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# pea protein



## EGGS OPTIONAL

Good things come in small packages so it's no big surprise that the protein portion of a pea would offer food processors and consumers a functional and affordable egg alternative. Using pea protein isolates and concentrates, food scientists are solving many egg-less dilemmas. This latest application expands the use of pea protein which has already found its way into healthy, protein-fortified or gluten-free baked goods, snacks, cereals, pastas, energy bars and beverages. (For more on those uses, flip to page 8).

Pea protein is already recognized as high quality, with an amino acid balance that complements other common ingredients such as wheat protein. News that pea protein can now mimic the egg in pastas and baked goods will be welcomed by millions worldwide who find the egg neither incredible nor edible because of egg allergies.

Food scientists are busy unlocking the egg-like potential of pea protein to the delight of many—especially children—who must resist some of their favorite foods because of a sensitivity or actual allergic reaction to eggs. Now they can enjoy the traditional taste and texture of everyday fare from waffles to spaghetti to muffins, cookies, and even chocolate cake, without worry. Food manufacturers also benefit from a clean label, because unlike soy or milk protein, pea and pea derivatives are not considered one of the top eight allergens they must disclose.

## NOTHING TO SNEEZE AT

Food allergies affect up to 4% of the population—some 12.2 million people—in the U.S. alone, according to the Centers for Disease Control (CDC). The National Institute of Health (NIH) ranks eggs as the fourth most common food to trigger allergic reactions in adults, right behind fish, peanuts and tree nuts. CDC numbers show that children are even more prone to egg allergy, with two-thirds of their food allergies associated with eggs. Next to milk, it's the most common allergy in those younger than 16, affecting 1.5% to 3.2% of children in the U.S., according to the American Academy of Allergy, Asthma & Immunology (AAAAI).

Egg allergy isn't the temporary problem once assumed. Results from a recent and large John Hopkins study found that far fewer people than previously thought actually outgrow egg allergies, with 32% of those diagnosed as kids continuing to suffer reactions to egg after the age of 16, many of them throughout adulthood.

## EGG-FREE ECSTASY

Imagine a busy mother being able to offer her egg-sensitive child goodies such as walnut-chocolate chip banana bread, coconut cake, sunflower cookies and blueberry muffins. Or, a treat such as a waffle cone, as well as breakfast fare like strawberry pancakes and hazelnut biscotti. A quick, simple supper of spaghetti and meatballs or cheese ravioli is no longer off-limits because of an egg allergy.

## A “NICHE” MARKET OF 30 MILLION?

Sensitivities to egg and egg-containing products explodes the market for a functional egg replacer to more than 30 million people. Indeed, many people who can't tolerate egg products don't have an actual egg allergy as medically defined, but rather a sensitivity to eggs. Egg intolerance produces many of the same symptoms as egg allergy, such as inflammation and diarrhea. In England, some 53% of those recently surveyed had intolerance to egg white and 32% to egg yolk. While the CDC does not track food sensitivities, conservative estimates for the U.S. scaled that number back to 8-10% of the population—still nearly 34 million consumers. That's a lot of folks looking for an egg-free eating experience.

## DON'T THINK “GREEN”

In fact, the only thing green about pea protein is the environment. As with pea fiber and pea starch, pea protein isolates and concentrates come from dry split peas. Because peas are a legume plant that naturally makes and returns nitrogen fertilizer back into the soil, they are as healthy to grow as they are to eat. But in the case of pea protein, that's where the “green” stays. Non-GMO and low allergenic pea protein concentrates and isolates are creamy-white powders that blend conveniently into dry ingredients, liquids and batters.

## WELL-SUITED SURROGATE

Pea and egg proteins are similar and both have similar emulsion characteristics. Pea protein has excellent foam stability, comparable to egg albumin. Depending on the product made, independent controlled baking tests found that pea isolates and concentrates can perform better than, equal to, or only slightly less functional than eggs in cookies, cakes, muffins or waffles.

## PUTTING PEA PROTEIN THROUGH THE PACES

Food scientists at North Dakota State University (NDSU) tested the egg replacement functionality of a pea protein isolate containing 80% protein and a pea protein concentrate containing 50% protein in standard commercial cake mixes as well as cookies.

