Pea Protein

Agricultural Utilization Research Institute

Minnesota Overview

Estimates of the total of Minnesota-grown pea sales in 2016 was around $24 million. Pea yields in 2016 were about 41.2 cwt/acre, and about $12.60/cwt, compared to the national average of $10.80/cwt. The higher average price in Minnesota for peas could be an incentive for farmers to increase their production. There is minimal risk involved in entering the pea market, as the crop is eligible for loss coverage. Adding legumes to crop rotation can be economically beneficial to farmers because it positively impact ssoil nutrient status and disease inoculum levels, increasing yields of subsequent crops. Specifically, adding peas to cereal and oilseed rotations can limit disease, fix nitrogen and conserve water. These benefits reduce production costs and promote sustainable farming.

Nutritional quality

Yellow field peas are about 20 to 30 percent protein. Due to high lysine levels, pea proteins are complementary to those in cereals; however, they are limited in methionine, making them incomplete. The PDCAAS score for pea protein ranges from 0.8 to 0.9. While it has lower PDCAAS than soy protein, pea protein is still a good quality protein. Research on the physiological benefits of pea protein is limited, however, pea protein is relatively high in branched-chain amino acids that are essential for muscle repair.

Currently available protein ingredient forms

The pea protein ingredient market is the fastest growing segment of the global plant protein market. This is due to the crop being non-GM and non-allergenic, as well as advances in extraction techniques.

Pea protein ingredients are gradually finding their way into several food and beverage applications. Food manufacturers are exploring successful ways of incorporating pea protein as the sole protein ingredient contributing to the desired functionality/texture in unique and new applications. Most pea protein ingredients in the market are produced from dry, whole, yellow peas. Globally, 20 manufacturers are producing pea protein ingredients, including Cargill, Roquette and Cosucra, and all are competing on production efficiency and functionality. Pea protein ingredients include air classified pea flour 55 (protein content 55%), pea protein concentrate, pea protein hydrolysate and extruded pea protein.

Potential functionality and applications

Pea protein is used in a variety of products, including pastas, meats, extruded snacks and bakery goods. In these foods, the protein functions as emulsifiers, gelling agents, foaming agents and meat extenders/texturizers. The function of pea protein and its effectiveness in such products, however,

Pea Facts

- High in protein
- Good quality protein with relatively high PDCAAS
- Non-GM and non-allergen
- Poor solubility
- Works well in a range of food applications
- Promotes sustainable farming
- Positively impacts soil nutrient status
- Often blended with other proteins to increase functionality

is highly dependent upon the method of production and processing conditions. In general, manufacturers of protein isolates must consider the characteristics they desire for their products prior to implementing a processing plan.

Advantages

From a sustainable agriculture perspective, adding peas to crop rotations enhances the structure, nutrient content and levels of organic matter in the soil, increasing the yields of subsequent crops. From a manufacturer's and, subsequently consumer perspective, pea proteins are not as of yet allergenic, nor genetically modified. Additionally, processing of peas to extract protein is a cleaner process than that of soybeans, which typically utilize, hexane for the extraction of the soybean oil.

Barriers

Compared to soy protein, pea protein has lower solubility and, consequently, lower functionality. Accordingly, manufacturers often blend pea protein with other sources of proteins (e.g., whey protein) in different applications (baked goods and beverages) to obtain the desired functionality and mask the beany flavor. While the FDA doesn't require labeling pea protein as an allergen, it may potentially become allergenic with increased exposure. The composition and structure of pea proteins are similar to soy protein, so it will not be surprising if allergenicity incidences start occurring. Other potential barriers are the antinutritive factors, including lectins, trypsin inhibitors and phytic acid, which can limit protein digestibility and cause gastrointestinal distress. There are several processes that can remove or make many antinutritive factors inactive, they can also increase the time and cost of pea protein ingredient manufacturing, as well as negatively affecting protein solubility and functionality.

Feasibility

Growing peas is highly feasible in Minnesota, especially with the recent development of pea varieties for northern regions and the additional benefits that adding peas to crop rotations provide to the soil, subsequent crops and farmers via reduced fertilizer and water use. Potential factors that limit the potential of peas as protein ingredient sources include the antinutritive compounds, effects of processing and environment on solubility and functionality, and impacts on sensory characteristics. Some of the aforementioned barriers can be overcome with thermal treatment, enzyme inactivation, protein modification via limited hydrolysis and product reformulation. The feasibility of manufacturing pea protein ingredients is demonstrable by the pea flours, concentrates and isolates already on the market.

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