

## Antibiotics and their Effect on Drug-Resistant Pathogens in Food: A Study on Sublethal Streptomycin Pressure on MRSA Biofilm Formation

Junyan Liu<sup>1</sup>, Viduranga Waisundara<sup>3</sup>, Dr. Zhenbo Xu<sup>1,2</sup>, Dr. Mark Shirtliff<sup>2</sup>

<sup>1</sup>School Of Food Science And Engineering, South China University Of Technology, Guangzhou, China, <sup>2</sup>Department of Microbial Pathogenesis, University of Maryland, Baltimore, United States, <sup>3</sup>Australian College of Business and Technology - Kandy Campus, Kandy, Sri Lanka

### **Biography:**

Brief introduction of your research experience:

2016.1-present, South China University of Technology, Associate Professor

2017.3-present, University of Maryland, Adjunct Associate Professor

2011.9-2015.12, South China University of Technology, Assistant Professor

Representative awards: National Outstanding Ph.D. Dissertation (2014), Pearl River S&T Nova of Guangzhou (2017) and Scientific and Technological Innovation Youth Elitist in Guangdong Special Support Program (2017).

Funding: Current > 1,800,000 RMB, Total > 3,500,000 RMB

Publication: > 65 SCI papers (First/Correspondence), Total IF > 125, Total Citation > 1100, H-Index = 25

International meetings: 6 Keynote and 6 oral presentations, 4 travel grants

Research perspectives

Bacteria and toxins: Rapid detection

Biofilm genetics: Surveillance and epidemiology study on bacterial biofilm phenotypes and genotypes, resistance phenotypes and molecular mechanisms

--Genomes > 35, Transcriptomes > 50, Novel plasmids/genes > 25

VBNC cells: Formation, resuscitation and pathogenicity of VBNC for bacteria, as well as the regulatory mechanisms

*Bacterial biofilms: Phenotypic and genotypic study on biofilm formation, correlation between biofilm formation and food processing, biofilm formation under low concentration of antibiotic, and polymicrobial biofilms*

**Introduction:** It is a common belief that incorporation of antibiotics to food may promote drug-resistant pathogen growth of clinical significance. Biofilm formation is regarded as one of the major indicators which denote the prevalence of drug-resistant pathogens such as methicillin-resistant *Staphylococcus aureus* (MRSA). However, in this particular instance, the effect of antibiotic pressure on MRSA biofilm formation, as well as the mechanism, remains unclear.

**Purpose:** This study aimed at investigating the effect of sublethal streptomycin (STR) pressure on MRSA biofilm formation, as one of the means of investigation antibiotic effects on boosting drug-resistant pathogen development.

**Methods:** The biofilm biomass of MRSA strain 10071 showing strong resistance (MIC=512 µg/mL) to STR were determined under 10 STR concentrations (from 4 to 1/128 MIC with 1/2 dilution) by crystal violet assay. The biofilm sample formed under 1/4 MIC STR pressure was further applied on transcriptomics analyses by RNA-seq and RT-qPCR.

**Results:** The biofilm biomass of MRSA strain 10071 was significantly increased under sublethal (1/4 MIC) STR pressure at 8 h. Upon transcriptomics analysis by RNA-seq, 1763 genes (766 up-regulated and 997 down-regulated genes) showed significantly differential expression. The differentially expressed genes (DEGs) enriched in GO terms including cellular process, metabolic process, and single organism process. Concerning KEGG pathways, Biosynthesis of amino acids, Carbon metabolism, and Glycine, serine and threonine

metabolism were enriched in up-regulated DEGs and Ribosome, Folate biosynthesis, and Sulfur relay system were enriched in down-regulated DEGs. Based on bioinformatics analysis, 24 potential key genes were selected to further verified by RT-qPCR. The expression of *lytR*, *arlR*, and *hssR* genes were consistent and might play important roles in the biofilm formation of MRSA strain 10071 under sublethal STR pressure. Conclusions: Sublethal STR pressure was seen to enhance the biofilm biomass of MRSA strain 10071 and the expression of *lytR*, *arlR*, and *hssR* genes might play important roles. It may also be inferred through these study outcomes that antibiotics such as streptomycin does have an effect on drug-resistant pathogen development, and biofilm formation could be considered as a plausible parameter to evaluate this aspect.

## MICROBIAL EVALUATION OF 'ADOYO' DRINK SOLD IN ABEOKUTA, OGUN STATE

Dr. Mojisola Adegunwa<sup>1</sup>, Dr Henri Bakare<sup>1</sup>, Dr Emmanuel Alamu<sup>2</sup>, Miss Yejide Da-Silva<sup>1</sup>

<sup>1</sup>Federal University of Agriculture, Abeokuta, Nigeria, <sup>2</sup>International Institute of Tropical Agriculture, Ibadan, Nigeria

### **Biography:**

Dr Mojisola Adegunwa is a senior Lecturer in the Department of Hospitality and Tourism, Federal University of Agriculture Abeokuta. She has 51 journal articles published in reputable local and foreign journals and 20 papers in refereed conference proceedings.

She is the immediate acting Head of Department Hospitality and Tourism. She was a Post-Doctoral Fellow of the prestigious African Women in Agriculture and Research Development (AWARD). She has attended many national and international trainings, conferences and workshops. She is an active member of many national and international professional associations such as International Association of Food Protection, ISTRC, IUFOST, NIFST.. She is a good team player, takes initiatives, provide innovative ideas and suggestions. She is happily married and blessed with three children.

### MICROBIAL EVALUATION OF 'ADOYO' DRINK SOLD IN ABEOKUTA, OGUN STATE

Adegunwa, M.O1., Da-Silva, Y. B1., Alamu, E.O2. and Bakare, H.A1.

'Adoyo' is an "acidic" herbal fruit drink used locally for treating malaria. It is also taken as a refreshing drink when iced. It is made by boiling pieces of *Enantia chlorantha* (African Yellowwood) with the leaves of *Cymbopogon citratus* (Lemon grass) in Omidun the supernatant fluid of processed Ogi and allowed to cool after which unpeeled fruits of *Citrus paradise* (grape fruits) and *Ananas comosus* (Pineapple) are added (Bankole, 2005).

Samples of 'Adoyo' drink was obtained from 3 different car parks (Kuto, Pansheke and Lafenwa) in Abeokuta while the control was produced in the laboratory. 'Adoyo' was assessed for the presence of *Staphylococcus aureus*, coliforms and fungi using standard laboratory methods.

'Adoyo' from Lafenwa had the highest *Staphylococcus aureus* count ( $4 \times 10^7$ ) while the control had the lowest ( $1.5 \times 10^6$ ). The presence of high counts of bacteria was also reported by Bankole, (2005). The assessment of the total coliform count in 'Adoyo' showed five genera of bacteria in the coliform group and were characterized as *Escherichia coli*, *Klebsiella* sp, *Enterobacter* sp, *Salmonella* sp, and *Proteus* sp. Fungal count was high as expected considering the pH (4.39 to 4.58) of the 'Adoyo' samples, the fungal count ranged from  $2.5 \times 10^6$  to  $5 \times 10^6$  CFU/ml with the control having the lowest count  $2.5 \times 10^6$  CFU/ml. This high fungi count compares favourably with the results obtained by Bello et al., 2013 in fruit juices ( $5 \times 10^6$ ). This is similar to result and conclusion of Mahale et al., 2008 in their study on microbiological analysis of street vended fruit juices from Mumbai city in India. The presence of *Staphylococcus aureus* and *Trichoderma* probably indicates contamination from the raw materials, environment or personnel processing or vending the "adoyo".

### REFERENCES

Bankole, M.O., (2005). The Presence and Types of Microorganisms in 'Adoyo'a Local Anti-Malaria Herbal Drink. *Journal of Food Technology* 3(2): 170-172

Bello, O.O., Bello, T.K. and Bankole, S.A. (2013). Occurrence of antibiotic resistant *Staphylococcus aureus* in some street-vended foods in Ogun State, Nigeria. *Journal of Advances in Biology*, 1(1): 21-28.

## New Circular Bioeconomy Packaging Biodegradable in the Environment: H2020 Innovation Action YPACK Project

Prof. Jose M. Lagaron<sup>1</sup>

<sup>1</sup>CSIC, Paterna, Spain

### **Biography:**

Dr. Jose Maria (Chema) LAGARON is Group Leader and Founder of the group Novel Materials and Institute of Agrochemistry and Food Technology (IATA) of the Spanish CSIC located in Valencia, Spain.

JM Lagaron is also Founder of the technology based companies Nanobiomatters S.L., Bioinicia S.L. and Ocenic Resins S.L.

### Other highlights:

- PhD in Polymer Science (Polymer Physics) at the University of Valladolid (Spain).
- He has published more than 280 peer reviewed papers, several books and over 50 patents.
- Member of the Editorial Board of the Journal J. Appl. Polym. Sci., Nanomaterials and Applied Sciences.
- Associated Editor in Frontiers in Sustainable Food Processing.
- Vocal of the Executive Board of the Biotechnology Association, BIOVAL.
- Coordinator of the Innovation Action of the H2020 EU Project YPACK on Circular Bioeconomy Food Packaging with 23 partners from all over Europe and over 7 MEuro budget.

Innovation in food packaging to reduce the environmental footprint of packaging materials and reduce food waste, is a key worldwide strategy. Nowadays, with an increasing social awareness, there is a need to develop renewable resins that can biodegrade in the environment, especially for use in short-term packaging and disposable applications. Thus, the ideal packaging concept is currently this which entails lower carbon and water footprints, is biodegradable and compostable, makes use of wastes or by-products, is properly eco-designed, is safe and has the right preservation properties to minimize food waste.

The YPACK project ([www.ypack.eu](http://www.ypack.eu)) comprises the scale-up and commercial validation of two innovative biodegradable food packaging solutions in the current EU social, economic and regulatory framework. These solutions have been developed to maintain or extend the shelf-life of foodstuffs, reduce the food waste and minimize the environmental impact of packaging taking into account the current market trends. These solutions are to be validated in fresh products (meat, fruits & vegetables and fresh pasta), some of the most significant generators of food waste. The project also provides relevant collaborative research towards achieving this concept.

## Validation study between the conventional and new dropping dpph - methods without spectrophotometer: evaluation for the advancement of antioxidant activity analysis

Mr. Kandi Sridhar<sup>1</sup>, Dr Albert Linton Charles<sup>1</sup>

<sup>1</sup>National Pingtung University Of Science And Technology, Pingtung, Taiwan

### **Biography:**

*Mr. Kandi Sridhar holds his master's degree in Food Engineering and Technology from India in 2015. He has a special interest in functional foods, solvent extraction, and plant bioactive compounds. He is currently a doctoral candidate under the supervision of eminent professor Dr. Albert Linton Charles. His research mainly focuses on grape polyphenol fortification in functional foods and delivery systems.*

DPPH• (2,2 diphenyl-1-picrylhydrazyl) assay is one of the popular analytical methods commonly applied to determine antioxidant activity. More recently, new approaches for measuring antioxidant activity have been developed to either eliminate or reduce the use of a spectrophotometer. All analytical method must provide consistent and reliable results, which should be validated with statistical models. Therefore, we compared the conventional and new dropping DPPH• methods with three widely used standard compounds (ascorbic acid, butylated hydroxytoluene, and propyl gallate). Moreover, in order to perform the validation studies, we employed and compared correlation analysis, linear regression model, and Bland–Altman method. Good R-squared values ( $R^2 = \geq 0.96$ ) confirmed (Figure 1) the similarity in accuracy of using new dropping DPPH• method compared with the conventional DPPH• method. Deviation studies (ARD = -0.32 to 0.13; RMSD = 0.10 to 1.15) and Bland-Altman method (95 % confidence interval) reported a good agreement between the two methods. These findings suggested that the new dropping DPPH• method was proven cheaper (without spectrophotometer), correlated well (with the conventional DPPH• method), and low cost. Therefore, this method could be affordably conducted in developing and less developed countries.

Keywords: Conventional DPPH• method, new dropping DPPH• method, antioxidant activity, validation studies, Bland-Altman method

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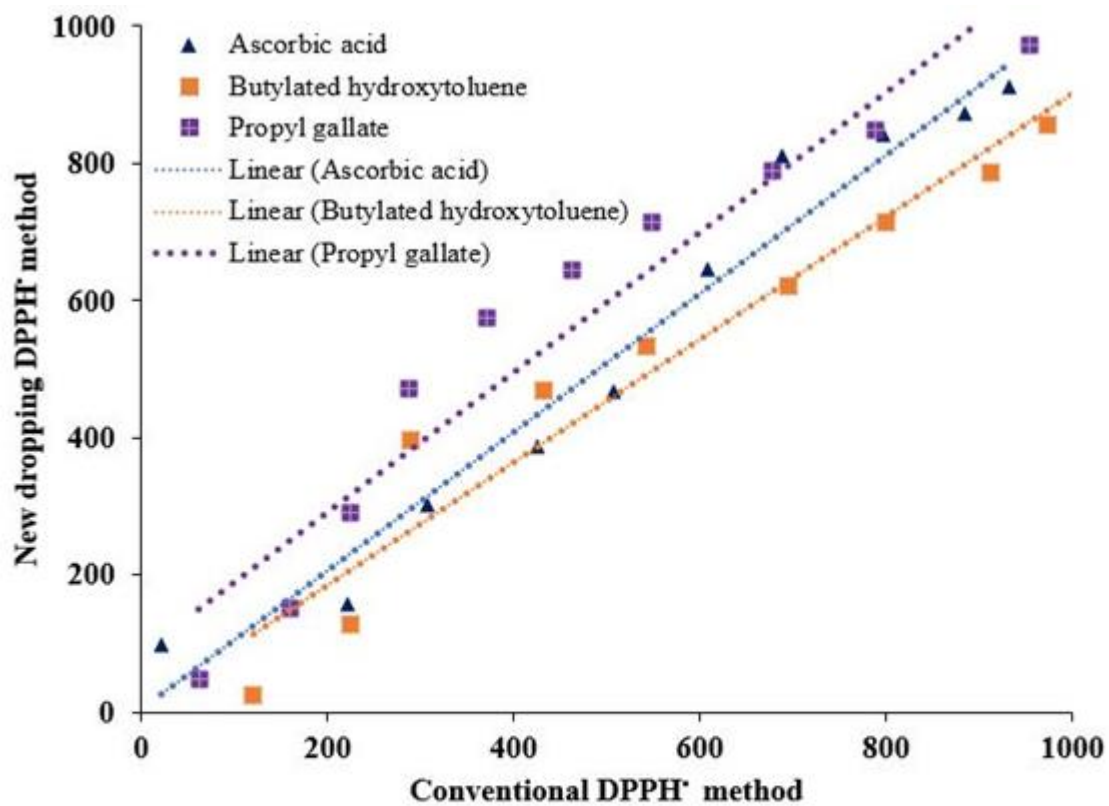
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**Figure 1.** Linear regression analysis of the conventional DPPH\* and new dropping DPPH\* method with regression line.

## COMPLIANCE ASSESSMENT OF CEREAL-BASED COMPLEMENTARY FOODS MARKETED IN THE CITY OF YAOUNDE TO LABELING AND NUTRITIONAL COMPOSITION STANDARDS.

Mr. Rolly Audrey MVOGO NYEBE<sup>1</sup>, Mrs Michelle Carole DJOUHOU FOWE<sup>1</sup>, Mr Ronald Blaise KUAGNY MOUAFFO<sup>1</sup>, Mrs Borelle MAFOGANG<sup>1</sup>, Mr Elie FOKOU<sup>1</sup>

<sup>1</sup>University Of Yaounde I, Yaounde, Cameroon

### **Biography:**

MVOGO NYEBE Rolly Audrey is a 28 years old PhD student in biochemistry and a High School Teacher of earth and life sciences. His research fields are: food quality and safety, nutritional education, complementary foods and feeding, foods and feeding impacts on sustainable health, especially for infant and young children. He is a member of the Laboratory of Food science and Metabolism of the Department of Biochemistry, Faculty of Science at the University of Yaounde I. He is very fluent in French and good in English (listening – speaking – writing), he has good proficiency in scientific dissertation and oral presentation and is in charge of the laboratory's library

*He also shows evidence of competences in other domains like music, public communication, leadership, projects management and humanitarian actions.*

**INTRODUCTION:** Complementary foods are foods intended for the consumption of infants and young children and their role is to supplement and then replace suckling or breastfeeding. They must be of good nutritional composition in order to favor their harmonious development and sustainable health. Labeling and nutritional composition are respectively extrinsic and intrinsic parameters that determine the overall nutritional quality of commercial complementary foods and are governed by specific standards.

**PURPOSE:** The purpose of this study is to assess the compliance level of cereal-based complementary foods marketed in the city of Yaounde to the Codex Alimentarius related standards.

**METHODS:** A descriptive cross-sectional study was conducted among 125 women-mothers in 2 main hospitals of the city of Yaounde from September to October 2016, using a probabilistic cluster sampling. The 4 most consumed cereal-based complementary foods were identified, collected, coded ("ASC O", "ASC I", "ASC E "and" ASC A ") and compared to the Codex Alimentarius labeling and nutritional standards for these foods (CODEX STAN 146, CAC/GL 1, CAC/GL 2, CAC/GL 08 et CODEX STAN 1) at a 80% acceptability threshold.

**RESULTS:** Labeling standards (compulsory, prohibited and optional) are met respectively at 98.44%, 93.75%, 92.19% and 67.19%, whereas nutritional composition standards are less respected, respectively with 50%, 72.22%, 83.33% and 33.33% of compliance rate.

**CONCLUSIONS:** About 90% of the cereal-based complementary foods marketed in the city of Yaounde comply with labeling standards, while only 26% have a nutritional composition compliant with international and national nutritional standards (from Codex Alimentarius). Deficiencies in proteins, minerals and mistakes in nutritional labeling are the main defects detected in these products. These results allow us to call both the producers, the controllers and the buyers of complementary foods to respectively improve, ensure and seek the good quality of these foods for the well-being of their consumers

**Key words:** Standard, labeling, nutritional quality, complementary food.



## Sequence analysis of VP26 and VP28 from Kingdom of Saudi Arabia white spot syndrome virus (WSSV) isolates in cultured shrimp

**Prof. Rashad Al-hindi**

<sup>1</sup>King Abdulaziz University, Jeddah, Saudi Arabia

### **Biography:**

*The author work as a professor of Food Microbiology at Biology Dept., King Abdulaziz University. He had had his Ph.D. from Strathclyde University on the survival and growth of Campylobacter jejuni. My main interests are in Food microbiology - food contaminants - antimicrobial of natural products.*

The VP28 and VP26 3D structures were predicted using Phyre2 tool based on PDB templates 2ED6 and 2EDM, respectively. The KSA-VP28 and VP26 belong to the white spot syndrome virus structural envelope protein WSS-VP superfamily. Proteins in this family are structural-envelope proteins found in viruses. These proteins contain a conserved NNT sequence motif. The x-crystal structure of WSSV proteins reveals a C-terminal  $\beta$ -barrel architecture of nine strands arranged in two Greek key motifs forming two  $\beta$ -sheets. The N-terminal has a protrusion, which completes the protein. Based on the toggle identity to known amino acid sequence of VP28 and VP26, the 3D structure was predicted with 2ED6 and 2EDM PDB id. The predicted 3D structure of KSA-VP28 monomer consists of a single C-terminal  $\beta$ -barrel of 12  $\beta$  strands ( $\beta$ 1<sup>2</sup>  $\beta$ 2<sup>2</sup>  $\beta$ 3<sup>2</sup>  $\beta$ 4<sup>2</sup>  $\beta$ 5<sup>2</sup>  $\beta$ 6<sup>2</sup>  $\beta$ 7<sup>2</sup>  $\beta$ 8<sup>2</sup>  $\beta$ 9<sup>2</sup>  $\beta$ 10<sup>2</sup>  $\beta$ 11<sup>2</sup>  $\beta$ 12<sup>2</sup>). The C-terminal domain has two small  $\alpha$ -helices hang outside the  $\beta$ -pore,  $\alpha$ 2 between  $\beta$ 3<sup>2</sup> and  $\beta$ 4<sup>2</sup> and  $\alpha$ 3 between  $\beta$ 4<sup>2</sup> and  $\beta$ 5<sup>2</sup>. The  $\beta$ -barrel forms a hydrophobic pore. The N-terminal has one  $\alpha$  helix ( $\alpha$ 1) protruding from the  $\beta$ -barrel architecture. The family of structural proteins of WSSV represents the conserved region and these domains essential for entry into cells of the host. In this study we found putative conserved domain which code for VP28 of WSSV super family. We found that the 3D form of structural relationships with the VP28 and VP26 amino acid sequences of WSSV KSA isolate. The sequences were toggled with the known sequence in protein data bank, and it was found that 2ED6 and 2EDM for VP28 and VP26 respectively. The predicted 3D structure of KSA isolates of WSSV VP28 indicated composed extended  $\alpha$  helix, core  $\beta$  barrel and VP26 composed of nine  $\beta$  barrel sheets with typical antiparallel  $\beta$  strands which are consistent with earlier report of crystal structure of VP26 and VP28.

## RENAL FUNCTION AMELIORATIVE POTENTIAL OF VENONIA AMYGDALINA EXTRACT IN ALBINO RATS DOSED WITH MONOSODIUM GLUTAMATE

**Dr. Nicodemus Nwankwo**<sup>1</sup>

<sup>1</sup>University Of Nigeria, Nsukka, Enugu, Nigeria, Enugu, Nigeria

### **Biography:**

*Dr. Nicodemus Nwankwo is Lecturer II in Natural Science Unit, School of General Studies. He holds B.Sc. in Biochemistry from Enugu State University of Science and Technology. He obtained Masters and PhD degree in Biochemistry from University of Nigeria, Nsukka. In addition, he holds a Master of Science degree in Pharmaceutical Chemistry from University of Nigeria.*

Monosodium glutamate normally added to food as seasoning agent has been established to have toxic effect on important organs of the body. The effect of varying doses of Vernonia amygdalina stem extract on Monosodium Glutamate (MSG)-induced alterations in some kidney function parameters in albino rats was investigated. The minerals and vitamins contents of V. amygdalina of the stem were determined. In the study, 20 adult male Albino rats (weighing 90-180 g) divided into five groups of four rats each were used. The administration of MSG and extract lasted for 2 weeks. In rats treated with MSG (8 mg/kg b.w.), there was significant ( $p < 0.05$ ) increase in the serum urea and creatinine concentrations but decreased albumin concentration compared to rats treated with normal saline. MSG Co-treatment with extract (200 mg/kg b.w.) significantly increased urea and creatinine concentrations but decreased at a higher dose (400 mg/kg b.w.). From the results on the histopathological study, MSG treated group showed signs of toxicity compared to other groups and the ameliorative effect of the extract on the MSG induced toxicity was shown in co-treatment with MSG and extract. Minerals such as zinc, sodium, iron and vitamins such as Vitamins A, C, E were present in the stem extract. These findings suggest that V. amygdalina ameliorated MSG-induced toxicity on the kidney function parameters better at higher doses. This ameliorative potential of the extract could be attributed to the presence of the vitamins and minerals and other bio-compounds present in the plant's stem.

## Advanced analysis in modern food technology

**Dr. Atefeh Amiri-Rigi<sup>1</sup>**, Prof. Soleiman Abbasi<sup>2</sup>

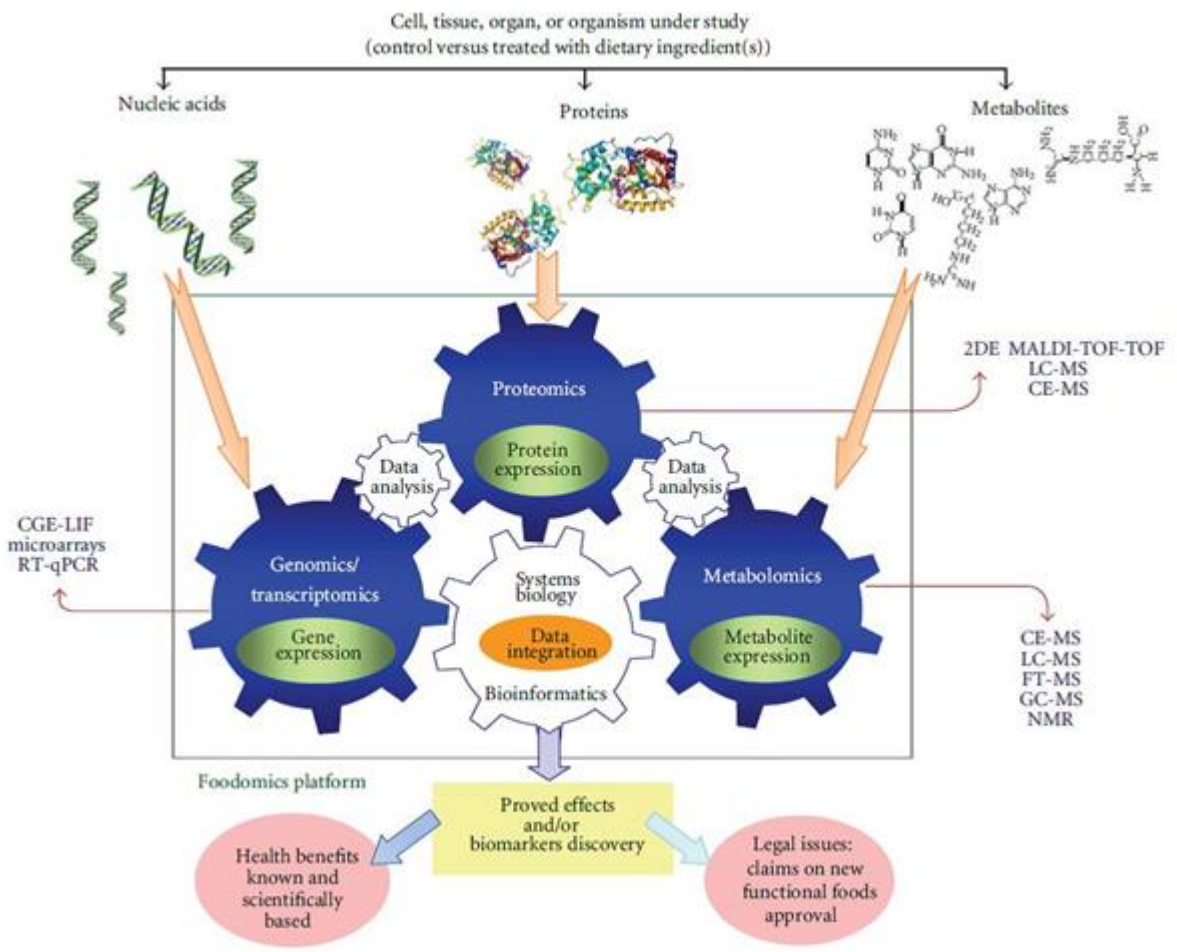
<sup>1</sup>Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran, <sup>2</sup>Tarbiat Modares University, Tehran, Islamic Republic of Iran

### **Biography:**

*Atefeh Amiri-Rigi has completed her PhD at the age of 34 years in Tarbiat Modares University in Tehran, Iran. She has been working as invited assistant professor at University of Tehran, Iran's oldest modern university and one of the most prestigious universities in the Middle East, for more than 5 years. She has published more than 32 papers in reputed journals and 3 patents and has also been serving as an editor for International Journal of Food Properties from 2010 up to now. She recognized as National Elite Student by Iranian National Foundation of Elites.*

Current healthcare costs is estimated to be greater than 15% of the national expenditure while medical nutrition therapy (MNT) has been shown to be a cost-effective procedure in this respect. However, health benefits assigned to many new constituents and nutraceuticals are still poorly documented and hence the subject of ongoing study as can be arrived at from many health claims rejected by the European Food Safety Authority. In this regard postgenomic strategies as “foodomics” which integrate the results from the three expression levels (gen, protein, and metabolite) can play a pivotal role in providing more sounded scientific authentications. Foodomics is an innovative approach that studies the food, nutrition and biotechnology domains via employment of integrated omics technologies to respond efficiently the research challenges and improve consumer’s understanding. It helps to understand the interaction of nutraceuticals at cellular and molecular levels and provide better scientific evidences on their health benefits. Foodomics approaches include epigenomics (mechanisms of gene expression and changes induced), transcriptomics (changes in mRNA expression levels), proteomics (the large-scale analysis of the entire protein complement of an organism), metabolomics (comprehensive analysis of various compounds and their relative concentration) and bioinformatics (conversion of complex biological data obtained into useful information) (Fig. 1). Some applications of foodomics is to detect food allergens, food frauds and unintended modifications and labelling issues of GM foods. Main objective of the current study is to introduce the concept of foodomics, importance and necessity of applying foodomics, application domains of foodomics and main analytical techniques used in foodomics.

