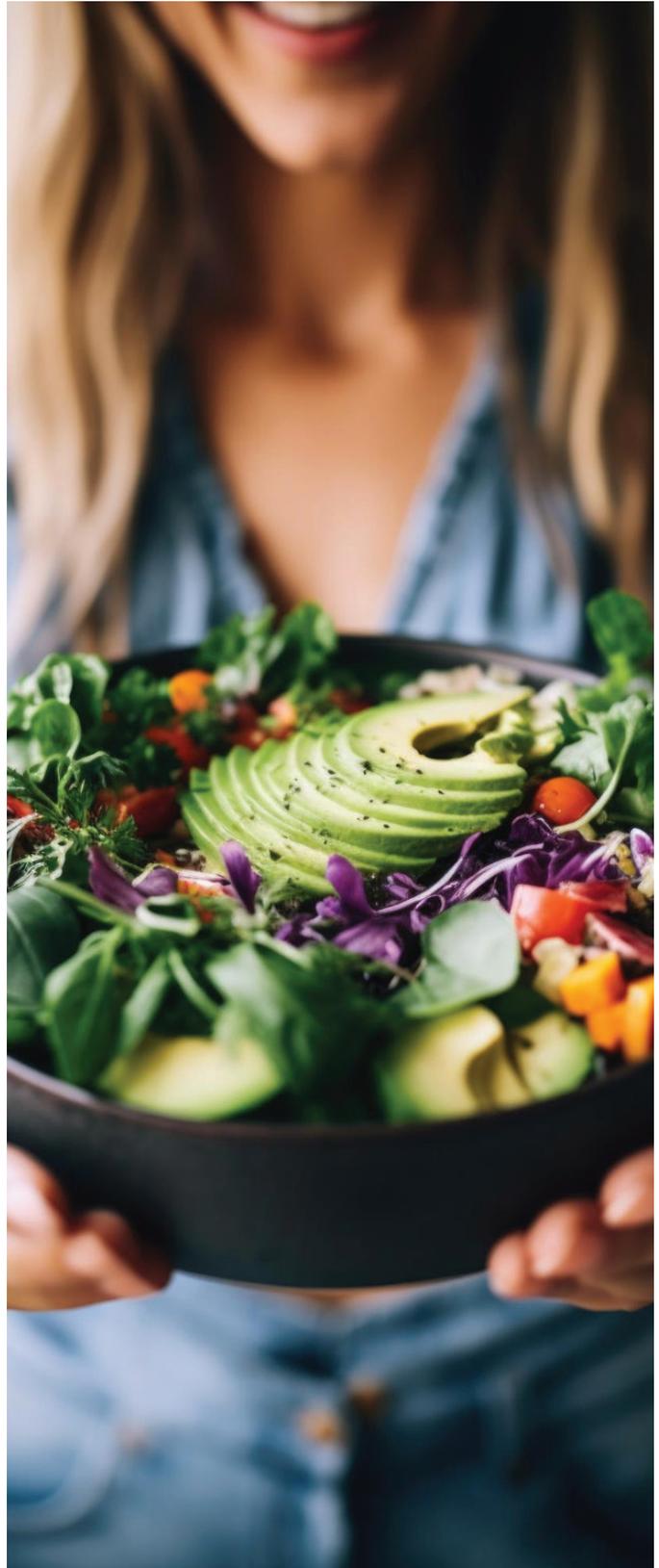
The content in this guide is intended to be used for informational purposes only. It is not to be used to diagnose or treat any medical condition or disease, and not to replace guidance from licensed healthcare provider.

Welcome!

I am excited that you are here and that you are interested in learning about protein intake for individuals who follow a vegan diet. While this guide will primarily focus on vegan diets, it can apply to other plant-based diets such as vegetarian diets and even pescatarian and lacto-ovo-vegetarian diets, as most of the core principles and concepts span all plant-based diets.

Plant-based diets, including vegan diets, have a lot of benefits and are great tools to consider using for specific periods of life or even for extended periods. However, there can be downsides whenever you follow a diet that restricts entire groups of food. One of the biggest issues you might run into if you choose to follow a vegan diet is that you might not be consuming enough protein or you might not be consuming enough of the right types of protein to ensure you are maximizing your health and results. In fact, if you choose to follow a vegan diet, you are likely to consume about 30% less protein than someone who consumes an omnivorous diet.

This guide is focused on helping you develop an understanding of how to think about protein intake while following a vegan diet. We hope that after reviewing this guide, you take away useful concepts, powerful tools, and feel empowered to be successful following a vegan diet. We are thankful you are here and are excited to go on this journey with you.



About NASM

The National Academy of Sports Medicine is the leader in educating and credentialing fitness, wellness, and performance professionals across the globe. We provide valid, up-to-date content on topics that improve the health and well-being of those they serve. We pride ourselves on creating content you can apply right away. Learn more about us at www.nasm.org, your favorite social media platform, or wherever you listen to podcasts.

Getting the Most from This Guide

This Guide to Protein Intake for Vegan Diets will walk you through information explaining a little bit of the “why” behind the “how”. We’ll make sense of the information out there, so you don’t have to. Then, we’ll give you some key takeaways and actionable steps to apply whenever you like.

