

# Increase of the protein content of rapeseed meal by sifting technology

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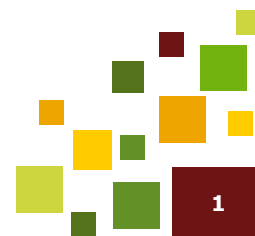
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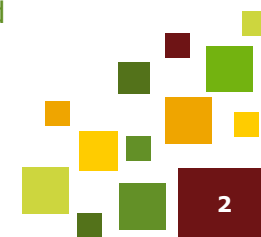
**15th International Rapeseed  
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# Distribution of the Main Components of Rapeseed Seeds in Kernel and Hull fractions

Fraction	Kernel	Hull
Mass	82%	18%
Oil	97%	3%
Protein	89%	11%
Crude Fibre	27%	73%
Glucosinolates	96%	4%

Ref : Carré P., Citeau M. & Quinsac A. 2015. Composition of kernels and hull fractions obtained from rapeseed dehulling. *Proceedings of the 14th International Rapeseed Congress*, Saskatoon, 2015.

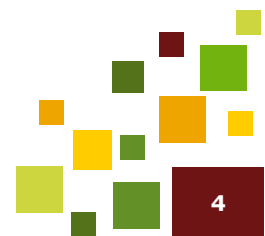
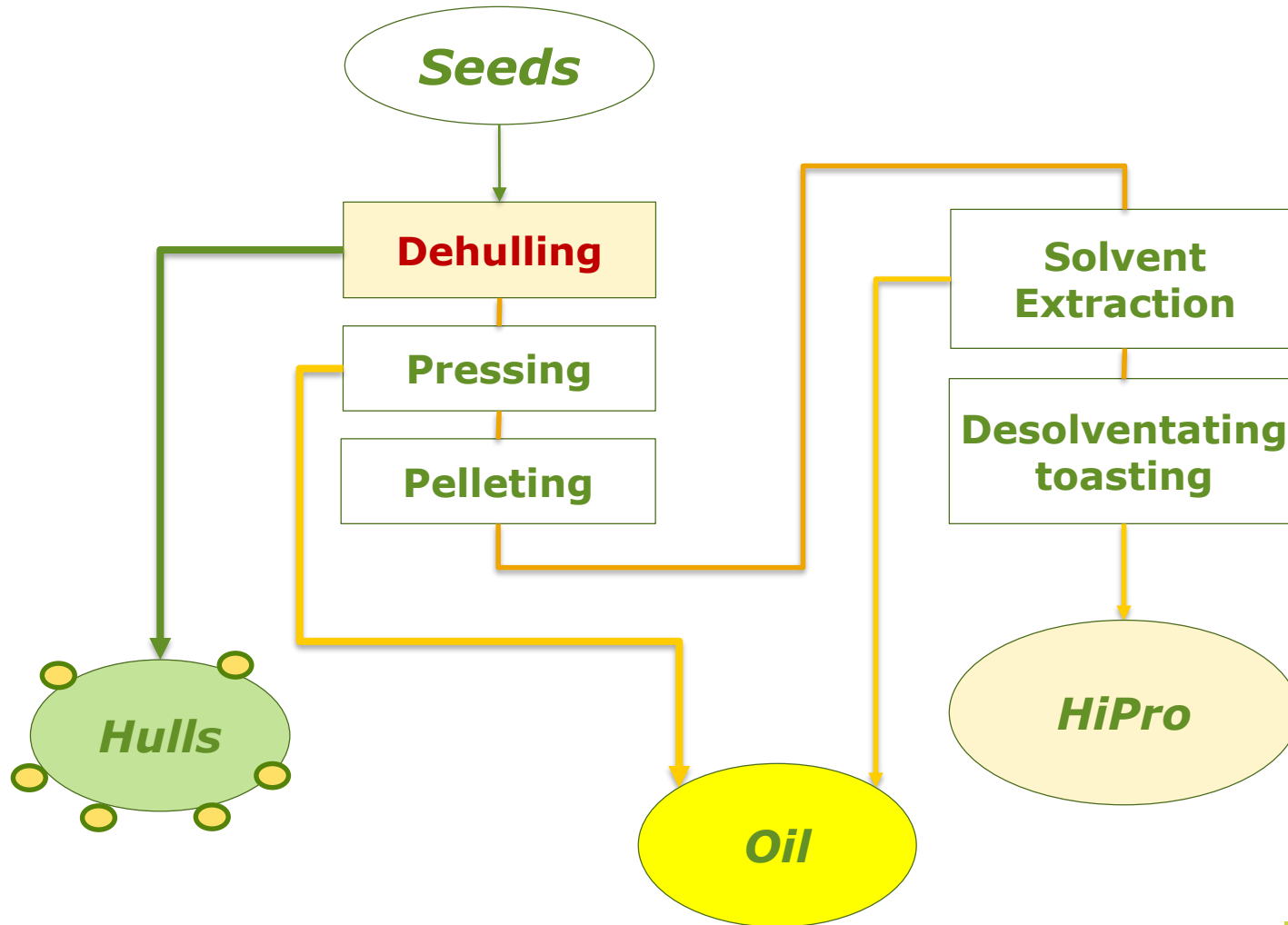