Caption of illustration: Scheme of an ideal Foodomics strategy



## Scientific assessments in European food law: making it future-proof

**Dr. Alie de Boer<sup>1</sup>**

<sup>1</sup>Maastricht University, Venlo, Netherlands

***Biography:***

*Dr. Alie de Boer is Assistant Professor in the field of nutrition and food law at Campus Venlo of Maastricht University. Alie is a nutritional scientist fascinated by food law and as founder and head of the Food Claims Centre Venlo, she studies how you can scientifically prove that food is legally considered to be safe and healthy. In her interdisciplinary research, she analyses the interplay between nutritional sciences and (European) food law and focusses on how to substantiate regulatory and scientific requirements regarding health claims and novel foods. The use of scientific evidence in political decisions is an important part of the conducted research.*

The use of risk assessment in European food law is analysed in this study, and the implication of the proposed adjustments to the EU's framework regulation for foods, the General Food Law, are reviewed. European food laws increasingly use scientific evidence to protect consumers from hazards and to prevent the use of misleading information. The risk analysis cycle (risk assessment, risk management and risk communication) that has been implemented in many authorisation decisions of the European Commission has resulted in improved levels of public health since 2002. In evaluating food law under the REFIT procedure however, various shortcomings were identified by the European Commission, including the lack of transparency of data and the independence of risk assessors in the European Food Safety Authority. To deal with these identified issues, various improvements are suggested in the recently published proposal to adjust the General Food Law (Regulation 178/2002) and secondary EU legislation.

Although these adjustments are expected to add to improving European food policies, today's European food laws can be further enhanced by improving the use of nutritional sciences in food law. Stimulating collaborations between both fields can result in a higher level of consumer protection from misleading and potential food risks, and further advance the internal European market. It is therefore essential to conduct scientific assessment in a more systematic way. Only improving the conducted scientific analyses as well as their use in risk management will result in more future-proof European food law.

## NANOSTRUCTURES IN FOOD PACKAGING

Prof. Dr. Mona Elena Popa<sup>1</sup>

<sup>1</sup>*University Of Agronomic Sciences And Veterinary Medicine Of Bucharest, Bucharest, Romania*

### ***Biography:***

Prof. Dr. Popa M.E. graduated from the Faculty of Food Chemistry and Technology, University of Galați in 1985 and is currently Full professor of Faculty of Biotechnology at the University of Agronomic Sciences and Veterinary Medicine Bucharest. She is PhD coordinator in Biotechnology field (having 6 students who already got PhD title and 10 ongoing PhD students). Main topics: plant antimicrobials, novel techniques for food preservation, new food packaging materials and systems for extended shelf life and biodegradability and toxicity of these new materials, bioactive compounds in berry fruits and wines, processing of fruits in functional drinks type smoothie.

Having a rich experience of research and development for over 30 years in the field of food quality and safety, food preservation, biodegradability and ecotoxicity of packaging materials, etc. The publishing activity, is consisting of 21 books or chapters in the books and over 250 papers or presentations at national and international conferences in the field of food science, among over 150 articles published in national and international journals in the field among 32 ISI indexed and her research activity consists of more than already finished 70 national and international research projects.

Nowadays more and more developments in nanoscience and nanotechnology applications in the food field are reported worldwide. These led to many innovative applications in the food sector trying to equal the applications of these in biomedicine and pharmacy. One of main directions of food sector applications is the development of nanopackaging materials. In packaging materials at nanoscale, functional compounds could be encapsulated to obtain better technical properties or to improve food quality attributes, and a better protection and a prolonged shelf life, well known as active and smart packaging concepts. Natural compounds with antimicrobial and/or antioxidant activity could be microencapsulated in nanostructures of food packaging which are supposed to inhibit or retard microbial growth on food products surfaces with more efficacy when nanoscale is involved. Apart from the food spoilage inhibition these nanostructures could enhance aroma attributes of packaged food, improve the texture for a better satiety and could have various roles in intelligent packaging sensors. Challenging trends in these nanostructures are bio-based nanocomposites (cellulose, starch, chitosan nanoparticles, proteins, polysaccharides, PHB, PLA) that could have different functionalities being more sustainable for the environment. The legislative issues related to the applications of these nanostructures in food packaging will also be assessed. This review gives an overview of nanostructured materials related to structures and their scope of action, their current applications and future perspectives in the food packaging area.

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Zohreh Honarvar<sup>1</sup> et.colab., Electronic Physician (ISSN: 2008-5842), June 2016, Volume: 8, Issue: 6, Pages: 2531-2538.

## GLOBAL FOOD SAFETY INCIDENT ALERT NETWORK

Dr. Chin-kun Wang<sup>1</sup>

<sup>1</sup>*Chung Shan Medical University, Taichung, Taiwan*

***Biography:***

Fellow, IAFoST & ISNFF

Past President, International Society for Nutraceuticals and Functional Foods

Former President, Chung Shan Medical University

Honorary President, Nutrition Society of Taiwan

Food safety is basic right for individuals in the world. To develop an anonymous system to limit the consequences of dangerous chemicals added to food or the presence of pathogenic microorganisms in food is the objective of Global Incident Alert Network (GIAN) work group of GHI. GIAN for Unauthorized Food Additives (GIANUFA) and GIAN for Pathogens in Food (GIANPIF) are two major objectives. A whistle-blower can report anonymously via an easy-to-find and well-known webpage. The site needs a reporting form with questions to obtain as many as possible details. The questions have to be answered as complete as possible, because there will be no possibility to ask the anonymous whistle-blower later. The whistle-blower needs to realise that his case can only be addressed with sufficient details. Using the GHI network, with emphasis on GHI Ambassadors and experts from all fields, GHI will check if the report is real or only meant to harm the company.

Experts' evaluation for the whistle-blower is very critical for GIAN system. A committee composed of food scientists, nutritionists, toxicologists, risk evaluator and medical doctors could immediately to evaluate the collected data or information. If it's real and serious, the GHI Office will alert the local National Public Health Institute(s) who then have to handle the incident further. GIAN system could be translated into different languages, food industry and local governments could treat by the connection with GHI. GIAN website also provides past incidents (e.g. plasticizer, melanin and some others) and their risk and harm to health. Results. To avoid the food safety problem from unauthorized food additives or pathogens, good and new regulation and monitor are required. In addition, the newly set up information is also very helpful. Whistle-blower is a good system to find out the potential threat for food safety anonymously.

## The mechanisms of hypoglycemic effect of foxtail millet based on transcriptomics

Dr. Xin Ren<sup>1</sup>, Dr. Ruiyang Yin<sup>1</sup>, Dr. Dianshi Hou<sup>1</sup>, Prof. Qun Shen<sup>1</sup>

<sup>1</sup>China Agricultural University, Beijing, China

### **Biography:**

Dr. Qun Shen, is from College of Food Science and Nutritional Engineering, China Agricultural University. She focus on dietary intervention of coarse cereals food on impaired glucose tolerance or hypertension persons' physiological indicators improvement; functional components evaluation; evaluation system between chemical quality and processing characteristics of coarse cereals; structure and characteristics of starch.

She is a post scientist of China Agriculture Research System. She is now presiding "Novel Technology Development and Processing Equipment Design & Demonstration to Producing Traditional Chinese Grains and Beans" of National Key Research and Development Program of China, Ministry of Science and Technology; and "Mechanism Study on the Molecular Scale of Starch Gelatinization Induced by High Hydrostatic Pressure" of National Natural Science Foundation of China.

She is supervisor of Chinese Institute of Food Science and Technology, advisor of Children's Food Branch of Chinese Institute of Food Science and Technology, advisor of Food branch of Chinese Cereals and Oils Association. Her research has resulted in more than 150 publications, more than 30 publications has published on Critical Reviews in Food Science and Nutrition, Journal of Food Science, Journal of Cereal Science, Food & Function, etc.

**Abstract:** Our previous animal experiment have proved that foxtail millet feeding significantly improved the blood glucose metabolism in high fat diet and STZ-induced (HFD/STZ) diabetic rats. To further clarify the mechanisms of the hypoglycemic effect of foxtail millet, the difference on liver transcriptional profiles between diabetic rats, normal rats and foxtail millet feeding rats were investigated. The results shown that 4 weeks of foxtail millet feeding in this study could mitigate negative variations of liver transcriptional profile in HFD/STZ diabetic rats. Specifically, foxtail millet feeding activated the insulin-stimulated PI3K/AKT signaling pathway by up-regulating expression of IRS, PI3K and AKT in liver, which will inhibit gluconeogenesis by down-regulating expression of G6P, FBP and PEPCK, and stimulate glycolysis by up-regulating expression of GK and PK subsequently. Moreover, foxtail millet feeding inhibited NF-κB signaling pathway and reduced expression of inflammatory factors, which will weaken the inhibition of insulin signaling pathway and improve blood glucose metabolism ultimately.

**Keywords:** foxtail millet; blood glucose metabolism; insulin signaling pathway; NF-κB signaling pathway

**Figure 1.** The mechanisms of blood glucose-lowering effect of foxtail millet intervention Note: Red background, significantly up-regulated genes or proteins; Blue background, significantly down-regulated genes or proteins. Arrow for promotion and —| for inhibition.

**Reference**

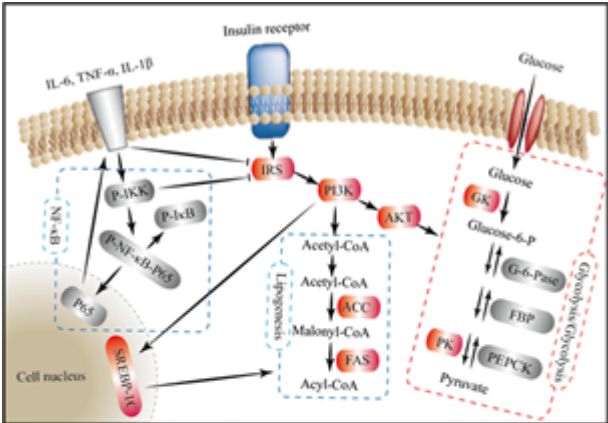
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## Synthesis and identification of thiobencarb hapten and artificial antigen

Prof. Guocheng Su<sup>1</sup>, Mr. Chenfang Cai<sup>1</sup>

<sup>1</sup>College Of Food And Biological Engineering, Jimei University, Xiamen, China

### **Biography:**

Su guocheng, graduated from XiaMen University microbiology major, Jimei University food and biological engineering college professor, master tutor.

*He has been engaged in scientific research for 36 years, and has presided over more than 10 national and provincial scientific research projects, more than 20 municipal scientific research projects, and published more than 40 papers. In recent years, he has been mainly engaged in the research of food safety, biotechnology and Marine biological engineering.*

In experiment, 2-(Ethylamino)ethanol, sublimed sulphur, carbon monoxide gas and p-chlorobenzyl chloride were used as raw materials to synthesize the hydroxyated thiobencarb through the chemical reaction. Then purified and reacted with succinic anhydride to synthesize the thiobencarb hapten, which was analyzed and identified as the expected product by thin layer chromatography, mass spectrometry and infrared spectrum. The hapten was conjugated to bovine serum albumin BSA to prepare the artificial antigen of thiobencarb using the carbodiimide method, which was identified by ultraviolet spectrophotometry and fluorescence spectrophotometry. The results of the experiment showed that it was successful for the synthesis of hapten and artificial antigen of thiobencarb. The coupling ratio of hapten and carrier protein was 6.59:1. This study has deeply laid the foundation for the preparation of thiobencarb antibody.

## FORMALIN EXPOSURE THROUGH FISH CONSUMPTION AND ITS ASSOCIATED PUBLIC HEALTH RISK IN SOUTHERN BANGLADESH

Dr. Sazedul Hoque<sup>1</sup>, Dr. Liesbeth Jacxsens<sup>2</sup>, Mr. Boktheir Hossain<sup>1</sup>, Dr. Nowsad Alam<sup>3</sup>, Dr. Martin Brakel<sup>4</sup>, Dr. Carl Lachat<sup>2</sup>, Dr. Bruno Meulenaer<sup>2</sup>

<sup>1</sup>Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Patuakhali-8602, Bangladesh, <sup>2</sup>NutriFOODchem Unit, Department of Food Safety and Food Quality (Partner in Food2Know), Faculty of Bioscience Engineering, Ghent University, Ghent-9000, Belgium, <sup>3</sup>Department of Fisheries Technology, Bangladesh Agricultural University, Mymensingh-2200, Bangladesh, <sup>4</sup>ECOFISHBD, WorldFish Bangladesh and South Asia Office, Banani, Dhaka-1213, Bangladesh

### **Biography:**

Md. Sazedul Hoque, PhD,  
Associate Professor,  
Patuakhali Science and Technology University, Bangladesh

### ACADEMIC QUALIFICATION

Degree: Ph.D in Food Science and Technology    Name of Institution: Prince of Songkla University, Thailand  
Year : June, 2011

Degree: M.Sc in Fisheries Technology  
Institute: Bangladesh Agricultural University  
Year: June, 2007  
Result: CGPA 3.92 (Out of 4.00)

Degree: B.Sc Fisheries (Hons.)  
Institute: Bangladesh Agricultural University  
Year: 2004 (Exam held on 2005)  
Result: 1st Class

### SCHOLARSHIPS:

- VLIR-UOS Scholarship for ITP-Food Safety-2013 and 2016, University Ghent, Ghent, Belgium.
- NFP Fellowship for Governance and Food Safety in International Food Chain-2016, Center for Development Innovation, Wageningen University Research, Netherlands.
- Graduate Scholarship (PhD)-2008, Prince of Songkla University, Hat Yai, Thailand.

### ACADEMIC & RESEARCH

- Associate Professor: July 28, 2017 to till date.
- Assistant Professor: July 28, 2011 to till July 27, 2017.
- Chairman, Department of Fisheries Technology: January 2012 to January 2015; October 2015 to January, 2017 and October, 2018 to till date.
- MS student supervised 14.
- Publications in International Refereed Journal: 23;

citation 611; h-index 10; i10-index 10.

- Research Projects: International 03 and in National 10

#### RESEARCH INTEREST

Food/Seafood Safety;

Post-harvest loss, Value-chain Analysis, Processing and Microbial Quality Control of Seafood.

**Introduction:** Formalin is reported to be frequently added as preservative to fresh fish to prevent spoilage and extend shelf life. Carcinogenic and mutagenicity of formalin is a challenging public health issue in Bangladesh.

**Purpose:** To assess the public health risk associated with formalin exposure in fresh water fish in Southern Bangladesh.

**Methods:** Formalin concentrations (mg/kg) were determined (n=3) in tilapia, Indian major carp rui, Chinese carp and a minor carp from local market. Laboratory simulations involved dipping fish in 0.5, 1.0, 2.0 and 4.0% formalin solution for 5, 15, 30 and 60 min, and analyzing with spectrophotometric and high performance liquid chromatography (HPLC) method. A food frequency questionnaire was used to collect fish consumption (kg/kgBW.day) data from 400 respondents. A probabilistic exposure assessment was conducted using @Risk<sup>®</sup>7.0 software.

**Results:** Fish treated with formalin with increasing concentrations and time showed increased trends of formalin acquisition irrespective of fish species and analytical methods used (p<0.05). The questionnaire survey showed that consumption of rui and tilapia was higher than Chinese carp and minor carp. Under spectrophotometric analysis, formalin exposure with consumption of four different fish was lower than acceptable daily intake 'ADI' (0.2 mg/kgBW.day) and tolerable daily intake 'TDI' (0.15 mg/kgBW.day) value for both "total population (400 respondents, both consumer and non-consumers)" and "consumers". The HPLC method determined maximum exposure to formalin at 0.28 mg/kg BW.day for tilapia consumers. Margin of exposure (MoE) provides high priority (<10000) for tilapia and rui at P99 under spectrophotometric analysis where under HPLC analysis, tilapia had much lower MoE values at P99, P95 and P90 (total population and consumers).

**Conclusion:** This study suggested that exposure of formalin associated with tilapia consumption is a public health concern in Southern Bangladesh that should be prioritized for risk management strategy.

**Acknowledgments:** The authors are very grateful to the International Foundation for Science (IFS), Sweden for the research grant (agreement number E/5670-1). The authors also would like to acknowledge ITP Food Safety program, Department of Food Safety and Food Quality, Faculty of Bioscience, Ghent University, Belgium and the Flemish Interuniversity Council (VLIR-UOS), Belgium for scientific and research stay support.

## PESTICIDE RESIDUES IN FISH FEED, FISH AND VEGETABLES: A FOOD SAFETY CONCERN FOR THE CONSUMERS IN BANGLADESH

Dr. Sazedul Hoque<sup>1</sup>, Dr. Matiur Rahman<sup>2</sup>, Mr. Shuva Bhowmik<sup>3</sup>, Mrs. Shahnaila Ferdousi<sup>4</sup>, Dr. Martin Brakel<sup>5</sup>

<sup>1</sup>Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Patuakhali, Bangladesh, <sup>2</sup>National Food Safety Laboratory, Institute of Public Health, Mohakhali, Dhaka, Bangladesh, <sup>3</sup>Department of Fisheries and Marine Science, Faculty of Science, Noakhali Science and Technology University, Noakhali, Bangladesh, <sup>4</sup>Department of Biotechnology and Genetic Engineering, Faculty of Science, Noakhali Science and Technology University, Noakhali, Bangladesh, <sup>5</sup>ECOFISHBD, WorldFish Bangladesh and South Asia Office, Banani, Dhaka, Bangladesh

### **Biography:**

Md. Sazedul Hoque, PhD,  
Associate Professor,  
Patuakhali Science and Technology University, Bangladesh

### ACADEMIC QUALIFICATION

Degree: Ph.D in Food Science and Technology    Name of Institution: Prince of Songkla University, Thailand  
Year : June, 2011

Degree: M.Sc in Fisheries Technology  
Institute: Bangladesh Agricultural University  
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Degree: B.Sc Fisheries (Hons.)  
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Year: 2004 (Exam held on 2005)  
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### SCHOLARSHIPS:

- VLIR-UOS Scholarship for ITP-Food Safety-2013 and 2016, University Ghent, Ghent, Belgium.
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### ACADEMIC & RESEARCH

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- Research Projects: International 03 and in National 10

## RESEARCH INTEREST

Food/Seafood Safety;

*Post-harvest loss, Value-chain Analysis, Processing and Microbial Quality Control of Seafood.*

**Introduction:** Pesticides persist in different feed and food production systems due to their widespread use by farmers, causing environmental contamination. The determination of pesticide residues is very important for identifying its potential public health risks in Bangladesh.

**Purpose:** This study aimed to determine pesticide residues in fish feed, fish and vegetable samples from different locations in Bangladesh.

**Methods:** Fish feed, fish and vegetable samples were randomly selected and collected from different locations in Bangladesh. Different organochlorine (OC), pyrethroid and organophosphate pesticide residues were analyzed using the quick easy cheap effective rugged and safe (QuEChERS) method followed by gas chromatography-mass spectrometry (GC-MS).

**Results:** The study showed that the 14 fish feed samples analyzed with this method appeared to be free of pyrethroid pesticide residues. In fish samples, among the organochlorine pesticide residues only aldrin was identified at the level of 31.42 µg/kg in a fish sample of catla (*Catla catla*) collected from Rajshahi Durgapur. Similarly, in case of pyrethroid pesticide residues, only permethrin was detected at a level of 83.52 µg/kg in bata fish (*Labeo bata*) from Satkhira Kaligonj. In contrast, the majority of vegetables sample tested positive for different pesticide residues. Among all 135 vegetable samples (27 samples each of country bean, green chili, tomato, eggplants and red amaranth) 27.4% were found positive for organophosphate pesticide residues (dimethoate, chlorpyrifos and quinalphos) of which 89% exceeded Maximum Residue Limits (MRLs) that cause a potential health risk for consumers in Bangladesh.

**Conclusions:** An effective management strategy is needed to prevent health risks from pesticide residues in vegetables and fish for consumers in Bangladesh.

**Acknowledgments:** The authors would like to acknowledge the National Food Safety Laboratory (NFSL), Dhaka, Bangladesh for laboratory analytical support.

## UC DAVIS CHIMNEY DRYER: A LOW-COST TECHNOLOGY FOR IMPROVED QUALITY DRIED FISH (*Harpadon nehereus*) IN SOUTHERN BANGLADESH

Dr. Sazedul Hoque<sup>1</sup>, Mr. Biplob Mithun<sup>1</sup>, Dr. Martin Brakel<sup>2</sup>

<sup>1</sup>Department of Fisheries Technology, Faculty of Fisheries, Patuakhali Science and Technology University, Patuakhali-8602, Bangladesh, <sup>2</sup>WorldFish Bangladesh and South Asia Office, Banani, Dhaka-1213, Bangladesh

### **Biography:**

Md. Sazedul Hoque, PhD,  
Associate Professor,  
Patuakhali Science and Technology University, Bangladesh

### ACADEMIC QUALIFICATION

Degree: Ph.D in Food Science and Technology    Name of Institution: Prince of Songkla University, Thailand  
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### SCHOLARSHIPS:

- VLIR-UOS Scholarship for ITP-Food Safety-2013 and 2016, University Ghent, Ghent, Belgium.
- NFP Fellowship for Governance and Food Safety in International Food Chain-2016, Center for Development Innovation, Wageningen University Research, Netherlands.
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- MS student supervised 14.
- Publications in International Refereed Journal: 23;  
citation 611; h-index 10; i10-index 10.
- Research Projects: International 03 and in National 10

### RESEARCH INTEREST

Food/Seafood Safety;

**Introduction:** Fish drying is a traditional method of fish preservation that provides cheap dietary sources of animal protein in Bangladesh. However, this traditional method produces low-quality dried fish.

**Purposes:** The aim of the present study was to improve the quality of dried fish using an innovative low-cost technology; the UC Davis solar chimney dryer. The study compared changes in sensory, microbial and biochemical quality of Bombay duck (*Harpadon nehereus*) dried using the improved method vs. the traditional method.

**Methods:** The sensory, microbial and bio-chemical quality of dried fish was evaluated following the quality index, standard plate count and the association of official analytical chemist (AOAC) method, respectively.

**Results:** The results indicated excellent and highly acceptable organoleptic characteristics of dried fish produced with the improved method. The results of aerobic plate count (APC), total E. coli count (TEC), and total Vibrio count (TViC) in improved dried fish were  $4.32 \times 10^4$  CFU/g,  $4.8 \times 10^5$  CFU/g,  $1.3 \times 10^2$  CFU/g, respectively. Total Salmonella count (TSC) was absent. All values were within the permissible limit. In comparison, the count in traditionally produced dried fish samples was found to be  $7.72 \times 10^7$  CFU/g,  $2.6 \times 10^2$  CFU/g,  $3.9 \times 10^5$  CFU/g and  $5.0 \times 10^4$  CFU/g, respectively. All values exceeded the permissible limit. The protein, lipid, ash and moisture contents of improved dried fish were 48.98%, 6%, 20.95% and 23.97%, respectively while the traditional dried fish was 44.46%, 5.86%, 21.29% and 28.29%, respectively. The total volatile-base nitrogen (TVB-N) content of improved and traditional dried fish was 0.040 mgN/100g and 0.135 mgN/100g respectively in sterile packed samples, compared to 0.162 mgN/100g and 0.149 mgN/100g in polyethylene packed samples.

**Conclusion:** The quality of dried fish produced in the UC Davis chimney dryer is superior compared to that produced by traditional sun-drying, both before and after storage time. Shelf life of both traditional and improved dried fish is extended under sterile packed conditions.

**Acknowledgements:** The authors would like to acknowledge the Horticulture Innovation Lab, University of California Davis and ECOFISHBD project (WorldFish Bangladesh) and the Ministry of Science and Technology, Bangladesh for Chimney dryer technology, facilitating community training and financial support, respectively to conduct the research work fruitfully.



