



9th



International Food Data Conference

Food Composition and Sustainable Diets

September 14-17, 2011
NBI Conference Centre
Norwich, United Kingdom

Editors:

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Institute of Food Research, Norwich, UK

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EuroFIR AISBL, Brussels, BE

www.eurofir.org/9th_ifdc



The abstracts in this book were submitted by participants of the 9th IFDC. They were reviewed, evaluated by the scientific advisory committee and were accepted as oral and poster presentations. Some of the abstracts were revised or corrected according to the comments from the reviewers, otherwise presented as submitted.

Norwich, United Kingdom, 2011

Welcome from the Host, Institute of Food Research



Prof David Boxer

Good morning Ladies and Gentlemen and welcome to Norwich. I am delighted that the Institute of Food Research was selected to host the 9th International Food Data Conference. The Institute has had a long association with food composition research, dating back to the late-1970s and has been closely involved with the compilation and publication of McCance & Widdowsons' The Composition of Foods with the UK's Ministry of Agriculture, Fisheries and Food, Food Standards Agency and more recently with the Department of Health.

The food composition activities under our soon to be launched Food Databanks National Capability form a key part of the Institute's programme which addresses the UK's Grand Challenges of obesity and healthy ageing.. The overall theme of the ninth conference - "Food Composition and Sustainable Diets" – is of particular relevance t to our research activities.

I would like to extend a very warm welcome to all speakers, participants and guests to this conference and I do hope that you can make use of the outstanding opportunities you have to share and exchange knowledge, experience and information.

This particular gathering also provides a perfect means to initiate and foster collaborative scientific research and activities among existing and new colleagues. In addition, I would like to offer a special invitation to our international delegates to take some time to explore the historic city of Norwich and other parts of our region. I am certain that you will enjoy our cultural and historical offerings and have patience with our English weather!

Finally, I wish to thank everyone who has been involved in planning the conference - I am sure it will be a successful and memorable event.

Prof David Boxer
Director

Introduction



Paul Finglas

On behalf of the Scientific Advisory Committee, we are pleased to warmly welcome you to the 9th International Food Data Conference (9th IFDC) in Norwich, which is being organised by the Institute of Food Research, and supported by FAO International Network of Food Data System (INFOODS) and EuroFIR AISBL.

The three-day conference entitled “Food Composition and Sustainable Diets” brings together around 150 delegates from 40 countries across the globe comprising food database compilers and food analysts, who generate and compile food composition data, and users of the data including food and nutrition researchers, dietitians and public health professionals and other experts representing the public sector, private industry, academia, regulators, and international agencies. The conference will serve to highlight research, policy, programme activities and to guide sustainable food systems with a minimal impact on the environment ensuring synergies to protect and promote biodiversity for food and nutrition.

The conference and associated meetings and workshops provides a timely forum to disseminate up-to-date knowledge and latest information related to the wider application of food composition data for food quality, health and trade, as well as all related research and development activities. It also provides an ideal opportunity to exchange ideas, share experiences, update relevant activities and new initiatives, discuss and debate various issues of mutual interest and catch-up with collaborators, both old and new.

The final programme is arranged around the opening session, where the Nevin Scrimshaw Award will be announced, and Dr Barbara Burlingame (FAO) will present the Greenfield Southgate Lecture, followed by two key note addresses, and 12 sessions.

Sessions 1-2 will focus on Food composition, Biodiversity and Sustainable Diets and will cover key recommendations defining sustainable diets and related topics such as food as an ecosystem service, varietal differences in nutrient content of foods, biodiversity as an element of dietary diversity, non-intensive agricultural systems for diversity and sustainable development, traditional diets of indigenous people and more.

The positive options offered by linking biodiversity to nutrition will be lost without urgent action that directly engages stakeholders in the fields of environment, agriculture, nutrition, health, education, culture and trade. Therefore, the sustainable diet's approach is the theme of the conference, where the scientific basis of food composition and sustainable diets will be presented.

Session 3 explores the use of food composition for trade, nutrition labelling and health. Session 4-5 focuses on recent research on traditional and ethnic foods in relation to sustainability and health from various EU-funded projects including EuroFIR and BaSeFood.

Session 6 looks at recent database developments and potential new tools including Food-CASE. Session 7 presents an update on the current state-of-the-art of analytical methods including folates, vitamin D, phytate and carbohydrates. The latter introduces nicely Session 8 which looks in more detail at the current developments in dietary fibre methodology, both from the perspectives of regulation, analytical requirements and challenges for the food database compiler. The final Sessions 9-12 cover current national and regional developments in food composition activities.

This booklet contains the scientific programme and abstracts of oral and poster presentations, as well as various satellite meetings and workshops. The conference peer-review proceedings of all oral presentations will be published in a Special Issue of the leading journal Food Chemistry, which will be available to all delegates following the conference. All manuscripts will need to be submitted through the journals online electronic submission system (<http://ees.elsevier.com/foodchem/>) and these must be done by the 1st November 2011 at the latest (as we cannot guarantee that manuscripts received after this date will be considered for publication). All authors should check the Guide for Authors prior to submission (author instructions) and remember to include the names and full addresses (including emails) of at least 4 potential reviewers with their submission.

Furthermore, we would like to publish all the posters as PDF files on the EuroFIR PosterBoard, if the author agrees. Guidelines for the preparation of posters are available at http://www.eurofir.org/9th_ifdc/scientific.

This conference cannot be successful without contributions from several collaborators and colleagues, and I would like to express my gratitude to the Scientific Evaluation Committee and other experts for their help with reviewing the large number of abstracts, and suggestions for invited speakers and programme topics; the FAO and EuroFIR AISBL for their financial and in-kind support and my own team at IFR, notably Dawn Wright, for helping to organise this conference. Last but not least I wish to thank the delegates for your participation.

I do hope that the conference will be fulfilling for all participants, and you also have the opportunity to visit some of Norwich's wonderful historical and cultural offerings, as well as our public houses (inns), churches and shops!

Paul Finglas
Scientific Chair
Institute of Food Research

Greenfield Southgate Lecture

Saving the Planet: sustainable diets, biodiversity and food composition



Dr Barbara Burlingame, FAO

The concept of “sustainable diets” is receiving renewed attention as the world struggles with the dilemma of feeding a hunger planet and preventing continued environmental degradation and biodiversity loss. Food production and consumption must change, as neither, as we know them now, is sustainable

In an attempt to conceptualize the issue, a series of activities were undertaken to define sustainable diets, which culminated in a consensus definition: Sustainable Diets are those diets with low environmental impacts which contribute to food and nutrition security and to healthy life for present and future generations. Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources. (November 2010).

The holistic approach is to focus on diets. The reductionist approach is to focus on nutrients. Food composition scientists have been “accused” of being a breed of reductionists, creating an unreal world view where nutrients are independent of their food matrix and the human diet. There is a perception that a fundamental philosophical divide exists among nutritionists regarding these approaches. Unfortunately, in some quarters that divide does exist. However, attention to one without the other invariably leads to problems. One of its crudest manifestations of the holistic view is the hypothesis of the green revolution; that is if you supply sufficient dietary energy, the nutrients take care of themselves. The green revolution was a success in that agriculture now provides enough food to feed the world; but the hypothesis was incorrect in that there are millions of people with adequate, even surplus, energy intakes who suffer from micronutrient deficiencies. An exclusively diet-based or food-based approach will never show important nutrient differences among cultivars, and misguided interventions can result. Already there are examples of transgenic crops designed to improve nutrient content, when the higher nutrient cultivars already existed. The food composition world has been remiss in its view of “food” as a generic entity.

Varietal and geographic difference in nutrient contents are ignored, and sampling programmes have been based on the notion of obtaining “nation-wide” mean values for nutrients in foods based on population data. This has resulted in unintended consequences for both nutrition and the environment.

Sustainable diets, as a goal or a concept, requires food composition. In order to characterize a diet, one needs to understand the ecosystem, the food species within that ecosystem, the genetic diversity within species, and last but not least, the nutrient contents at the level of the genetic resource. In order to be an intelligent reductionist, one’s ultimate purpose must involve appreciation of, and application to, the whole. And in order to be intelligently holistic, one must acknowledge the contribution of the reductionist. Neither approach will be so useful alone as they are together, whether it is for improving dietary adequacy or preserving our planet’s agro-biodiversity.

Dr Barbara Burlingame
FAO



9th International Food Data Conference

Food Composition and Sustainable Diets

Programme and Abstracts

September 14-17, 2011
Norwich, United Kingdom



International Food Data Conference

Food Composition and Sustainable Diets

Conference Programme

Tuesday 13th September 2011

1600-1800 Early Registrations Open - NBI Conference Centre - Foyer

Wednesday 14th September 2011

0730-0845 Registration - NBI Conference Centre - Foyer

Opening Ceremony – Merton Auditorium

Chairs: Prof David Boxer, Paul Finglas, Dr Barbara Burlingame & Dr Paolo Colombani

0900-0910 Welcome Address - Prof David Boxer, Director, Institute of Food Research

0910-0920 Conference's Chair - Paul Finglas

0920-0930 FAO/INFOODS - Dr Barbara Burlingame

0930-0945 Prof Dr Nevin Scrimshaw Award to Prof Heather Greenfield presented by Dr Ruth Charrondière

0945-1015 Greenfield Southgate Lecture: Dr Barbara Burlingame
Saving the Planet: sustainable diets, biodiversity and food composition

Keynote Addresses:

1015-1040 Prof Judith Buttriss, Director General, British Nutrition Foundation, UK

1. Sustainable Diets: Harnessing the nutrition agenda

1040-1105 Dr Paul Burrows, Biotechnology and Biological Sciences Research Council (BBSRC), UK

2. Responding to the food security challenge: The Global Food Security programme

1105-1130 Poster Session & Morning Break - Foyer

Session 1 – Food Composition, Biodiversity and Sustainable diets

Chairs: Paul Finglas (United Kingdom) and Dr Ruth Charrondière (Italy)

- 1130-1150 S1.03 Dr Elizabeth Lund Independent, Norfolk, UK
Health benefits of fish; is it just the fatty acids?
- 1150-1210 S1.04 Dr Ronald Calitri, Berkeley College, New York, NY, United States
Changes in consumption of native biodiversity in Brazil from 2002-3 to 2008-9: health, income, geographic diversity or markets?
- 1210-1230 S1.05 Prof Nicola Lamaddalena CIHEAM-Mediterranean Agronomic Institute of Bari, Valenzano, Bari, Italy
Contribution of Mediterranean food consumption patterns to sustainable natural resources management
- 1230-1250 S1.06 Dr T. Longvah, National Institute of Nutrition, Hyderabad, India
Nutrient biodiversity in rice and its health implications
- 1250-1310 S1.07 Mr Florent Vieux, INRA, Marseille, France
Food consumption and greenhouse gas emissions: changing food consumption patterns or consuming less?
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1310-1430 Poster Session & Lunch Break - Foyer

Session 2 – Food Composition, Biodiversity and Sustainable diets

Chairs: Dr Barbara Burlingame (Italy) and Dr Paul Hulshof (The Netherlands)

- 1430-1450 S2.01 Dr Julian Cooper, British Sugar plc, Peterborough, United Kingdom
A Case Study in Sustainability
- 1450-1510 S2.02 Dr Ruth Charrondière, FAO, Rome, Italy
The FAO/INFOODS Compositional Database on Food Biodiversity for Sustainable Diets
- 1510-1525 S2.03 Umma Khair Salma Khanam, Shinya Oba, Gifu University, Gifu, Japan
Morphological properties and bioactive constituents of amaranth, *Amaranthus tricolor* L.
- 1525-1540 S2.04 Md. Tariqul Islam Shajib, University of Aarhus, Slagelse, Denmark
Nutritional composition of Minor indigenous fruits: cheapest nutritional sources in the rural people of Bangladesh
- 1540-1555 S2.05 Katherine Stockham, National Measurement Institute Australia, Port Melbourne, Victoria, Australia
Comparative studies on the antioxidant properties and bioactive content of wine from different growing regions and vintages
-

Session 2 – Food Composition, Biodiversity and Sustainable diets

1555-1610 S2.06 Dr Christiant Kouebou, Institute of Agricultural Research for Development, Garoua, Cameroon
CAFOODS activities and prospects

1610-1630 Poster Session & Afternoon Break - Foyer

Session 3 - Challenges for trade, labelling and health claims

Chairs: Dr Siân Astley (United Kingdom) & Prof Hettie Schonfeldt (South Africa)

1630-1655 S3.01 Prof Fidel Toldra, Instituto de Agroquímica y Tecnología de Alimentos (CSIC), Avenue Agustín Escardino, Paterna, Valencia, Spain
Variability in the contents of meat nutrients and how it may affect food composition databases

1655-1715 S3.02 Joanne Holden, USDA-ARS-Nutrient Data Laboratory, Beltsville, MD, USA
USDA Progress in Monitoring Levels of Added Sodium in Processed and Prepared Foods

1715-1735 S3.03 Emily Fitt, MRC Human Nutrition Research, Cambridge, UK
A preliminary estimate of caffeine intake in UK adults following addition to the National Diet and Nutrition Survey food composition database

1735-1750 S3.04 Rebecca Goldsmith, Ministry of Health, Jerusalem, Israel
Nutrient Content Labelling- Many Years of Challenges, Dilemmas and Successes

1750-1805 S3.05 Gregoire Thonier, BIO Intelligence Service, Paris, France
Comparative environmental assessment of the consumption patterns of a consumer of organic products and an average French consumer

1805-1820 S3.06 Prof Barbara Korousic Seljak, Jožef Stefan Institute, Ljubljana, Slovenia
Food composition databases for effective quality nutritional care

INFOODS Meeting – By Invitation

1830-2000 Wilkins Room – NBI Conference Centre

Thursday 15th September 2011

Session 4 - Traditional & ethnic foods for sustainability and health

Chairs: Dr Maria Antonia Calhau (Portugal) & Dr Santosh Khokhar (United Kingdom)

- 0830-0850 S4.01 Dr Santosh Khokhar, University of Leeds, Leeds, United Kingdom
Application of ethnic food composition data for understanding the diet and health of South Asians in the UK
- 0850-0910 S4.02 Dr Mary Nicolaou, AMC - University of Amsterdam, department of Public Health, Amsterdam, Netherlands
Food consumption among migrant groups in the Netherlands: the HELIUS dietary patterns study
- 0910-0930 S4.03 Prof Gregorio Varela-Moreiras, Spanish Nutrition Foundation, Madrid, Spain and University CEU San Pablo, Madrid, Spain
Fortified foods availability and consumption in recent years in Spain. Contribution to the adherence to the traditional Mediterranean Diet
- 0930-0950 S4.04 Prof Filippo D'Antuono, University of Bologna, Cesena (FC), Italy
Variability of glucosinolates and phenolics in local kale populations from Turkey, Italy and Portugal
- 0950-1005 S4.05 Dr Helena Soares-Costa, Food and Nutrition Department, Instituto Nacional de Saude Doutor Ricardo Jorge, Lisboa, Portugal
New nutritional data on selected traditional foods from Black Sea area countries
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1005-1030 Poster session and Morning Break - Foyer

Session 5 - Traditional & ethnic foods for sustainability and health

Chair: Dr Maria Antonia Calhau (Portugal) & Dr Santosh Khokhar (United Kingdom)

- 1030-1050 S5.01 Angela Dolgikh, Uzhhorod National University, Uzhhorod, Transcarpathia, Ukraine
The role of micro-organisms and their metabolites in determining functional properties of traditional foods
- 1050-1110 S5.02 Lydia Rublang-Yalambing, Food Science and Technology, School of Chemical Engineering, University of New South Wales, New South Wales, Australia
Aibika, (*Abelmoschus*, manihot L.) a commonly consumed green leafy vegetable in Papua New Guinea (PNG): Biodiversity and its effect on micronutrients
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Session 6 - Database developments and new tools

Chair: Anders Møller (Denmark) & Prof Barbara Korousic Seljak (Slovenia)

- 1110-1130 S6.01 Julie Gauvreau, ANSES, Maisons-Alfort, France Assessment of the potential impact of the nutritional commitments of food operators on French nutrient intakes
- 1130-1150 S6.02 Prof Maria Glibetic, Centre of Research Excellence in Nutrition and Metabolism, Belgrade, Serbia
Development of regional Food Composition Data Base (FCDB) for West Balkan countries (WBC)
- 1150-1210 S6.03 Dr Paolo Colombani, SwissFIR Consumer Behavior, ETH Zurich, Zurich, Switzerland,
FoodCASE: A standardised Food Composition And Sytem Environment for Europe and beyond
- 1210-1225 S6.04 Dr Rachel Novotny, University of Hawaii at Manoa, Honolulu, Hawaii, United States
PacificTracker2 - Expert System (PacTrac2-ES) behavioral assessment and intervention tool
- 1225-1240 S6.05 Antoni Colom, Department of Health Protection, Ministry of Health and Consumer, Government of the Balearic Islands, Palma de Mallorca, Spain
Apomediation: aligning objectives from health professionals, food chain companies and target consumers
- 1240-1255 S6.06 Simone Bell, EuroFIR AISBL, Brussels, Belgium
RFID from Farm to Fork: traceability along the complete food chain
-

1255-1400 Poster Session and Lunch Break - Foyer

The George Institute for Global Health Workshop – by invitation

1300-1400 Wilkins Room, NBI Conference Centre Chairs: Prof Judith Buttriss & Elizabeth Dundford

Session 7 - New emerging methods

Chairs: Prof Peter Hollman (The Netherlands) & Dr Kunchit Judprasong (Thailand)

- 1400-1420 S7.01 Assoc Prof Cornelia Witthöft, Swedish University of Agricultural Sciences, Department of Food Science, Uppsala BioCenter, Uppsala, Sweden
Food composition data for folates - more than two decades of challenges
- 1420-1440 S7.02 Dr Ulrich Schlemmer, Max Rubner-Institut, Karlsruhe, Germany
Significance of phytate in human nutrition, methods of phytic acid/phytate determination and contents of phytic acid and other inositol phosphates in foods
- 1440-1455 S7.03 Prof Heather Greenfield, University of Sydney, Sydney, NSW, Australia, and University of New South Wales, Sydney, NSW, Australia,
Vitamin D content of Australian red meat
- 1455-1510 S7.04 Nicolette Hall, University of Pretoria, Pretoria, South Africa
Nitrogen vs. amino-acid profile as indicator of protein content in South African beef
- 1510-1525 S7.05 Dr Prapasri Puwastien, Institute of Nutrition, Mahidol University, Salaya, Putthamonthon 4, Salaya, Nakhon Pathom 73170, Thailand –
Achievements and future plan on development of good quality food analysis laboratory among ASEANFOODS
- 1525-1540 S7.06 Dr Klaus Englyst, Englyst Carbohydrates Ltd, Southampton, United Kingdom
Evaluation of methods for determination of carbohydrate constituents in real foods and in model foods with added dietary fibre

1540-1600 Poster Session and Afternoon Break

Session 8 - Update on dietary fibre methodology

Chairs: Paul Finglas (United Kingdom) & Dr Jan Willem van der Kamp (The Netherlands)

1600-1615	S8.01	<u>Dr Jan Willem van der Kamp</u> , TNO Innovation for Life, Zeist, Netherlands The new fibre definition - Understanding and predicting changes in fibre levels for cereal products
1615-1630	S8.02	<u>Roger Wood</u> , Food Standards Agency - retired, c/o Lincolne, Sutton and Wood, 70-80 Oak Street, Norwich, United Kingdom, Analytical requirements of the Codex definition of dietary fibre and the need for a decision tree approach
1630-1650	S8.03	<u>Prof Elizabete Wenzel Menezes</u> , Universidade de Sao Paulo Faculdade de Ciencias Farmaceuticas, Av. Prof Lineu Prestes, 580 Bloco 14, SP, Sao Paulo, Brasil Codex dietary fibre definition - Justification for inclusion of carbohydrate from 3 to 9 monomeric units
1650-1710	S8.04	<u>Dr Juergen Hollmann</u> , Max Rubner-Institute, Detmold, Germany Quantification of dietary fibre in cereal based food. Challenges by new fibre definitions, new methods and nutrient database management
1710-1725	S8.05	<u>Dr Kommer Brunt</u> , Eurofins Food Netherlands BV, Heerenveen, Netherlands Dietary fibre levels in bread according to AOAC 985.29 and AOAC 2009.01 method. First results.
1725-1740	S8.06	<u>Susanne Westenbrink</u> , National Institute for Public Health and the Environment (RIVM), Bilthoven, Netherlands Dietary fibre - A food composition database manager's view

1740-1745 Conclusions

Gala Dinner - Norwich City Football Club - Top of Terrace

1900-1915	Coaches will pick up from hotels
1930-2000	Welcome to the Gala Dinner
2000	Dinner
2300	Coaches will take back to your hotels

Friday 16th September 2011

Session 9 - Current National & Regional Activities in Food Composition

Chairs: Dr Adriana Blanco (Costa Rica) & Dr Ruth Charrondière (Italy)

- 0900-0920 S9.01 Dr Phil Johnson, Institute of Food Research, Norwich, Norfolk, United Kingdom
Credible information about food allergens and allergies for food allergen management: the InformAll database
- 0920-0940 S9.02 Elizabeth Dunford, The George Institute for Global Health, Sydney, NSW, Australia
The development of a global branded food composition database to monitor product reformulation by food companies
- 0940-1000 S9.03 Dr Elizabete Wenzel Menezes, University of Sao Paulo- Pharmaceutical Science Faculty, Sao Paulo - SP, Brazil
Brazilian database of compounds related to non transmissible chronic diseases: adequacy of food groups according to Choice Program
- 1000-1020 S9.04 Marie Machackova, Institute of Agricultural Economics and Information, Prague, Czech Republic
The new on-line Czech food composition database
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1020-1040 Poster Session and Morning Break - Foyer

Session 10 - Current National & Regional Activities in Food Composition

Chairs: Joanne Holden (United States) & Susanne Westenbrink (The Netherlands)

- 1040-1100 S10.01 Dr Yoonna Lee, KHIDI, Seoul, Korea, Republic of Korea
Recipe database development for BNI (Business and Industry) dishes for processing of dietary intake data of KNHANES
- 1100-1120 S10.02 Prof Barbara Korousic Seljak, Jožef Stefan Institute, Ljubljana, Slovenia
The Slovenian Food Composition Database
- 1120-1140 S10.03 Dr Sze Pui Cheryl Mak, Chinese University of Hong Kong Food Research Centre, Hong Kong
Construction of the Hong Kong food composition database
- 1140-1200 S10.04 Dr Petronella Wolmarans, South African Medical Research Council, Cape Town, Western Cape, South Africa
Food composition activities in South Africa
- 1200-1215 S10.05 Dr Pia Knuthsen, National Food Institute, Technical Univ. of Denmark, Søborg, Denmark
Current developments of analytical projects re; nutrients related to the Danish Food Composition Databank
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1215-1330 Poster Session and Lunch Break

Session 11 - Current National & Regional Activities in Food Composition

Chairs: Paul Finglas (United Kingdom) & Prof Elizabete Wenzel de Menezes (Brazil)

- 1330-1350 S11.01 Prof Heather Greenfield, Food Science and Technology, University of New South Wales, Sydney 2052, NSW, Australia
A reappraisal of the nutrient composition of Australian chicken meat
- 1350-1410 S11.02 Dr Pamela Pehrsson, USDA-ARS-Nutrient Data Laboratory, Beltsville, MD, United States
Sampling foods in at-risk subpopulations in the U.S
- 1410-1430 S11.03 Katja Stang, Max Rubner-Institute, Karlsruhe, Germany
A method to determine nutrient retention factors
- 1430-1450 S11.04 Mark Roe, Institute of Food Research, Norwich, United Kingdom
Nutrient analysis of a range of UK processed foods with particular reference to trans fatty acids
-

1450-1510 Poster Session and Afternoon Break

Session 12 - Current National & Regional Activities in Food Composition

Chairs: Dr Paolo Colombani (Switzerland) & Prof T. Longvah (India)

- 1510-1530 S12.01 Paul Finglas, Institute of Food Research, Norwich, United Kingdom
The EuroFIR Food Platform: Further integration, refinement and exploitation for its long-term self-sustainability (EuroFIR Nexus)
- 1530-1550 S12.02 Prof Hettie Schonfeldt, University of Pretoria, Pretoria,, South Africa
Capacity building in food composition for Africa – Lessons learned as AFROFOODS coordinator 2001-2010
- 1550-1610 S12.03 Fatimata Ouattara, Helen Keller International/AFROFOODS, Bamako, Mali
The challenges of food composition activities in Africa: Case study of Mali
- 1610-1630 S12.04 Prof Henrietta Ene-Obong, University of Calabar, Calabar, Cross River State, Nigeria
Compiling food composition database for dietary assessment: the Nigerian experience using a SWOT analysis
- 1630-1650 S12.05 Dr Adriana Blanco-Metzler, Costa Rican Institute of Research & Teaching on Nutrition and Health (INCIENSA), Tres Rios, Cartago, Costa Rica
LATINFOODS: Current status, activities and challenges
-

Poster Presentations, Announcements and Farewells

Chairs: Paul Finglas & Dr Ruth Charrondière

- 1655-1710 Poster Prize Presentation by Professor Heather Greenfield
- 1710-1720 Announcement 10th IFDC
- 1720-1740 Closing remarks and farewells
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Saturday 17th September 2011

Chairs: Ian Unwin (United Kingdom) & Dr Ruth Charrondière (Italy)

Rapporteur: Simone Bell (Belgium)

Joint INFOODS/EuroFIR workshop on Component Identification
NBI Conference Centre, Norwich, UK

Agenda

0900 – 0910	Introduction
0910 – 1030	General issues <ul style="list-style-type: none">• Scope and requirements• Coverage policies• Code definition principles• Component grouping• Scope notes and other documentation• Decision making process
1030 – 1045	Carbohydrates <ul style="list-style-type: none">• Oligo- and polysaccharide definitions
1045 – 1105	Coffee/tea
1105 – 1125	Lipid components <ul style="list-style-type: none">• Individual fatty acids• Fatty acid totals
1125 – 1140	Vitamins
1140 – 1200	Bioactives <ul style="list-style-type: none">• Coverage by INFOODS and EuroFIR• Code policies
1200 – 1220	Speciation (oxidation state, ionic species, radicals) <ul style="list-style-type: none">• Coverage• Code policies
1220 – 1300	Future plans and activities <ul style="list-style-type: none">• INFOODS tagnames• EuroFIR component identifiers• Continuing tagname-identifier harmonisation
1300	Close of meeting



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Food Composition and Sustainable Diets

Oral Abstracts

September 14-17, 2011
Norwich, United Kingdom

Sustainable diets: harnessing the nutrition agenda

Judith Buttriss

British Nutrition Foundation, London, United Kingdom

There has been rapid growth in the global population over the last century and it is around 6.8 billion and is expected to reach 8 billion by 2030. Estimates for 2050 are a global population of over 9 billion. Rate of growth is currently 1.1% globally, which equates to an extra 75 million people each year. These mouths need to be fed and the nutritional quality of the food received will be a key determinant of future health. Alongside this expansion in the world's population, rapid economic growth in China, India and South America is increasing demand for protein-rich foods, especially meat and dairy products, causing concern about the impact this may have on green house gas emissions. As economies strengthen and dietary and lifestyle patterns become more westernised, the so-called diseases of affluence are becoming ever more evident, often alongside malnutrition. As a result, public health challenges are complex. A report from the UK Foresight team published in 2011 highlighted the fact that 1 billion adults around the world are overweight or obese yet a further billion people go to bed hungry and another billion have micronutrient deficiencies that are likely to affect their physical and mental development and performance. The report concludes that there are major failings in the current food system, many systems of food production are unsustainable and, without change, the global food system will continue to degrade the environment and compromise the world's capacity to produce food in the future, as well as contributing to climate change and destruction of biodiversity. The Foresight report identifies key global challenges, among which are the need to balance future demand and supply sustainably to ensure food supplies are affordable, to manage the food system so as to mitigate the impact of climate change, and to maintain biodiversity and ecosystems while feeding the world. In order to rise to these challenges, there will be a need to recognise and grapple with trade-offs. For example, palm oil production is far more efficient per unit land area than oilseeds and has been used to replace harmful trans fatty acids in foods, but its production has in some counties led to destruction of tropical rainforest and hence has lost capacity for carbon sequestration and affected biodiversity in these areas. A variety of other foods and dietary practices have also been in the spotlight recently as a result of concerns about food security and the search for a globally sustainable diet. This presentation will summarise some of these and the associated nutritional dilemmas.

Keynote Address – 2

S1.02

Responding to the food security challenge: the Global Food Security programme

Paul Burrows

Biotechnology and Biological Sciences Research Council (BBSRC), Swindon, United Kingdom

Global Food Security (GFS) is a new multi-agency programme that brings together the major UK public sector funders of research and training related to food. The GFS partner organisations include research councils, government departments, devolved administrations and the Technology Strategy Board. The programme aims to help meet the challenge of providing the world's growing population with a sustainable and secure supply of safe, nutritious and affordable high quality food. It comprises four cross-disciplinary themes: economic resilience; resource efficiency; sustainable food production and supply; and sustainable, healthy, safe diets. As well as research, GFS will support cooperation among the funding partners on issues such as infrastructure, horizon scanning and skills, as well as the effective translation of research into practical application and policy. GFS provides opportunities for taking forward the findings of the recently published UK Government Foresight report, *The Future of Food and Farming*. Further information about the GFS programme, including its joint five-year strategic plan and background and discussion on food security issues, is available at www.foodsecurity.ac.uk.

Keywords: Global Food Security; research coordination



SESSION 1 –

Food Composition, Biodiversity and Sustainable diets

S1.03

Health benefits of fish; is it just the fatty acids?

Elizabeth Lund

Independent, Norfolk, United Kingdom

Epidemiological evidence suggests that fish consumption at levels of at least two portions a week is beneficial in relation to a wide range of health outcomes such as a reduced incidence of cardiovascular disease, inflammatory disorders, cognitive function and cancer. These benefits are assumed to be related to the long-chain polyunsaturated (PUFA) omega-3 fatty acid content of fish but it is entirely feasible that other components also support good health. However, the production of farmed Atlantic salmon in Europe uses in the region of 4M tonnes of fishmeal and fish oil per year to ensure maximal omega-3 content at the point of human consumption but as yet human intervention studies with fish oil have reached very inconsistent results. In a recent human fish intervention study we showed that cod consumption significantly increased serum selenium and reduced the inflammatory marker C-reactive protein as compared to control diets. The volunteers consuming salmon (equivalent to 1g/day of omega-3 PUFAs) also had increased selenium and decreased C-reactive protein but these beneficial effects did not reach significance. Although salmon increased serum omega-3 PUFAs no other differences in the measured health benefits were identified when compared to cod. All fish are a good source of selenium and some oil-rich fish contain relatively high levels of vitamin D. Furthermore fish and other seafoods have an unusually high content of taurine for which health benefits have also been claimed, and it should not be forgotten that the total structural complex may provide further benefits and synergy between components as yet to be defined. It is therefore essential that all aspects of fish composition be considered in aquaculture feed design and perhaps the focus on the fatty acid composition be reconsidered leading to potential environmental benefits.

S1.04

Changes in consumption of native biodiversity in Brazil from 2002-3 to 2008-9: health, income, geographic diversity, or markets?

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This paper explores the reasons for changes in consumption of native Brazilian foods during the first decade of the 21st century. Health, income and geographic identity are considered in multidimensional context with market factors such as prices relative to food group members and item availability. The Pesquisa de Orcamentos Familiares sampled 182,000 and 190,000 persons in 89 geographic regions during 7-7/2002-3, and 5-5/2008-9, collecting community, household, family and individual details, anthropometrics, food spending by individuals (30dy), and family consumption (7dy) of several thousand foods. Here, the following criteria: 1) native origin: domestication in Latin America, 2) Expert Consultation on Nutrition Indicators for Biodiversity category, 3) availability of domestic or international food composition data, are added to food group and item specifications for home and individual consumption. Health is modelled from WHO CGS/CGR Z-scores, age, BMI and health expenditures relative to income. Price and availability were estimated from unit values (cost/weight; standard deviations/mean), non-market or purchase location, and comparison within food groups. These factors were considered with community characteristics, living conditions, household composition, “wealth” (durables), race, sex, incomes, education or school type, occupation, other expenditures and surveyed locations. Multivariate analysis adjusted for spatial correlation and seasonality. Results indicate that market conditions, income levels with their covariates, and health factors were associated with changes in consumption of native biodiversity. Health was positively related with native foods consumption and with biodiversity indicator status. At lower income levels, geographic separation and non-market acquisition increased native foods consumption. At upper income and food spending levels, consumption of native foods increased and was less influenced by relative prices. For foods with available food composition data, prices were less volatile relative to volume of consumption. In Brazil, health concerns and rising income increased but market factors and lack of food composition data inhibited consumption of native biodiversity over 2002-2009. Correctable market uncertainties locally constrained sustainable diet and its positive effects on health.

Keywords: nutrition, biodiversity, health, income, Brazil

Contribution of Mediterranean food consumption patterns to sustainable natural resources management

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Sustainability of food systems and diets – some of the major players in biodiversity erosion, natural resources degradation, climate change, etc. - is not simply related to health concerns but it also involves environmental impacts. Sustainability of food production and consumption systems should be improved by promoting diets that are respectful of ecosystems and have lower environmental impacts.

This paper aims at analysing the main environmental impacts of the Mediterranean food consumption patterns on land and water resources and biodiversity.

It provides a review on water and land resources and biodiversity in the Mediterranean and a detailed analysis of the livestock sector impacts on ecosystem services. The most recent FAO food consumption statistics and standard impact data from different sources (e.g. Water Footprint Network; Barilla Centre; Mekonnen & Hoekstra, 2010) were used to calculate and discuss environmental impacts, i.e. water, carbon and ecological footprints.

The Mediterranean is the third richest hotspot in the world in terms of plant biodiversity. It represents a major centre of crop diversity and contains all the eight FAO farming systems. Mediterranean diets are unique in their tremendous diversity due to different environments, cultures, religions, species, genetic and ecosystem diversity. Mediterranean people gather and consume about 2,300 plant species, 880 of them being consumed in Italy. The share of plant-based energy is higher in the Mediterranean diets than in Northern Europe and American ones. There is an ecological deficit in the Mediterranean region. Water footprint is lower in Mediterranean countries, especially in southern and eastern ones. Some differences in terms of plant-based energy and environmental impacts were observed between North Africa, Middle East, the Balkans and the North Mediterranean.

Mediterranean diets offer considerable health benefits, promote biodiversity use and conservation and sustainable natural resources management as they have lower environmental impacts than Northern Europe and American diets.

Nutrient biodiversity in rice and its health implications

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Plant foods represent the largest segment of dietary diversity both within and among species. In the past, generic food composition data were considered sufficient, but today the importance of cultivar-specific nutrient data is being increasingly recognized. The findings of the study on 300 high yielding popular hybrid rice cultivars grown in different ecological zones in India and 127 landraces from Northeast India, is presented. Parameters studied include proximate composition, minerals, vitamins, phytate, amino acid composition and fatty acid composition with Glycaemic Index studies carried out on popular rice cultivars (20) and landraces (10). Both hybrid Rice cultivars and landraces showed wide variation in the protein content ranging from 4.79 to 13.09 g/100g. Hybrid rice cultivars had significantly higher protein content (9.13 ± 1.42) than landraces (7.76 ± 0.92). Dietary fibre was significantly higher in landraces than hybrid cultivars. Glycemic index (GI) was generally lower in landraces with most of the ten varieties tested showing low GI (<55) signifying the importance of landraces in biodiversity conservation. Fatty acid composition revealed the wide variation in individual fatty acids within rice varieties. Similarly, variations in the amino acid composition were also observed within rice varieties analyzed. Mean \pm SD iron content was 1.19 ± 0.54 mg/100g. Zinc content ranged from 1.01 to 4.15 mg/100g. Minerals like manganese, potassium was lower in hybrid cultivars but it had significantly higher phytate content compared to landraces. Significant correlation was observed among the macro and micro nutrients studied in all the food crops. The vastly different nutrient content within rice varieties offers opportunities to combat contemporary scientific and public health issues such as micronutrient deficiencies and nutrition transition precipitating the emerging epidemics of diabetes as well as to improve the conservation of biodiversity and genetic resources for food and agriculture.

Food Consumption and Greenhouse Gas Emissions: Changing Food Consumption Patterns or Consuming less?

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The first aim of this study was to estimate the daily Greenhouse Gas Emissions (GHGE), from agricultural production to retail, of self-selected diets in France. The second aim was to simulate the impact on GHGE of decreasing the intakes of red meat/delimeat. Dietary data from 1918 adults participating in the national INCA2 survey were used to estimate daily GHGE for each individual, based on the GHGE (in CO₂-eq/100g edible weight) of 74 highly consumed foods, representative of their food category. The mean percent contribution of food categories to total GHGE was calculated. For each individual, the potential impacts of two scenarios were tested: (1) reduction of 20% of red meat/delimeat consumption (scenario 1); (2) limitation to a maximum of 50g of red meat/delimeat per day (scenario 2). For each scenario, the decrease in the meat intake was either a) not compensated, or iso-energetically compensated for by an increase in b) fruit and vegetables or c) mixed dishes. The mean dietary GHGE was 4090 g/person.day. Individual GHGE showed a great variability, and was highly correlated with both total food intake and total energy intake. The strongest GHGE contributor was the red meat/delimeat category, and this contribution increased with increasing quintiles of total GHGE. The GHGE variations associated with the scenarios were 1a) -4.1%, 2a) -12%, 1b) 0%, 2b) +2.7%, 1c) -2.8%, 2c) -7.2%. For each scenario, the highest GHGE reduction was seen when a net reduction of red meat/delimeat intake was simulated. When red meat/delimeat was iso-energetically substituted for mixed dishes the variation stayed negative but when it was substituted for fruit and vegetables either nul or even positive GHGE variations were observed. Thus, substituting meat for fruit and vegetables is perhaps not the best option to decrease GHGE.



