

CONFERENCE REPORT

XIII ICC Cereal and Bread Congress – Cerworld 21stConcha Collar¹ & Cristina M. Rosell²¹ ICC President 2007–2008, Cereal group, IATA-CSIC, Spain² ICC National Deputy for Spain, Cereal group, IATA-CSIC, Spain

The International Association for Cereal Science and Technology (ICC), The Spanish Ministry of Environment, Rural Development and Fishery (MMRM), and The Spanish Association for Cereal Science and Technology (AETC) co-organized the XIII ICC Cereal and Bread Congress ‘Cereals worldwide in the 21st century: present and future’ – Cerworld 21st – in Madrid, Spain, from the 14 to 18 June 2008. The Congress (<http://www.cerworld2008.com>) was held in the Meliá Castilla Hotel, and was chaired by Concha Collar, ICC President (Spain), and vice-chaired by Cristina M. Rosell, Spanish National Deputy in ICC (Spain). The Congress Secretariat was headed by Maite Parrilla, AETC Director.

As an expression of international cooperation, ICC offers, every four years as its flag event, a neutral and fertile international open forum on the latest key topics in cereal science and technology. Cerworld 21st in Madrid was the location for the international debate on hot topics regarding cereals and cereal-based products, and provided opportunities to both young and consolidated professionals from academia, industry, government, and research institutes for the exchange, dissemination and transfer of the knowledge about the production and use of safer, healthier, more nutritious and higher quality cereals and cereal products in a sustainable, integrated, dynamic and multidisciplinary way. The Congress brought together tradition and innovation to provide tailor-made cereal science and technology. It was structured into eight tracks – seven symposia and eight technical sessions – running in parallel with simultaneous translation between Spanish and English. Invited speakers and submitted lectures, poster displays and table top exhibition covered the entire field of cereal science and technology and shaped the technical programme. Particular emphasis was placed on cereal biotechnology, safety, raw materials, industrial processing, nutrition, health and consumer expectations, analytical tools, ethnical cereal-based foods and non-food uses of cereals. Iberoamerican (CYTED) and EU (EU-FRESH BAKE, and HEALTHGRAIN)-funded project consortia arranged annual or working meetings as pre-Congress events. ICC committee meetings (the governing, executive, and technical), ICC General Assembly and the

Joint AACC Int'l and ICC Task Force Meeting were scheduled as pre-, in- and post-congress events.

The Congress attracted about 500 participants from 54 countries from across the six continents. A total of 338 presentations with 112 oral presentations and 226 posters from authors around the globe guaranteed a most enriching international programme. A book of abstracts (ISBN: 978-84-612-4517-8) was compiled and is available in both hard copy and electronic formats. Ten sponsors (CSIC, CSIC-CM, Brabender, Chopin Technologies, Berlys, Kraft Food, AFHSE, Harinera Castellana, Harinera Villafranguina, HealthGrain, Perten Instruments), four endorsing organizations (AACCI, C&E, CYTED, IUFOST) and 16 exhibitors supported Cerworld 21st. Major participating countries were Spain, United States, France, Italy, Argentina, and Brazil. The United States contributed most oral presentations (13), followed by Spain (11), Germany (9), Canada (8) and France (8).

Distinctive features of Cerworld 21st were the transnational nature of participants and the global approach of the topics handled, with extensive coverage from both traditional and innovative perspectives.

Welcome address and official opening ceremony

The Welcome Ceremony was chaired by Cristina M. Rosell (Spain), the master of ceremonies, and began with words of welcome addressed to the delegates Concha Collar, the President of Cerworld 21st and ICC President. In the second part of the opening ceremony Fellowship awards were made by the ICC Academy. The Chair of the ICC Academy, Robert Cracknell (Australia) awarded Fellowship certificates to Linda Young (UK), Jim Dexter (Canada), David Lineback (USA) and Pierre Gelin (Canada). The Clyde H. Bailey medal went to Barry McCleary (Ireland) and the Friedrich Schweitzer medal to Martha Cuniberti (Argentina). The Harald Perten Prize granted by the Harald Perten Foundation went *ex equo* to Concha Collar (Spain) and Cristina M. Rosell (Spain).

The plenary lecture was given by José T. Esquinas-Alcázar, Former President of the FAO Committee of Ethics for Food and Agriculture (Spain) who spoke on 'Cereals in the fight against hunger: genetic resources, science and ethics'.

The official opening of the Congress was delivered by Elena Espinosa, Spanish Minister for Environment, Rural Development and Fishery (MMRM) who, introduced by Concha Collar, stressed the great significance for Spain in hosting this international cereal event that largely contributes to the knowledge transfer in cereal science and technology worldwide.

