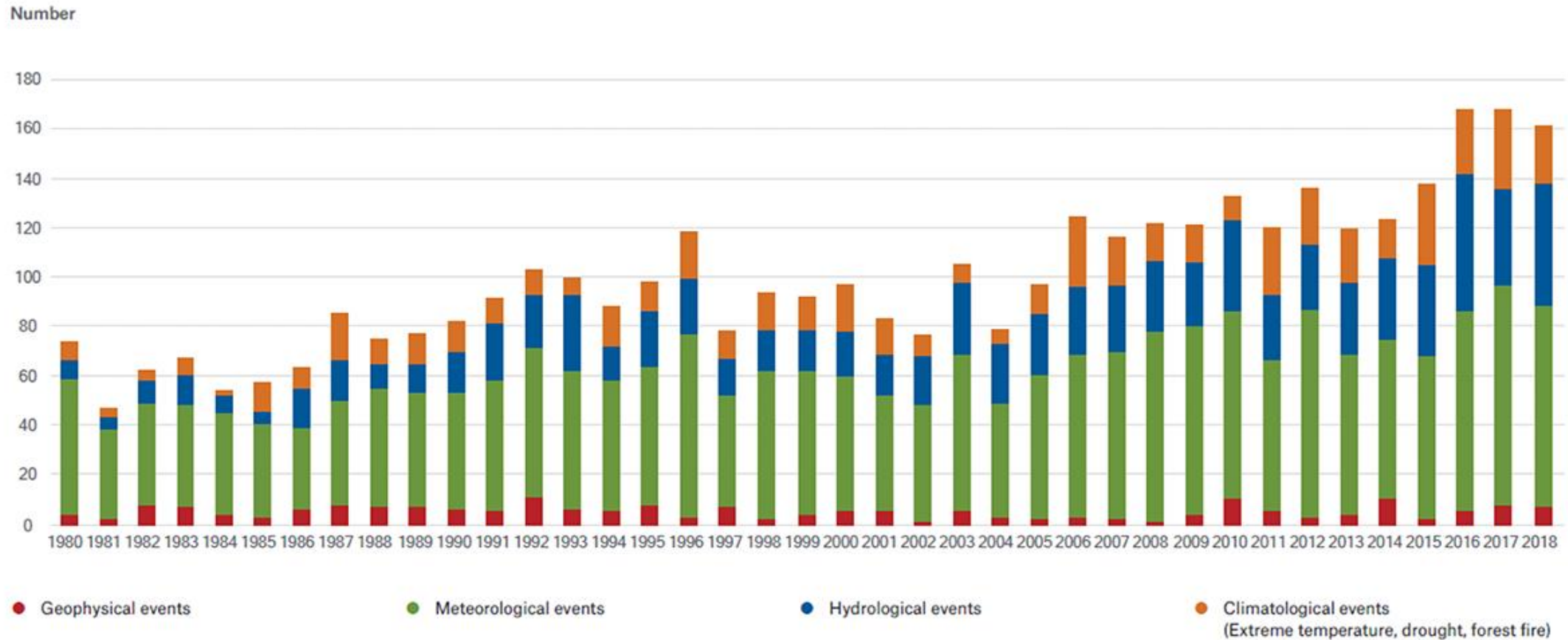


Innovative solutions of "Mühlenchemie" for leading milling enterprises

presented by Vladimir Wengorz

Munich Re: Loss events in the U.S. 1980 –2018

Number of relevant events by peril



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Challenge Climate Change: Rain Flooded Fields in India ...

Nagarajan



Common Flour Problems – Causes & Effects

Problem		Effect in Baking
Sprout damage	→	High enzyme activity, sticky doughs
Low amylase	→	Low volume, fast bread staling
Heat damage	→	Short protein, low enzyme activity, no volume
Low protein	→	Low tolerance + volume
High protein	→	Unsuitable for biscuits etc.
Bug damage	→	Protein destroyed
Ropiness	→	Bread deteriorates

