

Dry fractionation of rapeseed meal for the production of protein and phenolic enriched fractions

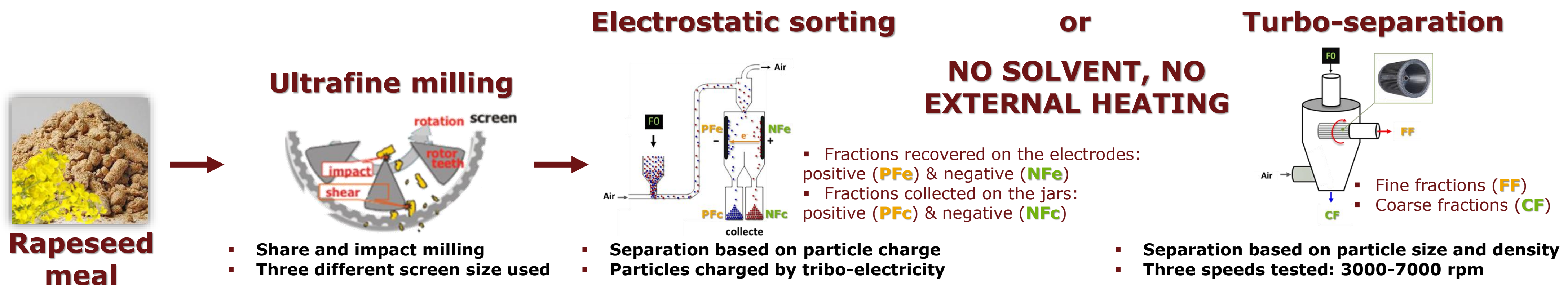
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Objective

Separate the phenolic fraction from the proteins of the rapeseed meal (RSM) by using dry fractionation processes: ultrafine milling combined with electrostatic sorting or turbo-separation.

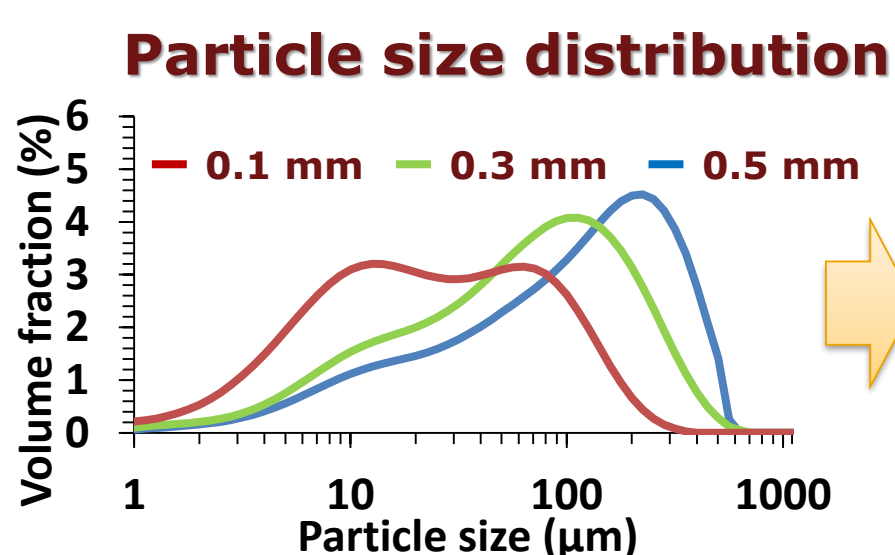
Materials & methods



Particle size distribution, total phenolic content (TPC) protein content and recovery yield determined

