



# Product Profile

Pulse Flour Milling and Utilization Project | Cigi (Canadian International Grains Institute) | cigi.ca



**Spaghetti Formulated with Yellow Pea Flour**

## Yellow Pea Flour in Spaghetti

Spaghetti and other pasta products consumed globally are traditionally made using durum semolina. The addition of yellow pea flour in spaghetti formulations can improve the nutritional value by increasing protein while contributing essential vitamins and minerals. Optimizing pasta processing parameters when adding yellow pea flour is critical for food processors looking to deliver a spaghetti product that maintains end-product quality and offers high protein content. Understanding how factors such as yellow pea flour protein content and pasta drying methods affect end-product quality will facilitate successful incorporation of yellow pea flour into spaghetti.

### Spaghetti Formulation and Processing

Spaghetti was formulated with low, medium, or high protein content yellow pea flour produced from roller milling (Table 1). For spaghetti production, yellow pea flour was blended with durum semolina at 30% inclusions. Water was added to the flour blends during mixing at amounts that were adjusted according to the extruder head pressure (Table 2). Two different methods of pasta drying were followed for each spaghetti formulation, high temperature-short time (HTST) drying method (85°C for 5.75 hours) and low temperature-long time (LTLT) drying method (50°C for 16.5 hours). After drying, spaghetti was cut and packaged.

**Table 1. Physical and Functional Specifications of Durum Semolina and Yellow Pea Flour**

Semolina or Flour	Protein Content (%)	Water Absorption Capacity (%)
Durum Semolina	14.6	0.79
Low Protein Yellow Pea Flour	21.2	1.39
Medium Protein Yellow Pea Flour	24.0	1.52
High Protein Yellow Pea Flour	26.4	1.54

**Table 2. Processing Parameters and End-Quality of Spaghetti formulated with Yellow Pea Flour**

Spaghetti Formulation	Spaghetti Processing Parameters		HTST/LTLT Spaghetti End-Quality			
	Water Addition (%)	Extruder Head Pressure (%)	Brightness L*	Redness a*	Yellowness b*	Firmness (Force, g) After 10 Minutes of Cooking
100% Durum Semolina	31	80-85	73.9/74.5	1.5/-0.4	58.3/57.1	501.0/479.4
30% Low Protein Yellow Pea Flour	31	75	60.6/67.7	16.5/7.3	50.7/51.1	629.8/492.8
30% Medium Protein Yellow Pea Flour	30	75-80	60.0/68.9	19.5/8.7	52.1/55.0	658.4/508.6
30% High Protein Yellow Pea Flour	29	75-80	56.6/68.1	22.0/9.6	48.5/54.8	709.2/439.4

Results and Recommendations

As protein content of the yellow pea flour increased, the amount of water in the spaghetti formulation was reduced slightly (Tables 1 and 2). All spaghetti formulated with yellow pea flour was different from the 100% durum semolina spaghetti in regards to colour and cooked firmness. Dry yellow pea flour spaghetti was less bright (L\*), less yellow (b\*), and redder (a\*) than the 100% durum semolina spaghetti (Table 2). Although the addition of yellow pea flour did not affect cooking time, cooked spaghetti formulated with yellow pea flour was firmer than the 100% durum semolina spaghetti (Table 2).

Among the yellow pea flour spaghetti, the drying method had a greater effect on dried spaghetti colour than the protein content of the yellow pea flours used in the formulation. Following the LTLT drying method, rather than the HTST drying method, resulted in yellow pea flour spaghetti with colour and texture results that were more similar to the 100% durum semolina spaghetti. Compared to HTST spaghetti, LTLT spaghetti had increased brightness (L\*) and reduced redness (a\*) (Table 2). In addition, LTLT spaghetti was less firm after 10 minutes of cooking compared to HTST spaghetti, and was more similar to the 100% durum semolina spaghetti (Table 2). Increasing the protein content of yellow pea flour did not negatively impact spaghetti quality, and therefore high protein yellow pea flour produced from roller milling would be recommended for use in spaghetti to improve nutritional value of the product. Following the LTLT drying method during processing would also be recommended, which will minimize differences in colour and texture when incorporating yellow pea flour in spaghetti formulations.

Nutrition Facts for Spaghetti Formulated with 30% High Protein Yellow Pea Flour

Nutrition Facts	
Serving Size (56g)	
Servings Per Container	
Amount Per Serving	
<b>Calories 190</b>	<b>Calories from Fat 5</b>
% Daily Value*	
<b>Total Fat 0.5g</b>	<b>1%</b>
Saturated Fat 0g	0%
Trans Fat 0g	
<b>Cholesterol 0mg</b>	<b>0%</b>
<b>Sodium 0mg</b>	<b>0%</b>
<b>Total Carbohydrate 40g</b>	<b>13%</b>
Dietary Fiber 2g	10%
Soluble Fiber 0g	
Sugars 2g	
<b>Protein 9g</b>	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%
Folate 10%	



HTST Processed Spaghetti



LTLT Processed Spaghetti

Spaghetti Formulated with 30% Yellow Pea Flour and Processed by Different Drying Methods

L-R: 100% durum semolina, 30% low protein yellow pea flour, 30% medium protein yellow pea flour, 30% high protein yellow pea flour. Top row displays HTST processed spaghetti. Bottom row displays LTLT processed spaghetti.

CONTACT US

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Project Partners and Funders



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