## THE CAKE TEST

Both white cake and chocolate cake mixes were made with eggs, pea protein concentrate, freeze-dried pea protein isolate and spray-dried pea protein isolate. Pea protein produced denser cakes with greater moistness than cakes made with eggs. Pea protein isolates produced cakes with comparable cake peak heights. Objective measurements found the egg cakes had slightly better cake uniformity and a softer texture, but all the cakes were deemed very tender and soft. Indeed, subjective measures found the pea protein and egg cakes difficult to differentiate in appearance. The pea protein cakes had

A.



B.



The white cakes prepared from pea concentrate, pea isolates, and eggs. The top view is represented in A while B represents the cross-section of the corresponding cake.

## FEASIBLE AND FUNCTIONAL

Thus far, NDSU food scientists concluded that pea protein isolates not only performed comparable to eggs in their preliminary tests, but proved to be a viable alternative to the egg—especially in popular consumer baked goods. Expect to see results from more complex sensory tests in the future.

While NDSU put pea proteins through controlled baking tests, food scientists at Northern Crops Institute (NCI), an outreach food and crop facility also in Fargo, ND, optimized recipes using pea protein concentrate. Less refined than pea protein isolates, concentrates are produced via a dry milling process. Dry milled concentrates have slightly less protein than protein isolates; more starch and can enhance texture and volume in many products. NCI replaced eggs in common baking formulas with a dry-milled pea protein concentrate consisting of ~50% protein and ~12% starch. When recipes were optimized, the pea concentrate performed exceptionally well as an egg replacement on a variety of baked products and pastas (see pages 5-7 for recipes and nutritional facts).

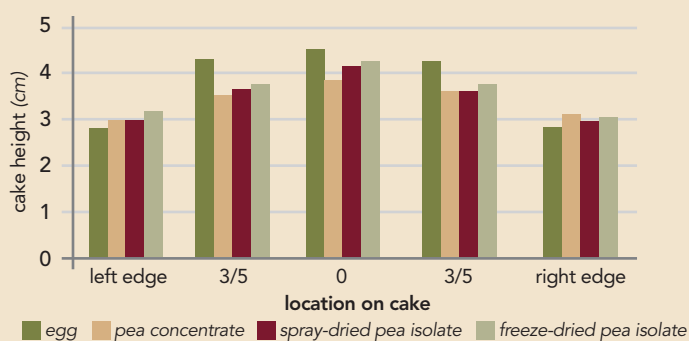
## MISTAKE-PROOF PASTAS

Pasta production at NCI showed that replacing eggs with pea protein concentrate not only lowers costs, but improves firmness, maintaining that desired texture even after overcooking. Expect classic bright golden yellow color, not only with traditional semolina, but even when using white wheat.

<u>Al dente pasta</u>	cooking time (min)	avg. firmness (gcm/strand)	avg. cooked weight (g)	avg. cooking loss (%)
100% Semolina	11	12.8	69.7	6.2
90% Semolina-10% pea protein concentrate	12	14.8	68.1	6.0
98% Semolina-2% egg white powder	12	15.7	68.8	5.0
<u>Overcooked pasta</u>	cooking time (min)	avg. firmness (gcm/strand)	avg. cooked weight (g)	avg. cooking loss (%)
100% Semolina	17	9.3	81.8	7.0
90% Semolina-10% pea protein concentrate	18	11.5	79.6	6.8
98% Semolina-2% egg white powder	18	11.7	78.1	5.6

similar diameters, shrinkage values and weights compared with cakes made with eggs. Pea protein isolates produced cakes with comparable cake peak heights.

Cakes made with pea protein scored a 10 for moistness compared with an 8 for cakes made with eggs, with testers concluding that cakes made with eggs had a slighter dry texture compared with cakes made with pea protein. Texture analysis on the chocolate cakes found that those made with pea protein had softer texture (lower peak load values) than the egg cakes after one day of storage, but slightly higher peak loads than egg cakes after two days of storage. Functionally, freeze-dried pea isolate performed similar to spray-dried isolate. (Cookie trial shown on next page.)



### Affect of protein source on white cake parameters

protein source	avg. diameter (cm)**	shrinkage value (cm)**	avg. weight (g)**
egg	19.5	0.8	400
pea protein concentrate*	19.4	0.9	393
spray-dried isolate*	19.6	0.7	391
freeze-dried isolate	19.4	0.9	395

\* Commercial sources of pea protein concentrate and isolates.