Results & discussions

Ultrafine milling

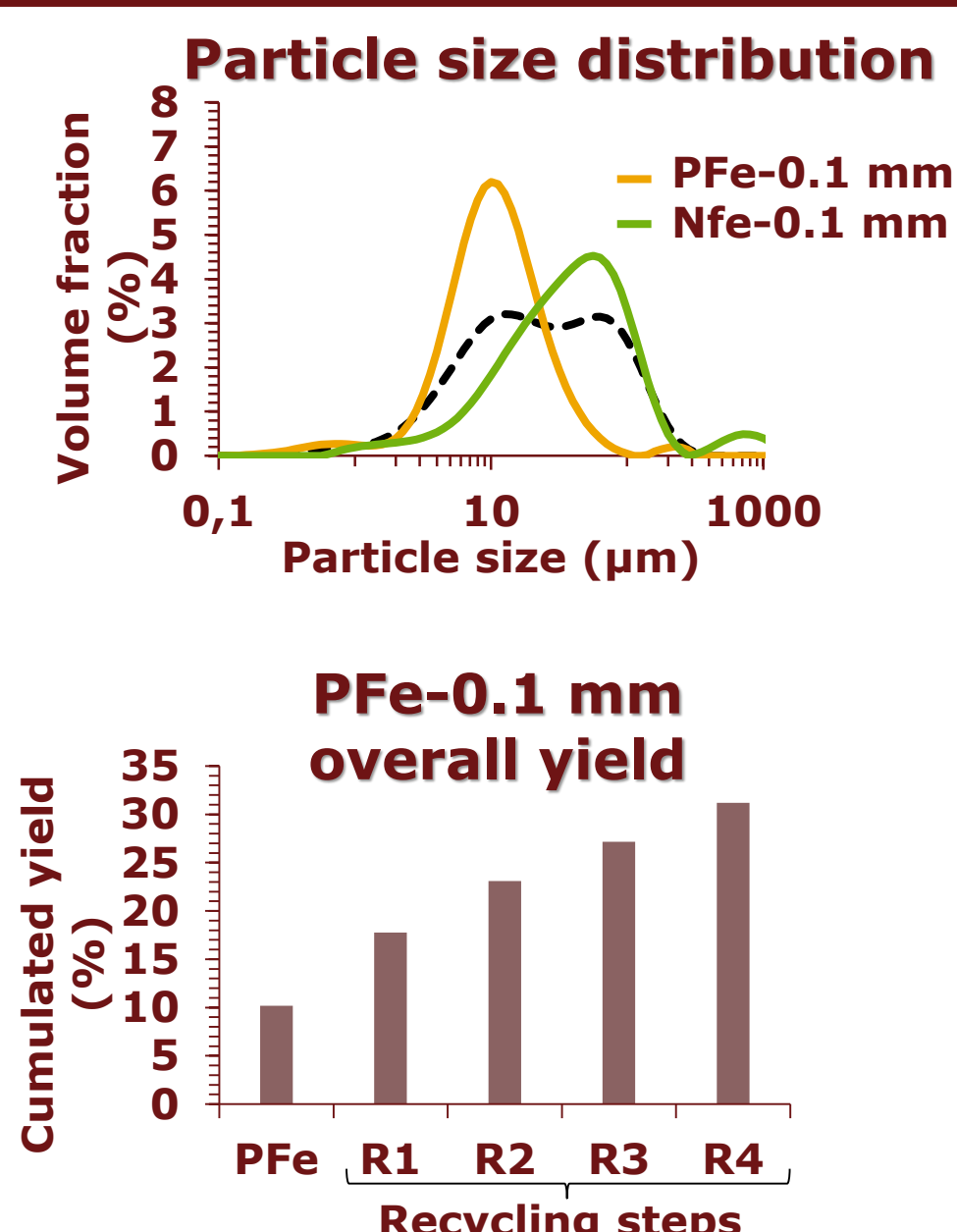