# Effect of dehulling on protein and fibre contents in rapeseed meal

	<b>Protein content</b> (% RM)	<b>Crude Fibre content</b> (% RM)
<b>Whole</b>	<b>33,1</b>	<b>14,1</b>
<b>Dehulled</b>	<b>37,8</b> <b>(+4,7)</b>	<b>7,0</b> <b>(-7,1)</b>



# Dehulling in rapeseed crushing process



# The Limits of Dehulling :

Lower pressing performance

Oil losses (6%) in hulls

Low valorisation of hulls

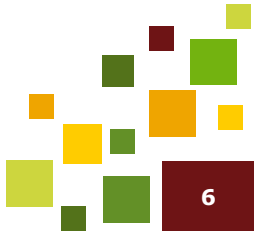
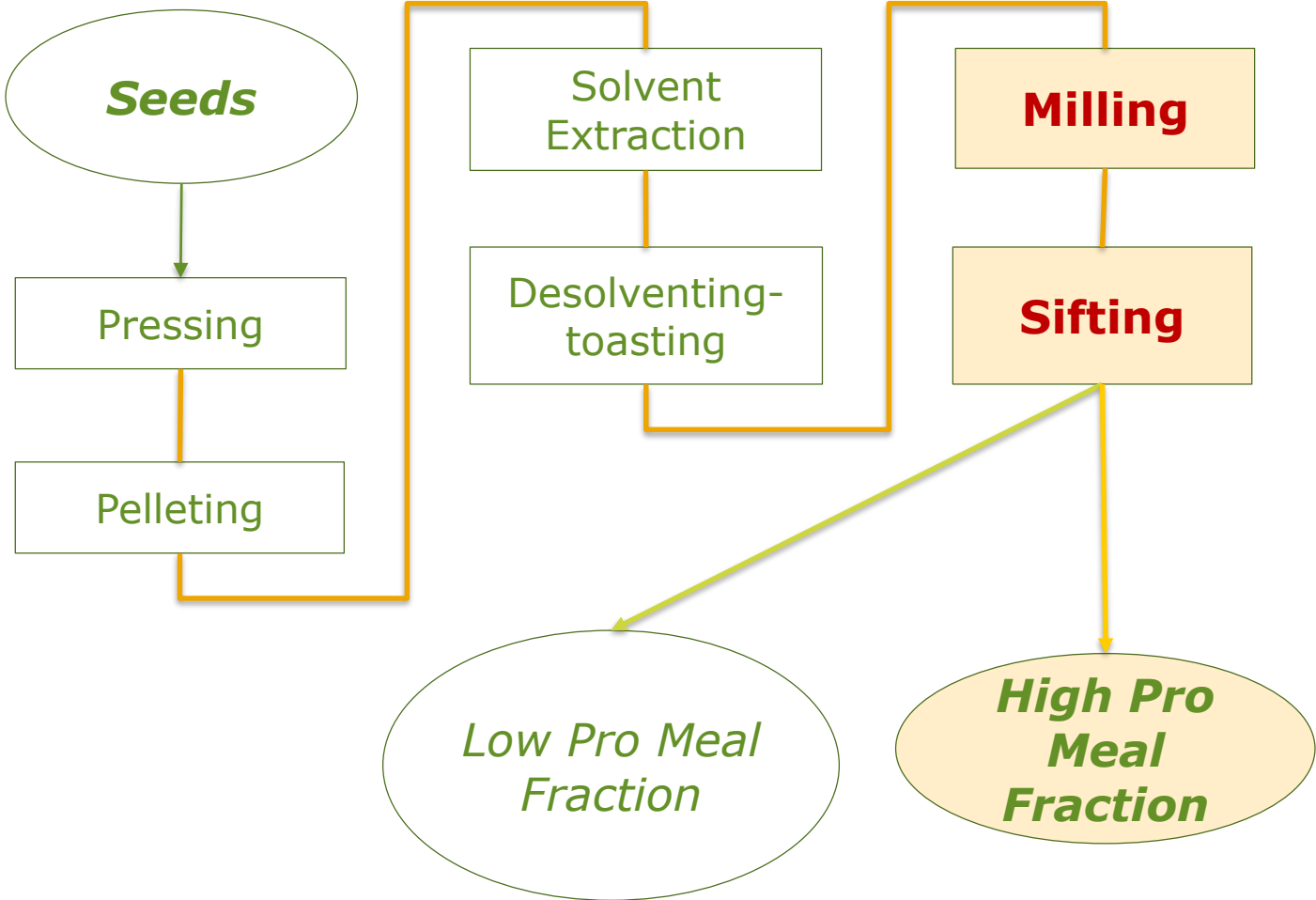
**→ interest of separating hulls and kernels after complete deoiling**

