

Ideally, steamed bread should have a white, shiny appearance and a uniform texture. New Lipopan® S from Novozymes can help to enhance all these qualities.



(Front row, from left) Xinyan Guo, Qing Xu, Ying Sun and Jianqin Xu of Novozymes in China. (Back row, from left) Genming Yang of Novozymes with Weijie Guo and Hongyu Qu of JiaLi.

## Biowhitening - a new concept for steamed bread

The Chinese like their bread steaming hot. Rather than baked bread, the Chinese prefer to eat steamed bread. The dough is steamed over a pan of boiling water and the bread is served hot. It has a shelf-life of one or two days.

There are two types of steamed bread in China: Northern-style and Southern-style. They are made from a leavened dough based on wheat flour. Northern-style steamed bread is produced according to a recipe containing only flour, water and yeast, whereas Southern-style steamed bread contains many other ingredients depending on the region where it is produced.

Traditionally, steamed bread has been pre-

pared at home, but more and more is now being made in factories. Just as industrial enzymes are used to improve baked bread, the Chinese are discovering that enzymes can also improve the flour for steamed bread.

### First Fungamyl®

In 2000, Novozymes started promoting enzymes for use in steamed bread in China. The quality of local flour can vary considerably and Fungamyl 2500 SG was added to improve performance. Fungamyl 2500 SG is a fungal amylase that improves the crumb structure and volume in particular. The amylase liberates fermentable sugars to improve yeast fermentation, and

thereby increases the volume of steamed bread.

Today, Fungamyl 2500 SG and Fungamyl Super MA (a combination of amylase and xylanase) from Novozymes are an accepted part of the ingredients used in steamed bread flour mixes in China.

### Next lipase

A recent development is the use of lipases for what is known as 'biowhitening' in China.

The whiteness of steamed bread is an important factor. If the bread has a whiter lustre, it indicates better flour quality and is therefore considered more attractive by consumers. Lipases can improve whiteness as shown in the photos (see Fig. 1). Lipopan S BG is by far the most popular lipase for this application and gives a superior whitening effect.

### Alternative to BPO

To improve whiteness, it is popular to use the chemical bleaching agent benzoylperoxide (BPO) in steamed bread in China. The dose rate of BPO is limited by food regulations and BPO is believed to diminish the nutritional value of bread.

Lipases on their own cannot give the same level of whiteness as high doses of BPO. However, combining Lipopan S BG with BPO can allow a reduction in the normal amount of BPO by around half while an equivalent whitening effect is still achieved.



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**Fig. 1. Steamed bread before and after enzyme treatment.**

Using a combination of enzymes, effects on whiteness, lustre and volume improvement can be achieved with Southern-style steamed bread.



**Fig. 2. Improved volume and crumb structure of Northern-style steamed bread.**

In combination with Fungamyl® 2500 SG or Fungamyl Super MA, the positive features of Lipopan® S BG are enhanced, and typical volume increases of 10% can be achieved.



One of China's largest producers of BPO, JiaLi, is one of Novozymes' customers for enzymes. JiaLi is located in the city of Zheng Zhou in He Nan province in central China. Originally a chemical manufacturer, the company changed direction and became a formulator of flour improvers. With concern growing about the use of chemical agents, JiaLi began to buy enzymes from Novozymes as an alternative. In this way, they can meet the needs of their various customers.

#### Better fermentation tolerance

Lipases can also improve dough stability by improving dough strength for flour with a low protein content. The dough can therefore endure a longer proofing time without collapsing. Mixing Lipopan S BG and Fungamyl Super MA will make the dough even more stable in case of overfermentation.

The combination of amylases, xylanases and lipases gives steamed bread a much better tolerance to fermentation. This is especially important when producing steamed bread on an industrial scale, where a batch is sometimes left to ferment for a long time.

It is difficult to achieve all these benefits in steamed bread without using enzymes, in particular Lipopan S BG.

#### Higher volume

In combination with Fungamyl 2500 SG or

Fungamyl Super MA, the positive features of Lipopan S BG are enhanced, and typical volume increases of 10% can be achieved (see Fig. 2).

Lipases also increase the formation of amylo-lipid complexes that inhibit the swelling of starch granules and give the bread more rigidity. This results in increased firmness and smoothness as well as reduced stickiness.

#### Stronger dough

Another enzyme suitable for use in steamed bread is the glucose oxidase Gluzyme® Mono BG, which works by the formation of disulphide bonds in the gluten structure. It is used to strengthen gluten in dough, especially for the Southern-style steamed bread where a low-protein flour is used. The addition of Gluzyme Mono BG results in a stronger and more elastic dough with greater resistance to mechanical shock and gives steamed bread a larger volume and shinier appearance.

#### Technical service

"Enzymes are still very new to the formulators and flour mills so we must be there in person to help them use enzymes in the right way," says Genming Yang, senior manager at Novozymes China for the Cereal Food segment. "That's why they require our technical service."

Novozymes China has set up technical service for cereal food applications in

Beijing. The newly renovated cereal food lab in Beijing has been equipped to perform trials for steamed bread, baked bread and noodles.

Most of the development work for steamed bread was done in this lab. Qing Xu is an R&D scientist who works there as a project manager. "We have run more than 100 trials in order to find out which enzyme or enzyme combinations give the best results for steamed bread when using different flours," she says. "Whiteness is the main factor for consumers in China and we have looked at whitening as well as other improvements," she says. The photos show some of the results from the trials she and her colleagues have conducted.

"With our two enzymes, we can improve the flour significantly for making steamed bread," she explains. "Fungamyl is used to increase volume and improve crumb structure, while Lipopan S BG improves whiteness. We never thought we could get such good results in steamed bread with enzymes, and the general reaction from formulators has been very positive." ●

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