The purpose of this guide is to help you understand the importance of protein for your body and your overall health, and to understand protein in the context of a vegan diet. This guide will also give you evidence-based recommendations on protein targets and strategies to help you meet your protein needs. While this guide will provide you with a solid foundation, there will be some topics that serve as a springboard to more in-depth learning options and guide you toward additional resources.

Come back and use the information as a reference any time. Be sure to use the key takeaways and application strategies in whatever way makes sense for you. Don’t feel obligated to put *everything* into action right away. When you’re ready for a deeper dive into the topic, check out our recommended resources.



Introduction

Plant-based diets have been part of human culture for millennia and are often utilized as tools to help people lose weight, reduce the risk of chronic disease, and eat in a way that aligns with their personal views on food. Veganism is one form of plant-based dieting that many people choose to follow, which requires the restriction of all animal foods, including animal by-products such as eggs, cheese, and milk.



Vegan diets have been utilized as effective tools to help people manage their weight, reduce overall disease risk, and increase feelings of vitality. However, one of the primary concerns that healthcare practitioners, health and fitness professionals, and individuals who follow a vegan diet have about vegan diets is surrounding protein intake, or lack thereof, when following a vegan diet. Research over the last several decades has provided a lot of clarity around protein intake for individuals following a vegan diet and this guide will discuss the major topics surrounding this issue.

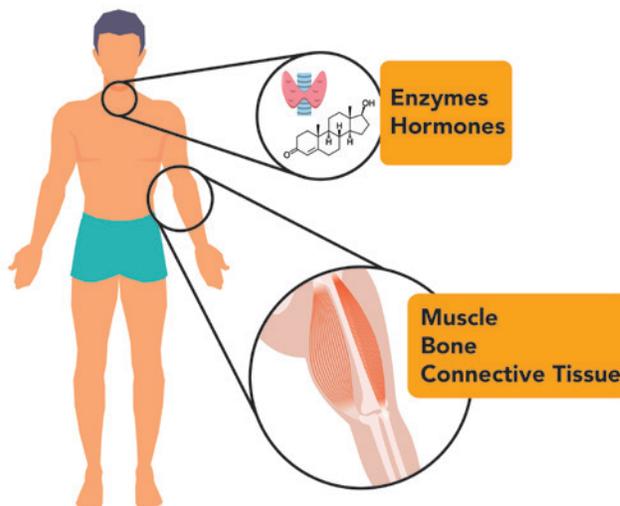
What Is Protein and Why Is It Important?

Protein is one of the three macronutrients, alongside carbohydrates and fats. All three macronutrients provide energy in the form of calories, but protein serves very different roles in your body compared to carbohydrates and fats. While the primary role of fats and carbohydrates is to provide energy, protein is used primarily to create structures in the form of muscles, bone, and connective tissue, as well as creating key molecules like enzymes and hormones.

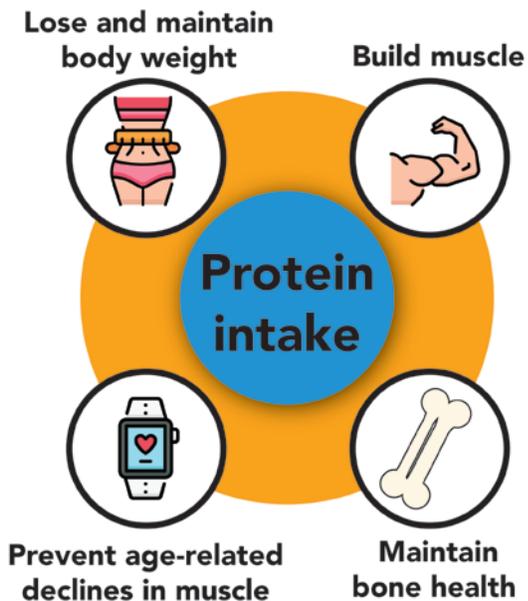
Protein intake is considered one of the major nutritional levers that people can use to lose and maintain body weight, build muscle, prevent age-related declines in muscle, and maintain bone health over the lifespan. Insufficient protein intake can increase the risk of weight gain, age-related sarcopenia, and might be a contributing factor to age-related osteopenia and osteoporosis. As

such, ensuring you meet your protein intake is an important part of an overall healthful dietary pattern.

