FOOD ALLERGIES ON THE RISE

Food allergies and intolerances are a growing concern. The US Centers for Disease Control and Prevention reports that they have risen by 50% between 1997 and 2011 (Food Allergy Organization, 2016). In Canada, 7.5% of the population have at least one allergy (Ben-Shoshan et al, 2010). According to the European Academy of Allergy and Clinical Immunology, one in 14 people in the EU have food allergies. Hospital admissions for severe reactions in children grew seven-fold over the past decade (Food Allergy Organization, 2016).

These alarming statistics have put pressure on food companies to develop ‘free-from’ products. Pulse ingredients are a valuable resource in the toolkit available to food scientists. Pulses are functional, nutrient-dense, economical, and inherently sustainable, and they carry no allergen label.
WHAT ARE FOOD ALLERGIES?

Food allergies are sensitivities caused by a reaction of the body’s immune system to specific proteins in food (Health Canada, 2016). The first time an allergic individual is exposed to a foreign protein, antibodies called immunoglobulin E (IgE) are created. When the individual is exposed again, IgE antibodies and inflammatory mediators such as histamine are released, triggering a reaction ranging from a mild response (such as an itchy rash) to anaphylaxis which is severe and potentially fatal. Early recognition and strict avoidance of food allergens are the key to preventing life-threatening reactions.

The US National Institute of Allergy and Infectious Diseases (NIAID) identifies eight major food allergens that must be labeled: milk, egg, peanut, tree nuts, soy, wheat, fish, and crustacean shellfish (Tree nuts include almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachios, and walnuts).

In Canada, the list specifies 11 food allergens: milk, egg, peanut, tree nuts, soy, wheat, fish, crustaceans, shellfish, sesame seeds and mustard (Health Canada, 2016). Gluten and sulphites must also be declared.

The EU has identified 14 major food allergens: milk, egg, peanut, tree nuts, soy, cereals containing gluten, fish, crustaceans, mollusks, sesame seeds, mustard, lupin, celery, and sulphur dioxide and sulphites (Food Safety Authority of Ireland, 2016).

WHAT IS FOOD INTOLERANCE?

The symptoms of food intolerance can be similar to food allergies. However, they occur via metabolic dysfunction rather than from an immune reaction (NIAID, 2016). One of the most commonly occurring is lactose intolerance. This occurs in people who lack lactase, the enzyme needed to digest the sugar in milk.

WHAT ARE THE BENEFITS OF PULSE FLOURS?

FUNCTIONAL ADVANTAGES
- Excellent moisture retention
- Good water holding and fat binding properties
- Good emulsification and foaming properties
- Good thickening and gelatinization properties, towards the replacement of gums and starches

NUTRITIONAL ENRICHMENT
- High in protein which because of the lysine may be combined with cereals to increase the total quality protein
- High in insoluble and soluble fiber (50% higher than wheat and oats)
- An excellent source of B vitamins (high in folate) and iron, and a good source of magnesium, calcium, selenium, potassium and phosphorus
- Contain both resistant starch and oligosaccharides, which play a key role in gut health as prebiotics
- Low in fat

HEALTH PROMOTION
- Reduction in markers for cardiovascular disease (Ha et al, 2015)
- Reductions in fasting insulin and insulin resistance, as well as reduced adiposity in women (Marinangeli and Jones, 2011)
- Improved gut health (Zhang et al, 2014)
- Increased satiety (McCrory et al, 2010; Li et al, 2014)

ENVIRONMENTAL IMPACT
- Pulses are good for the planet, using half or less of the non-renewable inputs of other crops (Zetner et al, 2004)
- By ‘fixing’ nitrogen from the air, they improve the sustainability of cropping systems
1. GLUTEN-FREE BATTERS AND BREADING MADE WITH PULSE FLOURS

Pulse flours have been used to replace 100% of the wheat flour in gluten-free batters and breading (Caspar and Meseyton, 2013).

In a typical three-step tempura batter, whole or split yellow pea flour was used to replace 100% of the wheat flour in a chicken nugget. Because of increased adhesion, the pulse flour resulted in a more golden, crispier chicken nugget which had a longer hold time under a heat lamp then the wheat control. Flavor enhancement was an additional benefit, with the roasted savory note enabling less salt to be used.

100% of the wheat flour was replaced with yellow split pea flour and pea hull fiber in a fish nugget system. The nuggets were golden in colour and had a longer hold time under a heat lamp when compared to the wheat control. Cost savings were possible, because the increased batter viscosity and pick up of the pulse ingredients allowed for the complete elimination of gums and caramel.

Pulse flour and grit have also been successfully used to replace wheat, soy, and corn ingredients in extruded snacks, cookies, cereals, flatbreads and pizza dough.

2. NON-ALLERGENIC MEAT BINDERS

Clean-label, natural (USDA), ‘non-allergenic’ (free from egg, wheat and soy) meatballs were made by replacing the typical wheat and soy-based breadcrumbs with a yellow split pea and lentil flour crumb.

The pulse crumb developed by Chef Subra Balakrishnan of Griffiths Foods Canada had the same yield, flavor and texture as the traditional control, with the added advantage of using a one-step process with no pre-hydration. Labeling of the crumb was clean and clear: yellow pea flour, salt, lentil flour. Delegates attending the Research Chef Association Annual Meeting 2016 sampled the novel meatballs alongside a traditional formula. They were unable to taste a difference.

