

Leader in flour applications.

# EMCEgluten<sup>Plus</sup>

Greater efficacy –  
less added gluten – reduced costs



**Mühlchemie**  
makes good flours even better

## Background

Many millers and bakers regard the gluten in wheat as the most important constituent of the grain. Although the quality of the gluten – i.e. its properties – is just as important as the quantity, a high protein and wet gluten content is felt to guarantee good, consistent results in the baked products.

In order to improve the baking properties of wheat with a low gluten content, vital gluten is often added to the flour, or a mixture is made up with flour from better quality and more expensive wheat lots. In the past there has been no lack of attempts to compensate for the deficits of low-gluten flours with flour improvers or baking improvers – but with little success.

## Mode of action

After years of research Mühlchemie has succeeded in developing a unique complex of protein fractions and enzymes that boosts the performance of the gluten in the wheat without impairing the other functions of flour improvers.

In our development work we assumed that by nature the protein composition of wheat gluten is not always optimally suited to the purpose of baking bread and bread rolls. Even if weak flour is supplemented with dried gluten, this does little to improve the situation. Although the quantity of gluten in the flour increases, it does not ensure a corresponding increase in the volume of the baked products.

Only through a combination of suitable proteins and interlinking enzymes is it possible to adjust the gluten network naturally present in the flour optimally to the baking process.

The specific composition of **EMCEgluten<sup>Plus</sup>** brings about the interactions between the polar and non-polar proteins present in the gluten that are necessary for taking up and linking the additional proteins.

This covalent interlinking by means of enzymes is also reflected in the rheological data.

## Less vital gluten

**EMCEgluten<sup>Plus</sup>** is a *gluten booster* that greatly enhances the performance of the gluten in the flour – whether it is naturally present or added as vital wheat gluten.

**EMCEgluten<sup>Plus</sup>** increases the potential of wheat lots with a low gluten content, making it wholly or partly unnecessary to add expensive vital gluten. Even if large amounts of gluten are needed it is possible to reduce the quantity added by at least 50 % without jeopardizing baking performance.

## Important advantages of EMCEgluten<sup>Plus</sup>

### Rheology

- Increases water absorption in the Farinograph
- Prolongs dough stability
- Optimizes dough development

### Baking

- Enlarges the baked volume of yeast-leavened products
- Improves the machinability of the dough
- Requires practically no adjustment of current treatment methods or correction of the amount of baking improver added

### Economy

- Reduction of the amount of dried gluten added
- Use of cheaper wheat varieties
- Label-friendly ingredient statement; also available as a soy-free product
- Low dosage of 0.03 – 0.3 % (flour basis)

## Example from a baking trial and effect on costs

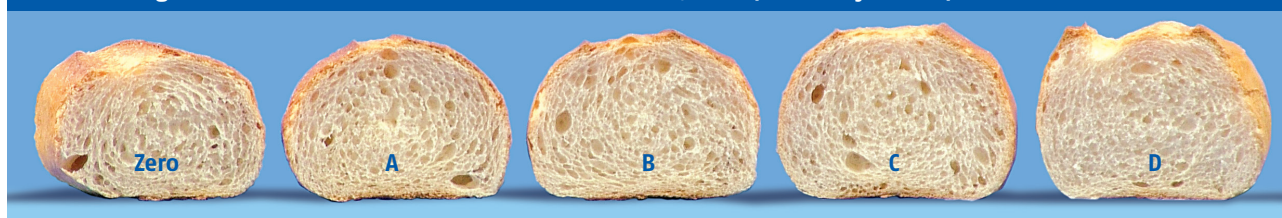
In the following examples, typical small wheat products of the type found in numerous countries throughout the world were baked. The basic treatment used in all the trials was typical of goods of this kind, namely oxidation and the addition of enzymes. In the first series of tests (Fig. 1), flour with approximately 10 % protein (in the dry matter) was used; in the second series (Fig. 2) the flour used was from the same wheat variety but with 12 % protein. Vital wheat gluten of German origin was

added to the reference samples: 1.5 % in Fig. 1 test A and 3 % in Fig. 1 test B and Fig. 2 test A. For the other tests in this series, 50 or 100 % of the vital gluten was replaced by 0.08 to 0.3 % **EMCEgluten<sup>Plus S</sup>**.

The effect on costs of adding vital gluten and/or **EMCEgluten<sup>Plus S</sup>** is shown to complement the results of the baking trials.