- **Sifting technology**

**→ Simple and low cost**



# Sifting in the crushing process



# Granulometry Analysis on planshister



*Sifting of rapeseed meal with 5 sieves*



**> 1000  
µm**

**500 to  
1000**

**250 to  
500**

**150 to  
250**

**100 to  
150**

**< 100**



# Mass and protein yields vs. particle size distribution of rapeseed meal

Meal Fraction	Protein content	Protein yield (1)	Meal Yield (2)	Concentration Factor
( $\mu\text{m}$ )	(% DM)	(%)	(%)	(3)
> 1000	38,8	34,4	33,9	1,01
500 - 1000	33,8	27,3	30,9	0,88
250 - 500	40,0	23,3	22,3	1,04
150 - 250	45,1	10,5	8,9	1,18
100 - 150	45,0	3,7	3,2	1,18
< 100	40,8	0,9	0,8	1,07
<b>Total</b>	<b>37,4</b>	<b>100,0</b>	<b>100,0</b>	<b>1,00</b>

(1) : Ratio Meal fraction Protein mass / Total Protein mass

(2) : Ratio Meal fraction mass / Total Meal mass

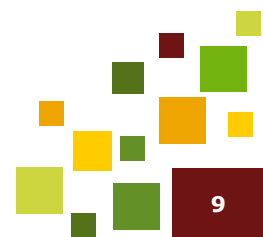
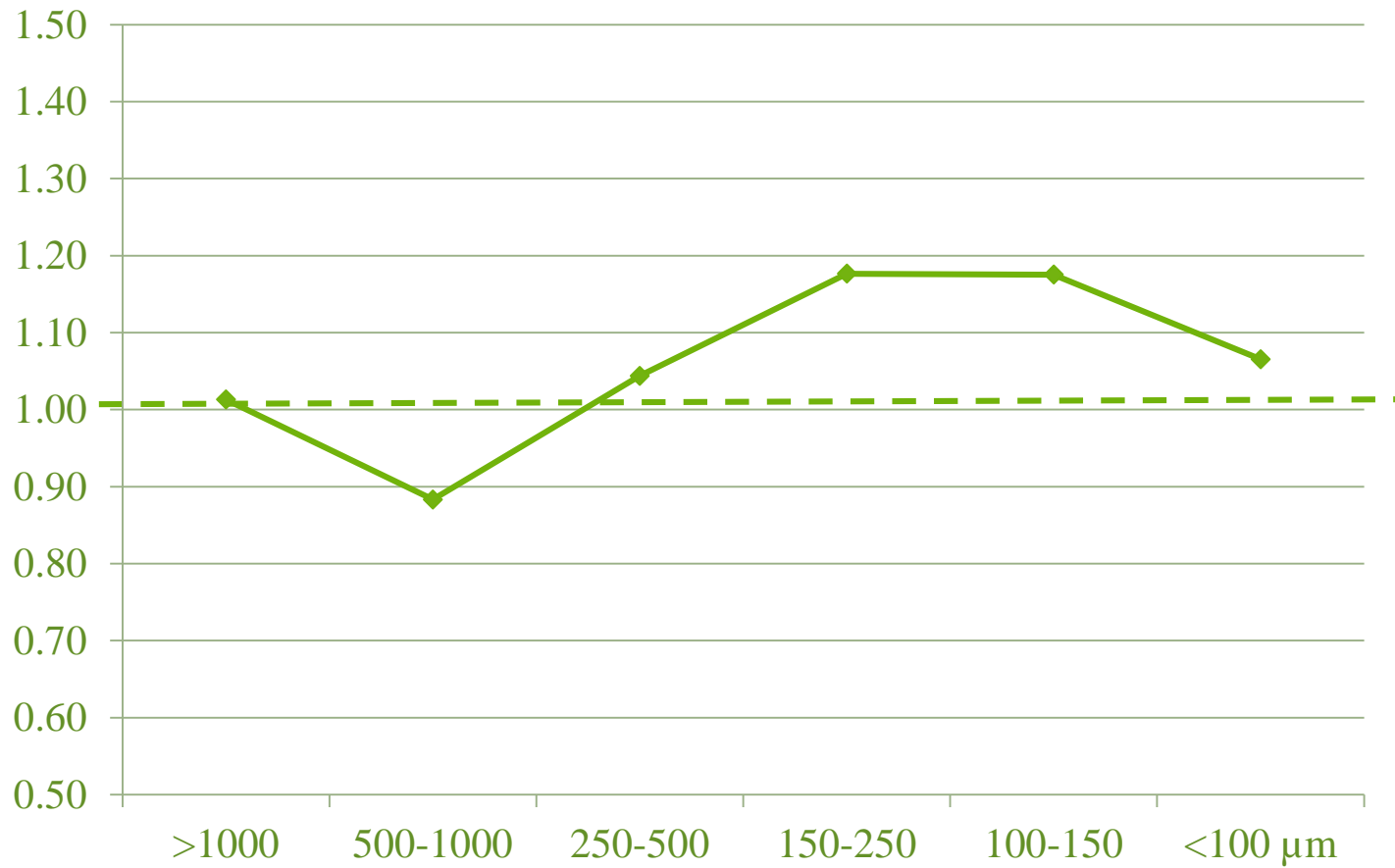
(3) : Ratio Protein yield / Meal yield





# Concentration factor vs. particle size distribution

*(Ratio Protein yield / Meal yield)*



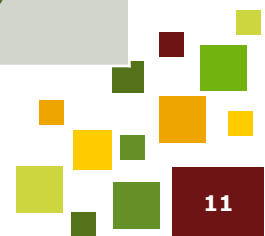
# Simulation of binary sifting of rapeseed meal (38,3 %) DM)

Fractions (µm)	Mass balance (%)	Protein content (%MS)	Variation (%MS)