Track 1: Food safety and risk assessment in the cereal supply chain

The symposium was endorsed by IUFOST and co-chaired by Roland E. Poms (Austria) and Duska Curic (Croatia). It covered the following topics: harmonised food safety assessment, analyses of mycotoxins and pesticide residues, acrylamide in cereal products, allergenic compounds in cereal products, advances in analytical techniques, policy and action, risk communication and socioeconomic impact of new regulations. David R. Lineback (USA), President of IUFOST, gave the keynote lecture on 'Globalization and Food Safety Issues' followed by five invited speakers. Roland E. Poms (Austria) spoke on 'Harmonization Efforts for Safer Foods and Cereal Based Products: MoniQA, GHI and other initiatives', Eva Maria Binder (Austria) presented a talk titled 'Mycotoxin analysis', Monica Ermolli (Italy) delivered a talk on 'Testing for GMOs in the EU', Helen Brown (UK) gave a lecture titled 'Food allergy on the rise – analytical challenges and legal requirements for the cereal industry', and Vural Gökmen (Turkey) talked on 'Occurrence and Analysis of Acrylamide in Cereal Products'.

The Technical session was handled by Meinolf Lindhauer (Germany) and was opened for all kinds of known (e.g. mycotoxins, heavy metals, pesticides) and less well-known risks (e.g. metabolites of heat treatment) and respective avoidance strategies throughout the cereal supply chain (breeding, cultivation, harvest, post-harvest activities, processing as well as sampling and analytics). The key note lecture was on 'Food safety from the farm to the mill: a case study on Canada's approach to on-farm food safety' and was given by Graham C. Worden (Canada). Seven more oral contributions and 21 poster presentations made up the session.

Track 2: Cereal biotechnology worldwide

José María Carrillo (Spain) and Jošl Abecassis (France) co-chaired both the symposium and the technical session

on Cereal Biotechnology in which several topics on the latest research approaches to increase the nutritional and the techno-functional properties of cereal grains were developed. The characterization and modification, by traditional and new approaches, of starch, proteins and other components of cereal grains, and their implication on the end-use quality were discussed. The symposium was opened by Ravindra N. Chibbar (Canada) as key note speaker who talked on 'Recent developments in cereal biotechnology – opportunities and challenges', and followed by Finlay MacRitchie (USA) and Peter R Shewry (UK) who gave respective talks on 'Cereal endosperm proteins: breeding and functional quality' and 'Improving the nutritional quality of bread wheat'. The technical session consisted of five talks started by Craig B. Faulds (UK) with a lecture on 'Disassembly of cereal by-products by multi-enzymatic mixtures', and 16 poster presentations. Specific topics tackled during the session included recent achievements, new opportunities and future challenges of increased amylose content of novel wheat starches of diverse genetic background, *in vitro* system to study starch biosynthesis during wheat grain development and modification of breadmaking quality and silencing of gliadins by RNA of interference, and the evaluation of durum wheat varieties for baking quality.

Track 3: Processing of cereal grains and cereal products

A current challenge facing cereal technologists is to design innovative cereal-based products to meet diverse worldwide consumer demands for healthy, tasty, and convenient foods. This symposium focused on new developments and emerging techniques of grain and/or grain-products processing with particular emphasis on the influences of processing variables on the characteristics and nutritional improvements of final products, and was co-chaired by Okkyung (Okky) Kim Chung (USA) and Beate Kornbrust (Switzerland). The keynote lecture was given by Friedrich P. Meuser (Germany) and titled 'Advances in Processing of Cereal Grains and Their Products'. Kent Rausch (USA) presented on 'Maize Processing: Dry and Wet Milling', Marina Carcea (Italy) on the 'Influence of Raw Materials and Processing on Pasta Quality' and Norbert Gimmler (USA) talked on the 'Influence of Different Cooking Processes on Product Characteristics of Ready-To-Eat-Cereals'.

