



AMERICAN
EGG BOARD



THE EGG ADVANTAGE: IRREPLACEABLE IN EVERY WAY

Real eggs play a crucial role in recipe formulation, cooking and baking. They provide more than 20 functional properties, including aeration, binding, browning, structure, moisture, flavor and more. While egg substitutes may offer some of these functional properties, the quality and versatility of eggs remain unmatched, making them the preferred choice for achieving optimal results in culinary applications.

THE ORIGINAL CLEAN LABEL INGREDIENT

When a recipe uses eggs, you'll find them listed simply as "eggs." But with egg substitutes, the ingredient list becomes noticeably more complicated.



(A) Control - Real Eggs ¹	(B) Starch based egg substitute ²	(C) Mung Bean based egg substitute ³	(D) Gum based egg substitute ⁴	(E) Chickpea based egg substitute ⁵	(F) Pea protein based egg substitute ⁶
Eggs	Potato starch, tapioca flour, baking soda, psyllium husk	Water, mung bean protein, canola, dehydrated onion, gellan gum, carrot extractives, natural flavors, turmeric extract, potassium citrate, salt, sugar, tapioca syrup solids, tetrasodium pyrophosphate, transglutaminase, nisin	Xanthan gum, sodium alginate, guar gum	Chickpea extract	Pea protein, chickpeas, gum acacia, vegetable juice

THE VERSATILE POWER OF EGGS

When put to the test, eggs can do it all! They provide the widest variety of functional benefits and consistently outshine egg substitutes in culinary applications.

Functions of Eggs

- Aroma & Taste
- Browning
- Color
- Crumb
- Leavening
- Structural Integrity
- Rise
- Texture

LEARN MORE!

Download our **20+** Functional Benefits of Eggs handout here:



THE BAKING BATTLE: EGGS VS. REPLACERS



Ever wonder what the real-world effects of baking with eggs compared to baking with egg substitutes are? We put eggs and five egg substitutes to the test – the cupcake test. In this bake-off, we created six different cupcakes using equivalent amounts of: (A) Real eggs - as the control, (B) a starch-based egg replacer, (C) a mung bean-based egg replacer, (D) a gum-based egg replacer, (E) a chickpea-based egg replacer, and (F) a pea protein-based egg replacer.

Here's how they all stack up:

Top Analysis to View Browning and Structural Integrity



- The control (real eggs) had the smoothest top, with starch and gum-based substitutes being closest in performance.
- The mung bean-based cupcake failed to rise, leading to a deformed top, while chickpea and pea protein-based cupcakes had the most cracks, indicating poor structure.
- The pea protein substitute was closest in color to real eggs, but all replacers produced paler cupcakes.

Real eggs provide better structure, rise, and color compared to the tested egg replacers.

Side Analysis to View Rise and Leavening



- The control (real eggs) was the tallest and had a domed top, while the others were flatter, indicating poor leavening and structure.
- The gum and chickpea-based cupcakes had slight domes but still didn't rise as high as those made with real eggs.

Real eggs achieve better rise and structural integrity compared to the egg replacers tested.

Cross-Section Analysis to View Crumb Texture



- Cross sections revealed that none of the cupcakes matched the crumb texture of those made with real eggs.
- Real eggs produced a uniform structure with small air pockets, while the gum-based cupcake was closest but had irregular air pockets.
- Other cupcakes lacked air pockets, leading to a dense, crumbly texture. These cupcakes compressed under pressure and did not spring back like the control.
- Only the real eggs and gum-based cupcakes would withstand frosting without tearing.

Overall, no egg replacer matched the desirable crumb structure provided by real eggs.



THE EGG ADVANTAGE: A CLEAN, CONSISTENT CHOICE

When it comes to recipe formulation, cooking, and baking, no single ingredient will replace the egg. Real eggs deliver consistent functionality, versatility, and a clean label that egg substitutes simply can't match.

Learn more: Download our A Dozen (or so) Questions to Ask About REAL Eggs in Your Formulation handout



References: 1. U.S. Department of Agriculture, Agricultural Research Service. (2019). FoodData Central: Egg, whole, raw, fresh. <https://fdc.nal.usda.gov/fdc-app.html#/food-details/171287/nutrients> 2. Bob's Red Mill Gluten Free Vegan Egg Replacer. March 27, 2024; Available from: <https://www.bobsredmill.com/gluten-free-vegan-egg-replacer.html> 3. JUST Egg Plant-based scramble. July 6, 2023; Available from: <https://www.justeat/just-egg> 4. Ingredion Ticaloid® 451T Powder. September 3, 2024; Available from: <https://www.ingredion.com/na/en-us/ingredient/ticaloid-451-t-powder-38424904ca.html> 5. Saheli Aquafaba Powder. September 3, 2024; Available from: <https://saheli.in/en/aquafaba/> 6. Ardent Mills Egg Replace. September 3, 2024; Available from: https://www.ardentmills.com/media/siudko2b/2023_egg_replace_brochure.pdf