Reasons for High α -Amylase Activity

Sprout damage due to excessive rain falls prior to harvest

(PHS, pre-harvest sprouting)

hidden

obvious sprouting

Late frost on immature wheat heads

“green amylase” not re-metabolized

no visible sign for sprout damage



Sprout Damage – Effects

Falling number, gelatinization temperature, & maximum viscosity too low

Insufficient water absorption

Sticky doughs

Weak dough structure

Excessive browning

Coarse pore structure

Crumb structure with lower elasticity

Good shelf-life

Sprout Damage - Principal Measures

In the flour mill

Lower extraction rates

Keep starch damage as low as possible

In the bakery

Increase acidity by sour dough or acidifiers

Prepare stiffer doughs

Reduce energy input upon kneading

Reduce bench time (save time for final proof)

Reduce bread improvers with strong enzyme activity

Slightly increase sodium chloride, if possible

Flour Treatment in Case of Sprout Damage

Oxidation & maturing agents (e.g. ascorbic acid)

Increase significantly

Enzymes

Reduce dosage of amylase

Cautious use of xylanase

Consider oxidase

Emulsifiers (Datem, mono/di, lecithin)

Help to reduce stickiness

Improve dough stability

Enzyme regulators

Help to control effect of intrinsic enzymes

Improvers for Flour from Sprout Damaged Wheat

ELCO C-100	(ascorbic acid)
Secalit 60	(acidic buffering agent)
Rowelit	(alkaline buffering agent)
Mulgaprot	(lecithin emulsifier)
MCgluten	(vital wheat gluten)
MCvit Plus	(lipoprotein-complex)
Alphamalt A 6003	(low α -amylase & side-activities)
Alphamalt HC 22443	(hemicellulase)
Alphamalt Gloxy	(oxidative enzyme)

Challenge Climate Change: Drought

Oldach



High Falling Numbers – Reasons

Low amylase content due to

Very dry growth & harvest conditions

Typically U.S., Australian or sometimes Indian wheat

Post-harvest heat damage

High protein content

May coincide with dry growth conditions

Probably due to increased water absorption by protein → higher viscosity of flour slurry

Low α -Amylase – Effects

High Falling and Amylograph numbers

Dry and stiff doughs

Slow fermentation

Little browning

Insufficient volume yield

Hard and dry crumb structure

Short shelf-life

Low α -Amylase – Measures

Blend with flour with high enzyme activity

Use malted wheat or barley flour

Use extracted cereal amylase

Add fungal α -amylase

Optimize enzymatic and oxidative treatment

Prolong rest & fermentation times

MC Products for Reduction of the Falling Number

Product	Composition	Dosage ppm	Properties
MCmalt	Malted wheat flour	500-2,000	reduces FN, little effect on vol., sticky dough possible
Alphamalt A 15140	Fungal amylase	10-20	little effect on FN
Betamalt 25 FBD	Barley & wheat amylases	50-250	good effect on FN
Deltamalt FN-A 5000	Fungal amylase, heat stable	20-250	good effect on FN & volume,

Enzymes for Control of Falling Number – Baking Results



Deltamalt FN-A

150 ppm

1,100 mL (+ 13 %)

FN = 360 s

Untreated

950 mL

FN = 433 s

Betamalt 25 FBD

150 ppm

950 mL (+ 0 %)

FN = 340 s

Alphamalt VC 5000

150 ppm

1,050 mL (+ 10 %)

FN = 415 s

Flatbread Toolbox Your Challenge – Our Solution!

Enzymes for Flatbread

Alpha-amylase: Alphamalt A Range

- fermentation
- flavour and colour formation
- dough handling properties / extensibility: release of water from starch → gluten softening
- eating properties: crumb more “juicy”
- duration of softness (shelf-life) → rollability

Hemicellulase: HC Range

- releases water from the pentosans
- softening of the pentosan-gluten network
- formability of the dough

Maltogenic alpha-amylase

- Prolongs shelf-life more efficiently than standard alpha-amylase
- Does not affect processing properties, bread structure or appearance
- Responds to market requirements

Glucose oxidase: Gloxy Range

- Stabilization of dough pieces
- Drying of dough surfaces → reduced stickiness
- Increasing effect upon resting time

Lipase: LP Range

- Stabilization of dough pieces for long resting times
- Bleaching of dough

Protease Alphamalt Pro

- useful in case of very short gluten structures
- weakens the interaction of the protein chains, not their strength.

