

# Plant-Based Protein: Questions on Quality

**PROTEIN:** The major functional & structural component of all cells in the body<sup>1</sup>



## Dietary Protein

Proteins are made up of amino acids

- The specific sequence of amino acids determines the protein function



## 20 Amino Acid Types

- 9 essential amino acids - must come from the diet
- 11 non-essential amino acids - can be made in the body



## Building Blocks for Muscles, Tissues, & Enzymes

The body produces proteins it needs for different functions when it has all the specific amino acids required

While meat and animal products are the most common dietary sources of protein, individuals who follow a plant-based diet (vegetarian, vegan, or other) may prefer to get their protein from **plant-based sources**.



## POSITIVES:

Plant-based protein sources are often easy to find in most grocery stores and tend to be higher in other nutrients we want to consume more of like fiber, vitamins, and minerals.<sup>2</sup>

## CONSIDERATIONS:

Plant-based proteins are usually lower in quality and amount of protein, meaning, on their own, they might not provide all of the amino acids our bodies need for important functions.<sup>3,4</sup>

# Protein Sources Matter

Dietary protein sources can vary in quality depending on both ease of digestibility and whether they provide all of the essential amino acids we need in the ratio that our body needs it.<sup>3,4</sup>

## LOWER Quality Protein

Considered "incomplete" proteins because they lack one or more of the essential amino acids needed (and they may be harder to digest and absorb)

## HIGHER Quality Protein

Considered "complete" proteins because they contain all of the essential amino acids (and they are usually easier to digest and absorb)



## Collagen

essential amino acid usually missing: tryptophan

## Nuts & Seeds

essential amino acid usually missing: lysine



## Grains

wheat / wheat flour, oats, rice, etc.  
essential amino acid usually missing: lysine

## Legumes

peas, beans, etc.  
essential amino acid usually missing: methionine



## Plant protein powders

pea, soybean or other concentrates / isolates  
essential amino acid usually missing: methionine

## Animal products & by-products

meat, eggs, milk / whey, casein

only complete protein sources

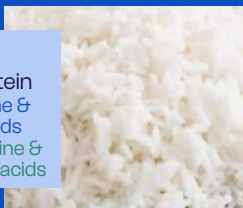


# Complementary Foods to Provide High Quality Protein

If you're not consuming high quality proteins (e.g., animal proteins or soy) each day, it is important to eat a variety of foods with proteins that complement each other to get all of the essential amino acids you need in a day.<sup>5</sup>

## RICE

Low quality protein  
**Missing** Isoleucine & Lysine amino acids  
**Provides** Methionine & Tryptophan amino acids



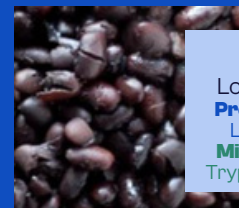
## RICE & BEANS

together are a high quality protein  
they each provide the amino acid the other is missing



## BEANS

Low quality protein  
**Provides** Isoleucine & Lysine amino acids  
**Missing** Methionine & Tryptophan amino acids



## Other

## Complementary Protein Examples

## Hummus & Pita Bread



## Peanut Butter & Wheat Bread



## Oatmeal & Almonds



## Protein Quality Scores

Protein quality is measured using a calculation called the Protein Digestibility Corrected Amino Acids Score (PDCAAS), which produces a protein quality score ranging from 0 to 1.00, with higher scores indicating higher protein quality.<sup>5</sup> For example: eggs, milk, & whey (all high-quality, complete proteins) have protein quality (PDCAAS) scores of 1.00, while plant-based proteins like grain flours and oats have a mid-level protein score around 0.50.<sup>3,4</sup>

Protein quality scores are used to calculate the amount of **quality corrected protein** in a product  
**g of quality corrected protein** = g total protein x protein quality score (PDCAAS value from 0-1.00)

## Protein Claims in the U.S. Correct for Protein Quality

The nutrition facts panel always includes total grams of protein.

**BUT** if a front of pack protein content claim is made, the **% Daily Value (% DV)** for protein must also be included, reflecting the **quality corrected** grams of protein.<sup>6</sup>



Nutrition Facts	
6 servings per container	
Serving Size	1 Packet (60g)
Amount Per Serving	
<b>Calories</b>	<b>220</b>
	% Daily Value*
Total Fat 3g	4%
Saturated Fat 0.5g	4%
Trans Fat 0g	
Polyunsaturated Fat 1g	
Monounsaturated Fat 1g	
Cholesterol 10mg	4%
Sodium 170mg	7%
Total Carbohydrate 39g	14%
Dietary Fiber 4g	15%
Soluble Fiber 2g	
Total Sugars 13g	
Protein 12g	22%
Vitamin D 0.2mcg	0%
Calcium 60mg	4%
Iron 1.5mg	8%
Potassium 190mg	4%

**How to find the grams of quality corrected protein from % DV listed**

DV for protein = 50 g

22% DV x 50 g = 11 g quality corrected protein

This means, of the 12 g total protein in the product, 11 g is considered high-quality corrected protein

## Plant-Based Protein Examples

Plant-Based Protein	Serving Size	Total Protein Content <sup>7</sup> (grams per serving)	Protein Quality <sup>8-12</sup> (PDCAAS value from 0-1.00) (average & range)	Quality Corrected Protein (g total protein x avg protein quality) (grams per serving)
<b>Soy protein isolate</b>	1 oz (28.4 g)	25 g	0.96 (0.92-1.0)	24 g
<b>Pea protein isolate</b>	1/4 cup (27 g)	21 g	0.85 (0.78-0.91)	17.9 g
<b>Lentils, uncooked</b>	1/4 cup (48 g)	12 g	0.66 (0.52-0.80)	7.9 g
<b>Quinoa, cooked</b>	1 cup (185 g)	8 g	0.81 (0.77-0.84)	6.5 g
<b>Edamame</b>	1/2 cup (85 g)	8 g	0.78	6.2 g
<b>Hemp seeds</b>	3 tbsp (30 g)	10 g	0.58 (0.49-0.66)	5.8 g
<b>Tofu</b>	3 oz (85 g)	8 g	0.63 (0.56-0.70)	5 g
<b>Black beans</b>	1/2 cup (125 g)	6 g	0.75	4.5 g
<b>Green peas</b>	1 cup (145 g)	8 g	0.55 (0.50-0.59)	4.4 g
<b>Chickpeas (boiled)</b>	1/2 cup (125 g)	6 g	0.69 (0.52-0.85)	4.1 g
<b>Peanuts</b>	1 oz (28.4 g)	7 g	0.51 (0.46-0.55)	3.6 g
<b>Oats</b>	1/2 cup (40 g)	5 g	0.72 (0.61-0.82)	3.6 g

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