The technical session was co-chaired by Cristina M. Rosell (Spain) and Filip Arnaut (Belgium) and provided an overview of the current and future trends in processing of cereal grains including new processing techniques – methods and

equipment – being developed to meet the challenges of cereal grain and ingredient processing for new products. As well as processing aids and food additives being developed to meet the new demands on cereal grain products and consumer new expectations. The session started with a key lecture delivered by Filip Arnaut on ‘Grain processing: bringing the benefits of cereal grains to the consumer’ followed by eight oral contributions and 46 poster presentations. Topics deserving special attention in the session included the development of new dry fractionation processes for ingredients production from wheat bran, the effect of milling conditions and genotype on the yield and composition of oat-milled products, functional and processing properties of wheat flours by stepwise polishing method, the role of dry-heated prime starch and tailings fractions in wheat flour on the springiness of pancakes, the influence of heat-treated bran on physicochemical, rheological and microstructural characteristics of sangak bread, the influence of legumes addition on quality of pre-cooked pasta, and the impact of refrigerated storage on yellow alkaline durum noodles, and the basis of good bread making – stabilizing the gas cells.

Track 4: Cereal based foods: nutrition, health and consumer expectations

The cereal community faces three major nutrition related challenges: combating malnutrition, enhancing protection against major civilization diseases – obesity, cardiovascular diseases, type-2 diabetes and cancer – and doing this by developing beneficial products attractive to consumers, endorsed by food safety and health authorities, and nutritionally evaluated by scientists. The symposium, co-chaired by Jan Willem Van der Kamp (The Netherlands) and Ascensión Marcos (Spain) offered new insights of nutrition research and technological opportunities, and presented approaches for successfully marketing healthy products. The key note lecture titled ‘HEALTHGRAIN: The European approach to better exploit grains for consumer well-being’ was provided by Kaisa Poutanen (Finland). Seven more invited speakers gave presentations; ‘Delivering cereals and cereal-based foods with substantiated human health benefits through modification of grain carbohydrates’ (Matthew K. Morell, Australia), ‘Enhancing the micronutrient concentration of wheat through plant breeding’ (Ivan Ortiz-Monasterio, Mexico), ‘Wholegrain foods and health’ (Chris J. Seal, UK), ‘Healthy rice based products – recent developments’ (Shin Lu, Taiwan), ‘Improving nutrient profiles of indulgence bakery goods’ (Jan deVries, the Netherlands), ‘Whole

grains in school foodservice’ (Len Marquart, USA), and ‘Consumer attitudes towards wholegrain products, and how to change them’ (Morten Strunge Meyer, Denmark).

Understanding relationships between the consumption of cereal products, dietary habits, nutrient intake and the nutritional status of population groups constitute current worldwide high priorities, concerning both nutrient adequacy and well-being issues. The technical session was co-chaired by Alberto E. León (Argentina) and Mónica Haros (Spain), and covered the following topics: (i) beneficial and harmful dietary cereal factors, (ii) specific needs and habits of population groups, (iii) cereal involvement in the reduction of incidence in diet-related disorders (e.g. obesity, metabolic syndrome, celiac disease), (iv) micronutrients deficiency, (v) bioavailability of bioactive compounds in cereal-based foods. The first part of the session started with Alberto Edel León as the keynote speaker, presenting a paper on ‘Grains and health: meeting specific requirements for Latin American population’. The second part of the session was headed by Julie Miller Jones (USA) who delivered an invited lecture titled ‘Mining whole grains for functional components’. The entire session comprised six oral presentations and 41 posters.

Track 5: Analytical tools for quality assessment of total cereal food chain

The symposium, co-chaired by Alain Le Bail (France) and Wallace Yokoyama (USA), aimed to gather studies on newly developed techniques or research work focussing on the improvement of existing techniques to assess the quality of cereals and cereal-based products. Quality was a generic keyword and within this symposium it encompassed specific properties of raw products (functional, technological, microbial, concentration of specific compound or chemical) or of transformed products (texture, structure, organoleptic). Innovative approaches were targeted by a worldwide panel of speakers. George Loochhart (USA) delivered a pre-recorded keynote lecture titled ‘Characterizing Cereal Proteins: past, present and future’, followed by seven invited lecturers. Wallace Yokoyama (USA) talked on ‘Characterization of the molecular weight distribution of cereal beta-glucans and starch by size exclusion chromatography and light scattering detection’: Marek Sikora (Poland) on a ‘Study on starch gelatinization of the dough during processing’; Pablo Ribotta (Argentina) on ‘Thermoanalytical methods to assess baked product quality’: Alain Le Bail (France) on ‘The mechanical properties of baked crumb – from the baked degassed crumb to the cellular solid’. Cécile

Rannou (France) stressed the importance of flavour compounds in bakery in a talk titled 'Aroma of bakery products; detection and evaluation. Can we replace the human nose?' while Arnaud Dubat (France) presented a new analytical device to fully characterize wheat and flour in his presentation titled 'The Chopin Mixolab: a new tool for a complete screening of flour and wheat characteristics'.

