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# "Gluten Replacement"

# Save cost & maintain quality by using more soft wheat & improvers in baking and pasta applications

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Gluten Enhancer Water Absorption New "Bromate Replacer" Pasta and Noodles

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# **Gluten Enhancer**

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# **Gluten Enhancement – The Solution**



### Your challenge

- Wheat with sufficient protein and good baking performance is expensive
- Vital wheat gluten is expensive
- The solution
- EMCEgluten <sup>Plus</sup> improves the baking performance of low protein flour
- EMCEgluten <sup>Plus</sup> allows for reduction or omission of added vital wheat gluten
- EMCEgluten <sup>Plus</sup> reduces the costs

## **Effect of Protein Content and Enzyme Treatment on Volume Yield**





- Enzymes have always been able to compensate for the lack of protein content in baking!
- Most enzymes have a pronounced effect on dough rheology.

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# **Gluten Enhancer – US Sandwich**



#### **Basic treatment**

BX	350 ppm
SSL	4,000 ppm



Sample No.	Null	Α	В	С
EMCEvit C (%)	-	3	1.5	-
EMCEgluten <sup>Plus</sup> (%)	-	-	0.08	0.10
Vol. yield (ml 100 g flour)	840	910	920	910
Costs (USD t flour)		83.2	47.9	10.9



# **Baking Trials with Gluten Enhancer:** White Bread Recipe



Component	%	Weight (g)
Flour	100	1000
Water	62	620
Sugar	4	40
Salt	1.5	15
Instant dried yeast	1	10
Shortening	4	40

# White Bread Baking Trials with Gluten Enhancer EMCEgluten<sup>Plus</sup>



Improver	Function	Unit	Trial 1	Trial 2
Elco P100 K	Ascorbic aicd	ppm	100	100
Alphamalt VC 5000 SN	α-Amylase	ppm	100	100
Alphamalt HCC	Hemicellulase	ppm	100	100
Vital wheat gluten		%	2.15	
EMCEglutenPlus	Gluten enhancer	%		0.215

# Gluten Enhancer (GE) vs. Vital Wheat Gluten (VWG) in Sandwich Bread





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# **Baking Trials with Gluten Enhancer:** Whole Meal Bread Recipe



Component	%	Weight (g)
Flour	86	860
Bran	14	140
Water	62	620
Sugar	8	80
Salt	1.5	15
Instant Dry Yeast	1	10
Shortening	8	80

# Whole Meal Bread Baking Trials with Gluten Enhancer EMCEgluten<sup>Plus</sup>



Improver	Function	Unit	Trial 1	Trial 2
Elco P100 K	Ascorbic acid	ppm	100	100
Alphamalt VC 5000 SN	α-Amylase	ppm	100	100
Vital wheat gluten		%	5	2
EMCEgluten <sup>Plus</sup>	Gluten enhancer	%		0.3

### Gluten Enhancer (GE) vs. Vital Wheat Gluten (VWG) in Whole Meal Sandwich Bread





5% VWG

2% VWG + 0.3% GE



5% VWG 2% VWG + 0.3% GE

# **Rheology Test Results - General**



		Whole Meal Bread			١	White Bı	read
Sample		86% flour + 14% bran	86% flour + 14% bran + 5% gluten	86% flour + 14% bran + 2% gluten + 0.3% enhancer	Flour only	2.15% giuten	0.215% enhancer
Moisture	%	14.63	14.26	14.41	14.76	14.53	14.63
Wet gluten	%	34.60	43.50	36.75	34.15	38.35	33.90
Dry gluten	%	11.15	14.35	12.00	11.44	12.90	11.50
Gluten Index	%	82	77	84	86	81	84
Protein (m.b.)	%	12.05	15.12	13.24	11.92	13.19	11.89
Ash (m.b.)	%	0.79	0.87	0.80	0.56	0.59	0.56
Falling Number	S	418	425	461	397	408	423

- Gluten enhancer replacer 10-fold quantity of vital wheat gluten
- Falling Number higher than with or without vital wheat gluten

# **Rheology Test Results - Farinograph**



		Whole Meal Bread			١	Nhite Bre	ead
Sample		86% flour + 14% bran	86% flour + 14% bran + 5% gluten	86% flour + 14% bran + 2% gluten + 0.3% enhcr.	Flour only	2.15% gluten	0.215% enhancer
Water Absorption (500 FU)	%	68.40	70.00	70.50	64.50	65.10	65.50
Development Time	Min	7.8	9.4	8.0	10.7	10.8	9.3
Stability	Min	8.1	10.8	9.2	15.1	16.5	15.5
Degree of Softening (ICC)	BU	82.0	73.0	89.0	63	57.0	60.0
Farinograph Quality Number		120	141	116	171	181	169

- Increase of water absorption with gluten enhancer better than with gluten
- Stability better than for untreated flour, but
- Softening higher

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# **Rheology Test Results - Extensograph**