## Effect of cooking on aroma profiles of Chinese foxtail millet (*Setaria italica*) and correlation with sensory quality

Shuang Bi<sup>1,2,3,4,5</sup>, Aojidong Wang<sup>1,3,4,5</sup>, Xinxing Xu<sup>1,2,3,4,5</sup>, Dongsheng Luo<sup>1,2,3,4,5</sup>, Wentao Zhang<sup>1,2,3,4,5</sup>, Qun Shen<sup>1,3,4,5</sup>, **Jihong Wu\***<sup>1,2,3,4,5</sup>

<sup>1</sup>China Agricultural University, Beijing, China, <sup>2</sup>Beijing Advanced Innovation Center for Food Nutrition and Human Health, Beijing, China, <sup>3</sup>National Engineering Research Center for Fruit & Vegetable Processing, Beijing, China, <sup>4</sup>Key Laboratory of Fruit & Vegetable Processing, Ministry of Agriculture, Beijing, China, <sup>5</sup>Beijing Key Laboratory for Food Non-thermal Processing, Beijing, China

### **Biography:**

*Jihong Wu, Professor of China Agricultural University, has her expertise in Processing and Storage of Agriculture Products, especially on Food Flavor, Fruit and Vegetable Processing Technology and Theory, Fruit and Vegetable Resources Comprehensive Utilization. She has taken over 20 multi-partner large scale research projects from the Chinese government, e.g. the National Key Research and Development Plan, the National Science-technology Support Plan Projects, 863 Program, Special Scientific Research Fund of Agricultural Public Welfare Profession of China, High Technology of Beijing, of which over 10 as a coordinator. As the first author or corresponding author, she has published more than 70 peer-reviewed research articles, which 50 research papers published in SCI/EI journals, such as Journal of Agricultural and Food Chemistry, Food Chemistry, Food Hydrocolloids, Carbohydrate Polymers, Innovative Food Science and Emerging Technologies. She has won the Second Award of the State Science and Technology Progress as well as 13 provincial or ministerial awards, e.g. Shandong Science and Technology Progress Awards. In addition, she obtained 14 national invention patents, lay down 7 criterions, got 8 certificates of scientific and technological achievements, and edited 8 books.*

The effects of roasting, boiling, and freeze-drying after boiling on volatile aroma compounds in three varieties of Chinese foxtail millet (*Setaria italica*), namely, Jingu 21, Fenghonggu and Dongfangliang were determined. During boiling significant ( $p < 0.05$ ) increases in the contents of several unsaturated aldehydes, alcohols, and benzene derivatives were observed, unlike roasting that mainly increased in the contents of pyrazines. Freeze-drying after boiling decreased complexity of flavors with a reduction in the contents of volatile compounds. Descriptive sensory analysis showed that the maximum intensity of 'popcorn-like' and 'smoky' odors was observed for roasted samples, whereas boiled and pre-boiled-freeze-dried samples were characterized by 'boiled rice' and 'boiled potatoes' odors, respectively. A correlation of odor-active profile data with descriptive sensory analysis clearly established the role of pyrazines such as 2-ethyl-3,5-dimethylpyrazine in contributing to the 'popcorn-like', 'boiled beans', and 'smoky' odors, whereas dienals such as (E,E)-2,4-decadienal were responsible for the 'boiled rice' aroma.

## GLOBAL ISSUES IN HARMONIZATION OF NUTRITION LEGISLATION

Dr. Iuliana Vintila<sup>1</sup>

<sup>1</sup>University "Dunarea de Jos" Galati, Galati, Romania

### **Biography:**

Vintila Iuliana is actually Associate Professor, PhD in Food Science and Engineering. She is specialised in Oil Science and Technology, Catering Management and Event Tourism Management. She is Co-Chair of the Global Harmonisation Initiative Nutrition WG and act as active member and/or expert in many international organisations and professional structures such as EFFoST, ESF, TAIEX, Eurostars etc. and peer reviewer in prestigious international journals such as European Food Research and Technology, Journal of Food Science, Journal of Agricultural Science, Canadian Center of Science and Education, Journal of Food Processing and Preservation, Journal of Food Engineering, European Food Research and Technology, International Journal of Contemporary Hospitality Management.

Keywords for the specialization area: food science, food engineering, food rheology, catering, event tourism, food nutrition, ecological footprint, food behavior.

The present article present an overview of current nutrition legislation on the global basis and the most relevant issues involved by the harmonization process, in the benefit on consumers, food industry, market traders and all involved stakeholders.

The nutrition legislation was investigated in tree directions: nutrition labeling, nutrition claims and health claims. The legislation from global jurisdictions was take into account, respectively EU, USA, China, Russia, UK and Ireland, Australia and New Zealand.

A harmonization checklist, as operational tool, was originally proposed for each investigated nutrition legislation issue, in respect with the estimated similitude factor and existing gaps between current global nutritional requirements.

The harmonization of global nutrition legislation is foreseen as the ideal future solution for improvement of food nutrition & security, food technology standards and fair international trade.

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## THE LEVEL OF COMPLIANCE WITH HARMONIZED NUTRITIONAL CARE STANDARDS IN THE CATERING SERVICES UNIT FROM A REGIONAL MILITARY HOSPITAL

Dr. Iuliana Vintila<sup>1</sup>

<sup>1</sup>University "Dunarea de Jos" Galati, Galati, Romania

### **Biography:**

Vintila Iuliana is actually Associate Professor, PhD in Food Science and Engineering. She is specialized in Oil Science and Technology, Catering Management and Event Tourism Management. She is Co-Chair of the Global Harmonization Initiative Nutrition WG and act as active member and/or expert in many international organizations and professional structures such EFFoST, ESF, TAIEX, Eurostars etc. and peer reviewer in prestigious international journals such as European Food Research and Technology, Journal of Food Science, Journal of Agricultural Science, Canadian Center of Science and Education, Journal of Food Processing and Preservation, Journal of Food Engineering, European Food Research and Technology, International Journal of Contemporary Hospitality Management.

Keywords for the specialization area: food science, food engineering, food rheology, catering, event tourism, food nutrition, ecological footprint, food behavior.

### Abstract

The present research study propose an original tool for assessing the performance level in nutrition, hydration and nursing services according to the compliance with harmonized nutritional care standards, which represent an original operational instrument for assessing, monitoring and developing quality food services in the public establishments.

### Introduction

The medical catering services have the role of supplying, on a contract basis, the full-service menus for the daily main meals in public or private hospitals for patients, healthcare professionals and visitors.

Depending on the structure of the medical specialty departments of the public hospitals, the menus delivered daily are therapeutically modified (restricted or fortified), depending on the nutrition, diet and hydration plan established individually at the hospitalization of each patient (Vintila, 2005).

### Methods

The study was conducted between 15 and 30 April 2018 by the Head of the Health and Occupational Medicine Department from a regional Romanian Military Emergency Clinical Hospital, with the approval and under the monitoring of the Military Hospital unit's Commander. The self-evaluation of the dietary menus and nutritional care service was done by appreciating and completing a questionnaire regarding the food service nutritional standards and quality management.

The data collected through the self-assessment of medical catering services in the military hospital were compared with the harmonized regulations for the nutrient & energy reference values and standards for nutrition and hydration of patients.

### Results

The performance level in case of investigated public unit was calculated to 94.26% because there are only two non-fulfilled criteria from the CIII standard and two criteria partially met from CI and CII standards.

## Discussions

The present protocol for assessing the level of performance in providing nutrition, hydration and nursing services with the harmonized nutritional standards for catering operation represent a practical tool for assessing, monitoring and developing quality food services in the military hospitals.

## References

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Vintila I., Turcescu A. Technology of the activities in the public food and tourism units, Didactical and Pedagogical Publishing House. Romania: Bucharest; 2005.

## Salmonella spp. and Campylobacter spp. in poultry feces and carcasses in Ouagadougou, Burkina Faso

Dr. Asseta Kagambega<sup>1</sup>

<sup>1</sup>University Ouaga I Pr Joseph Ki-zerbo, Ouagadougou, Burkina Faso

### **Biography:**

*Dr ASSETA KAGAMBEGA is a lecturer/researcher at the University of Ouagadougou/institut of Sciences. She is working on the epidemiology of foodborne pathogens such as Salmonella, pathogenic E. coli and Campylobacter isolated from food and food animals. Her goal is to understand how resistance develops in bacteria found in food animals, on farms, in processing plants, in retail foods, and it's potential to be transmitted to humans through the food chain. She has many articles published in international journals with high impact factor such as International Journal of food microbiology, Journal of food protection, Foodborne pathogens and diseases, BMC Microbiology, Food science and nutrition, MicrobiologyOpen..... As a young scientist, she is interested in molecular epidemiology of foodborne pathogens circulating among food, food animals and human holding resistance genes to antimicrobials, especially Salmonella.*

The importance of Salmonella and Campylobacter as foodborne pathogens is well recognized worldwide. Poultry and poultry products are commonly considered as the major vehicles of Salmonella and Campylobacter infection in humans. The aim of this study was to investigate the hygienic status of poultry facilities and determine the prevalence of Salmonella and Campylobacter in slaughtered poultry feces and carcasses in four different markets in Ouagadougou, capital city of Burkina Faso. A total of 103 poultry feces and 20 carcasses were analyzed using microbiological standard methods. Among the 103 fecal samples, 70 were positive for Campylobacter ssp (67.96%) and 54 for Salmonella ssp (52.42%). The hippurate hydrolysis test revealed that among the 70 Campylobacter strains isolated from feces, 49 were *C. jejuni* (70%) and 21 were *C. coli* (30%). From the 20 carcasses analyzed, 18 were contaminated with Salmonella (90%) and 10 with Campylobacter ssp (50%). Among the 10 Campylobacter ssp samples isolated from poultry carcasses, all were identified as *C. jejuni* using the API CAMPY system and the hippurate hydrolysis test. The assessment of markets hygienic practices for production, transportation, display, and vending of meat revealed unhygienic conditions. To complete the observation of unhygienic practices, we have sampled chicken-washing solution from the study sites and microbiological analysis of these samples revealed the presence of Salmonella spp in 100% of the samples. This study highlighted that poultry products on sale in Ouagadougou are highly contaminated with Salmonella and Campylobacter. To the best of our knowledge, this is the first report describing Campylobacter presence in the poultry industry of Burkina Faso. Our findings might help to better understand the epidemiology of Salmonella and Campylobacter.

## International perspectives on substantiating the efficacy of herbal dietary supplements and herbal medicines through evidence on traditional use

Ms. Karin Lenssen<sup>1</sup>, Prof. dr. Aalt Bast<sup>1</sup>, dr. Alie de Boer<sup>1</sup>

<sup>1</sup>Maastricht University, Venlo, The Netherlands

### **Biography:**

*Karin Lenssen is a PhD student at Maastricht University Campus Venlo. She obtained her MSc Health Food Innovation Management after which she pursued her career at Maastricht University Campus Venlo. Her research is part of Food Claims Centre Venlo and involves research on the scientific requirements in the regulation of herbal dietary supplements.*

Only two potential approaches are proposed by the European Commission to deal with the current impasse on health claims on botanicals. This review presents two additional other approaches and identifies that first, it should be discussed whether botanicals are foods or pharmaceuticals or a separate category in law. In the European Union, the regulation of botanicals as food or pharmaceutical is mutually exclusive and claims on these products are regulated differently. When the botanical is a medicinal product, efficacy can be substantiated by evidence on traditional use. However, health claims on food products, including those on herbal dietary supplements, cannot be substantiated with evidence on traditional use. The review procedure by EFSA of health claims on botanical containing foods is currently put on hold, to determine whether evidence on traditional use should be considered for the substantiation of these health claims. With no decision on this impasse, this article presents an analysis of various jurisdictions to identify their approach towards using traditional use evidence on the efficacy of botanicals and the applicability of these international procedures in the EU.

The first option in the discussion paper, to not allow evidence on traditional use for efficacy substantiation, was identified as main approach in the United States of America, Japan and China. The analysis shows that India and New Zealand accept evidence on traditional use for the substantiation of efficacy, comparable to the second option in the discussion paper. This analysis of regulations, guidance documents and scientific papers distinguishes two other possibilities: (i) split the current regulation to allow for special considerations for botanical health claims, as observed in Canada, as well as in EU medicinal law and India, China and Japan, where traditional medicinal practices are common. The final approach would be to develop a separate regulation for products on the borderline of food and pharmaceuticals, similar to Canada and Australia.

The decision upon the future approach how to substantiate health claims on botanicals may, however, be less complicated when the classification of botanicals as food or pharmaceutical is clarified.

## Establishment of the research platform for safety and functionality of local foods through clinical intervention and information technology

**Prof. Jun Nishihira<sup>1</sup>**

<sup>1</sup>Hokkaido Information University, Ebetsu, Japan

### **Biography:**

*Jun Nishihira, M.D., Ph.D. Vice President of Hokkaido Information University. Professor of Department of Medical Management and Informatics, Director of the Center of Health Information Science Center, Hokkaido Information University, Hokkaido Japan. Dr. Jun Nishihira graduated from Hokkaido University School of Medicine (1979). After he obtained Medical Degree (MD) from the Hokkaido University (Sapporo, Japan), he joined a basic medical research, focusing on infectious diseases and immunology in Bowman Gray School of Medicine, Wake-Forest University, Winston Salem, NC (1984-1985). He became an associate professor of Department of Biochemistry of the medical school, specialized in Diabetes and Immunology. He is currently Professor of Hokkaido Information University (2006-current). He published more than 265 peer-reviewed papers relevant to a wide variety of basic research and clinical practice. In 2016, he was awarded as a recipient of the Innovation net award for the community health through foods by the Ministry of Japan for Education, Culture, Sports, Science and Technology. In 2017, he was also honored by Hokkaido municipal government for his science activities in clinical trial system for food (Hokkaido Science and Technology Award).*

### Introduction

In recent years, food functionality has caught people's interest in terms of disease prevention and health promotion. The Japanese government introduced new rules on health food regulation in 2015, requiring evidence of human clinical trials. Within this context, interest in clinical trial systems to evaluate the safety and functionality of foods has grown. In 2012, Hokkaido was designated as one of the comprehensive special zones for international competitiveness (Hokkaido Food Complex). In this paper, we introduce our current activities focusing on the clinical trial for foods as well as the regional health information system.

### Purpose

We establish healthcare programs with the use of functional local foods evaluated by an ICT-assisted clinical trial system for food.

### Methods

We have established a clinical trial system for foods, called the "Ebetsu Model" through the regional innovation programs (2007-2016). The "Ebetsu Model" has been operated in Hokkaido Information University (HIU) through the close collaboration of Hokkaido municipal government and Ebetsu City. The clinical data obtained from clinical trials were securely stored and analysed focusing on food safety and functionality.

### Results

We conducted more than 80 human clinical trials of functional foods ranging from agriculture to fishery. The number of registered participants in "Ebetsu Model" has grown to about 10,000. To date, we have obtained the following outcomes: (1) establishment of clinical trial system that can issue "Food for Specified Health Uses (FOSHU)" labels and (2) systematic analysis of health-related information about safety and functionality of local foods.

## Conclusions

We established a research platform of food informatics that promotes food science and human health. In 2013, “Washoku” traditional Japanese cuisine was added to UNESCO’s intangible cultural heritage list. Hokkaido foods with their high nutrition and varied tastes have been expanding not only within the Japanese market, but also in foreign markets. We suggest to use the “Ebetsu Model” in the discussions within the GHI Working Group Nutrition, intended to develop a globally harmonized health claim labelling system.



## ACCURATE MEASUREMENT OF DIETARY FIBER AND DIETARY FIBER COMPONENTS

Prof. Barry McCleary<sup>1</sup>, Ms. Lucie Charmier<sup>1</sup>, Dr. David Mangan<sup>1</sup>

<sup>1</sup>Megazyme, Bray,, Ireland

### **Biography:**

*Dr. David Mangan was awarded his PhD from Trinity College, Dublin, Ireland in 2010. He is the author of a number of patents and papers in the fields of carbohydrate chemistry and biocatalysis. He has been employed at Megazyme since 2012 and currently holds the position of Research Director under CEO, Professor Barry McCleary, who has developed a series of globally adopted analytical methods including the Integrated Total Dietary Fiber method (McCleary Method, AOAC 2009.01), along with CODEX approved methods for the measurement of resistant starch (AOAC 2002.02),  $\beta$ -glucan (AOAC 995.16) and fructo-oligosaccharides (AOAC 999.03).*

The most commonly used method for the measurement of total dietary fiber (TDF) is the, so called, Prosky Method (AOAC Method 985.29). However, the recognition that resistant starch (RS) and non-digestible oligosaccharides (NDO) behave as dietary fiber (DF) has required the development of updated methods to properly measure and include these fibers. This led to the development of the integrated TDF methods (INTDF; AOAC Methods 2009.01 and 2011.25). In the application of these methods to a diverse range of fibers, several challenges and limitations were identified. These have been addressed in the Rapid Integrated TDF method (RINTDF) which is more physiologically relevant and yields more accurate values for RS and non-digestible oligosaccharides (NDO). The time of incubation with pancreatic  $\alpha$ -amylase/amyloglucosidase has been reduced to 4 hours, in-line with ileostomy transit time and the levels of pancreatic  $\alpha$ -amylase and amyloglucosidase have been increased to ensure that the values determined for various resistant starch samples are in line with known values from ileostomy studies.

This RINTDF method has been subjected to interlaboratory evaluation under the auspices of AOAC Int. and ICC. The study involved 13 laboratories world-wide and 16 samples (8 blind duplicates) were analysed. The dietary fiber content of the 8 test pairs ranged from 6.79 to 60.6%. TDF was calculated as the sum of high molecular weight dietary fiber [HMWDF (IDF + SDFP)] and SDFS. The within laboratory variability (sr) ranged from 0.29 to 0.74 and the between laboratory variability (sR) ranged from 0.57 to 4.67. The within laboratory relative variability (RSDr) ranged from 1.22 to 6.34% and the between laboratory relative variability (RSDR) ranged from 2.64 to 13.38%. This level and range of variability is similar to values obtained with other dietary fiber methods. On the basis of these results, the method has been adopted as AOAC Method 2017.16 and ICC Standard No. 185.

**Prosky/Lee + Matsutani**  
AOAC Method 985.29/991.43/2001.03

- Heat-stable  $\alpha$ -amylase  
Conditions: 98-100°C, pH 8.2, 30 min
- Protease  
Conditions: 60°C, pH 8.2, 30 min
- Amyloglucosidase  
Conditions: 60°C, pH 4.5, 30 min

**RINTDF**  
AOAC Method 2017.16

- Pancreatic  $\alpha$ -amylase  
Amyloglucosidase  
Conditions: 37°C, pH 6.0, 4 h
- Protease  
Conditions: 60°C, pH 8.2, 30 min

1. Enzyme Incubations

2. Alcohol precipitation, solvent washing, drying, filtration (2 residues)

Protein Determination    Ash Determination

3. Ethanolic Filtrate Concentrate  
Desalt in column  
(HPLC - TOSOH TSK)

3. Ethanolic Filtrate Concentrate  
In-line desalting  
(HPLC - TOSOH TSK)

SDFS (NDO)

"TDF" (HMWDF)  
as defined by  
Prosky/Lee method

HMWDF as defined by  
RINTDF method  
(correct RS measurement)

SDFS (NDO)

TDF as defined by Matsutani method

TDF as defined by RINTDF method

## MEASUREMENT OF $\beta$ -GLUCAN IN MUSHROOM PRODUCTS

Prof. Barry McCleary<sup>1</sup>, Ms. Anna Draga<sup>1</sup>, Dr. David Mangan<sup>1</sup>

<sup>1</sup>Megazyme, Bray,, Ireland

### **Biography:**

*Dr. David Mangan was awarded his PhD from Trinity College, Dublin, Ireland in 2010. He is the author of a number of patents and papers in the fields of carbohydrate chemistry and biocatalysis. He has been employed at Megazyme since 2012 and currently holds the position of Research Director under CEO, Professor Barry McCleary, who has developed a series of globally adopted analytical methods including the Integrated Total Dietary Fiber method (McCleary Method, AOAC 2009.01), along with CODEX approved methods for the measurement of resistant starch (AOAC 2002.02),  $\beta$ -glucan (AOAC 995.16) and fructo-oligosaccharides (AOAC 999.03).*

The worldwide market value of medicinal mushrooms has grown in value from \$6 billion in 1999 to \$18 billion in 2014. The primary active medicinal compound in mushrooms is  $\beta$ -glucan. Mushroom  $\beta$ -glucans primarily consist of a (1-3)- $\beta$ -linked main chain with single D-glucosyl residues linked (1-6)- $\beta$ - to every third D-glucosyl residue in the main chain. Other structures containing (1-3)- and (1-6)- $\beta$ -linkages are also present. Complete enzymic hydrolysis of mushroom  $\beta$ -glucan has not yet been achieved, however  $\beta$ -glucan can be specifically measured in mushroom products by difference. Total glucan ( $\alpha$ - plus  $\beta$ -) is measured by complete hydrolysis of all glucan to glucose with dilute acid with subsequent glucose determination. In parallel,  $\alpha$ -glucan (starch, phytoglycogen) in the sample is measured by specifically hydrolysing this glucan with  $\alpha$ -amylase plus amyloglucosidase to glucose, with measurement of glucose.  $\beta$ -Glucan is determined by difference (total glucan minus  $\alpha$ -glucan).

A sample set composed of a variety of natural mushroom fruiting bodies from NAMMEX (North American Medicinal Mushroom Extracts, British Columbia, Canada) and a range of commercial mushroom products in capsule form were analysed using the developed methodology. The natural mushroom samples contained very little  $\alpha$ -glucan (0.1 – 3.4%) and high levels of  $\beta$ -glucan (from 7 to 64%). In contrast, the mushroom capsules generally contained 24-83%  $\alpha$ -glucan and in several cases as little as 1-4%  $\beta$ -glucan.  $\beta$ -Glucan products can be prepared from fruiting bodies of mushroom but are often isolated from fungal mycelium growing on sterilized cereal grain such as brown rice, sorghum, oats, millet or wheat. Once the grain is fully colonized, the complete mass is cut into layers and dried in a dehydrator and then ground to a powder. Clearly, the high levels of  $\alpha$ -glucan (starch) in the final product is derived mainly from the grain on which the mycelium was grown.

Figure caption: A) Shiitake (*Lentinula edodes*), B) Reishi (*Ganoderma lucidum*), C) Lion's mane (*Hericium erinaceus*) and D) Turkey tail (*Trametes versicolor*).



## Effects of Different Storage Time and Temperature on kernels Quality and Processing Characteristics of Oats

Prof. Meili Zhang<sup>1</sup>, master JiaYuan Li<sup>1</sup>, dr. Jing Zhang<sup>1</sup>

<sup>1</sup>Inner Mongolia Agricultural University, Huhhot, China

### **Biography:**

Zhang Meili, female, Ph.D., professor at Inner Mongolia Agricultural University, PhD tutor, director of food oil and plant protein engineering. Graduated from China Agricultural University agricultural products processing and storage engineering in 2004, received a doctorate degree in engineering. Visiting scholar at Kyoto University, Japan. Selected Inner Mongolia grassland excellence in august 2016. National Scholarship Committee review experts of national construction of high-level university public school graduate programs. Communications review experts of Ministry of Education Degree Center. Reviewers of "Food Science" "Journal of Inner Mongolia Agricultural University" and other magazines.

The main research direction is processing of characteristic agricultural products, isolation and extraction of bioactive components and their functional properties. Main research the impact of protein, polypeptide, polyphenol and other active substances of oats, buckwheat, quinoa and other specialty grains on food processing. The effect of starch and protein structure of oat by HHP treatment. Currently chairing and has completed projects of the National Natural Science Foundation of China, the Ministry of Education for Study Abroad and the Inner Mongolia Natural Science Foundation are 12 in all. Published more than 50 research papers in SCI, Chinese core journals and apply for 3 patents.

Oats with rich nutrition and health function were aged easily during storage. In order to explore the changing of nutritional quality and oat dough characteristics of Oats in the process of aging, the content of water, ash, fat, protein, starch and fatty acid was measured by comparing the new oat kernels with oat kernels stored at room temperature and 4°C for one year. The effects of storage temperature on the characteristics of oat dough after oat kernel aging were investigated under different water addition conditions. The results showed that the content of conventional nutrients decreased after storage of oat kernels for one year. The nutrients of grains stored at room temperature decreased more and the content of starch, water and fat decreased significantly. After storage, the content of main fatty acids in oat kernels decreased. Oleic acid, linoleic acid, MUFA and PUFA decreased significantly after storage at room temperature ( $p < 0.05$ ). With the increase of water content, the dough hardness decreased during the year, and the elasticity and cohesiveness increased. Under the same water addition conditions, the oat grains after storage had higher dough hardness than the new oat dough, and the elasticity and cohesiveness were lower than the new oat dough. After storage at room temperature, the dough of the sample has higher hardness and lower elasticity and cohesiveness.

## META-GENOMIC CHARACTERIZATION OF MICROBIAL COMMUNITIES ISOLATED AT DIFFERENT NODES OF INDIGENOUS CHICKEN VALUE CHAIN IN KENYA

**Mr. Benard Oloo**<sup>1</sup>, Prof. Symon Mahungu<sup>1</sup>, Prof. Alexander Kahi<sup>1</sup>, Dr. Roger Pelle<sup>2</sup>, Ms. Eunice Machuka<sup>2</sup>  
<sup>1</sup>Egerton University, Nakuru, Kenya, <sup>2</sup>ILRI (BeCA-Hub), Nairobi, Kenya

### **Biography:**

*Mr. Oloo is a passionate Researcher, a Food Safety and Quality Expert, a natural leader and Trainer/Lecturer. He boasts an International training (Wageningen UR, the Netherlands), South and West Africa as well as regional (East Africa) experience and has consistently surpassed performance targets working in different positions in food industry and academia. He currently serves as the Vice Chair of Association of Food Technologist of Kenya, co-Ambassador of Global Harmonization Initiative for East Africa and Lectures Food Science and Technology courses at the Faculty of Agriculture in Egerton University. He is an internal auditor of ISO 22,000; 2005; ISO 9001: 2015, BRC and HACCP. Mr. Oloo won the Africa Bio-Sciences Challenge Fund-Fellowship at ILRI-Beca Hub, Nairobi to conduct research on molecular characterization of microbial communities from indigenous chicken value chain in Kenya using Next generation Sequencing based on 16S rRNA techniques. He is also an alumni of the prestigious Emerging Leaders Network Training Programme 2018 with IFT from Chicago, USA.*

### **ABSTRACT**

Poultry represents 30% of Kenya's Agricultural GDP which accounts for about 25% of overall GDP. Kenyan poultry population is estimated at about 42.4 million birds according to (FAO, 2014). Indigenous chicken (IC) accounts for 75% of this overall poultry population whereas broiler contributes 22%. Though only scanty reports exist in Kenya about the specific causes of food borne illnesses, the available data already points to a serious food borne disease burden due to the contamination of foods by a number of pathogens. Limited work has been done to establish microbial quality based on DNA sequencing of these micro-organisms at different nodes of the value chain and from the different ecotype clusters of indigenous chicken in Kenya. This study was conducted to evaluate microbial ecology of three different ecotypes of indigenous chicken from three different body parts (breast, thigh and caecum) and compared that of the broiler. It has also revealed the different taxonomic classifications of microbial communities at different nodes of IC value chain and the diversity metric measurements within samples and between different samples. Indigenous chicken microbiome consists of novel bacteria that can be associated with improved health, better performance, antagonism to pathogenic microbes, and improved food intake. The node of value chain, IC ecotype and part of chicken does not significantly determine microbiome abundance. However, there is a marked difference in microbial abundance and diversity between the broiler and indigenous chicken. Microbiome of IC (Naivasha and Kakamega, are clustered together) while that from Taita clusters closer to the broiler microbiome. No strains of pathogenic bacteria were identified in the samples and this may suggest that CCP at farm should potentially be set to address other hazards other than microbial. Indigenous chicken are rich in microbial communities and most of them are beneficial. Through HT-NGS technologies some bacteria that have never been cultured were identified including: TM7 and Prevotella. The huge abundance of Prevotella especially in Kakamega ecotype indicates these chickens' gut adaptation to utilizing plant based material which are a regular part of these chickens' diet under free range system and few mixed systems.

