PULSES

# Using Pulses As Meat and Egg Alternates

According to Mintel GNPD database, the top three food claims reflecting products introduced to the market between 2010 and 2015 are 1) non-GMO, 2) high/added fiber and 3) gluten-free.

Pulses (dry peas, beans, lentils and chickpeas) as an ingredient fit into all of these categories.

Additionally, growing consumer interest in "big eight" allergens including egg, milk, soy, peanuts, tree nuts, fish, shellfish and wheat creates new market opportunities for pulse ingredients as alternatives to soy, whey, casein and egg proteins. The top category of products with pulse ingredients between 2010 and 2015 were vegetable snacks, pet food, and meat substitutes. This factsheet provides an introduction to using pulse ingredients in meat and egg-alternate applications.

Pulses can be utilized in meat products in a variety of ways, including as a meat enhancer, meat replacer and egg replacer.

## MEAT ENHANCEMENT

Meat enhancers utilize protein or flour for gelation, emulsification and water-binding functionalities to form a complex, three-dimensional gel network in which fine particles of emulsified meat is trapped, using the starch and non-meat protein as a filler (Farooq and Boye, 2011).

Pulse ingredients for used in meat enhancers and binders include flour, starch and fiber ingredients.

**Potential benefits:**

- *Water and fat retention = Increased cooking yields*
- *Lower fat formulations of meat products such as luncheon meat, sausage, meatballs, burgers, and bologna.*

Texture and color changes vary with pulse type and pulse ingredient used.

## MEAT REPLACEMENT

Modification of plant-derived proteins through processing creates textured vegetable protein resembling meat. Texturized vegetable proteins are often created through an extruder obtaining a meat-like chewy and stringy texture when hydrated.

Either flour or protein concentrates, isolates or a blend can be used as a raw material.

Extrusion processes which produce the texturized vegetable protein can denature protein, inactivate anti-nutrient and provide better flavor (Asgar et al. 2010). While soybeans have been a major ingredient for texturized vegetable protein available in the market, pea protein presents a high potential partially due to its similar functionality with soy protein, and lower allergy incidence. For example, gel forming capacity, solubility and emulsifying capacity of pea protein and soy protein are relatively similar compared to the other types of legumes, while pea protein exhibits better oil and water absorption capacity than soy protein (Asgar et al. 2010).

## EGG REPLACEMENT

Just as pulse proteins can be comparable to meat and soy protein, they can exhibit comparable characteristics to egg proteins. The two main classes of proteins found in eggs and pulses contributing to their unique functionality characteristics are globulins (soluble in neutral salt solutions, very low water solubility) and albumins (soluble in neutral salt-free water).

A project sponsored by the Northern Pulse Growers Association compared cake made with eggs and egg replacers, including pea protein concentrate and two pea protein isolates with different drying methods. The study showed little difference between control and pea protein treatments in terms of baking quality such as diameter, shrinkage values and weights. Sensory evaluation revealed better moisture retention of the cake made with pea proteins compared to the control. The most noticeable difference between pea protein isolate and concentrate was the flavor profile. Pea protein isolate had a neutral, less beany flavor compared to pea protein concentrate.

In addition to pea proteins, pulse starches and flours can also be used as egg replacements. Some characteristics related to viscosity and gelling ability contribute to pulse usage in this application, including high water capacity and low gelatinization temperature.

| EGG | PULSES |
|---|---|
| *6% protein* | *23% protein* |
| *Globulins – 12%*<br>*Examples: ovoglobulins, lysozyme* | *Globulins – 50 to 80%*<br>*Examples: vicilin, legumin* |
| *Albumins – 71%*<br>*Soluble in neutral salt-free water*<br>*Examples: ovalbumin, conalbumin* | *Albumins – 15 to 25%*<br>*Examples: pea albumin 1 (PA 1)* |

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