The technical session was co-chaired by Stanley Cauvain, (UK) and Pablo Ribotta (Argentina). The session emphasized the need to understand all of the processes involved in the conversion of cereals to food if consumers expectations are to be met. Analytical tools available to the scientist and technologist for the study of cereal products and processes and their potential applications in delivering high quality cereal foods were considered. Topics ranged from the application of chromatography to study grain protein fractions and their functions, especially with respect to the rheological properties of intermediates (e.g. dough) and their contribution to dough processing. The recent use of noninvasive analytical tools is presenting new and exciting opportunities for the optimization of existing cereal foods and the development of new products and processes. Applications of such non-invasive analytical tools were considered. Nine oral contributions and 37 poster presentations shaped the session.

Track 6: Current and future developments in cereal product formulation

The formulation of innovative cereal-based foods is a key to the future of the cereals industry. Considering the health-consciousness of consumers and the positive nutritional image of cereal foods, this symposium reviewed critical aspects of food product development. Technical presentations helped with increased understanding of the functionality of cereal components (specialty flours, fibres, proteins, endogenous enzymes, sourdough, etc.) and non-cereal additives (yeast, enzymes, emulsifiers, modified starches, etc.). Peter Weegels (The Netherlands) and Pierre Gélinas (Canada) co-chaired both the symposium and the technical session.

The symposium, endorsed by AACC International, was opened by Mary Ellen Camire, President-Elect of AACC International as the key note lecturer with the talk titled 'Healthful food ingredients: practical considerations', followed by seven invited speakers. José Mastenbroek (the Netherlands) gave a talk on 'Let's Cake Together™, three steps to great tasting better for your cakes', Pierre Gélinas (Canada) presented on 'Yeast strains and products tailored for the baking industry'; Peter Weegels (the Netherlands) spoke about 'Innovative bread improvers: Facts and fiction';

Cristina M. Rosell (Spain) gave an overview on the 'Role of hydrocolloids in bakery products'; Rob J. Hamer (The Netherlands) presented on 'Crispiness creation and extension'; Frank T. Rittig (Switzerland) posed the question 'How can enzymes help you to cope with rising ingredient costs?' and Peter Koehler (Germany) delivered a presentation titled 'Volume, crumb softness, and staling of wheat bread as affected by polar lipids'.

The technical session included 10 oral contributions and 52 poster presentations. Selected topics discussed novel aspects of enzyme functionality, effects of different components and (functional) ingredients on dough rheology and bread technological performance and the simulation of breadmaking process with high fibre enriched doughs, and dealt with wheat, rye, triticale, gluten-free formulations and pseudocereals as raw materials.

Track 7: Ethnic cereal-based foods across the continents

The aim of the session was to assess the current and future impact of ethnic cereal-based foods on global eating patterns, especially with regard to the grain market, convenience foods, and good nutrition. The technical session co-chaired by John Taylor (South Africa) and Robert Cracknell (Australia). It started with Sergio Serna-Saldivar (Mexico) as the key note speaker with a lecture titled 'Research developments in the science and technology of maize-based nixtamalized foods' and he was followed by eight invited speakers. Nine poster presentations completed the session. Topics covered by oral presentations dealt with developments in African sorghum beers, in wheat- and other cereal-based local foods in South America, and traditional Turkish cereal-based foods and beverages, wheat and flour requirements for Western ethnic foods and Chinese steamed bread, buckwheat based foods, technological performance of durum wheat bread, and intake patterns outside Asia and health benefits of noodles.

Track 8: Special session: revisiting top demanded cereal topics at Cerworld 21st

This special session, co-chaired by Concha Collar (Spain) and Helmut Glattes (Austria), was devoted to revisiting selected contributions on the topics with special impact in the framework of Cerworld 21st. Research on nutrition and health, new developments and emerging techniques of grain and/or grain-products processing using conventional and innovative formulations were assessed by the latest

analytical tools. Particular emphasis was placed to the study of the influences of quality variables on the characteristics and nutritional improvements of final products in a safe and sustainable way. Innovation with traditional cereal-based foods, specialty/ethnic cereal goods and bioindustrial applications of cereals aroused a great deal of interest. Eight selected oral presentations shaped this special session and dealt with the scientific and technical aspects of oat, wheat, barley-based products and starch-based biofilms. Specific topics included fundamental studies on the creation of structure in oat bread (Elke K. Arendt, Ireland); the influence of HMW-GS and LMW-GS on viscoelastic properties of wheat kernel and their relation to functional properties of wheat doughs (J.D.C. Figueroa, Mexico); the prediction of wheat flour viscosity by near infrared reflectance spectroscopy (Carlos Miralbés, Spain); healthier cereal products: breadmaking with barley flour (María Jesús Callejo, Spain); strategies to modify crispness of crispy rolls by varying process conditions (Cristina Primo-Martín, the Netherlands); phytate reduction during whole wheat breadmaking by bifidobacteria from human origin (Monika Haros, Spain); how drying profile can affect pasta structure. Does this modify the digestibility of the starch and protein fractions and allergenicity? (Maud Petitot, France) and biofilms based on starch used as biodegradable and edible packaging (Carmen Cecília Tadini, Brazil). Four poster contributions on non-conventional uses of cereals were also displayed.