\*\* The average values were determined from two cakes according to the AACC International method 10-91.01.

The heights and contour of white cakes prepared from pea concentrate, peas isolates, and eggs. The 0 represents the center of the cake while the 3/5 indicates a measurement taken at 3/5 the distance from the edge of the cake.



Chocolate cupcake on left had 100% of eggs replaced with pea protein. Cupcake on right contained eggs and no pea protein.

While pea isolates offer a more neutral flavor profile, pea protein concentrates are well-suited to products that already contain a flavoring agent. For example, recipes with normal amounts of vanilla, almond, chocolate, banana and sour cream are sufficient to maintain a neutral flavor transfer when using the less-refined concentrates as an egg replacement. When formulas are optimized to mimic egg-containing controls, baked goods made with pea protein concentrate have excellent texture; similar color and flavor, and comparable, but slightly softer structure. High-quality results were obtained without the addition of any emulsifiers or crumb enhancers.

### MIX WITH WATER, THEN BLEND

Pea protein concentrate mixes well with dry ingredients when dissolved with higher temperature water around 75°C. Food scientists replaced whole/liquid eggs with 25% pea protein concentrate by weight. The concentrate-water mixture has a yellowish-orange, creamy color similar to eggs. Flavor ingredients should be added to this liquid, rather than later in the recipe preparation, and then blended with dry ingredients.

## PUTTING PEA PROTEIN THROUGH THE PACES

### THE COOKIE TRIAL

Pea protein proved to be a viable alternative for eggs in both sugar snaps and chocolate chip cookies. Based on these results, expect cookies made with pea protein to look like cookies made with eggs, with similar cookie spread and height. Pea protein cookies had greater moistness than cookies made with eggs. In general, cookies made with pea concentrates or pea isolates were similar. Objective measurements on cookies made with pea isolates confirmed lower peak hardness and thus softer textures than cookies made with eggs. Indeed, texture analysis indicates that pea protein has a tenderizing effect. Peak hardness values for cookies made with isolates are 1.89 times harder than the cookies made with eggs.

Despite uniform baking times, chocolate chip cookies made with fresh eggs were darker in color than those made with pea protein isolates, suggesting that Maillard browning was an issue. The sugar snap cookies used dehydrated eggs in the control and were similar in color across all comparisons.

Affect of protein source on sugar snap-type cookie parameters

protein source	avg. width (cm)**	avg. height (cm)**	avg. weight (g)**	avg. hardness value (g)***
non-fat dry milk	5.73	1.92	22.2	2550
dried egg	6.03	1.77	21.8	1555
pea protein concentrate*	5.79	1.96	22.2	1308
spray-dried pea isolate*	5.95	2.02	22.0	809
freeze-dried pea isolate	5.80	1.99	22.3	831

\* Commercial sources of pea protein concentrate and isolates.

\*\* The average values were determined from six cookies according to the AACC International method 10-53.01

\*\*\* The average values were determined from four cookies using a compression test with a trigger load of 10g, deformation of 10mm, and a speed of 5mm/s.



Above: The sugar snap-type cookie prepared from non-fat dry milk, pea proteins, and eggs. Cookies shown in duplicate. From left to right: non-fat dry milk, pea protein concentrate, freeze-dried pea isolate, spray-dried pea isolate, and eggs.

Left: The chocolate chip cookie prepared from a common household recipe. The formulas contained either egg (left) or pea protein isolate (right).



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### Dry Spaghetti (100% egg replacement)

Ingredients	Percent
Semolina <sup>1</sup>	90
Pea protein concentrate	10
Water hydration	32

<sup>1</sup>12.5% moisture basis

#### Procedure

Blend dry ingredients using cross flow blender. Mix, hydrate, and extrude blended semolina with a single screw extruder. Upon extrusion, cut pasta dough and dry with ultra-high temperature drying cycle.

### Ravioli

Ingredients	Percent
Extra Fancy durum flour <sup>1</sup>	90
Pea protein concentrate	10
Water hydration	39

<sup>1</sup>12.5% moisture basis

#### Procedure

Blend dry ingredients using cross flow blender. Mix, hydrate, and laminate blended durum flour with a roller or by using a ravioli machine. Upon lamination, sheet the dough and fill with meat and/or cheese fillings. To store the ravioli, toss with flour or cornmeal and store at 4° F until further processing.