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<thead>
<tr>
<th>Fiber</th>
<th>Protein</th>
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<td>Tapioca/Corn/Potato Starch</td>
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<tr>
<td>Teff Flour</td>
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<td>Amaranth Flour</td>
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<td>Quinoa Flour</td>
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<td>Sorghum Flour</td>
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<td>Brown Rice Flour</td>
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<td>White Rice Flour</td>
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<td>BEST Whole Pinto Bean Flour</td>
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<td>BEST Whole Laird Lentil Flour</td>
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<td>BEST Whole Chickpea Flour</td>
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<td>BEST Yellow Split Pea Flour</td>
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<td>BEST Whole Yellow Pea Flour</td>
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3. PULSE FLOURS AS EGG REPLacers

Pulse flours, which are neither precooked nor pregelatinized, may be used as egg replacers in muffins, cookies, and macarons.

Why is this possible? Eggs contain 6% protein, of which 12% is globulin and 71% is albumin. Pulses contain 23% protein, with 50-80% globulin and 15-25% albumin. Surprisingly, pulse flours contain more albumin than eggs.

The texture, volume, and flavor of muffins and cookies that are made using prehydrated whole navy bean flour to replace eggs were found to be comparable to those of the control products. The use of bean flour had only a minimal impact on flavor and texture (McRae, 2016).

Simple modifications to a traditional macaron recipe enabled the creation of egg-free, nut-free macarons made from whole navy bean flour whipped with water to replace the eggs. Modifications include a longer whipping time and the elimination of curing before baking. Using non-stick silicone baking mats created a better ‘foot’, typical of traditional macarons. Best results were obtained by not refrigerating the finished macarons (McRae, 2016).

4. ALLERGEN-FRIENDLY FIBER FORTIFICATION

Pea hull fiber is dry-milled from the cleaned outer hulls of peas to create a natural ingredient that contains 90% total dietary fiber. It is also an excellent source of iron and a good source of calcium. Pea hull fiber is non-GMO, free of all major allergens, gluten-tested and available conventional or certified-organic (COS). Under some milling conditions they retain antioxidant activity (Shum, 2012; Caspar and Meseyton, 2013).

Ground pea hulls are approved by the Canadian Health Bureau of Nutritional Science as pea hull fiber, the US Food and Drug Administration (FDA, 2016) as an intrinsic and intact dietary fiber (as a bran obtained by grinding), and by the US Department of Agriculture’s Food Safety and Inspection Service (USDA FSIS) as a filler or binder in fresh sausages, emulsified meat products, burgers and other ground meat products.

Pea hull fiber may also be used to replace oat bran and fiber, wheat bran and fiber, and soy fiber, increasing the fiber, iron and calcium content of both gluten-free and grain-based breads, baked goods, pasta, extruded cereals and snacks, bars, crackers, batters and breading, soups and sauces, and nutritional beverages, as well as functioning as an allergen-friendly carrier in spice mixes.

Clinical research supports the use of pea hull fiber for the treatment of constipation in children (Flogan and Dahl, 2010) and adults in long-term care homes (Dahl, 2003).
SUMMARY

Pulse ingredients can be used to eliminate allergens from a wide variety of food products. They offer several additional advantages including:

- Easy to use and store, with a two-year shelf life;
- Clean-label and low in cholesterol;
- Excellent functionality;
- Economically priced;
- Highly nutritious;
- Non-GMO, and available as either certified organic (COS) or conventional;
- Inherently sustainable;
- Suitable for both vegetarian and vegan diets.

REFERENCES


Food Allergy Organization, viewed on 10/12/2016 http://www.foodallergy.org/facts-and-stats

Food and Drug Administration, personal communication, August 24th, 2016.

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CONTACT BEST COOKING PULSES, INC.

Best Cooking Pulses is a Canadian, family-owned agri-foods company that has been active in the international pulse trade since 1936. BEST pulse ingredients, sustainably milled on the Canadian prairies from primarily North American raw materials, include a range of whole pea (yellow and green), bean (black, pinto and navy), chickpea (Kabuli) and lentil (green and brown) flours, split pea and decorticated lentil (yellow and red) flours, proprietary pulse flour and fiber blends, pea hull fibers, pulse inclusions, yellow and green split peas, and whole pulses (peas, chickpeas and lentils).

All ingredients are non-GMO, conventional, natural or certified organic (COS), and gluten-tested. Best Cooking Pulses is BRC GFSI (A), Canadian Grain Commission HACCP, Kosher Check, and WBEN certified, Halal approved, non-GMO Project Verified compliant and SEDEX registered.

Partner with us to create tasty, nutritious, functional foods.

FOR MORE INFORMATION OR SAMPLES OF SPECIALTY MILLED BEST PULSE FLOURS, PEA HULL FIBER/FLOUR, PULSE INCLUSIONS, AND WHOLE, SPLIT, OR DECORTICATED PULSES, CONTACT BEST COOKING PULSES AT 204.857.4451 (EXT 4) OR EMAIL SALES@BESTCOOKINGPULSES.COM.