

MODERN APPLICATIONS OF VITAL GLUTEN IN BAKERY PRODUCTS AND HIGHER DEMANDS FOR ITS QUALITY

MARKUS BRUNNBAUER

OVERVIEW

- Vital Gluten
- Applications
- Methods for Quality Tests
- Conclusion and Prospects

backaldrin – THE KORNSPITZ® COMPANY



- Austrian producer of ingredients for the baking industry
Mainly bakery premixes and improvers
- Established in 1964
- Inventor of the Kornspitz®, one of the most successful trademarks for bakery products
- Production facilities in 7 different countries
- Distribution in over 100 countries

Kornspitz®



VITAL GLUTEN

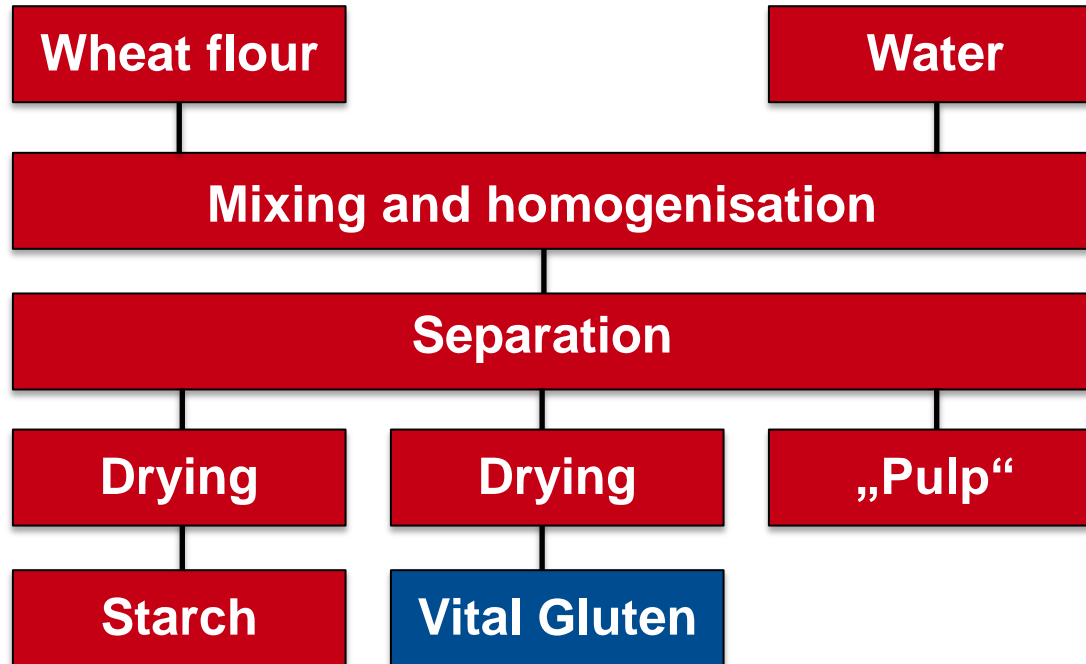
- Primary by-product of the wheat starch production
- Currently gaining more and more importance

➔ **tight market,**
especially for special qualities
(e.g. organic gluten)



VITAL GLUTEN

- Production:



VITAL GLUTEN

Applications:

- Fortification of flours
- Compensation of fluctuating flour quality
- Adjustment of the visco-elastic properties from wheat doughs
- Increased dough stability during fermentation

CURRENT DEVELOPMENTS

backaldrin®

Clean label:

Omitting additives like

- DATEM (increased dough stability)
- Thickeners (increased water absorbance)



Partly compensation with vital gluten



“Shorter recipes”:

Decreasing the amount of ingredients



Higher requirements on the quality of the remaining ingredients

CURRENT DEVELOPMENTS

Modern technologies in the baking industry:

- More and more specialized production lines
 - Long-time-fermentation
 - Frosting technologies
 - Storage of frozen dough pieces
- ➡ **Higher requirements for dough properties**

e.g. machinability, dough stability, etc.