### Nutrition Facts

Serving Size (132g)

#### Amount Per Serving

Calories 320      Calories from Fat 10

% Daily Value\*

<b>Total Fat</b> 1g	<b>2%</b>
Saturated Fat 0g	<b>0%</b>
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 0mg	<b>0%</b>
<b>Total Carbohydrate</b> 66g	<b>22%</b>
Dietary Fiber 4g	<b>16%</b>
Sugars 2g	

**Protein** 16g

Vitamin A 0%      •      Vitamin C 0%  
Calcium 2%      •      Iron 20%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories	2,000	2,500
Total Fat	Less Than	65g	80g	
Saturated Fat	Less Than	20g	25g	
Cholesterol	Less Than	300mg	300mg	
Sodium	Less Than	2,400mg	2,400mg	
Total Carbohydrate		300g	375g	
Dietary Fiber		25g	30g	

Calories per gram:

Fat 9 • Carbohydrate 4 • Protein 4

### Nutrition Facts

Serving Size (139g)

#### Amount Per Serving

Calories 320      Calories from Fat 10

% Daily Value\*

<b>Total Fat</b> 1g	<b>2%</b>
Saturated Fat 0g	<b>0%</b>
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 0mg	<b>0%</b>
<b>Total Carbohydrate</b> 66g	<b>22%</b>
Dietary Fiber 4g	<b>16%</b>
Sugars 2g	

**Protein** 16g

Vitamin A 0%      •      Vitamin C 0%  
Calcium 2%      •      Iron 20%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories	2,000	2,500
Total Fat	Less Than	65g	80g	
Saturated Fat	Less Than	20g	25g	
Cholesterol	Less Than	300mg	300mg	
Sodium	Less Than	2,400mg	2,400mg	
Total Carbohydrate		300g	375g	
Dietary Fiber		25g	30g	

Calories per gram:

Fat 9 • Carbohydrate 4 • Protein 4



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## Double Chocolate Cupcake

Ingredients	Grams	Amount (Baker's %)
Hot brewed coffee	360	88
Baker's chocolate	84	20
Pea protein concentrate	42	10
Water at 75°C	123	30
Vanilla extract	3.0	0.7
All-purpose flour	410	100
Sugar	645	157
Unsweetened cocoa powder	124	30
Baking soda	12.2	3.0
Baking powder	3.1	0.8
Salt	8.6	2.1
Vegetable oil	165	40
Milk	196	48
Sour cream	244	60

### Procedure

Mix chopped chocolate with hot coffee. Mix pea protein concentrate with water and vanilla extract. Mix all wet ingredients. Add dry ingredients and mix on medium speed. Fill muffin pans. Bake at 300 F for 20 minutes. Cool completely and spread the cupcake with frosting.

## Nutrition Facts

Serving Size (60g)

### Amount Per Serving

**Calories** 160      Calories from Fat 50

% Daily Value\*

<b>Total Fat</b> 6g	<b>9%</b>
Saturated Fat 1.5g	<b>8%</b>
Trans Fat 0g	
<b>Cholesterol</b> 5mg	<b>2%</b>
<b>Sodium</b> 180mg	<b>8%</b>
<b>Total Carbohydrate</b> 27g	<b>9%</b>
Dietary Fiber 1g	<b>4%</b>
Sugars 18g	
<b>Protein</b> 3g	

Vitamin A 0%      •      Vitamin C 0%  
Calcium 2%      •      Iron 6%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:  
Fat 9 • Carbohydrate 4 • Protein 4

## Sunflower Cookie

Ingredients	Grams	Amount (Baker's %)
Pea protein concentrate	23	12
Water at 75°C	67	34
Vanilla	4.0	2.0
Shortening	89	45
Margarine	114	57
Sugar	215	108
Brown sugar	110	55
All-purpose flour	200	100
Baking soda	6.0	3.0
Salt	3.1	1.6
Oatmeal	90	45
Sunflower seeds	40	20
Chopped butterscotch	60	30

### Procedure

Mix pea protein concentrate with water and vanilla extract. Cream pea protein concentrate mixture, with shortening, margarine, and sugars. Add the rest of dry ingredients. Fold in sunflower seeds and butterscotch. Bake at 350 F for 11 minutes.