## EFFECT OF MISCELLANEOUS BEAN DIETARY FIBER ON HYPOGLYCEMIC AND PANCREATIC OXIDATIVE DAMAGE REPAIR IN DIABETIC RATS

**Prof. Dr. Wang Ying<sup>1,2,3</sup>**, student Zuo Zhaohang<sup>1</sup>

<sup>1</sup>College of Food Science, Heilongjiang Bayi Agricultural University, Daqing, China, <sup>2</sup>National Coarse Cereals Engineering Research Center, Daqing, China, <sup>3</sup>Key Laboratory of Agro-Products Processing and Quality Safety of Heilongjiang Province, Daqing, China

### **Biography:**

Wang Ying, 39, professor, PhD Tutor. The Ph.D. of Jilin University, a visiting scholar at the Cornell University School of Food. For many years, he has been engaged in the teaching and research of agricultural products storage and food safety. The research direction has been centered on the extraction and functional research of agricultural product functional factors and the promotion of small molecule pollutants. She is currently the deputy director of the National Cereals Engineering Technology Research Center; the reserve leader of the agricultural product processing and storage talents team in Heilongjiang Province. She is also the executive director of the Agricultural Products Processing and Storage Society of the Chinese Agricultural Society, the vice chairman of the Heilongjiang Provincial Cereals Association (and the secretary-general), the deputy director of the Heilongjiang Branch of the Chinese Nutrition Society, and the expert of the National Natural Science Foundation. She has presided over 33 national and provincial research projects and projects, and published more than 130 academic papers, including 16 SCI and EI. She won 4 second prizes for scientific and technological progress in Heilongjiang Province, 18 invention patents and 3 academic monographs.

**Abstract:** Purpose: To investigate the effect of different amounts Miscellaneous Bean dietary fiber on hypoglycemic and pancreatic oxidative damage repair in diabetic rats. Method: Diabetic rat model was constructed by intraperitoneal injection of alloxan solution(150 mg/kg). After successful model, the body and pancreas weight, fasting blood glucose(FBG), the levels of serum hepatic glycogen, insulin(INS), glycosylated serum protein(GSP), superoxide dismutase(SOD), glutathione peroxidase(GSH-Px) and malonic dialdehyde (MDA) measured after 42 days of continuous administration of Miscellaneous Bean dietary fiber, and stained with pancreatic tissue to prepare H&E pathology sections to be observed. Result: Compared with the model group, the body weight of each group was significantly higher than that of the model group. The fasting blood glucose level of the each group decreased compared with the model group. The ratio of pancreas and the weight of the rats in the each group was higher than that in the model group. The levels of serum Hepatic glycogen and INS of the rats were significantly higher than those in the model group, serum GSP content decreased in varying degrees. The levels of serum GSH-Px and SOD in the rats of the rats were significantly higher than those in the model group, serum MDA content decreased in varying degrees. Histopathological examination of pancreas showed that the degree of pancreatic tissue injury was significantly reduced, the number of islet cells is increased, and the degree of edema of cell edema was reduced. Conclusion: Miscellaneous Bean dietary fiber can reduce the blood glucose content of diabetes, repair oxidative damage and improve the diabetic rats on the pancreas injury.

**Keywords:** Miscellaneous Bean dietary fiber; diabetes; hypoglycemic; pancreas; repair

### **Acknowledgements**

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## Significance and Health Implications of Antimicrobial Susceptibility Pattern of Bacteria Isolated from Locally Made Snacks in Nigeria

**Mrs. Grace Ajayi<sup>1</sup>**, Mrs. Lydia Ogunniyi<sup>1</sup>, Miss. Rebecca Ogundipe<sup>1</sup>, Mrs. Omotolani Oguntoye<sup>1</sup>

<sup>1</sup>*Ogun State Institute Of Technology, Igbesa, Nigeria*

### **Biography:**

*Ajayi Grace was born 1985 in Lagos, Nigeria. She obtained the Higher National Diploma (HND) Microbiology, Bsc. (Microbiology), Msc. (Environmental Microbiology), degrees from Yaba College of Technology, Lagos, Federal University of Agriculture Abeokuta, Ogun State, Nigeria and University of Lagos, Nigeria respectively between the years of 2010 to 2018 respectively. Currently, she is a Senior Laboratory Technologist in the Department of Science Laboratory Technology of Ogun State Institute of Technology Igbesa, Ogun, Nigeria. Ajayi has keen interest in Sustainable Development Goals spanning areas in Water, Sanitation, Hygiene, Food and Environmental Development. A member of various professional bodies at national and international level. Ajayi has authored and co-authored some academic journals published and unpublished*

### Introduction and Objectives

Generally, snacks are foods which are neither nuts, fruits nor vegetables but are made and eaten as they are sold. In Nigeria, there is a vast diversity of snacks foods, from bakery products to take-away foods. They are eaten by all age groups, particularly young ones and school children. Arguably, the proliferation of snack consumption has been the result of modern lifestyles, economic recessions and increased industrialization among other factors. Although world governments have tried to improve food/snacks supply safety, the incidences of borne disease has made snack consumption a significant health issue, especially in developing nations. The World Health Organization reported that in 2005 alone, 1.8 million people died from diarrheal disease. These deaths were mostly related to the consumption of contaminated food and water. The high consumption rate of locally-made snacks in Nigeria has thus warranted the need for the determination of the microbial quality and antimicrobial properties of these foods.

### Methodology and Approaches

The study collected 7 diverse samples of traditional snacks bought from different parts of Nigeria. These samples were subjected to microbiological analysis to ascertain the presence of antimicrobial susceptibility patterns. The samples were aseptically blended and serial dilution of up to ten fold were made for the samples. The isolated were identified by conventional methods.

### Analysis and Results

Certain bacteria were identified from the samples: *Enterobacter* spp, *Pseudomonas aeruginosa*, *Klebsiella pneumonia*, *Escherichia coli*, *Micrococcus* spp, *Bacillus* spp, *Streptococcus faecalis* and *Staphylococcus aureus*. Further, the bacterial count on the snacks samples revealed that kulikuli and aadun contained the greatest bacterial load (6.6x10.7cfu/ml and 5.6 x 10.7 respectively). The antimicrobial susceptibility pattern revealed that *Pseudomonas aeruginosa* had the greatest resistance to virtually all the antimicrobial agents tested.

### Conclusion and Recommendations

This paper shows the presence of antimicrobial susceptibility patterns in locally-made snacks in Nigeria. Many studies have reported that snacks and foods prepared under unhygienic conditions are vulnerable to microbial contamination. There is an urgent need to study the pathogenicity and strain distribution of presumptive food pathogens and how they relate to the hygienic practices of snack preparations in Nigeria.



## ASSESSMENT OF AFLATOXIN LEVELS IN REFINED AND UNREFINED VEGETABLE OILS IN NIGERIA

**Mrs. Eniola Oni**<sup>1</sup>, Prof. Flora Oluwafemi<sup>1</sup>, Dr Sarafedeen Kareem<sup>1</sup>, Prof. Adebukunola Omemu<sup>1</sup>

<sup>1</sup>*Federal University Of Agriculture , Nigeria, Abeokuta, Nigeria*

**Biography:**

Oni Eniola is a Doctoral student and An Assistant Lecturer in the Department of Microbiology, Federal University of Agriculture, Abeokuta, Nigeria. Her area of interest is Food Safety and Mycotoxins

This study was carried out to determine the presence of aflatoxin in refined and unrefined vegetable oils, extract and quantify the aflatoxin using High Performance Liquid Chromatography (HPLC). Ten refined and five unrefined vegetable oils of the same batch were purchased from open markets and vegetable oil factories respectively and screened for aflatoxin. Corn oil, Coconut oil, Soya oil, Palm kernel oil, Palm oil and Groundnut oil had the following aflatoxin concentrations respectively; 157 ng/kg, 49 ng/kg, 28 ng/kg, 9 ng/kg, 5 ng/kg and 4 ng/kg while the other four refined oils had no detectable aflatoxin. Comparing the rate at which the toxin (aflatoxin) travel from unrefined oil to refined oil. Unrefined Corn oil, Coconut oil, Soya oil, Palm kernel oil, palm oil and Groundnut oil of the same batch had the following aflatoxin concentrations respectively ;242 ng/kg, 102ng/kg, 67 ng/kg, 21 ng/kg, 9 ng/kg, and 10 ng/kg. The result indicated that unrefined vegetable oil had more aflatoxin load than refined oil. Low level of aflatoxin in the refined oil which is at permissible level according to European Commission is as a result of bleaching which allow for the loss of carotenoid which is responsible for reduction in aflatoxin load. It therefore implies refinery process reduces aflatoxin and this adds advantages to the vegetable oil refineries and to the consumers.

Keywords: Refined oil, Aflatoxins, High-performance liquid chromatography, Toxin

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## POTENTIALLY TOXIC FOOD COMPONENTS FORMED BY EXCESSIVE HEAT PROCESSING

**Professor Franco Pedreschi**<sup>1</sup>, Assistant Professor Michael Murkovic<sup>2</sup>, Associate Researcher Maria Salomé Mariotti<sup>3</sup>

<sup>1</sup>Pontificia Universidad Católica De Chile, Santiago de Chile, Chile, <sup>2</sup>Graz University of Technology, Graz, Austria,

<sup>3</sup>Universidad Tecnológica Metropolitana, Santiago de Chile, Chile

**Biography:**

*I am full time professor and Head of the Department of the Chemical Engineering and Bioprocess of the Pontificia Universidad Católica de Chile. My research lines are: (i) Chemical Food Safety; (ii) Compute Vision Applied to Food Technology, (iii) Microstructure and Physical Properties of Food. I have edited in 2013 the book "Chemical Food Safety and Health" together with Zuzana Ciezarova. I have written more than 70 ISI publications (h index 22) in recognized journals related to food science and technology. Finally, I have revised several scientific papers in prestigious ISI journals.*

Household and industrial heat treatment performs a number of important functions in food preparation; improving its digestibility, ensuring microbiological safety and developing flavour and taste. While these kinds of processes are an integral part of food production, recent research on neofomed contaminants (NFCs), a range of compounds produced during excessive heat treatment, paints a worrying picture of their wider health effects. Among several NFCs described in literature, acrylamide (AA), furan and Heterocyclic Amines. In this sense, High levels of AA – an NFC present in staple foods like potatoes, breakfast cereals and even infant formulas – have been linked to a potential increased risk of cancer, while research into Heterocyclic Amines suggests that high doses may have a carcinogenic impact.

These compounds are not external to the process but are formed naturally during thermal processing of foods through the complex set of chemical reactions taking place. While these findings are yet to be precisely quantified in humans, a growing weight of scientific evidence suggests some NFCs may have a negative effect on health, making understanding the mechanisms behind their formation in heat-treated food a real research priority. Since NFCs are generated in higher or less degree by Maillard Reaction (MR) and simultaneously MR is the also responsible of the development of the attractive sensory attributes in these kind of high heat processed foods, it is hypothesized that NFC formation could be mitigated by removing NFC precursors from raw foods to be heated.

## The Role of Fundamental Chemistry for Harmonization of Food Laws through Science and Evidence based Regulations

Dr. Vish Prakash<sup>1</sup>

<sup>1</sup>*International Union of Nutritional Sciences and Ramaiah University of Applied Sciences, Bangalore, Mysore, India*

### **Biography:**

Dr. Vish Prakash is currently the Vice-President of International Union of Nutritional Sciences (IUNS) (2017-2021); Founder Council Member of Global Harmonization Initiative (GHI); Hon. Chairman, India Region of European Hygienic Engineering Design Group, Germany; Adjunct Professor at Ramaiah University of Applied Sciences, Bangalore; Former Director of CFTRI, Mysore, and Distinguished Scientist of CSIR, India. He has received more than 60 National and International awards including one of the high Civilian Awards Padmashree, Coveted Bhatnagar Award for Science and Technology and Rajyothsava award and several Lifetime Achievement Awards from various organizations both in India and Abroad. He is currently serving in the editorial board of a number of Journals and Books.

Dr. Prakash's Scientific Contribution in the area of Food Science, Food Technology, Chemistry and Biochemistry of Foods, Food Biotechnology, Nutraceuticals, Food Safety and Nutrition is vast and in depth with new Innovations and Technologies in the foreground. Dr. Prakash has as of date 210 peer reviewed research publications, 55 Patents Filed, nearly 50 Ph.D. degrees (some are Masters) guided and 774 plus Keynote, Chief Guest and Convocation addresses delivered and is the author of 12 Books and 9 more Books are in pipeline.

The role of Information Technology today has revolutionized the world in connecting the unconnected and perhaps has paved way for boundary less travel of science beyond one can think of. The translational Food Science and Technology with the power of fundamental chemistry remain as the basis when we address harmonizing regulatory matters crossing society, culture, people and traditional distilled wisdom. Such an integrated approach with science based evidence of regulations has to be achieved and must ensure a global harmonization from Farm to Folk and from Pediatrics to Geriatrics using the basis of chemistry as the pivotal point and anchor. This new wave of asking the question how can there be different regulations with each one of them emerging from the same science based approach ??

This will be discussed in depth for bringing about a new wave of thinking for Global Harmonization Initiative (GHI) to address itself the multiple agenda in the Congress to bring in the distilled wisdom for unification of regulatory policies globally. The pathway for GHI in future will be this main agenda to tackle, to convince, to rewrite, to reunite and to bring in a new thinking process beyond CODEX and beyond many regulatory bodies in the translational science of harmonization based on science and chemistry base evidence of regulations for a Safe Food for all.

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## FOOD SAFETY KNOWLEDGE, ATTITUDE AND PRACTICES OF UNIVERSITY STUDENTS IN NIGERIA

Prof. Adebukunola Mobolaji Omemu<sup>1</sup>, MR IBUKUN DANIEL BADEJO<sup>1</sup>

<sup>1</sup>*Federal University Of Agriculture, Abeokuta. College of Food Science and Human Ecology, Department of Hospitality and Toursim. amomemu@gmail.com; omemuam@funaab.edu.com. +2348134793402, Abeokuta, Nigeria*

### **Biography:**

Omemu Adebukunola Mobolaji is a Professor of Food Microbiology and Safety working with the Federal University of Agriculture, Abeokuta, Nigeria. She is committed to teaching, research and extension activities; her area of research focus include microbiology/safety of indigenous fermented foods; assessment of knowledge and practices of food handlers and consumers.

Prof. Omemu has authored/co-authored over 65 articles in both local and international journals. She has supervised several projects at both undergraduate and post graduate levels.

She is a member of several professional bodies such as Nigerian Society of Microbiology, Society for Applied Microbiology, American Society for Microbiology, Organization for Women in Science for the Developing world, and Hospitality and Tourism Management Association of Nigeria.

Prof. Omemu is a fellow of the prestigious African Women in Agricultural Research and Development (AWARD) fellowship which is a career-development mentoring program. She also served as a mentor under the MYCOE/SERVIR initiatives in West Africa. She is presently the Nigeria Program Assistant coordinator and also one of the facilitator of the Food safety training partnership between International Life Sciences Institute (ILSI), University of Ghana (UG) and Federal University of Agriculture, Abeokuta (FUNAAB). She currently serve as the Deputy Dean of the Post Graduate School, FUNAAB.

**Introduction:** Food mishandling is more common in some consumer groups than in others. University students are an important target group as they are most likely to engage in risky food handling practices making them susceptible to food borne illness

**Aims and objectives:** The objectives of this study were to assess the self-reported food safety knowledge, attitude and practices of university students from various field of study and to assess relationship between course of study and food safety awareness.

**Methodology:** Respondents were undergraduate students of different food related departments and non-food related departments at the Federal University of Agriculture, Abeokuta. Socio-demographic characteristics and food safety knowledge, attitudes and practices were obtained from 1400 students using self-administered questionnaire.

**Results:** Majority (55.7%) of the respondents were female between the ages of 19 and 22 years (49.1%). Many of the respondents (51.4%) always cook their meals, 24% were not aware that keeping cooked food and raw food together causes food-borne illnesses and 73.7% believed that contaminated food always have some change in color and taste. Irrespective of course of study, majority of the respondent (90.6%) are aware that preparation of food disregarding hygiene rules can cause food-borne illnesses and 43.0% obtained food safety information from their university studies. Mean food safety knowledge, attitude and practices scores were significantly ( $p < 0.05$ ) higher for students studying food related courses (Table 1).

**Conclusion:** An educational background relevant to food safety was a significant predictor of responding accurately to a wide range of study questions. Universities can play a role in food safety education and there

is need for educational initiatives tailored to develop the food safety knowledge, attitude and practices of young Nigerian students.

**Table 1: Mean of Food Safety Knowledge, Attitude and Practices of University Students**

<b>Variable</b>	<b>Food Related courses Mean <math>\pm</math> SD</b>	<b>Non Food Related courses Mean <math>\pm</math> SD</b>	<b>Means <math>\pm</math> SD</b>
Food safety Knowledge	13.2 $\pm$ 2.38	11.8 $\pm$ 2.49	12.5 $\pm$ 2.44
Food safety Attitude	4.6 $\pm$ 2.21	3.8 $\pm$ 2.43	4.2 $\pm$ 2.32
Food safety Practices	23.8 $\pm$ 2.39	21.6 $\pm$ 2.51	22.7 $\pm$ 2.45

SD= standard Deviation

## Nutrition and Health Claims Status in Lebanon

Dr. Christelle Bou-mitri<sup>1</sup>, Lama Khnaysser<sup>1</sup>, Dr. Jessie El Hayek<sup>1</sup>, Pr. Jaqueline Doumit<sup>1</sup>, Pr. Antoine Farhat<sup>1</sup>  
<sup>1</sup>Notre Dame University-louaize, Zouk Mickael, Lebanon

### *Biography:*

Christelle Bou-Mitri is currently an Assistant Professor in Food Safety and Quality Management, at the Faculty of Nursing and Health Sciences at Notre Dame University-Louaize. Dr. Bou-Mitri received a Ph.D. Degree in Food Science/Biotechnology from McGill University (Quebec, Canada). She had been working for several years in national and international food industries in Canada and Lebanon. Dr. Bou-Mitri acquired expertise in the development of functional hydrocolloid systems for the improvement of the food stability and quality attributes as well as the synthesis of nutraceutical compounds, using “green” biotechnology approaches. Her research interests are at the interface of multidisciplinary skills combining food chemistry, enzyme technology and applied food science. Her main goal is to improve the Lebanese food safety and quality in order to address the needs of the Lebanese government and industries, and improve the food trade as well as protect the public health.

Nutrition and health claims (NHC) are used on food packaging to help consumers make healthier choices at the point of sale. In absence of stringent standards and regulations, those claims could be sometimes misleading. The NHC status in Lebanon was investigated. The case of pre-packed bread was selected to focus on locally manufactured foods.

Bread samples (n=354) from all the bakeries located in Mount Lebanon, between 2017 and 2018, were assessed. Breads with nutrition claims were analyzed using standard methods. A cross-sectional study was also conducted among 400 supermarket shoppers.

Of the bread samples, 59.6% carried at least a claim, 47.2% had non-nutrient claims, 32.5% had nutrition claims and 15.3% presented health claims. Claims related to sugar, salt and fiber content were the most commonly used (28.8%, 16.4% and 14.7%, respectively). Breads with claims were significantly more expensive. Various misleading and missing information were reported.

Overall, 83.5% of the Lebanese consumers thought that it is important to mention NHC on bread. Half of the participants relied on NHC whenever purchasing bread especially those suffering from hypertensive and kidney disease (p=0.013 and 0.01, respectively). Bread with claims were perceived healthy (78.5%), safe (72.2%), attractive (71.2%) and 70.9% agreed that bread with claims helps in maintaining a healthier lifestyle. More than half (56.2%) are ready to accept a poor taste if bread is bearing a claim. On the other hand, only 29.5% trust those claims and the majority believes that claims are exaggerated (68.8%), not controlled (65.5%) and misleading (53.8%). Males (48.6%) and participants following a specific diet (43.8%) are the most skeptical (p = 0.042 and 0.017, respectively).

While high level of consumers' exposure to NHC may be perceived beneficial due to their role in facilitating healthy food choices, consumers with health conditions could be particularly at risk from misleading ones. The overall findings highlight the need to control strictly NHC use and educate the Lebanese consumers to smartly use and judge food labels.

**Acknowledgment:** This project has been funded with support from the National Council for Scientific Research in Lebanon (CNRS-L).

**Keywords:** Nutrition claims; Health claims; Nutrition information; Label; Bread.

## Food Safety for Food Security: Analysing Right to Food

Dr. Purabi Bose<sup>1</sup>

<sup>1</sup>*Landing Together, Mumbai, India*

### **Biography:**

Purabi is social scientist working with indigenous and rural forest-dependent communities. About 20 years of international development experience, she has focused on issues of land tenure, forest rights, climate variability and food security. Purabi initiated a self-funded project, Landing Together Films, and her first indie multilingual documentary, TARA, has been nominated in film festivals including most recently at the National Science Film Festival of India (2018). Prior to this, Purabi worked with CGIAR's Forest, Trees and Agroforestry initiative as Gender Focal Contact, based at the International Center for Tropical Agriculture in Cali, Colombia. She holds a multidisciplinary PhD degree from Wageningen University, the Netherlands, in Environmental Sciences and Social Sciences.

*In 2018, Purabi completed a series of four short indie multilingual documentary films and a debut feature length film highlighting the implications of oil-palm vis-à-vis shifting cultivation; women's forest land tenure rights; impacts of extractive industries on local communities (See [www.landingtogether.weebly.com](http://www.landingtogether.weebly.com)). Recent scientific publications include a Special Issue on Latin American women's forest and land tenure (2017); a Special Issue on marginalised communities and climate vulnerability (2017) and an edited volume about Dryland Forests (2016), co-edited a volume titled (in Spanish) Género y Energía (2018).*

### **Background**

The topic Food Safety vs Food Security demands better understanding not just conceptually, but in its implementation. I will debate in this paper why food safety should be integral part of the food security, particularly in the context of food aid, and right to food schemes in developing countries like India. By 2050, the global population is expected to reach about nine billion. It suggests that demand for food production will increase so would the need to maintain sustainability aspect. In this context, it means that food safety should become an enabler and not inhibitor to meet the global food security.

### **Scope and approach**

This research paper will highlight how safety is integral of food and nutrition security, and how government's approach to 'right to food' among other developments and trends related to food security will impact the food safety of marginal communities in developing countries.

### **Method**

I will use primary and secondary data of right to food and incidences of lack of food safety that hurts the vulnerable groups, particularly children of indigenous peoples.

### **Key findings and conclusions**

Food safety is part and parcel of food and nutrition security. Yet, the standards of food safety is not met in the food chain from production to delivering, particularly for the marginal section. Government of India has special food and nutrition security programmes for those belonging to following categories: Antyodaya Anna Yojna (AAY), Midday Meal Scheme, Emergency Feeding Programme, Annapurna Scheme, which supports food security of vulnerable groups, but much of the food safety aspects are overlooked. Food security is NOT just a condition related to the supply of food, and individuals' access to it, but should be safe as well, as referred in the World Food Summit (1996).

Overcoming the challenges and hurdle of implementing food safety is the key priority for food and nutrition security.



## GEMS/Food Consumption Cluster Diets – Assessing Exposure to Chemicals in the Diet

**Dr. Gerald Moy<sup>1</sup>**

<sup>1</sup>*Food Safety Consultants International, Vandoeuvres, Switzerland*

### **Biography:**

*In 1976 Dr Moy began his career in food safety with the US Food and Drug Administration and in 1987 was appointed as the Regional Advisor for Food Safety for the World Health Organization's Western Pacific Region based in Kuala Lumpur, Malaysia. In 1991, he moved to WHO Headquarters in Geneva to manage the WHO/FAO/UNEP GEMS/Food program, which promotes international and national exposure assessments of chemicals in food and the total diet. In this capacity, he served on the WHO Secretariat for Joint FAO/WHO Expert Committee on Food Additives and the Joint FAO/WHO Meetings on Pesticide Residues and was closely involved in the work of the Codex Alimentarius Commission. He has authored many texts on food safety and was the co --editor of Food Safety Encyclopedia and Total Diet Studies. He is now retired but provides advisory services to several national food safety agencies and food safety journals. He has recently been elected to the Board of the International Union of Food Science and Technology.*

In the risk assessment paradigm of the World Health Organization (WHO) and the Food and Agriculture Organization of the United Nations (FAO), the health-based guidance level of a chemical (usually the Acceptable Daily Intake or the Provisional Tolerable Intake) is compared with the estimated or projected amount of that chemical consumed in diets of average and high consumers. The amount of a chemical consumed is derived from an exposure assessment, which is based the product of the concentration of a chemical in a food times the amount of that food consumed. If a chemical is in multiple foods, the exposure is summed over the individual concentrations and consumption amounts. Therefore, food consumption data is an essential element in the risk assessment process because without it, exposure cannot be accurately estimated. At the international level, food consumption data presented a particular problem because the types and amounts of food consumed by populations around the world varies enormously. At the same time, only a few countries have carried out detailed consumption surveys to ascertain the types of foods and amounts that are consumed by their people. Fortunately, the FAO has been collecting data from countries on raw agricultural commodities, including meat, poultry, fish and certain semi-processed commodities, for many years as a tool for agricultural management. Using this extensive database, a cluster analysis was conducted by FAO/WHO/UNEP GEMS/Food which grouped together countries with similar diets into various GEMS/Food Consumption Cluster Diets. These diets are used by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and the Joint FAO/WHO Meeting on Pesticide Residues (JMPR) to conduct exposure assessments to assure the safety of maximum levels proposed for adoption by the Codex Alimentarius Commission. The presentation will provide an overview of the GEMS/Food Consumption Cluster Diets and also touch on how the human diet is relevant for humanity's past, present and future development.

