The Entrepreneurial University.

Technische Universität München

News Release

Freising-Weihenstephan, 18 September 2008

Ceramic filters against microbes

TUM scientists investigate how to preserve milk without sacrificing quality

Milk lovers know the dilemma: Fresh milk tastes delicious, but is very perishable because of the microbes it contains. UHT milk, on the other hand, has a long shelf life but has lost its original fresh milk taste. The solution is microfiltration: Instead of heating the milk to make it less perishable, it is run through a ceramic filter. Food technologists at the Technische Universität München (TUM) are taking a closer look at this process. Their goal: Milk with full-bodied taste and a long shelf life – without any loss in quality. The researchers will showcase the heart of their filtration equipment at the Bavarian Agriculture Festival in Munich (20 – 28 September).

Heat makes milk less perishable, but it also changes many of its healthy nutrients and its typical taste. That is why a number of innovative dairies have switched from conventional preservation processes to microfiltration. They sterilize milk by running it through fine ceramic filters. When refrigerated the product has a longer shelf life than conventional fresh milk – yet retains almost all of the taste and vitamins of untreated raw milk. Neither the effect this process has on product quality nor the precise function of the filtration process itself has been investigated. Process engineers from the Center for Life and Food Sciences Weihenstephan of the TUM are closing this gap to better understand the method and to further optimize its efficiency.

The principle of membrane technology sounds simple: Instead of killing off microorganisms with strong heat, the milk is passed through a ceramic “sieve” to remove most of the microbes contained in raw milk. When the milk is run through the filter, the bacteria are held back and collect around the pores. But the devil is in the details: Milk fat globules are roughly the same size as the bacteria. For this reason the cream must first be skimmed off, before the remaining skim milk can be gently filtered. But this is also not as easy as it might appear. The smaller the ceramic pores, the fewer microorganisms are left in the milk. Unfortunately, more milk proteins also get caught up in the filter.

In short: It is difficult to selectively filter out microbes while retaining the milk proteins in an effective and predictable way. Making the whole procedure trickier yet is the fact that milk

Technische Universität München **Corporate Communications Center** **80290 München** **www.tum.de**

Dr. Ulrich Marsch	Head of Corporate Communications	+49.89.289.22778	marsch@zv.tum.de
Jana Bodický M.A.	Media Relations	+49.8161.71.5403	bodicky@zv.tum.de

particles also get caught up in the membranes, thereby clogging the filter. That is why dairies have resorted to larger pore sizes so far. In order to guarantee the safety of the product, microfiltration currently has to be combined with final heat treatment. This optimized, combined process keeps refrigerated milk fresh for up to three weeks without any loss of vitamins or changes in taste.

TUM researchers at the Chair for Food Process Engineering and Dairy Technology of the Center for Life and Food Sciences Weihenstephan are investigating the fundamentals, influential factors and separation mechanisms for microfiltration in order to get a better grip on this process. Their goal is to find a scientifically solid filtration process that helps remove microbes from raw milk selectively and efficiently, allowing for even gentler final heat treatment.

To this end scientists on Prof. Kulozik's process engineering team vary the pore size and design of the ceramic filters, as well as the individual experimental process parameters. Together with the Chair for Microbial Ecology (Prof. Scherer), they have also succeeded in identifying the milk microorganisms that "slip through" conventional filter membranes. Armed with this knowledge scientists can now modify the process in a targeted way. They can also adapt the heat treatment conditions to further improve the quality and shelf life stability of milk.

Thanks to the research results of the Weihenstephan scientists, micro-filtrated milk will appear on more and more supermarket shelves. The heart of their sterilization and filtration equipment will be on display at the Bavarian Agriculture Festival in Munich from 20 to 28 September. Please visit us at the booth of the Technische Universität München in Hall 7 at the Theresienwiese in Munich, Booth No. 7067. We will be on site every day between 9 am and 6 pm.

Contact:
Prof. Ulrich Kulozik
Veronika Kaufmann, Dipl. oec. troph.
Chair for Food Process Engineering and Dairy Technology
Technische Universität München
85354 Freising
Tel: 08161 / 71-4205 / -5032
E-Mail: Ulrich.Kulozik@wzw.tum.de
E-Mail: Veronika.Kaufmann@wzw.tum.de
http://lmvt.weihenstephan.de/

The Entrepreneurial University.

Technische Universität München

Background:
The interdisciplinary cooperation research project “Process optimization for the production of less perishable fresh milk (ESL) using thermal and membrane processes” (Project No.: AiF-FV 15047 N) is funded by the German Federation of Industrial Research Associations (Federal Ministry of Economics and Technology / AiF) through the Research Association of the German Food Industry (FEI).

++++ The attached photos have been released for publication free of charge under the Copyright of “TUM”. ++++

Photo descriptions:
Filtrationsmodul.jpg: A microfiltration module with ceramic multichannel elements (Photo: Kaufmann / TUM)
Mikrofiltrationsanlage.jpg: The microfiltration equipment for sterilization and filtration (Photo: Kaufmann / TUM)

Technische Universität München **Corporate Communications Center** **80290 München** **www.tum.de**

Dr. Ulrich Marsch	Head of Corporate Communications	+49.89.289.22778	marsch@zv.tum.de
Jana Bodický M.A.	Media Relations	+49.8161.71.5403	bodicky@zv.tum.de