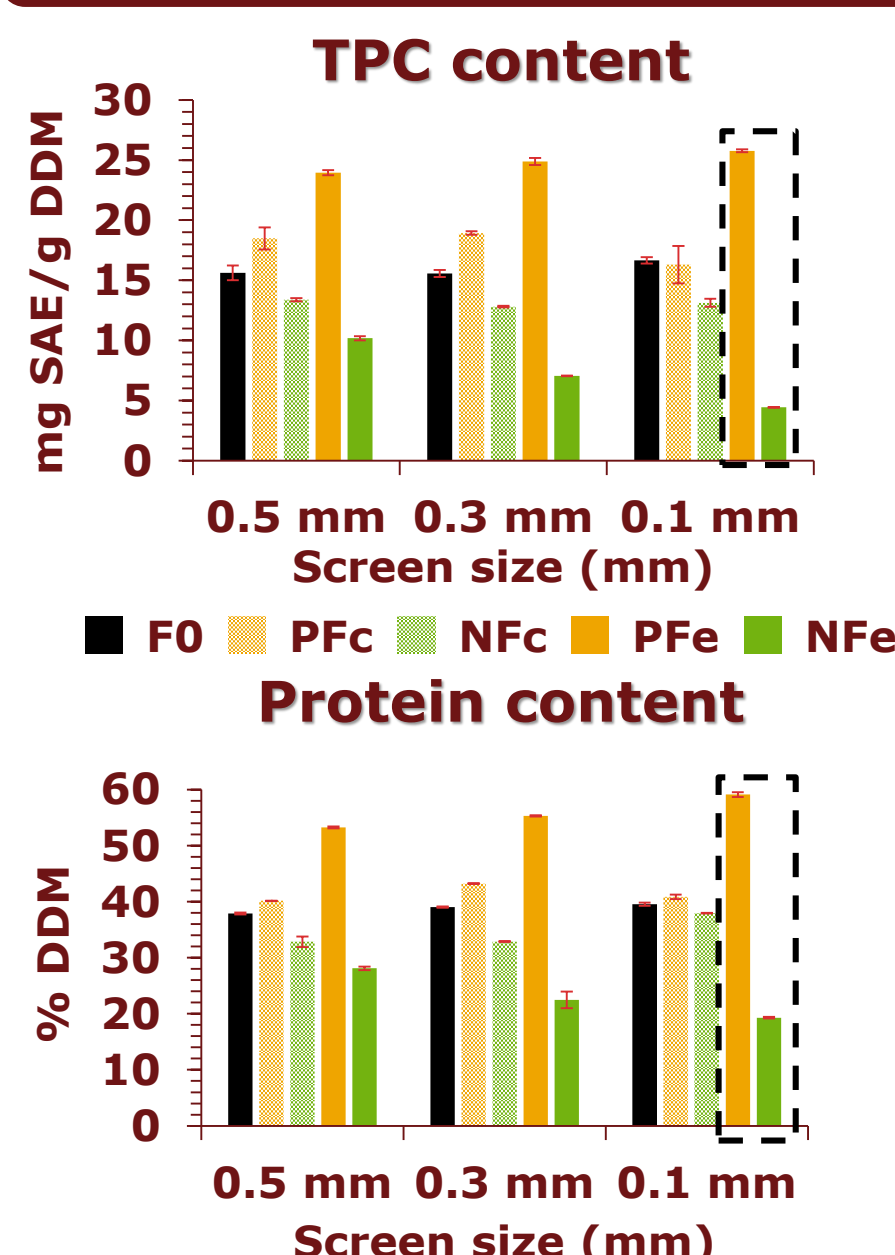