How The Body Uses The Protein You Intake



Potential Benefits of Adequate Protein Intake



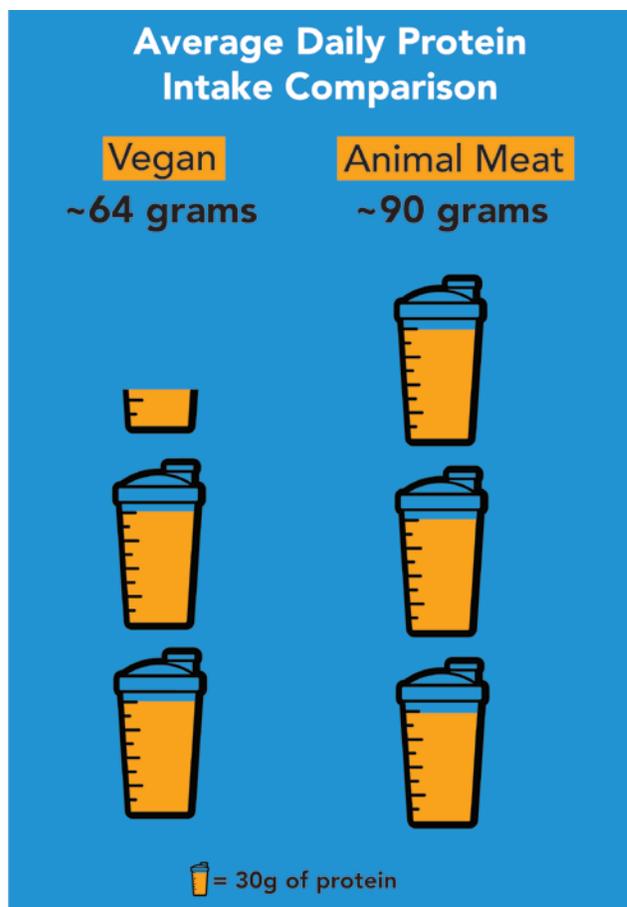
individuals who follow a vegan diet consume ~64 grams of protein per day, compared to meat eaters who consume ~90 grams per day.

The recommended daily allowance (RDA), which represents the number in which 97.5% of adults meet their daily nutritional needs, suggests that the average adult needs ~10% of the calories per day from protein, or roughly 0.8 g/kg per day. This means that the average adult following a vegan diet is likely consuming adequate protein intake to cover their minimal nutritional needs. **Table: Average Protein Intake by Dietary Status** compares protein intake of individuals following a vegan diet compared to other dietary patterns (Sobiecki et al., 2016). However, despite meeting the requirements, it is important to note that on average, if you follow a vegan diet, you consume ~0.3 g/kg less protein per day than your omnivorous counterparts.

Vegan Diets and Protein Intake

The ideal protein intake across all populations has not been clearly defined because protein needs vary person-to-person based on body size, age, physical activity, and overall health. However, despite there being no exact optimal intake, there is a lot of information on how vegan diets compare to other diets in terms of protein intake, which can help us understand how vegan diets stack up in the nutrition world.

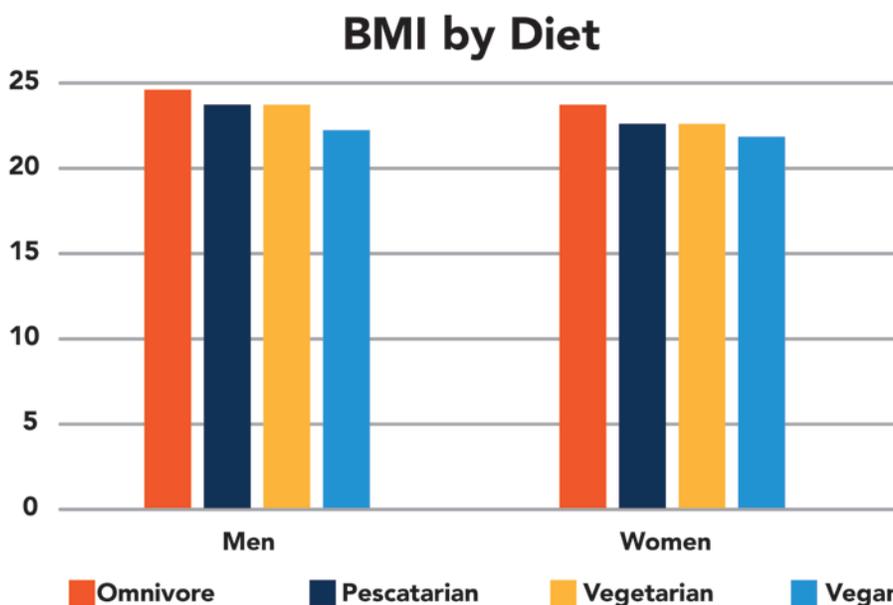
Generally speaking, people who follow a vegan diet consume less protein than individuals who follow diets that contain animal meats or animal by-products. On average, individuals who follow a vegan diet consume ~13% of their total daily energy intake from protein, which compares to ~16% for individuals who consume animal meat. When we translate this to absolute amounts of protein consumed, this means that, on average,



Average Protein Intake by Dietary Status				
	Vegans	Lacto-Ovo-Vegetarians	Pescatarians	Omnivores
Protein Intake (g)	64	70	79	90
Body Weight (kg)	64	67	67	70
Protein (g/kg Body Weight)	0.99	1.04	1.17	1.28
RDA	0.8	0.8	0.8	0.8

This table indicates that although individuals who follow a vegan diet might have a lower protein intake compared to individuals who follow an omnivorous diet, the average, sedentary individual can meet their daily protein intake following a vegan diet. However, as we will discuss later, some individuals like athletes have higher protein requirements and might have trouble meeting protein requirements following a vegan diet.

There are a couple key pieces of information above that you should note about protein intake and vegans. The first is that people on a vegan diet often weigh less than their omnivorous counterparts (Spencer et al., 2003). As noted in the table above, individuals on vegan diets weigh about 6 kg less. The second is that protein requirements are generally labeled in grams per kilogram since protein requirements are based on total body mass. This means if you follow a vegan diet for extended periods of time, your protein intake and requirements will be lower not only due to the lower protein density of your diet, but also because your body weight is ~8 to 10% less.