## Total Diet Studies – Assessing Chemical and Nutritional Hazards in Food

**Dr. Gerald Moy<sup>1</sup>**

<sup>1</sup>*Food Safety Consultants International, Vandoeuvres, Switzerland*

***Biography:***

*In 1976 Dr Moy began his career in food safety with the US Food and Drug Administration and in 1987 was appointed as the Regional Advisor for Food Safety for the World Health Organization's Western Pacific Region based in Kuala Lumpur, Malaysia. In 1991, he moved to WHO Headquarters in Geneva to manage the WHO/FAO/UNEP GEMS/Food program, which promotes international and national exposure assessments of chemicals in food and the total diet. In this capacity, he served on the WHO Secretariat for Joint FAO/WHO Expert Committee on Food Additives and the Joint FAO/WHO Meetings on Pesticide Residues and was closely involved in the work of the Codex Alimentarius Commission. He has authored many texts on food safety and was the co-editor of Food Safety Encyclopedia and Total Diet Studies. He is now retired but provides advisory services to several national food safety agencies and food safety journals. He has recently been elected to the Board of the International Union of Food Science and Technology.*

While biological hazards are often considered the most serious food safety problem, chemicals in food pose significant threats to public health and are major impediments to international trade. Every chemical is harmful to health if the dose is sufficient (Paracelsus Principle) and this includes all natural and man-made chemical contaminants as well as all direct and indirect food additives and residues of pesticides and animal drugs used in food production. In addition, the lack of certain types of chemicals in the diet, e.g. micronutrients, can also pose risks to health. Literally thousands of chemicals possess toxicities that can pose both acute and chronic risks to health if their presence in food is not controlled. Toxic chemicals in food have caused major outbreaks of disease resulting in acute poisonings (e.g. pesticides), birth defects (e.g. dioxins), intelligence deficits (e.g. lead and methylmercury), cancer (e.g. aflatoxins) and organ failures (e.g. melamine). At low levels, these chemicals are not detectable by sight, smell or taste. Furthermore, exposure is often due to multiple foods in the diet. To protect consumers from such risks, public health authorities are conducting total diet studies to determine whether dietary exposure of a chemical approaches or exceeds its health-based reference value, such as an Acceptable Daily Intake (ADI) or Provisional Tolerable Weekly Intake (PTWI). The World Health Organization has recommended that countries conduct total diet studies as the most cost-effective method for assuring that chemicals in the diet do not pose unacceptable risks. The presentation will explain what total diet studies are and why they are important.

## OZONE AND ELECTRON BEAM IRRADIATION ON DEGRADATION OF ZEARALENONE AND OCHRATOXIN A

**Prof. Dr. Zhengxing Chen**<sup>1</sup>, Jiali Xing<sup>2</sup>, Ke Li<sup>1</sup>, Associate Prof. Dr. Ren Wang<sup>1</sup>, Prof. Dr. Li Wang<sup>1</sup>, Dongling Sun<sup>3</sup>, Yanan Li<sup>1</sup>, Associate Prof. Dr. Xiaohu Luo<sup>1</sup>

<sup>1</sup>National Engineering Laboratory for Cereal Fermentation Technology, Jiangnan University, , wuxi, China, <sup>2</sup>Ningbo Institute for Food Control, Ningbo, China, <sup>3</sup>Wuxi EL PONT Radiation Technology Co., Ltd., Wuxi, China

### **Biography:**

Zhengxing Chen.

Male

Ph. D, Food Science

Comprehensive utilization of grain by-products

*Jiangnan university, National engineering laboratory for cereal fermentation technology, No. 1800 Lihu Road Wuxi , professor/executive deputy director/doctoral supervisor.*

Zearalenone (ZEN) and ochratoxin A (OTA) are the key concerns of the food industry for its toxicity and pollution scope. In this study, effects of ozone and electron beam irradiation (EBI) on degradation of ZEN and OTA were investigated. Results demonstrated that 2 mL of 50 µg/mL ZEN was degraded completely after 10 s of treatment by 2.0 mg/L ozone. The degradation rate of 1 µg/mL ZEN by 16 kGy EBI was 92.76%. Methanol was superior to acetonitrile for degradation of ZEN. The degradation rate of 2 mL of 5 µg/mL OTA by 50 mg/L ozone at 180 s was 34% and of 1 µg/mL OTA by 16 kGy EBI exceeded 90%. Moreover, OTA degraded more rapidly in acetonitrile. Ozone performed better in the degradation of ZEN, whereas EBI was better for OTA. The conclusions provided theoretical references and practical basis for the degradation of different fungal toxins. This research was financially supported by the National Natural Science Foundation of China (31501579), China Agriculture Research System (CARS-02-32), Jiangsu Agriculture Science and Technology Innovation Fund [CX(17)1003], Zhejiang Food and Drug Administration Science and Technology Projects of 2018 Annual (201802, 201811), Special Fund for Grain-Scientific Research in the Public Interest of China (201513006), National Key Research and Development Program of China (2017YFD0401200, 2017YFD0401100), International S&T Cooperation Program of China (ISTCP) (2015DFA30540).

## QUANTITATION OF L-ASCORBIC ACID IN SELECTED FRUITS BY USING THE $\alpha$ , $\alpha'$ -DIPYRIDYL METHOD

**Dr. Hiroko Seki**<sup>1</sup>, Ms. Miki Katsumata<sup>2</sup>, Dr. Shinichi Asada<sup>3</sup>, Dr. Hiroshi Shinmoto<sup>1</sup>

<sup>1</sup>Department of Advanced Food Sciences, College of Agriculture, Tamagawa University, Tokyo, Japan, <sup>2</sup>Food Science Hall, Tamagawa University, Tokyo, Japan, <sup>3</sup>Department of Agri-Production Sciences, College of Agriculture, Tamagawa University, Tokyo, Japan

### **Biography:**

*Hiroko Seki is an assistant professor in the department of advanced food sciences, college of agriculture, Tamagawa university, who specializes in the quality of food, food analysis, and the enzymes that are related to the deterioration of the food quality.*

### **Introduction**

Many fruits and vegetables contain L-ascorbic acid, an important nutrient that exerts an antioxidant effect on the human body. As L-ascorbic acid is unstable and easily affected by temperature and enzymes, it is also frequently used to evaluate fruit and vegetable quality. High-performance liquid chromatography (HPLC) is able to quantitate L-ascorbic acid content with high accuracy. However, absolute quantitation of high L-ascorbic acid concentrations in fruits and vegetables may be achieved using titration and colorimetric analysis methods. Of these, the  $\alpha$ ,  $\alpha'$ -dipyridyl colorimetric method is the simplest and most rapid. It relies on the color change resulting from reduction of iron, and is often used for quantitation of plasma L-ascorbic acid. Nonetheless, this method is also applicable to quantitation of L-ascorbic acid in fruits and vegetables, provided that produce-endogenous reducing agents do not act on L-ascorbic acid.

### **Purpose**

We have evaluated the validity of the  $\alpha$ ,  $\alpha'$ -dipyridyl method for quantitation of L-ascorbic acid in persimmon, orange, ponkan orange, yuzu, and kiwi fruit, as these fruits are known to contain relatively high levels of L-ascorbic acid.

### **Methods**

First, we investigated linearity, precision, and accuracy of a standard curve generated using the  $\alpha$ ,  $\alpha'$ -dipyridyl method to quantitate L-ascorbic acid in reference solutions of known concentration. We used a microplate reader and wavelength 520 nm. Next, we compared the standard curve  $\alpha$ ,  $\alpha'$ -dipyridyl method with a standard addition method for L-ascorbic acid quantitation in the fruits of interest.

### **Results**

The standard curve exhibited high linearity within an L-ascorbic acid concentration range of 0-50 mg/L. In addition, for the 20 mg/L L-ascorbic acid standard solution, precision and accuracy of this method were 1.4 % and 0.57 %, respectively. Our study demonstrated for the first time that no significant difference in average or parallelism exists between the standard curve  $\alpha$ ,  $\alpha'$ -dipyridyl method and the standard addition method within an L-ascorbic acid concentration range of 0-20 mg/L ( $p>0.05$ ).

### **Conclusions**

The  $\alpha$ ,  $\alpha'$ -dipyridyl method is appropriate for quantitation of L-ascorbic acid in the fruits investigated during the present study.

## Science communication in local languages - the importance of science outreach in languages other than English

Ms. Nevena Hristozova<sup>1,2</sup>

<sup>1</sup>Vrije Universiteit Brussel, Brussels, Belgium, <sup>2</sup>Scircle Ltd, Brussels, Belgium

### **Biography:**

*Nevena is a native Bulgarian currently living and working in Brussels, Belgium. Her scientific background is in biotechnology and molecular biology (stages of education completed in Bulgaria, Finland and Belgium), and her passion and professional interest - in science communication. She is actively involved in a plethora of outreach activities - from science podcasts to public science events and festivals. She is also an avid science writer and public speaker.*

English has established itself almost effortlessly as the language of international science. There are many objective reasons why English is preferred as an easier way into world-class science and research. According to some language education providers, English is spoken by about 20% of the world's population. Naturally, a huge chunk of the communication about science also happens in English in the strive to reach wider audiences.

And yet, in this case too, less might be indeed more, as aiming to reach more compact and uniform audience would allow to tailor the message more efficiently to achieve the communication goal originally set. While 1,5 billion English speakers is certainly an audience to be considered, it must be pointed out that the majority of these people are non-native speakers which only complicates the communication, having to also follow regional and cultural complexity of the psyche of the target audience.

Thus, English might not be Holy Grail of science communication and outreach. It is especially useless when considering the people in most dire need of trustworthy science and fact-based information. Populations at risk of marginalisation also run the risks of succumbing to pseudoscientific practices and beliefs, due to the lack of (often) sufficient education and access to understandable fact-based information in their native tongue. Hence, several news reports and activities focus on the importance of using native and local tongues for science communication and the recently established group for harmonisation of the science communication at GHI is no exception. In this talk, we will introduce the concept behind the working group at the backdrop of establishing the extensive untapped potential for successful science outreach in languages other than English.

## Composting of organically amended/treated hardwood and softwood sawdust

Mrs. Naomi Kisiwaa<sup>1</sup>

<sup>1</sup>*Ohakk 2 Consults, Accra, Ghana*

### **Biography:**

Naomi Kisiwaa has been comprehensively educated for studies of Agriculture and Economics in both scientific and non-scientific way. She has been particularly involved in the Economics of Food and Security and Renewable Energy for sustainable and equitable energy supply, focusing on bio-fuels, during her postgraduate studies.

She is a proactive, adaptable, working independently, and equally an effective team player. Not only that, having worked under various conditions, she has found in herself resilience to pressure, where a challenging environment is one she continues to strive for.

*Her outlook is one of adventures through a tenacious and questioning approach, where she is always eager to work in the areas of Energy studies to the highest professional standards that ultimately deliver multiple yields on all fronts.*

Sawdust is a major waste produced by the wood industry. Adding value to sawdust through composting is one of the surest means by which environmental pollution could be minimized. About 500 kg of softwood and hardwood sawdust were separately mixed with mucuna leaves and kitchen waste in the ratio of 3:1:1 on weight basis and heaped using effluent from abattoir to develop composts. Objectives of the study were to monitor changes in the physico-chemical properties,  $\text{NH}_4^+$ -N,  $\text{NO}_3^-$ -N, C:N ratio, minerals N, K, P, microbial load and toxic elements in the composts during a 12 week period. Germination test was also done to evaluate the stability and maturity of the composts developed.

Degradation of softwood sawdust compost (SSC) was better in the mesophilic phase while that of hardwood sawdust compost (HSC) occurred in the thermophilic phase.

Thus, significantly higher amount of the organic material in SSC was decomposed during the period as compared to HSC.

Also, greater percentage of the nitrogen in the initial material of SSC was converted into plant-available inorganic nitrogen ( $\text{NH}_4^+$  and  $\text{NO}_3^-$ ) than was achieved in HSC. Hence, most of the mineral nitrogen in HSC that was converted was lost, probably in the thermophilic phase. On the contrary, the amount of organic nitrogen contained in the finished composts of both SSC and HSC were adequately good for application to the soil.

Additionally, concentrations of pathogenic microorganisms in SSC and HSC products were within acceptable limits in terms of toxicity on growing plants.

The softwood sawdust compost was relatively more stable as compared to HSC under the experimental conditions.

Concentrations of heavy metals in both SSC and HSC were also within acceptable limits that would cause no toxicity to plants. Also, moisture contents in both SSC and HSC were within the good range (40-60%) required for a good compost. Thus both SSC and HSC produced were of good quality. Further research

targeting specific wood species utilised in Ghana would help to identify composting materials which are readily degradable, as well as those that are toxic to microorganisms.

## Occurrence of significant microbiological hazards and antimicrobial resistant Salmonella at live bird market operations in Accra, Ghana

Dr. Angela Parry-Hanson Kunadu<sup>1</sup>, Mr. Richard Otwey<sup>1</sup>, Dr. Lydia Mosi<sup>2</sup>

<sup>1</sup>Department of Nutrition and Food Science, University of Ghana, Accra, Ghana, <sup>2</sup>Department of Biochemistry, Cell and Molecular Biology, University of Ghana, Accra, Ghana

### **Biography:**

*Dr. Angela Parry-Hanson Kunadu is a Food Science Lecturer at the Department of Food Science, University of Ghana. She has MSc and PhD in Food Science from University of Pretoria, South Africa, and BSc in Cell Biotechnology from University of Alberta, Canada. Her research interests are in the field of food microbiology, particularly improving microbiological quality and safety of foods, application of food safety systems to control bacterial pathogens in foods, studies on microbial adaptation in food environments and risk assessments of foodborne hazards to generate data for the formulation of appropriate policies and risk based microbiological standards. She has several years' experience implementation, training and troubleshooting quality management, quality assurance and food safety systems in food production plants in West Africa. She is a 2015 African Women in Agricultural Research and Development (AWARD) Fellow, the 1st Vice of Ghanaian Women in Agricultural Research and Development (GhaWARD), a 2016 Cambridge Africa Research Excellence (CAPREx) Fellow. She is a member of the National Codex sub-committee on Food Hygiene and the National Committee for Microbiological Specifications of Foods in Ghana.*

**Introduction:** Live bird markets (LBM) are street food operations that slaughter, dress and trade live or dressed poultry on demand. Significant challenges affecting LBMs are poor hygienic practices and inappropriate use of antimicrobials. Here, we provide data on microbiological hazards from LBM operations and chicken meat from supermarkets and cottage farms, and evidence of multidrug resistant (MDR) Salmonella from informal poultry operations.

**Methods:** Samples (148) comprising of 60 broiler carcasses from LBM, supermarkets and cottage farms, and 33 bench-top swabs, 33 fecal samples and 22 rinse water samples from LBMs were assessed for Aerobic Plate Count (APC), Staphylococcus aureus, E. coli and prevalence of Salmonella and Campylobacter. Presumptive Salmonella and Campylobacter were confirmed with Oxoid Microbact. AMR against 14 antibiotics was determined using disc diffusion assay and EUCAST breakpoints.

**Results:** Mean APC, S. aureus and E. coli counts were 8.5, 5.8 and 3.8 Log CFU/g for LBM, 6.4, 2.1 and 0.9 Log CFU/g for supermarkets and 6.1, 3.9 and 5.2 Log CFU/g for cottage farms respectively. Microbial counts on chicken carcasses for LBM were significantly higher ( $P>0.05$ ) compared to supermarkets and cottage farms. Salmonella and Campylobacter were present at a prevalence of 61% and 18% respectively on chicken carcasses, 77% and 10% respectively from rinse water, 81% and 20% respectively from fecal matter and 5% and 0% on bench surfaces. At the LBMs alone, 77% and 13% of carcasses were positive for Salmonella and Campylobacter respectively. Multidrug resistance (MDR) to 3-6 classes of antimicrobials occurred in 88% of the Salmonella isolates. All Salmonella isolates were resistant to at least one antimicrobial and sensitive to tigecycline.

**Conclusion:** The high prevalence of MDR Salmonella in fecal matter, rinse water and on chicken carcasses suggest cross-contamination onto skin of carcasses during processing, and raises concern for public health. Implementation of hygienic Standard Operating Procedures, good hygienic practices and HACCP, alongside



thorough and repeated training and consumer awareness, could significantly reduce the risk of transmission of microbiological hazards through chicken handling and consumption.

The project was funded by International Foundation for Science.

## BRING EARLY THE REGULATORY DIMENSION IN YOUR FOOD INNOVATION PROCESS

Dr. Dominique Taeymans<sup>1</sup>

<sup>1</sup>FoodREG Consult Ltd, Brent, Switzerland

### **Biography:**

Dominique started his career almost 40 years ago in Belgium as an assistant lecturer at the Ecole Polytechnique of Louvain-la-Neuve, where he obtained his Ph.D. in chemical engineering, to become the professor of chemical & food engineering of the Institut Meurice Chimie in Brussels. 25 years ago, he began his career in Regulatory Affairs when he moved to CIAA, currently FoodDrinkEurope, the trade association representing the European Food & Drink industry, where he contributed to the development of a harmonized food regulatory framework at EU and international (Codex) levels. In 2004, he became managing director of the Belgian Brewers federation where he established, with the Federal Ministry of Health, co-regulation on beer and alcohol advertising at Belgian level.

In September 2006, Dominique joined Nestlé and its Corporate Regulatory Affairs department in Nestlé HQ as a well-recognized expert in European and international regulatory affairs. In his new role, he acted as a reliable business partner to support innovation. Dominique contributed to people development and provide training to the regulatory affairs community.

Using his broad regulatory expertise and his listening and external networking capabilities, he created his own regulatory consultancy company in 2016 and is still actively involved in international standardisation (ISO).

Regulatory obligations are generally neglected by food scientists and if not neglected, those regulatory obligations are seen as constraints and unacceptable hurdles by those food scientists in charge of new food product development.

Regulations are also often seen as barriers to innovation even if regulations are essentially there to protect the consumer. Therefore, to avoid regulatory provisions become constraints, they must be considered at the very early stage of the food innovation process, also because registrations or authorizations will take time.

Examples of regulatory procedures will be given for a novel food ingredient or a novel food claim.

Indeed, a deep understanding of the regulatory environment may also allow to define novel fields of innovation and creativity and there are excellent examples:

- reformulation,
- labelling and claims,
- novel ingredients, etc.

which respond to consumer needs.

Several examples will be given, based on the current regulatory environment.

## Microbial Quality of Grape Juice Pasteurized by Ohmic Heating Technology

Mr. Tankesh Kumar<sup>1</sup>, Dr. D. D. Smith<sup>1</sup>

<sup>1</sup>Acharya N. G. Ranga Agricultural University, Guntur,, India

### **Biography:**

*Presenting author is a postgraduate student with a specialization in Processing and Food Engineering from Acharya N. G. Ranga Agricultural University, Guntur, Andhra Pradesh (India). He has completed his bachelor in technology degree in Agricultural Engineering from Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh (India). He has published full-length research papers, two in international journals and one in a national journal, one review article in an international journal, and two abstracts in international conferences. He is a life member of Indian Society of Agricultural Engineers (LM-11658) and member of American Society of Agricultural and Biological Engineers as well as Canadian Society for Bioengineering (M-1055831).*

Ohmic heating is an emerging thermal processing technology in which a food product is heated by supplying alternating current directly through it. In this study, grape juice was pasteurized at different voltage gradients (10, 20, 30 and 40 V/cm) from 20°C to temperatures of 55°C, 65°C, 75°C and 85°C for holding time 1, 3 and 5 min. Pasteurized juice samples were stored for 21 days at the refrigerated condition. System performance coefficient (SPC) of the ohmic heating system and the microbial property of grape juice in terms of total plate count, mold count and yeast count was evaluated. It was observed that the temperature and heating rate of grape juice increased linearly with the voltage gradient. Total plate count, mold count and yeast count of grape juice greatly decreased with increase in voltage gradient, heating temperature and holding time (Fig. 1). The microbial cells were destroyed due to electroporation which leads to pore-formation in the membrane and changes in cell permeability. After the storage period, microbial counts were found to be under the safe limit in the juice samples treated at 30 V/cm:85°C:5 min (Fig. 1). SPC of the ohmic heating system was found in the range of 0.57-0.99. For effective pasteurization of juice at 85°C using 30 V/cm, SPC was 0.73, which was commendable. It is concluded that ohmic heating technology might be effectively used to pasteurize fruit juices with short processing time and it depends on applied voltage gradient, heating temperature and holding time. It is a pollution-free and high energy-efficient technology.

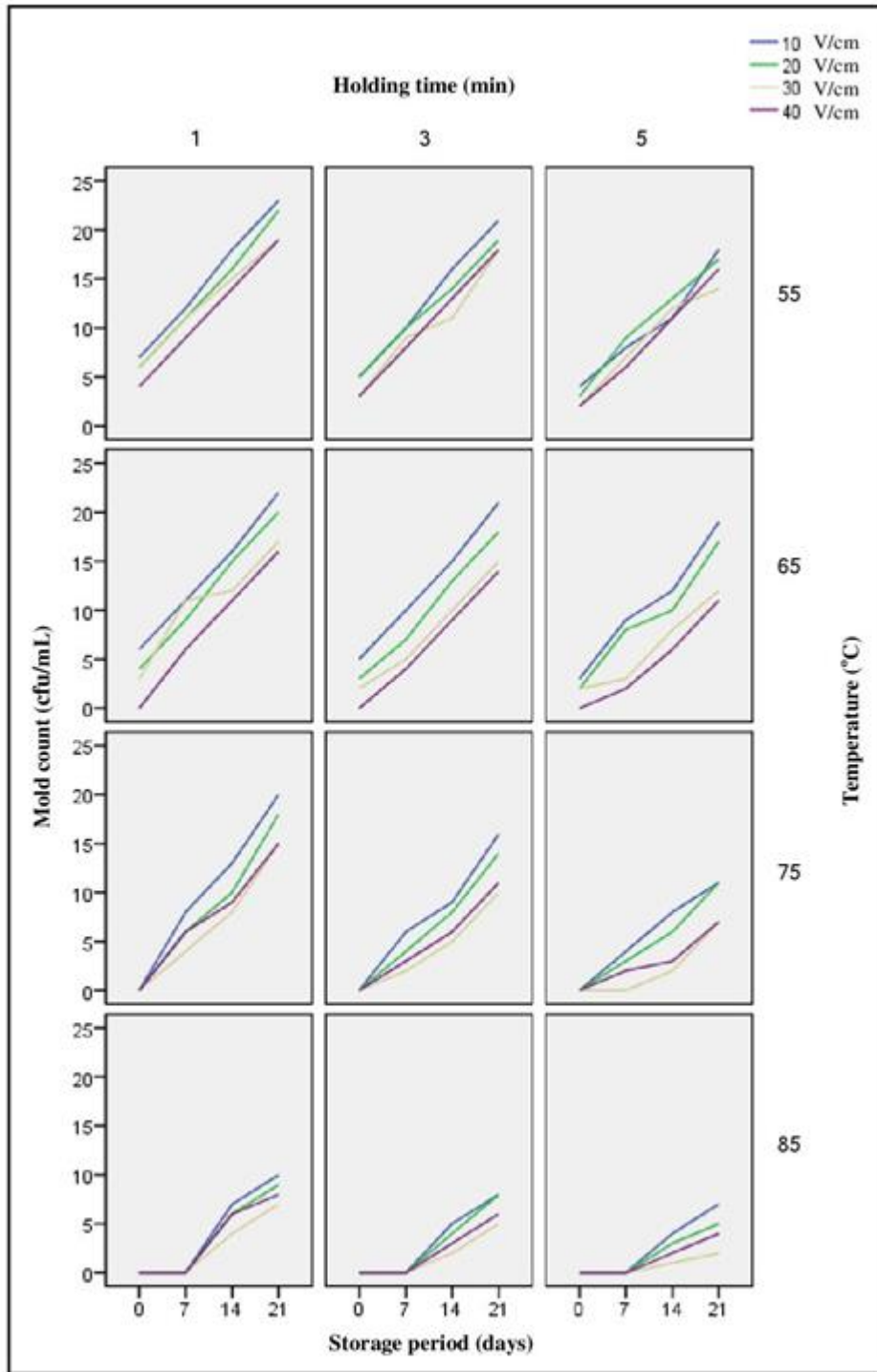


Fig. 1. Changes in mold count of ohmically treated grape juice samples during storage period

## Study on characteristics and inhibition of *Hafnia alvei* from aquatic products

Prof. Dr. Hongman Hou<sup>1</sup>

<sup>1</sup>*Dalian Polytechnic University, Dalian, China*

### **Biography:**

Professor of Food Science and Technology; Dean of Liaoning Key Lab for Aquatic Processing Quality and Safety, the College of Food Science and Technology, Dalian Polytechnic University.

Education:

1981---1985: Bachelor of Microbiology, Liaoning University.

1987---1990: Master of Food Science, Tianjin University of Science & Technology.

2000---2003: Doctor of Bioengineering, Dalian University of Technology.

Work Experience:

1985---1987: working as a assistant of Food Science, Dalian Polytechnic University.

1990---2004: working as a associate Professor of Food Science, Dalian Polytechnic University

2003---2005: postdoctoral research in Dalian Institute of Chemical Physics. CAS

2008, 04-09: visiting scholar in Agriculture of Kyushu University, Japan

2011,07-12: visiting scholar in FSHN, university of illinois at urbana-champaign,USA

2004---2018: *working as a Professor of Food Science, Dalian Polytechnic University.*

*Hafnia alvei* is an opportunistic pathogen belonging to the Enterbacteriaceae family. It is a Gram-negative and common food contaminant bacteria isolated from vacuum-packed dairy, meat, and fish products commonly. In recent years, we get 8 strains of *Hafnia alvei* from shrimp paste, fish sauce, fish and instant seafood during aquatic products research. The increasing detected opportunities of *Hafnia alvei* may be related to a large number of aquaculture. So we did further research on *Hafnia alvei*.

*Hafnia alvei* has a fast growth rate and strong biofilm ability. The growth curves under different temperatures, biofilm characteristics, salt tolerance, antibiotic resistance (17 antibiotics), corruption characteristic and other biological characteristics were researched. They can grow at 4°C temperature and cause spoilage of aquatic products during the low temperature storage. The results showed that the salt tolerance of *Hafnia alvei* could reach 4%-6%. These bacteria were resistant to 17 antibiotics in varying degrees, especially spectamycin, sulfonamides, ampicillin sodium. They can make the TVB-N values of relative products reach 20-50mg/100g in the artificial inoculation experiment.

In this paper, the sulfide flavors compounds were used to inhibition of *Hafnia alvei* as spoilage bacteria in aquatic products. Diallyl disulfide (DADS) and methyl 2-methyl-3-furyl disulfide (MMFDS) at 1/4 MIC concentration inhibited the swarming ability of *Hafnia alvei* by 73.50% and 76.43% respectively, also completely inhibited the formation of biofilm, while having virtually no effect on cell growth. The sulfide flavors in food processing can enhance aroma and prevent food spoilage.