➡ **Higher stability of the dough quality parameters**

Resulting in higher quality of the ingredients

PROTEIN ENRICHED BREAD

backaldrin®

- In Europe increasing popularity within the last 10 years
- High amount of proteins (~ 20 g/100 g)

At least compliance with the EU regulation:

High protein content

(requirement: basis for at least 20% of the total energy value)

- Often in combination with high fibre content
- At the beginning mainly tin loafs or with loose shape
- At present more and more diversification and new product categories



PROTEIN ENRICHED BREAD

backaldrin®

- Challenging baking processes due to
 - low starch content
 - high water content
 - techno-functional properties of the protein sources

➔ Vital gluten

- Consequences:

- ➔ Content of vital gluten higher than in conventional applications
- ➔ Mainly tailor made products



CONCLUSION

Therefore for vital gluten higher requirements are necessary

- To receive more variation in the techno-functional properties
- For a better stability of the quality

Problems:

- Not enough information about the correlation between the properties of vital gluten and its influence on dough and bread quality
- Which analytical methods are useful for defining and controlling the gluten quality?

GLUTOPEAK

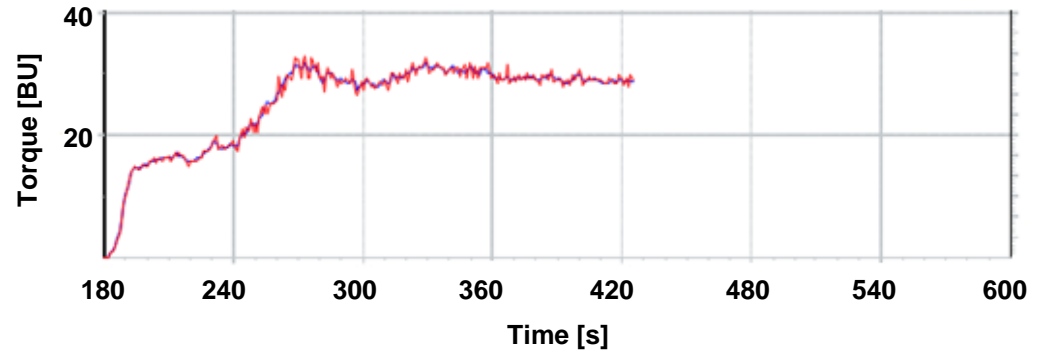
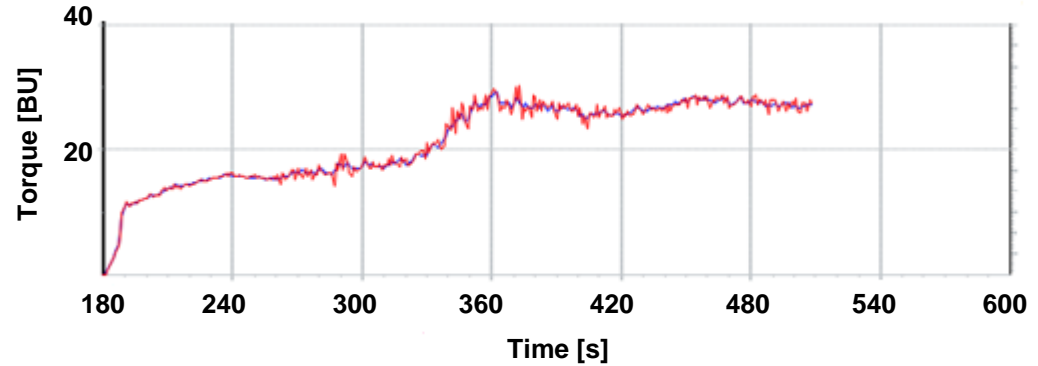
(Brabender)

- Dilution with Saccharose
- High speed mixing with NaCl-Solution
- Determination of the torque and the aggregation time