Spencer et al. 2003

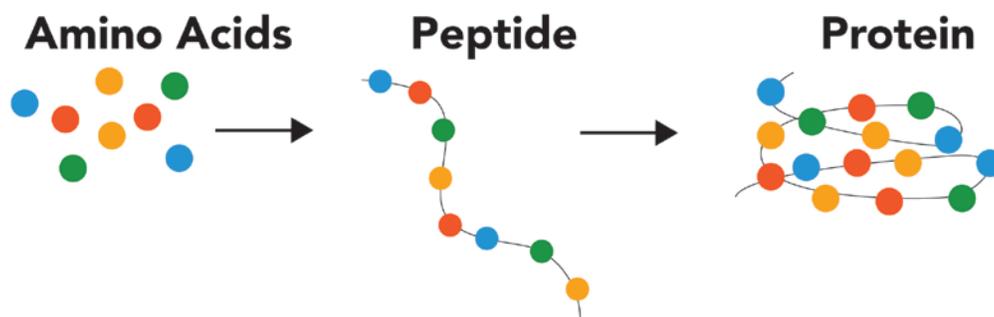
Plant-Based Protein vs. Animal-Based Protein

One of the most interesting things that we have learned over the past several decades in nutrition science is that not all dietary sources of protein are created equal. And it turns out, one of the most clear ways to categorize sources of protein is by whether they are animal proteins (e.g., meat, eggs, dairy, cheese) or plant proteins (e.g., grains, beans, nuts, seeds). The reason that proteins can be separated into animal proteins versus plant proteins is based on a concept called a complete amino acid profile.

All proteins are made up of individual building blocks called amino acids. These amino acids are the things that matter in proteins and are the components that our body uses to create muscle, bone, skin, hormones, and enzymes. For example, collagen is a structural protein that is important

in our skin, tendons, and ligaments, and consists primarily of the amino acids, glycine and proline. The best way to think about protein is that when we eat proteins in our food, we are consuming amino acids.

Different types of foods contain different amino acids and often in different ratios. Animal sources of protein often contain different amino acid profiles and ratios than plant sources. Take the example of collagen. When you consume animal proteins, they often contain collagen proteins, especially foods like skin-on chicken thighs, which makes those food sources much higher in amino acids like glycine and proline. Compare this to when you consume a plant-based protein source like beans, which are higher in amino acids like lysine, leucine, and phenylalanine.



DIGGING DEEPER ON AMINO ACIDS

Amino acids are considered the building blocks of proteins. These are molecules that each have individual functions but combine together to form larger protein molecules that eventually become enzymes, hormones, and even muscle. Amino acids can be thought of as individual Lego blocks that combine in a certain order and format to make a bigger structure.

There are 20 amino acids in the human body. As it turns out, there are some amino acids that our body can make for itself, but we are unable to make all of them. This means that there are some amino acids that we have to consume in our diet in order to have our body function properly. This is where the concept of essential amino acids (meaning we have to eat them because our body cannot make them) and non-essential amino acids (meaning we can make them ourselves and do not have to eat them) comes from, and it serves as the basis by which animal and plant proteins are separated.

Essential and Nonessential Amino Acids	
Essential Amino Acids	Nonessential Amino Acids
Phenylalanine	Alanine
Valine	Arginine
Threonine	Asparagine
Tryptophan	Aspartic Acid
Isoleucine	Glutamic Acid
Methionine	Serine
Histidine	Cysteine
Lysine	Glutamine
Leucine	Glycine
	Proline
	Tyrosine

It turns out that basically all animal sources of protein contain all of the essential amino acids, whereas almost all plant sources of protein are missing at least one of the essential amino acids. Protein sources that contain all essential amino acids, like animal protein sources, are called complete proteins, whereas protein sources that are missing one or more essential amino acids, like most plant protein sources, are called incomplete proteins. If your diet, in totality, is missing one or more essential amino acids, you can end up with a condition called amino acid deficiency. Amino acid deficiency can result in lowered immune function, depression, slowed growth in children, digestive issues, and a host of other medical conditions.

This concept is one of the primary focal points for protein intake among people who adopt a vegan diet. With rare exception, the protein sources that make up vegan diets are all considered incomplete proteins. However, as you learned, different foods have different amino acid profiles. This means that

if you follow a vegan diet, you do not necessarily have to consume animal proteins to get all the necessary amino acids; you just need to pay closer attention to the specific protein sources and the amino acid profiles you consume in order to meet your amino acid requirements.

DIGGING DEEPER ON COMPLETE AND INCOMPLETE PROTEINS

Another term used for these concepts are “high biological value” and “low biological value” proteins. Complete proteins are considered high biological value proteins and incomplete proteins are considered low biological value proteins. Also, there are some plant sources of protein that are in fact complete protein sources.