SESSION 2 –

Food Composition, Biodiversity and Sustainable diets

S2.01

British Sugar – A Case in Sustainability

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A major division of FTSE-50 Company Associated British Foods plc, British Sugar Group is one of the world's largest sugar producers, employing more than 42,000 people in 10 countries, and with a production capacity of around 5 million tonnes of sugar each year. Its operations stretch from Europe, to southern Africa, to China, encompassing climates suited to both beet and cane, and sited in countries at all stages of economic development.

The Group's approach to sustainability is focused on identifying and addressing key risks and opportunities through both mitigation and adaptation, and on developing responses that are commercial and sustainable. This has seen the Group invest in systems of continuous improvement and innovation to ensure it makes the most of every stick of cane and root of beet. This is illustrated by the fact that the company now also produces a range of co-products across its operations, including electricity, animal feed, landscaping products, and even tomatoes.

The presentation will illustrate British Sugars approach to sustainability.

The FAO/INFOODS compositional database on food biodiversity for sustainable diets

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Biodiversity is increasingly recognised as being an important element in nutrition to assure that a higher percentage of populations reaches their nutrient requirements, especially for micronutrients. Nutrient composition between foods and among varieties/cultivars/breeds of the same food can differ dramatically. Biodiversity can therefore make the difference between nutrient adequacy and inadequacy. FAO/INFOODS have compiled analytical data from the scientific literature, theses and reports into the Composition Database for Food Biodiversity from different varieties, cultivars and breeds as well as from underutilized and wild foods. The first version of the database included data for 2417 foods, either on variety/cultivar/breed level or for wild and underutilized foods: 1514 entries on potatoes (over 700 varieties), 27 on other roots and tubers, 444 on milk (from 14 species with 5 to 54 breeds per species), 316 on fruits, 30 on cereals, 24 on legumes, 30 on nuts and seeds, and 32 on vegetables. New data are being collected especially on fruits and fish and will be published as a new version in 2011. It is intended that regularly more food groups are being explored and data entered into the database and published. Those contributing data to the database are acknowledged and analytical data submission is encouraged. The database in Excel format can be downloaded from the INFOODS website http://www.fao.org/infoods/biodiversity/index_en.stm free-of-charge. It contains variable amounts of analytical values for over 120 nutrients and phytochemicals together with the bibliographic references, the name of the country, the food name in the original language and English, the scientific name, more information if available (e.g. region, season, feed, number of samples etc). This database could be the basis for investigating and valuing the existing food biodiversity, its relationship to nutrition, and it could serve as a basis for inclusion of more biodiversity data into national and regional food composition databases. The ultimate aim is to conserve and promote existing food biodiversity.

S2.03

Morphological properties and bioactive constituents of amaranth, *Amaranthus tricolor* L. an under exploited plant

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Rationale and objectives: Amaranth is a versatile crop exhibiting high adaptability to new environment even in presence of huge biotic and abiotic stresses. The attractive colour, beneficial bioactivity, health promoting properties and overall food processing performance of amaranth leaves have been subjected to considerable research interest on this crop. The aim of this study is to demonstrate the morphological properties and bioactive constituents of different amaranth accessions, to reveal their variation and finally to assign them within clusters on the basis of their attributes.

Materials and Methods: A total of forty two amaranth accessions, *Amaranthus tricolor* L. of Bangladesh, AVRDC, Taiwan and Vietnam were grown at Gifu field science centre, Gifu University, Gifu, Japan from June to August 2010 to conduct this study. Leaf colour parameters: L*(brightness), a*(redness /greenness), b*(yellowness/ blueness) and plant height were considered as morphological properties whereas bioactive constituents included leaf pigments (total chlorophyll and carotenoid), betalain contents (betacyanin and betaxanthin), total ascorbic acid (AA), dehydro ascorbic acid (DHA), reduced ascorbic acid (RAA), total antioxidant activity (TAO) and phenolic compounds (total polyphenol and total flavonoid contents). All statistical computations were performed using R package. Maximum likelihood factor analysis (MLFA), and clusplot analysis were used to show variation and infer clusters of the amaranth accessions, respectively.

Results and conclusions: The results obtained from the above mentioned properties, reflected that amaranth leaves are excellent sources of dietary antioxidant compounds. Correlations among these attributes revealed that leaf colour parameters significantly assigned with betalain, TAO, AA and DHA while leaf pigments were significantly related with phenolic compounds. MLFA gave in three factors associated with 61% of the total variation among the amaranth accessions. Clusplot analysis assembled five clusters on the basis of green leaf colour, high betalain content, and red leaf colour with high antioxidant content and high leaf pigment with short plant height. Overall, these results render contemplation for further study to enrich amaranth varieties with desirable traits.

Keywords: *Amaranthus tricolor* L., attributes, correlation, maximum likelihood factor analysis, clusplot.

Nutritional composition of Minor indigenous fruits: cheapest nutritional sources in the rural people of Bangladesh

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As a part of the development of new food composition database for Bangladesh, a total number of 10 different minor indigenous fruits were collected from the four different wholesale markets located at entry points to Dhaka city and 2 remote areas in Bangladesh. After washing and drying to remove unwanted substances of the fruits, the edible portions (EP) were analyzed for ascorbic acid, carotenoid, dry matter (DM), calcium (Ca), magnesium (Mg), potassium (K), phosphorus (P), iron (Fe), zinc (Zn), copper (Cu) and manganese (Mn). Ascorbic acids and carotenoids in the fruits samples were analyzed by spectrophotometric measurement. Micro minerals (Ca, Mg, K and P) were analyzed by flame photometric and spectrophotometric procedures and trace elements (Fe, Mn, Zn and Cu) were analyzed by atomic absorption spectrophotometry. The results were compared with different literature and Indian food composition tables. Ascorbic acid content was the highest in Aegle mermelous 65.59 ± 4.62 mg/ 100g EP and the lowest 3.66 ± 0.531 mg/100 g EP in Hibiscus sabdariffa. Artocarpus lakoocha contains highest amount of carotenoids (4609.00 ± 923.58 μg /100g EP), DM (39.26%), zinc (3980.61 ± 1.30 μg /100g DM) and copper (7974.29 ± 13.8 μg / 100g DM). Highest amount of calcium (85.89 ± 4.36 mg/100g DM), magnesium (29.41 ± 1.53 mg/100g DM) and phosphorus (26.87 ± 2.82 mg/100g DM) were found in Nunia* (scientific name unknown). Highest amounts of iron (Fe) and manganese (Mn) content were found in Hibiscus sabdariffa (3300.69 ± 310.02 μg /100 g DM) and (5836.54 ± 254.54 μg /100g DM), respectively. The results from this study will help to create awareness of the rural peoples as well as urban people in Bangladesh to intake the minor/ underutilized fruits and to create awareness to grow more indigenous fruits tree and to protect the minor indigenous fruits tree from extinction for keeping biodiversity.

Keywords: nutritional compositions; minor indigenous fruits; rural people; Bangladesh

Comparative studies on the antioxidant properties and bioactive content of wine from different growing regions and vintages

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A comparative study was carried out of different Australian wines from key growing regions across different vintages to determine the effect of climate conditions on the functional properties of wine. Characteristics such as colour and bioactive content are important when deciding on the intended or final use of the produce. Phenolic compounds in wine are responsible for colour, flavour and mouth-feel. The phenolic and bioactive content of wines are in a large part responsible for these characteristics. This research study was conducted to profile the bioactive content and antioxidant properties of different wines across growing regions and vintages. Shiraz, merlot, cabernet sauvignon, pinot noir and chardonnay from 4 major Australian growing regions were analysed for the 2008 and 2009 vintages. These vintages were chosen based on the variation in rainfall between these years, with 2008 experiencing rainfall well below the 10 year average. Conversely, rainfall for 2009 did not deviate significantly from the 10 year average and provided a comparison point. Antioxidant capacity was assessed using in vivo and in vitro antioxidant capacity methods, and the bioactive content was determined by Rapid Resolution Liquid Chromatography with Diode Array Detection and Fluorescence Detection (RRLC/DAD/FLD). Specific compounds of interest included hydroxycinnamic acids, catechins, caffeic acid, cinnamic acid and flavonols. During comparison, rainfall, soil quality and climate were all considered. Red wines produced in the warmer climates of Western Australia (WA) and New South Wales (NSW) showed different antioxidant behaviour and bioactive profile to those grown in cooler climates. The Margaret River (WA) and Hunter Valley (NSW) regions having a more Mediterranean climate produced white wines that had a higher antioxidant activity than those produced in cooler climates such as Victoria (VIC) and South Australia (SA). While total phenolic assessments showed similar results regardless of region, bioactive profiles differed and appeared to be influenced by both climate variation and growing region. South Australian wines grown in clay-rich soils had markedly different profiles to those grown in the cool, volcano rich and sandy soils of the Yarra Valley region (VIC).

CAFOODS activities and prospects

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The First West and Central African Graduate Course on Food Composition and Biodiversity brought to nine the staff of Central African experts on food composition activities (FCA). The trainees from Cameroon undertook a series of consultations in order to enhance FCA through networking. This gave the opportunity to identify priorities for the Central Africa Food Data System (CAFOODS): (i) To make the group known to national research bodies, in order to obtain institutional support; (ii) To identify data production centers and create a directory of available data sources as well as agro-resources, (iii) To develop a compiled database and (iv) To draft and submit funding proposals, geared towards analyzing and compiling food composition data, considering the rich biodiversity of Central Africa. 2009-2010 activities were initiated in Cameroon, the host country of CAFOODS coordination. Work carried out by a dozen of experts (from 7 institutions) enabled the collection of about 800 data sources, the review of almost 450 documents and present reports of the Sub-regional Data Centre in national (4) and international (3) meetings. In terms of agro-biodiversity, the main agricultural research institute (IRAD) has in breeding programs a collection of 227 fruit varieties or cultivars (mangoes, citrus, papayas...), about 200 rice varieties, 180 sorghum ecotypes and 150 plantain cultivars among others, while a few (39) selected crop varieties are characterized and put at the farmer's disposal. Data compilation started on more than 500 food items, out of which about 200 foods will be selected for a first user database on cereals, fats & oils, fruits, legumes, nuts & seeds, roots & tubers, spices and vegetables. Based on these findings, project proposals are under development in order to promote agro-biodiversity and improve the quality and availability of food composition data in the Sub-region.

Keywords: Agro-biodiversity, database, networking, Central Africa

SESSION 3 –

Challengest for trade, labelling and health claims

S3.01

Variability in the contents of meat nutrients and how it may affect food composition databases

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Meats are generally recognized as foods with relevant nutritional properties because of their content in high biological value proteins, group B vitamins, minerals especially heme iron, trace elements and other bioactive compounds. But meats also contribute to the intake of fat, saturated fatty acids, cholesterol, and other substances that, in inappropriate amounts, may result in negative physiological effects. However, there are relevant factors affecting the content of many of these substances and somehow such variability should be taken into consideration. So, genetics, age and even type of muscle have a relevant influence on the amount of fat and the contents in heme iron. Also the composition in fatty acids of triacylglycerols is very sensitive to the mixture of cereals in the feed; for instance, polyunsaturated fatty acids may range from 10 to 22% in pork meat. The content of other nutrients, like vitamins E and A, are also depending on the type of feed. Some bioactive substances like coenzyme Q10, taurine, glutamine, creatine, creatinine, carnosine and anserine show a large dependence on the type of muscle. This lecture will describe the main factors affecting the composition of meat nutrients, with special reference to pork meat, and how these changes may affect the general food composition databases.

USDA Progress in Monitoring Levels of Added Sodium in Processed and Prepared Foods

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Recent concerns of the U.S. public health community have led USDA to develop a plan to monitor the levels of sodium and selected other nutrients in prepared and processed foods. In the dietary component of the NHANES: What We Eat in America (WWEIA) 2007-2008, the average sodium consumption per day by individuals two years of age and older was 3330 mg/day. The 2010 edition of the Dietary Guidelines for Americans recommended an intake of < 2300 mg/day for adults and 1500 mg/day for individuals at greater risk for cardiovascular disease. Nutrient Data Laboratory scientists worked with scientists in USDA's Food Surveys Research Group to identify and rank highly consumed multi-component processed foods and ingredients which together contributed 80% of the added sodium intake assessed during the 2007-2008 WWEIA. The sodium values of the highest ranking foods are being updated by chemical analysis. To assess where major changes have occurred in lower ranking foods, mean sodium values will be obtained from industry-provided values, Nutrition Facts panels, or other labelling information and compared to existing values in the USDA National Nutrient Database for Standard Reference (SR).

Preliminary assessment indicates that less than 200 ranked foods provided 80% of added sodium while approximately 15 processed foods contributed 25% of the added sodium intake. The list includes a number of popular multi-component foods (e.g., cheese pizza) and is distributed across numerous food categories.

Accurate and current data for sodium and other nutrients in processed foods will support monitoring changes in sodium content of foods, as well as future assessment of sodium intake in the U.S. population. The new data will be released in SR.

A preliminary estimate of caffeine intake in UK adults following addition to the National Diet and Nutrition Survey food composition database

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Rationale; Caffeine is naturally occurring in tea, coffee, cola, cocoa and artificially added to some 'energy' drinks. Moderate caffeine intakes are suggested between 300-400mg/day with high intakes resulting in increased anxiety, sleeplessness, dehydration and elevated blood pressure. Data for caffeine content of a variety of food and drinks is available but not currently included in UK food composition tables. We will complement results from the National Diet and Nutrition Survey (NDNS) 2008-09 with caffeine contents to estimate caffeine intake in adults (19+y).

Method; Food codes recorded as consumed by adults in NDNS 2008-09 and identified as potential caffeine containers were from the following food groups; Tea and coffee made up, chocolate confectionery, soft drinks, instant beverage powders and other milk. Caffeine contents (mg/100g or ml) from our literature review were mapped against these requisite food codes from which we estimated mean total caffeine intake (TCI, mg/d) based on amounts consumed.

Results; Mean TCI was 134.0mg/d for men (6.0-450.3mg/d) and 131.4mg/d (0.8-562.4mg/d) for women, with a respective average intake of 39.7mg and 35.9mg per caffeine consumption occasion. Of caffeine consumers 5.8% (n=25) consumed caffeinated energy drinks and 93.5% (n=400) consumed tea or coffee products. TCI in energy drink consumers was 115.0mg/d and 115.6mg/d for men and women respectively, while tea or coffee consumers showed higher TCI of 142.2mg/d for men and 137.6mg/d for women.

Conclusion; Current mean caffeine intakes in the UK appear within the recommended 300mg/d, but some people are consuming in excess of this, with tea and coffee the greatest contributors to caffeine intakes. The emerging café culture in the UK and increased popularity of caffeinated 'energy' drinks could lead to a rise in caffeine consumption particularly within certain population groups. From a public health perspective it may be beneficial to include caffeine data in UK food composition tables.

Keywords; NDNS, caffeine, adults, food composition database

Nutrient Content Labelling- Many Years of Challenges, Dilemmas and Successes.**Rebecca Goldsmith, Ziva Stahl***Ministry of Health, Jerusalem, Israel*

Background: Mandatory nutrient content labelling for packaged foods was legislated in Israel in 1993. The dilemmas facing early legislators included whether labelling would be by serving size (as in USA) or by 100 grams/ml, which nutrients to include, whether to permit claims such as health and /or nutrient content claims, language choices for mandatory labelling, and mechanisms for supervision. An ongoing issue is avoidance of legislation which interferes with free trade agreements, to which Israel is a signatory.

Method: Mandatory nutrient content labelling is per 100 gram/ml, in Hebrew, for protein, carbohydrates, sugars, fats, energy, sodium, (saturated fats and cholesterol) with per serving size and other languages optional. Voluntary labelling of ISO and/or GMP certification, organic, and kosher (ritual Jewish dietary laws) certification is permitted. The Food Control Services of the Israeli Ministry of Health, the food labelling regulator, has incorporated numerous revisions and additions, responding to new knowledge regarding other nutrients (trans fats, total sugars), regulatory changes (CODEX, standards for gluten-free definitions), consumer demand (allergen content), new technologies and analytical capabilities, and insights regarding health impacts of nutrients content labelling. Consumers' understanding and use of nutrients labelling have been extensively researched, in national and local surveys, and results show acceptability and understanding, though not equally in all subpopulations. Studies have also shown an association of nutrient label use with improved dietary and lifestyle habits. Consumer demands related to labelling also reflect recognition of labelling as an important contributor to healthy eating.

Future directions: New challenges include Front-of packaging labelling/logos for healthy choices (which model to adopt, if at all), expansion of nutrients requiring mandatory labelling, and incorporation of health and nutrient claims. Improved analytical methods enabling more precise labelling, and consumer demands for increased transparency regarding ingredients and nutrients will help shape labelling in the future.

S3.05

Comparative environmental assessment of the consumption patterns of a consumer of organic products and an average French consumer

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Food Products are estimated to account for 20 to 30% of the environmental impacts caused by consumption products, which are responsible for 50% of total European greenhouse gases emissions. The organic label is promoted as an eco-friendly farming system, with benefits for ecosystems and human health, by avoiding the use of chemicals. However, given the lower yields, conclusions of quantitative studies (e.g. LCA) on environmental benefits of organic farming per unit of production uses vary with the product and the study. To assess environmental performances of organic farming, it appears relevant to consider the lifestyle of organic consumers whose eating habits' specificities may lead to more significant environmental benefits.

Therefore, this study aims at:

- Underlying the key parameters responsible for the main distinctions between organic and conventional systems environmental performances using LCA methodology.
- Comparing the environmental impacts of French organic and conventional consumers at the scale of the annual food baskets using LCA methodology.

To answer these questions the project was divided into three parts: after defining the consumption pattern of organic and conventional consumers, comparative LCAs of 5 representative organic and non-organic products are performed. Finally, a comparative environmental assessment of the annual food baskets of organic and conventional consumers is conducted, based on LCA methodology.

The preliminary results of the study for understanding the heterogeneous results available in the literature show that the differences between farms may be more significant than between organic vs. conventional products. Furthermore, results are very sensitive to some parameters like the generic data used to model the production of fertilizer. The first results of the comparison of French organic and conventional consumers show that the difference of the total amount of food eating per year may counterbalance the specific eating habits the two types of consumers.

Food composition databases for effective quality nutritional care

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Rationale and objective: Nutritional care process is a systematic problem-solving method that dietetics use to make decisions to address nutrition-related problems. It consists of four distinct, but interrelated steps: nutritional assessment, diagnosis, intervention, and monitoring and evaluation. As each of these steps can be well supported by a computer, we have developed a web-based and mobile application Optijed (<http://opkp.si>).

Methods: The application supports systematic processes for obtaining and interpreting data needed to make decisions about the nature and cause of the nutrition-related problem. It uses the Slovenian food composition (FC) database that has been aligned with the CEN standard for FC data and other EuroFIR guidelines. The application supports web services to enable data transfer within the EuroFIR information platform. Optijed further considers the Central European D-A-CH references as well as ESPEN and ESPGHAN recommendations and guidelines on clinical nutrition. It provides online dietetics support for patients.

Results: The application has been pilot tested by dietetics and patients at the Oncology Institute and University Children's Hospital in Ljubljana. The majority found Optijed facilities useful and efficient. Validating the food recording tool, we have not observed any difference between Optijed-assisted records and records using the paper-and-pencil form. We compared the total intakes of nutrients calculated by Optijed and other software for 50 subjects and did not find significant deviations. Also the comparison of the calculated with analytical values of energy, water, total dietary fibre, macro-nutrients and selected essential minerals for 20 daily food records did not show any statistically significant difference.

Conclusion: Optijed has proven as a reliable tool, yet, its efficiency can still improve: a) by extending the FC database with new values, and b) by incorporating a database for management of evidence-based knowledge of nutrition and metabolism.

Keywords: food composition databases, nutritional care, web-based application, clinical nutrition, knowledge database

SESSION 4 –

Traditional & ethnic foods for sustainability and health

S4.01

Application of ethnic food composition data for understanding the diet and health of South Asians in the UK

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Food composition data for ethnic foods in the UK and selected European countries was developed through EuroFIR using harmonised procedures. These data were used to assess dietary patterns and nutrient intakes among South Asians in the UK. Food portion sizes specific to South Asian population were developed and validated using these data. Sources of key nutrients were identified and compared in individuals at-risk and not-at-risk of metabolic syndrome. Micronutrient analyses showed vegetarian ethnic dishes to contain appreciable amounts of Fe (2.9mg/100g in saag), total carotenoids (4000µg/100g in palak paneer) and fibre (4.7g/100g in channa). However, these studies suggested wide variation in recipes within Indian, Punjabi, Gujarati and Pakistani sub-populations leading to under- or over-estimation of nutrient intakes. To address this, recipe calculation and further investigation of raw and processed food samples may be considered for future studies.

Keywords: food composition, portion size, nutrients, metabolic syndrome, South Asian

Food consumption among migrant groups in the Netherlands: the HELIUS dietary patterns study

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Introduction: Food consumption surveys in the Netherlands typically do not include migrant origin groups, due to the complexity of data gathering and analysis. As a result information on this important determinant of health, and its determinants, is unavailable. We aim:

1. To give an overview of the current state of knowledge regarding the diet of the main migrant groups in the Netherlands: Turkish, Surinamese (of African origin and South Asian origin) and Moroccan.
2. To introduce the HELIUS dietary patterns study.

Methods: The discussion on the current state of knowledge will draw on our experience in conducting 24hr recall surveys among the migrant groups mentioned above. We will reflect on the methodological issues encountered during these studies and their implications for future research.

The HELIUS dietary patterns study is embedded in the HELIUS study (Healthy Living in an Urban Setting), a longitudinal cohort study in Amsterdam which includes a focus on cardiovascular disease risk and its determinants. For this study we are developing and validating ethnic-specific Food Frequency Questionnaires (FFQs) designed to assess dietary intake over the period of a month. We plan to include 5000 participants (18-70 year old) of Turkish, Moroccan, African Surinamese, South Asian Surinamese and Ethnic Dutch origin.

Discussion: The HELIUS dietary patterns study is the first study in the Netherlands that aims to measure the habitual diet of a multi-ethnic population. It will provide much needed insight into the food consumption of these groups. Due to its embedding in HELIUS we will have the opportunity to study the main determinants and health consequences of the diet of non-western immigrants.

Keywords: non-western migrants, food consumption, food frequency questionnaire, Netherlands

S4.03

Fortified foods availability and consumption in recent years in Spain. Contribution to the adherence to the traditional Mediterranean Diet.

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Introduction: The traditional Mediterranean Diet is not associated with the use of enriched/fortified foods. However, in recent years there is a rapid and marked increase in these type of foods in the Spanish market although there is not an updated information on how are being consumed and their contribution to the Spanish diet.

Objectives: To evaluate the enriched/fortified foods availability and their contribution to the present Spanish diet. Different variables (e.g. age; socio-economical status, family size; urban vs. rural) and scenarios (e.g. diet high in fortified foods vs. unfortified) have been also evaluated.

Methods/design: The sample consists of consumption and distribution data, obtained from the “Food Consumption Panel” between 2000 and 2008. The study was carried out in households (n= 8000) per year. Food entries are registered weekly twice a year by using a scanner.

Results: The availability and consumption of enriched/fortified foods are continuously and markedly increasing in recent years. The most consumed are milks (49,6 g/day) followed by yogurt (14,2 g/day). Vitamins (A,E,D, folic acid, niacin, C) constituted the most widely used nutrients/ingredients followed by minerals (mainly calcium) and fibre, sterols, omega-3 fatty acids and conjugated linoleic acid (CLA). The fortified foods/drinks even within the same group show large differences in nutrient/ingredients concentrations although did not reach the upper tolerable intakes when the different scenarios are considered. Fortified foods are more consumed with increasing age except for fruit juices and “functional” drinks. Medium-High socio-economical status is associated with a higher acceptance of fortified foods. The family size seems to be also an important factor with the highest consumption corresponding to singles.

Conclusions: The new and updated data show a dramatic increase in availability and consumption of fortified foods in parallel to a dietary pattern which does not correspond to the traditional and healthy Mediterranean diet.

Variability of glucosinolates and phenolics in local kale populations from Turkey, Italy and Portugal

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Rationale and objectives. Leafy forms of *Brassica oleracea* L. are generally known as kales or collards. They are traditional crops of several areas of Europe (Portugal, Spain, Scotland, The Netherlands, Italy) and in Turkey, well rooted in local farming and food systems, but far lesser known as commercial crops. Glucosinolates are typical components of the Brassicaceae family, to which kales belong, presently valued as health promoting phytochemicals. Leafy kales are virtually the only edible crops containing high relative glucobrassicin content and, at the same time, a total glucosinolate amount suitable for human consumption. With this respect, these local and somewhat neglected species can play a major role for the valorisation, in a healthy food context, of the glucobrassicin / indole-3-carbinol system. The EU funded project BaSeFood targeted kales as interesting raw materials for further investigation.

Materials and methods. Mature kale leaves have been collected in two contexts: a) on field, in locally grown crops in Turkey, Italy and Portugal during winter 2009-2010; b) from an experimental trial planted in Cesena, Italy, using 7 Italian, 6 Turkish and 2 Portuguese populations, in winter 2010. The samples were freeze dried and stored and -20 °C until extraction with methanol/water. Glucosinolates were converted in the corresponding desulpho-derivatives before analysis. The analyses were carried out by HPLC, under appropriate conditions for the two classes of compounds.

Results. The main glucosinolates and phenolics have been identified. Ample variability was detected either in dependence on the origin of the material and within each origin.

Conclusions. For the first time, kale populations of different origin were compared in a common environment. Therefore this work allowed to characterise kale biodiversity. It also allowed the individuation of strains with better opportunities for exploitation in the preparation of health promoting traditional foods.

Keywords: traditional foods, Black Sea area, kales, glucosinolates, phenolics

New nutritional data on selected traditional foods from Black Sea area countries

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Traditional foods are the key elements that differentiate the dietary patterns of each country. In most countries, there is limited information on the nutritional composition of such foods, therefore, there is a need to investigate, register and promote traditional foods. These foods are also a valuable contribution to the development and economic sustainability of rural areas and preservation of biodiversity. One of the aims within BaSeFood project is to provide new data on the nutritional composition of traditional foods of plant origin from six Black Sea area countries (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine) to promote their sustainable development and exploitation. Thirty-three traditional foods were selected taking into account namely food biodiversity and food composition data. Chemical analyses to determine the nutritional composition of the selected traditional foods were performed and the data were fully documented and evaluated according to EuroFIR guidelines and standardised procedures. To assure the quality of analytical results accredited laboratories or laboratories with successful participation in proficiency testing schemes were chosen. Information on food description, recipe, ingredients, sampling plan, sample handling, component identification, method specification, value and quality assessment was collected for each of the traditional foods for inclusion in the available national food composition databases.

The use of a common methodology for the study of traditional foods will enable countries to further investigate their traditional foods and to continue to update their national food composition databases. Moreover, knowledge base of traditional foods from Black Sea Area countries will contribute to promote local biodiversity and sustainable diets, by maintaining healthy dietary patterns within local cultures.

Keywords: traditional foods; sustainable diets; nutritional composition; food composition databases; biodiversity.

Acknowledgement: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n.º 227118.

SESSION 5 –

Traditional & ethnic foods for sustainability and health

S5.01

The role of micro-organisms and their metabolites in determining functional properties of traditional foods

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Rationale and objectives: Functional foods (FF) by definition have to exert positive effect on the human health. Examples are whole meal bread, vitamin-enriched cereals, mueslis with minerals, juices with biofibres, etc., as well as the products with microbiological substances: bacteria and microscopic fungi as the basis of probiotics. This study aimed to answer partially: Can the traditional food be treated as the FF?

Materials and methods: Prioritised traditional dishes within BaSeFood project and their major plant components had been examined for their pro- and anti-microbial properties on different test-microorganisms: including either potential probiotic strains or pathogenic bacteria. **Results:** *L. salivarius* was stimulated by the extracts of fresh white cabbage, melon and cumin tea, whereas the traditional Georgian dressings similarly affected only the *Bacillus* strains, e.g.: *B. subtilis* and *B. licheniformis*. The plum dressing and sauerkraut (a traditional Ukrainian fermented food) had strong inhibitory activity on the growth of pathogenic bacteria, including Enteropathogenic *E. coli* (EPEC), *Shigella sonnei*, *Salmonella enteritidis*, *Proteus mirabilis*, and *Enterococcus faecalis*. Fresh cabbage juice inhibited the growth of *Enterobacter cloacae*, while the garlic extract acted similarly against the methicillin resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa*. The other registered effects proved less desirable, however not less important (inhibition of the growth of the tested strains of lactobacilli, enterococci and other representatives of the commensal microbiota).

Conclusion: A complex analysis of the traditional foods of the Black Sea area countries would make it possible to select the dishes and beverages with putative functional properties due to their interaction with specific micro-organisms. **Keywords:** traditional and functional foods, pro-bacterial and inhibitory effects, commensal and pathogenic bacteria, BaSeFood.

Acknowledgement: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n.º 227118.

Aibika (*Abelmoschus manihot* L.) a commonly consumed green leafy vegetable in Papua New Guinea (PNG): Biodiversity and its effect on micronutrients.

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Rationale and objectives. Green leafy vegetables are known to be good sources of iron, folate and other micronutrients. Aibika is the most popular and commonly-consumed indigenous green leafy vegetable in PNG. Despite this, micro-nutrient deficiencies especially anaemia are major nutritional problems in PNG. The PNG National Agricultural Research Institute (NARI) is playing a key role in the collection, preservation, morphological characterization and preliminary assessment of aibika accessions. To date the genetic makeup of aibika is unknown. The main objectives of this study are to analyze over thirty different varieties of aibika for micronutrients including folate, minerals and beta-carotene; and to trace the variability of nutrients between the varieties using genetic fingerprinting. The selected micronutrient profile for the varieties would then be documented and the most promising nutrient-rich varieties promoted for consumption in the community. This will also help NARI put in place an effective conservation management system for the aibika germplasm.

Materials and methods. Over 30 accessions grown under similar conditions at NARI were vacuum packed and frozen at -200C for at least 3 days to satisfy Australian Quarantine requirements before they were freighted packed in ice to Sydney. Genetic variation was determined using random amplified polymorphic DNA (RAPD) and chloroplast DNA gene sequencing. Mineral analysis was performed using ICPOES whilst for the folate, the extract was tri-enzyme treated and analysed using the Vitafast® folic acid kit.

Results. Initial results for folate ranged from 170 – 300 (µg/100g fresh weight), the mineral contents (mg/100g) were in the following ranges; iron, 5 - 14; zinc, 2 - 14; potassium, 2381 - 3902; calcium, 1595 - 2736; magnesium, 570 - 1030; manganese, 2 - 6; sodium, 8 - 87. Preliminary genotyping showed no variation between the accessions in the chloroplast trnL(UAA) 5' exon and trnF(GAA) region, however, variation was detected in the psbM-trnDGUC, and using RAPD and further studies are in progress.

Keywords : *Abelmoschus manihot* L., Aibika, micronutrient, DNA sequence, RAPD

SESSION 6 –

Database developments and new tools

S6.01

Assessment of the potential impact of the nutritional commitments of food operators on French nutrient intakes

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Objective: In accordance with French health authorities, food operators have signed voluntary commitment charters to improve the nutritional quality of their foodstuffs. The purpose of this study by the French Observatory of Food Quality (OQALI) is to evaluate the potential cumulative impact of these improvements on consumer nutrient intakes.

Methods: Reference nutrient intakes were computed by combining the data from the “INCA2” consumption survey and the “CIQUAL” food composition database. Potential nutrient intakes were simulated by attributing revised nutrient values to foodstuffs affected by nutritional improvements and to the corresponding amounts of generic foods consumed, according to four hypothetical scenarios for foodstuff market shares (100%, 50%, 25% and 10%). Nutrient intakes were simulated for adults and children (3-10/11-17 year olds) respectively, and compared to the reference intakes.

Results: Potential intakes of certain nutrients differed significantly from the reference intakes in the 50% and 100% scenarios for adults and children (3-10/11-17 year olds) respectively. For instance, vitamin D intakes increased (+8.3% and +5.4%/+6.3%) thanks to yogurt fortification, sodium intakes decreased (-7.8% and -6.3%/-7.3%) due to reduced salt in breads and ready meals, and sugar intakes decreased (-4.2% and -5.2%/-5.7%) due to reformulations of soft drinks. When considering adults only, the higher dietary fiber intake (+2.3%) was explained by the contribution of breads and pizzas/quiches, and the lower fat intake (-2.5%) was due to improvements in soups and ready meals.

Conclusion: These simulations represent an interesting tool for monitoring the impact of improved food composition in terms of nutrient intakes and for assessing French nutritional policies. It will be further refined to integrate real foodstuff market shares and to verify whether nutritional improvements concern all consumers, regardless of the socio-economic group they belong to.

Keywords: food policy, food composition, nutritional improvements, nutrient intakes, impact assessment.

Development of regional Food Composition Data Base (FCDB) for West Balkan countries (WBC)

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Introduction: Development of a regional FCDB requires involvement of many compilers from different countries and is a long and continuous process. UNU/SCN Network for Capacity Development in Nutrition in Central and Eastern Europe (NCDNCEE, www.agrowebcee.net) together with FP7 EuroFIR-Nexus project took challenge to develop the first regional FCDB.

Objectives: Our goal was to develop a regional online food composition database specific for some countries of Central and Eastern Europe and West Balkan. **METHOD/ DESIGN:** FP6 EuroFIR project (www.eurofir.org) was central in this endeavour and provided all necessary technical recommendations under which a Serbian FCDB was created. Web based application (Food Comp Data Management, FCDM) was developed and network members were trained in FCDB creation during many NCDNCEE meetings in last three years.

Results: This tool was proved to be a useful for the initiation of new FCDB and enabled the creation of a Regional Food Composition data base. The FP7 EuroFIR-Nexus project and NCDNCEE initiated Balkan platform and regional food composition data base further development. Regional FCDB has now food composition data for 46 nutrients, and more then 1300 foods specific for WB countries and is growing. The development of the Regional Food Composition data base is a concrete result of collaboration between EU funded project EuroFIR-Nexus and UNU NCDNCEE network. **Conclusions:** In conclusion one could say that the approach resulting in a regional FCDB was seen as important for CEE and WB countries. The web based application that allowed the creation of a new FCDB on national level plus one in the English language seems to be one of a few capacity development activities with such a result. This activity is important in communication, data exchange between different countries and for integration of any new food data in the future. This work is funded in part under the European Community's Seventh Framework Program (KBBE.2010.4.01) under grant agreement No. 265967"). **Keywords:** FCDB, web application, EuroFIR-NEXUS, UNU NCDNCEE network

FoodCASE: A standardised Food Composition And System Environment for Europe and beyond

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The quality of food composition data (FCD) depends on many factors and the tool used to manage the data is certainly essential. The software FoodCASE was developed at the ETH Zurich (Switzerland) in collaboration with EuroFIR compiler organisations and within a project aiming at defining, categorizing, and monitoring data quality aspects.

FoodCASE consists of several levels to manage FCD (original data, aggregated and published data) that are implemented as independent modules, and which are interconnected by user-guided automated aggregation and recipe calculations. In addition, FoodCASE accommodates all necessary meta information to comprehensively document FCD and offers web-based data exchange functionality through a standardised data format. It supports pre-defined sets of thesauri such as LanguaL and EuroFIR thesauri and can be extended to other thesauri (e.g. INFOODS tagnames or country-specific thesauri). The overarching research goal was the creation of a data quality framework that minimises human errors by leading the data input through standardised masks emphasising mandatory and quality increasing information. The data quality framework also maximises computer-derived assistance in evaluating FCD quality, including calculation, visualisation and interpretation of FCD quality as well as identification of FCD quality deficiencies. FoodCASE supports platform-independent, concurrent user access (over web or local), is based on open-source technologies, offers the possibility to use multiple languages and data flagging for an advanced, individual data filtering. The usability of a pilot version of FoodCASE was evaluated in a user study with 28 compilers representing 28 institutions and 22 countries around the world. 84% of the testers reported that FoodCASE already in its pilot state contained most or all features they needed, and 76% of the testers stated it was better or much better than their current system. FoodCASE is currently used to manage the Swiss FCD and prepared for the use in Europe and beyond.

**PacificTracker2 - Expert System (PacTrac2-ES) behavioural
assessment and intervention tool**

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The Pacific Tracker (PacTrac) is a computer program designed to analyze food intakes of individuals from the Pacific Region. The Pacific Tracker's output includes servings of daily intake of food groups according to the United States Food Guide Pyramid, nutrient intake recommendations, and a comparison to other national nutrition recommendations. The PacTrac is available for public use through two websites (pactrac.crch.hawaii.edu and hawaiifoods.hawaii.edu). The PacTrac2 is an update and expansion of PacTrac to the United States MyPyramid food guidance system, which now provides output in cups of daily intake of food groups, rather than servings. In addition, the PacTrac2 has modified PacTrac to include a physical activity analysis tool which quantifies minutes of physical activities and their intensities based on energy estimates from the Compendium of Physical activity and research on children. The PacTrac2-ES was designed for the Pacific Kids DASH for Health (PacDASH) intervention study, conducted in the Kaiser Permanente health care system in Hawaii. The intervention is based on the child's self-efficacy and stage of readiness to change intake of fruits and vegetables and physical activity, with a goal of maintaining body weight to prevent obesity. An Expert System (ES) - a computerized decision tree to guide behaviour change - was developed using the information on self-efficacy and stage of readiness to change, and the fruit and vegetable intake and physical activity information from PacTrac2. The ES produces reports for the child, the parent/guardian, and the child's physician with child-specific strategies, targeted behavioural information, and feedback tailored to the child. The ES intervention is complemented with stage-based mailers addressing the environment for physical activity and fruit and vegetable intake and newsletters that address related behaviours (sedentary activity and a DASH eating approach). This project is the first to expand the PacTrac and to develop an expert system for 5-8 year old children.