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Acknowledgements

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## Study on the antibacterial substances of *Lactobacillus* isolated from marine fish

**Prof. Guangqing Mu**<sup>1</sup>, Current Master students Rixin Zhang<sup>1</sup>, undergraduate Xidong Jiao<sup>1</sup>, Associate Professor Yanfeng Tuo<sup>1</sup>

<sup>1</sup>Dalian Polytechnic University, Dalian, China

### **Biography:**

*Professor Mu works in the school of food science and technology, Dalian Polytechnic University, in China. Prof. Mu is interested in the physiological function of lactic acid bacteria and probiotics.*

This paper focused on the inhibitory effects of cell-free supernatant obtained from *Lactobacillus* strains MRS culture, which were isolated from intestinal tract of marine fish, on the food-borne spoilage bacteria, and determined the nature of the main antibacterial substances. Sixteen bacillus strains isolated and preliminary predicated as *Lactobacillus* bacteria due to their catalase negative and gram-positive. The antagonistic effect of the 16 strains was determined via Oxford cup agar diffusion method by using *Escherichia coli* as the indicator bacteria, and the results showed that the strains S2-4 , S2-6 , Y3-1 , H2-4 , B2-4 and B2-10 exhibited high antagonistic activity and the inhibitory zone diameters of *E. coli* were 13.73mm , 14.77mm, 13.71mm, 12.84mm, 13.63mm and 13.65mm, respectively. The further antagonistic assays showed that the strains S2-4 , S2-6 , Y3-1 , H2-4 , B2-4 and B2-10 showed antimicrobial activities in different degrees against *Salmonella* , *Staphylococcus aureus*, *Listeria monocytogenes*, *Vibrio parahemolyticus* and *Shigella Castellani*, and the inhibitory effects of S2-6 and Y3-1 were significantly higher than that of the rest strains. The cell-free supernatant of the 6 strains were treated by adjusting pH to neutral, heated to 80°C to destroy H<sub>2</sub>O<sub>2</sub>, and deactivating proteins by neutral protease and pepsin and the results showed that antibacterial substances would be acid and proteinous material. The strain B2-4, H2-4 and S2-4 were identified as *Lactobacillus sakei* and the strain S2-6 and Y3-1 were identified as *Lactobacillus plantarum* by the analysis of 16S rDNA sequence.

## REACTIVITY OF FREE MALONDIALDEHYDE IN OIL-IN-WATER EMULSION DURING IN VITRO DIGESTION

**Ms. Angelique Vandemoortele**<sup>1</sup>, Mss Pinar Babat<sup>1</sup>, Mss Mariam Yakubu<sup>1</sup>, Prof dr Bruno De Meulenaer<sup>1</sup>  
<sup>1</sup>University Ghent, Ghent, Belgium

**Biography:**

*She graduated in 2012 with great distinction as Bioscience Engineer at Ghent university. From 2012, she works as an assisant/phd student at the NutriFoodChem unit at the faculty of bioscience engineering under the guidance of Prof dr ir Bruno De Meulenaer.*

Malondialdehyde has been widely used as a marker to measure the extent of lipid oxidation. When malondialdehyde is generated endogenously as a result of oxidative processes, it is considered to be a potential causal agent of numerous human diseases, such as diabetes, etc. The interaction of proteins with malondialdehyde has been shown to generate various potential toxic adducts and to cause protein cross-linking. Moreover, malondialdehyde is prone to aldol self-condensation and hydrolytic cleavage leading to the formation of a dimer and oligomers, and acetaldehyde respectively.

The reactivity of malondialdehyde during the digestion process has scarcely been studied. In this study, the influence of digestion on malondialdehyde, its cleavage products, and aldol self-condensation products in fully hydrogenated coconut oil-in-water emulsions stabilized by Tween 20 was evaluated, using an in vitro gastrointestinal digestion method. Initially, the behavior of malondialdehyde in aqueous buffer, saturated oil and Tween 20 stabilized oil-in-water emulsions, after 24h incubation at 4 and 40°C was elucidated. After incubation, these model systems were subjected to digestion whereby the amount of free malondialdehyde was examined. Furthermore, the concentration of acetaldehyde was determined in order to assess the dominant reaction pathway of malondialdehyde.

The recoveries of malondialdehyde before digestion were compared after incubation at 4 and 40°C. At both temperatures, the reactivity of malondialdehyde in aqueous buffer was the same. Surprisingly, malondialdehyde was very reactive in saturated oil. However the degradation in oil proved to be strongly temperature dependent which mainly affected the aldol self-condensation of malondialdehyde. The reactivity of malondialdehyde in emulsions also depended on the temperature which influenced the partitioning of malondialdehyde in both phases of the emulsion. Nevertheless at both temperatures, the aldol self-condensation was the dominant reaction in emulsions. However during digestion, the free malondialdehyde content altered depending on the degree of hydrolytic cleavage and aldol self-condensation of malondialdehyde before digestion.

In conclusion, this study revealed that malondialdehyde is a very reactive molecule whose reactivity does not stop at the point of ingestion. Consequently, the exposure of malondialdehyde to the human body cannot be estimated based on the determination of free malondialdehyde in foods.



## The research and development of food irradiation in Croatia

**Dr. Branka Mihaljević<sup>1</sup>**

<sup>1</sup>*Ruđer Bošković Institute, Zagreb, Croatia*

### ***Biography:***

*Dr. B. Mihaljević, PhD in Chemistry, is a Head of Radiation Chemistry and Dosimetry Laboratory. Her main research interests are the study of ionizing radiations and their damaging effect on certain biomolecules. She has been investigator in a number of studies on the nature and fate of the reactive short-lived species formed under controlled conditions in the radiolysis/photolysis. Her work has been recognized through the investigations of iron-mediated reaction of lipids which resulted in the quantitative method for determination of lipid hydroperoxides, which found its place in many interdisciplinary studies for lipid peroxidation level measurements. Research interests in radiation chemistry and laser flash photolysis experiments in the last five years can be grouped into several narrower research fields: (1) applications and evaluation of analytical methods for lipid peroxidation products determination; (2) free radicals-induced modifications of lipids; (3) characterization of reactive intermediates in the photochemical reactions with biological significance; (4) kinetics and mechanisms of reactions of short-lived reactive species; (5) the development and application of time-resolved irradiation techniques (laser flash photolysis); (6) research of potential applications of irradiation. She is a Head of Radiation Chemistry and Dosimetry Laboratory and a leader of several international scientific projects.*

Food irradiation is a physical method for food treatment comparable to food processing by heating or freezing. Processing of food with low levels of radiation has the potential to contribute to reducing both spoilage of food during storage and the high incidence of food-borne diseases. The process involves intentionally exposed food, either prepackaged or in bulk, to gamma rays, X-rays or electrons. Different doses of gamma radiation can be used for different purposes in food preservation. At present, the dose of radiation recommended by the FAO/WHO Codex Alimentarius Commission must not exceed 10 kGy, at which irradiated food is considered safe for human consumption. This is actually a very small amount of energy equal to the amount of heat required to raise the temperature of 1 l of water by only 2.4 °C. Food processing by irradiation can solve specific problems of food losses and could complement other established technologies, in improving the quality and wholesomeness of food as well as well as in expanding trade in certain foods and agricultural products.

There is a substantial amount of high quality scientific data that attests to the safety of foods and foodstuffs subjected to ionizing radiation. In this lecture the effects of gamma irradiation on the physicochemical properties of food will be described. Convinced that research and education are key to promoting understanding of the benefits that radiation can provide, our latest scientific results of irradiation of some foods will be presented as well as current irradiation applications for food preservation and conservation in Croatia.



## DETECTION OF SALMONELLA SPP. IN BROILER CHICKEN MEAT SOLD IN RETAIL MARKETS OF YEREVAN, ARMENIA

Dr. Davit Pipoyan<sup>1</sup>, Dr. Meline Beglaryan<sup>1</sup>, Ms. Emma Ghrejian<sup>1</sup>

<sup>1</sup>Informational-Analytical Center for Risk Assessment of Food Chain of the Center for Ecological-Noosphere Studies of NAS RA, Yerevan, Armenia

### **Biography:**

*My name is Emma Ghrejian, I am a fifth-year student of Specialist Degree programme (equivalent to first-year of Master's Degree programme) in Medical Biochemistry at the Russian-Armenian University (RAU) of Armenia. Parallel to my studies, I work as a research assistant at the Informational-Analytical Center for Risk Assessment of Food Chain, which is one of the leading departments of the Center for Ecological-Noosphere Studies of the National Academy of Sciences (CENS NAS RA). I have more than 3 years of work experience, and, currently, I am a co-author of 2 methodological books and 2 articles on chemical hazard risk assessment. Also, I made an oral presentation during the 4th International Conference on Food Chemistry and Technology held in Berlin in November 2018.*

Food-borne salmonellosis is one of the most relevant sources of Salmonella outbreaks with a high impact on human health. Among other sources, animal origin products, in particular, contaminated chicken meat have been considered as one of the main vehicles of Salmonella infection [1]. According to the National Center for Disease Control of Armenia, more than 350 annual cases of salmonellosis were estimated, which were associated with a large number of hospitalizations. Moreover, as in recent years there is a tendency of increasing the consumption of chicken meat in Armenians' diet, new problems might arise regarding salmonellosis.

Therefore, this study aimed to determine the presence of Salmonella spp. in broiler chicken meat sold in retail markets of Yerevan.

In the frame of this research, 7 locally produced and 9 imported (3 samples per each) frozen raw broiler meat were collected from local retailers then treated and tested according to GOST R 50455-92 standard [2]. The obtained results showed the presence of Salmonella spp. only in one sample of locally produced raw broiler meat. Among the imported samples (from Russia, Brazil, and Ukraine), only in one chicken meat sample (imported from Russia), the Salmonella spp. was detected. It should be mentioned, that in the territory of the Eurasian Economic Union, the import of chicken meat from Russia to Armenia can be implemented based on the declarations of conformity and without additional testing. Meanwhile, the obtained results underline the need for microbiological surveillance testing.

Overall, the presence of Salmonella spp. in both imported and locally produced chicken meat, showed possibilities of cross-contamination in various sources either in a processing plant or until storage at retail level. Appropriate hygiene practices and cooking methods prior to consuming should be taken in order to ensure chicken meat safety before ingestion.

### Acknowledgment

This study was conducted with the support of the State Committee of Science, Ministry of Education and Science of Armenia.

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## SIMPLE SCIENTIFIC-MOLECULAR STRATEGY TO STANDARDIZE AND GUARANTEE THE SAFETY OF ARTISANAL CHEESE PRODUCED IN BRAZIL

Dr. Marilia Penteado Stephan<sup>1</sup>, Dr Izabela Miranda Castro<sup>1</sup>, MSc Juliana Carneiro<sup>2</sup>, BSc Tatiana Azevedo<sup>1</sup>, BSc Alexandro Santos<sup>1</sup>, Dr Ana Carolina Chaves<sup>1</sup>, Dr Ana Carolina Chaves<sup>1</sup>, Dr. Maria Gabriela Kobliz<sup>2</sup>

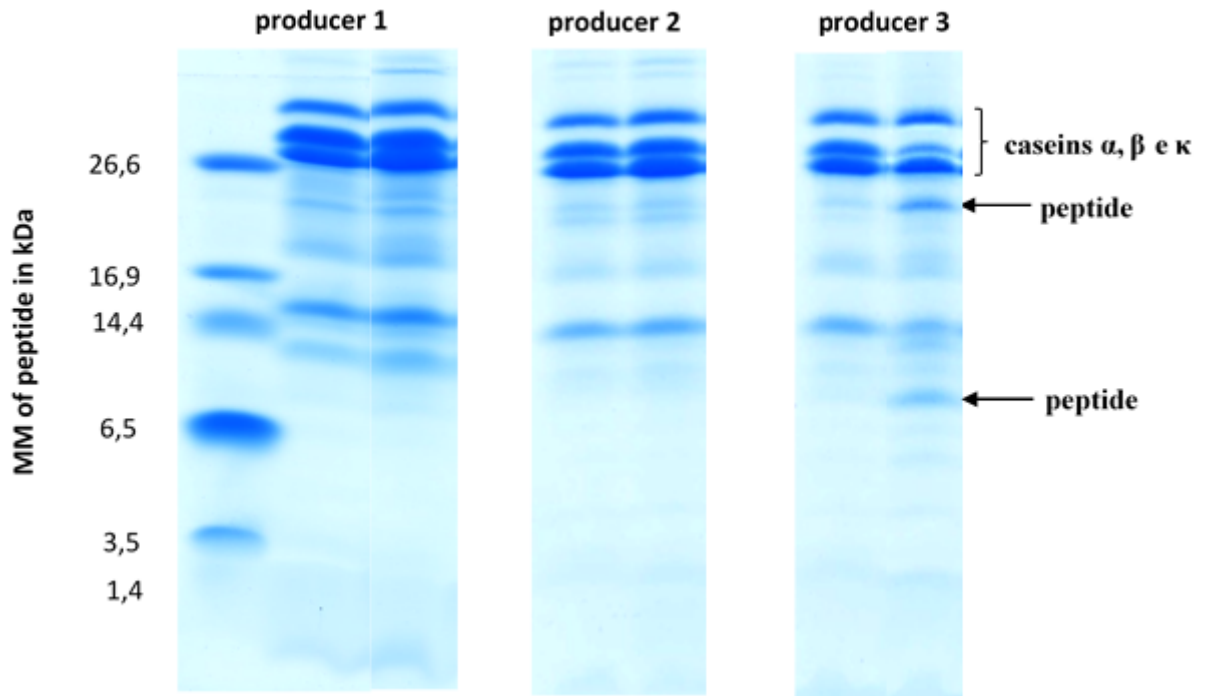
<sup>1</sup>Embrapa Agroindustria de Alimentos, Guaratiba, Brazil, <sup>2</sup>Federal University of State of Rio de Janeiro, Rio de Janeiro, Brasil

### *Biography:*

The author has a degree in Pharmacy from the Federal University of Rio de Janeiro (1977), a master's degree in Biochemistry from the Federal University of Rio de Janeiro / Brazil-Germany (1983) and a PhD in Biochemistry from the Federal University of Rio de Janeiro. of Rio de Janeiro (1995). She is currently a researcher at EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA, where she has been working in the field of research since 1978. Her first 15 years of research was in the field of biochemistry of microorganisms, with emphasis on nitrogen fixing bacteria, implementing scientific strategies for the contribution of microorganisms in the growth of food in the class of legumes (beans and soya) not legumes (sugar cane, maize and cassava). In the last 20 years, she has developed mainly researches in the field of food science with emphasis on the molecular modifications of protein foods subjected to thermal, chemical and fermentative processing. He has knowledge of SDS-PAGE electrophoresis, TRIS-TRICINA and two-dimensional electrophoresis. He is also active in the field of immunochemistry. It has had 40 publications in international research over the years and 4 of them in the last five years.

In the state of Minas Gerais (Brazil) there are approximately 30 thousand producers of artisanal cheese. The production of this cheese, called "Minas", is associated with a very important economic factor, since many family farmers have such a cheese as the main source of their income. However, this process is empirical and requires standardization of the product in order to attest cheese its quality and safety. In this work it is utilized a scientific-molecular technique of protein analysis to monitor the degree of casein hydrolysis. The aim of this work was to offer a strategy for the molecular analysis of polypeptide chains in artisanal cheeses. For the technical analysis of proteins, the well-established electrophoresis method (TRIS / TRICIN) was used for concomitant protein and peptide determinations, being simpler than many chromatographic methods. Regarding the obtained protein extract, the association of lyophilization with solubilization of the dried sample with a buffer was applied. This represents a new strategy for molecular protein analysis. The method deals with the direct solubilization of lyophilized cheese in electrophoretic buffer followed by low temperature submission to defat the material. Two mg of lyophilized cheese were solubilized in electrophoretic buffer and submitted about 4h at -23°C. After centrifugation (5,000 rpm; 2 minutes) 30 µL aliquot of the defatted cheese extract was applied on electrophoresis gel. The results revealed the integrity of casein in the polyacrylamide gels observed after staining with Coomassie Blue. The clear image of polyacrylamide gels permitted an excellent visualization of casein bands ( $\alpha$ ,  $\beta$  and K). From now on, this analytical procedure can be used to detect molecular modifications of the protein profile resulting from casein degradation. In this work, it was utilized cheese from three different producers (called 1, 2 and 3). This proposed method can be recommended for the control of the whole process of cheese maturation due to its facility in showing simultaneously in the polyacrylamide gel image, the three different caseins and the low molecular weight peptides.

EXTRACTS OBTAINED FROM THREE DIFFERENT PRODUCERS



## EFFECT OF FOOD COMPOSITION ON THE MIGRATION OF SURROGATE CONTAMINANTS FROM PAPERBOARD PACKAGING

**Mr. Maarten Baele**<sup>1</sup>, Dr. An Vermeulen<sup>2</sup>, Prof. Dr. Peter Ragaert<sup>1,2</sup>, Prof. Dr. Bruno De Meulenaer<sup>1</sup>  
<sup>1</sup>Research group Food Chemistry and Human Nutrition, Department of Food Technology, Safety and Health, Ghent University, Ghent, Belgium, <sup>2</sup>Pack4Food VZW, a member of Food2Know, Ghent, Belgium

### **Biography:**

*Maarten Baele graduated in 2015 at the bioscience engineering faculty at Ghent University, specialising in food technology. Later that year, he started his PhD research, to be completed in 2019. His research investigates the required barrier properties of food packaging materials, especially considering the transmission of gases, light and migrating compounds through the packaging and their effect on microbiological and chemical properties of the packaged food.*

### Introduction

When foods are packaged in recycled paperboard, migration of many non-intentionally added substances such as mineral oils can occur. This can be prevented by using a functional barrier. However, it is not always clear how much protection such a barrier should provide. Certain components have a higher tendency to migrate than others. Depending on their fat content, particle size or shelf life, certain types of foods may be less sensitive to migration than others, so a weaker barrier may be appropriate. Gaining more knowledge on migration to specific foods may provide valuable insights on these matters.

### Purpose

The current research uses a simple test to monitor migration from spiked paperboard to foods by extracting the paperboard, rather than the food itself. This allows evaluating the migration of surrogates too hard to extract from matrices.

### Methods

Virgin board was spiked with 9 surrogate components: 4 saturated hydrocarbons, 3 aromatic hydrocarbons and one plasticizer. Samples were stored at 22°C, in tightly sealed bottles containing Tenax<sup>®</sup> (legal simulant) or one of 9 different foods as receptor. After 2, 4, 10 and 16 weeks of storage, paperboard samples were extracted by immersion in ethanol/hexane (1/1) to evaluate recovery of the surrogates. The non-recovered fraction of surrogates is assumed to have migrated towards the receptors. This was validated by comparing the recovery from paperboard in contact with Tenax<sup>®</sup> with the recovery from the Tenax<sup>®</sup> itself.

### Results and discussion

The extent of migration of the surrogates was found to be related to their vapor pressure. Paperboard in contact with wheat pasta showed high recovery, indicating low migration. Paperboard in contact with starchy or particulate foods such as egg pasta, wheat flour and rice flour showed intermediate recovery. Paperboard in contact with fatty foods such as biscuits and chocolate showed low recovery, indicating high migration. These results show that the fat content affects the extent of migration more than the particle size of the food. Migration to Tenax<sup>®</sup> was in some cases a strong overestimation of the migration to foods. For these cases, a correction factor for using Tenax<sup>®</sup> as a simulant may be appropriate.

## Release of trace elements from porcelain enameled tableware.

Mrs. Heidi Demaegdt<sup>1</sup>, Mrs. Karlien Cheyns<sup>1</sup>

<sup>1</sup>Sciensano, Tervuren, Belgium

### **Biography:**

*Heidi Demaegdt graduated in 2003 from the Free University of Brussels (VUB) as a Bio-engineer (Biotechnology). She completed her PhD in Applied Biological Sciences at the VUB in 2008. After a post-doc at the same university, she started in 2010 at CODA (the predecessor of Sciensano) as a scientist and worked on the in vitro effects of endocrine disruptors. Currently she is a scientist in the Trace elements and Nanomaterials department, and works on the release of metals from food contact materials, ...*

### Introduction

Currently, the European Commission is revising the Directive 84/500/EEC on ceramic food contact materials (FCM) and will extend the scope of this directive with vitreous enameled articles and glassware. New release limits for Pb and Cd as well as limits for other metals are being discussed. Ceramics are rather well studied, on the contrary, little data exist on metal release from vitreous enameled cookware. Vitreous enamelware consists of a metal substrate and an enamel coating (frit), this creates a very specific material. The substrate can be composed of several metals and alloys with possible contaminants and impurities, more specifically oxides of Ni, Co and Li are important components of the frit.

### Purpose

The goal of this research is to collect data on metal release for enameled tableware and compare this to the trends seen for ceramics. Can differences in release of metals from these types of FCM be detected? These differences could have important consequences when setting (new) limits for Pb, Cd and other metals in the Directive 84/500/EEC.

### Methods

Samples (in quadruplicate) for enameled tableware were collected from the Belgian market. Migration was performed according to Directive 84/500/EEC (4% Acetic acid, 24h, 22°C). Three consecutive migrations were performed and compared. After migration, simulants were measured by ICP-MS/MS with a fully validated method for 20 elements: Li, Be, Al, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Se, Mo, Cd, Sn, Sb, Ba, Tl and Pb.

### Results

Preliminary results showed that for some elements differences can be seen between ceramic or enameled tableware. Overall, ceramics have higher release in Ni, Cu and other elements depending on the coloring. Enameled tableware seemed to have higher release of Li (3 - 40ppb), Al (0.1 - 6 ppm), Co (0.2 – 180 ppb) and Ba (1 – 100 ppb), with Co and Li exceeding in some cases the existing limits of the Resolution for Metals and Alloys (CM/Res(2013)9).

### Conclusion

Release of trace elements from both materials showed different trends for some elements. This can have important implications when setting limits in the revision of Directive 84/500/EEC, where enamelware will be included.



## Teaching food ethics

**Prof. Dr. Rui Costa<sup>1</sup>**

<sup>1</sup>*CERNAS, Escola Superior Agrária, Coimbra, Instituto Politécnico de Coimbra, , Portugal*

### ***Biography:***

*He has academic qualifications in Food Engineering (Honours and PhD). Since 1999, he is a professor on the Food Science and Technology Department of the Polytechnic Institute of Coimbra, Portugal. Coordinator of national funded research projects in food processing, more recently on pulses and seaweeds. Since 2002 has working at international level on curriculum development and quality assurance in food studies, in more than 12 projects. Chair of the Accreditation Commission of the ISEKI Food Association for the accreditation of curricula. Chair of the ESCO Manufacturing of food, beverages, and tobacco (European Union DG Employment & DG Education). Currently he collaborates on the project Lifelong Learning for Sustainable Development.*

The health and safety of consumers is main concern of all stakeholders of the food chain and of policymakers. A number of legislation to assure that foods are safe for the consumer are in place. Food safety alerts are quicker and reach more efficiently the consumer. However, still too many foodborne outbreaks occur and the consumer is far from being completely out of risk. To improve even more food safety, more levels of prevention need to be added to the existing actions. The ethics of professionals of the food chain, in particular of responsible for food operations, is a key issue to assure food safety and should be considered as a new level of prevention.

Teaching food ethics in food science and technology degrees is essential to prepare adequately graduates for the world of work, either building them with competence to critically evaluate when confronted with unethical situations, but particularly to avoid their compliant behavior with unethical practices. Although the academic community is aware of this need, the teaching of food ethics is not a common practice in food science and technology curricula.

Food ethics teaching is a relatively new discipline when compared to teaching applied ethics on other subjects, such as medicine and accounting. The literature in food ethics is scarce but abundant in these subjects which use common methods. This presentation presents successful examples in the teaching of ethics in other disciplines for the implementation of the teaching of food ethics, including the formulation of objectives, identification of the content, and the illustration of teaching methods proven successful. An overview of how the teaching of food ethics can be implemented in its different forms as a single course or across the curriculum approach will also be given, as also examples of teaching methods and of evaluation.

## DETERMINATION OF FOOD WASTE AND PROCESSING INEFFICIENCIES IN A UK READY-TO-EAT (RTE) SECTOR MANUFACTURING SITE: IMPLICATIONS FOR COST EFFICIENCY

Miss. Rhiannon Facey-Richards<sup>1</sup>, Mr David Owens<sup>1</sup>, Dr Elizabeth C Redmond<sup>1</sup>

<sup>1</sup>ZERO2FIVE Food Industry Centre, Cardiff Metropolitan University, Cardiff, United Kingdom

### ***Biography:***

An experienced food industry professional that has worked in the UK food industry for the last 15 years in technical, process and new product development functions. In the last five years specialisms have focussed on process management, process efficiency and waste reduction with large food businesses and small and medium size enterprises.

Recent employment with ZERO2FIVE Food Industry Centre at Cardiff Metropolitan University as a Process Manager, has resulted in responsibility for progression in food industry waste research. Current work also involves mentoring and technical knowledge transfer with food companies in the specialist areas of waste reduction, technical compliance, process efficiency, food law and consumer protection, legal labelling and food safety audit preparation.

### Introduction

Food-industry waste has received increased attention in recent years, particularly regarding point-of-sale food expiry-dates and food waste caused by the end-consumer. Recent studies indicate that the ready meals/chilled products sector generates up to 12% of total waste arising in the food and drink supply chain (including packaging) (WRAP, 2016). Key causes of food-industry waste are reportedly attributed to machinery performance problems, poor quality production, trimmings (process waste that is not reusable), packaging, product disposals and market imposed reasons. Limited research has been undertaken in the food-industry to quantify inefficiencies in food manufacturing and link with financial-implications.

### Purpose

The purpose of this research was to investigate and quantify the causes of waste at point-of-production; the study aimed to identify RTE manufacturing process inefficiencies with a quantifiable monetary value.

### Methods

In-depth production/packing observational-audits (n=4) from weigh-up, through the process and at point of packing, were undertaken in a RTE manufacturing business. Weight verifications (n=6578) for key manufacturing process-control-points(PCPs) were identified and audited against specified weight and tolerances to determine inefficiency/waste. Data analysis used industry standard statistical-process-controls(SPC).

### Results

Overall, data capture focused on the assembly process of the RTE product. Across the four production runs at each PCP weight variability was determined and specified target weight/tolerances were not achieved. Findings indicated the manufacturing depositors were not capable of delivering upper and lower specification or control limits. Due to initial process-depositing weight variance, finished product weights were inconsistent. On average 46.1% finished products were above target weight (61.0g->65.0g), 35.8% were within the target weight range (59.0g–61.0g) and 18.1% were produced under target weight (59.0g-

<56.0g). The SPC demonstrated a process that was not capable of delivering process efficiency. The monetary value of over-depositing by 23% above target tolerance consistently was verified to be £90,000.00 per-annum.

#### Conclusions

Observation-audits in this study highlighted excessive waste and over production. Findings also highlighted the requirement for the need to effectively monitor weight as a PCP but ensure it is achievable. Substantial financial-savings could be realized by achieving processing control and efficiency methods, consequently improving business profitability.

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## EVOLUTION OF QUALITY CHARACTERISTICS AND BIOACTIVE COMPOUNDS OF BARLEY GENOTYPES BREED IN LATVIA UNDER ORGANIC AND CONVENTIONAL MANAGEMENT

Dr. Ida Jakobson<sup>1</sup>, Dr. Mara Bleidere<sup>2</sup>, Dr. Sanita Zute<sup>2</sup>

<sup>1</sup>University of Latvia, Riga, Latvia, <sup>2</sup>Stende Research Centre, Institute of Agricultural Resources and Economics, Dižstende, Latvia

### **Biography:**

Ida JAKOBSONE has born on 28.12.1946. Studied chemistry in Chemistry department of University of Latvia (UL) from 1966 till 1971. Has scientific degree Candidate of Chemistry since 1990, on 1992 this degree was nostrified as scientific degree Doctor of Chemistry.