## Nutrition Facts

Serving Size (40g)

### Amount Per Serving

**Calories** 170      Calories from Fat 80

% Daily Value\*

<b>Total Fat</b> 9g	<b>14%</b>
Saturated Fat 3g	<b>15%</b>
Trans Fat 1g	
<b>Cholesterol</b> 5mg	<b>2%</b>
<b>Sodium</b> 160mg	<b>7%</b>
<b>Total Carbohydrate</b> 22g	<b>7%</b>
Dietary Fiber 1g	<b>4%</b>
Sugars 14g	
<b>Protein</b> 2g	

Vitamin A 4%      •      Vitamin C 0%  
Calcium 0%      •      Iron 4%

\*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less Than	65g	80g
Saturated Fat	Less Than	20g	25g
Cholesterol	Less Than	300mg	300mg
Sodium	Less Than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:  
Fat 9 • Carbohydrate 4 • Protein 4



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## Waffle

Ingredients	Grams	Amount (Baker's %)
Pea protein concentrate	20	6.7
Water at 75°C	42	14
Vanilla extract	4.5	1.5
Almond extract	4.0	1.3
All-purpose flour	300	100
Baking powder	14	4.6
Salt	3.4	1.1
Sugar	57	19
Eggs	111	37
Vegetable Oil	158	53
Milk	461	154

### Procedure

Mix pea protein concentrate with water, vanilla extract, and almond extract. Sift dry ingredients. Whisk pea protein concentrate mixture with eggs at high speed. Add oil, milk, and then dry ingredients. Mix well. Pour batter into a non-stick waffle maker. Cook until desired color is obtained at approximately 100-120 C for 4-8 minutes.

## Banana Bread

Ingredients	Grams	Amount (Baker's %)
Pea protein concentrate	28	11
Water at 75°C	84	34
Vanilla extract	6	2.4
Ripe bananas	122	49
Sour cream	112	45
Butter, melted	147	59
All-purpose flour	250	100
Sugar	180	72
Baking soda	5	2.0
Baking powder	4	1.6
Salt	3	1.2
Chopped walnuts	131	52
Semi-sweet chocolate	100	40

### Procedure

Mix pea protein concentrate with water and vanilla extract. Puree with banana and sour cream. Sift together dry ingredients. Combine wet and dry ingredients until absorbed. Fold in chopped walnuts and semi sweet-chocolate. Pour the mixture into 2 loaf pans (9 ¼ x 5 ½ x 2 ½). Bake at 350 F for 60 minutes.

Nutrition Facts	
Serving Size (73g)	
Amount Per Serving	
<b>Calories</b> 190	Calories from Fat 100
% Daily Value*	
<b>Total Fat</b> 11g	<b>17%</b>
Saturated Fat 2g	<b>10%</b>
Trans Fat 0g	
<b>Cholesterol</b> 35mg	<b>12%</b>
<b>Sodium</b> 200mg	<b>8%</b>
<b>Total Carbohydrate</b> 19g	<b>6%</b>
Dietary Fiber 0g	<b>0%</b>
Sugars 6g	
<b>Protein</b> 4g	
Vitamin A 2%	Vitamin C 0%
Calcium 6%	Iron 6%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less Than 65g 80g
Saturated Fat	Less Than 20g 25g
Cholesterol	Less Than 300mg 300mg
Sodium	Less Than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

Nutrition Facts	
Serving Size (49g)	
Amount Per Serving	
<b>Calories</b> 180	Calories from Fat 90
% Daily Value*	
<b>Total Fat</b> 10g	<b>15%</b>
Saturated Fat 5g	<b>25%</b>
Trans Fat 0g	
<b>Cholesterol</b> 15mg	<b>5%</b>
<b>Sodium</b> 125mg	<b>5%</b>
<b>Total Carbohydrate</b> 20g	<b>7%</b>
Dietary Fiber 1g	<b>4%</b>
Sugars 11g	
<b>Protein</b> 3g	
Vitamin A 4%	Vitamin C 0%
Calcium 2%	Iron 6%
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:	
	Calories 2,000 2,500
Total Fat	Less Than 65g 80g
Saturated Fat	Less Than 20g 25g
Cholesterol	Less Than 300mg 300mg
Sodium	Less Than 2,400mg 2,400mg
Total Carbohydrate	300g 375g
Dietary Fiber	25g 30g
Calories per gram:	
Fat 9 • Carbohydrate 4 • Protein 4	

## THE REST OF THE STORY

Providing food manufacturers and consumers with a functional egg alternative is just the latest item in a growing list of practical applications for pea protein.

