4th International Symposium on Sourdough
- from arts to science -

Scientific Program

14 - 17 October 2009 - Freising - Germany
Preface

Bread is an essential part of human nutrition and culture. Each step in its manufacture, from careful selection of the ingredients to preparation and handling of the dough to the baking process represents a piece of art to give rise to products with a virtually unlimited variety of colours, shapes and flavours. The variety of leavened baked goods results from differences in tradition, cultural heritage and geographical origin, but the most appealing baked goods have one ingredient in common to ensure their otherwise irreproducible quality: the sourdough. Unique sourdoughs reflecting an immense biodiversity of lactic acid bacteria and yeasts are manufactured and used both at artisan and industrial levels. Interactions among microorganisms, and between microorganisms and raw materials, ingredients and technological parameters influence extensively the performance and properties of sourdough.

Many bakers master the art of controlling the microbiological and chemical transformations occurring during bread production without knowledge of the underlying mechanisms, however, current scientific interest in food quality as well as industrial requirements in food production have moved the field "From arts to science". Modern techniques like genomics, metabolomics, proteomics and molecular sensory science with special emphasis on lactic acid bacteria allow insights in and exploitation of the biodiversity of known and novel species and the genetic and metabolic background of cultures that influence texture, flavour, aroma and health aspects of the sourdough bakery products. Novel fermentation technologies and starter cultures represent the tools to satisfy industrial and consumer demands, and to develop baked goods with value added functions.

Since the first meeting in Verona in 1996, the International Symposium on Sourdough has developed to a regular, triennial appointment to bring together scientists, R&D and product managers from the industry, and industrial and artisan bakeries from all over the world. The Fourth symposium in this series is organized by the Technische Universität München, Germany. It was structured to take into account the various disciplines that contribute to the field, starting from the ecosystem sourdough representing a large biodiversity of yeasts and lactic acid bacteria, going through the technological, microbial and biochemical factors determining aroma formation, structure formation, nutritional properties and shelf live culminating with added value functions focused improved human nutrition and health. We were very enthusiastic in facing a number of significant scientific contributions proposed by researchers from many different countries, thus yearly increasing the interest for these topics. Contributions were also selected by the scientific committee to provide a forum for industrial R&D experience in the sourdough field, allowing the scientific community to become aware of most common practical matters and of industries’ expectations from microbiology and biochemistry.

Prof. Dr. Rudi F. Vogel
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Luc De Vuyst (Vrije Universiteit Brussel, Belgium)

Symposium Venue
Kardinal Döpfner Haus
Domberg 27
85354 Freising
Germany
Lecture program

Wednesday, October 14, 2009

From 10:00  Reception open - Poster mounting
14:00  Opening / Welcome, Rudi F. Vogel
14:15  Welcome, Gerhard Wenzel
(Dean of the Center of Life and Food Sciences Weihenstephan)

Session 1: Sourdough Ecology
Chair: Michael Gänzle

14:30  Biodiversity, ecological determinants and metabolic exploitation of sourdough microbiota. Luc De Vuyst, Gino Vrancken, Frédéric Ravyts, Tom Rimaux, Stefan Weckx, Research Group of Industrial Microbiology and Food Biotechnology, Vrije Universiteit Brussel, Belgium

15:10  Cell-cell communication within sourdough lactic acid bacteria: a matter of discussion. Marco Gobbetti, Raffaella Di Cagno, Maria De Angelis, Fabio Minervini and Mariella Calasso, Department of Plant Protection and Applied Microbiology, University of Bari, Italy

15:40  Coffee break

16:10  Meta-transcriptome analysis of natural wheat and spelt sourdough ecosystems through functional gene microarray analysis. Stefan Weckx1, Joke Allemersch2, Gino Vrancken1, Roel Van der Meulen1, Ilse Scheirlinck3, Geert Huys3, Peter Vandamme3, Paul Van Hummelen2, and Luc De Vuyst1, 1Research Group of Industrial Microbiology and Food Biotechnology (IMDO), Faculty of Sciences and Bio-Engineering Sciences, Vrije Universiteit Brussel, Belgium, 2MicroArray Facility, Flanders Institute for Biotechnology (VIB), Belgium, 3Laboratory of Microbiology, Faculty of Sciences, Ghent University, Belgium