Keywords: Pacific, food, physical activity, DASH, expert system

S6.05

Apomediation: aligning objectives from health professionals, food chain companies and target consumers

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Rationale: The World Health Organization warns that of the 10 most harmful risks to health, 6 are directly related to food and diet, and it is estimated that 130 million obese and 400 million overweight people are currently living in Europe. Managing food and diet processes has become a public health priority and a competitive market strategy.

Objective: To create a menu and recipe reformulation Web2.0 tool as a research project to empower businesses through the food chain to transfer scientific knowledge to distribution and consumers.

Materials and methods: First, a food management software using LanguaL and full ingredient indexing was created in order to characterise foods according to nutritional quality and technology. A second module was then developed to target specific consumer needs. Finally, a third module was developed to assess menus based on recipe ingredient availability and conditions (frequency, minimum or maximum requirements and incompatibilities), as requested by users.

Results: After publication of the first software release (HANCptool), based on the control of three nutrients (saturated fats, free sugars and salt), the website received 4,223 visitors from 252 companies in 48 countries and 5 continents, producing 2,997 reformulated recipes. Results from the current release (HMtool) for healthy menus, based on self-management of healthy persons and patient target-groups, are preliminary and not discussed in this presentation.

Conclusions: The web-based recipe reformulation system proved that a food product or recipe could be improved while preserving its essential characteristics and without converting it into a different product. The greatest amount of nutrients can be preserved and the product made healthier. This know-how opens the way for a future Web2.0 computer application to self-manage disease-related nutritional hazards.

All the above can be checked at www.hmtool.org or www.hancptool.org

Keywords: LanguaL, Food reformulation, Web2.0 e-Health.

RFID from Farm to Fork: traceability along the complete food chain**Simone Bell¹, Dawn Wright², Claudia Krines³, George Chrysochoidis⁴, Paul Finglas²**

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The RFID-F2F project will showcase the ability of radio frequency identification (RFID) technologies to make a return on investment for small and medium enterprises (SMEs) in the food sector. The main goal is the use of one single system to perform the complete food traceability recording data at each stage of the food chain: from the farms where, e.g. fishes are farmed, through transport, processing, storage until the end-consumer. Food producers, end-consumers and all handlers of the food chain would take advantage of such a system, as a high level of documentation, accomplishment with quality and hygiene standards as well as availability of transparent information for end-consumers can be achieved. The instant identification of a product, e.g. by a RFID-reader installed in a supermarket or an application on personal smart phones, will allow users and especially end-consumers to obtain a complete traceability report originating from a central database. Additional retrieval of accurate national food information from European food composition databases linked with EuroFIR will bring added-value for food producers along the chain, e.g. for recipe calculation, labelling and reformulation, and will satisfy end-consumer information needs on healthy nutrition. The project covers the design of the complete information model and architecture applying state-of-the-art RFID technology. European SMEs in the food sector are involved in project pilots enabling system's usability testing at different stages of the food chain and testing of acceptance and usage by end-users, in order to verify systems performance and accomplishment with users wants and needs. Such results are essential to establish a sustainability framework towards continuation of the system after the project.

Acknowledgement: This work was completed on behalf of the RFID-F2F Consortium (250444) and funded under the EU 7th Framework CIP-ICT-PSP.2009.7.2: Internet evolution and security (including RFID).

Keywords: Food traceability, RFID technology, food information, EuroFIR, end-consumer.

SESSION 7 – New emerging methods

S7.01

Food composition data for folates – more than two decades of challenges

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Folates remain of major nutritional significance because of its protection against neural tube defects, and low folate status being associated with possible increased risk of certain cancers and dementia. Due to the high number of natural occurring folate forms, their low concentrations in food, and their instability, analysis was challenging. Improving the quality of folate data in national food databases is fundamental to support nutritional epidemiology research. During the 1990s intercomparison studies were conducted to improve the reliability and accuracy of folate methods (microbiological (MA), HPLC and radioprotein-binding assays) under EU funding schemes with focus on sample extraction and clean-up; γ -glutamyl hydrolase sources for deconjugation; and calibration procedures. Five certified reference materials (CRMs) were prepared. Thereafter, a European standard microbiological method for total folate became available (CEN EN14131:2003) and validated for cereal foods. During the last decade, around 50 LC-MS and LC-MSMS methods were described for separate quantification of native folates and folic acid in food and clinical samples, but still today no official standard chromatographic method is available. In a recent study between EuroFIR and IARC, 18 European and international databases were assessed for folate data completeness, quantification, terminologies and documentation of values. While in most databases completeness was high and the common terminology for “total folate” after microbiological assay was used, comparability was hampered by lack of value documentation and values on folic acid fortificant alone. Recommendations were formulated for the compilation of standardized folate values for national food databases suitable for nutritional studies.

This talk will outline results from various studies and discuss current recommendations for the compilation of standardized folate values for food databases to support both the national food database compiler organisations, laboratories generating the data and researchers using the data.

Significance of phytate in human nutrition, methods of phytic acid/phytate determination and contents of phytic acid and other inositol phosphates in foods

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Phytate, the salt of phytic acid (myo-inositol-1,2,3,4,5,6-hexakis dihydrogen phosphate), is one of the most fascinating bioactive compounds and widely distributed in foods made from plant seeds. Due to its unique molecular structure phytic acid shows high affinity to polyvalent cations. Under special dietary conditions phytate interferes in the intestinal absorption of minerals and trace elements which may result in deficiencies of these elements. On the other hand the high metal affinity is also the basis of beneficial properties such as the antioxidative and anticalcification property of phytate and most probable also of its anticancer activity. Thus, phytate shows unique properties with contradictory consequences for humans (Schlemmer, U. et al.(2009).Mol.Nutr.Food Res.53, S330-375). To determine the phytate/phytic acid contents in foods, various methods have been applied. Most of them, however, are unspecific ones which do not discriminate between phytic acid and other inositol phosphates. Thus, specific analysis of total inositol phosphates present in foods, inclusive their stereo isomers, is indispensable. Problems of the specific determination of inositol phosphates in various foods will be discussed and criteria for a specific, sensitive, reliable and simple determination established. Earlier reviews showed extreme high variation of the phytic acid/phytate contents in the same food which partly are due to the different analytical methods applied. To obtain reliable data on the phytic acid consumption in humans, 200 phytate containing foods were purchased from the market in Karlsruhe (Germany) and analysed for their total inositol phosphates (InsP2–InsP6) by a specific and simple HPLC-method (slightly modified to Schlemmer, U.et al.(2001). Arch.Anim.Nutr.55, 255-280). The results show the first time total inositol phosphates of all relevant foods, determined by only one specific method, and allow to calculate reliably the intake of phytic acid and other inositol phosphates in different population groups.

Keywords: Phytic acid, phytate, analysis, food contents, intake.

Vitamin D content of Australian red meat**Jerry Liu¹, Norbert Strobel³, Heather Greenfield^{1,2}, David Fraser¹**¹*University of Sydney, Sydney, NSW, Australia,*²*University of New South Wales, Sydney, NSW, Australia,*³*National Measurement Institute, Melbourne, VIC, Australia*

Rationale & objectives: The vitamin D content of retail Australian red meat has never previously been investigated. It was postulated that since Australian cattle and sheep are predominantly range-fed and exposed to abundant sunshine their meats would be higher in vitamin D than reported in other countries, and within Australia would be higher at lower latitudes.

Materials & Methods: Two different cuts of lamb and beef were purchased from supermarkets and butchers across high and low SES Sydney. For the latitude comparison, five cuts of beef were purchased from Queensland (17° South) and Tasmania (41° South). All samples were separated into lean and fat tissue, and each tissue analysed for vitamin D₃ and 25OHD₃ by LCMS.

Results: Concentrations of vitamin D₃ and 25OHD₃ were similar for lean lamb (0.1 ± 0.03 vitamin D₃/100 g and 0.2 ± 0.6 25OHD₃/100 g) and beef samples (0.12 ± 0.06 vitamin D₃/100 g and 0.27 ± 0.05 25OHD₃/100 g). The values were also comparable to published studies for red meat from other countries. Latitude had no effect on the vitamin D content of lean beef. However, fat from cattle originating from Queensland (1.39 ± 0.31 µg/100 g) contained significantly higher (P < 0.01) concentrations of vitamin D₃ than fat from Tasmanian cattle (0.4 ± 0.29 µg/100 g). This may be a result of the improved vitamin D status of cattle from Queensland, and the ability of adipose tissue to sequester vitamin D.

Conclusion: The vitamin D content of Australian meat is comparable to meat from other countries. Furthermore, improved vitamin D status as a result of latitude only appears to affect the fat, and not lean tissue of cattle.

Keywords: beef, lamb, vitamin D₃, 25-hydroxy-vitamin D₃, LCMS

Nitrogen vs. amino-acid profile as indicator of protein content in South African beef**Nicolette Hall, Hettie Schonfeldt***University of Pretoria, Pretoria,, South Africa*

In most cited food composition studies and tables, the proximate system measures protein as total nitrogen (determined by Kjeldahl or Dumas method) multiplied by a specific factor. This factor has originally been 6.25 based on the assumption that all proteins contained 16 % nitrogen. However, it has been known for some time that plant proteins (and gelatin) contain more nitrogen, and thus require a lower factor.

Various different factors, originally determined by Jones et al. (1942), are currently used to calculate proximate protein amounts based on nitrogen content in different foods. It is considered better, although more expensive, to base estimates of protein content on amino acid data (Greenfield & Southgate, 2003). Other concerns need to be taken into consideration to ensure accuracy of this approach, including accommodation of free amino acids, and sound analytical data.

A study previously conducted on the nutrient composition of South African beef analyzed the full amino-acid profile of specific cuts, as well as determined total nitrogen content to determine proximate protein composition via the Kjeldahl method. In this paper a comparison is drawn between total protein content calculated by nitrogen content vs. analyzed amino acids. Differences are highlighted and extrapolated.

S7.05

Achievements and future plan on development of good quality food analysis laboratory among ASEANFOODS

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The ASEAN Network of Food Data System (ASEANFOODS) was established in 1986. Current country members are Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. For the past 25 years, one of the main activities of the ASEANFOODS has been to strengthen the analytical performance of food analysis laboratories in member countries. The aim of this presentation is to describe the development, achievements and the future plans in this activity. Improving laboratory performance started with setting up in-house quality control systems, followed by developing programmes for evaluating laboratory performance and having food reference materials with reference values of nutrients available for use. The activities include organising regional and national training workshops, in collaboration with the Asia Pacific Food Analysis Network (APFAN), and conducting proficiency testing within and between regions. Ten laboratory performance studies have been organised since 1989, using different matrices of test materials for each study. Over this time, improvement was demonstrated in the preparation of test materials, the included analytes, the statistical evaluation and the interpretation of laboratory performance. Eight different matrices of food reference materials were established, with reference values of analytes developed with the aid of experts and established high quality laboratories. Since 2004, several institutes in Thailand and in 2006, country coordinators of Indonesia and the Philippines (2006) have become proficiency testing providers. The Technical Division on Reference Materials (TDRM) of the AOAC recognised these continuing activities, especially the significant contributions to raising the 'quality awareness' among food analysis laboratories in ASEAN region, particularly through the proficiency studies and training programmes. As a result, the TDRM award was presented to the ASEANFOODS Coordinator in 2008. Future activities, especially the proficiency testing on problematic nutrients, will be organised to continue improving the analytical competence of laboratories among ASEAN.

Keywords: ASEANFOODS; Analytical Performance; Proficiency testing; Reference Material

Evaluation of methods for determination of carbohydrate constituents in real foods and in model foods with added dietary fibre

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Rationale and objectives: Foods can contain a diverse range of carbohydrate constituents and various empirical and rational methods have been proposed for their measurement. A selection of these methods was evaluated by investigation of a range of real and model foods.

Methods: Products from different food groups were selected, some of which were further used to prepare model foods with added dietary fibre ingredients. A range of rational methods were applied in determining specific carbohydrate constituents including: sugars, starch, resistant starch, non-starch polysaccharides and resistant oligosaccharides, including fructans. For comparison, empirical methods for dietary fibre were applied, based on determination of gravimetric residues for high molecular weight and size-exclusion HPLC for low molecular weight components.

Results: In general there was good agreement between rational methods for the analysis of individual carbohydrate constituents, with a few exceptions for resistant starch and fructans in some products. For the fibre fortified model foods there was good agreement between expected and observed values obtained by the rational methods. For many products there was good agreement between results obtained by rational and empirical methods, though there were exceptions and the reasons for these are discussed. **Conclusion:** Rational and empirical methods can both be used to determine dietary fibre in most situations. The information provided by rational methods is useful in identifying the specific carbohydrate constituents present in foods allowing their nutritional characteristics to be assessed in detail.

SESSION 8 – Update on dietary fibre methodology

S8.01

The new fibre definition - Understanding and predicting changes in fibre levels for cereal products

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Food composition databases are listing dietary fibre levels of many thousands of products. Total fibre levels in most countries worldwide have been usually determined with AOAC method 985.29. This method does not measure all types of fibre included in the definitions recently adopted by Codex and the EU:

- Inulins, raffinose/stachyose and other non-digestible oligosaccharides are not measured, or for a very minor part.

- Of the various types of resistant starch (RS) only RS₃, retrograded starch is measured.

The new, Codex approved, AOAC method 2009.01 is measuring all these types of fibre. For compliance of fibre levels in food databases with the new definition, re-measurement of all fibre containing products may be considered.

Cereal grain based products - e.g. bread, other bakery products, breakfast cereals and pasta

- contain, in addition to polymeric fibres, various RS types and oligosaccharides. RS levels are affected by mechanical processing (e.g. crushing of intact grains) and by heating, cooling and water activity. Fermentation and enzymatic processes, applied in bread production, may result in higher levels of oligosaccharides.

The Healthgrain Forum, with TNO, Eurofins and ICC is preparing a project aiming at

- An overview for cereal raw materials and products of differences in fibre levels according to AOAC985.29 vs. levels complying with the Codex and EU fibre definition.

- Developing an expert system for estimating, based on data of raw materials and processing, the differences in fibre level with old and definition compliant methods. This may help in assessing the need for adapting recommended intake levels for dietary fibre.

Analytical requirements of the Codex definition of dietary fibre and the need for a decision tree approach

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The Codex Alimentarius Commission has adopted a definition for dietary fibre. In order to estimate the dietary fibre in foodstuffs the Codex Committee on Nutrition and Foods for Special Dietary Uses has proposed a series of methods of analysis for dietary fibre. These methods have now been endorsed by the Codex Committee on Methods of Sampling and Analysis (CCMAS) in March 2011. However, there are multiple methods now endorsed, many of which are Type I, empirical (defining) methods of analysis. In the Codex system it is not permitted to have more than one Type I method for any particular determination. In order to ameliorate this anomaly it was agreed at the last Session of CCMAS that decision trees should be prepared to help the analyst choose the most appropriate method to be used for any particular fibre determination. Two draft decision trees were tabled at the Session; the first applied to the empirical methods of analysis and the second to rational methods of analysis. It was agreed that these decision trees should be further developed before the next Session of CCMAS. This presentation will explain the significance of the Typing of methods of analysis used within Codex, how the Typing of methods may cause problems to the dietary fibre analyst and how advice on how such problems through the use of decision trees may be addressed.

S8.03

**Codex dietary fibre definition –
Justification for inclusion of carbohydrates from 3 to 9 monomeric units**

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Rationale: At the 30th and 31st meetings of the Codex Committee on Nutrition and Foods for Special Dietary Uses – CCNFSDU, the definition of dietary fibre (DF) and analytical methods were agreed. The commission of the Codex Alimentarius complied with the recommendation of CCNFSDU and adopted this definition of DF for nutrition labelling. The main controversy about the DF definition refers to the inclusion of carbohydrate polymers of 3 to 9 monomeric units (MU), decision which may be made individually by the authorities of each country. Considering that this inclusion alters, or not, the total dietary fibre value of certain food, according to the methodology used for DF analysis, it is important to underlie this choice.

Objective: Present justifications for the inclusion of carbohydrate polymers of 3 to 9 MU in the definition, considering that the main goal of nutritional labelling is to help the consumer select healthy foods.

Justifications: 1. There is no scientific or physiologic basis for assuming that non available carbohydrates have different behaviour when the number of MU is < 10 or ≥ 10 ; 2. With the use of AOAC 2009.01 method in foods containing oligosaccharides, the DF content would be over-rated, in case these compounds are not included in the definition; 3. Oligosaccharides are already part of the DF definition proposed and adopted by several institutions of experts in the field (ex. AACC, EC, ILSI Europe and ILSI North America); 4. Considering that several countries have already been adopting the inclusion of oligosaccharides in the definition of DF, continuing with this criterion may facilitate the harmonization of nutritional labelling and reduce barriers for the international market; 5. Once consumers understand that DF is a group of compounds that provide benefic effects to the organism, any alteration in the concept may cause confusion and interfere in the adequate selection of foods, and hence affect the daily intake.

Conclusion: The decision of including non available carbohydrates of 3-9 UM in the definition of DF may cause effective global harmonization in the nutritional labelling, not interfere in its quantification, and reduce barriers for the international market, not interfering in the consumer understanding of what DF is.

Keywords: Codex, dietary fibre, definition

Quantification of dietary fibre in cereal based food: Challenges by new fibre definitions, new methods and nutrient database management

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The health benefit of cereal based food is attributed last but not least to its high content of dietary fibre. Thus, being able to reliably quantitate soluble, insoluble and total dietary fibre (TDF) in baked goods and cereal flours is an important issue for research, production and marketing. At the Max Rubner-Institute (MRI) in Detmold, Germany, a study is ongoing comparing TDF contents of selected cereal based foods determined by AOAC Official Method 991.43 and AOAC 2009.01/2010.xx, respectively. The aim is to provide up to-date data of cereal food for the GERMAN NUTRIENT DATA BASE (BLS). First results from this study will be presented. Up to now, four types of wheat and rye flours, ten different types of bread and some standard bread rolls baked with different amounts of fructo-oligosaccharides added were investigated. NDO-supplemented baked goods are at the market and for this reason were included in the study. First results show that TDF data from the BLS and the AOAC method 991.43 correspond, but data determined by AOAC 2009.01/AOAC 2010.xx are always significantly higher. Interestingly, the sum of Insoluble Dietary Fibre (IDF) and High Molecular Weight Soluble Dietary Fibre (HMWSDF) correlate with well TDF data from BLS and values determined by AOAC 991.43. But including Low Molecular Weight Soluble Fibre fractions (LMWSDF) in bread samples resulted in TDF contents differing by the factor 1.5 with respect to established methods.

These results document that at least in cereal products, including LMWSDF in the TDF quantification poses the question how to update TDF data in nutrient databases in a reasonable time with an acceptable expenditure.

Keywords: Cereals, Food, dietary fibre, CODEX, non-digestible oligosaccharide

S8.05

Dietary fibre levels in bread according to AOAC 985.29 and AOAC 2009.01 method. First results.

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Different categories of bread have been analyzed for their total dietary fibre content applying two different methods of analysis, being the classical AOAC 985.29 and the new AOAC 2009.01 method.

Depending on the applied analytical method and on the category of bread, the established total dietary content varied from 3.0 – 8.6 %. The established total dietary fibre contents in the different categories of bread measured with the new AOAC 2009.01 method are significantly higher (about 1%) than the results obtained with the classical AOAC 985.29 method. The established high molar weight dietary fibre content in each of the different bread samples measured with the AOAC 2009.01 methods is fully confirmed by the results obtained with the AOAC 985.29 method. Both methods result in comparable high molar weight dietary fibre contents in the different bread samples

The increase in the measured dietary fibre content is purely caused by the measurement of soluble low molar weight dietary fibre which is “not seen” with the classical AOAC 985.29 method. The characteristics of this fraction soluble low molar weight dietary fibre are investigated and the results will be discussed.

It is very well possible that this fraction low molar weight dietary fibre is formed by some enzymatic hydrolysis and or thermal degradation of high molar weight dietary fibre during the bread baking process. The investigation will be extended with other sample matrices.

Dietary fibre - A food composition database manager's view

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Food data base compilers working on dietary fibre values face many questions, due to the variety of definitions and methods of analyses for this group of components.

Compilers need to have a clear view on the definition for dietary fibre in their database and on the criteria for accepting new values. For databases working with in house or contract laboratories this will be more easy compared to databases, like the Dutch NEVO database, that depend on several laboratories to get food composition data.

In the Netherlands only part of the nutritional data are produced by analyses. Other frequently used data sources are the food industry and foreign food composition tables. Before adding new dietary fibre values to the database data needs to be scrutinized for questions like:

- which definition for dietary fibre was used?
- how was the dietary fibre value determined (which analytical method/ calculation/ estimation was used)?

In general it is very difficult to get this information from the food industry.

The AOAC985.29 method was the standard method for fibre analyses in recent years. With the new definition for dietary fibre and new analytical methods, database compilers need to reconsider how to deal with new values. Questions that arise are:

- is the new method (AOAC2009.01) only relevant for cereal products?
- should AOAC985.29 and AOAC2009.01 values be regarded as different dietary fibre compounds, requiring separate columns in food composition tables?

For compilers and users of the data it is important to get international consensus on the preferred method and definition, in order to produce and work with comparable data. However re-filling a database with data produced by a new analytical method will require a considerable amount of time and money.

Keywords: food composition, dietary fibre, definitions, analytical methods

SESSION 9 –

Current national and regional activities in food

S9.01

Credible information about food allergens and allergies for food allergen management: the InformAll database

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Providing food that is safe for consumers to eat is of paramount importance to the food industry and involves managing microbiological, chemical and physical hazards. Food allergens are an unusual food safety issue, where food ingredients innocuous to the majority of consumers, represent a (sometimes) life-threatening hazard to allergic consumers in very low amounts. As there is no cure for food allergies, allergic consumers have to avoid problem foods and to assist them legislation has been enacted to ensure major allergenic food ingredients are labelled irrespective of their level of inclusion. Extensive precautionary („may contain“) labelling has been instituted to warn allergic consumers of the risk, but has increasingly lost its effectiveness, leading to risk-taking by allergic consumers. Similarly the allergenic risks posed by novel foods (including genetically modified foods) and novel processes must be assessed. Established in 2005 the InformAll database (foodallergens.ifr.ac.uk) provides credible, reviewed information on allergenic foods to allergic consumers, the agro-food industry, regulators, health professionals and researchers. The information is available for each foods with a general summary page, clinical information about the allergenicity of the food and biochemical information about each allergen, each of which are individually accessible without any cross-referencing. Each entry is independently reviewed and provides links to the most relevant literature, and access to allergen sequences and structures. Version 3.0 of the InformAll database with around 100 food entries and information on over 300 allergens is due for release in autumn 2011. The InformAll database has been consistently popular (as judged by pageviews) from its inception. Case studies illustrating the utility of the Informall database will be given, including the development of novel mass spectrometry-based methods for analysis of allergens in foods, a novel food not previously consumed within the European Union and a novel food processing procedure.

The development of a global branded food composition database to monitor product reformulation by food companies

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Rationale and objectives: Chronic diseases are now the leading cause of premature death and disability in the world with over-nutrition a primary cause of diet-related ill health. Excess quantities of energy, saturated fat, sugar and salt derived from processed foods are a major cause of this disease burden. The objective of this project is to compare the nutritional composition of major processed food categories between countries, between food companies and over time.

Design: Surveys of processed foods will be done in each participating country using a standardized methodology. In-store surveys will be undertaken in retail outlets to capture a full listing of all processed food products for sale. Corresponding food composition data will be sought either from the product label, from food processing companies, from company websites or from other brand-specific nutrient databases. Products for which food composition data are unavailable will be recorded. Processed foods will be categorized into 14 food groups and 45 food categories for the primary analyses which will compare mean levels of nutrients at baseline and over time. Initial commitments to collaboration have been obtained from 18 countries (Argentina, Australia, Barbados, Brazil, Canada, China, Costa Rica, Ecuador, Fiji, France, Guatemala, Mexico, New Zealand, Panama, Peru, South Africa, The Netherlands and the United Kingdom) with more anticipated to follow.

Conclusions: The use of standardised methodology in conjunction with a collaborative approach to the collation and sharing of data will enable low-cost tracking of processed food composition around the world. This project represents a major step forward in the objective and transparent monitoring of industry and government commitments to improve the food supply.

Keywords: food databases, nutrient composition, global food industry, monitoring, reformulation

Brazilian database of compounds related to non transmissible chronic diseases: adequacy of food groups according to Choice Program

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Rationale: The Choice Program adopts criteria, based on WHO guidelines, aiming to decrease the intake of specific components (saturated (SFA) and trans fat acids (TFA), added sugar, sodium, energy) and increase the dietary fiber (DF) ingestion, which may contribute to the reduction of the risk for non transmissible chronic diseases (NTCD). Through a quality stamp, the program provides to consumers healthier options; also, it intends to stimulate food industries to adequate the composition of their products.

Objective: To create a database of specific components of Brazilian industrialized foods, aiming to make a diagnosis of the situation of food groups in relation to Choice criteria.

Methods: information on the chemical composition from the industries is being collected from labels of products or websites. Data on added sugar could not be evaluated, once this information is not mandatory on labels, according to the Brazilian legislation.

Results: The database contains information of 1,000 foods distributed in 23 groups. It was possible to observe that 83% present some specific components with values above or below (in case of DF) what is recommended, in their categories; whereas 36% are not in accordance with 1 criterion, 31% with 2 criteria and 16% with 3 or more. Out of the total evaluated foods, 528 products present high content of SFA, 447 of sodium, 192 of energy and 84 of TFA, while 224 present DF lower than the recommendation.

Conclusions: It was possible to identify that 17% of the products could be certified by the stamp and used in the strategies that aim to decrease the risk for NTCD. This information may be used in similar initiatives of global strategy, as well as allow the evaluation of the impact of introducing products with the Choice stamp in the usual diet of the Brazilian population.

Funding acknowledgment: This work was supported by Minha Escolha Institute – Brazil.

Keywords: Database, industrialized food, Choice, NTCD.

The new on-line Czech Food Composition Database

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Background/aims: The Czech Food Composition Database (FCDB) programme was re-launched in 2007. The presented project has been aimed at development of a new on-line Czech FCDB application. **Methods:** The concept of the on-line database was based on the following criteria: presentation of a database documented according to the EuroFIR standardised procedure using Excel sheets, implementation of a content management system (CMS) for administration of the application by a compiler, data expressed per 100 g edible portion, reference attached to each value, Czech and English version, free of charge access.

Results: The new on-line FCDB was launched on www.czfcdb.cz in December 2010. The application met the above mentioned criteria. New elements were implemented into the Czech on-line application: LanguaL codes displayed within each food record as searchable keywords of the database, references linked to available online sources of data (full texts, CiteXplore Database, on-line national food composition databases), photo to majority of foods (with possibility of implementation of a photogallery). Export transport package files in a XML format for each food were also tested. Search options comprised search by foods, nutrients, food groups and alphabet. By the end of March 2011 data for 298 foods were available for a full scale of components documented in the Czech FCDB. **Conclusions:** An on-line application for presentation of a FCDB documented according to standardized EuroFIR criteria using Excel sheets has been developed. The implemented CMS enables to administer the system by a compiler. Display of searchable LanguaL codes within the food record is a newly applied element in on-line FCDB's. LanguaL code R0515 (*CZECH REPUBLIC*) is applied as a tool for flagging traditional Czech foods. The application is designed as an official national FCDB of the Czech Republic. **Funding acknowledgments:** This project has been supported by the Czech Ministry of Agriculture and the EuroFIR.

Keywords: food, composition, database, on-line, Czech Republic

SESSION 10 –

Current national and regional activities in food

S10.01

Recipe database development for BNI (Business and Industry) dishes for processing of dietary intake data of KNHANES

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Objective: To develop a representative recipe database for BNI dishes to be used in the processing of the dietary intake survey results from KNHANES

Methods: With dietary intake data from 2007 and 2008 KNHANES, frequently consumed BNI dishes were selected to make a list for recipe collection. More than 5,000 recipes were collected from 6 leading companies of the Korean BNI food service market and 15 local providers of smaller scale business in 2010. For each dish item, ingredients were pooled among recipes from different source and sorted by frequency and weight. Ingredients with less than 10% of frequency or ones with less than 1% of sum of ingredient weight were excluded. To produce a preparatory recipe, remaining ingredients were divided by number of recipes included for each dish. Major dishes were experimentally prepared using preparatory recipes to examine the relationship between dish volume and amount of ingredients and for a final adjustment.

Results: We produced a representative recipe database for 239 dishes with 10 or more recipe sources and a provisional recipe database for 309 dishes with limited number of recipes. These will be used in estimating ingredient food intake from intake of BNI dishes reported in volume only.

Significance: This will be incorporated into the fundamental nutrition database to be used in the processing of KNHANES dietary intake data and consequently enable the estimation of food and nutrient intake of Koreans with increased reliability and credibility.

Funding disclosure: This study was supported by the Centers for Disease Control & Prevention (KCDC) with the Health Promotion Fund of 2010, Korea.

The Slovenian Food Composition Database

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Rationale and objectives: In Slovenia, biodiverse foods from our ecosystem have been analysed since 1976. Many results of analysis have been published in peer-reviewed literature and laboratory reports. During the period 1999-2004, Slovenian representatives participated in several CEECFOODS training courses and compiled the first food composition database applying the Alimenta nutritional software. However, that database contained food compositional values of differing quality. Therefore, we discarded values of low-quality, added up-to-date analytical results, and in 2006 published a Slovenian food composition database (FCD) with aggregated data about meat and meat products in both electronic and paper version. In 2010, we have started a new national project focusing on composition of foods of plant origin from our ecosystem. Once results will be assimilated into the FCD with data about meat and meat products, Slovenia will acquire a good source of food compositional values of consistent and compatible quality.

Materials and methods: The current edition of the Slovenian FCD includes values for a range of 145 different meat types and their products. We plan to collect compositional data from analyses of produce of approximately 200 native and cultivated plant varieties, and their products till 2012. All the food composition data is being acquired with respect to the requirements of the CEN/TC 387 "Project Committee – Food composition data" standard.

Results: The Slovenian FCD is internet-deployed to ensure widespread accessibility. Its application in dietary and nutritional treatment (www.opkp.si) supports the exchange of food data with different parties by using the EuroFIR Web Services.

Conclusion: Although Slovenia is a small country, it needs its own FCD with values for biodiverse foods that are indigenous or typical of Slovenia and frequently consumed.

Keywords: food composition database, biodiverse foods, wild foods, foods at cultivar level, dietary and nutritional treatment

S10.03

Construction of the Hong Kong Food Composition Database

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The Hong Kong Food and Drugs (Composition and Labelling) (Amendment: Requirements for Nutrition Labelling and Nutrition Claim) Regulation 2008 (Amendment Regulation) was passed in 2008 and effective on 1 July 2010. In the regulation, all pre-packaged foods need to have a nutrition label consist of energy plus 7 core nutrients (available carbohydrate, protein, total fat, saturated fat, trans fat, sugar and sodium). To assist the local Small and Medium Food Enterprises to comply with the new legislation, the Chinese University of Hong Kong Food Research Centre (CUHK FRC) used over 4 years to construct the Hong Kong Food Composition Database (<http://foodcompdb.fns.cuhk.edu.hk>). The Hong Kong Jockey Club Charities Trust provided the funds and the Food and Environmental Hygiene Department provided technical support. The Database runs on a membership system. Members can access and use the nutrition data to make nutrition labels for their products. Members provided their food products and all the ingredients for food composition analysis. Sample information including ingredient names, brands, origins, grades and batch numbers are recorded for traceability and verification. CUHK FRC analyzed over 1,300 local commonly used food and ingredients. CUHK FRC is accredited for the testing of core nutrients of “1+7 items” by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) of Hong Kong Accreditation Service (HKAS). Accreditation ensures the analytical system matches international standard and comparable to other international food databases. A website provides nutrients data of the ingredients and the retention factor from processing for members to use. Nutrition data of general local food products are available for members and general public to disseminate the use of “nutrition label” for a “balance diet”.

Food Composition Activities in South Africa

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In 2009 at the 8th International Food Data Conference in Bangkok a declaration for the advancement of food composition activities was formulated. Researchers at the South African Medical Research Council, working on food composition, decided to adopt this declaration as an additional motivation for guiding their activities. The aim with the South African Food Data System (SAFOODS) is to generate and compile country-specific food composition data for South Africa. Specific objectives are to increase the number of foods, with country-specific information, in the database; encourage the food industry to become involved in data generation; advance the science of food composition; and educate the local nutrition fraternity and food industry about the correct use of food composition data. Another important objective is to encourage the analytical laboratories to improve quality control regarding the chemical analysis of food. As a first step to meet these objectives, a national representative group interested in food composition, the South African Food Data Advisory Group (SAFDAG), was formed to collaborate with SAFOODS. Outcomes as a result of this collaboration were: the development of a website for SAFOODS; workshops to identify specific projects for execution to increase food composition data; implementation of a new recipe calculation strategy for SAFOODS; collaboration with tertiary institutions to generate yield factors for typical South African dishes; updating and distribution of revised food composition data; the development of research tools; training of students about food composition data and its application; and promoting the science of food composition.

In conclusion, SAFOODS with the support of SAFDAG met several food composition objectives identified by the Bangkok Declaration and it is believed that in future even more will be achieved regarding the advancement of the science of food composition in South Africa and to ensure that it is sustainable.

Keywords: South Africa food composition activities

S10.05

Current developments of analytical projects re nutrients related to the Danish Food Composition Databank

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This presentation gives an overview of the ideas behind the production of nutrient data for the Danish Food Composition Databank. The ideas will be illustrated by numerous examples from current projects.

We have many years of experience in managing and running analytical projects for various types of foods and various nutrients. However, the principles behind are continuously being optimized. This applies to everything from sampling strategy to data processing.

One important aim of many projects is to produce values for the foodstuffs that are representative of what is typically eaten by the Danes. As resources for analyses are quite limited, the sampling strategy for every project has to be carefully decided. So before deciding on the sampling strategy for an actual project, the starting point is generally making a thorough survey of actual products available on the Danish market, how widespread the individual commodities are, and also taking aspects like seasonal and geographical variations into account. Based on this survey report, the detailed sampling plan is worked out. Afterwards, sampling is done strictly according to this plan.

In the project description the course of events in the analyzing laboratory is stated including receipt of samples, sample preparation(s) and storing. Analytical parameters for all samples have been selected, likewise the analytical methods. The analyzed compounds are comprehensive, covering micro and macro nutrients. The analytical methods are well established, with broad applications – still problems with new matrices turn up now and then, demanding further optimization of the actual method for ‘new’ foodstuffs. As nutritional knowledge is growing, it is also important to develop more specific methods. Currently, e.g. in the vitamin area there is a growing knowledge about the nutritional importance of the different vitamins pointing to a need for developing of specific methods.

Keywords: nutrient, analysis, databank, sampling, vitamins

SESSION 11 –

Current national and regional activities in food

S11.01

A reappraisal of the nutrient composition of Australian chicken meat

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Rationale and objectives. A study was undertaken to determine the nutrient composition of Australian chicken meat and selected chicken meat products in 2009 and whether current meat chicken genetics, feeding practices new processing methods had resulted in any changes since the previous nutrient analyses done in the 1980s and 1990s.

Materials and methods. A wide variety of chicken cuts (whole chicken, breast fillets, breast with skin, thigh fillets, thigh with skin, wings, drumstick) and chicken products (mince products and mechanically deboned meat) were collected from the two largest producers of chicken meat in Australia and from several geographical regions, and were analysed for proximate composition, fatty acids and cholesterol, 11 minerals including fluoride and selenium; 10 vitamins including vitamin D₃, 25-OH vitamin D₃. Skinless chicken breast and thigh fillets were analysed separately for samples “as supplied” and “visible fat removed”. Cooking methods used were roasting, rotisserie, grilling and stir-frying. **Results.** The total fat content was lower in the “visible fat removed” samples, as expected, with a corresponding decrease in retinol content, omega-3 and omega-6 fatty acids particularly in skinless breast fillets. Total fat contents in skinless breast and thigh fillets were significantly lower compared to previous data from 1998. The levels of 25-OH vitamin D₃ were higher than those of vitamin D₃, probably as a result of the significant use of 25-OH vitamin D₃ as a source of vitamin D in meat chicken diets. All the chicken products had higher fat contents (28-47 g/100g), compared to the chicken cuts. Retinol levels were the highest in breast mince (51 µg/100g). No major differences in other key nutrients were seen compared to previous studies other than for the riboflavin content. **Conclusions.** In 2009 the most comprehensive survey of the nutrient composition ever was undertaken in Australia. Total fat contents in skinless breast and thigh fillets were significantly lower compared to 1998. Cooking methods did not reveal any particular trends in composition.

Keywords: chicken cuts, chicken products, nutrient composition

S11.02

Sampling Foods in At-risk Subpopulations in the U.S.