Screen size (mm)	Initial	0.5	0.3	0.1
Recovery yield (w%)	--	96.0 ± 0.6 ^a	95.8 ± 0.8 ^a	95.9 ± 0.3 ^a
Proteins (% DDM*)	37.7 ± 0.8 ^b	37.9 ± 0.2 ^b	39.0 ± 0.1 ^c	39.5 ± 0.3 ^c
TPC (mg SAE/g DDM)	16.6 ± 0.8 ^f	15.6 ± 0.6 ^f	15.6 ± 0.3 ^f	16.6 ± 0.3 ^f

*DDM : deffated dry matter

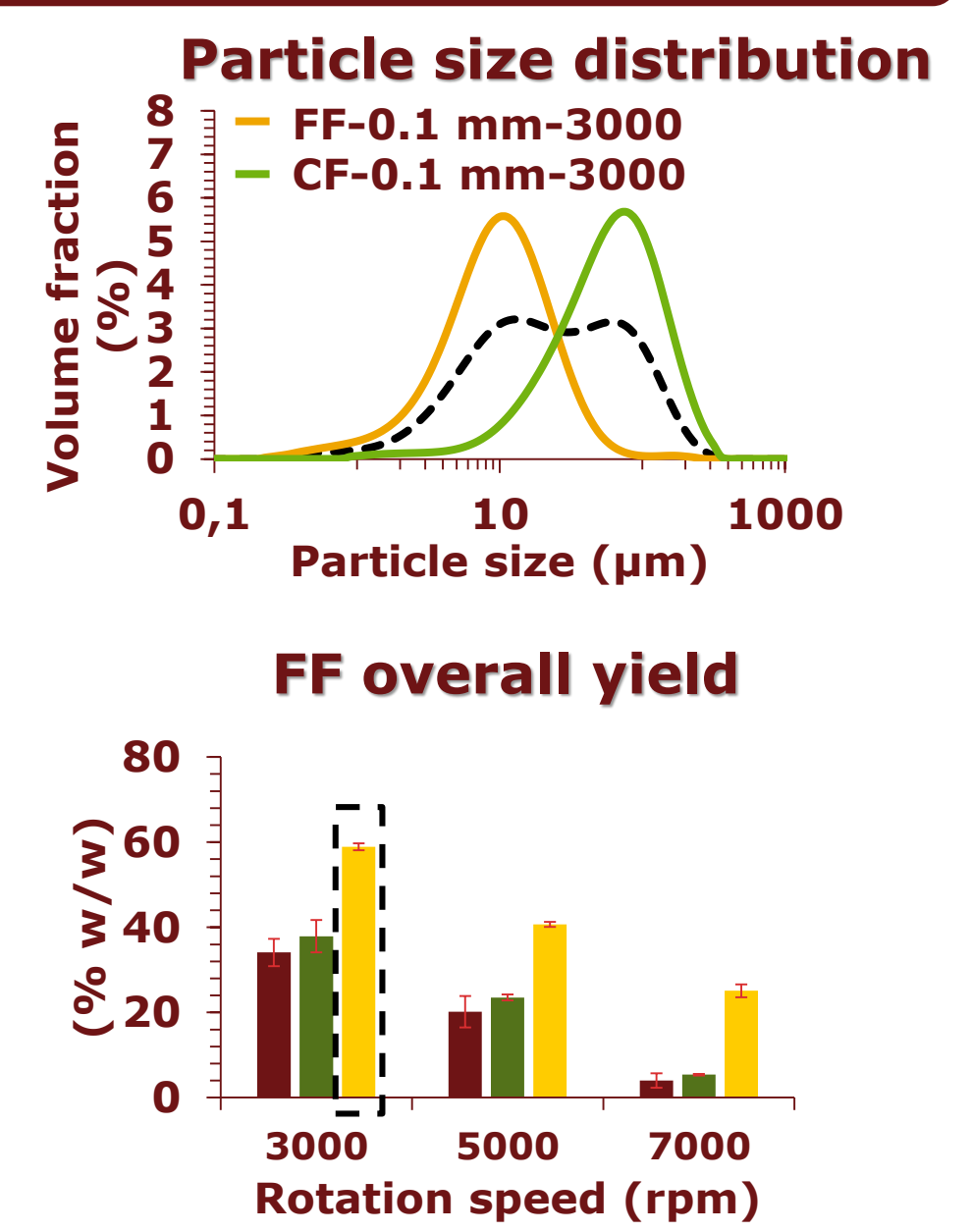
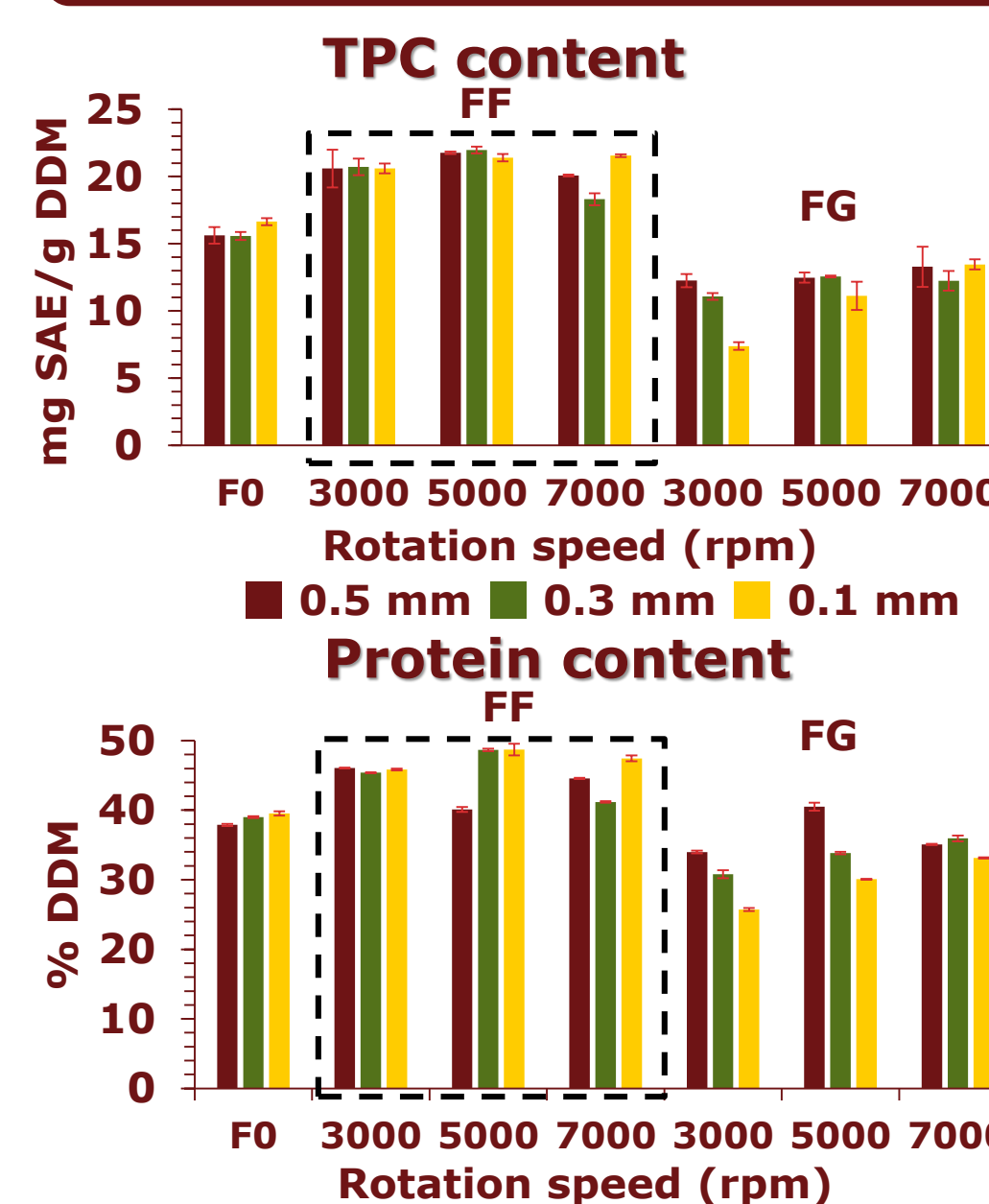
- Decrease of the screen size: appearance of two populations.
- Hypothesis: detachment of the small globular protein bodies from the cellular matrix.
- Protein and TPC content not affected by the milling process.

Electrostatic sorting



- Finest and more easily charged particles recovered on the electrodes.
- PFe fractions enriched with proteins/phenolics.
- Highest protein/TPC content obtained in the PFe of the finest RSM (TPC = 25.8 ± 0.1 mg SAE/g DDM, proteins = 59.1 ± 0.4 % DDM).
- After re-passing four times the corresponding collected fractions, the PFe overall yield increased (≈ 31%).

Turbo-separation



- FF fractions enriched with proteins/phenolics.
- No clear influence of the rotation speed and the recovery of protein/phenolics observed.
- Best overall recovery yields of the FF fractions obtained with the finest RSM, the highest (58.9 ± 1.4 %) obtained at 3000 rpm: TPC = 20.6 ± 0.2 mg SAE/g DDM, proteins = 45.9 ± 0.1 % DDM).

Conclusions

Proteins are somehow linked to phenolics and they can't be separated by dry fractionation processes. However, these processes can be seen as a mild pre-purification step of protein and phenolics. Also, the enriched protein/phenolic fractions could be used as emulsifiers displaying strong antioxidant activities.