Enzymes for Flatbread

Alpha-amylase: Alphamalt A Range

- Alphamalt VC 5000
- Alphamalt VC 5000 SN
- Alphamalt 15140
- Deltamalt FN-A

Hemicellulase: HC Range

- Alphamalt HCC 2
- Alphamalt HCE
- Alphamalt HCF
- Alphamalt H 24511
- Alphamalt H 23011

Maltogenic alpha-amylase

- Alphamalt Fresh& Soft
- Alphamalt Fresh & Spring
- Alphamalt Fresh 15

Glucose oxidase: Gloxy Range

- Gloxy 100
- Gloxy TGO
- Gloxy 31841

Lipase: LP Range

- EFX Mega
- EFX 100
- EFX Swift

Protease

- Alphamalt Pro
- Porit L
- Soft S Fine

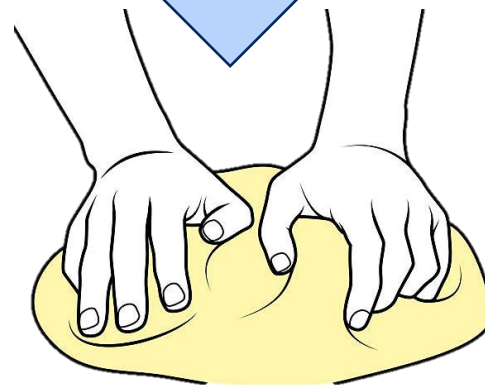
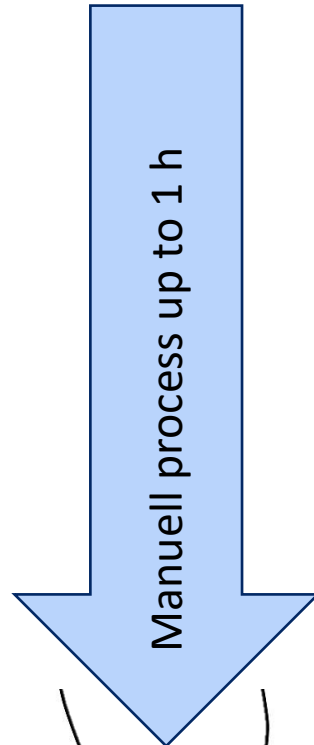
Mühlenchemie Flatbread Toolbox



- Fresh Keeping solutions for different flatbread types
- High water absorption
- Premium hard wheat replacement
- Dough stability for flatbread
- Basic flatbread improvers for dough processing baking optimization
- Rheology adjustment

Challenge: Unleavened Dough Improvement

Flatbread Toolbox: Alphamalt Lawash



Alphamalt Lawash

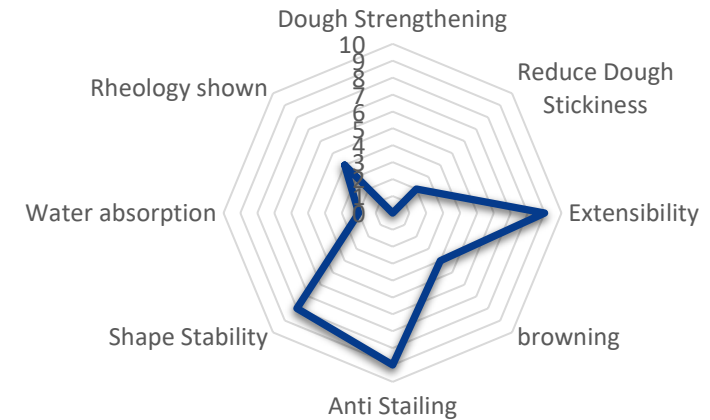


Diagram 5: Shows the properties of Alphamalt Parotha

- Lawash dough is usually kneaded by hand.
- After kneading the dough is moulded into round pieces of dough
- After the relaxation time, the dough pieces are rolled out to a certain size Lawash is then baked in the tandir oven.

Alphamalt Lawash contains enzymes to improve dough properties as well as fresh keeping.

Dosage: 60-80 ppm

Conclusions

Enzyme Systems from our Flatbread Toolbox...

- ... improve the processing properties of the dough
- ... can be used in long and short processes
- ... can be used to strengthen or soften the dough
- ... improve the appearance and the eating properties
- ... prolong the duration of softness and foldability

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Thank you very much for your attention!