➔ Correlations between aggregation time and dough development time



backaldrin®



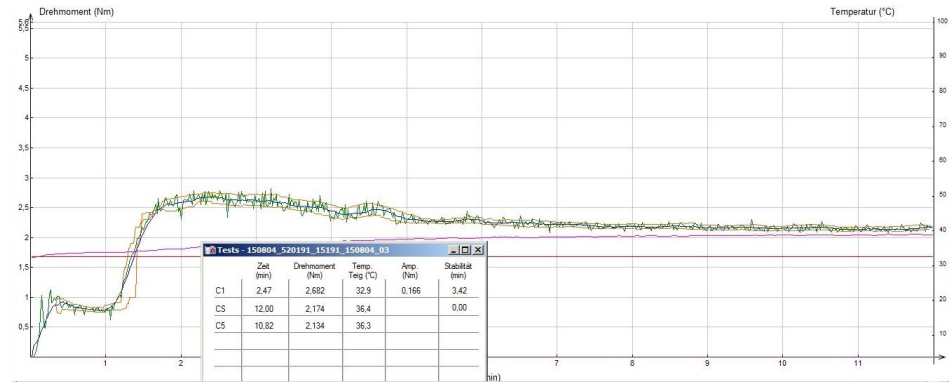
(Dreisoerner J, 2014; Feilmeier N, 2016)

MIXOLAB

(Chopin: according project 2008-004F)

backaldrin®

- Mixing with water
- Determination of the torque and the aggregation time
- Similar correlations compared to the Glutopeak
- Design of the mixer suitable for the hydration of gluten

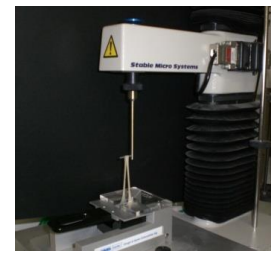


But: Higher robustness of the mixing chamber is necessary

EXTENSOGRAPH

- Mixing of Vital gluten and water not possible with the Farinograph
 - ➔ Mixing a certain quantity of gluten with flour or starch
 - ➔ Results dependent on flour or starch quality
 - ➔ Results not significant enough

MICRO EXTENSION TESTS



backaldrin®

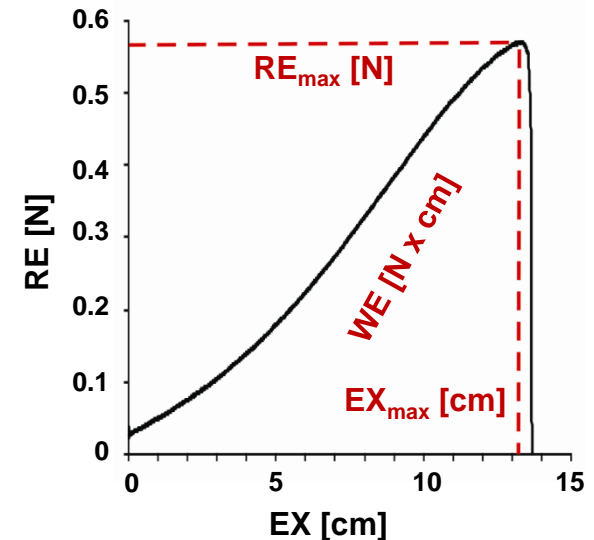
Gli/Glu	RE _{max} [N]*	EX _{max} [cm]*
2,3	0,403	11,2
2,2	0,514	10,9
1,7	0,969	9,4
1,1	1,317	8,1
0,8	1,883	5,0

N = 2-4; COV < 10%

(Brunnbauer, 2014)

➔ Analysis of pure vital gluten after rehydratisation

But: Appropriate method for rehydratisation?