### Baguettes (made from low-protein flour)

**Fig. 1: Structure and volume yield of baguette-type bakery products with the addition of vital wheat gluten or EMCEgluten<sup>Plus S</sup>. Protein content of the wheat flour: 9.8 % (in the dry matter).**



Test number	\$/kg*	Zero	A	B	C	D
EMCEvit C vital wheal gluten	1.73	0 %	1.5 %	0.75 %	0 %	3 %
<b>EMCEgluten<sup>Plus S</sup></b>	<b>14.04</b>	0 %	0 %	0.08 %	0.20 %	0 %
Volume yield (ml/100 g)		510	545	560	635	635
<b>Cost of treatment</b>		<b>0 \$/t</b>	<b>25.9 \$/t</b>	<b>24.2 \$/t</b>	<b>28.1 \$/t</b>	<b>51.8 \$/t</b>

\* Reference price ex works

### Baguettes (made from high-protein flour)

**Fig. 2: Structure and volume yield of baguette-type bakery products with the addition of vital wheat gluten or EMCEgluten<sup>Plus S</sup>. Protein content of the wheat flour: 12 % (in the dry matter).**



Test number	\$/kg*	Zero	A	B	C	D	E
EMCEvit C vital wheal gluten	1.73	0 %	3 %	1.5 %	0 %	0 %	0 %
<b>EMCEgluten<sup>Plus S</sup></b>	<b>14.04</b>	0 %	0 %	0.08 %	0.10 %	0.20 %	0.30 %
Volume yield (ml/100 g)		580	635	730	670	700	750
<b>Cost of treatment</b>		<b>0 \$/t</b>	<b>51.8 \$/t</b>	<b>37.2 \$/t</b>	<b>14.0 \$/t</b>	<b>28.1 \$/t</b>	<b>42.1 \$/t</b>

\* Reference price ex works

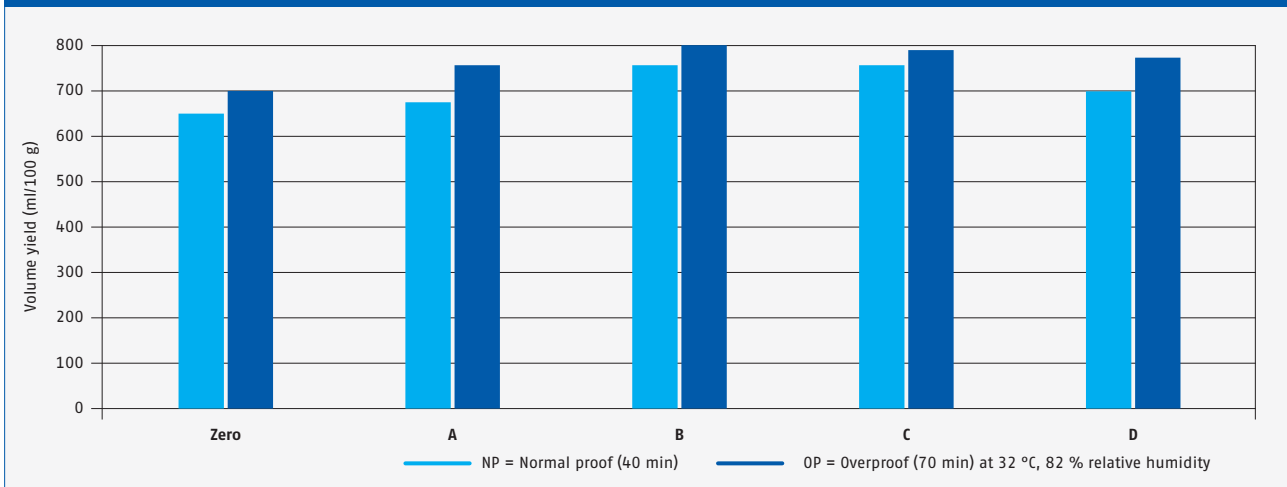
The baking trials demonstrate that as little as 80 – 100 g **EMCEgluten<sup>Plus S</sup>** to 100 kg flour (0.08–0.1 %) was sufficient to reduce the addition of gluten by 50 %. When 100 g (0.1 %) **EMCEgluten<sup>Plus S</sup>** was used in a flour with 12 % protein it was even possible to do without the addition of dried gluten completely without im-

pairing the volume yield or the structure of the crumb (cf. Fig. 2, A and C).

Furthermore, a comparison of Figs. 1 and 2 shows that **EMCEgluten<sup>Plus S</sup>** improves the baking performance of the flour whatever the natural gluten content.

Similar results were achieved with split rolls. In this case it was possible to halve the amount of gluten added with an even smaller dose of 0.05 % **EMCEgluten<sup>Plus</sup>** without causing a loss of volume (Fig. 3).