16:30  Function of the arginine deiminase (ADI) pathway in Lactobacillus fermentum IMDO 130101, a potential sourdough starter culture. Gino Vrancken1, Dorrit Wouters, Tom Rimaux, Stefan Weckx, Frédéric Leroy, and Luc De Vuyst, Research Group of Industrial Microbiology and Food Biotechnology, Faculty of Sciences and Bio-engineering Sciences, Vrije Universiteit Brussel, Belgium

17:30  Dinner (poster session open)

19:00  Healthgrain – Exploiting Bioactivity of European cereal grains for improved nutrition and health benefits. Kaisa Poutanen, VTT, Helsinki, Finland

19:15  Hofpfisterei – Tradition, artisanry and ecology in sourdough bread making. Friedbert Förster, Hofpfisterei, Munich, Germany

19:30  Weihenstephan – The origin of beer. Josef Schrádler, Bavarian State Brewery, Weihenstephan, Germany

19:45  Poster session with Bread & Beer tasting
Thursday, October 15, 2009

Session 1: Sourdough Ecology (continued)
Chair: Luc de Vuyst

08:30  *Lactobacillus sanfranciscensis* – insights from the genome. Rudi F. Vogel, Wolfgang Liebl, Thomas Rattei, Melanie Pavlovic and Matthias A. Ehrmann. Lehrstuhl für Technische Mikrobiologie, Technische Universität München, Germany

09:00  Dextranase gene transferred by a *Lactobacillus sanfranciscensis* phage. Claudia Picozzi, Daniel Meißner, Margherita Chierici, Roberto Foschino, Rudi F. Vogel, DiSTAM, Università degli Studi di Milano, Italy; Lehrstuhl für Technische Mikrobiologie, Technische Universität München, Germany

09:20  Characterisation of the microbiota of buckwheat and teff sourdoughs. Alice V. Moroni, Fabio Dal Bello, and Elke K. Arendt, Department of Food and Nutritional Sciences, University College Cork, Ireland

09:40  Coffee break + Poster session

Session 2: Sourdough bread aroma
Chair: Elisabetta Guerzoni

10:40  Sensory perception of aroma and taste of foods. Thomas Hofmann, Chair of Food Chemistry and Molecular Sensory Science, Technische Universität München, Germany

11:20  The isotopologue enrichment technique - A useful tool in the characterisation of precursors and chemical pathways leading to key aroma compounds during microbial fermentations and thermal food processing. Peter Schieberle, German Research Center for Food Chemistry and Chair for Food Chemistry, Technische Universität München, Germany

11:50  Impact of different lactic acid bacteria on flavour formation in sourdough. Frédéric Ravyts, Frédéric Leroy, and Luc De Vuyst, Research Group of Industrial Microbiology and Food Biotechnology, Faculty of Sciences and Bio-engineering Sciences, Vrije Universiteit Brussel, Belgium

12:10  Leucine metabolism in *Lactobacillus sanfranciscensis* in the presence of acid stress. Diana I. Serrazanetti, Sylvain Sado, Maurice Ndagijimana, Andrea Gianotti, Matthias Ehrmann, Rudi Vogel, Aldo Corsetti, M. Elisabetta Guerzoni, Dipartimento di Scienze degli Alimenti, Università degli Studi di Bologna, Italy; Dipartimento di Scienze degli Alimenti, Università degli Studi di Teramo, Italy; Lehrstuhl für Technische Mikrobiologie, Technische Universität München, Germany

12:30  Lunch break

Session 3: Dough rheology and bread structure
Chair: Stefan Cappelle and Maria de Angelis

14:10  Building structure in gluten free cereal products. Elke K. Arendt, Department of Food and Nutritional Sciences, University College Cork, Ireland

14:50  Fermentation of pseudocereals as a new way of enhancing bread quality. Andreas Houben, Thomas Becker, Department for brewery and beverage technology, Workgroup Cereal process engineering, Technische Universität München, Germany

15:10  Sourdough in gluten-free bread: an ancient technology to solve a novel issue? Fabio Dal Bello and Elke K. Arendt, Department of Food and Nutritional Sciences, University College Cork, Cork, Ireland
15:30  Break + Poster session

