

During the hydrolysis of wheat bran, some proteins are added (enzymes = proteins)

- Our hypothesis is that this will allow to obtain higher proteins content in wheat bran residues at the end of the hydrolysis reaction
- So more proteins in wheat bran for feed application

Wheat bran hydrolysis with cellulases and hemicellulases

WBF: wheat bran from Biowanze



WBF + Water + enzymes



Hydrolysis at 50°C during 24h



At the end of hydrolysis:
liquid phase containing saccharides
+ starch phase
+ **WBF residues (= WBF-HE)**



WBF characterization

Van Soest analysis
Starch quantification
Proteins and amino acids

Starch quantification

% starch / initial DM	
WBF	28.2
WBF-HE	10

Less starch in WBF residues after HE (= WBF-HE) compared to initial WBF

Van Soest analysis

	% / initial DM			
	Solubles	Hemicelluloses	Cellulose	Lignins
WBF	29.0 +/- 1.1	57.6 +/- 2.6	8.4 +/- 1.2	4.7 +/- 1.0
WBF-HE	24.8 +/- 3.3	43.4 +/- 2.2	17.6 +/- 0.9	15.5 +/- 0.3

Enzymatic hydrolysis generate a decrease of solubles (notably starch and possibly proteins) and hemicelluloses fractions in WBF residues (WBF-HE).

These losses explain the higher cellulose and lignins contents in WBF-HE compared to initial WBF.

Proteins and amino acids analysis by Upscience

(see analytical reports on slides 5 – 6)

	Total proteins (g/100 g)	Total amino acids (g/100 g)
WBF	14.6 +/- 0.4	13.3 +/- 1.06
WBF-HE	10.5 +/- 0.4	8.31 +/- 0.66

Less proteins in WBF residues after HE (= WBF-HE) compared to initial WBF
 As a consequence, the amino acids content decreased in WBF-HE and the decrease concerned all amino acids (see analytical report)

Conclusions:

- ✓ The hydrolysis is responsible for an important loss of proteins in wheat bran (WBF-HE). Proteins from WBF are probably released as solubles during the reaction.
- ✓ The addition of enzymes (= proteins) during the hydrolysis step did not allowed increasing the proteins content in the WB residues after hydrolysis (WBF-HE)

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ANALYSE	RESULTATS ± INCERTITUDES	UNITES	CIBLE / SPECIFICATIONS	CONFORMITE
AZOTE DUMAS				
<i>Méthode Interne DUMAS-H 14</i>				
AZOTE TOTAL DUMAS ☉	2,34 ± 0.07	g/100g	-	-
AZOTE TOTAL DUMAS /SEC	ND	g/100g MS	-	-
PROTEINES DUMAS (Nx6.25) ☉	14,6 ± 0.4	g/100g	-	-
PROTEINES DUMAS (Nx6.25) /SEC	ND	g/100g MS	-	-
PROTEINES DUMAS (Nx5.7) ☉	13,3 ± 0.4	g/100g	-	-
ACIDES AMINES TOTAUX				
<i>Règlement CE 152/2009 du 27-01-2009</i>				
ACIDE ASPARTIQUE ☉	1,05 ± 0.08	g/100g	-	-
THREONINE ☉	0,49 ± 0.04	g/100g	-	-
SERINE ☉	0,65 ± 0.05	g/100g	-	-
ACIDE GLUTAMIQUE ☉	2,78 ± 0.22	g/100g	-	-
PROLINE ☉	0,95 ± 0.08	g/100g	-	-
GLYCINE ☉	0,78 ± 0.06	g/100g	-	-
ALANINE ☉	0,73 ± 0.06	g/100g	-	-
CYSTINE ☉	0,31 ± 0.03	g/100g	-	-
VALINE ☉	0,73 ± 0.06	g/100g	-	-
METHIONINE ☉	0,22 ± 0.03	g/100g	-	-
ISOLEUCINE ☉	0,46 ± 0.04	g/100g	-	-
LEUCINE ☉	0,95 ± 0.08	g/100g	-	-
TYROSINE ☉	0,52 ± 0.04	g/100g	-	-
PHENYLALANINE ☉	0,58 ± 0.05	g/100g	-	-
HISTIDINE ☉	0,39 ± 0.03	g/100g	-	-
LYSINE ☉	0,59 ± 0.05	g/100g	-	-
ARGININE ☉	1,04 ± 0.08	g/100g	-	-
HYDROXYPROLINE	< 0,20	g/100g	-	-
HYDROXYLYSINE	< 0,02	g/100g	-	-
SOMME DES ACIDES AMINES	13,20 ± 1.06	g/100g	-	-

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ANALYSE	RESULTATS ± INCERTITUDES	UNITES	CIBLE / SPECIFICATIONS	CONFORMITE
AZOTE DUMAS				
<i>Méthode Interne DUMAS-H 14</i>				
AZOTE TOTAL DUMAS ©	1,68 ± 0.07	g/100g	-	-
AZOTE TOTAL DUMAS /SEC	ND	g/100g MS	-	-
PROTEINES DUMAS (Nx6.25) ©	10,5 ± 0.4	g/100g	-	-
PROTEINES DUMAS (Nx6.25) /SEC	ND	g/100g MS	-	-
PROTEINES DUMAS (Nx5.7) ©	9,6 ± 0.4	g/100g	-	-
ACIDES AMINES TOTAUX				
<i>Règlement CE 152/2009 du 27-01-2009</i>				
ACIDE ASPARTIQUE ©	0,71 ± 0.06	g/100g	-	-
THREONINE ©	0,38 ± 0.03	g/100g	-	-
SERINE ©	0,43 ± 0.03	g/100g	-	-
ACIDE GLUTAMIQUE ©	1,29 ± 0.10	g/100g	-	-
PROLINE ©	0,48 ± 0.04	g/100g	-	-
GLYCINE ©	0,69 ± 0.06	g/100g	-	-
ALANINE ©	0,48 ± 0.04	g/100g	-	-
CYSTINE ©	0,28 ± 0.03	g/100g	-	-
VALINE ©	0,42 ± 0.03	g/100g	-	-
METHIONINE ©	0,12 ± 0.03	g/100g	-	-
ISOLEUCINE ©	0,29 ± 0.03	g/100g	-	-
LEUCINE ©	0,64 ± 0.05	g/100g	-	-
TYROSINE ©	0,33 ± 0.03	g/100g	-	-
PHENYLALANINE ©	0,35 ± 0.03	g/100g	-	-
HISTIDINE ©	0,31 ± 0.03	g/100g	-	-
LYSINE ©	0,37 ± 0.03	g/100g	-	-
ARGININE ©	0,75 ± 0.06	g/100g	-	-
HYDROXYPROLINE	< 0,20	g/100g	-	-
HYDROXYLYSINE	< 0,02	g/100g	-	-
SOMME DES ACIDES AMINES	8,31 ± 0.66	g/100g	-	-