

Undeniably Belgian research

# Beer with a touch of clove

A room filled with barrels of beer, a degustation glass here and there and the smell of wort: it all feels like home for researcher Nele Vanbeneden. In the Centre for Malting and Brewing Sciences linked to the Faculty of Bioscience Engineering, she is working on her PhD research on flavour components in blond top-fermented specialty beers.

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## Matt Tips

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In 1971, the famous Brewing School of Professor J. De Clerck left Leuven and was reinstalled at Louvain-La-Neuve. Exactly twenty years later, in 1991, a brewing research centre was re-established at K.U.Leuven's Department of Food and Microbial Technology, known as the Centre for Malting and Brewing Science. It was clearly stated from the start that an important objective of the CMBS, besides its research and educational function, was to offer extensive services to the national and international brewing industries.

Nele Vanbeneden, PhD researcher at the CMBS, welcomes us among barrels of beer. "The brewery consists of three parts. We have the consultancy group, the lab assistants, and the researchers. Because our test brewery is a recognized academic centre, breweries come to us for advice or to have our lab assistants analyze their samples. This way, there is a lot of interaction and feedback, which makes this research so interesting: everything is tested by practical experience and there is a lot of input from the sector."

Nele's research focuses on the flavour of blond top-fermented specialty beers and white beers. "Brewing beer is quite simple, but the process is complicated. In a first stage, water is added to malted grain in a process known as mashing. When malt is mashed at different temperatures, natural enzymes in the grain break down starch particles into sugar. The resulting solution, called wort, is run off from the mash. The wort is then boiled to sterilize it and hops are added to obtain the typical bitter taste of beer."

"In a next stage, known as fermentation, yeast is added to the wort. The fermentable sugars in the wort are consumed by the yeast, while ethyl alcohol and CO<sub>2</sub> – the bubbles in the beer – are produced together with flavour components."

### Tasty blondes

"The idea for my research came from needs of breweries. It seems that a certain spicy flavour component has been found more prominently in blond beers lately. In a low concentration,

this gives a nice clove taste and smell, but in a high concentration you get a strong, medicinal taste. Of course, breweries want to avoid this. Flavour components are formed during the fermentation process, but while brewing, precursors of these flavour components already appear. The head precursor that I am examining is ferulic acid, which is converted to 4-vinylguaiacol, which for me is the most important flavour component. I take the whole beer production process into account: how much of the precursor is formed, what is the influence of the yeast, the brewing, and the fermentation, and what happens to the flavour component during preservation."

"Breweries have three specific questions. They want to know how they can increase or decrease the concentration of the flavour component, depending on the preferred beer, and how they can balance the quantity of the concentration." After three years of research, Nele has come up with partial answers to these questions. "During the brewing process, it is possible to control the



Nele Vanbeneden (© Rob Stevens)

release of the precursor. We now know which factors influence this release: the choice of the malt variety and the temperature during brewing. The best way to control this during fermentation is the choice of yeast, but according to Professor Delvaux, brewers are more likely to change wives than to change their yeast. I am trying to find out which parameters may still be adapted: the pH value, the temperature, and the fermentation technology, for example. If I have time, I would like to examine what happens to the flavour component during preservation."

<http://www.biw.kuleuven.be/Imt/cmbs/home.htm>