

What is Protein

Protein in wheat flour plays a crucial role in **dough formation, elasticity, and baking performance**. The primary proteins in wheat flour are gluten-forming proteins, which provide structure and texture to baked goods.

Wheat flour contains two main categories of proteins:

1. Gluten-Forming Proteins (80-85%)

- Gliadin – Contributes to dough extensibility (stretchiness).
- Glutenin – Provides dough elasticity and strength.
- When mixed with water, **gliadin + glutenin = gluten**, forming a stretchy network that traps gas, allowing bread to rise.

2. Non-Gluten Proteins (15-20%)

- Albumins & Globulins – Water-soluble proteins with minimal impact on baking but contribute to nutritional value.



Effects of Protein on Baking

1. Gluten Development

- Higher protein flours create **stronger gluten networks**, leading to **chewier bread and better gas retention**.
- Lower protein flours produce **less gluten**, resulting in **softer, delicate textures**.

2. Water Absorption

- **Higher protein = higher water absorption**, affecting dough consistency.
- Bread flour needs more water than cake flour for proper hydration.

3. Crumb Structure & Texture

- **High-protein flour -> Firm, chewy crumb** (e.g., baguettes, pizza dough).
- **Low-protein flour -> Light, soft crumb** (e.g., cakes, cookies).

Why Should We Care?

Protein (Gluten) content and quality (Mixing, Stability, Extensibility, Tenacity, Elasticity...) are the main drivers of quality across all baked products. This is why protein quality must be measured precisely, to ensure the flour meets specific end-product requirements.

How To Measure It?

- Final product characteristics: **Vision Inspection**
- Content: **SpectraStar™**
- Gluten properties (Tenacity, Extensibility, Elasticity, Strength) **Alveolab®**
- Mixing properties **Mixolab®** (Beginning -> C2)
- Proofing properties **Rheo F4** (Gas Retention)

Protein (Gluten) Impact On Baked Products Characteristics

The numbers in the table represent the strength of the impact of each **COMPONENT** on the **CHARACTERISTICS** of various baked products:

- **3 = Strong impact** / **2 = Medium impact** / **1 = Low impact**
- The Impact Factor in rows indicates how strongly a COMPONENT affects a specific CHARACTERISTIC.
- The Impact Factor in columns shows how strongly a COMPONENT influences a particular BAKED PRODUCT.

	Noodles	Flat Bread	Crackers	Pan Bread	Wafer	Wheat Tortilla	Baguette	Hamburger Bun	Pizza Crust	Sponge Cake	Biscuit	Croissant	Streamed Buns	Impact Factor
Color	2	2	2	2	2	2	2	2	2	2	2	2	2	67%
Size & Shape	3		3	3	3	3	3	3	3	3	3	3	3	92%
Volume/Rise	3						3	3	3	3	3	3	3	62%
Surface	2			2	3	3	3			3			3	49%
Scoring							2							5%
Puffing		3										3		15%
Thickness	3	2		3	3	2	3		3					49%
Crispness	2		3		3		3		3		3	3		51%
Softness	3					3		2					3	28%
Texture	3		3		2	3					3			36%
Elasticity	3													8%
Stickiness	3	3												15%
Flexibility		3				3								15%
Chewiness	3	3				3		3	3					38%
Springiness				3			3	3		3			3	38%
Crumb Texture		3		3			3	3	3	3		3	3	62%
Flakiness			3								3	3		23%
Crumbling			3	3	2					2	2			31%
Slicing				3				2						13%
Moisture		2	2	2	2	3	3	2	3	2	2	2	3	72%
Cooking	3													5%
Water Abso.	2													5%
Staling	2	2	2	2	2	3	3	3	2	3	1	2	2	74%
Sogginess					2	2		2	3		2			26%
Impact Factor	51%	32%	29%	36%	33%	42%	43%	39%	39%	33%	33%	33%	35%	