>1000	33,9	38,8	+0.51
<1000	66,1	38,0	-0.26
>500	64,8	36,4	-1.86
<500	35,2	41,7	+3.44
>250	<b>87,1</b>	<b>37,3</b>	<b>-0.96</b>
<250	<b>12,9</b>	<b>44,8</b>	<b>+6.48</b>
>150	96,0	38,1	-0.24
<150	4,0	44,1	+5.85
>100	99,2	38,3	-0.02
<100	0,8	40,8	+2.51

# Binary sifting of ~ 500 kg Rapeseed Meal

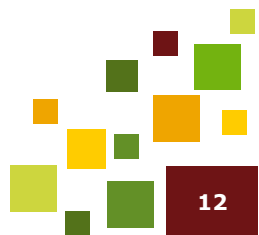
(Protein content 37.6 % DM)

Fraction ( $\mu\text{m}$ )	< 250	> 250
Mass (kg DM)	44,5	400
Meal yield (%)	<b>10,0</b>	90,0
Protein (% DM)	<b>44,6</b>	36,8
Protein Concentration Factor	1,19	0,98
Glucosinolates ( $\mu\text{mol/g DM}$ )	11,6	9,6



# Conclusions

- **Sifting is easily applicable on deoiled meal and could be implemented in the current crushing process at a low cost (< 10 €/t)**
- **Sifting is efficient to increase the protein content (+ 7 à 12 pts with ~10% meal yield)**
- **The protein depleted fraction (in the case of 90% yield) remains similar to the initial meal (decrease of protein content by only 1 pt)**
- **Fractioning strategy must be defined according to the uses of the two fractions to maximize the global value**



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