Protein Does That?

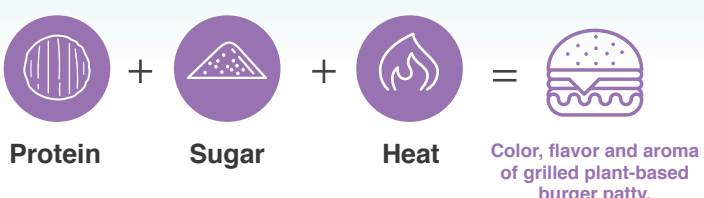
We often think of protein when it comes to nutrition, but protein delivers a better eating experience by sparking our senses. **Let's uncover four unique ways protein contributes much more than what meets the eye.**

1

PROTEIN DELIVERS THE FLAVORS WE LOVE

Through a variety of ways, proteins are central to delivering the flavors we love from our favorite foods.

Maillard Reaction



The savory aroma you smell and taste when you heat meats or bake breads comes from the Maillard reaction.

This reaction **transforms the proteins and sugars in foods leading to a better sensory eating experience** and distinctive flavors.

Iron-Binding Proteins

Iron-binding proteins in animal foods, like hemoglobin and myoglobin, carry heme – **an iron-containing molecule that's essential for life.**

Myoglobin gives meat its satisfying, savory "meaty" aroma and taste.

2

PROTEINS PROVIDE COLOR TO OUR FAVORITE FOODS

Researchers think protein may be involved in chemical reactions and interact with light as a complex molecule that impacts the colors of many foods.

Heat-Induced Browning

(Maillard Reaction)
This happens when sugars and protein are heated, producing the color, flavor and aroma of some foods (such as meat and bread).

Enzymatic Browning

Enzymes are proteins that speed up chemical reactions. When compounds in fruits and vegetables are exposed to oxygen, a chain of enzyme reactions causes them to brown.

Water Binding

Loose or unbound water in proteins like fish makes the meat look translucent or pale.

Light Absorption

More heme in meat means more light is absorbed. When cooking, this causes meat to change from bright red to rich brown.

Light Scattering

Proteins (such as casein) and fat in dairy products form tiny particles which reflect light, resulting in their white color.

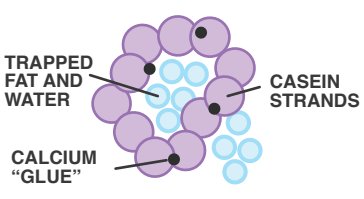
Rich meat appearance, like in freshly caught tuna, means water is tightly bound.

3

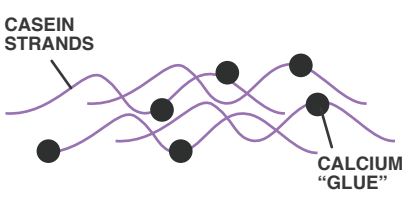
PROTEINS ARE KEY TO IMPROVING FOOD TEXTURE

DAIRY PROTEINS

The proteins in dairy, like casein or Beta-lactoglobulin, are responsible for melty, thick, and creamy dairy products. They are also used to drive innovations in plant-based dairy alternatives.



Casein proteins form strands that encase fat and hold in water.



Cheese melts/stretches as casein strands **slide past each other.**

Yogurt is thick and creamy due to casein, which **forms a network that traps water and fat.**

Beta-lactoglobulin, another protein found in dairy, **helps control the texture of a variety of foods including yogurt.**

EGGS

The protein in eggs adds texture to many foods!

Foaming

Whisking egg whites creates air that is trapped by proteins and makes a foam. **This is what gives meringue its airy texture.**

Emulsification

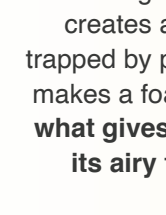
Some proteins in egg yolk interact with both water and oil. This makes them **good at forming mixtures and holding foods like mayonnaise, custard or ice cream together.**

Gelling

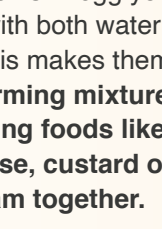
When proteins in eggs are heated, their structure is changed. This causes them to **form a gel that binds the ingredients in foods together.**

CORN PROLAMIN

Prolamin is a plant-based protein that enables dairy-free cheese to melt, bubble and stretch.



Prolamin from corn, also known as **"Zein," is a byproduct of wet milling corn to extract starch and oil.**



Zein from prolamin is **very good at binding to itself and other ingredients forming a matrix,** including the oils used to make plant-based cheese.

When plant-based cheese is heated, the oils stay where they are and don't leak out. This makes Zein an ideal candidate for plant-based cheese by **allowing prolamin to have the meltability and stretch otherwise seen in dairy.**

4

FOODS GET A NUTRITIOUS BOOST FROM PROTEIN

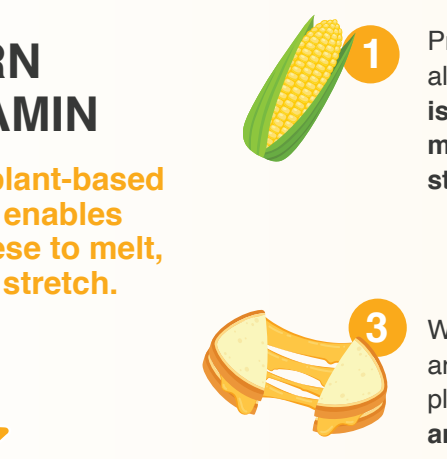
Protein is a nutrient in foods from both plants and animals. It's found in every cell in the human body and is critical for proper growth, development, and function during pregnancy, childhood and adolescence.

Building Blocks of Protein

Protein is made up of hundreds or thousands of building blocks, called amino acids, which are linked to one another in long chains.

But not all proteins are created equal.

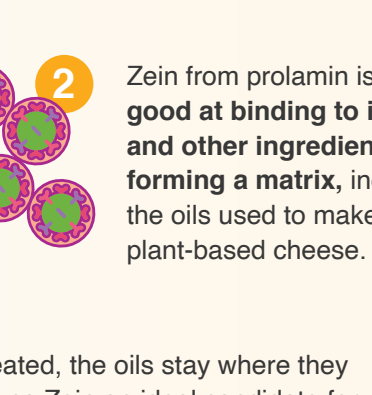
Some are complete, meaning they have all the essential amino acids (e.g., the amino acids we must get from foods because our bodies can't make them) in proper amounts, while others are incomplete.



Complete proteins contain all nine essential amino acids.

1. Isoleucine
2. Leucine
3. Lysine
4. Threonine
5. Tryptophan
6. Methionine
7. Histidine
8. Valine
9. Phenylalanine

Incomplete proteins contain insufficient amounts of one or more of the nine essential amino acids.



Understanding Protein Quality

Scientists use a method called the protein digestibility corrected amino acid score (PDCAAS) to assign scores to the quality of proteins based on:

1. The amino acid needs of humans

2. How well humans can digest and use the protein in a food

The highest possible PDCAAS score a food can get is 1.0. This means, even after a protein has been digested, it still gives 100% or more of the essential amino acids we need.

COMPLETE protein

	PDCAAS Score
Whole Boiled Egg	1.0
Casein	1.0
Beef	1.0
Soy	1.0

INCOMPLETE protein

	PDCAAS Score
Chickpea	0.77
Cooked Pea	0.58
Rice	0.53
Wheat	0.45

To learn more about plant-based and alternative protein, and the latest food technologies, visit
scienceofsenses.com

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