ICC corporate member session

The ICC Corporate Member Session was co-chaired by Roland E. Poms, ICC Secretary General (Austria) and Marina Carcea, ICC President Elect (Italy) with the intention of providing the latest information on developments in the areas of (1) cereal, flour, and bread testing for quality and safety, (2) innovative products and processing technologies for cereal-based foods, (3) most recent advances in enzyme design and (4) healthy ingredients. Presentations in this session were exclusively given by ICC Corporate Members, these are companies with global activities that contribute to the advancement of cereal science and technology (a major aim of the ICC). Reinhard Moschitz (Romer Lab, Austria) opened the session with a presentation titled 'Rapid detection of mycotoxins in cereal grains and cereal products', followed by Sigrid Haas-Lauterbach (R-Biopharm AG, Germany) with the talk on 'Detection of gluten and related proteins in foods and beverages – specific detection with the R5 antibody in a ready-to-use test kit for industry', Bo Allvin (Perten Instruments, Sweden) presented 'Perten Instru-

ments – New product range', Arnaud Dubat (Chopin Technologies, France) introduced the 'Chopin SDmatic and Chopin Mixolab, two new ICC standards No. 172 and 173', Jens Dreisoerner (Brabender® GmbH, Germany) delivered views on 'The heating of dough – different methods and possibilities with a Farinograph®', Henrik Andréén (Foss, Sweden) provided a lecture titled 'Foss – new solutions for the milling industry' and Angel Johnson-Kozłowska (Sadkiewicz Instruments, Poland) closed the session with the presentation titled 'Fermentation properties of wheat, rye and triticale flour measured by the Sadkiewicz Fermentograph Laser Device'.

Congress gala dinner

The Congress gala dinner was held at the emblematic Casino de Madrid, a 200-year-old Historical Institution located in the heart of the city. The formal dinner offered delicious Spanish foods and wines in splendidly decorated halls, followed by a dancing party in the Casino's boÿte. Enthusiastic participants enjoyed foods, entertainment and socializing, which contributed to the unforgettable memories of the Congress.

Prize giving and closing ceremony

A prize giving ceremony preceded the official closing ceremony of Cerworld 21st and was supported by three sponsoring companies with awards for posters and oral presentations which achieved high scientific and technical standards, and displayed innovation and originality from among the 226 posters and the 60 oral contributions to the technical sessions. The **Puratos Great Taste and Wellness Awards** went to Priscilla Verjans *et al.*, (Katholieke Universiteit Leuven, Belgium) for a poster titled 'Use of thermophilic xylanases for *in situ* production of arabinoxylo-oligosaccharides with prebiotic potential in bread' and to Carolina Chaya *et al.* (Universidad Politécnica de Madrid, Spain) for an oral presentation titled 'Healthier cereal products: breadmaking with barley flour'. The **Kraft Foods Young Cereals Researcher Awards** went to Dimitra Lebesi and Constantina Tzia (National Technical University of Athens, Greece) for a poster titled 'Development of high fibre cakes with different dietary fibre and edible cereal bran sources' and to F.M. Vanin *et al.*, (CEMAGREF, Rennes, France) for a poster titled 'A study of the crust setting and its effect on heat and mass transport and expansion during bread baking'. The **BakeTran Best Student Poster Award** went to Emma Lynch (National University of Ireland, Cork,

Ireland) for the poster on ‘Studies on the spoilage of breads produced with reduced salt’.

The closing ceremony address was delivered by Francisco Mombiela (MMRM Officer) who expressed the pleasure and the pride of the Spanish MMRM Ministry with regard to the Congress performance. Concha Collar, ICC President, summarized the main conclusions from the Congress and thanked all its supporters, and Roland Poms, ICC Secretary

General, thanked the co-organizers of the Congress on behalf of ICC.

Acknowledgements

The authors wish to thank all the supporters for their contribution to the organizational and scientific success of Cerworld 21st.