**Fig. 3: Changes in the baked volume yield of split rolls brought about by the addition of gluten or EMCEgluten<sup>Plus</sup> P.**



## Rheological results (Farinograph)

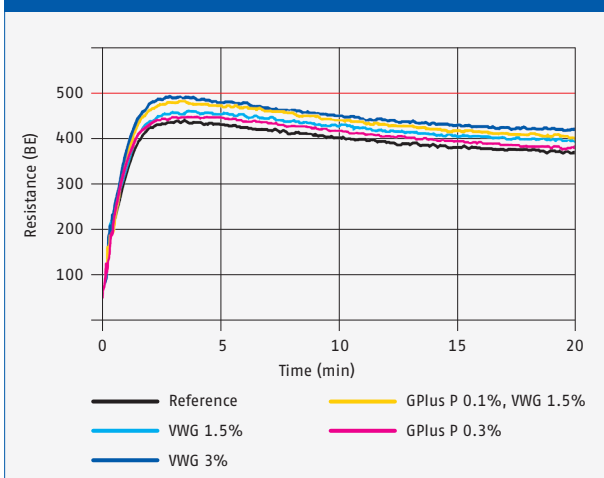
The rheological data of a wheat flour treated with **EMCEgluten<sup>Plus</sup>** are impressive evidence of the product's effects on dough properties.

Gluten replacers based solely on enzymes or emulsifiers generally reduce the stability of the dough. One exception is the addition of glucose oxidase (e.g. Alphamalt Gloxy 7082). This substance improves the results in the Farinograph (not shown). However, it only takes effect after a fairly long mixing time. The disadvantages of

enzymes other than glucose oxidase can also be seen from Fig. 5: although the basic treatment with oxidizing agents and enzymes ("Reference") improves the baking performance of the flour, the result is not very obvious in the Farinogram.

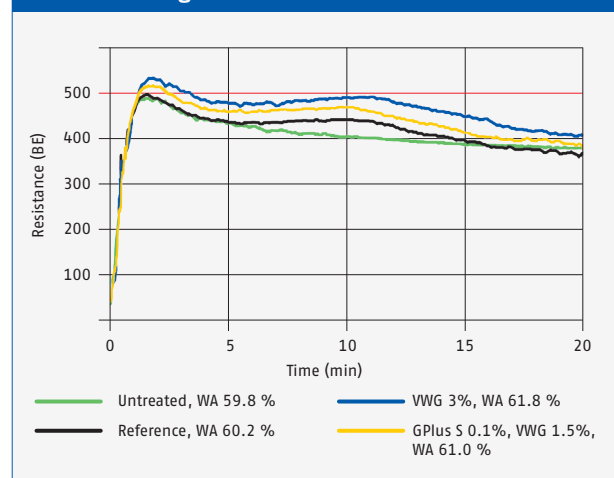
On the other hand, if **EMCEgluten<sup>Plus</sup>** is used in conjunction with 1.5 % vital gluten, water absorption is greater and the curve more stable than with 1.5 % vital gluten alone (Fig. 4).

**Fig. 4: Effects of EMCEgluten<sup>Plus</sup> P (GPlus P) and dried vital wheat gluten (VWG) on a bread roll\***



\* dough made with flour from German A wheat (basic treatment: Elco C 100K, 40 ppm, Alphamalt A 6003, 50 ppm) and a typical baking improver for rolls - TopBake Brötchenmalz (composition: ascorbic acid, enzyme-active malt flour; emulsifiers: lecithin and esterified mono- and diglycerides (E 472e), enzymes)

**Fig. 5: Effects of EMCEgluten<sup>Plus</sup> S (GPlus S) and dried vital wheat gluten (VWG) on the Farinogram of flour from HRW wheat\***



\* Basic treatment (except "Untreated"): Elco C 100K, 20 ppm, Oxem 23, 45 ppm, Alphamalt A 6003, 100 ppm (water addition not corrected)

## Dosage

The typical dosage of **EMCEgluten<sup>Plus</sup>** is in the range of 0.1 to 0.3 % (flour basis). However, good results can already be achieved with much smaller amounts, as the baking trials described above show. Whether the addition of vital wheat gluten can be avoided completely will depend on the application and the requirements of the particular baker. In some cases larger amounts of **EMCEgluten<sup>Plus</sup>** may be necessary.

## Product variants

Although **EMCEgluten<sup>Plus</sup>** has a very wide range of uses and has achieved positive results in many different baking applications, we have developed two different variants to meet specific requirements.