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With the increased diversity of the U.S. population (U.S. Census Bureau, 2010), it is critical that the USDA National Nutrient Database for Standard Reference (SR) contain nutrient values for foods consumed by multiple ethnic subpopulations, especially those most at risk for development of diseases related to dietary behaviors. Obesity, undernutrition (nutrient deficiencies), diabetes, cancer, hypertension, and cardiovascular disease are more prevalent in many minority populations (e.g., Latino, American Indian/Alaska Native (AIAN), Asian-American) in the U.S. These unique data are used for monitoring intakes of the entire population as well as providing directed clinical assessment, dietary guidance, health education, and formulating nutrition policies. USDA conducts its food composition analyses through the National Food and Nutrient Analysis Program, internationally recognized in food composition research. In addition to its multi-stage sampling plan developed for the entire population, specialized sampling plans have been developed and foods sampled and analyzed for the AIAN and Latino populations. A number of foods from “Americanized” Chinese restaurants have also been sampled as a preliminary step in future sampling of Asian-American populations. Similarly, rural African-American foods have been sampled. Foods were selected using published research, data from other projects, informal surveys/interviews, collaborations, focus groups, and regional studies. Full nutrient profiles are obtained for most foods, though nutrients of public health interest were targeted—fat, saturated fatty acids, sugars and sodium. In addition, data were obtained for a number of bioactive compounds e.g., carotenoids and flavanoids, considered important in disease prevention. To date, nutrient profiles for 184 AIAN foods and 63 Latino foods generated in these studies have been incorporated into SR. They are used in the “What We Eat in America” component of the U.S. National Health and Nutrition Examination Survey (NHANES), as well as by health professionals working with the various subpopulations.

A Method to Determine Nutrient Retention Factors

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Food composition databases provide analysed nutrient data basically on raw foods. Because of expensive and time consuming analyses, data on nutrient content of cooked foods and dishes are often calculated from the ingredients. To allow for losses of nutrients and changes in weight during cooking, nutrient retention factors (NRFs) and weight yield factors (WYFs) must be applied. The aim of this work is to describe a method to determine NRFs and WYFs via cooking experiments, exemplified by baking of bell pepper in an oven.

Since the retention of nutrients is influenced e.g. by temperature, time, pH value, oxygen and light, these are taken into account by different kinds of experiments. The cooking experiments are conducted under standardized conditions; weight and nutrient content are determined before and after cooking. The pepper undergoes sensory tests for cooking times of undercooked, cooked and overcooked pepper and is analysed respectively. To study the effect of acid pH value, pepper is baked in tomato sauce. For covering the effect of baking pepper in different dishes, pizza and casserole are simulated with a model mass (industrially produced mashed potatoes). To ascertain changes in nutrient content of pepper, experiments with model mass and tomato sauce are conducted with and without pepper. Each experiment is repeated three times.

The WYF is calculated by dividing the weight of pepper after cooking by its weight before cooking. The NRF is calculated by dividing the analysed nutrient content of pepper after cooking by its content before cooking multiplied by the WYF. Besides NRFs for each kind of experiment, these NRFs may be aggregated to a mean NRF for baked pepper.

For validation reasons, nutrients of pepper containing dishes (like pizza and casserole) are analysed and compared to the sum of the nutrient content of all ingredients calculated by the determined NRFs.

Keywords: nutrient retention factor, yield factor, cooking experiments, analyses, calculations

S11.04

Nutrient analysis of a range of UK processed foods with particular reference to trans fatty acids

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Rationale and objective: A survey to determine the nutrient composition of a range of processed foods has been carried out in response to recent reformulation work by the food industry to lower the artificial trans fatty acid content of processed products. Results have been incorporated into the Department of Health's nutrient databanks, which support the UK National Diet and Nutrition Survey (NDNS), and will also be included in future publications of McCance and Widdowson's The Composition of Foods series.

Materials and Methods: 62 samples were collected in 2010 and were analysed for fatty acids, and a range of nutrients. The foods analysed included pizza, garlic bread, breakfast cereals, quiche, fat spreads, a range of fish and meat products, chips, savoury snacks, confectionery and ice cream. Each composite sample was made up of between 5 and 12 sub-samples. Lipid fractions were solvent extracted and esterified to form fatty acid methyl esters (FAMES). The profile of 104 fatty acid components was determined using capillary gas chromatography.

Results and conclusions: Levels of trans fatty acids have reduced considerably compared with previous analyses of similar foods where comparisons are possible. Concentrations of trans elaidic acid (C18:1(n-9)) from hydrogenated oils in all samples were < 0.2g/100g.

Levels of proximates, inorganics and vitamins were within the ranges expected for these types of foods.

These results confirm information provided by the food industry in 2007 on the levels of trans fats in key processed food sectors, used in conjunction with NDNS consumption data to estimate average population intakes as part of a review of the evidence of the health impacts of trans fats. This review confirmed that average population intakes of trans fats have decreased to 0.8% of food energy and meet current recommendations that average intakes of trans fats should provide <2% of food energy.

Keywords: Trans fatty acids, Nutrient Composition, NDNS, McCance and Widdowson's The Composition of Foods

SESSION 12 –

Current national and regional activities in food

S12.01

The EuroFIR Food Platform: Further integration, refinement and exploitation for its long-term self-sustainability (EuroFIR Nexus)

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The objective is to further integrate/refine the EuroFIR Food Platform (EFP), to improve/support the ways research is undertaken into relationships between food, diets and health in Europe. Our focus is on extending application and exploitation of validated food data and tools for pan-European nutrition studies and networked usage, implementation of standards and best practice. This together forms the basis of long-term sustainability through the newly established legal entity EuroFIR AISBL). Six Work Packages are included: Quality standards & certification; Systems integration & operational support; Integration & business development; Training; Dissemination & Management. The revised consortium has 35 existing EuroFIR partners (18 as 3rd parties/EuroFIR AISBL members). The already achieved high-level institutional commitment will be further strengthened. The new General Assembly consists of executive representatives of all beneficiaries (who are also AISBL Members), thus real and durable integration is achievable. The Executive Board will work closely with EuroFIR AISBL to provide an integrated approach to joint activities and stakeholder engagements. A high-level External Advisory Board of key users/stakeholders from Europe and internationally will ensure that food data, other products and services are fine-tuned to stakeholders needs, keeping Europe at the forefront of leadership and innovation in this area. Outputs are consistent with the ETP 'Food for Life' and will further support Theme 2 (FP7) in food and nutrition research contributing to the structuring of leadership and innovation in this area. Outputs are consistent with the ETP 'Food for Life' and will further support Theme 2 (FP7) in food and nutrition research contributing to the structuring of European Research Area and world-class scientific/technological excellence. Additionally, the outputs bring the EFP in alignment with the current European CEN Standard on Food Data and its application.

S12.O2

**Capacity Building in Food Composition for Africa –
Lessons learned as AFROFOODS coordinator 2001-2010**

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International Network of Food Data Systems (INFOODS), as a joint FAO/UNU project, represents a technical cooperation of networks on food composition with an objective to coordinate, encourage and facilitate activities in order to generate national and regional food composition data which would be of high quality, adequate quantity and accessible to users. An African Network of Food Data Systems (AFROFOODS) was established in September 1994. Under the auspices of FAO, the WHO, UNU and the University of Ghana, an organizational meeting of AFROFOODS, was held in September 1994 in Ghana, to establish national networks for promoting, coordinating and improving food composition work and creating national food composition databases in Africa.

The FAO and UNU joined efforts to stimulate the production of new food composition data through activities such as providing much needed fellowships for training participants in the different regions. During a follow-up meeting of AFROFOODS in Dakar (June 2000) sub-regions were re-divided based on food culture, availability and distribution. A plan of action at national, sub-regional and international level was established, and various working groups were appointed. As AFROFOODS coordinator for the period 2001 to 2010, a plethora of training courses, educational and scientific publications, posters, presentations and visits were delivered with the aim to build capacity in food composition within the AFROFOODS region. Extrapolation of these deliverables, lessons learnt during this period, challenges and future recommendations will be presented.

The challenges of food composition activities in Africa: Case study of Mali

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The Food Composition Table for Mali was published in 2004. It contains updated information on macro and micronutrient content of 63 food items from Mali, included iron, zinc, beta-carotene, thiamine, riboflavin and niacin content for some cereals. Samples were collected from 4 different regions in the country. The cereals were sorghum (n=4, cs=142), millet (n=4, cs=163), maize (n=4, cs=107), wheat (n=4, cs=123), rice (n=5, cs=151) and fonio (n=3, cs=104). Data on wild food were also included in the table. The green leaves came from monkey bread (baobab) (n=11, cs=151), fakouhoye (n=3, cs=124), sorrel (*Hibiscus sabdariffa*) (n=1, cs=13). The wild fruits were African locust bean, tabacoumba (n=1, cs=386), sheabutter (n=2, cs=34). All samples were cleaned and processed (ready to cook according to Malian food habits) before analyses. Iron and zinc were analyzed with flame atomic absorption spectrophotometry, -carotene with HPLC, and thiamine by ion exchanger chromatography, microbiological method and HPLC, and riboflavin and niacin by microbiological method and HPLC. Considerable differences in micronutrients content was found in cereals from different parts of Mali. The differences were considerable for iron in all the cereals. The differences in B-vitamins content were mostly the same. High content of calcium, iron and -carotene make the wild green leaves important sources in the fight against malnutrition, vitamin A deficiency and anaemia. However more exploration on the absorption and interaction between the different nutrients is needed. In addition, new varieties of cereal seeds have been introduced in Mali, industrial food fortification and bio-fortification have changed the composition of food products. All this requires a revision of the table. This can only be done in partnership at national and international levels.

Compiling Food Composition Data for Dietary Assessment: the Nigerian Experience using a SWOT Analysis

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Rationale and Objective: Food composition databases form the bedrock for sound nutrition practice. Where they are unavailable, correct measurement of dietary exposures and the ability to relate levels of consumption with incidence of diseases become difficult. This study seeks to produce a food composition database for the assessment of dietary intake for population groups in Nigeria.

Methods: Baseline data collection was conducted in the six geopolitical zones in Nigeria. Communities used for this study were selected using cluster sampling technique, bearing in mind similarities in culture and eating pattern. In each of the communities, quantitative and qualitative data collection methods (focus group discussions, key informant interviews, recipe documentation and food preparations, literature reviews and market surveys) were employed to obtain data. Trained research assistants were used for data collection. Field experiences were analyzed using the SWOT (strength, weakness, opportunity and threat) analysis.

Results: Results showed diversity in foods and dietary habits across the geographical zones; the south east zone having a wider variety of foods than other zones in the country. Traditional food systems and indigenous diets of the various zones that can form the basis for sustainable diets and improved nutrition were identified. Wide variations in recipes and method of preparation of similar foods exist, which if not taken care of would affect nutrient intake estimates for individuals. There were challenges with the use of values reported in literature for Nigerian foods; these include wide variations in nutrient content of similar foods, inadequate reporting of values, poor description of foods, lack of recipes, etc. The challenges of compiling analytical or calculated values for foods/diets are highlighted.

Conclusion: There is need to include composition data on biodiversity in databases for dietary assessment so as to ensure accurate estimation of food intake of the Nigeria population.

LATINFOODS: Current Status, Activities and Challenges

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The objective of this presentation is to provide information on the current status, activities and challenges of the Latin American Food Data System (LATINFOODS). The network is organized in three major committees and 19 branches (37% active, 16% lost contact and 47% is under strengthening and/or reorganization). The network structure, operating rules and website were recently optimized for better performance. The web hosts the database which includes data for 6188 foods and 24 components. However, some data needs to be updated and the database is incomplete with missing data in terms of the components covered. FAO Project TCP/RLA 3107, involving Argentine, Chile and Paraguay, finished last year with very good results. A model, software and tools for a relational database were developed and it is being tested by experienced leaders before it is released. In the region a high priority is given to control obesity and non communicable diseases where knowledge of food composition is key in this process, therefore the combination of forces with other initiatives is ongoing. In collaboration with PAHO's Initiative on "Cardiovascular disease prevention through dietary salt reduction", a regional survey on sodium content in foods was made. Eight (42%) of the branches are participating in an international collaborative project with The George Institute, Sydney, Australia. Main challenges to improve the quality and availability of food composition data are technical and economic sustainability of the local networks; improvement and updating of the database; establishment and implementation in the branches of database software; improvement of the national capacities for generating, compiling and using good food composition data and reactivation of branches. During its 25 years, LATINFOODS has a consolidated and dynamic structure, trained and experienced members and specialized tools and documents. In order to continue developing good quality food composition data and strengthening the network for a long-term self-sustainability, funds and other type of support are required.

Keywords: LATINFOODS, Latin America, regional activities, food composition database



9th International Food Data Conference

Food Composition and Sustainable Diets

Poster Abstracts

September 14-17, 2011
Norwich, United Kingdom

SESSION 1 –

Biodiversity and Sustainable Diets

S1.P1

Vitamin Profile of Some Standardized Nigerian Composite Dishes

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Objective: The purpose of the study was to determine the vitamin contents of twenty standardized dishes commonly consumed in Nigeria.

Materials and Methods: Representative samples of Twenty Nigerian dishes were analyzed for fat soluble (A, D, E, and K) and water soluble (C and B- Complexes) vitamins. The foods analyzed included those based on cereals, starchy tubers and roots, legumes and vegetables. The analysis was carried out using the spectrophotometry method.

Results: The results revealed the following concentrations (mg/100 g): vitamin C, not detected to 2.692 mg/100 g; thiamine, 0.011 – 1.094 mg/100 g; riboflavin, 0.011 – 0.816 mg/100 g; pyridoxine, not detected to 0.412mg/100 g; niacin, 0.070 – 0.967 mg/100g; pantothenic, 0.060– 1.193 mg/100 g; biotin, not detected to 2.092mg/100 g; B12, 0.045 – 2.424µg/100 g; folate, 7.822 – 101.764 µg/100 g; total vitamin A, not detected to 121.444 µg RE/100 g; vitamin D, not detected to 2.445 IU/100 g; vitamin E, not detected to 2.627 IU/100 g; and vitamin K, 0.266 – 13.091 µg/100 g.

Conclusion: The results suggest that these dishes are good sources of fat soluble and water soluble vitamins and provide base line data, which will be valuable in complementing available food composition data, and estimating dietary intakes of vitamins in Nigeria.

Keywords: Vitamin content, Nigerian, standardized, composite dishes

S1.P2

Mineral and Heavy metal contents of Nigerian Dishes

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Objective: The purpose of the study was to determine the mineral and heavy metal composition of twenty standardized dishes commonly consumed in Nigeria.

Materials and Methods: Twenty standardized dishes more frequently consumed were cooked in triplicate and their major elements (Ca, Mg, Na, K, P) and trace elements (Se, Mn, Pb, Cd) content were analyzed using atomic absorption spectrophotometry by standard methods of the Association of Official Analytical Chemists (AOAC, 2005).

Results: Dry weights varied from 18.33 ± 0.20 to $63.77 \pm 0.30\%$ fresh matter. Calcium, phosphorus, magnesium, selenium, and potassium contents expressed in mg/100 g ranged from 45.96 ± 0.33 to 421.94 ± 0.56 , 20.56 ± 0.64 to 309.77 ± 2.89 , 38.34 ± 0.81 to 270.32 ± 4.21 , 0.01 ± 0.01 to 0.45 ± 0.01 , and 413.17 ± 0.63 to 654.21 ± 4.87 mg/100 g, respectively. Their sodium, manganese, lead, and cadmium contents were between 16.86 ± 0.28 and 67.54 ± 2.10 mg/100 g, 0.03 ± 0.01 and 0.22 ± 0.02 mg/100 g, 0.03 ± 0.01 and 0.65 ± 0.05 , and 0.01 ± 0.01 and 0.28 ± 0.01 mg/100 g, respectively. There were statistically significant ($p \leq 0.5$) differences in the mean values of all the parameters determined.

Conclusion: Most of these recipes could adequately contribute to dietary minerals intake in most of the recipes.

Keywords: Mineral, heavy metal, standardized dishes, Nigerian

Antioxidant Potential, Antidiabetic Properties, and Phytic Acid Content of Certain Indigenous Food Ingredients: Effects of Traditional Processing Methods.

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Rationale and objective: Diet-based strategies through consumption of a broad variety of foods are the most promising approach for a sustainable control of malnutrition and disease among vulnerable groups. New emerging scientific evidence reveals that phytic acid has several positive effects on human health. The aim of this study was to evaluate the antioxidant activity and type II diabetes-related enzyme inhibition property of phytic acid extracted from raw and processed indigenous grains and vegetables with a view to identify the elite food ingredients with potential health benefits for vulnerable groups in Kenya.

Material and methods: Samples included grains such as finger millet, amaranth grain, pigeon pea, field bean, groundnut, pumpkin seed and sunflower seed. The indigenous vegetables selected were pumpkin, butternut, sweet potatoes, and leafy vegetables such as drumstick leaves, amaranth leaves and pumpkin leaves. Antioxidant activity (DPPH and FRAP assay) and type II diabetes-related enzyme inhibition property (-amylase inhibition and -glucosidase inhibition activities) of phytic acid in the raw and processed samples were analyzed according to standard methods.

Results: Phytic acid content of grains and vegetables ranged between 2.81-3.01 g/100 g and 0.29-3.23 g/100 g DM, respectively. The phytic acid extracts revealed 59-89 % of DPPH radical scavenging capacity, 27-3526 mmol Fe(II)/g of reducing power, 20-72% of -amylase inhibition activity and 8-91% of -glucosidase inhibition activity. Cooking of vegetables and roasting of grains improved the functional properties of phytic acid.

Conclusion: Adoption of roasting treatment for the presently studied cereals and legumes, and cooking method for vegetables could positively influence the health status of vulnerable groups in Kenya. Viable processing techniques for respective food samples could be devised in the formulation of supplementary foods with therapeutic properties.

Keywords: Indigenous foods; phytic acid; antioxidant activity; type II diabetes; health benefits.

S1.P4

Compositional analysis in pigments and bioactive compounds characterization in four species of red prickly pear

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Prickly pears are the fruits of species belonging to the *Opuntia* genus. Red prickly pears are rich in betacyanins pigments and can be used as natural red food colorants as an alternative of red beet root (E-162). The biodiversity of cactus pears can increase the betacyanins sources. So, a high number of *Opuntia* spp have fruits with betacyanins as major pigments. Some of them have high betacyanins concentration which besides color has antioxidant activity. Furthermore, prickly pears are interesting for the presence of other bioactive compounds such as polyphenols which can improve the quality of these fruits. Prickly pears are consumed as fresh fruit, and can be used as juices or purees for other processed food products. The aim of this work was to study the compositional analysis of four red prickly pears, characterizing their pigments and other bioactive compounds content. The species studied were *Opuntia stricta*, *O. inermis*, *O. engelmannii* and *O. linguiformis*.

Ripened fruits were homogenized and used for pigment extraction, using a 1/5 (w/v) ratio of fruit/water. Later on samples were centrifuged and filtered through 0.45 µm nylon filters. The obtained extracts were analyzed for total betacyanins and total phenols contents, while HPLC was used for identification of betacyanins present in each species. Betacyanin concentrations obtained were 86, 87, 90 and 124 mg betanin/100 g fresh fruit, for *O. stricta*, *O. linguiformis*, *O. engelmannii* and *O. inermis*, respectively. Total phenols detected showed the same pattern with values of 109, 119, 141 and 164 mg gallic acid equivalents/100 g fresh weight, respectively. So the highest betanin and total phenols concentrations were shown by *O. inermis*. HPLC analyses showed the presence in all species of betanin, isobetanin, betanidin, gomfrenin, and isobetamidin. Tyrosine, the betacyanins precursor was also detected. This study reveals the different composition of very close species, showing up the importance of the biodiversity to obtain different compounds in different species.

Keywords: prickly pear compositional analyses, *Opuntia*, betacyanins, polyphenols, food colorants

Bioavailability of haem iron from Jumil bug, edible insects vs non haem iron from spinach

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Iron deficiency anemia is still a major nutritional problem in vulnerable population groups in the world because it can lead to negative changes in psychomotor and mental development, which may be irreversible. Animal food provide haem iron ready to be absorbed, non haem iron from plant sources is much less absorbable, iron absorption is influenced by the dietary content, bioavailability of diet and the amount of iron storage in the body. Non haem and haem iron are absorbed from the diet by different mechanisms. Non haem iron from spinach plants is in the inorganic form as salts are not soluble and are inhibited by phytates, polyphenols and tannins amongst others and can be immobilized when bound up with other molecules. Haem iron from Jumil bugs edible insects are in the organic form, bound up with amino acids or proteins and without electronic charge. This study was conducted to determine properties of haem and non haem iron from Jumil bugs edible insects and spinach plants. The iron content in ash samples of *Atiziezia taxcoensis* A was performed by spectrophotometer atomic absorption. Data obtained in Jumil bugs: 5.50 mg/100g and spinach leaves: 3.40 mg/100g. Bioavailability of iron depends on diet composition, quality and quantity and the capacity to absorb it. The percentage absorbed depends on the type of food eaten and the interaction between the food and the regulatory mechanisms in the intestinal mucosa that reflect the body's physiological need for iron. The haem iron from animal sources is bound within the protoporphyrin molecule structure, soluble in an alkaline environment, so no binding proteins are needed for its luminal absorption. Non haem iron in the lumen of the gut has variable solubility depending on the iron binding compounds. Spinach leave contains less iron than Jumil bugs, and in a regular intake, non haem iron is absorbed at 5% to 10% and haem iron can be absorbed at nearly 60%, depending on the foodstuff included in the diet. In conclusion, consumption of iron from animal sources is much better, than vegetable iron sources.

Keywords: nutrition, hem iron, non hem iron, Jumil bugs, spinach.

S1.P6

**Food biofortification:
promising use of biodiversity to meeting nutritional deficiencies in Sub-Saharan Africa**

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Nutrition-related diseases, especially those linked to micronutrient deficiencies, are considered as a huge obstacle to the development of African countries and to the achievement of the Millennium Development Goals set by the United Nations. The most vulnerable of the population include the poor, children and HIV-positive persons. It is therefore crucial to promote healthy diets and improve the nutritional status of the population throughout the life course by using reliable and accurate food composition data. The food biofortification (FBF) concept offers a scientific contribution alongside other attempts currently in use by the World Food Programme, WHO and FAO to meet the food insecurity challenges that most developing countries have to address. It is an innovative approach that makes better use of biodiversity as a tool for meeting community nutritional needs. The FBF concept employs a plant-based approach using locally available, cheap and affordable staples in the formulation of nutrient-enriched foods. Developed recipes could provide $\geq 45\%$ of the daily nutritional requirements of vulnerable groups. These results suggest that the FBF approach can also be used as a medium- to long-term adjunct to community-based rural integration projects that are aimed at health improvement in Sub-Saharan Africa and emphasize the crucial role of biodiversity in sustainable development.

Keywords: biofortification, food composition, macronutrients, micronutrients, RDA.

Potentials of Wild and Cultivated Edible *Pleurotus tuber-regium* flours in meeting the protein and micronutrient needs of population groups in resource poor communities

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Rationale and objective: Dietary diversity from indigenous food sources is one of the food-based approaches for ensuring food security and sustainable diets in resource poor communities. This study determined the chemical composition of wild and cultivated edible *Pleurotus* mushroom and explored its use in food to food fortification.

Materials and Methods: Cultivated *Pleurotus* mushrooms were collected from the Department of Botany, University of Nigeria, Nsukka (UNN). Wild *Pleurotus* mushrooms were collected from different parts of Nsukka town and identified as such in the Department of Botany, UNN. The wild and cultivated mushrooms were processed into flour and chemically analyzed using standard methods. Different proportions of the cultivated mushroom flour were incorporated into traditional starch-based snacks. The acceptability and nutrient composition of these fortified snacks were determined. The ability of the snacks in meeting the nutrient requirements of pre-school and school children was evaluated.

Results: Wild and cultivated *Pleurotus* mushrooms flours were high in protein (31.7% and 33.0% wet weight; 34.2% and 35.8% on dry weight basis, respectively) and ash (4.4% and 5.1% wet weight; 4.8% and 5.5% dry weight basis, respectively). They were low in fat and crude fibre (<1% and 2%, respectively). Calcium varied from 227-372mg/100g on wet weight and 246-402mg/100g on dry weight basis. *Pleurotus* mushrooms flours contained good amounts of selenium (19.8 - 44.3µg/100g); copper (120-216µg/100g); folic acid (2320-2700µg/100g); riboflavin, thiamine and a fair amount of vitamin E (28.6-36.3µg TE/100g). Incorporation of 30g of the mushroom flour into starch-based snacks led to substantial increase in the percentage of the daily requirements for iron, copper, selenium, folic acid, riboflavin, thiamine, vitamins E and B12 of preschool and school children. The snacks were well accepted by these children.

Conclusion: Wild and cultivated *Pleurotus* mushrooms have significant role in ensuring sustainable diets for rural and urban dwellers in resource poor communities.

S1.P8

Data on composition of Slovenian honey types

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Honey is a natural sweet substance produced by honeybees. The diversity of plants foraged is reflected in the honeys produced and their characteristics. In general, honey types are divided into two big groups regarding the main source: nectar honeys, obtained from the nectar of plants, and honeydew honeys, produced from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants (Directive relating to honey, 2002). Natural geographic conditions and climatic diversities in Slovenia together with appropriate beekeeping technology enable production of different honey types regarding the predominant botanical origin. Traditionally monofloral types of honey are produced (robinia, linden, chestnut, fir, spruce honey) and two blended types: multifloral and honeydew honey. The honey types are well recognized among Slovenian consumers, the average honey consumption is among the highest in Europe and slightly higher than the average amount of honey produced in Slovenia (0.9 kg/capita). Regarding the natural and legislative division of honey, it was found relevant that Food Composition Tables comprise the composition data for both, nectar and honeydew honey. Furthermore, basing on the recognition of the seven most typical Slovenian honey types among Slovenians and significant differences in physicochemical parameters determined in these honeys, it was decided to include in the national tables data for each type separately. Data were obtained from the research projects on characterisation of Slovenian honey types (1999-2003, 2006-2010), in which about 2200 samples of honeys were collected. The most typical of each type were selected by the means of sensory analysis and submitted to further analyses of the quality parameters set by legislation, as well as other physicochemical parameters (content of protein, amino acids, elements, phenolic compounds). Although the energy value of honeys is similar, it is believed that compiled data will give better information on composition and insight into specific compounds of these honey types typical of the Central European territory.

Keywords: Slovenian food composition tables, honey types, composition of honey

Increased Saccharide Contents in Waxy Bread Wheat (*Triticum aestivum* L.) Grain**Takeshi Yasui, Kanae Ashida***National Agricultural Research Center for Western Region,
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Starch is a major component of cereal grain, and its properties affect the qualities of various cereal products. Amylose content is the most influential factor affecting starch properties and is genetically controlled by waxy gene(s), which encodes granule-bound starch synthase I responsible for amylose biosynthesis in endosperm. Because bread wheat is a hexaploid plant, it has three waxy loci, Wx-A1, Wx-B1 and Wx-D1, derived from three homoeologous genomes, A, B and D, respectively. The contents of starch, pentosan, fructan, beta-glucan and several mono- and oligosaccharides in bread wheat grain were evaluated to find out the probable influences of the Wx-D1 gene using two sets of near-isogenic waxy and non-waxy lines and two low-amylose mutant lines with a common genetic background of cv. Kanto 107. These materials have two non-functional Wx-A1b and Wx-B1b alleles in common. Waxy near-isogenic lines with a non-functional Wx-D1d allele showed consistently increased contents (1.4-2.1 times) of total fructan, beta-glucan, glucose, fructose, sucrose, 1-kestose, 6-kestose, neokestose, nystose and bifurcose compared with non-waxy lines with a functional Wx-D1a allele in three growing/harvest seasons. Starch and total pentosan contents were variably affected by the allelic status of the Wx-D1 locus, but water-soluble pentosan and raffinose contents were not influenced. The compositional changes of a low-amylose mutant line with an almost non-functional Wx-D1f allele were closely similar to those of waxy near-isogenic lines, while significantly different changes were scarcely observed in another low-amylose mutant line with a partly functional Wx-D1g allele in two seasons. These results showed that the Wx-D1 gene has pleiotropic effects on the saccharide contents of bread wheat grain. Most of the saccharide contents varied seasonally, but the seasonal variation did not blur the genetic effects. The effect of increased saccharide contents on the properties of the wheat grain and products remains to be clarified.

S1.P10

Edible insects produce less greenhouse gases and ammonia than common production animals and are potentially a more sustainable source of animal protein.

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Introduction: Anthropogenic greenhouse gas emissions are seen as a major cause of climate change. The livestock sector contributes greatly (18%) to the total anthropogenic greenhouse gas emission as well as to total ammonia emissions, resulting in acidification. Therefore, the production of animal protein is strongly connected to climate change and acidification. It has been suggested that insects are a more sustainable source of animal protein than common production animals. However, experimental data are lacking. In order to quantify greenhouse gas and ammonia emissions by insects an experiment was conducted.

Materials and methods: For five insect species the production of methane, nitrous oxide, carbon dioxide and ammonia were quantified per kilogram of weight increase through the use of climate respiration chambers.

Results: The investigated species emitted 4% or less of the amount of greenhouse gases per kilogram of weight increase compared with beef cattle and four out of five species produced less greenhouse gases than the lowest values reported in literature for pigs. Ammonia emissions were also lower for all insect species when compared to pigs (12% or less). Furthermore, the relative growth rate of the insects was much higher than for pigs and beef cattle.

Conclusions: The data presented here show that the direct production of greenhouse gases is lower for insects than for the common production animals and indicate that the production of animal protein by means of insects can be more sustainable.

Further investigations are now focussing on quantifying the environmental impact of the insect production chain. This will result in a life cycle analysis for insect protein and allow comparisons with other sources of animal protein.

Keywords: Greenhouse gas emission, ammonia, edible insects, animal protein

Evaluation of Regional Diet of The Northwest of Argentine

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Puna, Quebrada of Humahuaca and Valleys Calchaquíes are located in the Andean zone of Jujuy and Tucumán provinces (height up to 1700 m above sea level), Argentine. Their populations are descendants of indigenous people from different ethnic groups. Both are rural areas with distant population from urban centres, poor communication media and unsatisfactory health care.

Objective: To study the regional diet and analyze the nutritional value of typical dishes of the region.

Materials and methods: A cross-sectional nutritional survey that included one 24h recall and a semi-quantitative food frequency questionnaire was conducted among a statistically representative sample of the population. Also the recipe of the most consumed regional dishes prepared at home and school canteens were collected.

Results: Argentine Food Composition Tables (FCT) does not contain information about regional foods so that it was necessary to realize an analysis of them to fulfill recipe calculation. These data were incorporated to the ARGENFOODS and LATINFOODS FCT. The regional dishes varies little from one day to another, constituting a monotonous diet with high intake of fried foods, refined grains, and little quantity and variety of vegetables and fruits. Also these populations have a high consumed of sugary and carbonated drinks. These populations had limited use of regional foods. In both provinces for most of population very low intakes of calcium, iron, folate, thiamin, riboflavin, zinc, magnesium and vitamin E were observed.

Conclusions: Chronic malnutrition and deprivation at the household level seemed to be major nutritional problems; they were reflected in the low values of height in children, adolescents and adults from Jujuy. On the other hand, overweight and obesity prevalence among adults was also very high in both regions.

It is necessary to recover and develop the food ancient culture of the population in addition to revalue regional foods.

Keywords: regional foods, food composition table, diet, Andean zone, Argentine

S1.P12

Fatty acids and Pytochemicals Contents of Coconut Seed Flesh in Nigeria

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Some positive health benefits have currently been attributed to coconut intake. This study was carried out to determine the fatty acids and phytochemical contents of coconut seed flesh collected from the different parts of Nigeria. The fatty acid composition was determined by gas chromatography while phytochemical content were detected using the polar and non polar solvents. The findings revealed that samples from eastern Nigeria had highest fatty acids (caprylic:8.60±0.00%;Lauric:41.30±0.14%;Palmitic:13.00±0.14%;Stearic:3.6±0.07%) contents. The fats and oil constituent of coconut was more of lauric acid (37.40% - 41.30%), a medium chain fatty acid considered to be responsible for the many health benefits attributed to coconut consumption. Both solvents used in determination of phytochemicals revealed the presence of alkaloid, resins, glycosides, terpenoids and tannins in all the Nigerian coconut samples. However, Saponin was found present in coconut when polar solvent was used while Flavonoids, steroids and acidic compounds were absent with the use of both polar and non polar solvents. The detected phytochemical and beneficial fatty acids revealed that Nigerian coconut seed flesh should be regarded as one of the functional foods in our diets. Thus, the use of coconut seed flesh in our diets should be encouraged for health supporting functions.

Influence of geographical conditions on carotenoid content of Portuguese cabbage

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Rationale and objectives. Carotenoid content of food plants often varies not only with species and variety but also with natural factors such as light exposition, soil and temperature. The extent of this variation is not established since many non-controllable factors are involved for a long period of time and these factors may affect different plants in different manners. The objective of this work is to study the carotenoid content of the variety Portuguese cabbage in three landraces of three country regions and to contribute to the definition of the respective sampling plan.

Materials and methods. Three different samples of Portuguese cabbage (*Brassica oleracea* L. var. *costata* D.C.) landraces, Valhascos, glória de Portugal and penca respectively from Ribatejo (centre), Beira Alta (inland north) and Minho (north) were studied in relation to their carotenoid content which was quantified, after extraction, by a reversed phase HPLC method. Analytical measurement uncertainty was estimated based on data from the in-house method validation. The between samples variance was compared with the measurement uncertainty through an F-test.

Results. Lutein and all-trans-beta-carotene content in Portuguese cabbage samples were, in mg/100 g, respectively 4.7 and 3.6 for Valhascos, 0.52 and 0.46 for glória de Portugal, and 3.3 and 2.8 for penca. Relative analytical measurement uncertainty was 0.19 and 0.21, respectively, for lutein and all-trans-beta-carotene. At a significance level of 5%, Valhascos and penca landraces did not present statistically significant differences. However, glória de Portugal landrace was statistically different from the last two.

Conclusions. The analysed Portuguese cabbages are very good sources of lutein and beta-carotene presenting diet advantages. The results show that carotenoid content of Portuguese cabbage varies with the geographical region of production easily overshadowing contributions from the analytical process. That factor should be addressed in the production of data for Food Composition Data Bases and based on this study, for the group of Valhascos and penca, and for lutein, 5 primary samples are necessary to estimate the population's mean value, with a 95% confidence and 10% accuracy.

Keywords. Carotenoid, Uncertainty evaluation, Sampling, HPLC, Food

S1.P14

Black Sea area traditional foods as a new, valuable source of antioxidant polyphenols

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Rationale and objectives. The antioxidant capacity of many commonly consumed fruits and vegetables is well-documented. Many traditional foods from the Black Sea area (BSA) have plant components as main ingredients; nevertheless their antioxidant properties are not yet well characterized. In the BaSeFood project, we have tested the antioxidant capacity, and evaluated the polyphenol content of more than 30 traditional foods of the BSA, generally not yet known by western European consumers.

Materials and methods. Traditional dishes were prepared in different Countries of the BSA (Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine) by local Partners, according to the typical recipes and according to the seasonal availability of plant ingredients. After preparation, foods were sent to the University of Bologna for further analysis. The samples were prepared using a water/ethanol extraction procedure. The extracts were examined for antioxidant capacity and polyphenol content.

Results. Overall, the antioxidant capacity and polyphenol content of analyzed BSA traditional foods are very relevant with respect to other vegetable foods and beverages commonly considered rich in bioactive compounds. Some foods, in particular, deserve attention in the light of their very high antioxidant potential.

Conclusions. For the first time, the antioxidant properties and the phenolic compounds of traditional foods of the BSA were studied. Although these foods are largely consumed with the daily diet in individual Black Sea area countries, less is known about their potential health benefits. Our data, evidencing foods with the highest antioxidant capacity, represent the first step for further researches on their health effects. The nutritional reevaluation of traditional foods will be interesting for both consumers, that can discover or rediscover typical dishes, and food processors, that can exploit these scientific data to implement and optimise production schemes.

Keywords: traditional foods, Black Sea area, phytochemicals, antioxidant capacity, phenolic content

Variation of sesquiterpene lactones and phenolics in chicory and endive germplasm

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Rationale. The genus *Cichorium*, (Asteraceae family), includes the two cultivated species: *Cichorium intybus* L. (chicory) and *Cichorium endivia* L. (endive). Both are highly variable in shape and colour, and are appreciated as vegetables for their texture and taste. The quality of chicory is affected, from both sensory and nutritional standpoints, by secondary metabolites, such as sesquiterpene lactones (SL) and phenolics. SL, known also as “bitter principles”, are a group of more than 500 compounds characteristic of the Asteraceae family. SL are responsible for chicory bitterness, promote appetite and digestion in humans, and have also shown anti-tumor, anti-leukaemic, cytotoxic, antimicrobial activities, and allergenic properties.

Materials and methods. The fresh edible parts of 32 endive and 64 chicory accessions were analysed for their SL and phenolic content. The extraction of both categories of components was carried out on freeze-dried material, in a single step, employing a methanol/water mixture acidified by formic acid. SL were subsequently isolated from phenolics by means of solid phase extraction. The determination of both classes of metabolites was accomplished by high performance liquid chromatography under appropriate conditions.

Results. Chicory samples showed a higher amount of lactones in comparison to endive. SL content ranged from 6.7 to 122.0 and from 22.2 to 245.5 mg/kg fresh weight in endive and chicory, respectively. Total phenolic content in chicory was, as a mean, 266% higher than in endive and ranged from 48.0 to 6305.3 and from 80.4 to 820.3 mg/kg of fresh sample in chicory and endive, respectively.

Conclusions. This research allowed the characterisation of a germplasm collection for key components for both sensory and health promoting properties of the two species. Ample variability was detected, allowing opportunities for the selection for either low or high content of the two classes of components.

Keywords: chicory, endive, germplasm, sesquiterpene lactones, phenolics.

S1.P16

Fish and shellfish from sustainable fisheries are good sources of n3 fatty acids

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Rationale and objective: National authorities in several European countries recommend an increased fish consumption, mainly due to the beneficial health effects of n3 fatty acids. However, this advice may be in conflict with sustainable fisheries. Our aim was therefore to evaluate whether the recommended n3 fatty acid intake can be achieved by using sources from sustainable fisheries, only.