16:30  Comparison of baked goods leavened with or without use of baker’s yeast. Markus J. Brandt, Ernst Böcker GmbH & Co. KG, Minden, Germany  

16:50  Enzyme assisted evaluation of the structure and content of dextrins in sourdough. Ndegwa Maina1, Liisa Virkki1, Kati Katina2, Riika Juvonen2, Laura Flander2, Maija Tenkanen1, 1Department of Applied Chemistry and Microbiology, University of Helsinki, Finland, 2VTT, Finland

Session 4: Nutritional properties of sourdough products  
Chair: Peter Kohler and Kaisa Poutanen

17:10  Rich nutrition from the poorest – cereal fermentations in Africa and Asia. Rob Nout, Laboratory of Food Microbiology, Wageningen University, The Netherlands

17:50  Lessons learned from comparative sourdough fermentations with non-traditional raw materials. Koen A. Dekker, R. Linnemann, M. Merfeld, B. Ritzka, A. Kuhlmann, R&D Business Unit Bakery, Dr. Otto Suwelack, Billerbeck, Germany

18:10  Microbiological and technological aspects of sourdoughs for breadmaking with barley flour. Cristiana Garofalo1, Lucia Aquilanti1, Emanuele Zannini1, Sara Santarelli1, Gloria Silvestri2, Valentina Sparvoli1, Manuela Marotti1, Francesca Clementi1, 1SAIFET, Università Politecnica delle Marche Ancona, Italy, 2DiSTAM, Università degli Studi di Milano, Italy

18:30  Germinated Wheat as Constituent of Wheat Bread Produced by Sourdough Technology. Peter Koehler1, Michael Rychlik2, Gaby Andersen1, Veronika Somoza3, 1Deutsche Forschungsanstalt für Lebensmittelchemie, Garching, Germany, 2Bioanalytik Weihenstephan, Freising, Germany, 3Food Science and Nutrition, University of Madison, Madison, Wisconsin, U.S.A.

18:50  Wheat germ stabilization by sourdough fermentation. Carlo G. Rizzello1, Luana Nionelli1, Rossana Coda1, Antonio Trani2, and Marco Gobbetti1, 1Department of Plant Protection and Applied Microbiology, University of Bari, Italy, 2Dipartimento di Progettazione e Gestione dei Sistemi Agro-Zootecnici e Forestali, University of Bari, Italy

19:10  End of session

19:30  Dinner

21:00  Visit to the Freising Cathedral – optional guided tour

Friday, October 16, 2009

Session 4: Nutritional properties of sourdough products (continued)  
Chair: Peter Köhler

08:30  Sourdough and fermentation in a nutritional perspective. Kaisa Poutanen and Kati Katina, VTT, Finland

09:10  Enzyme-aided sourdough fermentation induces structural modifications of bran and enhances its bioactivity. Kati Katina1, Emilia Selinheimo1, Laura Flander1, Nuria Mateo Anson2, Rob Havenaar1 and Kaisa Poutanen1, 1VTT Technical Research Centre of Finland, Finland, 2University of Maastricht, Pharmacology and Toxicology, The Netherlands, 3TNO, Zeist, The Netherlands
### Lecture program

**09:30**  
**Effect of sourdough fermentation on kamut prolamine.** Alessandra Russo, Diana I. Serrazanetti, M. Elisabetta Guerzoni, Andrea Gianotti, Food Science Department, University of Bologna, Italy  
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**09:50**  
**Effect of sourdough bread on iron status.** Asmaa Chaoui, Mohamed Faid, and Rekia Belahsen.  
1Training and Research Unit on Nutrition & Food Sciences, Chouaib Doukkali University, School of Sciences, El Jadida, Morocco,  
2Department of Food Microbiology and Biotechnology, Hassan II Institute of Agronomy and Veterinary Medicine, Rabat-Institute, Rabat, Morocco  
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**10:10**  
**Break**