Plant Sources of Complete Proteins



Quinoa



Soy



Buckwheat



Spirulina



Chia seed



Hemp



Tempeh



Amaranth

Complementary Proteins

One of the ways that individuals who follow a vegan diet can ensure they are consuming enough essential amino acids is through the concept of complementary proteins. This approach simply means to consume two different sources of protein in a given meal or day to ensure that you are consuming all of the essential amino acids to make your food sources considered complete. While this might sound complicated and like a lot of work, it actually is relatively simple to do. Most classes of plant-based protein sources have a well-known amino acid profile and it is relatively easy to find a complementary source. **Table: Food Types and Their Amino Acid Complements** shows a breakdown of the primary sources of plant-based proteins, their amino acid limitations, and how to complement them. When you add the complementary food source along with the original food source, you have effectively created a complete protein source.

Food Types and Their Amino Acid Complements

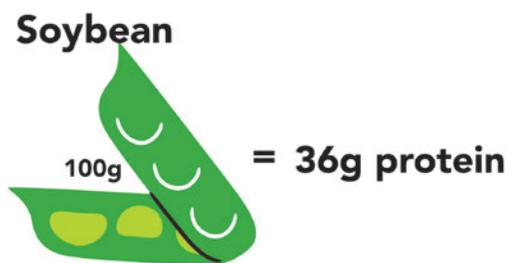
Food	Food To Complement With	Missing Amino Acid
Legumes (Beans)	Grains, nuts, seeds	Methionine
Nuts/Seeds	Legumes	Lysine
Grains	Legumes	Lysine, threonine

For decades, it was believed that in order for the idea of complementary protein intake to be effective, the foods had to be consumed in the same meal. However, research over the last several decades has shown that consuming complementary amino acid profiles across the course of a day is sufficient, making it much easier for individuals who follow a vegan diet to hit their amino acid requirements (Venderley & Campbell, 2006).

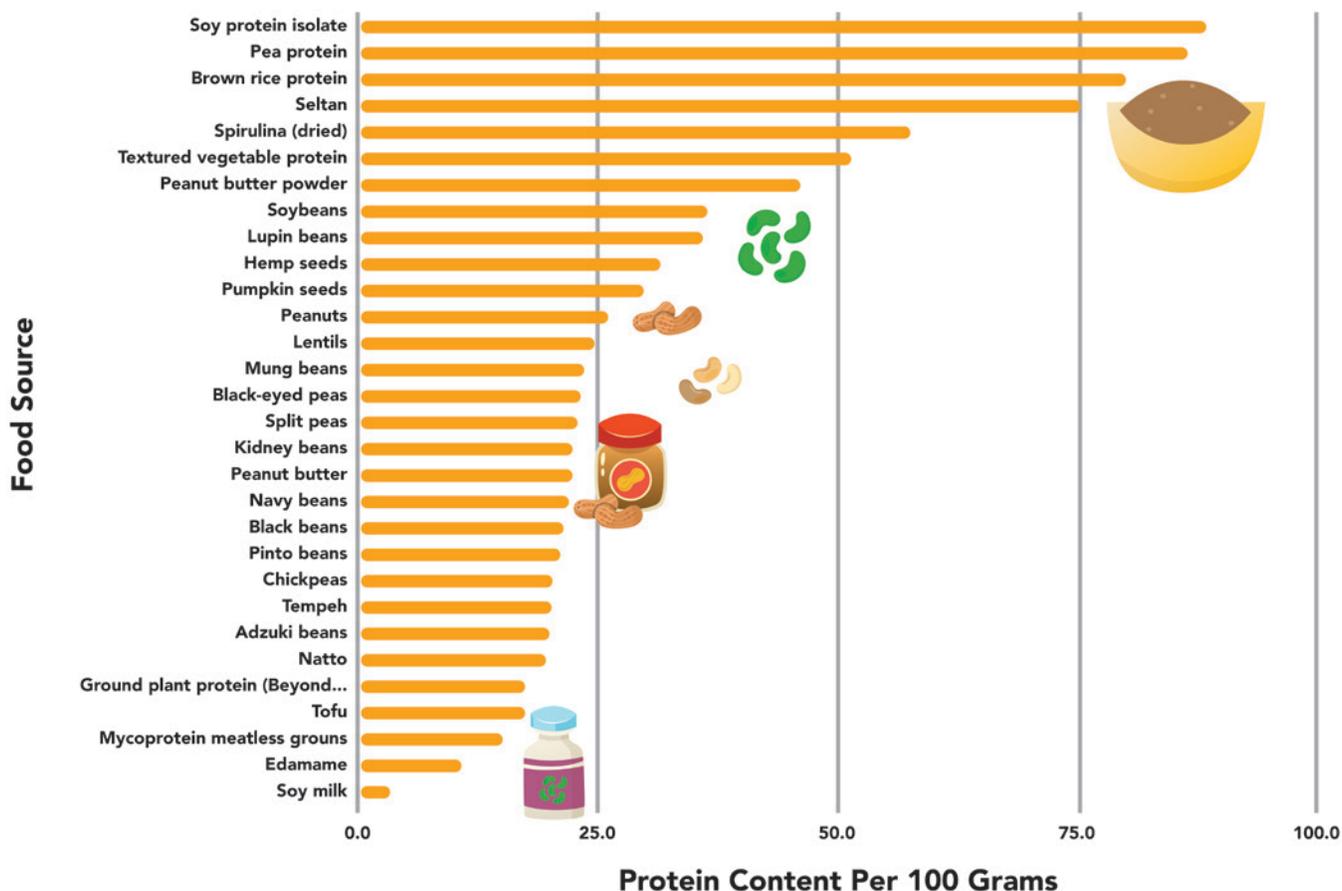
It has often been stated that due to the fact that plant-based proteins are considered incomplete, they are often considered lower in biological value and provide less overall value than animal proteins. This has led to the idea that individuals who follow a vegan diet might actually require a higher total protein amount than individuals who consume the same amount of animal protein. However, this has not been proven in the scientific literature and currently remains mostly speculation (Campbell et al., 2007; Mariotti & Gardner, 2019). In fact, protein intake requirements appear to be the same among people following vegan diets in western civilizations or among people who have a diet higher in cereals and legumes (Agnoli et al., 2017; “Protein and Amino Acid Requirements in Human Nutrition,” 2007).