Working in Chemistry department of UL from 1971 till now. Since 1995 till now Head of the Centre of Food Chemistry at Chemistry department of UL. In period from 2003 till 2006 elaborated first in Latvia inter-university (University of Latvia, Latvian University of Agriculture and Riga Stradiņš University) Masters' study program „Nutrition Science”, Director of this study programm from 2006 till now.

Head of organizing committees of 1st and 2nd international conferences „Nutrition and Health” (Riga, 4-6 September 2012 and 5-7 October 2016).

From 2013-2018 as lead researcher participater in 3 projects of ERDF and 1 project of ESF. In these years published 20 articles in international cited scientific magazines and participated with posters in 19 international conferences and 27 local conferences of UL, under her guidance 20 Masters' Theses in Nutrition Science and 12 Bachelors' Theses in Food Chemistry were elaborated.

The aim of this study was to evaluate physical characteristics (test weight TW, 1000 grain weight TGW), basic chemical composition (crude protein, starch,  $\beta$ -glucan) and the bioactive compounds (total phenolic compounds, lignans, alkylresorcinols, macro and trace elements) of barley varieties – naked grain varieties 'Kornelija', breeding lines 'ST 1185' and 'ST 1165', and hulled grain variety 'Ansis', cultivated in the conditions of organic and conventional management in Stende Research Centre, Institute of Agricultural Resources and Economics (Latvia).

Several methods of chemical analysis were used for study: protein, starch and  $\beta$ -glucan contents were determined by Infratec Analyser 1241; total content of phenols was determined colorimetrically by Folin – Ciocalteu assay; high performance liquid chromatography (HPLC-MS/MS) was used for determination of lignans; high performance liquid chromatography (HPLC-UV) was used for determination of alkylresorcinols; Cd, Pb, Cr, Ni, and Al concentrations were determined by electrothermal atomic absorption spectrometry; K, Na, Zn, Cu, Ca, Mg, Mn and Fe concentrations – by flame absorption spectrometry.

The highest TW, TGW, crude protein and  $\beta$ -glucan contents were determined in barley genotypes grown in the conventional management if compared to the organic management conditions. The lignans, alkylresorcinols and total phenolic compound concentration in barley genotypes did not differ significantly depending on organic or conventional growing conditions. The highest macro and trace element concentrations were in barley genotypes grown conventionally. Risk assessment regarding Cd, Pb, Cr, Ni, Cu and Zn concentration in barley used for human consumption showed that concentrations of heavy elements are low in all genotypes. The highest contribution of barley grain (presuming that 130 g of barley were consumed daily) was 53, 43, 27-49 and 23% from values recommended by Latvian Ministry of Health for Mn, Mg, Fe and Zn, respectively.

All varieties of hulled and naked barley grain were found to be good sources of protein, bioactive compounds, macro and trace elements; variety 'Kornelija' exceeds others barley genotypes in protein and micronutrient content.

The authors acknowledge financial support from the European Social Fund project No. 2013/0072/1DP/1.1.1.2.0/13/APIA/VIAA/032.

## THE EVOLUTION OF 'RECOGNIZING OTHER FOOD CONTROL SYSTEM' AS EQUIVALENT

Mr. Gabor Molnar<sup>1</sup>

<sup>1</sup>Laval University, Quebec city, Canada

### **Biography:**

*Mr. Gabor Molnar is a PhD candidate in Food Science at University Laval (Canada), focusing on the improvement of outcomes of food safety capacity building initiatives in developing countries. Accordingly the title of his research is "The development and application of impact assessment and project formulation methods in food control system capacity building initiatives". Simultaneously, Mr. Molnar is also engaged with food safety capacity building initiatives through his work in the private sector in the past and currently in the international development community. As a consultant, he participated in the development and implementation of food safety capacity building initiatives, mainly in Asia and Africa.*

Food regulators are constantly improving their understanding on the various forms and needs of regulatory co-operations in food trade, aiming towards the 'recognition of other systems'.

This evolution also resulted from the enhancement of national food control systems supported by the guidelines of Codex Alimentarius Commission (CODEX). However, currently neither a harmonized terminology is applied among different countries, nor the required guiding tools are in place to support the establishment of such comprehensive regulatory collaboration. Consequently, trade negotiations are sometimes limited to the 'piloting' of regulatory co-operations covering only few food sectors or even lead to possible delays. Even though few regulatory mechanisms are available in the developed countries, for example International Comparability Assessment Tool (ITAC) by the US Food and Drug Administration (FDA) or the Foreign Food Systems Recognition Framework by Canadian Food Inspection Agency (CFIA), further capacity building initiatives are required for the application by competent authorities in developing countries. Accordingly, there is a need to put clarity in the terminologies currently stipulated by multinational agreements and applied by governments and international organizations in regulatory co-operations, particularly to 'recognition of other systems', along with the categorization of different regulatory co-operations. It is also necessary to identify the required instruments based on former best practices introduced by developed countries. As a result, it is noted that instead of the CODEX terminology, namely 'recognition of other systems', developed countries use their own. In addition, it became evident that required relevant international bodies, like the CODEX or the WTO's SPS Committee, have to still develop guidelines and principles to ensure proper food regulatory co-operation mechanisms through the development of a harmonized assessment tool.

In addition, more research and collaboration among regulators are required to formulate an internationally accepted instrument, embedding the principle of 'recognition of other systems' stated in the CODEX Principles and Guidelines for National Food Control Systems (CAC/GL 82-2013) for the sake of creating robust national food control systems. Through these efforts, competent authorities will have the required know-how and tools to improve regulatory co-operations and better facilitate enhanced trade in food.

## Current legislation in respect to food applications of nanomaterials worldwide

Mr. Chi-hao Lee<sup>1</sup>

<sup>1</sup>*Food Safety Division, Food And Drug Administration, Ministry Of Health And Welfare, Taipei, Taiwan*

***Biography:***

Present Title: Technical Specialist

Department: Food Safety Division, Food and Drug Administration, Ministry of Health and Welfare

*Address: 161-2, Kunyang St., Nangang, Taipei, Taiwan 11561, R.O.C.*

Nanotechnologies have been widely applied in food processing, packaging and production. These products may bring some benefits to consumer, as well as hazards to health of consumer and environment. As the increased interest in food applying nanotechnology and concerns on the potential hazard of nano-scale materials, guidance or regulation to assess potential risk of nanoparticles are necessary. Several guidance and information on risk assessment and management of the application of nanotechnologies in the food and its package will be introduced in this presentation.

## POSSIBILITIES AND CHALLENGES TO QUANTIFY AND CHARACTERIZE ENGINEERED NANOMATERIALS (ENMs) IN FOOD MATRICES

**Dr. Ralf Greiner<sup>1</sup>**

<sup>1</sup>Max Rubner-institut, Karlsruhe, Germany

### **Biography:**

*Ralf joined the Federal Research Centre for Nutrition, Karlsruhe, Germany in 1990 as a Ph.D. student after graduating in Chemistry at the University of Stuttgart. In the early steps of his career he was mainly engaged in research in respect to genetically modified food and enzyme for food processing, with phytases in the centre of his interests. In 2007 Ralf held a position as a Visiting Professor for Biochemistry and Molecular Biology, Federal University of Paraná, Curitiba, Brazil working on solid state fermentation and fungal enzyme production. In 2008 he returned to Karlsruhe where he became Head of the Department of Food Technology and Bioprocess Engineering of the Max Rubner-Institut. His research is focused on studying and modelling conventional and new processing technologies, and on food nanotechnology, but phytases are still in the focus of his interests. Ralf is a representative of MRI in several international and national associations on food technology, food control and food nanotechnology. In 2012 Ralf accepted the position as an Honorary Assistant Professor in the School of Biological Sciences of the University of Hong Kong. Currently, Ralf also acts as Deputy to the President of the MRI. In addition, he is Editor for Food.*

A number of challenges arise when analyzing foods for the presence of ENMs. In contrast to simple matrices, food has a complex composition, is hetero-dispersed and may contain more than one type of ENM. Besides nano-scale ingredients or additives, nano-scale contaminants from the environment or from food contact materials may be present. When analyzing ENMs in foods, not only their particle-size distributions are of interest, but also their chemical composition and their physical and chemical properties. The choice of the detection method depends on the nanomaterial to be analyzed and the food matrix it is incorporated in. All available techniques have their strengths and drawbacks and an extensive sample preparation is in general needed. While developing detection methods for ENMs in foods, the following problems have been identified. It is in general neither possible to distinguish between engineered and natural occurring nanomaterials nor to determine the particle size distribution and the chemical composition of a nanomaterial in a single analytical run. Moreover, several of the analytical techniques available are destructive and therefore a certain sample cannot be analyzed by more than one technique. In addition, the method-intrinsic size detection limit ( $D_{min}$ ) was determined to be significantly above 1 nm. Thus, the size range between 1 and 100 nm is not fully covered by the analytical methods available. Furthermore, it is impossible to quantify all particles of the same chemical identity from the nano to the micro or mm range with the same system. Different methods may also result in different particle size distributions or average particle sizes due to the different principles used for size determination. Last but not least, sample preparation may lead to artefacts and the nature of the ENMs present in a food may change over time. With the available techniques detection and quantification of an ENM in a food is feasible when it is the only chemical identity in the nano-scale present or existing in excess with a particles size between  $D_{min}$  of the method applied and 100 nm. Quantification of unknown nanoparticles in real foods will therefore be at least a challenge.



## PERCEIVED AND REAL RISKS OF THE USE OF NANOMATERIALS IN THE FOOD SECTOR

**Dr. Ralf Greiner<sup>1</sup>**

<sup>1</sup>Max Rubner-institut, Karlsruhe, Germany

### **Biography:**

*Ralf joined the Federal Research Centre for Nutrition, Karlsruhe, Germany in 1990 as a Ph.D. student after graduating in Chemistry at the University of Stuttgart. In the early steps of his career he was mainly engaged in research in respect to genetically modified food and enzyme for food processing, with phytases in the centre of his interests. In 2007 Ralf held a position as a Visiting Professor for Biochemistry and Molecular Biology, Federal University of Paraná, Curitiba, Brazil working on solid state fermentation and fungal enzyme production. In 2008 he returned to Karlsruhe where he became Head of the Department of Food Technology and Bioprocess Engineering of the Max Rubner-Institut. His research is focused on studying and modelling conventional and new processing technologies, and on food nanotechnology, but phytases are still in the focus of his interests. Ralf is a representative of MRI in several international and national associations on food technology, food control and food nanotechnology. In 2012 Ralf accepted the position as an Honorary Assistant Professor in the School of Biological Sciences of the University of Hong Kong. Currently, Ralf also acts as Deputy to the President of the MRI. In addition, he is Editor for Food.*

Toxicological data to perform a hazard analysis are still lacking for the majority of nanoparticles. It is of most concern that nanoparticles make, due to their minute scale, their way deeper into the human body, in ways we do not understand, and producing impacts we have not yet realized and are perhaps currently unable to detect. There are major gaps in knowledge with regard to the behavior, fate and effects of nano-sized material via the gastro-intestinal route. Most concern exist over insoluble, indigestible and biopersistent nano-particles. It is not known to what extend nano-sized materials bind to other food components, agglomerate, or remain as free particles in the gastro-intestinal tract. As with other food components interaction of nano-sized materials is very likely to change during passage through the gastro-intestinal tract. Nano-sized material may also affect gut function or gut microflora. An important issue is whether the nano-sized material is differently digested, absorbed and metabolized compared to its macro-scale equivalent. If absorption and bioavailability of the nano-sized form is improved, there might be a need to establish new accepted daily intakes for these materials in the nano-form. Furthermore, nano-sized materials might facilitate uptake of other substances from the intestine. Last but not least only little information on migration of nanoparticles from food packaging or surfaces used in food storage and processing into food products or beverages is currently available. Since the toxicological properties of nanoparticles are dependent from many factors such as chemical composition, shape, surface chemistry, surface charge, aggregation, it is at least a challenge to generalize about health risks associated with exposure to nanomaterials. Therefore, each nanomaterial must be assessed individually and all material properties must be taken into account in safety assessment. Applications of engineered nanomaterials in food and beverages however, are very likely to involve the use of relatively small amounts of the nanomaterials and only food-grade materials will be applied in foods and beverages.

## Selection of Histamine Binding Agents by Phage Display Technique

Miss. Hafize Öz<sup>1</sup>

<sup>1</sup>Hacettepe University, Ankara, Turkey

### **Biography:**

*I am MSc student in the Department of Food Engineering at Hacettepe University, Ankara, Turkey. I have graduated from Hacettepe University at 2017. My graduation project was colorimetric detection of pesticides by recombinant enzyme technology. In addition, with this project we won the first prize of Hacettepe University Engineering Faculty Graduation Project Exhibition in Food Engineering Department. I am working on the development of artificial recognition agents against histamine in phage display method lately.*

Biogenic amines are formed in foods mainly by the microbial decarboxylation of certain amino acids. Histamine, one of the most frequently found biogenic amines in foods, threatens public health due to its high toxicity. Histamine can be found in many foods such as fish and fish products, dairy products, meat products, fermented vegetables, wine and beer. Therefore, rapid and sensitive quantification of histamine in food samples has vital importance in terms of human health and food safety. Bioassays and biosensors in which histamine specific enzymes or antibodies are used as biological recognition agents, allow rapid, sensitive and easy detection of histamine. However, the production of those conventional recognition agents is laborious and expensive. Therefore, there is an urgent need for the development of histamine binding artificial recognition agents to be used in bioassays. Phage display technology has been used frequently in the selection and development of novel recognition agents that show affinity to various target molecules. In this study, we aimed to select histamine binding phages by using 12 mer phage display peptide library. For this purpose, histidine having a similar structure with histamine, was eliminated in the final cycle of the panning to satisfy the selectivity of the binding phages. Totally, 41 phage clones were isolated, and the binding properties of the selected clones were investigated by phage-ELISA. The performance of the phage clones showing high affinity to histamine was also investigated for the detection of histamine in milk samples. The results showed that selected phage clones can be used as novel recognition agents in bioassays developed for the detection of histamine. Moreover, the encoding peptides also have the potential to be used as artificial receptors for histamine which will be investigated in further studies.

This project was founded by Hacettepe University Scientific Research Projects Coordination Unit for one year. (2018-2019)

## FILM-FORMING PROPERTIES OF CARBOHYDRATE-INDUCED WHEY PROTEIN CONCENTRATE BASED COMPOSITE FILMS

Prof. Fang Qian<sup>1</sup>, Shu-juan Jiang<sup>1</sup>, Tao Zhang<sup>1</sup>, Jingjing Liu<sup>1</sup>, Ying Wang<sup>1</sup>, Guangqing Mu<sup>1</sup>

<sup>1</sup>Dalian Polytechnic University, Dalian, China

### **Biography:**

The dean of the department of Food Science and Engineering in the College of Food Science in Dalian Polytechnic University in China,, Professor and master's supervisor. Research orientation is on Dairy Science, Food biotechnology, Utilization of food and protein resource. Published more than 50 papers and 2 academic works named "Production and application of soybean protein" (Editor in chief) and "Food security"(twelfth-five teaching materials, editor).

To prevent environmental white pollution, resource shortage, food safety and many other issues, the study of edible film has been a new trend of packaging due to its characteristics of edibility and environmental protection. Furthermore, edible film can be considered to replace traditional non-degradable petroleum matrix materials because it has the barrier properties to control moisture migration, oxygen permeability, fat oxidation, volatile matter loss and maintain food quality, extend shelf life. In addition to its water resistance and antioxidation properties, whey protein also have favorable film-forming properties and can be as a practical edible film matrix. However, some film-forming properties of whey protein are still not as good as commercial plastic packaging films due to the inherent structure of the molecule. In this work, disaccharides (sucrose and lactose), oligosaccharides (chitosan oligosaccharides and stachyose) and polysaccharides (pullulan and soluble starch) were introduced to whey protein concentrate (WPC-80) to prepare protein based composite films, respectively. Furthermore, the effects of different kinds of carbohydrate on the film-forming conditions and properties of WPC were studied. Mechanical properties including tensile strength (TS), elongation at break (EAB) following the ASTM D882-12 method. Water vapor permeability (WVP) and oxygen permeability (OP) was determined using a gravimetric cup method. The film thickness was measured by a micrometer at 5 points selected randomly for each film and the average value was taken as the thickness of the film. Transmittance was accessed by measuring transmittance using an UV-vis spectrophotometer. The film-forming properties of WPC-pullulan composite films are best in our work. The film-forming properties of WPC-pullulan composite films are best in our work. TS and EAB of WPC composite films were significantly increased by 48.8% and 141.5%. Furthermore, WVP and OP of WPC composite films were reduced by 17.3% and 42.8%, respectively. The result showed that WPC composite film treated with 2.0% (w/v) pullulan at 80°C for 40min has an excellent comprehensive performance compare with that of untreated WPC films.

This work was funded by National Key R&D Program of China (2018YFD0400703).

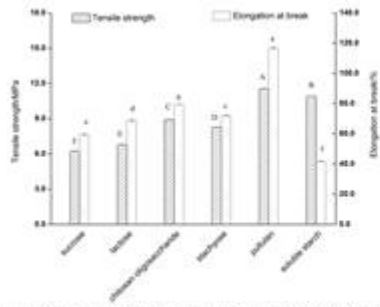


Fig. 1 Effect different carbohydrate of WPC on mechanical properties of the composite film

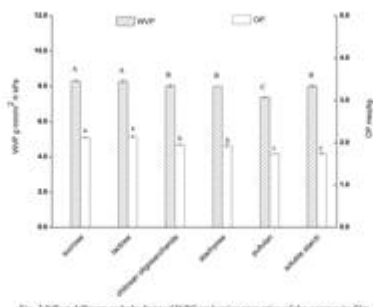


Fig. 2 Effect different carbohydrate of WPC on barrier properties of the composite film

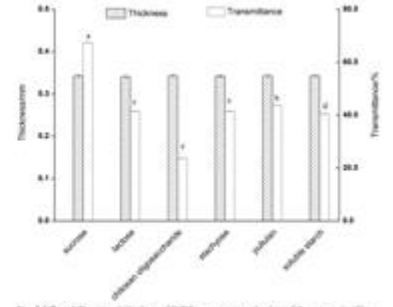


Fig. 3 Effect different carbohydrate of WPC on sensory evaluation of the composite film

## Current and potential future applications of nanomaterials in the food sector

**Prof. An-I Yeh<sup>1</sup>**

<sup>1</sup>National Taiwan University, Taipei, Taiwan

### **Biography:**

*An-I's research areas include food extrusion, starch technology, snack foods, nanomaterials from bioresources, and mitigation of processing contaminants such as acrylamide. He has published 80 articles in peer-reviewed journals and received "The Outstanding Research Award, Ministry of Science and Technology", Taiwan, in 1993 and the "Excellence in teaching", National Taiwan University (NTU), in 2014. An-I has served as the Director of the Graduate Institute of Food Science and Technology at NTU and provided crucial and effective leadership to the Institute. During his term, An-I has promoted the concept of combining food science and nutrition science for developing healthy food products and balanced diets. He is also a leading advisor to Taiwan FDA in establishing two important guidelines on the indicative value of acrylamide for various foods, and the labeling of nano food. As a coordinator of the discipline of Food and Nutrition in the Department of Life Science, Ministry of Science and Technology (MOST) of Taiwan, An-I has initiated two research platforms in the MOST to encourage academia to form interdisciplinary teams for exploring foods for elderly, and technologies for improving food safety. He has effectively established industry-academia-government relationships in addressing the forefront issues in food science and technology.*

In Chinese tradition, the lotus has been recognized as a symbol of a notable man since its leaves rise immaculately clean from the mud. Nowadays, the lotus effect has been recognized as a result of nanostructure and hydrophobic properties. Nano science and technology has been recognized as an enabling technology that has the potential to revolutionize agriculture and food systems.

Currently, the attitudes of consumers on nano products are different depending upon regions. In Europe, most of people are conservative. Asian people are more optimistic on the benefits of nano products. In America, consumers are neutral to nano products. However, safety is an important issue to everybody around the world. EFSA has revised the guidance on risk assessment of the application of nanoscience and nanotechnologies in the food and feed chain in May 2018. Taiwan is the second country to issue a guidance on the registration of nano food in December 2014. A restricted regulation tends to retard the development of market and technology. Hopefully, more safety studies would dispel the clouds to let consumers see the sun.

The nanostructures in natural edible materials including cellulose, starch, and muscle have been evidenced to show their functionalities. It is currently difficult to prepare nano food via bottom-up method. Size reduction of edible materials via top-down method has been shown to significantly alter the physicochemical properties and to exhibit benefits of final products. For example, the preparation of whole bean soy milk reduces significantly the waste and increases the contents of isoflavones. The size reduction by physical forces could be an attractive method to treat edible materials for minimizing wastes and enhancing functionalities.

## A Novel Process for Peach Drying: Pulsed Microwave-Convective Technique

**Mr. Ahmet Polat<sup>1</sup>**, Dr. Onur Taskin<sup>1</sup>, Assoc. Prof.Dr. Nazmi Izli<sup>1</sup>

<sup>1</sup>Bursa Uludag University, Bursa, Turkey

### **Biography:**

*Ahmet Polat is 31 years old. He works as Research Assistant in the Department of Biosystems Engineering, Faculty of Agriculture, Bursa Uludag University. Research Topics: Food Science and Technology*

Peach (*Prunus persica* L.) is widely cultivated in subtropical regions and total world-wide production was approximately 23 million tons in 2017. Due to their high moisture content, drying technologies are using to prolong their shelf life. In this study, a custom-modified dryer was used. Six different drying treatments were applied to peach puree with using methods of convective (60 °C), microwave (200 W) at pulse ratios (PR=1 (Continuous), PR=1.5 (40 s ton / 20 s toff) and PR=2 (30 s ton / 30 s toff)) and combined convective-pulsed microwave (60 °C-200 W-PR=1.5 and 60 °C-200 W-PR=2). Drying effect on time, pH, brix, color and microstructure (Scanning Electron Microscopy (SEM)) were analyzed. The results showed that the total time required to reach the final moisture content was highest at “60 °C” with convective drying (220 min) and lowest at “PR=1” with microwave drying (10 min). In accordance with the all drying experiments, the maximum change of the pH and brix were determined by “60 °C-200 W-PR=2”. By comparison the total color change ( $\Delta E$ ), being highest values were reached at “60 °C-200 W- PR=1.5”, whereas the lowest values were achieved at “200 W-PR=2”. From the scanning electron micrographs, the samples applied by microwave exhibited a collapsed structure compared to the sample dried by convective. Acknowledgments This study was funded by the Research Foundation of Bursa Uludag University (Project No. OUAP(Z)-2017/1).

## Nutrition Sciences at a cross-road; what are proper research models to examine effects of nutrition on longevity

Dr. Jan de Vries<sup>1</sup>, Prof.dr. Jogchum Plat<sup>2</sup>, Prof.dr. Edith Feskens<sup>3</sup>, Prof.dr. Aletta Kraneveld<sup>4</sup>, dr. Jan Sikkema<sup>5</sup>, dr. Anna Wolters<sup>2</sup>

<sup>1</sup>Foundation Nutrition In Transition, Utrecht, The Netherlands, <sup>2</sup>Maastricht University, Maastricht, The Netherlands,

<sup>3</sup>Wageningen University, Wageningen, The Netherlands, <sup>4</sup>University of Utrecht, Utrecht, The Netherlands, <sup>5</sup>Groningen University, Groningen, The Netherlands

### **Biography:**

Jan de Vries has more than 16 years experience in the Research & Development of the food industry, respectively in the Dairy Industry (Friesland Coberco from 1994-2006) and the Bakery Ingredient Supplies Industry (CSM from 2006-2010). Before starting to work for the food industry he contributed to several advices from the Dutch Food and Nutrition Council in the Netherlands. With his background in Biology, Human Nutrition and Pharmacology he is able to understand a wide variety of scientific approaches needed in the field of cereal sciences and health. His publications cover the broad area of human nutrition to pharmacology. During his industrial career he participated actively in many Task Forces of ILSI-Europe and actively represented his employers in the Top Institute Food and Nutrition in the Netherlands and the Healthgrain Project.

From September 2010 he started a consultancy to support food industry, government and other organizations in scientific background of nutritional issues. Late 2017, together with prof. Edith Feskens, he raised the Foundation Nutrition in Transition with the purpose to increase capability, credibility and relevance of nutrition sciences in the future.

Goal: creating awareness at the audience that there is a need for a structured discussion on organizing the future of the nutrition sciences.

Nutrition sciences is at a cross-road. Complex problems like ageing, migration, individualization, multi-morbidity require different research questions, innovative concepts and reassessment of research methods. With hypothesis testing studies, that is based on a reductionist molecular research model, nutrition sciences have achieved a huge amount of knowledge on the physiological effects of individual nutrients leading to the assumption that the effects of nutrition and individual foods, composed of macro- and micronutrients, can be explained by the effects of the individual nutrients. Unfortunately, reality is relentless. The benefits of nutrition interventions aiming at prevention of chronic diseases cannot be related to one single cause. Results from studies conducted with the reductionist approach are more and more not supported by observations that the consumption of foods, according to the reductionist approach composed of disease risk increasing nutrients, are probably disease risk reducing.

In general, nutrition has a different perspective than the use of drugs. A medical intervention needs to result into a measurable effect on an as short as possible time axis to achieve the desirable health level of an unhealthy individual. Nutrition aims to maintain the health of an individual as long as possible, ultimately for life time. The pharmacological model of double-blind placebo-controlled intervention studies as proof of action needs to be reconsidered for the type of research questions addressed and the type and level of validity of biomarkers needs a thorough discussion.

In addition, nutrition sciences face abstention in society with respect to the trust in scientific outcomes. To achieve more relevant and credible nutrition research innovations are necessary to improve interactions with the public and other partners. Achieving consensus on basic scientific concepts and the development of innovative research methods will improve the research tools of nutrition scientists. Together with

stakeholder, complex problems, like the preventive role in ageing, obesity, and multi-morbidity diseases, can then be more adequately studied.