**Session 5: Shelf life of sourdough products**  
Chair: Elke Arendt

**09:30**  
**Potential of antifungal lactic acid bacteria, propionibacteria and yeasts in bread preservation.** Johan Schnürer, Department of Microbiology, Swedish University of Agricultural Sciences, Uppsala, Sweden  
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**10:00**  
**Break**

**10:30**  
**Exploitation of propionate formation by lactobacilli to extend the mould-free shelf life of bread.** Chonggang Zhang, Clarissa Schwab, Markus J. Brandt, and Michael G. Gänzle.  
1Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada,  
2Ernst Böcker GmbH & Co. KG, Minden, Germany  
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**12:10**  
**Lunch**

**13:10**  
**Excursion to Kehlheim / Kloster Weltenburg**

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**Saturday, October 17, 2009**

**Session 6: Added value from fermented cereals**  
Chair: Marco Gobbetti and Clarissa Schwab

**09:00**  
**Natural enrichment of foods through bacterial fermentation.** Jeroen Hugenholtz, NIZO food research and the Kluyver Centre for Genomics of Industrial Fermentation, Ede, The Netherlands  
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**09:40**  
**Novel Metabolites from cereal-associated lactobacilli – novel functionalities for cereal products?** Michael G. Gänzle, Chonggang Zhang, Biono-Sekwati Monang, Vivian Lee, and Clarissa Schwab, Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, Canada  
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**10:00**  
**A non-bread appropriation of sourdough – from dehulling of oats to probiotic snack.** Hannu Salovaara, Department of Food Technology, University of Helsinki, Finland  
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<td>10:20</td>
<td><strong>Safety for celiac patients of breads made of wheat flour hydrolyzed during food processing.</strong></td>
<td>Maria De Angelis¹, Raffaella Di Cagno¹, Carlo G. Rizzello¹, Angela Cassone¹, Luigi Greco², Raffaella Di Mase², Renata Auricchio³, Riccardo Troncone², Salvatore Auricchio² and Marco Gobbetti¹, ¹Department of Plant Protection and Applied Microbiology, University of Bari; ²Department of Pediatrics and European Institute for the Study of Food Induced Diseases, University of Naples, Italy</td>
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<td>10:40</td>
<td>Coffee break</td>
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<td>11:00</td>
<td><strong>Rye-malt sourdough – a multifunctional improver for gluten-free baking.</strong></td>
<td>Jussi Loponen¹,², Päivi Kanerva¹, Chonggang Zhang², Meri Elo¹, Tuula Sontag-Strohm³, Hannu Salovaara¹, Michael G. Gänzle², ¹Department of Food Technology, University of Helsinki, Finland, ²Department of Agricultural, Food and Nutritional Science, University of Alberta, Canada</td>
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<td>11:20</td>
<td><strong>Effect of sourdough process on the antioxidant protective effects of Kamut bread in experimental animals.</strong></td>
<td>Andrea Gianotti, Francesca Danesi, Maria Elisabetta Guerzoni and Alessandra Bordoni, Campus of Food Science, University of Bologna, Cesena, Italy</td>
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<td>11:40</td>
<td><strong>Farewell and Invitation</strong></td>
<td>Rudi F. Vogel and Kaisa Poutanen</td>
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1P03 Taxonomic structure and monitoring of the dominant lactic acid bacteria population during wheat flour sourdough type I propagation by using *Lactobacillus sanfranciscensis* or *Lactobacillus plantarum* starters De Angelis, M. p 26
1P04 Phenotypic characterization and molecular analysis of lactobacilli from Bulgarian rye sourdoughs Dobreva-Yosifova, G. p 27
1P05 How long does the same strain of *Lactobacillus sanfranciscensis* inhabit a Panettone sourdough? Foschino, R. p 28
1P06 Lactic acid bacteria in spontaneous sponge fermentation of Latvian traditional rye sourdough KozlinskiS, E. p 29
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2P03 Biosynthesis of lactones by sourdough lactic acid bacteria and interaction with *Candida milleri* Vernocchi, P. p 46
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6P03  Synthesis of γ-aminobutiric acid (GABA) by sourdough lactic acid bacteria in cereal and pseudo-cereal flours  Gobbetti, M.  p 99
6P04  Effect of fermentation of native and germinated rye on folate content of bread  Kariluoto, S.  p 100