Spaghetti Formulated with Yellow Pea Semolina

Yellow Pea Semolina in Spaghetti

Spaghetti and other pasta products consumed globally are traditionally made using durum semolina. The addition of novel ingredients to increase nutritional value of spaghetti will help to improve health and well-being of its consumers. Yellow peas contain 20-25% protein, 10-15% dietary fibre, as well as essential vitamins and minerals including folate, iron and selenium. Through roller milling technology, yellow peas can be processed into yellow pea semolina products that have similar physical specifications to durum semolina. To add yellow pea semolina to spaghetti while preserving end-product quality, the formulation and processing parameters need to be optimized. Understanding how factors such as yellow pea semolina granulation and pasta drying methods affect spaghetti quality will facilitate successful incorporation of yellow pea semolina into spaghetti.

Spaghetti Formulation and Processing

Fine and coarse granulation yellow pea semolina were produced using the same roller milling technology that is used for durum semolina production (Table 1). A 30/70 % yellow pea/durum semolina blend was used to produce spaghetti. 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 Semolina

Semolina	Particle Size (µm)	Water Absorption Capacity (%)
Durum Semolina	382.3	0.79
Fine Yellow Pea Semolina	332.8	1.8
Coarse Yellow Pea Semolina	702.9	1.6

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

Spaghetti Formulation	Spaghetti Processing Parameters		HTST/LTLT Spaghetti End-Quality			
	Water Addition (%)	Extruder Head Pressure (Bars)	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% Fine Yellow Pea Semolina	29	75	57.7/71.2	21.8/5.8	49.5/53.2	687.0/500.7
30% Coarse Yellow Pea Semolina	29	75-85	57.8/70.9	21.3/6.4	49.1/52.6	602.7/415.7

Results and Recommendations

No adjustments in water addition or extruder head pressure settings were required between the fine and coarse pea semolina formulations. However, the amount of water added to the yellow pea semolina formulations was reduced by 2% compared to the 100% durum semolina formulation. Reducing the water addition prevented the dough crumb from becoming too sticky, which would negatively affect extrusion.

Changing the pasta drying method lead to changes in the appearance of dry spaghetti made with yellow pea semolina. The LTLT drying method produced yellow pea semolina spaghetti that was brighter (L*) and less red (a*) than yellow pea semolina spaghetti produced by the HTST drying method (Table 2). Optimal cooking time was not different among all spaghetti samples, indicating that neither the addition of yellow pea semolina nor the drying method had an effect on spaghetti cooking time (data not shown). On the other hand, following the HTST drying method led to increased cooked firmness in all spaghetti compared to the LTLT drying method (Table 2). Firmness of cooked yellow pea semolina spaghetti was most similar to the 100% durum semolina spaghetti when both the LTLT drying method was followed and a fine granulation yellow pea semolina was used in formulation. Therefore, when adding yellow pea semolina to spaghetti, it would be recommended that the formulation be adjusted to use a fine granulation yellow pea semolina that has a particle size similar to durum semolina, and that the processing be adjusted to follow the LTLT drying method. This formulation and processing combination will maintain the bright appearance and firm texture desired in spaghetti products.

Spaghetti Formulated with 30% Yellow Pea Semolina and Processed by Different Drying Methods
L-R: 100% durum semolina, 30% fine granulation yellow pea semolina, 30% coarse granulation yellow pea semolina.

HTST Processed Spaghetti **LTLT Processed Spaghetti**

CONTACT US
To learn more about the Cigi Pulse Flour Milling and Utilization Project or to discuss your application needs please contact:

Heather Maskus, MSc
Project Manager
Cigi Pulse Milling Project
Tel: 204-984-3139
hmaskus@cigi.ca

Lindsay Bourré, MSc
Technical Specialist
Cigi Pulse Milling Project
Tel: 204-984-1063
lbourre@cigi.ca

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