Plant-Based Protein Sources

While most plant foods are not considered as primary protein sources, there are a lot of plant foods that contain meaningful amounts of protein, and in some cases might have higher protein content than some animal foods. For example, foods like soybeans have 36 grams of protein per 100 grams, which compares with 12 grams of protein to 100 grams for eggs. Also, foods like hemp seeds, pumpkin seeds, almonds, lentils, and kidney beans all boast protein content higher than foods like eggs. This makes it possible to meet your daily protein intake from plant-based foods alone.



Plant-Based Foods Sources and Protein Content Comparison



Protein Intake for Weight Loss on a Vegan Diet

Vegan diets have been shown to be especially effective for weight loss. The primary reason they work so well is because they are often lower in calories than most other dietary approaches. This is most often due to the fact that vegan diets consist of foods that have lower energy density and are often more satiating per calorie because of higher fiber and water content, such as fruits, vegetables, beans, and tubers. A dietary pattern like this can make controlling calories much easier than alternative diets that contain foods that have high energy density and low satiety.

While weight loss is considered a benefit among people who carry extra body weight and body fat, not all weight loss is created equal. When you lose body weight, the weight can come either from your fat mass or your lean body mass, which is made up of muscle mass, bone mass, and your organs. Generally speaking, the goal with weight loss is to ensure as much of the weight loss occurs from your fat mass as possible and to reduce the amount of lean mass lost as much as possible. There are several

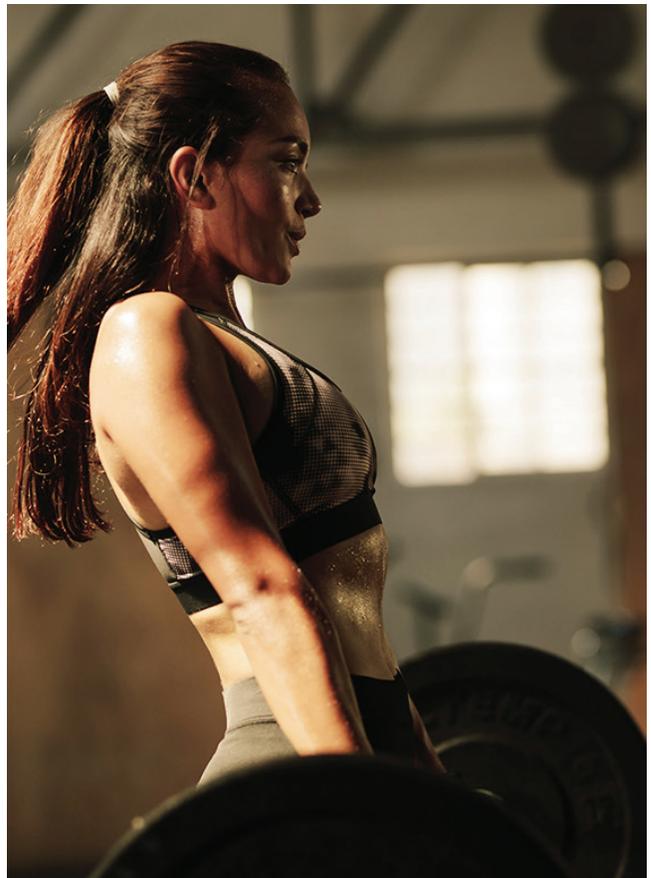
reasons for this. The first is that your lean mass is generally more metabolically active, meaning that when you lose your lean mass, you burn less calories after the weight loss is over than if you lose only your fat mass. The second is that when you lose your lean mass, you lower your bone density and your skeletal muscle, which reduces your quality of life and ability to be physically active, especially as you age. This means that if your lean mass is not preserved during weight loss, it makes reaching and sustaining weight loss much harder over time.



During weight loss, protein intake is important for ensuring your lean body mass is maintained. As mentioned earlier, dietary protein intake for individuals who follow a vegan diet is lower than other diets, so it is important to understand how a vegan dietary pattern might affect lean body mass loss during periods of weight loss. Research has found that although vegan diets can be highly effective for weight loss, in general they are often less effective for sustaining lean body mass than other diets that are higher in protein intake. For example, after 16 weeks of a weight-loss-focused

diet, individuals who followed a vegan diet lost ~2 kg (roughly 4 ½ pounds) more lean body mass than individuals who followed an omnivorous diet (Barnard et al., 2022). However, not all studies have shown this to be the case, and vegan diets that are higher in total protein content or that include resistance training in conjunction with diet might help minimize lean body mass loss during periods of weight loss (Bloomer et al., 2015).