Material and methods: Fishes and shellfish from sustainable fisheries (n=8 species) and vulnerable fisheries (n=7 species) (based on information from World Wide Fund for Nature) were included in the study. Species were selected based on sales data from Swedish retailers. From each species at least 12 individuals were analysed as a composite sample. Seasonal variation and effects of processing were accounted for. Fat content and fatty acid composition were determined using methods accredited by the Swedish Board for Accreditation and Conformity Assessment. Briefly, fat content was determined using a gravimetric method. Fatty acids were determined as fatty acid methyl esters using gas chromatography. Fatty acid composition was converted into total fatty acids using the conversion factor 0,9 for fatty fish (> 5 % fat) and 0,7 for lean fish (<5 % fat).

Results: Good sources of n3 fatty acids (>0,8 g/100 g fresh weight) were found in sustainable fisheries e.g. herring and blue mussel as well as among the more vulnerable species e.g. sub-arctic char. The best source of n3 fatty acids was pickled herring, contributing with more than 2 g n3 fatty acids/100 g fresh weight. Thereby 3 servings (each 40-50 g) of pickled herring a week is within the international acceptable macronutrient distribution range of n3 fatty acids (0,5-2%E, FAO 2010) and would more than cover the recommended daily intake of n3 fatty acids (1%E, Nordic Nutrition Recommendations 2004).

Conclusion: The n3 fatty acid recommendation can be fulfilled by consuming fish and shellfish from sustainable fisheries only.

Keywords: n3 fatty acids, sustainable fisheries, gas chromatography

Composition, yield and pre-conditioning treatment for Selected Cultivars of African Yam bean (*Sphenostylis stenocarpa*) seeds.

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Rationale and Objectives.: African yam bean (AYB) is a tuberous legume crop which is currently underutilized but has great potentials as a food security crop in Africa. The seeds, tubers and leaves are utilized as food. Up to 80 accessions of AYB have been identified but the cultivation and utilization of this food crop is on the decline. Major problems associated with the utilization of AYB seeds include the compositional analysis of the different cultivars, to promote good nutrition; pre-conditioning and dehulling treatments for seed coat removal, ways of removing antinutritional factors in the seeds in addition to studies on the tubers and leaves to promote their utilization. The present report highlights research findings on the comparative composition of four cultivars of AYB seeds; their yields during cultivation and the pre-conditioning treatments appropriate for seed coat removal.

Materials and methods: The nutrient composition of four cultivars of AYB seeds grown in South Eastern Nigeria was determined using standard AOAC methods (AOAC, 1990). The yield of several accessions of this legume grown in South Eastern Nigeria was evaluated. Pre-conditioning treatments required for effective seed coat removal were also determined using the method of Screedham et al., (1985); Nelson (2003)

Results: The brown and mottled cultivars of AYB seeds contained significantly higher amounts of crude protein and minerals (calcium and potassium). The mottled AYB seed cultivar gave the highest yield while the black cultivar gave the lowest yield in terms of number of seeds per plant. The rate kinetics data suggest that soaking of seeds for 14-18h at about 50°C is an effective pre-conditioning treatment for effective seed coat removal from the seeds.

Conclusion: The speckled and Brown cultivars of AYB are good candidates for cultivation and utilization. More detailed analysis should be undertaken to ascertain their nutritional quality. Research work also needs to be undertaken to promote the utilization of the tubers and leaves of African Yam bean.

Keywords: African yam bean, utilization, yield, composition, conditioning treatment

S1.P18

**Italian garlic bulb (*Allium sativum* L.):
soil and cultivar influence on morphological and chemical parameters.**

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Garlic has been used throughout history for both culinary and medical purposes. The bulbs can grow in a wide range of soil textures and soil pH; fertilization, irrigation, and harvest practices may be different for each geographical areas but rarely require micronutrients. Some “Italian varieties” of *A. sativum*, well-known for their organoleptic properties and of long tradition were studied within the Italian project Biovita in order to identify and valorize Italian local, traditional and certified products. The present study focuses on how different cultivars and singular physical and chemical soil properties influence garlic morphology and some production and chemical parameters.

The study was carried out on four “typical varieties” characterized by peculiar morphological characteristics (Aglione rosso di Castelliri, Aglione bianco Piacentino, Aglione rosso di Sulmona, Aglione rosso di Proceno) grown in two different geographical areas of Lazio (Viterbo and Alvitto), using the same technical/agronomic trail. Production parameters were measured on 90 bulbs of each variety from the two areas; garlic samples were analyzed for proteins, Vit. C, total polyphenols and FRAP.

Results - All samples grown in Viterbo showed on average: smaller bulbs (33-39 g), fewer cloves (10), more uniform size and more organized arrangement, a less yield; cloves from Alvitto commonly showed: larger bulbs (34-42 g), more numerous cloves (12) in a more random arrangement and more variable size.

The protein content showed a small variability between samples with a mean value of 8.4%. Regarding the vit. C content were not found significant differences between the four varieties and the two geographical areas, with a range from 10 to 13mg/100g. Total polyphenol content ranged from 0.12 to 0.21 mg/100g and the varieties Rosso di Sulmona and Rosso di Proceno showed the extreme values according to the area of production. Alvitto bulbs presented an antioxidant activity (FRAP) greater than those from Viterbo.

Keywords: Garlic, cultivar, soil, morphology, chemical parameters

New food ingredients for a sustainable and healthy diet: the case of apple pomace

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Rationale and objective: A huge amount of apple “pomace” consisting of skins, seeds and stalks is produced every year from industrial processing worldwide. The recovery and re-use of these by-products in the food chain could increase sustainability of apple industry and contribute to a better nutrition. Indeed apple pomace contains valuable phytochemicals and fibers. The nutritional value of apple pomace is especially linked to its high content of phloridzin. This phenolic compound is known to inhibit competitively the Na⁺/glucose co-transporter and is recognized as an anti-diabetic agent. The aims of this study were: to 1) to summarize the state of art of apple pomace potential food uses, and 2) to present novel results on the stability of phytochemicals in dried apple pomace.

Materials and methods: For the experimental study, apple pomace and control apple pulp were dehydrated at different moisture levels. Major components were analyzed by AOAC procedures. Phytochemicals were analyzed by HPLC. Antioxidant and antiglycation properties were determined by spectroscopic and fluorescence techniques. Moisture properties were studied by ¹H NMR. Storage was carried out at 30 °C for 9 months and kinetic models for phytochemical degradation were developed.

Results and conclusions: Phytochemical contents were more than one order of magnitude higher in the pomace than in the pulp of apple. These compounds showed long-term stability in the dried apple pomace, which was related to moisture properties.

The distinctive composition, properties and stability of dried apple pomace support its exploitation on industrial scale for new product development. Some uses of apple pomace as a food ingredient have resulted successful in terms of consumers' liking, whereas apple pomace benefits in terms of health improvement still remain to be validated.

S1.P20

Nutrients and bioactive compounds of indigenous fruits at a conservative area in Kanchanaburi Province, Thailand

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Rationale: The project on conservation and utilisation of indigenous foods has been conducted since 2008 by a multidisciplinary research team to support local communities for nutrition well-being. It is under the umbrella of Plant Genetic Conservation Project initiated by Her Royal Highness Princess Maha Chakri Sirindhorn.

Objectives: The objective of this study is to survey food biodiversity and identify potential food sources gathering at conservative area near Wang Khamen Mountain, Kanchanaburi province, Thailand.

Materials and Methods: Three kinds of indigenous fruits were collected at different times and identified by botanist, then prepared as fresh. They were analysed for nutrients and bioactive compounds by standard methods. Antioxidant activities were evaluated using oxygen radical antioxidant capacity (ORAC) assay.

Results: Among three kinds of fruits, *Phyllanthus emblica* L. (Ma-Kham-Pom, n=3) contained the highest amounts of vitamin C (1058-1074 mg/100g), phytosterol (13-21 mg/100g) and polyphenol (2173-4304 mGAE/100g). High level of protein (1.6-1.9 g/100g), dietary fibre (16.2-21.8 g/100g), and calcium (368-590 mg/100g) were found in fruits of *Antidesma velutinsum* Blume (Ma-Mao, n=4). While fruits of *Spondias pinnata* (L.f.) Kurz (Ma-Kok-Pa or wild olive, n=3) also had high amount of polyphenol (3286-3948 mGAE/100g). The antioxidant activities, by ORAC, showed high potential for health benefit in *Phyllanthus emblica* L. (204-539 umolTE/g) followed by *Spondias pinnata* (L.f.) Kurz (207-272 umolTE/g).

Conclusion: This study generated new nutritional data of indigenous fruits which can be used to promote for local consumption. It also useful for further process of conservation and utilisation of indigenous plant. These data will also be compiled into a Thai food composition database.

Keywords: indigenous fruit; nutrient; bioactive compound; antioxidant activity

Phytochemicals and antioxidant activities of indigenous plants in Kanchanaburi province, Thailand

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Rationale: Fruits and vegetables have been worldwide promoting for consumption because of their phytochemicals which play roles as antioxidants for prevention of chronic diseases. Thailand is a country of great biodiversity; however, there is limited information on indigenous plants consumed by local people.

Materials & Methods: This study aimed to determine some phytochemicals and antioxidant activities in three indigenous vegetables, including *Kaempferia roscoeana* (KR), *Melientha suavis* Pierre (MS) and *Millettia brandisiana* Kurz (MB). Plants, naturally grown in the forest area of Kanchanaburi province, were collected at different time. Raw edible parts (KR leaves, MS and MB young shoots and leaves) were analyzed for flavonoids, phenolic acids and carotenoids using HPLC. Total phenolics (TP) were measured by the Folin-Ciocalteu method. Antioxidant activities were evaluated using three different approaches, including ferric reducing antioxidant power (FRAP), 1,1-diphenyl-2-picrylhydrazyl (DPPH) and oxygen radical antioxidant capacity (ORAC) assays. Phytochemical contents were expressed per 100 g wet weight.

Results: The compounds and content of flavonoids identified in MS were 169, 4 and 3 mg of quercetin, kaempferol and isorhamnetin, respectively. KR also contained the same compounds but less amount compared to MS. MB contained 50 and 13 mg of quercetin and kaempferol, respectively. Among three samples, MS had the highest level of total carotenoids, lutein and β -carotene (8636, 5987 and 2353 μ g, respectively). TP content of MB (636 mgGAE) was 1.7 and 5.6 times of that of MS and KR, respectively. A similar trend of the antioxidant activities by three methods of those three samples was observed. MB showed the highest activities, followed by MS and KR, respectively.

Conclusions: In summary, these indigenous plants are potential plants that should be conserved and promoted for regular consumption.

Keywords: phytochemicals, antioxidant activity, indigenous plant

S1.P22

Effect of *Aspergillus flavus* Contamination on the chemical composition of Pistachio (*Pistacia vera*)

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Three cultivars of pistachio nuts (Ahmari numai, Akbari and Dawoda) were inoculated with *Aspergillus flavus* strain isolated from peanuts using serial dilution and malt extract agar culturing techniques. The three cultivars were analysed for aflatoxin content (B1, B2, G1, G2) by HPLC method, proximate composition using AOAC methods and mineral elements by atomic absorption spectrophotometer before inoculation (control samples) and after inoculation (experimental samples). Oil was extracted with hexane/isopropanol (3:2, v/v) and fatty acids were extracted as methyl esters and analysed with capillary column gas liquid chromatography.

Results showed that the aflatoxin content of inoculated samples were higher than the control. Data on chemical composition showed that moisture, and NFE were increased while crude protein, crude fat, ash, crude fiber, were significantly decreased ($p < 0.05$) in the inoculated samples. Most of the mineral elements (Pb, Se, Cu, Mn, and K) showed a decrease while Cd, Ca, Mg, Cr, Fe, Zn, Se, Na and P increased due to inoculation. Among fatty acids, palmitic acid, stearic acid and linolenic acid increased and oleic acid and linoleic acid decreased due to inoculation. Significant correlations were observed between the four Aflatoxins and various nutrients.

Keywords: *Aspergillus flavus*, Aflatoxins, chemical composition, mineral composition, fatty acids composition

Effect of harpin on some quality criteria of pepper cvs. 'Demre' and 'Sari Sivri'**Bulent Akbudak, Nuray Akbudak***University of Uludag, Bursa, Turkey*

Rationale and objectives: Activators of induced plant responses have potential for use in promoting growth and stimulate fruit quality of agricultural crops, but studies are needed to evaluate their effectiveness and their impact on the fruit. This study was undertaken to determine effects of harpin on induction of storage and fruit quality of two cultivars of pepper (*Capsicum annum* L. cvs. 'Demre' and 'Sari Sivri'). **Materials and methods:** Peppers grown in greenhouse were applied with two treatments consisting of harpin and control. Harpin was applied 3 times to foliage, 50 g/100 L (3% a.i.) in water in the greenhouse. Peppers used in the study were stored in the cold room at 7 °C and 90±5% relative humidity. Changes in the quality parameters (weight loss, total soluble solids, ascorbic acid, colour (L, a, b) and total chlorophyll) were observed during the storage period at 10 day-intervals. **Results and Discussion:** Harpin treatments proved effective with regard to delaying the maturity and fruit quality during storage. The reductions of ascorbic acid proceeded faster control fruits and significant L (brightness) value losses occurred in the control pepper compared with the harpin treated. Harpin delayed maturation and reduced weight loss. Harpin slowed down the changes leading to quality loss in fruits for, 30 days of storage. This study will provide practical information about the most appropriate time to storage the pepper cvs. 'Demre' and 'Sari Sivri' following plant activator treatments.

Keywords: *Capsicum annum*; Harpin; Quality; Storage

SESSION 2 –

Challenges for trade including labelling, health claims

S2.P1

Analysis of Total Individual Polyphenols (TIP) for labelling functional content of commercial antioxidant fruit juices with health claims

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Polyphenols are present in processed fruits and vegetables. Nowadays there is a growing interest in the commercialization of antioxidant fruit juices rich in polyphenols, which may have beneficial effects on consumers' health. Health benefits of these compounds are well documented, being dependent on the type and content of polyphenols. Main polyphenol groups present in fruit juices are phenolic acids (hydroxybenzoic and hydroxycinnamic acids) and flavonoids (anthocyanins, dihydrochalcones, flavonols, flavanols and flavanones). Analyses of Total Polyphenols content (TP) are usually accomplished by simple colorimetric methods (e.g. Folin-Ciocalteu), but they suffer from low specificity and offer a limited information. Thus, polyphenols compositional characterizations of foods are normally done by HPLC analyses.

This work presents a simple, improved, fast and reliable HPLC method able to measure the Total Individual Polyphenols content (TIP) present in foods without sample hydrolysis. HPLC method uses a high-resolution column, and simultaneous UV-Visible and fluorescence detection for identification and quantification of polyphenols. Chromatogram times were 28 minutes. TIP was calculated as the sum of individual polyphenol content of each polyphenol group, quantifying with a standard compound for each group. Analysis method was applied with commercial antioxidant fruit juices of strawberry, red raspberry, blackberry, blueberry, European cranberry, blackcurrant, sour cherry, and red grape. Analysis method measured TIP and allowed building an unambiguous compositional polyphenols database for these juices. The proposed HPLC method is of special interest to juice industry because it is useful to verify authenticity of fruit and vegetable juices and to quantify polyphenols composition in juices. This information should be used in juices labelling to increase consumer awareness of potential healthy components. Individual polyphenols determination by a standard HPLC method should be encouraged to evaluate the quality of juice products.

Keywords: Polyphenols determination, Total Individual Polyphenol (TIP), fruit juice composition, fruit juices authentication, juices labelling.

S2.P2

Laboratory performance study: analysis of mandatory nutrients and preparation of nutrition labelling

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Rationale: This study was conducted to assess the performance of laboratories in Thailand on analysis of mandatory nutrients and preparation of Nutrition Information based on the Thai Food and Drug Administration (Thai FDA) regulations.

Materials and Methods: Whole wheat cracker and cracker powder were used as test materials. Number of participating laboratories varied from 15 to 17, depending on their routine facilities. Assigned values of nutrients in each material, as robust mean and robust standard deviation, were estimated according to ISO 13528. Laboratory analytical performance was statistically evaluated using z-score. Laboratories with satisfactory, questionable and unsatisfactory results for each nutrient were identified based on robust z-score.

Results: As percentage of total number of participating laboratories, the satisfactory results ($|z\text{-score}| < 2$), were found on total lipid (82%), saturated fat (80%), protein (85%), Na (82%), Ca (62%), Fe (81%), ash (70%) and moisture (82%). The main discrepancies of the submitted results were found on dietary fibre, sugars, vitamin B1 and B2. Repeated analyses of the nutrients were conducted after a technical meeting. At the end, reference values of most nutrients in broad bean powder - total lipid, saturated fat, protein, dietary fibre, sugars, Na, Ca, Fe, vitamin B1, ash and moisture – were developed from good performance laboratories. The test material could then be used as reference material for the nutrients analyses. For the preparation of nutrition information, the common non-complying performance, based on the Thai FDA regulation, included declaration of nutrition format, uncorrected calculation and declared information on nutrient per serving and percent Thai RDI.

Conclusions: The findings strongly support a requirement of a training programme for responsible laboratories, to improve the quality and reliability of the nutrition information on food labels.

Keywords: Nutrition Labeling, Laboratory Performance, Mandatory Nutrient

Consumer inquiries on nutritional labeling and food advertising in Costa Rica

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Rationale: Changes in lifestyle and epidemiological profile of the population, as well as technological progress and free trade agreements lead to an increased supply in prepackaged foods and ready to eat meals. Food products highlight nutritional and health benefits. Food labels, printed materials and media advertising are used to promote and disseminate these claims.

Objective: To present the results of queries on nutritional labeling and food advertising received by an interagency and interdisciplinary commission.

Methods: A standardized procedure was developed by a Costa Rican governmental commission to evaluate the queries. Compliance of national legislation was used as criteria for evaluation. Seven variables were analyzed and reported for their frequency. Processed foods were classified into fifteen categories based on criteria established by international programs.

Results: Thirty-five consultations were attended between 2004-2010 in foods processed by national (68%) and multinational (32%) industries. 73% of them were related with labeling and 22% on advertising. Main categories were snacks (33%) and soft drinks (13%). The nutritional components evaluated were energy (41%), sugars (14%), fats (10%) and cholesterol (10%). Corrective measures were achieved by: voluntary compliance (26%), attendance by regulation offices (16%), improvement of national regulation (11%) and market food recall (9%). Errors found in nutritional labeling may significantly affect the health of specific population groups, such as those with diabetes mellitus and cardiovascular diseases. **Conclusions:** Critical control nutrients appeared as the main issue according to the WHO global strategy on diet, physical activity and health. The commission aided to improve the quality of the information, of national legislation and protect consumer health.

Keywords: nutritional labeling, food advertising, processed foods, healthy eating, Costa Rica

Changes occurred in food consumption and dietary patterns in Spain by using the Food Consumption Survey

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Introduction: The Spanish Ministry of Environment, Rural and Marine Affairs (MARM)'s Food Consumption Panel represents the most reliable source to evaluate the food consumption patterns in Spain. The aim of this study was to assess population food availability per capita per day, which allows the calculation of energy and nutrient intake and comparison with the Recommended Nutrient Intakes for the Spanish population. In addition, different markers of the quality of the diet have been evaluated.

Objectives: The aim of this study was to assess population food availability per capita per day (pc/d) and to evaluate dietary intake and the changes occurred recently.

Methods/Design: The sample consists of consumption and distribution data, obtained from the "Food Consumption Panel" between 2000 and 2008. The study was carried out in households (n=8000), catering trade (n=1500) and institutions (n=300). The data allow us to calculate the quality of the diet. The present study corresponded to men and women aged 20-40 years old.

Results: the average menu was made up by milk and derivatives (349 pc/d), vegetables and greens (327 pc/d), fruit (305 pc/d), cereals and derivatives (218 pc/d), meat and meat products (179 pc/d), fish & shellfish (103 pc/d), oils and fat (47,2 pc/d) and eggs (31,1 pc/d). There was also a high consumption of non-alcoholic beverages (446 pc/d) and alcoholic beverages (247 pc/d). In consequence, milk and derivatives, eggs, fish, meats and derivatives and oils, sweets and charcuterie consumption was higher than recommendations, whereas cereals and derivatives, vegetables and greens, including potatoes, and legumes consumption was below the recommendations. The mean energy intake for adult population at present is 2754 kcal/d and the energy profile shows no variations in the last ten years: proteins, 14%; lipids, 40%; carbohydrates, 42%; alcohol, 4%. Dietary fat, however, shows an adequate proportion of monounsaturated fatty acids but lack of sufficient omega-3. In addition, folates and zinc intakes seems to be insufficient.

Conclusions: Food consumption patterns in Spain has been almost constant in recent years, but have markedly changed in the last 50 years, differing at present from the traditional and healthy Mediterranean Diet.

**Microbial safety, quality and nutritional status
of minimally processed turnip and carrot**

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Sanitizing efficacy of malic acid and ozone on artificially inoculated turnip (*Daucus carota*) and carrot (*Brassica rapa*) was determined against *Salmonella typhimurium*. Malic acid and ozone alone reduced the pathogen populations less than 1.5 log in carrot and 2 log in turnip following complete immersion and spraying. Whereas, combination of both the sanitizers reduced pathogen populations significantly ($P < 0.05$) by 2.5 log in carrot and 3.2 log in turnip. Following treatment, antioxidant status of sprouts in terms of free radical scavenging activity against DPPH and ABTS did not change significantly ($P > 0.05$); whereas, polyphenols, flavonoids and reducing power remained unchanged following the treatment. Both the fresh produce samples were sensorially acceptable. Results of our study suggest a commercially applicable intervention strategy for the control of *Salmonella typhimurium* in turnip and carrot which are preferably eaten as raw.

Keywords: Antioxidants, organic acid, nutrition, survival, *Salmonella*

SESSION 3 –

Food composition related policies, standards

S3.P1

Analytical survey of seafood consumed in the UK

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Rationale and objective: An analytical survey to determine the composition of various fish, fish products and seafood consumed in the UK was carried out to update UK food composition data. The survey was designed to reflect the wider range of fish now consumed in the UK, changes in production and cooking methods, nutritional interest in both long-chain fatty acids and vitamin D, and the need for robust data to support nutrition and health research. **Materials and Methods:** 56 samples were collected between December 2010 and February 2011. Samples were prioritised according to current or increasing market share and adequacy of existing data. 18 different species of natural fish and seafood including white fish, oily fish, molluscs and crustaceans were sampled from supermarkets, independent retailers and wholesalers. Sample collection included fresh, frozen and chilled products and for most species, samples were analysed both raw and cooked. Processed fish and fish products including frozen fish products, tinned fish, and smoked fish were also sampled. Composite samples, consisting of between 4 and 15 sub-samples were analysed for a range of nutrients, including macronutrients, individual fatty acids, inorganics, water soluble vitamins and fat soluble vitamins, including vitamin D₃ and 25-hydroxy vitamin D₃. **Results and conclusions:** Results have been incorporated into the Department of Health's nutrient databanks, which support the UK National Diet and Nutrition Survey (NDNS). Results will also be included in future publications and updates of McCance and Widdowson's The Composition of Foods series.

Cooking yield and nutrient retention values for South African lamb and mutton

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Rationale. With the influences of breed, harvesting, slaughtering and storage conditions, animal composition, production and processing methods including cooking methods (which all may affect both weight and nutrients), it is important to determine country-specific yield and retention values. Currently, yield and retention values used in South Africa are borrowed from the USA. Therefore, South Africa is undertaking activities relating to the compilation of its own food composition data.

Objective. To generate South Africa's own cooking yield and nutrient retention values for lamb and mutton.

Materials and Methods. Dorper and Merino lamb and mutton carcasses, representing three main production areas in South Africa were used. The shoulder, loin and leg cuts were used to determine the cooked nutrient composition. Using GenStat for Windows, 2000, the significance of all variables measured for each sample was tested by means of factorial analysis of variance, which tested the main effect of the nutrients, cuts, breed and cooking method as well as the nutrient-by-cut-by-breed-by-cooking method interactions, at the 5% level.

Results. Shoulder and leg cuts cooked according to a moist heat cooking method tended to have a higher cooking yields and nutrient retention than the loin which was cooked with a dry heat cooking method. Mutton loin and shoulder cuts had higher cooking yields and nutrient retention in comparison with the leg.

Conclusions. Reasons could be attributed to the cooking method and the fat distribution due to the growth phase and body composition of the animals. It is known that the core (approximately at the loin and thick rib) of the carcass is the part that matures last, thus explaining the lower amounts of subcutaneous fat in the thick rib and hence the lower cooking yield. Dorper breeds mature earlier than Merino breeds, explaining their differences in the cooking yield.

Keywords: Yield and retention values, South African lamb, mutton, cuts.

S3.P3

Evaluation of Nutrition Education Program for Prevention of Type II diabetes among Egyptian Children & Adolescents

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Objectives: To raise the awareness of the students to the importance of protective role of healthy nutrition and lifestyle for prevention of T2DM and its' sequelae and to evaluate their nutrition knowledge, anthropometric and laboratory results pre and post to Nutrition Education Program (NEP).

Design: 324 students (118 males and 206 females) were selected and representative of twenty eight (preparatory and secondary) schools in urban (143 adolescents) and rural (181 adolescents) areas. They were subjected to nutrition education process that was deliver nutrition education through a series of lessons and activities to the students. The process was continued for three months and conducted in three stages: Pre-program evaluation, N E P implementation and Post-program evaluation. The studied adolescents were subjected to clinical, anthropometric and laboratory assessments in the pre and post program period. The program consists of two modules that covered topics related to basics of nutrition and diabetes mellitus.

Results: This study revealed an impressive gain in knowledge among participants following the NEP implementation. The program has not successfully changed obesity and overweight percentages, however. A dramatic improvement in fasting blood glucose (FBG) level was elicited after the NEP as 16 out of 21 (76.0%) of the diabetics and 61 out of 104 (58.7%) of the pre-diabetics had normal FBG in the post evaluation phase. Lipid profile didn't change significantly but 17.0% of participants had an increase in their high density lipoproteins (HDL-c) level in the post evaluation phase to be re-categorized in the acceptable range.

Conclusion: The results of this study suggest that patients who are at risk for T2DM should be screened early and treated aggressively to prevent the onset of the T2DM whenever possible. The short-term changes observed in the present study are markedly encouraging and indicate great potential for progressive improvement.

**Is there a relation between the nutritional adequacy of diets
and their greenhouse gas emissions?**

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The aim of this study was to compare the greenhouse gas emissions (GHGE) of self-selected diets, depending on their level of nutritional adequacy. Food consumption data from 1918 adults participating in the national INCA2 survey was used to identify 4 groups of eaters for each gender, based on the nutritional adequacy of their diets. Adequate eaters were defined as those having a diet complying with three nutritional objectives: a Mean Adequacy Ratio (MAR, mean of % recommended intakes for 20 essential nutrients) above the median; a Mean Excess Ratio (MER, mean of % maximal recommended values for sodium, SFA and free sugars) below the median; an Energy Density (ED, in kcal/100g of solid food intakes) below the median. Intermediate+, Intermediate- and Inadequate diets were defined as those fulfilling 2, 1 or 0 nutritional objectives, respectively. Daily dietary GHGE was estimated for each individual, based on the GHGE (in CO₂-eq/100g edible weight) of 74 highly consumed foods, representative of their food category. Adequate eaters had both the lowest energy intake and the highest food intake. In adequate diets, the energy contribution from plant-based foods (which have lower GHGE than animal products, on a per weight basis) was higher than in inadequate diets (49% vs 32% of total energy intake, respectively). Dietary GHGE did not differ between the 4 groups of men (p=0.16). Among women, the adequate eaters had the highest GHGE (p=0.005). However, whatever the gender, adequate diets presented the lowest GHGE when adjustments were made on daily quantities consumed and the highest GHGE when adjustments were made on daily energy intakes. In conclusion, the relation between the nutritional adequacy of self-selected diets and their greenhouse gas emissions seems to be weak. This is due to the fact that nutritionally adequate diets contain high amounts of foods with low GHG emission.

S3.P5

Predicted contribution of folic acid voluntary fortification in Spain to children's dietary intakes, as assessed with new food folate composition data

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Rationale and objective. The Spanish market offers a significant number of folic acid (FA) voluntarily fortified products. In previous work, we developed an inventory of commercialized FA fortified foods. Adding vitamin overages seems to be a common practice, as we observed in ready-to-eat breakfast cereals (RTEC) and dairy products, when analyzed total folate (TF) was compared to declared values. We aim to further analyze FA fortified products and assess their contribution to FA potential intake in a vulnerable population group.

Methods. Products were analyzed by trienzyme extraction followed by affinity chromatography, described by Bagley and Selhub and Poó-Prieto. FA and 5-methyltetrahydrofolate (5-MTHF), the main natural folate vitamer, were quantified by HPLC with fluorescence and UV detection. Children food consumption data was obtained from the enKid Study. FA and 5-MTHF data was used to calculate theoretical intakes, then assessed by comparing intakes to their age-specific folate intake recommendations (RDI).

Results. A total of 113 FA fortified products were analyzed. Different scenarios indicated that, on average, all fortification levels provided more than 10-fold FA than 5-MTHF. For RTEC, low and high level of fortification provided 1,8-6,2% and 6,1-21,4% of RDI, respectively. High level fortification provided $\leq 31,6\%$ of ULs at higher level of consumption (P90). Low level fortification milk provided 29,6-94,7% of RDI at P50, and at higher level reached 39,8-106% of UL. Highest level of FA intake was found at P90 for 2-5 y boys and girls. High level fortification yogurt provided 25,2-80,9% of RDI and only children of 2-5 y at P90 exceed 100% ULs.

Conclusion. Our results suggest that while some age groups could achieve optimal intakes through current FA fortification levels, younger children at higher consumption levels could be exposed to excessive FA intakes. This underlines the importance of adequate target group identification.

Keywords: folic acid, voluntary fortification, children, trienzyme extraction, HPLC.

**The Pan-American Health Organization (PAHO) Initiative on
“Cardiovascular disease prevention through dietary salt reduction”**

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Cardiovascular diseases (CVD) are the main cause of premature death in the Pan-American region and globally. Hypertension is the most important risk factor for CVD and salt intake is the major cause. Because there is an urgent need for action regarding the dangers of high dietary salt, PAHO has convened a group of scientific and technical experts to strengthen capacity in the region for the implementation of population wide salt reduction policies. The Regional Expert Group (EG) has a two year mandate. The objective of this presentation is to provide advances of the “CVD prevention through dietary salt reduction” Initiative. The EG has prepared the Policy Statement that provides countries with a roadmap for concerted action by governments, NGO and the food industry. Other products are: a review of methods to determine the main sources of salt in the diet, a protocol for population level sodium determination in 24 hour urine samples, a position on the use of spot urine for monitoring, a questionnaire of industry reformulation practices to learn about their effort to reduce salt in packaged foods, recommendations for policies on salt fortification, facts sheets and meetings to aid collaboration with iodine supplementation programs; all of them available at <http://new.paho.org/>. A meeting with the public health authorities and representatives of the food industry to convene a declaration for salt reduction in food products manufactured by the food industry recently occurred, and a research on knowledge, attitudes and behaviours on salt consumption is being analyzed. After completing the commitment in September 2011, the proposed plans and goals are expected to have been achieved. Subsequent activities will focus on aiding countries initiate dietary salt reduction programs, which includes sodium content evaluation and monitoring in food products.

Keywords: salt, sodium, cardiovascular diseases (CVD), hypertension, PAHO Initiative

Nutritional analysis and characterisation of some popular weight-loss diets in France

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Objectives: In a context characterised by a sharp increase in dietary weight-loss practices related to the increasing prevalence of overweight and obesity in the population, the French Food Safety Agency was asked to assess the risks related to these practices. One of the objectives of this study was to estimate the nutrient intakes of weight-loss diets (WLDs) which are popular in France.

Methods: 15 WLDs were selected on the basis of their apparent popularity, i.e. those most frequently mentioned on the Internet or promoted in best-selling books in stores or on the Internet. The book for each diet was consulted to determine the dietary recommendations for each of the diet's phases. These recommendations were recorded and combined with French nutritional composition data to calculate energy, macro and micronutrient intakes.

Result(s): A typology of diet phases was proposed based on their total energy intake and contribution of proteins, lipids and carbohydrates to energy intake. Protein intake was found to be higher than the French population reference intakes (PRI) for more than 80% of the diet phases examined. 74% of the diet phases result in fibre intakes lower than the French PRI, and some were almost ten times lower. The estimated average calcium requirement for adults was not met by 23% of the diet phases. In contrast, two of the diet phases studied had calcium intakes that were twice the French PRI. Sodium intakes were higher than the limit recommended by the WHO for 58% of the diet phases, and in one case was twice this recommended level.

Conclusion: This original work highlights the inadequate nutritional intakes of certain phases of WLDs when compared with recommended intakes, in particular concerning protein, dietary fibre, calcium and sodium.

Keywords: food composition, nutrient intakes, weight-loss diet, public health.

Survey on data of sodium in processed and prepared foods of Latin America

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Rationale and objective: Current and high-quality data on the sodium content of foods is critical to estimate the baseline consumption, identify the main food sources and monitor intervention strategies for this micronutrient. The study was a regional survey of the needs and plans of LATINFOODS branches on the sodium content in processed and prepared foods.

Methods: A semi-structured questionnaire with 26 questions on sodium content in processed and prepared foods was emailed in February 2011 to LATINFOODS members and related laboratories from 19 countries. Foods were classified into 14 categories.

Results: 22 forms were completed with a return rate by country of 75%. The profile of the respondents was: academic (59%) and from governmental institutions (36%); food composition data (FCD) generators and compilers (52%); LATINFOODS members (68%) and the remaining (32%) were interested in participating in the network. 68% had some information on sodium content in all food categories, mainly in breads, cereals and snacks. Data was generated mostly in the last two decades, and some had recent data. The purposes for FDC generation and compilation are FC tables and databases, research and laboratory services. The reported analytical methodologies for sodium were AOAC (82%) and none have this assay accredited. 100% of participants need updated data on sodium content for all food categories. At least 57% of generators are interested in training in sample size estimation, preparation and sodium analysis. Convenience foods, snacks and cereals were identified as priority foods for sodium content estimation. The majority (73%) require funds to purchase reference materials, laboratory supplies and samples. 100% indicated support for the PAHO Initiative on „Prevention of cardiovascular diseases in the Americas by reducing dietary salt consumption „ and other regional and local health plans /programs.

Conclusions: There is strong interest in those surveyed to assess the sodium content of foods and working with PAHO programs to reduce dietary salt. Up to date information on the sodium content of food is needed in the region, as well as resources and training to obtain this data.

S3.P9

Effect of different maize meal diets on growth and vitamin A

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Background: South Africa embarked on mandatory vitamin and mineral fortification of wheat flour and maize meal in 2003 as part of a multi-faceted approach to alleviate malnutrition. However it was reported in 2008 that vitamin A deficiency increased despite the mandatory fortification programme. This motivates the current study.

Objective: In this study the relative efficacy of the daily consumption of fortified white maize meal in sustaining or improving vitamin A status was evaluated in a chicken model.

Materials and Methods: A total of 900 broilers were randomly allocated to 30 pens, each containing 30 birds. Five different maize meal diets containing different fortification levels were administered. Fortified white maize meal (three brands) was purchased at retail outlets. Feed grade yellow maize meal with and without Vitamin A were administered as control diets. Feed samples were taken weekly and vitamin A was determined in duplicate. Growth and vitamin A status of the chickens were evaluated using the body weight, feed conversion ration (FCR) and liver retinol levels of the chickens over a six week period.

Results: Yellow maize meal with normal vitamin A supplementation (optimised poultry diet) produced the highest weight gain and high cumulative feed intake. Although the chickens on the diets with fortified white maize meal have a lower body weight than birds on the optimised poultry diet, the body weight was still significantly higher than for the low vitamin A diets. There was no significant difference in vitamin A levels in the livers of birds on the fortified white maize meal and the poultry diet. Results from the study show that vitamin A from fortified white maize meal can contribute as much vitamin A to the diet as vitamin A in the optimised in poultry diet.

Conclusion: The chickens performed optimally in growth and showed good vitamin A status in the liver when consuming vitamin A fortified white maize meal.

Keywords: Vitamin A, Maize meal, fortification, deficiency, FCR

Portuguese Food Information Resource – sharing of food data, information and knowledge

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PortFIR (Portuguese Food Information Resource) is a program for the implementation of national networks of knowledge and data sharing in the areas of nutrition and food safety, and might be considered a spin-off of EuroFIR. The main aims of PortFIR are to promote synergy among the different actors in these fields in order to optimize the usage of national resources, and to manage and deliver data and information. Therefore, Port in PortFIR stands for Portal as well. This Portal, currently in its early stages of development, will include sustainable and quality assured food databases on composition, contamination (chemical and microbiological) and consumption and functionalities to electronically transmit and exchange data with international and national organisations, namely EuroFIR and EFSA. The PortFIR program is coordinated by the National Institute of Health (INSA) in a partnership with GS1 Portugal and with the support of governmental and private organizations encompassing health, agriculture and economy sectors. The Portuguese Food Composition Network was the first PortFIR network to be created and started its activity formally in October 2009 with the ultimate purpose of maintaining and updating the national food composition database (FCDB). Since January 2010, four Working Groups – Sampling, Organization and Transfer of Information, Users, Support to Standardization Work - are developing their activity. The network has currently 58 members, representing namely, food industry and distribution, state and private laboratories, universities, and regulators, of which 28 have declared their willingness to share data with the national FCDB. The Portuguese Food Microbiological Information Network, the second network created, was launched formally in October 2010 during the 3rd PortFIR Annual Meeting, and to date more than 80 entities already responded positively to the invitation to participate. The work in progress reveals that PortFIR activities are important to promote the use and quality of food data at national and international level.