- Gluten-Free
- Protein Supplements
- High-Protein Pastas
- Energy Bars
- Drink Mixes
- Protein-Fortified Baked Goods
- Cereals
- Extruded Snacks
- Smoothies and Shakes
- Pet Foods

## ENHANCED PROTEIN QUALITY

Rich in lysine, the high-quality amino acid balance of pea protein makes it a perfect compliment to wheat protein while its uncommon allergen status outshines soy and whey sources. If gluten-free is part of your product portfolio, the creamy-white color and availability of pea protein also eclipses rice protein. What's more, pea adds a pleasant nutty flavor versus the cereal-like flavor of wheat or rice.

## STABILITY—IN TRIPLICATE

### Emulsion stability.

*Pea protein holds on to both fat and water, making a creamy, stable emulsion that offers process stability, holds flavor components together and improves shelf life.*

### Process stability.

*Pea protein won't lose its structure or functionality under high temperatures, pH fluctuations or pressure. Such stability enables high-stress processes such as baking, deep frying and extrusion.*

### Extrusion stability.

*Pea protein can replace gluten as a stabilizer in snacks and cereals, becoming part of a matrix that allows expansion; thereby maintaining desired structure, texture and shape.*

## PRACTICAL, AFFORDABLE, FUNCTIONAL

Pea Protein creates healthy as well as tasty snacks and nutrition bars with good "bite" and mouth feel. Maintain volume without expansion in bread crumbs and brownies. Include up to 11% pea protein to create high-protein pastas that withstand cooking and deliver traditional texture. Stretch gluten supplies in conventional baked goods because pea protein mimics the bulk and structure of wheat flour. Or, tap into the \$7 billion gluten-free market in the U.S. Create gluten-free snacks and cereals with popular shapes and texture by using pea protein in conjunction with a non-cereal starch such as pea starch or tapioca to replace wheat or corn flour. Use pea isolates to make nutritious, 50% reduced-fat salad dressings with the mouth feel, taste and stability of their full-fat counterparts. Dairy-free smoothies also can get a high quality protein boost from pea

isolates. And now, reduce market exposure to fluctuating egg costs by using pea protein as an egg replacement in baked goods and pastas.

## CONCENTRATED PROTEIN BULLET

Pea isolates are at least 80% protein—packing a powerful protein punch with lots of flexibility for other ingredients. Indeed, as little as 2% to 5% of a pea protein isolate added to wheat flour is enough to hike the nutritional value without major formula changes. Highly refined to reduce oligosaccharides, pea protein isolates offer improved flavor, mouth feel and digestive ease. These attributes allow increased protein levels in foods such as high-fiber, high-protein, low-calorie breads without changing their flavor. Pea protein isolates usually contain little if no starch or fiber. But don't fret about cardboard chewiness. Pea isolates provide their potent protein boost without that mouth-drying woody taste.

## ONE SIZE NEEDN'T FIT ALL

Pea protein isolates are commercially available in particle sizes ranging from 150 to 400 microns to fit a variety of applications. Smaller particle sizes are well-suited for beverages, nutrition bars and any application where a smooth mouth feel is desired. Larger particle sizes operate like a molecular sponge—with excellent water retention that reduces cooking loss, improves yield and provides a moist mouth feel. Medium-sized particle sizes are available for applications that require a bit of both attributes.

Pea protein concentrates range from 35% to 60% protein and may or may not have a starch component. Pea protein concentrates are generally larger in particle size than isolates (20 to 30 microns). Still a fine powder, the larger particle size of pea protein concentrates make them well-suited for water-absorbing applications and for enhancing texture in baked goods and pastas.

Remember to store pea protein powders out of light and tightly sealed to maintain neutral flavor. Refrigeration aids in maintaining freshness. For product sources or more information, contact Northern Pulse Growers Association, [www.northernpulse.com](http://www.northernpulse.com) or USA Dry Pea & Lentil Council, [www.pea-lentil.com](http://www.pea-lentil.com)



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