Food waste, and how to combat with sustainable enzyme solutions

Presented by
Kathy Sargent
Market Director, Corbion
HOW YOUR SANDWICH CHANGED THE WORLD
Key Topics

- Importance of a Sustainable Bakery Industry
- Using Enzymes as a Tool to Deliver on Sustainability Goals
- Responsible Sourcing, Operations & Ingredients Solutions
- Life Cycle Assessment of Bread
Bread is one of the most commonly discarded foods

Consumers throw away 286 million tons of cereal products

Source: Global food losses and food waste, SIK / FAO, 2011
What are the causes?

Product Quality
Staleness

Consumer Behavior
Planning, Expiring
“Best Before” Dates

Supply Chain
Lack of coordination in the supply chain

Source: Global food losses and food waste, SIK / FAO, 2011
Creating a positive impact by growing our business in sustainable ingredient solutions
and maximizing our contribution to zero hunger and responsible production and consumption

**Ambitions**

**Responsible sourcing**
Create a sustainable supply chain for agricultural materials

**Responsible operations**
Create a zero-incident and zero-waste business

**Sustainable ingredient solutions**
Create solutions based on renewable resources to improve the quality of life for people today and for future generations
Section 2

HOW CAN ENZYMES BE A TOOL TO DELIVER ON OUR SUITABILITY GOALS?
Why do we use enzymes in baking?

**Dough Improvement**
- Yeast Fermentation
- Dough Absorption
- Clean Label
- Dough Strength
- Process Tolerance
- Dough Extensibility

**Volume**
- Crumb Structure
- Crust Color
- Crumb Whiteness

**Freshness**
- Reduce Staling
- Increase Shelf Life
- Texture
A synergistic bakery enzyme solution

Advanced ESL technology for added shelf life

Advanced flavor & taste enhancement technology

Flavor/taste enhancement

Reduced sugar

Less inhibition

Optimally blended for maximum functionality

Sustainability opportunities
Baking Process

Today's Baking Process

Sugar + Standard ESL

~50% Less sugar + Enzyme Solution

Process with Enzymes

Bread Production

In Situ Sugar Production During Baking

Finished Bread Characteristics

Improved Quality Freshness Lifecycle
Section 3

RESPONSIBLE SOURCING
Enzymes are nature’s helpers – inherently sustainable

Enzymes are found in every living organism

– Natural, sustainable and biodegradable **proteins** essential to life

– Efficient **biological catalysts** that speed up chemical reactions, **saving time and money**

– Allow processes to take place at less severe conditions, **saving energy**

– Increase the yield and efficiency of processes, **saving raw materials**

– By using enzymes, the industry can **do more with less**

Source: Novozymes - Bagsvaerd, Denmark
Optimize formulations

- Utilize local ingredients
  - Formulate with US wheat and minimize off-shore sugar transportation
  - Minimizing distribution emissions

- Reduction of formula ingredients
  - Please consumers with label-friendly alternatives
  - Cost optimization
RESPONSIBLE OPERATIONS
Increase production efficiency & plant capacity

**Enzymatic function**
- Aid in Yeast fermentation
- Reduce mixing time
- Soften dough and manage extensibility
- Control pan flow
- Process tolerance

**Output**
- Allow for longer, more efficient production runs
- Reduce product changeovers

**Result**
- Reduce energy consumption
- Reduce bakery emissions
- Reduce water consumption
Reduce Manufacturing Waste

- Dough Absorption
- Dough Strength
- Crust Color
- Process Tolerance
- Finished Loaf Volume
- Crumb Structure
- Crumb Whiteness
Avoid feeding the landfill
Reduce equipment stress
Direct Store Distribution

Multiple production sights running at low utilization

Complex and expensive delivery

Regional delivery
Efficiency in Distribution

- Optimized manufacturing footprint running at high capacity
- Full truck shipments into and out of distribution
- Expanded deliver reach

Longer shelf life is essential
Section 4

SUSTAINABLE INGREDIENT SOLUTIONS
Reduce Consumption Waste

Source: Global food losses and food waste, SIK / FAO, 2011
Freshness Expectations – Today and the Future

Commercial Bread
Majority of consumers (70%) expect commercial bread to remain fresh for 5-7 days after purchase

In-Store Bakery Bread
A substantial portion of consumers (36%) expect ISB bread to remain fresh for 3 days after purchase

Freshness Opportunity
- Commercial
  - 43% of consumers desire bread to last up to 14 days longer
- In-Store Bakery
  - 41% of consumers desire bread to last up to 5 days longer

Source: Corbion Proprietary Sensory Test November, 2011
Further benefits with enzymes: quality and taste

Consumers speak up: Bread with next generation enzymes ranks highest in all consumer liking categories: taste, texture, freshness & overall liking

Consumers rank quality over time

Source: Corbion Proprietary Sensory Test – November 2011
Quantifying the environmental and economic benefits of bread shelf life extension

ECO-EFFICIENCY IN THE FOOD SECTOR
Life Cycle Assessment

Enzyme usage in breads delivers environmental benefits in terms of global warming potential, cumulative energy demand and land use that have been quantified under a generic model.

Environmental & Economical Benefits:

- Reduction in bread waste → Less bread produced
- Bread production: Less change-overs
- Bread distribution: Less trips and higher loads
- Reduction of sugar, HFCS and yeast
Food production

Total food supply  430M loaves/year

Food waste

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<thead>
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<th>Extended SL</th>
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<tr>
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Waste reduction  36,700 tons/year

Economic performance

Margin increase 32 %
### Food production

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### Waste reduction

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### Carbon footprint

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- 3.7 American citizens/year
- 8.5 Car trips around the world/year
## Food Production

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<td>Production</td>
<td>21.0M</td>
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<tr>
<td>increase</td>
<td>600,00</td>
<td>loaves/yr/plant</td>
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### Economic Performance

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**Margins**: 140%

**Standard Extended SL**
Enzymes are a Sustainable Ingredient Solution
References

• Corbion Proprietary Sensory Test November, 2011
• Food and Agriculture Organization of the United Nations 2011
• Global food losses and food waste, SIK / FAO, 2011
• Novozymes - Bagsvaerd, Denmark
• Spunk Bear, NPR, *The Carbon Footprint of ... one Sandwich*; https://youtu.be/jRQEi-C5GDg
Thank You!

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