Keywords: PortFIR, National Network, Food databases, Food composition, Food Safety

SESSION 4 –

Database Management systems, quality

S4.P1

**Development of a relational database for LATINFOODS:
a tool for food composition data compilation.**

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As a follow-up activity of the FAO TCP/RLA /3107 project, an interdisciplinary team was formed for the development of a food composition data compilation software program and the modeling of a database (DB) in a database server, based on the compilation charts agreed for LATINFOODS. The program allows the classification of foods according to the food groups established by LATINFOODS and for their description using the LanguaL System. INFOODS tag-names for food components are included as well. The program also stores information on nutrient content in specific sheets for each group, where data, statistical values (number of samples, average, standard deviation, maximum, minimum), sample descriptions, sample handling, origin and analytical methods are recorded, allowing for the processing of information from various sources. Electronic forms include field controls in all charts, as well as user levels and licenses to make data handling easier and ensure data safety. The application creates a sheet which displays whether the compiled information complies with the minimum obligatory requirements to be entered into the DB. The DB allows a structure of local, national and regional nodes, where the compiled information is stored until approved by assessing committees. Information may be transferred between nodes. The technology used (Oracle Express and JAVA) complies with open source software requirements. The relational software and database are being tested with a view to using them in all of the LATINFOODS chapters and in the LATINFOODS Regional FCDB. It is an informatics solution that provides a more versatile, economical and accessible way to update and manage information currently displayed in conventional food composition tables.

Keywords: Food composition, data base, compilation, LATINFOODS.

Evaluation of the analytical measurement uncertainty by two methods in food vitamin A and E determination

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Rationale. ISO 17025 prescribes the estimation of the measurement uncertainty and specifies requirements concerning this estimation and how it should be reported. Besides, for a consistent interpretation of an analytical method result it is necessary to evaluate the confidence that can be placed in it. This can be provided by the quantification of its accuracy (trueness and precision) in the form of a measurement uncertainty estimate.

Objective. To compare two approaches to estimate the analytical measurement uncertainty in the HPLC analysis of vitamins A (all-trans-retinol and 13-cis-retinol) and E (alpha-tocopherol) in infant milk powder.

Materials and methods. The normal phase HPLC analytical method was based on EN 12822 e 12823-1. Identification was carried out based on retention time and quantitative determination by external standard method. Analytical measurement uncertainty was laboratory estimated based on method in-house validation data (evaluation of calibration curve parameters, precision, reference material analysis, detection and quantification limits) and laboratory performance results in proficiency tests (BIPEA and FAPAS), for infant milk powder.

Results. Combined relative standard uncertainty obtained from laboratory validation data was 0.22 for vitamin A infant milk powder content of 100-500 µg/100 g, and 0.080 for vitamin E infant milk powder content of 15 mg/100 g. Estimation based on proficiency tests was 0.17 and 0.14, respectively for vitamin A and E.

Conclusions. Results from the analytical measurement uncertainty estimation by the two methods were in good agreement for vitamin A although for vitamin E the result obtained from the intralaboratory data was lower than from the interlaboratory data. According to the obtained results to give a correct impression of accuracy with which these constituent levels can be known in samples similar to the analysed, results should present at maximum two significant figures.

Keywords. Vitamin A, Vitamin E, Uncertainty evaluation, HPLC, Food

S4.P3

Adoption and adaptation for enhancement of a local food and nutrient database

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Background. The BINAT national food and nutrient database, developed and maintained by the Nutrition Department of the Israel Ministry of Health, drives nutrient analyses of the Mabat national health and nutrition surveys. Other end users include dietitians, researchers, risk assessors, and the food industry. In addition, the database is incorporated into several online dietary analysis programs. About one-third of the current BINAT database is adopted „foreign“ data, another third, local foods with nutrient values added through adaptation of data from international databases, with the remaining third being data derived from recipes. With the increasing proportion of imported foods, incorporating source (foreign) data for these foods is time-efficient and cost-effective. Furthermore, limited local resources for food analysis necessitate some reliance on externally supplied data.

Methods: Foreign nutrient databases are periodically reviewed to identify foods imported into Israel, and to identify matches for local foods. Many local ethnic foods are not included or easily identified in foreign databases. The range of foods that can be adopted for matches is limited as: most local manufacture is based on Kosher (ritual dietary) laws, necessitating use of different fats, limited use of milk powder in composite foods, and increased use of soy products. In addition, the sodium content of meat and poultry is influenced by the koshering process, so that „foreign“ values cannot be adopted without adaptation. In Israel, nutrient fortification is not mandatory so the adaptation process may include mathematical de-fortification of flour and other foods, especially in estimating nutrient contents of manufactured items where data must be optimized to estimate flour content.

Conclusion. Despite the disadvantages, currently limited amounts of local data can be augmented by selective adoption and adaptation of data from foreign databases, creating a comprehensive, useful nutrient database.

Keywords: database, nutrients, Israel, data adaptation, optimization

SESSION 5 –

Delivering food composition data via emerging innovative tools

S5.P1

Web analytics on food composition websites

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Rationale and objectives: Measuring visitor statistics is a core activity for any website provider. However, the analytical methods have so far been quite limited, difficult, expensive, or cumbersome. Google Analytics (GA) offers a free tool for measuring and analyzing visitor statistics.

Materials and methods: GA was tested on three food composition websites (Denmark, Finland, and Switzerland) during 1 May – 30 November 2010. There were totally 879 607 visits.

Results and conclusions: All the websites had a considerable number of visitors, which seemed to increase with the maturity of the website. The results also suggested that there were a considerable number of potential unreached users in Denmark and particularly in Switzerland, thus suggesting promotion be increased and search engines be taken into account more during website design. About 15–20% of users visited the website more than nine times and about 20% spent there more than ten minutes on the site. Following traffic from referring websites showed that food composition website gained quite a broad spectrum of visitors and most of them could not be categorized as food or nutrition professionals. Many of the visitors seemed to be oriented towards health and lifestyle, physical exercise, or different diets.

Our experience showed that GA was quite easy to use and gave useful and versatile information that can be used to compare different websites and improve the website design. Finally, we would like to encourage other food composition website providers to utilize either GA or another of the similar tools available

S5.P2

**Implementation of a tool to facilitate compilation of food composition data:
BRASILFOODS reference electronic register**

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Rationale: Tools for compilation of food composition data are essential for managing this kind of information. The main tool used in the Brazilian Food Composition Database – USP (TBCA-USP)/ BRASILFOODS is the compilation form, which has become a reference for all Latin America. However, a tool for simply managing and storing all references used in TBCA-USP and the ones available for compilation was necessary.

Objective: Elaboration of an electronic register to systematize the search for bibliographic references, present the compilation status of this information and generate a history of the registered publications.

Material: The BRASILFOODS reference electronic register for food composition was created using Access® software and it is made of a form where all reference information is registered (complete identification, presented component(s), situation in relation to the compilation (compiled/ available for compilation/ discarded), justification, kind of media and observations).

Result: Once the forms are filled, tables are automatically generated with all available data that can be filtered according to the desired information (kind of nutrient, publication year, discarded or used data in TBCA, among others); then, reports are generated from these filters. Currently, there are 1,560 registered references, from which 215 are included in TBCA-USP, 210 are already compiled and 107 were discarded due to the lack of data, inadequate methods and others. From the rest that is available for compilation, there are 520 articles with proximal composition data, whereas more than half brings incomplete information regarding dietary fiber (81%), moisture (9%), lipids (2%) or ash (8%).

Conclusion: The electronic register of references allows a fast rescue of information, through a consultation with search filters, on compiled and not used data. Also, it allows building the profile of the published information.

Keywords: electronic register; reference; food composition; compilation, BRASILFOODS.

ECooked meat calculator; estimating the food composition of cooked meat based on the composition of the raw product and type of cooking fat

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Rationale and objectives: Due to the growing variety in cooking fat, updating the data of cooked meat in the Dutch Food Composition Database (NEVO) was needed. Due to financial restrictions it was not possible to produce all the data by chemical analyses. An analytical protocol is carried out to identify tendencies in the change in composition of meat during cooking. Analyses included macro nutrients, fatty acid profile, minerals and vitamins. The results are used to develop a calculation tool to estimate the composition of cooked meat.

Material and methods: From the analytical analyses 16 datasets with the composition of both raw and cooked meat were obtained. The data included 12 varieties of meat, 3 types of cooking techniques (pan frying, browning and simmering), and 3 types of cooking fat. These data were used to identify tendencies in the change of food composition during cooking by multivariable regression. The contents of the macro nutrients of the raw meat were included as variables in the multivariable regression. The statistics of the multivariable regression were satisfying and it was concluded that the obtained tendencies estimate the composition of cooked meat well.

Results: A software tool was built in which loss of moisture, loss of fat, uptake of cooking fat, retention of micro nutrients and change in fatty acid composition during cooking is calculated. The tool is linked to the NEVO database. After selecting the raw meat cut and the cooking fat, the composition of the cooked variety is calculated.

Conclusions: The calculator is easy to use, allowing for calculations on raw beef or pork meat with any type of cooking fat. Results based on different types of cooking fat can be produced without extra costs. The calculator gives a good estimate of the composition of cooked meat.

Keywords: meat, food composition, cooking loss, fatty acid profile, nutrient retention factors

**An approach for a standard compilation system.
The Spanish LanguaL based Food Compilation Model**

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One of the main aims of EuroFIR has been and actually is the harmonization of the compilation process. The development of SOPs has supposed an advance in standard methodology to process analytical data, but there is a lack of information about borrowed data which are commonly used in multiple databases across Europe. When compiling food data, compilers choose which calculations and rules to use, and these ones vary from one compiler to another. Based on this, our main objective is to design a food compilation model that follows EuroFIR standards, to improve the quality of the Spanish food composition data and also to propose this model to harmonise the process of food compilation. To complete these tasks, we have used BEDCA food composition data and LanguaL thesaurus and we have identified some common calculations and design several algorithms as LanguaL based agents. Our results are the design of a model that uses LanguaL as the base to classify the compilation rules and calculations and to manage the different stages of the compilation process. We have also done several tests on BEDCA food database, including error and consistency detection and several component calculations. We can identify several future advantages of this model in terms of harmonization and quality management, as we will be able to associate rules and calculations to LanguaL descriptors and export our compilation logic in an understandable model that allows to know how values are compiled and apply this processing to other LanguaL indexed food items. Due to this association between LanguaL description and food composition data, we will be able to detect not only food composition data errors but also imprecision and errors committed when indexing food items, or inconsistency between the indexed food item and its food composition data.

Keywords: Compilation model, LanguaL thesaurus, Harmonization, Algorithm, Food data

Use of EuroFIR eSearch applying different criteria: some suggestions to improve its usability

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Rationale and objective. The EuroFIR eSearch is an innovative online interface developed in the framework of the EuroFIR project which allows the simultaneous search of more than 26 food composition databases from different countries. This work was undertaken within the EuroFIR NEXUS task 3.3 with the aim to improve the eSearch usability.

Method. Researches on simple foods using eSearch.

Results.

- More information on the user interface could facilitate the search structuring a step by step procedure with the inclusion of helps; a more visible warning to persuade the user to select one or more databases before starting search is necessary as the first step of the research process.
- A standard definitions of databases (country, institution, release) is advisable to manage the information as well as a distinction between different types of databases (e.g., original analytical data vs. imputed bibliographic data).
- The exact string option research may be too restrictive to retrieve all the food names that actually meet the search criterion. A suggestion to avoid this inconvenience could be to apply some standards in writing the food names.
- The eSearch offers a wealth of information on the individual datum and compares different databases. However, sometimes one nutrient is expressed in different Units.
- In different databases carbohydrates are expressed in different ways (e.g., CHOT, CHO) that could cause misleading in the interpretation of data. Similar problems can be found for other compounds.
- In some cases the export in excel of nutritional values provides a result not always corresponding to the setting in the original data format. Improving the export to excel module is advisable.

Conclusion. Some refinements to address the above mentioned critical points will make the eSearch more friendly to a wider spectrum of users and stakeholders.

Keywords: eSearch, food composition database, usability test, mode of expression, food names

Developing a nutritional score for foods to tackle the quality specificity of food categories

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The nutrient profile system proposed by the French Food Safety Agency is based on two independent scores, the SAIN and the LIM, estimating the positive and negative aspects of foods, respectively. In this study, we explored the possibility of better taking into account the nutritional specificities of food categories in the SAIN score, originally calculated as the mean % nutrient adequacy for 5 basic nutrients (proteins, fibre, ascorbic acid, calcium, iron) per 100kcal. Food products that contained at least 50g per 100 g of either fruit and vegetables, or fish, or meat and eggs, or dairy products or cereals and starchy roots were allocated to the corresponding food category. For each positive nutrient (more than twenty), we calculated the contribution of each category to the total intake of this nutrient by adults participating in the INCA2 dietary survey. Then, we identified the top-5 nutrients provided by each food category. Two alternative SAIN scores, each based on 5 nutrients only, were then tested. Within each food category, the SAIN1 used all the top-5 nutrients of the corresponding category, and the SAIN2 included the 5 basic nutrients of the original SAIN with a possibility of exchanging one basic nutrient with one category-specific nutrient. The latter was selected among the top-5 of its category based on public health considerations and common-sense of what is nutritionally expected from a given category: folates, vitamin D, niacin, riboflavin, and complex carbohydrates were respectively selected for fruit and vegetables, fish, meat and eggs, dairy products and cereals and starchy roots. The SAIN2 values were always greater than the original SAIN values whereas the SAIN1 values could be lower. These results suggest that an across-the-board scoring system including only some category-specific nutrients (like SAIN2) would perform better than a system only based on category-specific nutrients (like SAIN1). The latter may be too dependent on the a-priori definition of the categories.

PHENOBASE: Polyphenol database, a new tool for research and development

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Phenolic compounds are ubiquitous phytochemicals in foods from plant origin and they constitute one of the most abundant groups of plant secondary metabolites. Polyphenols have been extensively studied in vitro and in animal studies as agents against cardiovascular disease and cancer. However, the effects of polyphenols in humans remain unclear, partly due to the lack of composition tables. This study aims to build a 120 food products database on total and specific polyphenol contents. The selection of each specific phenolic compound (20 aglycones and 5 glycosides) was based on their biological effects reported in literature and the expertise shared in PHENOBASE consortium. Furthermore, the sampling plan was built by crossing data on the most consumed food products and on their total phenolic content (TPC). One hundred and twenty products were analyzed using a global extraction method (developed for this project) and quantification of individual phenolic compounds was performed by HPLC. TPC as well as total procyanidins and anthocyanins were quantified. Products displaying the highest TPC (in mg gallic acid equivalent /100 g of fresh weight, FW) were strawberry (252.1), red cabbage (188.8), grapefruit (160.8), artichoke (115.2) and cherry (114.7) (cocoa and coffee not included). Cocoa powder, unrefined rice, dried black grape, black tea and stewed apples, with 178.9, 21.8, 21.1, 17.3 and 14.1 mg catechin equivalent /100 g of FW, respectively, were the greatest sources of procyanidins. Anthocyanins are mostly found in cherry, red cabbage, radish, and black grape with 64.1, 18.3, 17.3 and 14.2 mg/100g of FW, respectively. All the data will be freely available in the french food composition table named CIQUAL and supported by AFSSA. These results will permit to estimate the French daily polyphenol intakes and to look for relationships between health and phenol intakes. This project was financially supported by ACTIA and AFSSA.

Keywords : database, polyphenols, food products

S5.P8

Using the EuroFIR eSearch platform for design of food frequency questionnaires and quantification of nutrient intake: applications in ophthalmic epidemiology

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Rationale and objective: Age-related macular degeneration (AMD) is the major cause of legal blindness for older adults in Europe. The role of nutritional factors in the prevention of this disease is still inconclusive in part due to difficulties in assessing dietary intake. In this study the EuroFIR eSearch platform was used to adapt and prepare a questionnaire to study the relationship between habitual diet and AMD.

Materials and Methods: The design and construction of the food list and nutrients of interest was based on a literature review. The EuroFIR eSearch platform was used to identify key foods that contain significant amounts of relevant nutrients and bioactive compounds. A questionnaire was designed to assess the dietary intake of the following nutrients: Vitamin A, Beta Carotene, Lutein/zeaxanthin, Lycopene, Vitamin E, Folate, Vitamin C, Zinc, Omega 3 fatty acids, Resveratrol.

Results and conclusions: A food list with more than 90 foods including fish, vegetables and fruits was prepared based on national food composition databases (nFCDB), Phenol-explorer (database on polyphenol content in foods) and EuroFIR e-BASIS (BioActive Substances in Food Plants Information System). Links to nFCDB were obtained through the EuroFIR eSearch platform and values were assigned to food components based on the geographic origin of the food and the value in the corresponding nFCDB.

The EuroFIR eSearch platform is a valuable tool that can be used to design food frequency questionnaires (FFQs) and validate food composition data used for nutrient intake calculation. It is particularly relevant to identification and validation of food composition data for use with customized FFQs.

Keywords: food frequency questionnaires, diet, eSearch, nutrients

SESSION 6 –

Current activities on food composition at national and regional levels

S6.P1

Nutrient composition of pork – updated data for the Czech Database of Food Composition

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Rationale and objectives: The aim of this work was to update data on nutrient composition of pork in the newly compiled Czech Database of Food Composition. The previously published Czech data were mostly acquired in the 1970-80's. The present consumer prefers leaner meat cuts, which is respected by the market.

Materials and methods: Pork cuts – shoulder, blade shoulder, loin, leg, belly, cured blade shoulder (3 sources of each) – were purchased from several retail chains. Composite samples of raw pork cuts with removed separable fat were formed for each cut by combining three equal-weight subsamples from different sources. Separable fat removed from raw samples was used for composite sample of fat. Cooked samples were roasted or boiled with fat; separable fat was removed only after cooking. Water, ash, proteins, amino acids, fat, cholesterol, fatty acids, vitamins A, E, B1, B2, B6, niacin, pantothenic acid, Ca, Fe, K, Mg, Na, P and Zn were analyzed. The contents of saccharides, polyols, fibre, -carotene, vitamin C and alcohol were assumed a null value.

Results: Nutritional values of raw and cooked pork cuts and raw separable fat were determined. Nutritional values of pork intended for industrial processing, and for respective kinds of raw pork cuts with various proportions of separable fat currently offered to the consumer, were calculated considering the contributing constituents. The results were documented according to the EuroFIR standardized methodology for full value documentation compatible with the e-Search system. **Conclusion:** The data on the composition of selected kinds of raw and cooked pork were updated. Compared with older Czech data, significantly lower fat and energy contents were found.

Funding acknowledgment: This work was supported by the Czech Ministry of Agriculture.

S6.P2

Development of a database containing validated scientific information on Plant Food Supplement bioactive compounds, with putative health benefits and toxic effects, and contaminants and residues.

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Objective: The use of plants and plants derivatives to maintain health has been the popular choice throughout Europe for many centuries. The consumption of teas, digestive drinks, juices, elixirs and extracts prepared from botanicals and used for health maintenance purposes has become part of European cultural heritage. Plant food supplements (PFS) are a modern-day extension of this process. PlantLIBRA (PLANT food supplements: Levels of Intake, Benefit and Risk Assessment) is a project co-financed in the 7th EU Framework Program, within this project a core deliverable is the development of a comprehensive and searchable database containing up-to-date coherent and validated scientific information on PFS bioactive compounds, with putative health benefits and toxic effects, and contaminants and residues.

Methods: The PlantLIBRA database system will be based on the existing EuroFIR/Nortox eBASIS database and MoniQA systems, further developed and extended, using defined quality assurance systems from peer-reviewed published literature, to include plants, botanicals and botanical preparations used for food supplements, together with additional compound classes and individual compounds. **Results:** Within the database naturally-occurring bioactives and contaminants will be included as follows: a) Compositional data: b) Bioeffects data; both beneficial and toxic: c) Bibliographic information: d) PFS information: e) Plant information. **Conclusions:** A sustainable, reliable, flexible and fit-for-purpose internet-deployed database on Plant Food Supplements is being produced. Ultimately, the database will provide a unique comprehensive resource on PFS for researchers, health professionals, health educators, the food industry and policy makers. The authors acknowledge the assistance of all members of PlantLIBRA Workpackage 6. The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 245199. . It has been carried out within the PlantLIBRA project (website: www.plantlibra.eu). This report does not necessarily reflect the Commission views or its future policy on these areas.

Keywords: Plant Food Supplements, database, bioactive compounds

Food Composition Table of Nepalese Diets: An Initiative Towards the Food Database

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Different crop varieties have statistically different nutrient contents hence acquiring nutrient data on existing diversified foods is a prerequisite for decision making process in nutrition planning. However, the data on the nutritional make up of Nepalese foods are scanty. Due to the lack of professional attention to food database, large gaps exist in our knowledge of the composition and the dietary contribution of these foods to human nutrition. Thus the main objective of this work was to develop the food composition data table for commonly consumed Nepalese foods.

Department of Food Technology and Quality Control for the first time developed the nutritional composition table of wide varieties of the Nepalese food. Food samples were randomly collected from different parts of the country. Samples were selected based on the local food habit and consumption practices. Collected samples were analyzed at National Nutritional Laboratory for their proximate and nutrients content following the standard methods of analysis. Triplicate analysis was done, average value was taken to develop the Food Composition Table. Altogether 120 foods, including different groups of foods like cereal, legumes, starchy foods, tubers, green leafy vegetables, processed food products, including the wild and marginalized crops, were included in this study. Information in the food composition table includes: moisture, fat, protein, ash, dietary fiber, carbohydrate, minerals (Ca, P, Fe Mn) and vitamins (A, C) content of respective foods.

Identifying and disseminating nutrient profiles of local foods including wild and under-utilized varieties could foster both food and nutritional security which is most warranted areas in Nepalese perspective. Such nutritional data could serve as a reference for academic and nutritional research, and would be helpful in nutrition planning and development of intervention programs and activities by the national government and development agencies to ensure the local food security and nutritional wellbeing of the population.

Keywords: Food, Composition, Nutrition, Human Health, Nepal.

S6.P4

**Effect of storage in nutritional value of escamoles ant eggs
Liometopum apiculatum M edible insects**

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Escamoles a common foodstuff in rural communities and a gourmet dish in high class restaurants of urban cities are seasonally available but production is limited to four months a year, however customer demand is all year round. Insects are high in polyunsaturated fatty acids PUFAs therefore, changes during storage such as rancidity, lipid oxidation, modification of sensory properties and alpha-Tocopherol and protein loss might happen. The aim of this study was to investigate quality status of escamoles ant eggs *Liometopum apiculatum* M refrigerated at -5 °C and frozen at -30 °C for up to 12 months. Samples harvested in spring 2010 were analysed which included: lipid hydrolysis, total fatty acids, oxidation, loss of antioxidant Tocopherol, protein changes and sensory characteristics modifications. Escamoles packed in polyethylene bags vacuum sealed and refrigerated at -5 °C up to one month and frozen at -30 °C for 3, 6, and 12 months were assessed. Data obtained was: samples refrigerated - after one month lost few water and sensory characteristics of texture, colour and flavour stayed firm, they did not present any rancidity, and fatty acids, proteins and alpha-Tocopherol remained the same. At 6 months, fatty acids, proteins and alpha-Tocopherol decreased a little, but the flavour did not change. Samples frozen at -30 °C maintained nutritional value and sensory characteristics up to 12 months. The use of low temperatures inhibited rancidity and permitted escamoles to achieve a good quality. For consumption after 12 months ant eggs should be lyophilized. Escamoles ant eggs are very much appreciated in Mexico, and are a popular dish in northern Thailand locally known as mot som; in Laos and Cambodia consumption has a high demand as a dish called mok kai mot daeng. Species from Asia are different than those in Mexico.

Keywords: ant eggs, nutrition, fatty acids, proteins, sensory characteristics.

**Kenyan Food Composition Database:
Identification of Gaps for Future Adoption In Estimating Nutrient Intake**

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The Kenyan Food Composition Database was developed in 1993 and since then, no documented update can be traced. The objective of this study was therefore to identify the gaps for purposes of updating it for future use in estimating nutrient intake from traditional foods in rural Western Kenya. The FCDB contains 354 basic food ingredients that are representative of ingredients consumed in the country. The database comprehensively deals with proximate analysis of 354 foods and ingredients; 6 minerals of 337 foods ingredients; 6 water soluble vitamins and 1 fat soluble vitamin of 258 foods ingredients; 12 amino acids of 66 foods; fatty acid content of 61 foods which has been summarised to % SFA, % MUFA and % PUFA but does not give the specific fatty acids; oxalic acid of 84 foods. Of the basic traditional foods identified in the food intake survey in Western Kenya, only 45% were featured in the FCDB. In addition food density information (g/ml) and weights of common household measures is also lacking. Therefore, some missing basic foods needed to be added for a comprehensive estimation. Also, the presence of new or reformulated commercial products requires several updates to the file which links local food ingredients to the database food ingredients.

Keywords: Food Composition Database Nutrient Intake

S6.P6

Food Databanks National Capability (FDNC)

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Food composition data is vital for UK public health with respect to understanding patterns and trends in food composition and consumption, their affects on health and the development of healthier food products. Systematic collection, analysis and reporting of UK food consumption and nutritional status and food composition data is essential for assessment of dietary risk-benefit, and the development and support of scientifically-robust public health recommendations.

FDNC comprises of three unique but inter-linked databases: (a) UK Food Composition; (b) eBASIS and (c) InformAll. The UK Food Composition database describes food eaten in the UK in terms of macro-nutrients and micronutrients; eBasis provides information about non-nutrients (bioactives) with putative health benefits or detrimental affects in humans, and weights their status according to peer-reviewed evidence; and InformAll offers information about food allergy and the proteins responsible tailored to a cross section of users (i.e. consumers, healthcare professionals, food industry and researchers) via a common portal. These databases are already established as independent and trusted resources with 50,000 users from academia, healthcare, industry, government and the general public.

The objectives of FDNC are: (1) To improve delivery and research applications of food composition data describing nutrients, bioactive dietary molecules and food allergens for the UK biosciences community; (2) To enhance cooperation and exchange of data and information with other providers (e.g. food industry, other national food database compiler organisations in Europe globally); (3) To provide coordinated training and support for food composition data users from the research community, health professionals, food and biotech industries, government agencies and departments, and citizens; (4) To increase awareness through user and stakeholder events in order to enhance and extend food and bioscience research and other applications; and (5) To enhance exploitation by securing additional co-funding from research projects, food and biotech industries, and maximising financial return from publications including electronic data formats.

The new proposed 5-year funding will ensure that facilities and skills are made available to support food ad health research across the UK and international biosciences communities, and to promote increased research collaboration. IFR is the only publically funded research institute in the UK that addresses the fundamental science underpinning food and health.

The FDNC is supported by the Biotechnology and Biological Sciences (BBSRC) and Department of Health (DH).

The Nutritional composition of South African pork

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Background. The most important challenge facing mankind in the future is to provide adequate nutrition and safe food as well as clean water for all in an environmentally safe way. People consumed food in various forms, but their health depends on the combination and quantity of nutrients in the food consumed.

Objective. To determine the nutritional composition of raw and cooked selected wholesale cuts (shoulder, loin and leg) for South African pork.

Materials and methods. Each raw and cooked cut (shoulder, loin and leg) were dissected into meat, bone and subcutaneous fat in order to determine the nutritional composition per cut and for the whole carcass. Nutrient analysis was performed on the raw and cooked meat and fat samples from the leg, loin and shoulder cuts on a double blind basis. The data collected has been statistically analysed using GenStat for Windows, 2007.

Results. Significantly lower fat contents were observed for the leg (5.21 g/100 g) and loin (6.99 g/100 g) compared to the shoulder cut (10.32 g/100 g edible portion). The overall percentage fat for all three cuts is less than 10 % that is recommended by the SA Heart Mark. The loin cut (27.5 g/100 g) had more protein when compared to the leg (25.5 g/100 g) and shoulder cuts (22.8g/100 g). However, the loin cut had significant less vitamin B2 (0.02 mg/100 g) than the shoulder (0.04 mg/100 g) and the leg cut (0.04 mg/100 g).

Conclusion. Pork is a nutrient-dense food that naturally contains many essential nutrients such as protein, vitamins and minerals, without supplying too much fat. Therefore, as recommended in healthy eating advice around the world, lean meat especially lean pork, should be promoted as part of a healthy balanced diet.

Keywords: Food composition, pork, cuts (shoulder, loin, leg), raw and cooked

S6.P8

Pilot study to develop a food composition database for a Southern region of Ecuador

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Rationale and Objectives: This research is focused on prevention of adolescence obesity and maintenance of an appropriate diet, thus the availability of an updated local food composition database is highly needed.

Methods: The selection of foods was done based on a cross sectional study conducted in 2009, that aimed to assess dietary patterns through 24 hour recall in a random sample of 770 adolescents in Cuenca and Nabon cantons, Ecuador. The most frequently consumed foods were searched in a food composition database from Peru (CENAN/INS, 2008), Mexico (INNSZ, 1999) and Chile (INTA/U.Chile, 1997) for further food intake assessment. 95 foods, particularly locally produced and prepared, were not in these databases and were selected for macronutrient analysis. Those key nutrients were selected because our main goal is to evaluate energy content, and only analytes that are considerably present in each food were determined. To document and warrant the sample traceability and data quality, pre-analytical and post-analytical protocols were prepared based on recommendations of LATINFOODS and EuroFIR. A sampling plan was designed to collect representative samples from the main local markets and supermarkets. Considering that variability data for the selected key nutrients in those foods is not available, a sample size of n=12 was taken (pilot study) and mixed as composite sample. One analytical portion was analyzed in triplicate, determining: moisture and dry matter (AOAC, 2002; Anklam et al., 2001), ash (AOAC, 2002; Sullivan and Carpenter, 1993), total fat by Weibull (AOAC, 2002; Sullivan and Carpenter, 1993), total nitrogen by Kjeldahl (AOAC, 2002; Sullivan and Carpenter, 1993), dietary fiber (Prosky et al., 1992) and total and available carbohydrates (by difference).

Results: At the moment, 15 % of selected foods were analyzed (eg. pewa nut, highlands papaya, melloco, mizhque, chibil) and results are presented as means \pm sd. Among triplicates, total fat and protein content showed the highest variability and sample size was recalculated based on these variability values.

Conclusions: As a result, bigger sample sizes (n=15-30) must be necessary when those macronutrients are part of the analysis.

Keywords: food composition database, local foods, Ecuador, macronutrients

South Asian dietary patterns identified using ethnic food composition data.**Sara Diana Garduño-Díaz, Santosh Khokhar***University of Leeds, School of Food Science and Nutrition, Leeds*

Rationale and objectives: South Asians represent the largest minority group in the UK and have been identified as a high risk population both at home and abroad. As diet is a well known determinant factor on the development of non-communicable diseases, the evaluation of the overall dietary pattern of a migrant population might help clarify the link between food consumption and health status in a host country. The aim of this study was to assess the major dietary patterns of South Asian men and women using newly generated food composition data through EuroFIR. In addition, the correlation between dietary patterns and ethnic-related factors, including educational level and time of residency, was examined.

Methods: Principal component analysis was used to identify dietary patterns from weekly intake data collected by means of an ethnic-specific FFQ answered by South Asian participants (n=100). A pattern score was calculated according to frequency of consumption of foods integrating each pattern. Multivariate logistic regression was used to determine the association of dietary patterns with ethnic-related factors. Regression models were controlled for age, gender and physical activity.

Results: Three major dietary patterns were found and due to their association with time of residency were named accordingly as traditional pattern (pulses, dark coloured vegetables, traditional snacks and sweets), transition pattern (red and white meat, eggs, traditional cereals and mainstream snacks) and mainstream patterns (light coloured vegetables, caffeinated and decaffeinated drinks, dairy, fruit and mainstream cereals). None of the patterns were significantly related to educational level.

Conclusion: Dietary patterns, when obtained from reliable food composition databases, have a greater potential for demonstrating the link between complex diets and numerous factors that could influence health and wellbeing. Time of residency and the process of acculturation are stronger determinants of changes in the diet than is educational level for South Asians in the UK.

Keywords: food composition, transition diet, acculturation

S6.P10

FOOD COMPOSITION DATA: Kenyan Situation

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Introduction: The importance of good Food composition data cannot be over emphasized. Food composition data form part of the bases for certain policies, food labelling, nutritional intervention, nutritional guidelines and diet formulations, and food standard implementation among other uses. Generation of good quality food composition data is a challenge for developing countries like Kenya. Good quality and reliable food composition data depend on good presence of laboratories, well trained and reliable staff, and use of the cutting edge analytical techniques. Food composition tables must be relevant and appropriate, containing data on locally consumed foods. This critical review of the food composition tables currently being utilised in Kenya, with a view to update, making it more appropriate. The “National Food composition Tables and The Planning of Satisfactory Diets in Kenya” was compiled by Dr Jaswant Kaur Sehmi in 1993. Materials and Methods: The book is organised into 10 chapters, in roman numbers I to X. I: nutritive value macronutrient and micronutrient, dietary allowance of various vulnerable groups and briefly mentions methodologies used for analysis. II; Tabulates proximate principles, energy of food groups; cereal and grain products per 100g portions, starchy roots and tubers, legumes, nuts and seeds, vegetables and products, fruits, meat, poultry and eggs, oils and fats, beverages, spice and condiments and miscellaneous. III: Minerals (mg/100g). IV: Vitamins (per 100g). V, VI and VII: Essential amino acid, Fatty acid and Oxalic acid contents respectively. VIII: Food names in Kenyan languages. IX: index of foodstuffs. Every page has a column with serial No, used to match various analysed nutrients, recorded as indexes in IX. X: bibliography and appendixes. References used to check the requirement of a Food databases: Food composition data, Production, management and use (second edition). INFOODS international data exchange,(web-site), Joint FAO/WHO Foods standards Programme codex Alimentarius and European Food Information Resource Network of Excellence. All had similar requirements for compiler guidelines. Results 1. Absence of the composition of the commonly consumed indigenous foods and some others. 2. Lack of standardisation of the basis on which the constituent’s composition are reported. 3. Absence of some macro and micronutrients which are omitted and have recently become of public health significance such as folate, vitamin B12, and B6. Yet the bases for not analysing are not stated or apparent. 4. Lack of documentation of all conversion factors. Conclusion: It is hoped that this critique will help to improve and make the document more relevant and up-to-date to adequately serve Kenya and the Region in educating the population for policy formulation, food labelling, teaching and research.

New data on meat composition in the Netherlands

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Rationale and objectives: New food composition data for meat in the Netherlands are needed because of expected changes in raw meat, the changing varieties of meat on the market and changes in cooked meat composition due to the use of other types of cooking fat.

Materials and methods: An analytical protocol was developed in which 49 types of meat were selected including the most frequently consumed meat cuts and 'new' varieties that were lacking in the Dutch Food Composition Database (NEVO). Each type of meat was sampled at 16 locations all over the country, taking into account rural and urban areas and market shares of supermarkets and butchers. Analyses included macro nutrients, fatty acid profile, minerals and vitamins.

All (49) composite samples were analyzed raw. 10 Meat cuts (out of 49) were cooked with cooking fat and then composite samples were analyzed. To estimate the composition of cooked meat cuts a tool (cooked meat calculator) was developed separately.

Results: Results showed that on average the total fat and saturated fat content of selected raw meat cuts has decreased compared to previous Dutch values. Data on raw meat cuts were used to calculate the composition of 39 cooked meat cuts not included in the analytical protocol. Results from analyses and calculations for both raw and cooked meat cuts were included in the NEVO database.

Conclusions: The analytical data confirm the expected changes in food composition of fresh meat. Composition of cooked meat could be estimated satisfactorily using the cooked meat calculator. With these data the 2011 version of the NEVO Table provides up to date food composition data for the most relevant types of raw and cooked meat in the Netherlands.

Keywords: meat, food composition, NEVO database, fat content

Development of a West African Food Composition Table

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Food composition tables (FCTs) are fundamental tools for all nutrition and food security strategies. Existing FCTs for most of the West African countries date back to 1960 and 1970. In order to address present health problems and strengthen local development, adequate data on food composition of local foods are indispensable. Therefore, FAO/INFOODS, WAHO/ECOWAS and Bioversity International developed a Food Composition Table for West Africa. In March 2010, food composition data were collected (from scientific articles, theses, university reports and FCTs; ranging from 1968 to 2010) of traditional foods in Benin, Burkina Faso, Ghana, Guinea, Niger, Nigeria and Senegal. The data were compiled according to international standards for food composition (e.g. from INFOODS and by using the FAO/INFOODS Compilation Tool). The first edition of the FCT entitled `Composition of selected foods from West Africa` was published in September 2010. For the new edition, data from the Mali FCT 2004, as well as analytical data from Gambia, Nigeria and scientific articles were included. The revised version of the FCT will be published in May 2011, in English and French. Altogether more than 300 foods and 30 components will be included in the revised West African FCT. The foods represent average values of the collected compositional data. Nutrient values of cooked foods were calculated using the yield and nutrient retention factors from Bogner, Bergström and EuroFIR. Traditional recipes were included from the Mali FCT. The data were complemented by other sources of food composition data to minimize missing values, in particular for minerals and vitamins. Emphasis was given to include data on food biodiversity by incorporating cultivars/varieties and underutilized foods. The West African FCT is a work in progress, as are all FCTs and it is the most recent example of INFOODS for regional food composition activities.