		Wh	ole Meal Br	ead		White Bread	
Sample		86% flour + 14% bran	86% flour + 14% bran + 5% gluten	86% flour + 14% bran + 2% gluten + 0.3% enhcr.	Flour only	2.15% gluten	0.215% enhancer
Water Absorp. (500 FU)	%	64.0	65.3	66.1	62.1	62.4	62.8
Energy	cm <sup>2</sup>	92 113 100	162 168 171	121 148 118	128 140 132	155 163 149	135 141 111
Resistance	BU	362 512 512	603 748 805	468 623 589	396 575 692	494 780 782	460 720 726
Extensibility	mm	145 136 125	149 139 136	148 146 129	161 141 131	156 129 129	153 128 115
Maximum	BU	454 624 624	808 963 1030	609 789 737	618 769 840	789 1029 953	686 916 778
Ratio		2.5 3.8 4.1	4.0 5.4 6.3	3.2 4.3 4.6	2.5 4.1 5.3	3.2 6.1 6.0	3.0 5.6 6.3
Ratio (Max)		3.1 4.6 5.0	5.4 6.9 7.6	4.1 5.4 5.7	3.8 5.5 6.4	5.1 8.0 7.4	4.5 7.2 6.8

- Water absorption with gluten enhancer better than with gluten
- Effect of gluten enhancer on dough rheology weaker than that of gluten

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# **Rheology Test Results - Amylograph**



		W	١	White Brea	ad		
Sample		86% flour + 14% bran	86% flour + 14% bran + 5% gluten	86% flour + 14% bran + 2% gluten + 0.3% enhcr.	Flour only	2.15% gluten	0.215% enhancer
Gelatinization onset	°C	59.80	59.90	57.40	60	60.30	58.80
Gelatinization temperature	°C	88.30	88.60	87.00	87.4	88.10	88.90
Gelatinization Maximum	AU	1042	1025	1253	738	763	957

Although the gelatinization starts earlier, the maximum viscosity is higher

# **Gluten Enhancer Benefits**



- Dosage only 400 3,000 ppm
- Can replace 50% and more of added gluten
- Operation Upgrades low protein flour
- Boosts vital wheat gluten function
- Does not interfere with standard flour treatment or bread improvers
- Improves rheological and baking properties
- Lable-friendly
- Safes up to 50% of the gluten costs



# Powerzym S – A New Bromate Replacing Compound

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# **Optimizing Dough Stability – The Solution**

#### Your challenge

- Wheat with weak properties occurring more often
- More stability required for weak flour
- Replacement of potassium bromate
- Cost control

#### The solution

- Powerzym S has beneficial effects particularly on dough from weak flours
- Powerzym S creates a balance between stability and elasticity 
  improves the machinability
- Powerzym S simplifies the flour improvement and it
- Achieves high volume yields

### **Powerzym S and its Competition in East Africa**







# back:BXLocal improverLocal improverBXPowerzym Sfront:Powerzym S

Wheat from Pakistan, FN 250 s, protein 11.5 %, wet gluten 26 %

# **Powerzym S – Simplified Treatment of Flour for Baguette Rolls**



Customer treatment 50 ppm ascorbic acid 30 ppm Oxem 23 30 ppm Gloxy 5080 100 ppm VC 5000 80 ppm H 19450



**Customer treatment** 

300 ppm Powerzym S

 Powerzym S simplifies the treatment and improves the baking results



# **EMCEbest WA Plus - Increasing** the Water Absorption

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# Water Absorption – The Solution



### Your challenge

- More WA needed
  - to meet the specifications of the customers
  - to improve the shelf life
- Vital wheat gluten is expensive
- Guar gum impairs the baking performance and the taste

### The solution

 EMCEbest WA Plus increases the WA while maintaining the baking performance

### Farinograph Water Absorption of EMCEbest WA Plus – Comparison and Vital Wheat Gluten





✤ Dosage: 0.1 – 1 %

Effect: up to 6 % more water absorption

# **EMCEbest WA Plus – Farinograph Evaluation**

IF

Mühlenchemie makes good flours even better





# Recent Developments to Improve the Quality of Pasta and Noodles

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# Improving Pasta & Noodle Flour – The Solution



### Your challenge

- Improvement of the noodle quality
- Replacing durum by hard wheat or hard by soft wheat
  - because of limited availability of durum wheat
  - to reduce the costs
  - while maintaining the noodle quality

#### The solution

 Pastazym improves the cooking & eating quality of noodles & pasta made from soft and hard wheat

# **The Pastazym Family Has Grown**



Product name	Principle	Dosage* (ppm)
Pastazym	Enzymes	100-300
Pastazym Plus	Enzymes	200-250
Pastazym BCT	Enzymes, ß-carotene, tartrazine	200-400
Pastazym BCN	Enzymes, natural beta carotene	200-300
Pastazym CUR	Enzymes, natural curcumin	400-600

\* Dosage depends on processing conditions and the quality of the flour

Remarks: The use of colourants in pasta is not permitted in Europe. The food legislation needs to be checked for each country.

# **Properties of the Pastazym Family**



Property	Pastazym	Pastazym Plus	Pastazym BCT	Pastazym BCN	Pastazym CUR
Colour	-	+	+++	++	++
Firmness	++	++	++	++	++
Stickiness	++	+++	++	++	++
Cost reduction	++	+++	++	++	+

# **Durum Colour for Soft Wheat Pasta**





# Firmness of Spaghetti from Durum or Soft Wheat Flour - Effect of Pastazym on Firmness





German Soft wheat; Texture Analyser XT2

# **Cost Reduction Potential of a Durum/Soft Wheat Mix with Pastazym**





Hard Wheat (%)

Calculation based on Figures from July 2011

	USD/bu	USD/t	€/t
Spring Wheat	7	257	184
Hard Red Winter	8	294	210
Durum	11	404	289

# **Further Challenges Addressed by MC**









Source: Peter Cate, AGES Vienna





# **Thank You for Your Attention!**



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