## EMCEgluten<sup>Plus</sup> P

**EMCEgluten<sup>Plus</sup> P** meets the demand for a soy-free product and is also geared to the needs of untreated wheat flour or flour with slight oxidative or enzymatic treatment or containing bromate. In this variant protein fractions from peas are used.

## EMCEgluten<sup>Plus</sup> S

Strongly oxidative treatment, especially with azodicarbonamide or other fast-acting oxidizing agents, may cause "over-stabilization" of the gluten and result in undesirable rheological properties and less than optimum baked volume. For this reason we have developed a variant better suited to such conditions: **EMCEgluten<sup>Plus</sup> S**, which has the same positive effects at the same dosage and label declaration as the original product. **EMCEgluten<sup>Plus</sup> S** optimizes the elasticity of strongly oxidized doughs, thus preventing too short a structure.

## Product specification

Article no.	(EMCEgluten <sup>Plus</sup> P) 0807009 or (EMCEgluten <sup>Plus</sup> S) 0807011
Description	Gluten enhancer
Ingredients	Enzymes, pea or soy proteins, wheat flour, silicon dioxide as an anti-caking agent
Storage and shelf-life	Min. 12 months if stored cool and dry in the closed original pack
Packaging	Cardboard box with PE liner, 25 kg net

Chemical, physical and microbiological properties			
Property	Method	Unit	Target
Appearance			Off-white to light brown powder
Odour			Mealy, leguminous
Granulation			95 % < 250 µm (laser refraction)
Loss on drying	3 h, 105 °C	g/100 g	< 14
Total plate count, aerob.		KBE/g	< 50,000
E. coli		KBE/g	Negative
Salmonellae		KBE/25	Negative



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**STERNWYWIOL**  
Gruppe

Innovative Ingredients

### Germany

Muehlenchemie GmbH & Co. KG  
Kurt-Fischer-Straße 55  
22926 Ahrensburg, Germany  
Phone: +49 / (0) 41 02 / 202-001  
Fax: +49 / (0) 41 02 / 202-010  
info@muehlenchemie.de  
www.muehlenchemie.de

### Mexico

Stern Ingredients, S.A. de C.V.  
Guillermo Barroso No. 14,  
Ind. Las Armas, Tlalnepantla, Edo. Méx.,  
C.P. 54080, Mexico  
Phone: +52 / (55) 5318 12 16  
Fax: +52 / (55) 5394 76 03  
info@sterningredients.com.mx  
www.sterningredients.com.mx

### Brazil

Stern Ingredients do Brasil Ltda.  
Alameda dos Maracatins, 1435  
Edifício Imaginaire - Conj 1110  
04089-015 São Paulo, SP / Brazil  
Phone: +55 / 11 37 28-47 60  
Fax: +55 / 11 37 28-47 62  
info@sterningredients.com.br  
www.sterningredients.com.br

### Poland

Representative Office  
Krzysztof Grabinski  
ul. Kwitnãca 15/2  
01-926 Warsaw, Poland  
Phone: +48 / (0) 22 / 244 37 90  
Fax: +48 / (0) 22 / 490 62 94  
info@sterningredients.pl  
www.sterningredients.pl

### China

Stern Ingredients (Suzhou) Co., Ltd.  
Block 9, Unit 1, Ascendas Linhu  
Industrial Square, 1508 Linhu Avenue,  
Fenhu Economic Development Zone,  
215211 Wujiang, China  
Phone: +86 / 512 6326 9822  
Fax: +86 / 512 6326 9811  
info@sterningredients.com.cn  
www.sterningredients.com.cn

### Russia

KT "000 Stern Ingredients"  
pr. Obuchovskoj oborony, d. 45, lit. "0"  
192019 St. Petersburg, Russia  
Phone: +7 / (812) 319 36 58  
Fax: +7 / (812) 319 36 59  
info@sterningredients.ru  
www.sterningredients.ru

### India

Stern Ingredients India Private Limited  
211 Nimbus Centre, Off Link Road  
Andheri West  
Mumbai 400053, India  
Phone: +91 / (0) 22 / 402 755 55  
Fax: +91 / (0) 22 / 263 258 71  
info@sterningredients.in  
www.sterningredients.in

### Singapore

Stern Ingredients Asia-Pacific Pte Ltd  
No. 1 International Business Park  
The Synergy # 09-04  
Singapore 609 917  
Phone: +65 / 656 920 06  
Fax: +65 / 656 911 56  
info@sterningredients.com.sg  
www.sterningredients.com.sg