Estimation of South Asian food portion sizes for children

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Rationale and objectives: Assessing the diet of ethnic minority children has been reported to be challenging. Using visual aids such as food photographs in combination with reliable food composition databases may help improve the accuracy of measuring the food intake among this population. To our knowledge, ethnic-specific food photographs for South Asians in the UK have not been previously made. The aim of this study was to develop and test photographs of commonly consumed foods by South Asian children to enhance the estimation of food portion sizes among this population. New composition data was employed through EuroFIR for nutrient content assessment of ethnic food.

Methods: Participants were invited to compare a set of coloured photographs with the actual portion sizes of foods served on a plate. The degree of accuracy and percentage of correct estimation was calculated and nutrient composition of identified portions was reported for energy, CHO, fat, protein, Fe, Na and other nutrients. Descriptive statistics were used to assess the characterisation of the participant's response for the actual food as compared with photographs.

Results: In all, 36 participants completed the food estimation sessions. A total of 360 estimations were carried out by Indian (n=150) and Pakistani (n=210) mothers. On average, 83% of the comparisons were made correctly. Under/over-estimation was recorded for certain foods; however, these values were minimal and might be within the expected range due to difference of perception of individuals. Nutrient composition ranged from 54-215 calories/portion in chicken curry, from 0.6-2.3 mg/portion for iron in lamb biryani and from 112- 449 mg/portion for Na in mixed vegetables.

Conclusion: Food portion photographs may enhance both the reliability and validity of estimated dietary intakes in the South Asian population. This was demonstrated by the high percentage of accurately estimated portion sizes in this study.

Keywords: food photographs, food portion, multiethnic studies

S6.P14

Validation of 24-hour recalls assisted by estimated records in British Asian children in Leeds

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Rationale and objectives: Assessing children's diet is more challenging than adults' diet especially for British Asian children due to the absence of standardised tools. Specific factors must be considered when assessing the diet of children from minority groups, such as religion, culture, inter-generational differences, and dietary patterns. The purpose of this study was to collect dietary information and compare the data using 24-hour multiple pass recalls and estimated food records.

Methods: Parents/guardians completed a 3-day estimated food record and two multiple pass 24-hour recalls on non- consecutive days. Food and drinks consumed were estimated using household measures and a newly developed photographic booklet. Dietary information was collected from British Asian children (n=20) between 5-8 years of age. Intake of energy and other nutrients were calculated from the food records using COMP-EAT software for mainstream foods and EuroFIR food composition data for ethnic foods. Paired sample t-test was used to compare between methods.

Results: There were no significant differences in daily intake of energy, macro-nutrients and micronutrients when compared between the two methods. However, the energy contribution from fat was higher from 24-hour recalls than from estimated food records. **Conclusion:** Multiple 24-hour recalls may be considered a practical method to be used in this population. 3-day estimated records and multiple pass 24-hour recalls had a good agreement with respect to daily intake of nutrients. 24 hour recall method also requires less commitment and may increase participation rate. Additionally, mother's education, language barriers, religion, recruitment method, and instruments used were found to be important determinants for participation and commitment.

Keywords: 24-hour recall, estimated record, ethnic group.

Ascorbic acid content in berries and red fruits: a contribution to produce quality data for food composition databases

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Rationale and objectives: Health-benefits of berries and red fruits can be mostly attributed to their particularly high concentration of antioxidants. In fact, berries are considered as one of the most concentrated sources of antioxidants amongst the commonly consumed fruits and vegetables. Because of the positive effects of antioxidants on human health, the interest in consuming fruits and their products is growing worldwide. The aim of this study was to measure the ascorbic acid (AA) content in six types of berries and two red fruits to be included in the Portuguese food composition database.

Materials and methods: Fruits were acquired in local supermarkets according to consumption patterns. The edible portion of the following fruits was analyzed: mulberry (*Morus L.*), raspberry (*Rubus idaeus L.*), gooseberry (*Ribes L.*), blueberry (*Vaccinium myrtillus L.*), strawberry (*Fragaria L.*), cape-gooseberry (*Physalis peruviana L.*), cherry (*Prunus cerasus L.*) and pomegranate (*Punica granatum L.*). AA content was determined by a highly sensitive, rapid, precise and accurate HPLC method, previously validated. The quality of the results was confirmed by using an in-house reference material. In addition, the laboratory participates successfully in proficiency testing schemes. All the results are expressed as mean values of three individual samples ($n=3$) and each sample analyzed in triplicate.

Results: AA content ranged from 0.464 ± 0.016 to 44.7 ± 0.606 mg/100 g of edible portion, for cherry and gooseberry, respectively. From all the analyzed fruits, 4 are included in the Portuguese food composition database, results of this study showed significant differences between analytical values and the available data, which might be due to the different growing conditions, cultivars or ripening state.

Conclusion: Analytical results showed some berries and red fruits can be an excellent source of vitamin C. This study contributes to the existing knowledge and to update or produce new data for inclusion in the Portuguese food composition database.

Keywords: Ascorbic acid; berries; red fruits; food composition database; antioxidants.

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Determination of total folate content in traditional foods from Black Sea Area countries

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Rationale and objectives: Folates occur naturally as a variety of polyglutamates, with different biological activity. Folate is a generic term for a water-stable vitamin from B-complex, which exists in many chemical forms. It is essential for many of the methylation reactions involved in the synthesis of DNA and RNA, and hence plays a crucial role in cell division. The recommended daily allowance (RDA) is 400 µg/day (for both men and women) of dietary folate equivalents. Food folates have approximately 50% lower bioavailability than folic acid. The ingestion of a supplement of folic acid during the periconceptional period significantly reduces the risk of giving birth to a child with a neural tube defect.

Materials and methods: The determination of the total folate content in foodstuffs was carried out by a microbiological assay (EN 14131:2003) with turbidimetric detection of the growth of the microorganism *Lactobacillus casei*, subspecies *rhamnosus* (ATCC 7469). The analyses were performed in an accredited laboratory according to ISO/IEC/17025. This method was applied to the selected traditional foods of European Project BaSeFood (Sustainable Exploitation of Bioactive Components from the Black Sea Area Traditional Foods).

Results: Total folate content of cereals or cereals based foods ranged from 11.7 to 20.5 µg/100 g, while for vegetables based foods it varied between 5.2 µg/100 g (Ukrainian Borsch) and 97.2 µg/100 g (Nettles with walnut sauce). The highest total folate content was found in the group of products from oilseeds for roasted sunflower seeds (113 µg/100 g).

All traditional foods containing fruits have a total folate content lower than 5 µg/100 g. The analytical results are expressed per 100 g of edible portion.

Conclusions: Our results show that some of the analysed traditional foods are a good dietary source of natural folates in the diet of Black Sea Area countries. Fruit based foods presented the lower total folate content and products from oilseeds were the group with the highest content.

Keywords: folate; traditional foods; vitamins; BaSeFood; microbiological assay.

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Proximate composition of plant origin traditional foods from Black Sea Area Countries

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Within the frame of the European Project BaSeFood (Sustainable Exploitation of Bioactive Components Black Sea Area traditional foods), thirty-three traditional foods from six Black Sea Area Countries (Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine) were selected and prepared according to the traditional recipe, ingredients and traditional preparation methods. The aim is to promote and preserve traditional foods and to produce new and reliable data of the overall nutritional composition. Water content is being determined by gravimetric method, using a dry air oven at $101 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ for 2 h, until constant weight. Total fat analysis is being performed with an acid hydrolysis method followed by extraction using a Soxhlet with petroleum ether, as the extraction solvent. The obtained residue is dried for 1 h 30 min at $101 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$, until constant weight, according to the acid hydrolysis method. Total dietary fibre, ash and total protein content are being determined by the AOAC official methods 985.29, 945.46 and 991.20, respectively. Total nitrogen for protein content is being determined by the Kjeldahl method in combination with a copper catalyst using a block digestion system. To assure the quality of analytical results, methods used in the laboratory are accredited by ISO/IEC/17025 or by successful participation in proficiency testing schemes. Herbs, spices, aromatic plants and fermented products are those which presented the highest water content. In contrast, products from oilseeds have the lowest water content (3.94 g/100 g) and the highest total fat (58.2 g/100 g), total protein (20.8 g/100 g), ash (3.25 g/100 g), total sugars (45.8 g/100 g) and total dietary fibre (11.3 g/100 g) contents. For cereals and cereal based foods, a great variability in the water content was found (5.99 to 75.8 g/100 g). All results are given per 100 g of edible portion.

Traditional foods from the same group have generally similar proximate analysis patterns. The highest content in macronutrients was found in foods from the oilseeds group. The proximate composition will be useful to include new nutritional data into national food composition databases.

Acknowledgement: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n.º 227118.

Riboflavin content in selected traditional foods from Black Sea Area countries

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Riboflavin (vitamin B₂) is an essential water-soluble vitamin present in a wide variety of foods, namely in milk, dairy products, cereal products, meat products and green leafy vegetables. The primary form of the vitamin is an integral component of the coenzymes flavin mononucleotide and flavin-adenine dinucleotide. It is in these bound coenzyme forms that riboflavin functions as a catalyst for redox reactions in numerous metabolic pathways and in energy production. The daily recommended allowance for riboflavin is 1.3 mg/day and 1.1 mg/day, for males and females, respectively. Due to its unquestionable importance in human nutrition, riboflavin was determined in the selected traditional foods analysed in the frame of the European Project BaSeFood (Sustainable exploitation of bioactive components from the Black Sea Area traditional foods).

Riboflavin was determined according to the method EN 14152:2003. The sample is extracted after acid hydrolysis followed by dephosphorylation (with enzymatic treatment) and quantified by High Performance Liquid Chromatography with Fluorescence detection. The quantification limit of the method is <0.02 mg/100 g. This is an accredited method and the laboratory participates successfully in proficiency testing schemes. All the analyses were carried out protected from light because riboflavin is very sensitive to light. Analysis are being carried out in selected traditional foods from six Black Sea Area countries, which belong to the following groups: cereals and cereal based foods; vegetables; fruits; products from oilseeds; herbs, spices and aromatic plants; and fermented products.

Our results show that 76.5 % of the analysed traditional foods had riboflavin content higher than 0.02 mg/100 g per edible portion. Roasted sunflower seeds presented the highest concentration of riboflavin (0.19 mg/100 g per edible portion). Therefore, traditional foods from Black Sea Area countries can give a good contribution to riboflavin dietary intake.

Keywords: Riboflavin; traditional foods; BaSeFood; vitamin B₂; HPLC

Acknowledgement: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n.º 227118.

Identification of Phytochemical Profiles to Differentiate Teas using Fast High-Performance Liquid Chromatography with Diode Array and Fluorescence Detection.

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Tea is one of the most consumed beverages in the world and is made of the infusion of leaves of the *Camellia Sinensis* plant. Several different denominations are used, such as green, white and black teas depending of processing conditions used. Red “teas” are infusions made of the leaves of Rooibos plant (*Aspalathus linearis*) and present a very different phytochemical profile although some black teas are commercialized as red teas. In this work, a fast HPLC-DAD-FL method was used for the determination of phytochemical profiles of different types of teas and these profiles were employed to identify composition patterns of specific types of samples. Using the concentration data of 21 main phytochemicals present in teas (phenolic acids, flavan-3-ols, flavonols and alkaloids), it was possible to contrast the profiles of more than forty commercial teas and distinguish between most sample types. Green teas are composed by flavan-3-ols and alkaloids, with high caffeine concentration. Black teas are composed mainly by alkaloids (with high caffeine levels) and reduced levels of flavan-3-ols are found due to the oxidation during the fermentation of the leaves. Flavonols are also present in lower concentrations, but seems that these compounds are less affected by the processing of the leaves to produce black teas. The composition pattern of the tested “red” tea samples suggested that they may be black teas instead of rooibos leaves. In general, the identified phytochemical patterns may be used to correctly identify not only red “teas” but also to allow differentiation between green and white from black teas. However, differentiation between green and white teas chemical patterns is more difficult due to their similar origin and processing. Although in some green teas higher concentrations of flavan-3-ols were found than in white teas, results were variable and more samples are needed to contrast these results.

Keywords: Tea; Phytochemical profile; Identification patterns; Phenolic acids; Flavan-3-ols; Flavonols; Alkaloids

Development and implementation of a protocol to update nutrient values in the Dutch Food Composition Database

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Objective: To develop a protocol for selecting, sampling and analysing foods and to implement this for the update selected food items within the Dutch Food Composition Database (NEVO).

Methods: Selecting foods for analyses was done by using information from the Dutch national food consumption survey, knowledge from experts and information available in the NEVO database. A sampling protocol was designed taking into account regional differences, urbanisation degree and place of purchase. Consultation with experts from analytical laboratories and knowledge from EuroFIR resulted in the selection of state of the art methods of chemical analysis.

Results: A protocol was developed to select, sample and analyse food items in the Netherlands. The most significant foods with a high contribution to the nutrient intake of the general Dutch population, for which the current values in the NEVO were not yet available or were outdated, were selected. This resulted in 149 selected foods, over 14 different food groups. For each food item a representative composite sample was mixed based on the edible part of maximum 16 samples taken in 4 regions, in areas with different degrees of urbanisation as well as in different places of purchase. New values were used to update the NEVO database. Due to the fact that many of the analysed foods were basic foods in the Dutch diet, the results also contribute to recipes and comparable foods for which no new analyses were available.

Conclusion: Selecting, sampling and analysing nutrients for the update of food composition databases needs a well designed and efficient protocol. Input from experts in different fields of expertise proved to be very valuable for the development of the protocol. A regular update of nutrient values is essential for a reliable, representative and up-to-date food composition database.

Keywords: food composition, selecting foods, sampling protocol, analyses

S6.P21

The UK Foodcomp project: updating data on foods in the UK

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Introduction: UK Foodcomp is a four year project, funded by the UK government to review, update and maintain UK data on the composition of foods, culminating in the publication of the 7th edition of McCance and Widdowson's The Composition of including the age of current data, the introduction of new foods into the UK diet and reformulation of foods by the food industry. The first new survey undertaken was on a range of processed foods that had previously been sources of artificial trans fatty acids. This has shown a marked reduction in the trans fatty acid content of many foods. Analytical surveys to update current composition data on fish and eggs have also been completed and plans for a survey of the nutritional composition of selected fruit and vegetable products are in progress. Alongside plans for new analytical surveys, the project team have been working with the food industry to facilitate data sharing on the composition of some products. This has included the provision of data on the sodium content of bread from the Federation of Bakers and from major retailers. Following a stakeholder engagement event in 2009, the project has maintained and developed strong links with the food industry and is investigating the possibility of joint funding for further analysis of foods. In addition a stakeholder event was held for dietitians in 2010 to gather their views. The results of new surveys and data obtained from industry are incorporated into the Department of Health's nutrient databanks, which support the National Diet and Nutrition Survey (NDNS) and will be published in the next edition of McCance and Widdowson's The Composition of Foods series.

Future aims: The project will continue to build links with stakeholders across the piece in order to raise awareness, particularly of the online integrated dataset, which can be updated more frequently. Targeted analytical surveys of food composition to update the dataset will continue through the project, which will feed into the new edition of the published food composition tables but also into the online dataset so that updates are available more rapidly. The next edition of McCance and Widdowson's The Composition of Foods will be published in 2013.

Formulating guidelines for developing yield factors for South African foods

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Rationale and objectives: The South African Food Data System (SAFOODS) is the main provider of information on the nutrient composition of foods consumed by South Africans. The main reference source of information for 37% of food items is South African while recipe calculations account for nutrient information for 28% of food items. Previously, recipe calculations were based on cooked food, but a new approach is now adopted from the EuroFIR model which uses raw ingredients with application of yield and retention factors. The aim is to develop national guidelines for the generation of yield factors for foods consumed in South Africa.

Materials and methods: Record sheets have been developed for recording the mass of single ingredient foods and foods with varying shapes of edible and inedible parts, before and after processing. A pilot study testing the guidelines was done in collaboration with students from the University of Pretoria, Department Consumer Science. Students were tasked to generate yields for selected baked products. The yield factor was calculated by dividing cooked mass by total raw ingredient mass expressed as a percentage. Yields calculated from the pilot study were compared to yields borrowed from the USDA reference.

Results: 28 students participated in the piloting of the guidelines. Yield factors were developed for 28 recipes reflecting a variety of baked products both savoury and sweet. Each recipe was triple tested and the yield factors used in calculations were the mean of three samples for all 28 recipes. Yields generated vary between 70% and 80 %. When compared to USDA yields for similar foods, the percentage difference varies between 15% and 65%.

Conclusion: National guidelines for the generation of yield factors is warranted for foods consumed in South Africa and the first step of formulating these guidelines have been completed in this pilot study.

Keywords: yields – recipes – South Africa – food composition – cereals

S6.P23

Food composition activities under SAARCFOODS

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SAARCFOODS was established as a regional centre of INFOODS to cater for the South Asian countries with its first meeting in Peshawar in 1996. This was followed by the second SAARCFOODS meeting in Kathmandu in November 1998 and the third in Colombo in October 2010. In all these meetings, capacity building, training in analytical methods, proficiency testing of nutrient and compilation of food composition data were identified as pre-requisite for progress in food composition in the region. Under the present activities, member countries are preparing a list of Neglected underutilized species in order to capture the biodiversity of food resources available in their respective countries. Member countries are also updating their respective food composition tables in order to segregate foods with original analytical data for preparing the regional SAARCFOODS FCT. At the country level India is preparing a new Indian FCT. The first Indian FCT was published in India in 1937 as „The Nutritive value of Indian Foods“ (NVIF) which was revised and updated in 1958, 1971 and 1989. Keeping in mind the changing scope of the nutritive/anti-nutritive factors in health and disease, interest in food components and the varieties of foods that are available and consumed it was decided to prepare a totally new Indian FCT. A nationwide sampling plan has been drawn up to provide the best estimates of the nutrient profile or the nutrient means for the population of each food in the food supply in order to accurately represent what is currently being consumed by the population. The first phase of the study will address the 240 key foods identified to cover 90% of the rural diet according to NNMB surveys. The New Indian FCT will include Glycemic index/glycemic load as well as cultivar specific nutrient data for major food crops consumed in the country.

Water and lipid soluble antioxidant activity in various cereal grains

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Increased whole grain consumption has been associated with reduced risk of developing major chronic diseases due to their dietary fibre and antioxidant substances. The purpose of this study was to examine the antioxidant properties of water soluble antioxidant capacity (ACW) and lipid soluble antioxidant capacity (ACL) of various cereals against superoxide anion radicals using photo-chemiluminescence method. Antioxidant capacity (AOC) within cultivars was also assessed in 20 Pearl millet, 17 sorghum, and 36 rice landraces (brown Vs 10% polishing). Substantial antioxidant activity of water extracts was observed in pearl millet (5.84 ± 0.16 $\mu\text{mol/g}$ Ascorbic acid equivalent) (AE) followed by Wheat (3.19 ± 0.3), Sorghum (3.11 ± 0.04), Maize (1.73 ± 0.06) Foxtail millet (1.49 ± 0.21) and Barley (1.37 ± 0.14). The following hierarchy of antioxidant activity was observed for lipid soluble extracts in whole grains: Oats ($2.49 \mu\text{mol/g}$ trolox equivalent) (TE) > Pearl millet > Maize > Barley > Sorghum > Rice > Wheat > Foxtail millet > Saamai (0.27 ± 0.002). Processing cereal grains into its cooked form resulted in the loss of antioxidant activity in some grains while there was increase in other grains such as Corn, Wheat and Foxtail millet. Among pearl millet cultivars, ACW ranged between 2.72 - 6.94 $\mu\text{mol/g}$ TE and ACL between 2.64 - 7.59 $\mu\text{mol/g}$ AE. The mean ACW and ACL was 4.26 $\mu\text{mol/g}$ AE and 4.55 $\mu\text{mol/g}$ TE respectively for pearl millet. The mean ACW of 17 Sorghum cultivars was $5.17 \pm 1.21 \mu\text{mol/g}$ TE but mean ACL was low ($2.46 \pm 0.753 \mu\text{mol/g}$ AE). The mean ACW of brown rice was $2.12 \pm 0.91 \mu\text{mol/g}$ AE and ACL was $2.50 \pm 0.53 \mu\text{mol/g}$ TE. Significant ($p < 0.05$) reduction in ACL (45 to 89%) as well as ACW (20 to 90%) was observed as a consequence of polishing rice to 10% level. These results indicate that there are significant differences in the antioxidant activity among the different types of cereals and within cultivars which gives insight to its potential application to promote health.

Keywords: antioxidant capacity, photo-chemiluminescence, cereals, polished rice, processing.

S6.P25

Effect of Enrichment with Red Raspberry Concentrate on Some Quality Characteristics of Stirred Yoghurt

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The importance of bioactive compounds in milk and especially in fermented milk products are probably greater than previously thought. They include certain vitamins, specific proteins, bioactive peptides, oligosaccharides, organic (including fatty) acids. Some of them are normal milk components, others emerge during digestive or fermentation processes. Fermented dairy products and probiotic bacteria decrease the absorption of cholesterol (Akin, 2006).

New toxicological data on some of the synthetic antioxidants cautioned against their use. In the recent past, natural antioxidants attracted the attention of many food manufacturers as a result of the necessity to produce healthy foods. The antioxidant activity for LDL was associated directly with anthocyanins and indirectly with flavonols, and for liposomes it correlated with the hydroxycinnamate content (Heinonen et al., 1998). However, according to Costantino et al. (1992) the activities of black raspberries, blackcurrants, highbush blueberries, blackberries, redcurrants and red raspberries toward chemically generated superoxide radicals were greater than those expected on the basis of anthocyanins and polyphenols present in the berries. Berries constitute a significant source of antioxidants such as ascorbic acid, tocopherols, carotenoids, flavonoids and phenolic acids. Raspberries extracts inhibited LDL oxidation (Heinonen et al., 1998)

In this study stirred type yoghurt were produced by using red raspberry concentrate (10-15%). Quality parameters were observed in yoghurts with storing 21 days in refrigeration conditions (4C). Yoghurt samples that enriched red raspberry concentrate acidities were found higher than natural yoghurt samples. According to addition of concentrate lactic acid bacteria content and viscosity decreased. Antioxidant capacity and total phenolic content in yoghurt added red raspberry concentrate samples were found higher than the others samples. Yoghurts that contained 10% red raspberry concentrate favour optimum in a result of sensory panel.

Keywords: Stirred yoghurt, red raspberry concentrate, antioxidant capacity, shelf life, Quality

Comparison of Chlorophyll Amount in Commercial Tea Leaves and Tea Bags

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Chlorophyll is a natural green pigment that is responsible for green colour of plant products, including tea leaves, and it may affect final colour of the tea infusion. The focus was to determine the total amount of chlorophyll and phaeophytins, to compare their quantities in types of tea of different size aiming to detect loss of chlorophyll based on a technological step - cutting. For analysis were used 14 samples non-fermented teas grown in similar areas (6 portions of loose tea and 8 tea bags) from processors in the Czech Republic were measured. UV-vis spectrophotometry was used. The principle was the extraction of chlorophylls and phaeophytins in acetone and measuring their absorbance at wavelengths of 642.5 and 660 nm. In loose tea there was 11.42 mg/l of chlorophyll in tea infusion and degradation phaeophytins a and b were in the amount of 6.25 and 10.9 mg/l of tea infusion respectively. Tea bags contained chlorophyll in the amount of 9.69 mg/l of tea infusion and 2.5mg of phaeophytins a and 3.9 mg of phaeophytins b mg/l of tea infusion. It was founded that the amount of chlorophyll (by 5 %) and its primary degradation products (by 60 – 65 %) is lower in tea bags than in loose tea. This can demonstrate that during the technological processing - cutting, which increases the risk of air access, oxidation of chlorophylls and their primary degradation products - phaeophytins occurs and results in other products that may adversely affect the color of tea infusion and the resultant sensory value of it.

Keywords: Tea Leaves, Tea Bag, Chlorophylls, Phaeophytins, UV-vis spectrophotometry
Work has been performed within the IGA No. 91/2011/FVHE project.

S6.P27

The Hong Kong Food Composition Database: background, scope of service and mode of operation

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Background: The Hong Kong people are aware of the nutritional value of their food. Nutrition label has become an important tool for consumers to choose food. In 2008, the Hong Kong legislation council passed the Food and Drugs (Composition and Labeling) (Amendment: Requirements for Nutrition Labeling and Nutrition Claim) Regulation. After two years of grace period, the law has been enforced since July 2010. Pre-packaged foods in Hong Kong must bear nutrition labels of energy plus 7 core nutrients (protein, total fat, saturated fat, trans fat, available carbohydrate, sugar and sugar) and the amount of nutrients related to claims.

Objectives and rationale: There is a lack of nutrition data on many Hong Kong local food ingredients in the currently available food composition tables. Thus, funded by The Hong Kong Jockey Club Charities Trust and supported by Food and Environmental Hygiene Department, the Chinese University of Hong Kong Food Research Centre used over 4 years to set up the first Hong Kong Food Composition Database.

Scopes: Over 1,300 local commonly used food and ingredients were analysed with internationally recognized testing methods to construct the Database. The Database is comparable to other food composition database around the world.

The mode of operation and service to the industry and public is through the interactive website (<http://foodcompdb.fns.cuhk.edu.hk>). Companies register as database members to access the Food Composition Database. The selected reference data can be used to create appropriate nutrition labels for their products. Manufacturers can also use the database to develop and produce products beneficial to the public health and meeting nutrition labeling regulations. In addition, the website also provides food related information to encourage the public to use nutrition label to choose foods that are healthy such that their eating habit can be improved.

Keywords: Hong Kong, Food Composition Database, service, operation, Website

Coefficients of conversion from volume to food gram weights for a dietary survey described the USDA Food and Nutrient Database and New Zealand food Composition Tables.

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Background: Image processing technologists are going to automatically estimate the volume of a meal using digital photos of 3-dimension data, as a pilot study. For dietary assessment, the specific gravity (SG) must be converted to "gram" units from food volume. But the SG database has not been sufficiently standardized in our country.

Purpose: To review the SGs in previously established databases.

Methods: We retrieved food weight descriptions from 2 kinds of database (the USDA Food and Nutrient Database for Dietary Studies r22 and the New Zealand food Composition Tables 8th ed.). The search terms were cup, fl oz (including oz), tablespoon and teaspoon. SG (g/cm³) was calculated from volume to weight.

Result: According to the FNDDS, from 13,209 items, we retrieved 7,262 items whose measure description was in volumes. We dropped the items for which the cooking water additions were unknown. Finally, we obtained SGs for 6,622 food/prepared dishes. SGs of cheese were 0.3 for grated Parmesan, 0.5 for shredded other kinds of cheese, 0.6 for diced or sliced, and 1.0 for melted cheese. SGs for yogurt and cream were approximately 1.0, but those of whipped cream were 0.3, and ice cream 0.6. SGs for milk were 1.0, regardless of fat content, but 1.3 for condensed sweetened milk. SGs for vegetables were approximately 1.0, but SGs for chopped, diced, or sliced were lower (0.4-0.8). SGs for dry pasta and cooked pasta were 1.0 and 0.6, respectively. Similarly according to NZFC, we retrieved 509 items of SG description from 2,066 items. Conclusion: SG description is essential factor for dietary assessment. More than third of the Nuts group and vegetables group food had SG data. The SG for the same food was different, depending on the shape of food, cooking condition and seasoning contents.

Keywords: dietary survey, specific gravity of food, food database, assessment tool

S6.P29

Folate content in Swedish eggs – influence of breed and feed

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Rationale and objectives: Eggs contribute to 3 % of the folate intake in Sweden. Organic production has been promoted recent years and comprises 6 % of egg production. However, the effect on folate content has not been studied. The aim of this project was to compare folate content in conventional and organic eggs. Furthermore, folate retention in boiled eggs was determined.

Materials and methods: Eggs from three of the most common breeds, fed with three different feeds (two conventional and one organic) were chosen for sampling from 46 farms. For comparison of breed and feed, 18 farms were randomly chosen, two farms for each combination. Four eggs were chosen at random from each farm and the yolks were analyzed as composite samples. For study of retention, 22 eggs were chosen from one farm, half of them (11) were boiled and the yolks of raw and boiled eggs were analyzed individually. Folate content was analyzed by a microbiological assay using protease for extraction and no deconjugation step. Folate forms in eggs were determined by two HPLC methods, with fluorescence- and MS detection.

Results: Folate content in organic eggs (76-85 µg/100g) did not differ significantly from conventional eggs (82-91 µg/100g). Differences between the three breeds were minor. Folate forms found were 5-CH₃-H₄-folate and 10-formyl-folic acid. A loss of 9 % folate content was determined when boiling eggs.

Conclusions: Eggs are good folate sources, regardless of production form. One egg (60 g) supplies 50 µg folate, which correspond to 15 % of the recommended daily intake.

Keywords: Folate, analysis, egg, organic production, retention

Vitamin B6 in foods of plant origin- free and total amount**Hanna Sara Strandler, Anna von Malmborg***National Food Administration, Uppsala, Sweden*

Rationale and objectives: Vitamin B6 comprises three compounds and their phosphorylated forms, pyridoxine (PN), pyridoxal (PL) and pyridoxamine (PM) and is common in both animal and plant tissues. PN is the dominant form in foods of plant origin, bound in varying extent to glycoside. This form is less bio-available for humans, but in varying degrees for different foods.

Materials and methods: Wholegrain products, grains and legumes sampled for the Swedish Food Database were analysed for vitamin B6 content with HPLC. Samples were prepared as eaten, for legumes conserved products were compared with home-cooked foods. Vitamin B6 was extracted from homogenised samples where after extracts were treated with phosphatase. A portion of this extract was analysed to determine the content of free vitamers while another portion was treated with beta-glycosidase for determination of the total amount of vitamin. Reversed phase chromatography was used for separation on C-18 column and vitamers were analysed by fluorescence detection.

Results: PN-glycoside was found in all analysed foods. The percentage of bound vitamin was for bread 7-45 %, wholegrain pastas 9-44 %, quinoa, bulgur and couscous 21-55 %, and for legumes 34-65%. The home-cooked products generally contained more vitamin, but also a higher percentage of bound vitamin.

Conclusions: Since up to half of the vitamin B6 in foods of plant origin can be bound it is of importance to determine this amount when analysing foods for food database purpose, although the PN-glycoside prevalence cannot be used as an indication of available vitamin B6 due to the variation of bioavailability for different foods.

Keywords: Vitamin B6, plant foods, bioavailability, food database, HPLC

S6.P31

Proximate and Mineral profile of Quinoa (*Chenopodium quinoa*), and kiwicha (*Amaranthus caudatus*) consumed in north of Argentina

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Quinoa (*Chenopodium quinoa*), and kiwicha (*Amaranthus caudatus*) are pseudo-cereals largely consumed in North of Argentina. They gained special attention by scientific community in part due to high nutritional value. Therefore the nutrient analysis with the purpose to be included in Argentinean Food Composition Databank is urgent. In this work proximal and mineral profile of Quinoa consumed in the North of Argentina was determined and reported for the first time, for the purpose to be included in national Food Composition Databank and disseminated through EuroFIR e-search platform. Ash, Moisture, Dietary Fibre, Protein, and Fat content were determined by AOAC methods and Calcium, Copper, Iron, Sodium, Potassium, Phosphorus, Magnesium, were analyzed by or ICP-OES and Selenium by ICP-MS. The values were obtained applying quality criteria as defined by EuroFIR guidelines for laboratory analysis. This required criteria on sample handling, an appropriate analytical method in terms of precision and accuracy, limit of quantification selectivity, and an effective internal and external quality control program including appropriate use of Certified Reference Materials and participation in adequate Proficiency Testing Schemes carried out by laboratories hold ISO/EN 17025. Guidelines for laboratory performance are paramount to guarantee the acceptability of values in LATINFOODS and other Food Data Organizations. This provides the necessary information to the users of Food Composition Databanks who wish to have an overview of the parameters, which influence the estimation of nutrient intake, and may affect the diet-disease relationship.

EuroFIR AISBL – latest developments in what the association has to offer to food and health professionals

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Food composition data and accompanying information are essential to support the work of dietitians, researchers and food and health professionals, but until recently the collation and access to such information was neither standardised nor centralised in Europe.

Some of the major achievements of the EuroFIR Network of Excellence (2005-10) were to help harmonise data collection, compilation and interchange across countries. These achievements were underpinned with the establishment of the European Food Data Platform and the launch of the International Association, EuroFIR AISBL, to continue and enhance these activities. EuroFIR AISBL's membership has increased to 60 members including 26 food composition data compiler organisations from Europe, Australia and Canada, research institutes, universities, small and medium enterprises, together with individual researchers and students in the food and nutrition field. The Association provides its members with access to food information and tools, best practice and innovation support, professional development, networking/representation. Additionally, members have the possibility to take part in pre-competitive research and development projects in the food and health field.

In particular, the re-launch of the food composition database compiler group in 2011 provides a unique opportunity for each country to enhance their national databases with latest innovations and standards, as well as providing data integration into the European Food Data Platform.

The objectives are to continue the effort of the EuroFIR Network of Excellence in EuroFIR AISBL and potentially underpin food and health research across Europe through the European Food Data Platform.

Keywords: Food information, membership, EuroFIR AISBL, innovation, networking.

S6.P33

Alkylresorcinols content in Swedish cereal products

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Alkylresorcinols (AR) have been suggested as a biomarkers for whole grain/ bran intake of rye and wheat as more than 99 % of AR in these cereals are located in the outer part of rye and wheat kernels. AR are absorbed by humans and can be analyzed as intact AR homologues in plasma or as two main metabolites in plasma and urine. The concentrations increase proportionally with intake. Most biomarker validation studies have been conducted under controlled conditions, but studies are needed where AR is validated as a biomarker in different free-living populations. Thus, AR intake of humans in a free-living population needs to be calculated and a database is therefore needed. In this study, we developed a database on AR in 159 cereal products reported by 72 free-living subjects in 6 day weighed food records. A total of 46 soft breads, 38 crisp-breads, 22 mueslis, 17 flakes, 10 flours, 7 pastas, 4 cookies and 15 other cereal products were analyzed for AR homologues C17:0-C25:0 and their sum according to a method previously developed in our laboratory (Ross et al. 2003). AR content varied from not detectable to 4178 µg/ g (fresh weight), which was in line with previous reports. Highest AR concentrations were found in two bran-based flours, while in corn, rice, oat and barley items AR were not detectable. We further investigated the correlation of rye and wheat whole grain content and AR content and we observed a very strong correlation ($r=0.77$, $P<0.001$) supporting the use of AR as a biomarker of whole grain wheat and rye intake. Our results can be used to estimate AR intake within a Swedish population.

Keywords: alkylresorcinols, whole grain, cereals, food, biomarker

Effects of household cooking on nutritive values of commonly consumed eggs

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The purpose of this study was to investigate the effects of cooking on the nutritive value of eggs. Hen, duck and quail eggs were purchased from three markets in Bangkok, Thailand. Uncooked fresh, boiled, fried (in vegetable oil) and steamed (hen only) eggs from each market were individually prepared and examined. Homogenised samples were analysed in duplicate for proximate composition, minerals and vitamins using AOAC standard methods. The protein contents of the fresh eggs were similar (13-14 g/100 g) whereas the total fat and cholesterol in hen egg was less than that in quail or duck eggs. These nutrients were not significantly affected by boiling (101±3% true retention, TR) or by steaming hen eggs (97±5%TR). Fried eggs lost water, 19 to 31%, in all cases and absorbed oil equivalent to 18 to 23% (hen and duck egg) or 3-6% (quail egg, fried in a mould) of the initial weight of the fresh egg. Some reduction in cholesterol (10-25%) was observed. Eggs are good or excellent (quail) sources of vitamin A and good source of riboflavin. Hen and duck eggs retained 61-88%TR vitamin A after boiling, 51-85%TR after frying and ~50%TR after steaming (hen egg). Boiling and frying (in a mould) had less effect on vitamin A in quail eggs, where 78 and 69%, respectively, of initial levels were retained. Boiling any of the eggs and steaming hen eggs had no significant effect on riboflavin (98±10% and 106±11%TR, respectively). An unapparent increase in riboflavin was found in omelette prepared from hen and duck eggs (130±12% and 117±5%TR, respectively) whereas in fried quail egg (in a mould), it significantly decreased (77±7%TR). It is concluded that common household cooking of eggs preserves their nutritive values in terms of the main nutrients, with some loss of vitamin A with boiling, steaming and frying.

Keywords: eggs, nutritive value, effect of cooking, true retention.

SESSION 7 –

New emerging technologies for analysis for nutrients

S7.P1

Analysis of digestible carbohydrates in different varieties of basmati rice and other popular cereal samples by using HPLC-RI

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Analysis of digestible carbohydrate such as free sugars and starch are important components of foods like cereals. The objective of this study was to assess the digestible carbohydrates in different branded basmati rice and in other popular cereal samples of local markets of twin cities of Secunderabad and Hyderabad. In the study, we determined carbohydrates that are digestible in the human upper gastrointestinal tract by using enzymes that mimic the human system under laboratory conditions. After enzymatic hydrolysis, free sugars were extracted and determined by HPLC using refractive index detector. The chromatographic separation was achieved using Supelcosil-NH₂ column using an isocratic elution with acetonitrile/water (80:20, v/v) at a flow rate of 1.0 ml/min. The analyzed amounts of sugars and starches in different branded basmati rice varieties is varied from 73.14% in India gate super basmati rice to 80.47% in Davat basmati rice similarly sugars and starches in different other popular cereals showed the lowest concentration of 64.47% in sorgam (jowar) varieties and the higher concentration of 76.12% in ragi varieties.

Keywords: Sugars, starches, alpha-Amylase, protease, amyloglucosidase.