There are two primary ways to reduce the risk of lean body mass loss during periods of weight loss while following a vegan diet. The first is to aim for protein intake above the RDA and reach ~1.2-1.8 g/kg per day (Leidy et al., 2007, 2015). The second is to engage in resistance training exercise (Bellicha et al., 2021; Leidy et al., 2015). Both of these factors have been shown to help reduce lean body mass loss during periods of diet-induced weight loss.



Protein Intake for Active Vegans and Vegan Athletes

If you are physically active, engage in recreational sports, or consider yourself an athlete, your protein requirements as a vegan differ from someone who is sedentary. This is because people who are physically active, engage in regular exercise, or are considered athletes have a higher protein requirement than their sedentary counterparts. This is true across all diet types, not just for people who follow vegan diets.



The recommended daily allowance (RDA) for non-exercising adults is 0.8 g/kg per day, which is estimated to meet the needs of 97.5% of healthy adult men and women (Campbell et al., 2007). However, this amount is not considered sufficient

for athletes or adults who engage in regular exercise. Protein recommendations for physically active individuals can range from 1.4 g/kg to 2.0 g/kg per day, depending primarily on the specific type of exercise and, to some extent, the total amount of exercise performed. If you engage in ~3 to 7 hours of moderate to vigorous activity per week, such as going to the gym or engaging in recreational sports, you fall in the lower end of the range at ~1.4 to 1.6 g/kg per day. If you engage in 7 or more hours of moderate to vigorous activity per week, or you engage in very heavy resistance training, you fall at the higher end of the range at ~1.8 to 2.0 g/kg per day.

Protein Requirements Across Sports

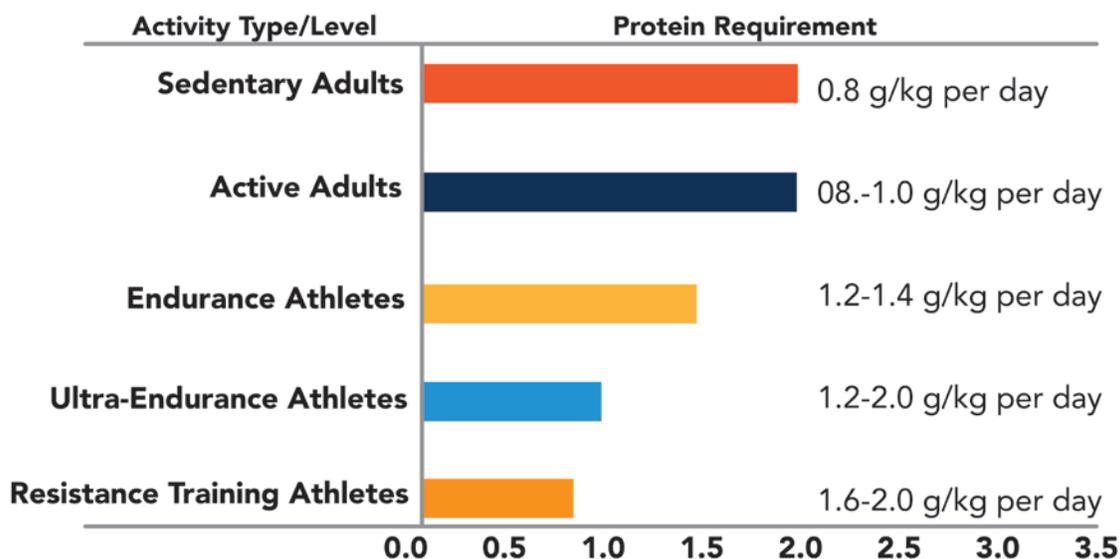
Every type of activity has different metabolic demands during training and recovery. These metabolic demands result in different nutritional needs to meet both the demands during training and the recovery period.

The primary way to distinguish different activities is whether they require endurance (e.g., biking, running, hiking, swimming) or strength (e.g., weightlifting, bodybuilding, gymnastics). Physical activity that requires endurance exercise often places a lower metabolic demand on protein metabolism compared to resistance training sports, which means individuals who engage primarily in endurance exercise require slightly

less protein per day than individuals who engage in resistance training. However, at very high volumes of endurance exercise, protein requirements increase to match resistance training because of the increased total metabolic demand.

As stated earlier, individuals who are considered sedentary have a protein requirement of ~0.8 g/kg per day. This compares to generally active adults who have a protein requirement of ~0.8 to 1.8 g/kg per day (Kato et al., 2016; Kerksick et al., 2018; Kreider et al., 2010; Rodriguez et al., 2009). When we move to people who are considered athletes, endurance athletes should aim to consume ~1.2 to 1.4 g/kg per day, with ultra-endurance athletes having an increased intake to ~1.2 to 2.0 g/kg per day. Resistance training athletes, such as body builders, powerlifters, and weightlifters have a protein requirement of ~1.6 to 2.0 g/kg per day.

