



Effect of faba bean content on color, cooking and textural properties of soft wheat-based fresh pasta

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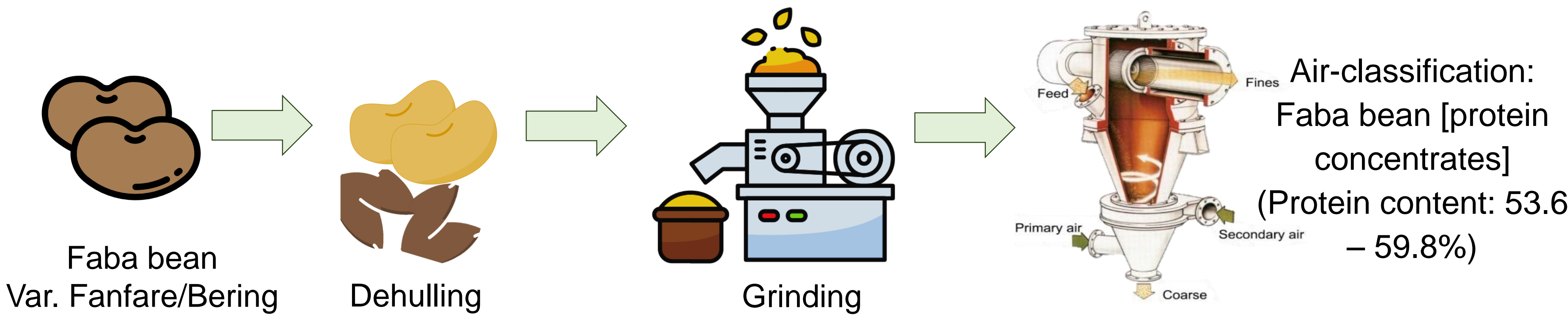


Background & Objective

- **16.9 million tons** of pasta produced in the world in 2022 (IPO).
- Mostly made of **hard wheat** but it represents only **5%** of global wheat production.
- **Soft wheat** is more abundant, especially in regions like Belgium (**1.9 million tons** in 2019).
- **Faba bean** is high in **protein** (23 – 41%, db) and can be combined with **soft wheat** to produce fresh pasta with **high nutritional value**. But can affect the dried pasta properties.
- The objective of this study is to investigate the production of **fresh pasta** using **soft wheat** and the impact of supplementing it with **faba bean fractions**, on **chemical**, **textural** and **cooking properties**.

Material

Faba bean fractions production



Pasta formulation

	Hydration level	Mass ratio
Wheat	53.1	
W-Fanf	42.9	70/30
W-[Fanf]	46.4	82.6/17.4
W-Ber	42.9	70/30
W-[Ber]	43.6	82.9/17.1

The table is followed by a diagram showing the 'Kneading' process in a red stand mixer and the 'Extrusion' process in a blue extruder.

- Preliminary work was performed to choose the optimal water amount for an acceptable dough consistency, using a farinograph.

Methods

Chemical properties

- Dry matter: 2h45 in oven at 130°C
- Crude proteins: DUMAS method (conversion factor 6.25)
- Ash content: mineralization overnight in muffle furnace at 600°C
- Starch content: Ewers method (ISO, 1997)

Textural properties

- Compression tests were performed with a 35mm cylindrical probe on 2 pasta strings, raw and cooked. A constant deformation (1mm/s) to 70% strain was applied.
- Several parameters were measured and calculated: Hardness (N), resilience (%), adhesiveness (N.sec), cohesion (%), springiness (%), gumminess and chewiness.

Cooking properties

- Cooking time: the optimal time for pasta cooking (min)
- Cooking loss:

$$CL (\%) = \frac{DM_w}{DM_p} * 100$$

(DMw is the dry mass of the cooking water. DMp is the dry weight of raw pasta)

- Water index:

$$WI (\%) = \frac{W_2 - W_1}{W_1} * 100$$

(W₂ is the pasta mass after cooking and W₁ is the pasta mass before cooking)

Colour

Doughs, raw pasta and cooked pasta colours were determined on the L*, a*, b* CIELAB spectrum.

Results

- Protein content **was increased** from **12.5** to **18.4 – 21.3%** (db).
- Ash content **was increased** by about **40%**.
- Integrating faba bean **improved** the pasta hardness (increased up to **76%**) while maintaining most of the other texture properties.
- Incorporating faba bean **increased** the cooking time (from **4** to **7-9 min**).
- It also **increased** the WI by **15.8** to **26.7%**.
- Faba bean-containing pasta has **similar** (**4.5%**) or **higher** CL (**5.8%**) than wheat-based pasta.
- **Improved** colour (high brightness, low redness and moderate yellowness) was obtained with faba bean addition.

Conclusion

- Faba bean had a low impact on the pasta quality but improved its nutritional value.
- Improvement of pasta's hardness and colour was observed.
- Faba bean addition has limited impact on gluten network in soft wheat fresh pasta.
- Faba bean-soft wheat pasta provides a local, nutritious option, promoting sustainability and supporting local agriculture.

References

- Fuad & Prabhasankar (2010)
- Hoehnel et al. (2020)
- FAOSTAT, 2019

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