Phenolic interference in Somogyi-Nelson colorimetric analysis of total Sugars and development of a new method of their removal from the test sample

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Preliminary work to evaluate the extent of interference by natural phenolic compounds in the Somogyi-Nelson method of total reducing sugars was done. Concentration range of 0-50ppm of six standard phenolic compounds and glucose were made. After reacting them with the Somogyi-Nelson reagent, all the solutions gave positive results. Notably, Gallic acid and catechol recorded the highest interference. To overcome this problem a new sample preparation procedure was developed. This involves treatment of the sample extracts with Polyvinyl-pyrrolidone (PVPP), Hydrochloric acid (HCl) and diethyl ether (DE) to free the samples from the phenolics. A mixture of six standard phenolics and glucose were made at 1000ppm. One portion was subjected to treatment with PVPP, HCl and DE whereas another portion was used as a control. The new procedure was also applied to six selected food samples. Residue phenolic content was tested using Folin Ciocalteau method (Singleton and Rossi, 1965). The results showed that all the phenolics which were mixed with glucose were removed. Similarly the phenolic content of five out of six food samples reduced by more than 90%. The recovery of glucose was 100% after the treatment. This method is simple and promises better results of analysis.

Keywords: Phenolics, glucose, sample preparation

Evaluations of antioxidant activity of saponin rich fractions (SRFs) from *Gypsophila* species

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Roots from *Gypsophila* species are an especially rich source of triterpenic saponin compounds. They are exploited commercially for a variety of purposes including medicines, detergents, adjuvants and cosmetics. A large number of the *Gypsophila* mono and bidesmosides have been isolated and characterized. The most common basic structures of their aglycones (sapogenins) are mainly gypsogenin but also in fewer amounts gypsopenic acid and quillaic acid.

The present study established baseline data on antioxidant activity of saponin rich fractions (SRFs) from *Gypsophila arrostii* var. *nebulosa*, *G. pilulifera* and *G. simonii* from Turkish flora using ABTS [2,2'-azinobis-(3-ethylbenzthiazoline-6-sulfonic acid)], DPPH[2,2-diphenyl-1-picrylhydrazyl] assays and total phenolic content was investigated as well. Each plant species extracted with a serial solvent system petroleum ether (3X1) and MeOH (3X1) and finally AcOH:MeOH (5:1 V/V). Saponin levels of each fraction have been examined thin layer chromatography. UV and anisaldehyd/sulfuric acid (98%) reagent have been used for detection of saponin bands.

The results demonstrated that *Gypsophila* species have remarkable antioxidant and free radical scavenging capacity and positive correlation was available between total phenolic content (TOC) and antioxidant capacity.

Keywords: *Gypsophila* species, ABTS, DPPH, saponin rich fractions

Isoflavones content of soybean derived foods available in major supermarket chains in Spain

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Nowadays a wide variety of soybeans and soy foods is available in the Spanish market. The raise in the demand and availability of these products is related to the potential beneficial health effects from the consumption of soybeans. Among the several classes of phytochemicals present in soybeans, isoflavones are being the focus of intensive research about soy products intake and prevention of diseases. However, it is necessary to have accurate data about the concentration of these compounds present in foods in order to have reliable results from studies investigating isoflavones and soy foods in the diet to health outcomes. In this work, the concentration of the 12 main isoflavones present in soybeans (Daidzin, Glycitin, Genistin and their respective acetyl, malonyl and aglycone forms) was determined in a variety of soy foods available in local major supermarket chains (Dia, Mercadona, Lidl, E.Leclerc, HiperSimply) of Soria, Spain. Soy products included soybeans, fried soybean, textured soy protein, canned soy, soy beverages, milk with added isoflavones and tofu, among others. Optimized conditions of both sample preparation and analysis methods were used to ensure that highly quality data were acquired. Analysis of more than fifty samples revealed that isoflavone profile and concentration is highly variable and depends of several factors. Total isoflavone concentration (including all chemical forms) ranged between 45.3 and 3562.8 mg.Kg⁻¹, found in soy yogurt and fried soybeans, respectively. In general, isoflavone profile depends on the kind of food. Soy beverages, for instance, have mainly glucosides and malonyl glucoside forms, whereas for tofu the main isoflavones were malonyl and aglycone forms. Variability may be caused by several factors, including soybean variety, processing and storage. Products from different manufacturers were also analyzed and provided valuable information about the variability within the same type of soy food.

Keywords: Isoflavones; Daidzin; Genistin; Glycitin; Soy foods; Spanish market

Composition of nutritional starches in processed plantain (Musa AAB)**Ebun-Oluwa Oladele^{1,2}, Santosh Khokhar¹**¹*University of Leeds, Leeds*, ²*Federal University of Technology, Akure, Nigeria*

Plantain, a member of the banana family is an important staple food in the tropics. It is edible when fully ripe but in most cases it is cooked before consumption. Despite its abundance in the diet of many populations, quantitative and qualitative data on various starch fractions are scarce. In vitro digestibility of starch for processed and unprocessed samples was determined using pancreatic α -amylase and amyloglucosidase (Englyst & Englyst, 2004), and D-glucose was measured using glucose oxidase/peroxide reagent. Resistant starch content in uncooked samples was 36.6 ± 1.5 g/100g and 62.7 ± 2.9 g/100g for ripe and unripe samples. Resistant starch (RS) in cooked samples reduced up to 90% and 76% in the ripe and unripe samples, respectively. Slowly digestible starch (SDS) values were between 0.6 and 9.2 g/100g, while rapidly digestible starch (RDS) ranged between 25.6 – 56.6 g/100g for processed samples. Starch digestibility index (SDI), which is the ratio of the rapidly released glucose to the total starch content was lowest in the grilled samples (0.6). It is concluded that processing techniques affect the type and content of nutritional starches and therefore it will be essential to optimize processing techniques to maximize the RS and SDS which are known to have positive effect on postprandial glucose response.

Keywords: Plantain, resistant starch, slowly digestible starch, rapidly digestible starch, processing

Determination of Optical Parameters Scanned from the Surface of Green and Roasted Beans of *Coffea arabica* and *Coffea canephora* Pierre

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Roasting of coffee is a key process in production of the final organoleptic characteristics of coffee, on which its quality depends. Roasting temperatures range from 195 – 220 °C and roasting time from 2 – 25 minutes. It is very important to estimate the optimal degree of roasting, due to possible violations and over-roasting of grains causing coffee depreciation. The aim of the experimental work was to develop a method for measuring of optical RGB parameters when scanning the surface of coffee beans and for sufficiently correct and accurate conversion to CIE Lab system parameters, namely L, a* and b*. The reason was to establish criteria for the quality control of raw material (coffee beans) for the subsequent coffee technology. As the method of measurement microspectrophotometry was used in which firstly the macroscopic pictures of the coffee bean surfaces were taken, afterwards the acquired images were evaluated using the AxioVision software, version 4.9 (Zeiss MicroImaging GmbH, Germany) and optical characteristics were measured, namely the RGB data. Subsequently, acquired characteristics were converted to CIE Lab system parameters L, a* and b*. The results can contribute to the quality assessment of coffee beans, which was until recently in outdated material controls carried out by measuring of metric parameters of coffee beans (particle size analysis), with following manual quality inspection. Specific numbers will be presented on the poster. The result of the measurement was the obtaining of normative values for the assessment of coffee during the technological process of coffee production enabling to achieve high quality intermediate product for roasting of coffee.

Keywords: coffee bean, CIE Lab system, UV-Vis microspectrophotometry, roasting, quality

Determination of Optical Parameters of Colour of Ketchups from the Czech Market and their Comparison with the Results of Sensory Analysis

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This work is focused on two types of analysis: Sensory analysis with the aim to find out the preferences of Czech consumers regarding the colour of ketchup and subsequently physical image analysis, the readout of which is the objective characterization of the colour of selected ketchups commonly available on the Czech market with the CIELab system parameters L, a* and b*. On the basis of the comparison of the results of both analyses it is possible to objectively describe the preferences of the Czech market regarding the colour of ketchup. Within the scope of this work the colours of the random selection of 9 ketchups from domestic and foreign producers were determined by the image analysis of macroscopic pictures. In the first phase the reflectance of the polychromatic beam was measured and expressed as RGB data that were subsequently converted to the CIELab system parameters. With the commercial spectrophotometer random control measurements were performed. Sensory analysis of the samples was performed according to the standard methods by a group of untrained panellists. The results of the sensory analysis show that ketchups available on the Czech market move along the colour scale from reddish-orange to brownish-red without more significant deviations. Green ketchups, eventually other colour variants aren't commonly available on the Czech market. The results of the optical parameters determination move along relatively narrow interval as well and will be presented on the poster. By the comparison of the results of both analyses with the help of statistical analysis it was determined that the most positively valued colour by the consumers is the „tomato-like“ red, indicating the usage of high ratio of tomato puree, characterized by the L, a*, b* values. This fact is particularly important for ketchup producers and distributors.

Keywords: ketchup; colour; sensory analysis; optical parameter; microspectrophotometry

Analyses of vitamin K in eggs and leguminous plants for the Swedish Food Database

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Rationale and objectives: An analysis project including a wide variety of nutrients is performed each year at the Swedish National Food Administration (NFA). The matrices analysed are chosen according to the needs from nutritionists. In 2008 eggs and leguminous plants, i.e. pulses, were analysed and the results for vitamin K and the method used are presented.

Materials and methods: Both eggs from conventional and organic production were collected from different farmers in Sweden. Three hen breeds were represented. Among the pulses chickpeas, lentils and different kinds of beans were analysed. Both preserved and cooked samples were used. Samples were bought in different shops and products of the same category were pooled before analysis.

The principle of the analysis method is as follows. The sample is mixed with 70% ethanol and the fatty soluble components are extracted with heptane during reflux cooking. The heptane phase is concentrated and the final extract is analysed by reversed phase HPLC with a fluorescence detector. A reduction column filled with zinc powder is used, and therefore vitamin K can be detected with a low detection limit.

Results: In the eggs the contents of vitamin K₁ were in the range 0.3-1.5 µg/100 g, while the contents of vitamin K₂ were much higher (22-31 µg/100 g). The lowest contents of vitamin K₁ were near the detection limit of 0.3 µg/100 g. The contents of vitamin K₁ in the pulses were in the range 3-15 µg/100 g.

Conclusion: The beans had lower contents of vitamin K₁ than the chickpeas and the lentils. The eggs from the three breeds gave slightly different results, but there was no clear difference between the two production methods.

Keywords: Vitamin K, analysis, pulses, egg, food database

Methods to express dispersion of the analytical values in food composition data**Isabel Castanheira¹, Ana Sofia Matos², Mark Roe³, Maria Antónia Calhau¹, Paul Finglas³**

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In Europe one feature of National Food Composition Databanks (nFCDBs) is to provide data sound supported in standardized quality assurance procedures. According to recently requirements the concept of data quality incorporates the evaluation of the measurement uncertainty (MU) as an indicator of the reliability of the result. The aim of this work is to study the typification of methods to estimate measurement uncertainty in food composition analysis in compliance with the criteria established in Guide to the expression of uncertainty in measurement (GUM). The work addressed the so-called “experimental approaches”. The data used in these approaches were typically precision and bias data obtained from within-laboratory validation studies, quality control, inter-laboratory method validation studies, or proficiency testing schemes. The examples covered different nutrients such as proteins; minerals; trace elements and vitamins. A comprehensive specification of the measurement procedure is given as well as an analysis of the effects affecting measurement results. In most of the cases reproducibility was the major of source of uncertainty. Systematic uncertainty budgets presented here facilitate the evaluation of data performed by different laboratories and could assist compilers to establish target uncertainty as a parameter associated to nutrient value that expresses the dispersion.

Anti-oxidant activity and Total phenol content of commonly consumed Indigenous vegetables and fruits of Bangladesh

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Food can modulate various functions in the body in addition to supply the basic nutrients. The bioactive compounds, such as secondary metabolites of plant origin foods has been reported for their potential health beneficial role, includes, anti microbial, anti-carcinogenic, anti-inflammatory, anti-allergic etc. In Bangladesh, diet related chronic diseases are increasing day by day. For the management of present critical health situation, advanced research study is needed to investigate and identify the potential functionality of indigenous and commonly consumed foods of Bangladesh. In order to screening Total Polyphenol Content (TPC) and antioxidant activity of 37 commonly consumed indigenous foods of Bangladesh, included 6 Green leafy vegetables (GLV), 16 non leafy Vegetables(NLV) and 15 fruits were analyzed. Freeze-dried samples were subjected to sequential extraction of hexane/dichloromethane (1:1) and AWA (acetone/water/acetic acid 70:29.5:0.5). TPC were determined spectrophotometrically according to the Folin-Ciocalteu method and the anti-oxidant activities were determined by Radical Scavenging Activity (DPPH-RSA). TPC ranged from 0.60 ± 0.05 to 27.65 ± 1.45 mg of Gallic acid equivalent (GAE)/g on a fresh weight (FW) basis in analyzed vegetables and 6.95 ± 0.01 to 0.04 ± 0 in fruits. Antioxidant activities are varied from 0.61 ± 0.19 to 652.6 ± 2.78 μmol Trolox equivalent (TE)/g of FW of vegetables where as, 180 ± 4.5 to 0.42 ± 0 in fruits. A linear relationship was observed between antioxidant activities and TPC content in Amaranth gangeticus, Amaranth viridis, Brinjal (green), Coriander leaves, Mint and Ipomoea leaves ($R^2=0.9606$). Statistical analysis by using Pearson correlation coefficient test shows anti-oxidants activity significantly and positively correlated with TPC ($p < 0.01$) in six vegetables and four fruits. Present study result indicates, selected tropical indigenous vegetables and fruits containing high TPC may provide source of dietary anti-oxidants to prevent the chronic diseases caused by free radicals.

Keywords: total polyphenols, anti-oxidant activity, DPPH radical scavenging activity, Fruits and vegetables.

A Comparative Study of Different Extraction Solvents on the Determination of Lycopene and Beta-Carotene in Vegetables

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This research was focused on the influence of some extraction solvents for the determination of lycopene and beta-carotenes in vegetables. In the study, different extraction solvents were prepared for the comparison of extraction efficiency of methanol (MeOH) (100%), acetonitrile (ACN) (100%) and tetrahydrofuran (THF) which ranges from 10% to 80% in MeOH and ACN respectively. Potassium hydroxide (KOH) was used in the saponification solutions at room temperature. Each sample was dried using a rotary evaporator at temperatures between 35 °C and 40 °C. The separation and determination of lycopene and beta-carotene were carried out by high performance liquid chromatography (HPLC) with photo diode array (PDA) detector. The mixture of MeOH/THF (95:5 (v/v)) showed better resolution for lycopene and beta-carotene as a mobile phase. In the meantime, a similar study was performed for non-saponificated samples with high chlorophyll content. Direct extraction with THF:MeOH at different concentrations provided adequate HPLC separation of chlorophyll and carotene peaks (lycopene and beta-carotene).

We can conclude that the extraction with THF/MeOH (80:20 (v/v)) provided better recovery for samples which contain high level of lycopene. High contents of THF (90%-100%) proportion in the extraction solvent can cause the deformation of the chromatographic peaks due to the polarity difference. On the other hand, low amounts of beta-carotene was identified in the samples which were extracted with MeOH (100%) or ACN (100%) however, lycopene was not detected due to its poor solubility in these solvents. As a result, samples can be extracted directly with THF/MeOH without the need of saponification. Direct extraction has been shown to be a great impact on the quality and yield of lycopene and beta-carotene for vegetables.

Keywords: Lycopene, Beta-Carotene, extraction, solvents HPLC

Compositional and physical quality change during storage on polyethylene film in cherry tomato (*Lycopersicon esculentum* Mill.)

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Rationale and objectives: Tomato is considered a climacteric fruit, in which ripening is accompanied by a peak in respiration and a concomitant sharp increase in ethylene production, which accelerates quality loss through the physicochemical changes related to this process, such as softening and color evolution. Modified atmosphere packaging (MAP) is a technique that has been used to prevent or retard postharvest fruit ripening and its associated biochemical and physiological changes by favorably altering the O₂ and CO₂ levels around the products. In this study, effect of MAP on the storage and fruit quality of cherry tomato (*Lycopersicon esculentum* Mill. cvs. 'Alona' and 'Naomi') was investigated.

Materials and methods: Effect of MAP on the storage and fruit quality of cherry totamo (*Lycopersicon esculentum* Mill. cvs. 'Alona' and 'Naomi') was investigated. MAP studies were carried out by using 50 µPE with an O₂ permeability of 303.20 mL/mdayatm² and a CO₂ permeability of 64.27 mL/mdayatm², and by using 100 µPE with an O₂ permeability of 116.60 mL/mdayatm² and a CO₂ permeability of 112.40 mL/m/day/atm² at 5°C. All treatments in NA and MAP were stored in 5–7°C and 90±5%. Parameters such as weight loss, total soluble solids, firmness, acidity, ascorbic acid, lycopene, beta-carotene, and the ratio of O₂ and CO₂ in MAP were observed in the cherry tomatoes throughout the storage period at 7-day intervals. Results and Discussion: 50 µPE produced the best result in the two cultivars at the end of the 28-day storage with respect to the parameters evaluated in the study. Therefore, especially 50µPE treatment was effective with regard to delaying the maturity along the storage and fruit quality in tomatoes.

Keywords: *Lycopersicon esculentum*; MAP; O₂ and CO₂; Quality; Storage

SESSION 8 –

Effective capacity development and training

S8.P1

The Official Slovak Development Support Programme in food composition area for Central and Eastern European countries

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Objectives: The Slovak Republic has created specialized workplace Food composition databank (FCDB) in Food Research Institute. FCDB has been working on collecting of food composition data and building up the food composition databases. Most of Eastern European Countries (CEE) have not built similar databases and therefore FCDB Slovakia in the frame of the Official Development support Program enhances and strengthens knowledge of potential food composition data producers and compilers and thus helps to enhance creation of the national food composition databases in CEE area.

Materials and methods: Within this Program FCDB since 2004 have been providing grants to various training, workshops and capacity building activities for the region of Central and Eastern Europe. Following tools has been used on trainings activities: Slovak Food Composition Data Bank (SFCDB) methodology, generally accepted methodology on food composition databases management and use (harmonized within EuroFIR project European Food Information Resource Network), and nutritional Software Alimenta with the Slovak database.

Results and conclusions: The support has been addressed to Armenia, Belarus, Georgia, Kazakhstan, Macedonia, Russia, Serbia, and Ukraine. The target countries are expected to actively nurture and implement gained knowledge and experience to the local situation, which is a challenge in the CEE region. Pan-European objectives and recommendations in harmonisation of the food composition database systems have been disseminated and a contact network enhances networking of experts working in food composition issues. In general, development support via training courses, visits and technical support is an important tool in capacity building and in disseminating our common goal, i.e. to produce quality data on food composition all over Europe.

Keywords: CEE countries, capacity building, developing and technical support

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Food Composition and Sustainable Diets

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**Author, Affiliation and
Presentation Codes Index**

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Participant code: consists of 3 components as follows:

- 1) S₁ – to S₁₂ = Session 1 to Session 12
- 2) O = Oral Presentation, P = Poster Presentation
- 3) Number after O = order of presentation in each session
- 4) Number after P = poster number in each session

Example:

S₃-P₃ means Session 3 – Poster presentation – Number 3 and
S₃.P₃ = this person is presenting

Author	Affiliation	Presentation Code
Aboul ella, Nebal	National Nutrition Institute	<u>S₃.P₃</u>
Abril, Victoria	Cuenca University	S ₆ .P ₈
Achu Loh, Mercy	University of Yaounde	S ₂ .O ₆
Aderibigbe, Olaide	Centre of Excellence for Nutrition, North West University	S ₁ .P ₁
Adetogun, Adekemi	University of Agriculture	S ₁ .P ₁
Aguzzi, Altero	INRAN - National Institute for Research on Food and Nutrition	S ₁ .P ₁₈
Akbudak, Bulent	University of Uludag	<u>S₁.P₂₃</u> , S ₇ .P ₁₂
Akbudak, Nuray	University of Uludag	S ₁ .P ₂₃ , <u>S₇.P₁₂</u>
AKIN, Mehtap	Selcuk University	S ₆ .P ₂₅
AKIN, Nihat	Selcuk University	<u>S₆.P₂₅</u>
Akinyele, Issac	AFROFOODS	S ₁₂ .O ₃
Akinyemi, Olamide	University of Agriculture	S ₁ .P ₁ , S ₁ .P ₂
Akkus Çevikkalp, Senem	Tübitak MRC	S ₇ .P ₁₁
Alacid, Mercedes	Univestidad Politécnica de Cartagena	S ₁ .P ₄
Albuquerque, Tania	Instituto Nacional de Saúde Doutor Ricardo Jorge	S ₄ .O ₄
Aldick, Thomas	Institute of Food Research	S ₉ .O ₁
Alexieva, Iordanka	University of Food Technologies	S ₄ .O ₅ , S ₆ .P ₁₆ , S ₆ .P ₁₇ , S ₆ .P ₁₈
Aliyu, Hassan	University of Calabar	S ₁₂ .O ₄
Alonso-Aperte, Elena	San Pablo-CEU University	S ₃ .P ₅
Aman, Per	Swedish University of Agricultural Science	S ₆ .P ₃₃
Amaro, Manuel	University of Córdoba	S ₅ .P ₄
Amiot, Marie Josèphe	INRA	S ₅ .P ₆ , S ₅ .P ₇

Author	Affiliation	Presentation Code
Amoutzopoulos, Birdem	Tübitak MRC	S7.P11
Ananthan, R	Food Chemistry Division, National Institute of Nutrition	<u>S6.P24</u>
Andersson, Agneta	Uppsala University	S6.P33
Andrade, Susana	Cuenca University	S6.P8
Anigo, Kola	University of Calabar	S12.O4
Aoudé Werner, Dalal	AERIAL	S5.P7
Arcot, Jayashree	Food Science and Technology, University of New South Wales	S11.O1, S5.O2
Arslan, Idris	Pamukkale University	<u>S7.P3</u>
Ashida, Kanae	National Agricultural Research Center for Western Region	S1.P9
Ashkanani, Fatemah	University of Leeds, School of Food Science and Nutrition	<u>S6.P14</u>
Astudillo, Gabriela	Cuenca University	S6.P8
Autonell, Marta	Department of Health Protection, Ministry of Health and Consumer, Government of the Balearic Islands	S6.O5
Ávila, José Manuel	Spanish Nutrition Foundation	S2.P4, S4.O3
Azzini, Elena	INRAN - National Institute for Research on Food and Nutrition	S1.P18
Baba, Naomichi	Okayama University	S7.P2
Barikmo, Ingrid	Akershus University College	S12.O3
Bartl, Pavel	University of Veterinary and Pharmaceutical Sciences Brno	S6.P26
Bassett, Natalia	Institute of Biological Research. Department of Nutritional Biochemistry	S1.P11, S4.P1
BC, Viraktmath	National Institute of Nutrition	S1.O6
Begum, Parveen	University of Dhaka	S2.O4
Bell, Simone	EuroFIR AISBL	S12.O1, <u>S6.O6</u> , S6.P2, <u>S6.P32</u>
Benedik, Evgen	University Children's Hospital, University Medical Centre	S3.O6
Benelam, Bridget	British Nutrition Foundation	S6.P21
Bertoncelj, Jasna	University of Ljubljana, Biotechnical Faculty	S1.P8
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Author	Affiliation	Presentation Code
Bhattacharjee, Lalita	FAO- National Food Policy Capacity Strengthening Programme	S2.04
Biesalski, Hans Konrad	Institute for Biological, Chemistry and Nutrition, University of Hohenheim	S1.P3
Biringen Löker, Gül	Tübitak MRC	S7.P11
Black, Lucinda	University College Cork	S6.P2
Blanco-Metzler, Adriana	Costa Rican Institute of Research & Teaching on Nutrition and Health	<u>S12.05</u> , S2.P3, <u>S3.P6</u> , <u>S3.P8</u>
Bonglaisin, Julius	CRAN-IMPM	S2.06
Boonpor, Jirapicha	Institute of Nutrition, Mahidol University	S2.P2
Bordoni, Alessandra	University of Bologna	S1.P14
Boyko, Nadiya	Uzhhorod National University	S4.05, S5.01
Brants, Henny	Institute for Public Health and the Environment, centre for Nutrition and Health	S4.02
Brat, Pierre	CIRAD	S5.P7
Brouwer, Inge	university of nairobi	S6.P10
Brunt, Kommer	Eurofins Food	S8.01, <u>S8.05</u>
Buddhadasa, Saman	National Measurement Institute Australia	S2.05
Buhyna, Larysa	Uzhhorod National University	S5.01
Burgering, Maurits	TNO Innovation for Life	S8.01
Burlingame, Barbara	Food and Agriculture Organisation of the United Nations (FAO)	S2.02, S6.P12
Burrows, Paul	Biotechnology and Biological Sciences Research Council	<u>S1.02</u>
Busamongkol, Arpom	Thailand Institute of Nuclear Technology	S6.P34
Buttriss, Judith	British Nutrition Foundation	<u>S1.01</u> , S12.01, S6.P21
Bysted, Anette	National Food Institute, Technical University of Denmark	S10.05
Caboni, Maria Fiorenza	University of Bologna	S1.P14
Calhau, Maria Antonia	INSA	S12.01
Calhau, Maria Antónia	Instituto Nacional de Saúde Doutor Ricardo Jorge	S3.P10, S5.P8, S7.P9
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Author	Affiliation	Presentation Code
Calvo Carrillo, Concepción	Instituto Nacional de Ciencias Medicas y Nutrición Salvador Zubiran	S1.P5, S6.P4
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Camões, M. Filomena	Faculdade de Ciências da Universidade de Lisboa	S1.P13
Campbell, Norm	PAHO Expert Group on Cardiovascular Disease Prevention through Dietary Salt Reduction	S3.P6, S3.P8
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Castellar, M Rosario	Univestidad Politécnica de Cartagena	<u>S1.P4</u> , S2.P1
CELIK, Ali	Pamukkale University	S7.P3
Chan, Victoria	Costa Rican Institute of Technology	S3.P8
Charoenkiatkul, Somsri	Institute of Nutrition, Mahidol University	<u>S1.P20</u> , S1.P21
Charrondière, U. Ruth	Food and Agriculture Organization of the United Nations (FAO)	<u>S2.O2</u> , S6.P12
Chelea, Matchawe	CRAN-IMPM	S2.O6
Chetty, Joelaine	South African Medical Research Council	S10.O4, <u>S6.P22</u>
Chibuzo, Elizabeth	University of Calabar	S12.O4
Christensen, Tue	National Food Institute, Technical University of Denmark	S5.P1
Chrysochoidis, George	FoodCon	S6.O6
Chukwu-Ebi, Jane	University of Calabar	S1.P7
Church, Susan	Susan Church	S11.O4, S3.P1, S6.P21
Coelho, Ines	National Institute of Health Dr Ricardo Jorge	S6.P31
Colom, Antoni	Colegio Oficial de Dietistas Nutricionistas de Baleares	S6.O5
Colombani, Paolo	ETHZ	S12.O1, <u>S6.O3</u> , S6.P32
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Author	Affiliation	Presentation Code
Conte, Costanza	International Association for Cereal Science and Technology	S6.P2
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Daniel-Lamazière, Marie-Dominique	CHU	S3.P7
Dan, Milana C. T.	University of Sao Paulo - Pharmaceutical Science Faculty	S5.P2, S8.03, S9.03
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Djekic-Ivankovic, Marija	Centre of Research Excellence in Nutrition and Metabolism	S6.02
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Donoso, Silvana	Cuenca University	S6.P8
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Dunford, Elizabeth	The George Institute for Global Health	<u>S9.02</u>
DuRand, Gerrie	University of Pretoria. Department of Consumer Science	S6.P22
Elahi, Selvarani	LGC Limited	S11.04, S3.P1, S7.06
El Bilali, Hamid	CIHEAM-Mediterranean Agronomic Institute of Bari	S1.05
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Ene-Obong, Henrietta	University of Calabar	<u>S1.P7</u> , <u>S12.04</u>
Englyst, Klaus	Englyst Carbohydrates Ltd	<u>S7.06</u> , S8.02
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Exler, Jacob	USDA-ARS-Nutrient Data Laboratory	S3.02
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Farron-Wilson, Melanie	Department of Health	S11.04, S3.P1
Federico, Ferioli	University of Bologna	S1.P15
Fedosova, Katerina	Department of Nutrition, Odessa National Academy of Food Technologies	S4.05, S6.P17
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Fiedlerova, Vlasta	Food Research Institute Prague	S6.P1
Finglas, Paul M	Institute of Food Research	S4.05, S5.P8, S6.02, S6.06, S6.P16, S6.P17, S6.P18, S6.P2, <u>S6.P21</u> , S6.P32, S7.01, S7.P9 S11.04, <u>S12.01</u> , S3.P1, <u>S6.P6</u>

Author	Affiliation	Presentation Code
Fitt, Emily	MRC Human Nutrition Research	<u>S3.03</u>
Flores, Cristina	Food and Nutrition Department, Instituto Nacional de Saude Doutor Ricardo Jorge	S6.P18
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Gabrovska, Dana	Food Research Institute Prague	S6.P1
G. Albuquerque, Tânia	Food and Nutrition Department, Instituto Nacional de Saude Doutor Ricardo Jorge	S4.05, S6.P15, S6.P17, S6.P18
Ganguli, Abhijit	Thapar University	S2.P5
García-Lafuente, Ana	Centro para la Calidad de los Alimentos, Instituto Nacional de Investigación Y Tecnología Agraria y Alimentaria	S6.P19, S7.P4
García, Vanesa	University CEU San Pablo	S2.P4
Garduño-Díaz, Sara Diana	University of Leeds, School of Food Science and Nutrition	<u>S6.P9</u>
Gauvreau, Julie	ANSES	<u>S6.01</u>
Gebhardt, Susan	USDA-ARS-Nutrient Data Laboratory	S3.02
Georgé, Stéphane	CTCPA	<u>S5.P6</u> , <u>S5.P7</u>
Giambanelli, Elisa	University of Bologna	S4.04
Gimenez, Alejandra	Facultad de Ingenieria , Universidad Nacional de Jujuy	S6.P31
Giuntini, Eliana B	Depto Alimentos e Nutricao Experimental, Faculdade de Ciencias Farmaceuticas/USP	S8.03, S9.03
Glibetic, Maria	Centre of Research Excellence in Nutrition and Metabolism	<u>S6.02</u>
Godoy, Carolina	Instituto Minha Escolha - Brasil	S9.03
Goldsmith, Rebecca	Ministry of Health	<u>S3.04</u> , <u>S4.P3</u>
Golob, Terezija	University of ljubljana, Biotechnical Faculty	S1.P8, S10.02
González de Núñez, Leticia	University of Panama	S12.05

Author	Affiliation	Presentation Code
Goulão, Beatriz	School of Health Technology of Lisbon	S5.P8
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Grönholm, Rasmus	National Food Administration	S7.P8
Gry, Jørn	Danish Technical University	S6.P2
Gueifão, Sandra	National Institute of Health Dr Ricardo Jorge	S6.P31
Guillamón, Eva	Centro para la Calidad de los Alimentos, Instituto Nacional de Investigación Y Tecnología Agraria y Alimentaria	S6.P19, S7.P4
Gurinovic, Mirjana	Centre of Research Excellence in Nutrition and Metabolism	S6.02
Haglund, Maria	National Food Administration	S1.P16
Hall, Nicolette	University of Pretoria	<u>S7.04</u>
Hansen, Kirsten S.	National Food Institute, Technical Univ. of Denmark	S10.05
Hartmann, Bernd	Max Rubner-Institute	S11.03
Hayran, Osman	TC Yeditepe University	S4.04, S6.P18
Haytowitz, David	USDA-ARS-Nutrient Data Laboratory	S11.02, S3.02
Hoffmann, Ingrid	Max Rubner-Institute	S11.03
Holasova, Marie	Food Research Institute Prague	<u>S6.P1</u> , S9.04
Holden, Joanne	USDA-ARS-Nutrient Data Laboratory	S11.02, <u>S3.02</u>
Holford, Paul	School of Natural Sciences, University of Western Sydney	S5.02
Hollmann, Juergen	Max Rubner-Institute	<u>S8.04</u>
Hollman, Peter	Wageningen University	S12.01, S6.02
Hossain, Sharmin	Institute of Nutrition of Food Sciences	S7.P10
Hsu, James	Food Science and Technology, University of New South Wales	S11.01
Husain, Wafaa	University of Leeds	<u>S6.P13</u>
Imaeda, Nahomi	Nagoya Women's University	<u>S6.P28</u>
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Ireland, Jayne	Danish Food Information	S6.05

Author	Affiliation	Presentation Code
Islam, Sheikh Nazrul	University of Dhaka	S2.O4
Ismail, Mervat	National Nutrition Institute	S3.P3
Jakobsen, Jette	National Food Institute, Technical Univ. of Denmark	S10.O5
Jansen-van der Vliet, Martine	National Institute for Public Health and the Environment	S6.P11, <u>S6.P20</u>
Jastrebova, Jelena	Swedish University of Agricultural Sciences, Department of Food Science	S6.P29
Jiménez Aguirre, Héctor Daniel	Universidad Autónoma Metropolitana	S1.P5
Johnson, Phil	Institute of Food Research	S6.P6, <u>S9.O1</u>
Judprasong, Kunchit	Institute of Nutrition, Mahidol University	S1.P20, S1.P21, <u>S2.P2</u> , <u>S6.P34</u> , S7.O5
Kadvan, Agnes	Centre of Research Excellence in Nutrition and Metabolism	S6.O2
Kalonji, Esther	ANSES	S3.P7
Kamal-Eldin, Afaf	Swedish University of Agricultural Science	S6.P33
Kambuou, Rosa	National Agricultural Research Institute	S5.O2
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Karanja, Paul N.	Jomo Kenyatta University of Agriculture and Technology	<u>S7.P2</u>
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Kawsar, Mahbuba	University of Dhaka	S2.O4
Kerr, William L.	Department of Food Science and Technology, University of Georgia	S1.P19
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Author	Affiliation	Presentation Code
Khokhar, Santosh	University of Leeds	<u>S4.01</u> , S6.P13, S6.P14, S6.P9, S7.P5
Kiely, Mairead	University College Cork	S6.P2
Kilasonia, Zaza	Elkana, Hiological Farming Association	S4.05, S6.P16, S6.P17, S6.P18
Kim, Cho-il	KHIDI	S10.01
Kim, Dohee	KHIDI	S10.01
Kim, Jiwon	KHIDI	S10.01
Kinyuru, John N.	Jomo Kenyatta University of Agriculture and Technology	S7.P2
Kinyuru, John Ndungu	Jomo Kenyatta University of Agriculture & Technology	<u>S6.P5</u>
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Kocaoglu, Bike	TC Yeditepe University	S4.04, S4.05, S6.P16, S6.P17
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Koval, Nelya	Uzhhorod National University	S6.P17, S6.P18
Krines, Claudia	TTZ Bremerhaven	S6.06
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Author	Affiliation	Presentation Code
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Lindhauer, Meinolf G.	Max Rubner-Institute	S8.04
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Lo, K.M.	Chinese University of Hong Kong Food Research Centre	S10.03, S6.P27
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Author	Affiliation	Presentation Code
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International Network of Food Data Systems (INFOODS)

International Network of Food Data Systems (INFOODS) was established in 1984 on the basis of the recommendations of an international group convened under the auspices of the United Nations University (UNU) and is since 1999 coordinated through FAO. Its goal was to stimulate and coordinate efforts to improve the quality and availability of food analysis data worldwide and to ensure that anyone anywhere would be able to obtain adequate and reliable food composition data. In order to achieve the goal INFOODS has

- developed standards (e.g. tagnames, food nomenclature, interchange)
- published guidelines for collection, compilation, and reporting of food component data (e.g. Rand et al; 1991; Greenfield and Southgate, 2003)
- provided input into training and capacity building (e.g. 20 food composition courses between 1992 to 2009, Food Composition Study Guide, 2009)
- assisted countries to develop their national food composition tables and databases (e.g. South Pacific, Lesotho and Armenia)

INFOODS and FAO are currently promoting food biodiversity and the collection of compositional and food consumption data at variety, cultivar and breed level, as well as data on wild and underutilized foods. Through this approach, it is hoped that food biodiversity will be mainstreamed in nutrition programmes and policies.



INFOODS is a global network and operates through regional data centres. The INFOODS effort is intrinsically interdisciplinary, depending on the efforts of food scientists, analytical chemists and nutritionist working together with computer and information scientists.

EuroFIR AISBL

The European Food Information Resource Network project (2005-10; **EuroFIR**) was a Network of Excellence (NoE) comprising of 48 partners from academia, research organisations and small-and-medium size enterprises (SMEs) in 27 countries. The project was funded by the European Community's Sixth Framework Programme (Priority 5: Food Quality and Safety; Contract no FP6-513944).

One of its main objectives was to develop, for the first time in Europe, a single online platform with up-to-date food composition data across Europe. Another important outcome of EuroFIR NoE was the establishment of a longer-term sustainable platform to continue some of the activities set up during the project and this was achieved by the creation of a non-profit international association, **EuroFIR AISBL**. The association is based in Brussels, with 42 of the original 48 EuroFIR NoE partners joining as Members.

The purpose of the Association is the development, management, publication and exploitation of food composition data, and the promotion of international cooperation and harmonization through improved data quality, database searchability and standards.

EuroFIR AISBL offers a single and unique food information resource to academia, industry, public sector funding bodies and regulators, as well as researchers, dietitians and students, who are all welcome to join the association as a member.

The Association provides its members with:

- Access to harmonised and documented food information (energy and nutrient values)
- Use of standardised food composition data in software tools
- Access to innovative software tools and databases (e.g. critically evaluated data on the content and biological effects of bioactive constituents in plant based foods)
- E-learning modules and specialised training courses
- Valuable references and standardised vocabularies for the handling of food information
- Best practice and innovation support
- Professional development
- Networking/representation and the possibility to take part in pre-competitive research and development projects in the food and health field

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