Activity Level vs. Protein Requirements

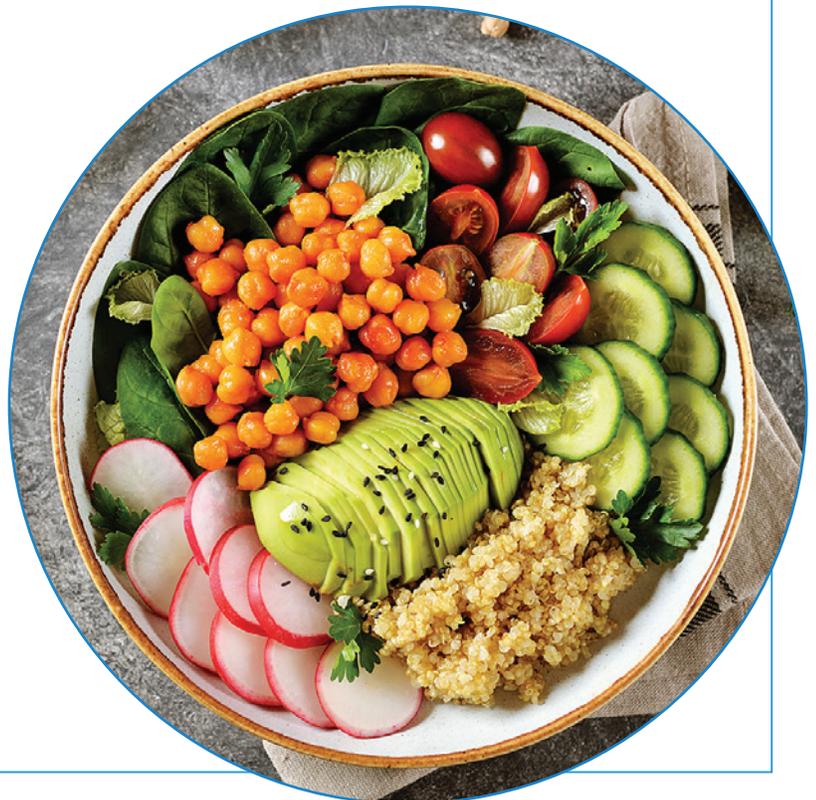


While missing these protein requirements for a day or two is not likely to cause any issues, consistently not meeting protein requirements for weeks or months at a time can have negative health effects. The first effect you will likely notice is impaired recovery from your exercise. Essentially you are not providing your body enough material to repair the tissue you utilized during exercise, so your body will not adequately recover. The second effect is that the risk of injury often increases, especially for connective tissue like tendons, ligaments, and bones (Lowery & Forsythe, 2006). Lastly, insufficient protein intake can increase the likelihood of getting sick due to suppressed immune function (Lowery & Forsythe, 2006).

Conclusion

Vegan and other plant-based diets are followed by ~5 to 10% of the population, which represents upwards of 15 to 30 million people in the United States alone. In the right context, these diets have been shown to be effective for weight loss, weight management, and improving overall health. Despite these benefits, there is often some concern about ensuring individuals who follow these diets are consuming adequate protein. Here are some key concepts surrounding protein intake for individuals who follow a vegan diet:

1. Among sedentary but otherwise healthy adults, the minimum protein requirement of ~0.8 g/kg per day is met by a standard vegan diet.
2. Vegans who are physically active have increased protein requirements, ranging from 1.2 g/kg per day up to 2.0 g/kg per day.
3. In some situations, athletes who are vegan might need to consider plant-based protein supplements to meet the higher-end targets, such as resistance training athletes who can have protein requirements of upwards of 2.0 g/kg per day.
4. Individuals who follow a vegan diet can ensure they are meeting their daily amino acid requirements by eating complementary proteins throughout a given day.
5. There are some plant foods that are considered to have complete amino acid profiles and can be very useful foods to include in a vegan diet, such as quinoa, soy, buckwheat, hemp, chia seeds, spirulina, tempeh, and amaranth.



What You Can Do Now

Now that you have a good understanding of the protein requirements when following a vegan diet, here are seven steps you can take to make sure you are meeting your protein and amino acid requirements:

1. Determine your daily protein requirements in g/kg per day.
 - a. If you are a mostly sedentary adult, set your target at 0.8 to 1.0 g/kg per day.
 - b. If you are physically active, set your protein targets between 1.4 to 1.6 g/kg per day if you engage in endurance exercise or between 1.8 to 2.0 g/kg per day if you engage in resistance exercise.
2. Review the list of high-protein plant foods and the table of complementary protein sources, and then build a list of staples you can incorporate into your diet.
3. Plan out your day of eating ahead of time and create a plan that meets your protein requirements.
4. Track your protein intake using a food journal or an app, and ensure you are falling within the recommended protein intakes.
5. If you find that you are still low on protein intake despite pre-planning, revisit the list of high-protein plant foods and increase the serving sizes of those foods in your daily meals and decrease the low-protein foods in your diet.
6. Revisit your food choices every few weeks and make sure you are consuming complementary proteins each day to meet your amino acid requirements.
7. Consider including one or more of the plant foods that have a complete amino acid profile like quinoa, soy, buckwheat, hemp, chia seeds, spirulina, tempeh, or amaranth.

Online Resources

Want to learn more about nutrition? Here are a few places to find reliable information and insight about nutrition and healthy eating behaviors.

- [NASM's Certified Nutrition Coach Certification \(NASM-CNC\)](#)
- [NASM Blog](#)
- [NASM's YouTube Channel](#)

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