PROTEIN COMPOSITION

backaldrin®

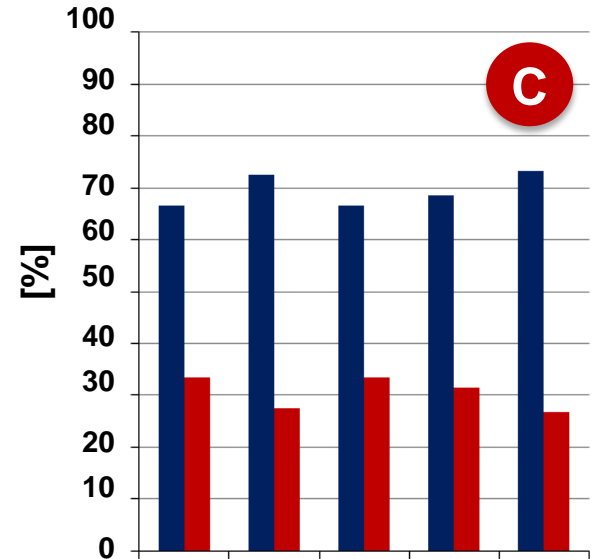
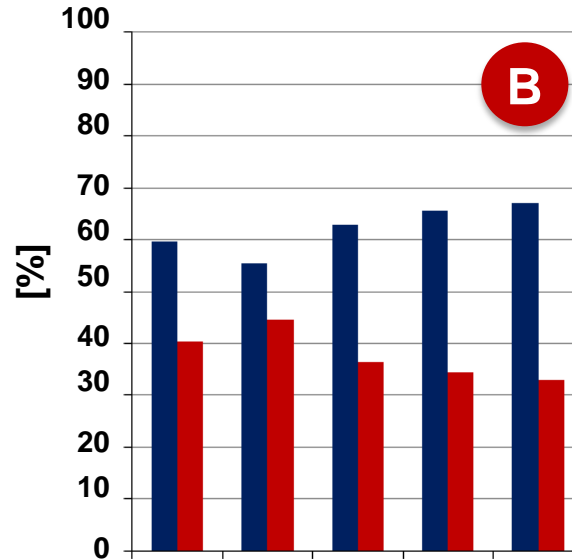
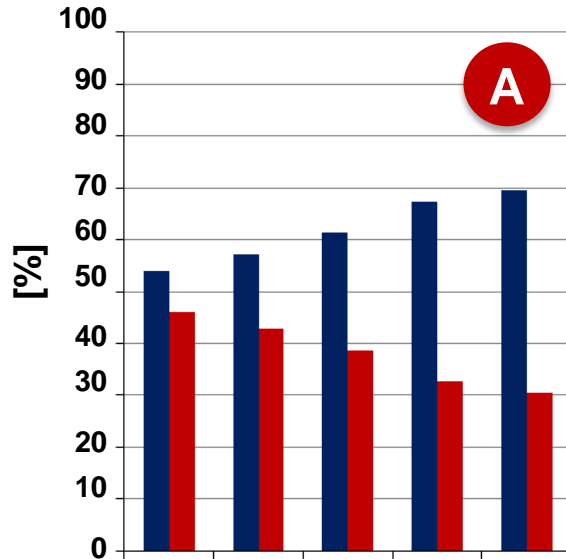
Sample	Gliadins [%]				Glutenins [%]			HMW/LMW	Gli/Glu
	ω 5	ω 1,2	α	γ	ω b	HMW	LMW		
A	1.88	3.81	30.31	25.85	2.91	4.94	30.31	0.16	1.69
B	2.26	3.59	29.97	27.73	2.58	4.24	29.54	0.14	1.84
C	3.18	3.92	33.49	29.31	2.70	3.32	24.11	0.14	2.36

Mean values of 5-10 batches

(Feilmeier, 2016)

PROTEIN COMPOSITION

Variation between different batches:



(Feilmeier, 2016)

◆ Gliadins ◆ Glutenins

DETERMINATION OF FREE SULFHYDRYL GROUPS

- Dissolving of the vital gluten in 2 % SDS
- Determination of the sulfhydryl groups with 5,5'-Dithio-bis(2-nitrobenzoic acid) (Ellmann's reagent)

(Brunnbauer, 2014)

Sample	Free SH [μmol/gluten proteins]	SD*	min	max	No.
A	3.84	1.10	3.18	5.80	5
B	6.35	3.04	0.31	10.32	11
C	7.51	3.01	3.81	13.96	9

*SD: Standard deviation

(Feilmeier, 2016)

SUMMARY

- Finding suitable methods for the quality control is still a challenge
- Recommendation:
Defining at least 2-3 parameters:
 - ➔ **Gluten aggregation**
 - ➔ **Visco-elastic properties**
 - ➔ **Interaction between vital gluten and native gluten**
- Up-to-date: Suitable parameters for certain applications
No universal quality parameters

THANK YOU

FOR YOUR ATTENTION

backaldrin International
The Kornspitz Company GmbH

Kornspitzstraße 1 · 4481 Asten · Austria
T +43 7224 88 21 0 · F +43 7224 88 21 16
info@backaldrin.com

www.backaldrin.com