## Antimicrobial resistance in the food chain

MSc Marloes Hoeksema<sup>1</sup>, Dr. Martijs Jonker<sup>1</sup>, **Prof. dr. Stanley Brul<sup>1</sup>**, Prof. dr. Benno ter Kuile<sup>2</sup>

<sup>1</sup>Universiteit Van Amsterdam, Amsterdam, The Netherlands, <sup>2</sup>Netherlands Food & Consumer Product Safety Authority, Utrecht, The Netherlands

### **Biography:**

*Stanley Brul (1964) was trained as Biochemist and graduated “cum laude” in 1986. In 1991 he obtained a PhD at the AMC in Amsterdam. He went in 1990 as a post-doctoral fellow to Nijmegen University (Microbiology and Evolutionary Biology) and obtained an NWO (NATO) TALENT Stipendium . In 1994 Stanley Brul moved to Unilever R & D and in 2002 to the University of Amsterdam as full professor of Molecular Biology & Microbial Food Safety (MBMFS) and since 2007 as director of the program in Bio-medical Sciences. prof. Brul is regularly asked as reviewer of papers and institutional research and education programs. His scientific interest focuses on antimicrobial resistance and the biology of spore forming microorganisms. Lately the group of Stanley Brul has identified in collaboration with groups in Leiden and the academic hospital of the University of Amsterdam the molecular basis of the mode of action of novel anti-microbial peptides, some of which might be alternatives for current antibiotics. Prof. Ter Kuile and prof. Brul jointly are active in the supervision of studies that aim at analysing the development of antibiotic resistance in the food chain.*

**Introduction:** In the last decades massive usage of antibiotics in agriculture and medicine has caused an increase in antimicrobial resistance (AMR). It is estimated that up to 80 % of the antibiotics in use are applied in agriculture. Since dosing regimens are ill controlled in agriculture, veterinary and environmental microbes are often exposed to sublethal levels of antibiotics. It is this exposure to sub-lethal drug concentrations that must be considered a risk factor for de- novo resistance development, transfer of AMR genes, and selection for already existing resistance.

**Purpose:** Here, we set out to study the genome of an Escherichia coli strain upon de novo acquisition of AMR. We analyse and discuss genome rearrangements observed. **Methods:**

Whole genome sequencing using IonTorrent was deployed. For quality control and read mapping we subjected BAM files to copy number analysis with the cn.mops package in R (<https://cran.r-project.org/>).

**Results:** We probed four antibiotics commonly used. Cells were made resistant to one antibiotic and subsequently to one of the remaining. This way we documented initial genetic rearrangements together with the effects of an AMR adapted genetic background on subsequent resistance development. The ampC gene was amplified by factors 10-500 as a result of exposure to amoxicillin. Excision of prophage e14 was observed in many samples with a double exposure history, but not in cells exposed to a single antibiotic, indicating that the activation of the SOS stress response alone was not sufficient to cause excision. Partial deletion of clpS and clpA occurred in strains exposed to enrofloxacin and tetracycline. Other deletions were observed in some but not all replicates with the exact same exposure history. Various insertion sequence transpositions correlated with exposure to specific antibiotics.

**Conclusions:** Many of the observed genome rearrangements have not been reported before. The observed correlation between genome rearrangements and specific antibiotic selection pressure, as well as their presence in independent replicates indicates that these events do not occur randomly. The genome rearrangements illustrate the plasticity of the E. coli genome when exposed to antibiotics and call for surveillance throughout the food chain.

1Hoeksema et al. 2018. BMC Genomics 19, 973.

## THE USE OF MEAT THERMOMETERS FROM A FOOD SAFETY PERSPECTIVE: NORTH AMERICA VERSUS EUROPE

Mrs. Sarah Elshahat<sup>1</sup>, Mrs. Linda Gordon<sup>2</sup>, Prof. Jayne Woodside<sup>1</sup>, Dr. Michelle McKinley<sup>1</sup>

<sup>1</sup>Centre for Public Health, Queen's University Belfast, Belfast, United Kingdom, <sup>2</sup>Safefood, Cork, Ireland

### **Biography:**

*Sarah obtained her master's degree in Public Health from Queen's University Belfast, UK. She is interested in the field of food safety, where her master's thesis focused on addressing consumers' attitudes towards safe food-handling behaviours. She conducted her project under consultation of Safefood (a governmental administration responsible for food safety in Ireland). She is currently participating in different collaborative public health projects in Northern Ireland.*

Food poisoning is a major health problem affecting 10% of the world population every year [1]. Proper cooking of meat to a minimum safe temperature using a meat thermometer is recommended by food safety authorities in North America (Figure 1), but not yet recommended in Europe [2, 3]. A scoping review was conducted to investigate the trends of meat thermometers usage in different countries, consumers' barriers and facilitators, and interventions for enhancing thermometers usage. The study topic was suggested after discussions with safefood (all-island public body responsible for food safety promotion on the island of Ireland), with the aim of informing a potential policy change in consumer cooking guidelines. The study results highlighted the presence of knowledge-compliance gap, with meat thermometer ownership of higher trend relative to its actual usage. The meat thermometer usage trends in the US were generally higher than those in many European countries, including the UK, Ireland, and the Netherlands. Barriers to meat thermometers usage differed according to country, age, gender, and socioeconomic status, yet unfamiliarity and lack of experience were common barriers among different study subgroups. On the other hand, perceived susceptibility of food poisoning was a strong facilitator. Intervention studies utilized educational materials, campaigns, and food safety training. These showed maximum effectiveness when they addressed consumers' attitudes towards meat thermometers usage. Enhancing meat thermometers usage in Europe requires prior thorough understanding of consumers' cooking habits, attitudes, and behaviours in order to develop effective evidence-based interventions.

### **Funding**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### **Figure Caption**

Figure 1. Safe minimum cooking temperatures for different meat types recommended by food safety authorities in the US and Canada

### **References**

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Meat type	Safe minimum cooking temperature (°C)	
	US	Canada
Beef, Veal, and Lamb	62.8	63
Pork	62.8	71
Ground/minced meat	71.1	71
Whole poultry	73.9	82
Ground/Pieces of poultry	73.9	74
Fish	62.8	70

## THE ACADEMIC INTER-UNIVERSITY MASTER`S STUDY PROGRAM: “NUTRITIONAL SCIENCE”

Dr. Ida Jakobson<sup>1</sup>, Dr. Daina Karklina<sup>2</sup>, Dr. Inga Ciprova<sup>2</sup>, Dr. Lolita Neimane<sup>3</sup>

<sup>1</sup>University of Latvia, Riga, Latvia, <sup>2</sup>Latvia University of Life Sciences and Technologies, Jelgava, Latvia, <sup>3</sup>Riga Stradiņš University, Riga, Latvia

### **Biography:**

Ida JAKOBSONE has born on 28.12.1946. Studied chemistry in Chemistry department of University of Latvia (UL) from 1966 till 1971. Has scientific degree Candidate of Chemistry since 1990, on 1992 this degree was nostrified as scientific degree Doctor of Chemistry.

Working in Chemistry department of UL from 1971 till now. Since 1995 till now Head of the Centre of Food Chemistry at Chemistry department of UL. In period from 2003 till 2006 elaborated first in Latvia inter-university (University of Latvia, Latvian University of Agriculture and Riga Stradiņš University) Masters' study program „Nutrition Science”, Director of this study programm from 2006 till now.

Head of organizing committees of 1st and 2nd international conferences „Nutrition and Health” (Riga, 4-6 September 2012 and 5-7 October 2016).

From 2013-2018 as lead researcher participater in 3 projects of ERDF and 1 project of ESF. In these years published 20 articles in international cited scientific magazines and participated with posters in 19 international conferences and 27 local conferences of UL, under her guidance 20 Masters' Theses in Nutrition Science and 12 Bachelors' Theses in Food Chemistry were elaborated.

The first in Latvia Academic Inter-university Master`s Study Program Nutritional Science was developed and is implemented since 2006 by the teaching staff of Latvia University of Life Sciences and Technologies (LULST), University of Latvia (UL) and Riga Stradiņš University (RSU) in accordance with the Cooperation Agreement.

The aim of the implementation of the program is to train qualified specialists of nutrition science able to analyze, critically evaluate and generate new ideas and alternative approaches in nutrition science to promote public health and prevent diseases associated with nutrition and to realize aims of the nutrition policy of the World Health Organization, the European Union and Latvia.

Students' research activities are closely connected with the research of academic staff of UL, LULST and RSU. Subjects of the research: health of the society and policy of nutrition; habits of nutrition and eating; provision of wholesome nutrition for population; nutrition – risk factor of chronic diseases; nutrition therapy; nutrition of sportsman, new and functional food. Realization of the research offers cooperation opportunities to scientists from different branches in implementing the full research cycle: agricultural sector, food chemistry and technology, food microbiology, medicine etc. Research results have been presented on local and international conferences, including two international conferences “Nutrition and Health” (in 2012 and 2016) organized in Latvia by the universities implementing this program. Articles prepared on a basis of these presentations are published in five issues of the journal “Proceedings of the Latvian Academy of Sciences”.

Since 2008, health science master`s degree in nutrition science was obtained by 267 students; ~20 of them are doing or have already completed their doctoral studies.

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## DATA USED IN THE SAFETY ASSESSMENT OF INSECTS AND PRODUCTS THEREOF AS NOVEL FOODS

Mr. Ermolaos Ververis<sup>1</sup>, Dr. Wolfgang Gelbmann<sup>1</sup>

<sup>1</sup>European Food Safety Authority (EFSA), Parma, Italy

### **Biography:**

*Ermolaos Ververis is a Chemist, specialized in Biochemistry, Biotechnology, and Foods. After having obtained his M.Sc. in Food Chemistry and Technology in Greece, he joined the cross-disciplinary M.Sc. program in the science of animal-derived foods, “Erasmus Mundus Food of Life”, spending one year in the University of Copenhagen and one year in the University of Helsinki. So far he has participated in various scientific projects, dealing mainly with the development of new food products, both within Europe and overseas. Since the end of 2016, he works at the Nutrition Unit of the European Food Safety Authority (EFSA), with his main task being the safety assessment of Novel Foods. He is also a Ph.D. candidate at the Department of Hygiene, Epidemiology and Medical Statistics, in the School of Medicine of the National and Kapodistrian University of Athens.*

Insects are part of the diet of various populations, with approximately 2000 insect species being consumed across the globe. Sustainability, mass rearing potential, nutritional profiles, and food-innovation perspectives are the main reasons that have raised western world’s interest towards edible insects. Being governed by the European Union (EU) regulation on Novel Foods, insects and products thereof have to undergo a safety assessment by EFSA before entering the EU market. However, data addressing the safety of insects for food consumption are scarce in the literature. The paper addresses how to make the most out of the existing relevant data towards the safety evaluation of such products.

Physicochemical properties, chemical and microbiological characterization, nutritional profile, toxicological parameters, and allergenic potential are the main aspects needed to be addressed. To date, compositional and nutritional profiles for a wide range of insect species have been largely discussed. Nevertheless, existing data on genotoxicity, subchronic toxicity and toxicokinetics is still limited. Insects and insect-based foodstuff are complex matrixes that cannot be easily tested by implementing classical toxicity approaches due to various scientific hurdles (e.g. method sensitivity, selectivity, applicability, difficulty to administer toxicologically meaningful amounts of insects to test animals).

Hence, a comprehensive compositional analysis, alongside an exposure assessment to putative undesirable compounds through insect consumption can be the key to identify underlying risks and evaluate the safety of such products. However, nature and levels of undesirable compounds, especially in fractionated products like insect protein preparations (e.g. isolates, concentrates, and hydrolysates) or insect-derived oils may trigger the need for further research on the action of these compounds. Species (physiology and developmental stage), substrate used, methods for farming and processing and effect of the production process on the chemical and microbiological composition of the final products need to be taken into consideration.

Evaluating the safety of insects and products thereof as novel foods can be challenging, due to lack of toxicological data in the literature. However, assembling the available compositional data, and combining them with evidence occurring from exposure assessment may overcome possible gaps and deliver consistent and reliable results.

## THE VENEZUELAN ISSUE: A PARTICULAR CHALLENGE FOR FOOD SECURITY AND SAFETY

**Dr. Maria S. Tapia<sup>1</sup>**, M. Sci. Pablo I. Hernández R.<sup>2</sup>

<sup>1</sup>Institute of Food Science and Technology. Faculty of Sciences, Central University of Venezuela, Caracas, Venezuela, Bolivarian Republic of, <sup>2</sup>Faculty of Medicine. School of Nutrition and Dietetics. Central University of Venezuela, Caracas, Venezuela, Bolivarian Republic of

### **Biography:**

*Biologist. Master's and Ph.D in Food Science. Professor Central University of Venezuela, Institute of Food Science and Technology, Faculty of Sciences. Correspondent Member of the Academy of Physical, Mathematical and Natural Sciences. Director "Fundación Saldía Venezuela" Author of more than 100 publications as articles and book chapters. She has published five books internationally in the area of food and fruit preservation. Coordinator of international and national projects in fruit preservation and of the community project "5aday campaigns in schools and communities of Caracas". Co-editor of the digital project MiradorSalud <https://miradorsalud.com/>.*

Venezuela is an oil state with governmental, military and political control over food production, importation, distribution and marketing, stern price controls and currency exchange policies, along with a strong dependence on food imports that in 2013 covered 65% of the necessary caloric intake of the population. This avalanche of food imports -facilitated by the Government at a preferential exchange rate and an Economic Emergency Decree, resulted in transitory regulations and laxity in procedures and compliances with protocols. With the economic crisis, food imports drastically dropped, but the Government continued to import basic foods for social programs and sell them at regulated prices. Many complaints have been placed about their unsuitability to Venezuelan cultural patterns as well as nutritional composition and safety. In 2016, the Government allocated enormous efforts and resources on the implementation of a food distribution program: The Local Supply and Production Committee (CLAP). The objective of this work is to present examples of anomalies presented with some basic products imported for CLAP: corn meal, powder milk, rice, etc. Some corn flours from Brazil or Mexico for instance, are not tested to check if the Venezuelan regulations for fortification are met. Consumers started to perceive conspicuous sensory problems in the powder milks distributed which moved the news portal "Armando.info" to evaluate the chemical and nutritional properties of 14 Mexican brands of dehydrated milk imported by CLAP. The majority of the brands declared as milk powder resulted excluded from the regulatory definition not complying with the Covenin 1481 National Standard and the criteria of the National Institute of Nutrition nor with the Official Mexican Standard 155-SCFI-2012. Other examples are also presented. These facts place Venezuelan consumers in a situation of vulnerability and lack of protection in terms of food safety and security. The final message is that global standards on the constitution of essential products, globally harmonized labelling, and regulations, should be ingrained in the minds of all those who hold responsibilities regarding food safety and security (military, politicians, governments) and never be disregarded or subject of flexibilization for political reasons and in sake of food access and availability.



## ADDITION OF CHIA SEEDS, HYDRATED WITH ORANGE JUICE ON FRANKFURTER SAUSAGES: EFFECT ON QUALITY AND SAFETY

Dr. Manuel Viuda-Martos<sup>1</sup>, Máster in Food Science and Technology Raquel Lucas-Gonzalez<sup>1</sup>, Dr Estrella Sayas-Barbera<sup>1</sup>, Dr. Casilda Navarro-Rodriguez de Vera<sup>1</sup>, Dr Asuncion Martínez-Mayoral<sup>1</sup>, Dr Juana Fernández-López<sup>1</sup>, Dr. Jose Angel Perez Alvarez<sup>1</sup>

<sup>1</sup>UMH Universidad Miguel Hernández. Higher Polytechnical School of Orihuela. Agrofood Technology Department, Orihuela, Spain

### **Biography:**

*Professor of Food Science and Technology area.*

### Introduction

Foods are looked upon as a way to achieve good health and even for reducing the risk of developing a variety of chronic diseases. The production and characterization of new ingredients with a high technological potential, high nutritional value and high content of bioactive compounds is seen as a promising field for increasing competition in the world food industry by offering innovative products with added value. One of these new ingredients could be the chia (*Salvia hispanica*), which has received increasing attention in recent years.

### Objetives

Thus, in this work the effect of the addition of chia seeds hydrated with orange juice at two concentrations (7,5 and 15%) on the chemical composition, lipid oxidation, residual nitrite level and sensory acceptance of frankfurter sausages was evaluated.

### Material and methods

Frankfurter sausages were manufactured according to a traditional formula. Chemical composition was determined by AOAC methods while, residual nitrite level (mg NaNO<sub>2</sub>/kg sample) was determined in agreement with standards ISO/DIS 2918. Lipid oxidation was assessed in triplicate by the 2-thiobarbituric acid (TBA) assay. For sensory analysis a Quantitative Descriptive Analysis was carried out.

### Results

The addition of chia seeds hydrated with orange juice led to an increase in the fat (4.48 and 19.79%) and protein (25.16 and 52.44%) content with respect to control sample, while the moisture and ash content were not affected. The residual nitrite contents decreased 34.12 and 58.59% with respect to control sample. The use of hydrated chia seeds decreased the hardness, cohesiveness and the gumminess but had no effect on springiness. The addition of chia seeds hydrated with orange juice led to lower oxidation rates (0.42 and 0.49 mg MAD/kg sample) than observed in the control (0.55 mg MAD/kg sample). The most acceptable sample was the frankfurter sausage added with chia seeds at 7.5%.

### Conclusions

A combination of chia seeds and orange juice can be used as potential new ingredients to develop frankfurter sausages with better nutritional profile without demerit of their sensory and physicochemical properties.

Acknowledgement: CYTED 119RT0568. PRODUCTOS CARNICOS MÁS SALUDABLES (HEALTHY MEAT PRODUCTS)

## BLANCHING TIME EFFECT ON TECHNO-FUNCTIONAL PROPERTIES OF WHITE, BLACK AND RED QUINOA FLOURS

Dr. Manuel Viuda-Martos<sup>1</sup>, Máster on Food Science and Technology Raquel Lucas-Gonzalez<sup>1</sup>, Dr. Estrella Sayas-Barbera<sup>1</sup>, Dr. Casilda Navarro-Rodriguez de Vera<sup>1</sup>, Dr. Asuncion Martinez-Mayoral<sup>1</sup>, Dr. Juana Fernández-López<sup>1</sup>, **Prof. Dr. Jose Angel Perez Alvarez<sup>1</sup>**

<sup>1</sup>UMH Universidad Miguel Hernández. IPOA Research Group Agrifood Technology Department. Polytechnical High School of Orihuela, Orihuela, Spain

### **Biography:**

B.S. in Pharmacy Sciences. Master in Food Science and Engineering and Dr. in Agricultural Engineer. Professor in Food Science & Technology. Head of the IPOA Research Group (<https://youtu.be/fblBW-A-jZw>). Research line: Food Product Development, of healthy meat products with the adición of bioactive compounds and dietary fibers (obtained from the valorisation of co-products from agri-food industries). *h index: 44. Tutor of Essenza di Vega, 2018 national Ecothropelia winner. One of the most cited author in Agricultural Sciences (Clarivate) in 2018*

### Introduction

Quinoa seeds (*Chenopodium quinoa* Willd.) has gained great global interest in recent years due its excellent nutrient value. Thus, this pseudocereal contains high biological value proteins and bioavailable essential aminoacids, unsaturated fatty acids, dietary fiber, complex carbohydrates and other beneficial bioactive compounds such as polyphenolic compounds. Research and innovation in healthy meat products is demanded by consumers, thus quinoa could be a good option for innovation. Previously to introduce in meat formulations, is necessary to known its industrial potential. Techno-functional properties (mainly water holding and oil binding capacity) are easy tools to evaluate it. During blanching, not only techno-functional properties changes, also saponins (gives an unpleasant bitter tast) are removed.

### Objectives

The aim of this work was determined the effect of blanching time on techno-functional properties (water holding and oil holding capacity) of flours obtained from white, black and red quinoas.

### Material and methods

The analyses were performed on three different quinoas obtained from the local market: white, red and black Bolivian Real quinoa obtained from organic farming. The samples were blanched at 60°C during different times and their effect on the techno-functional properties were measured.

### Results

As regards the techno-functional properties, the water holding capacity (WHC) and swelling capacity (SWC) increased, for all samples analyzed, with the blanching time with average values of 1.63 g water/g sample at 0 min to values of 1.98 g water/g sample at 10 min for WHC and average values of 1.60 mL/g sample at 0 min to values of 2.0 mL/g sample at 10 min for OHC. However, for oil holding capacity no differences were found between samples and blanching time. Both properties are very useful for meat products development and innovation.

### Conclusions

The results obtained suggest that the quinoa seeds blanching treatment, at 60°C for 5 minutes, is a suitable treatment to maintaining good techno-functional properties.

Acknowledgment: CHIQUIMEAT projetc. AGL2016-75687-C2.R Ministerio de Economía y Competitividad Gobierno de España

## Evaluation of microbiological quality of beef samples from of semi-intensive and intensive production systems

**Mr. Norton Komora<sup>1</sup>**, Ms. Diva Jesus<sup>1</sup>, Professor Maria João Monteiro<sup>1</sup>, Mr. Ivo Gama<sup>3</sup>, Professor Tiago Domingos<sup>2</sup>, Doctor Ricardo Teixeira<sup>2</sup>, Professor Manuela Pintado<sup>1</sup>, Professor Paula Teixeira<sup>1</sup>

<sup>1</sup>CBQF – Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Universidade Católica Portuguesa/Porto, Porto, Portugal, <sup>2</sup>MARETEC – Marine, Environment and Technology Centre, Instituto Superior Técnico, Universidade de Lisboa, Lisboa, Portugal, <sup>3</sup>Terraprima, Environmental Services, Ltd, Lisboa, Portugal

### **Biography:**

Graduate of Department of Food Science and Technology (CAL) of Universidade Federal de Santa Catarina (UFSC, Brazil) with B.Sc. in Food Science and Technology (2015) and a M.Sc. in Applied Microbiology of Escola Superior de Biotecnologia (ESB) of the Universidade Católica Portuguesa (2018). Actually holds a research fellowship in the ModelMeat Project co-founded by European Regional Development Fund. His subjects of study are natural alternatives to chemical food additives as natural peptides, natural polymers and bacteriophages, as well as non-thermal food processing technologies. He has been author/co-author of 7 original articles in peer-reviewed journals, 2 oral communications and 25 posters in international meetings

Issues related to animal welfare are increasingly on the agenda, and have increasing implications for day-to-day livestock farms. Increasingly, consumers are concerned about the origin and the mode of production, requiring that the meat they consume is coming from animals grown, transported and slaughtered in an ethical manner respecting animal welfare standards. Animal welfare is the subject of specific legislation and animal welfare requirements have been incorporated into most quality assurance and food safety systems on holdings. In general consumers assume high standards of animal welfare, such as indicators of food quality and safety. Besides several studies regarding the quality of conventional and organic beef, information about microbiological safety of meat from animals grown in different production systems is scarce. The aim of this work was to evaluate the microbiological safety of samples of beef from semi-intensive and intensive livestock production. Twenty-seven samples of beef sold in Portugal, 17 from semi-intensive and 10 from intensive system were accessed for hygiene and spoilage indicator bacteria and foodborne pathogens, including: Enterobacteriaceae, total aerobic bacteria, lactic acid bacteria, *Pseudomonas* spp., *Staphylococcus aureus*, *Salmonella* spp., *Listeria* spp., *Escherichia coli*, STEC *E. coli*, *Acinetobacter* spp., *Clostridium perfringens* and sulphite reducing clostridia. For the parameters investigated, no significant differences were detected on the microbiological quality of beef from both production systems ( $p \geq 0.05$ ). Overall, meat from both systems of production did not exceed the limits imposed by the legislation actually in force in the Europe Union.

**Acknowledgments:** This work received financial support from the European Union (FEDER funds through COMPETE) under the project ModelMeat: Modelo de Optimização de Ambiente e Qualidade do Produto para Serviços de Apoio à Competitividade dos Agentes da Fileira da Produção Animal Extensiva (POCI-01-0247-FEDER-017630)

## BROILER CHICKENS: CHARACTERIZATION OF ABDOMINAL AND GIZZARD FAT

Máster in Food Science and Technology Lina Peña-Saldarriaga<sup>1</sup>, Dr. Juana Fernández-López<sup>1</sup>, Dr. Estrella Sayas-Barbera<sup>1</sup>, **Prof. Dr. Jose Angel Perez Alvarez<sup>1</sup>**

<sup>1</sup>UMH Universidad Miguel Hernández IPOA Research Group Agrifood Technology Department. Politechnical High School of Orihuela, Orihuela, Spain

### **Biography:**

B.S. in Pharmacy Sciences. Master in Food Science and Engineering and Dr. in Agricultural Engineer. Professor in Food Science & Technology. Head of the IPOA Research Group (<https://youtu.be/fblBW-A-jZw>). Research line: Food Product Development, of healthy meat products with the adición of bioactive compounds and dietary fibers (obtained from the valorisation of co-products from agri-food industries). *h index: 44. Tutor of Essenza di Vega, 2018 national Ecothropelia winner. One of the most cited author in Agricultural Sciences (Clarivate) in 2018*

### Introduction

Poultry sector in Colombia has increased in the last 10 years. A large amount of by-products (blood, fat, skins, etc.) are generated every year. These by-products are a big environmental problem and must be valorised. Thus meat industry can be more sustainable. In general fat, is a necessary ingredient in meat products but consumers considered it, as unhealthy. Valorisation of chicken fats and used in potentially functional foods is a priority for Colombian poultry sector.

### Objetives

The general aim is to evaluated the diet influence on the lipid profile of abdominal and gizzard broiled chicken fat from 3 Colombian farms with different climatic conditions.

### Materials and Methods

Samples: gizzard and abdominal fat were mixed in a 6,5:3,5 ratio (abdominal:gizzard), as potential "commercial" fat. Colour determinations: CIEL\*a\*b\* color space was used (X-Rite spectrophotocolorimeter). D65 as illuminat and 10° observer angle was used. Solid and fused fat were analysed

Lipid profile: sample fats were extracted by Soxhlet method. Methyl ether was added; then methylated to form methyl esters of fatty acids (FAME) using BF3 in methanol. The FAMEs were quantified in a gas chromatograph (GC-2014 Gas Chromatography, SHIMADZU), against the C11: 0 standard.

Results: climate conditions did not affect fat composition. Palmitic and oleic acid were the most representative fatty acids.

Fat colour co-ordinates were not affected by climatic conditions, but the state of fat (solid or "liquid") affected mainly to yellowness co-ordinate and chroma values of solid fat (b\*) were lower than liquid (b\*: 24.05- 65.89, respectively), all of them solid state showed higher values than liquid fat (L\*, a\*), hue was not affected by the state of fat.

Conclusión: Colombian climate conditions did not affect fatty acid profile and fat colour. This is very useful data for poultry sector ina country, as Colombia, with very different climate conditions.

Acknolegement: CYTED 119RT0568 PRODUCTOS CARNICOS MÁS SALUDABLES (HEALTHY MEAT PRODUCTS)

## Food sustainability = Food security + Food safety + Feed back

Dr. Harry Aiking<sup>1,2,3,4</sup>

<sup>1</sup>*Institute for Environmental Studies, Amsterdam, The Netherlands*

Humanity requires an uninterrupted supply of sufficient, nutritious, and safe food. As a species, however, we have been successful to the point that we are currently threatening our own existence - and that of many other organisms in stride - in our efforts to feed our increasing population at increasing levels of affluence. Consequently, food production has become the single most important driver of resource appropriation and pollution, with repercussions on biodiversity and climate, but also on its own propagation. This feedback loop inhibits further food production increases via soil degradation, siltation, and reduced availability of freshwater, fuel and other natural resources, but also via increasing chemical and biological contamination of air, water, soil and biota - including food.

This lecture delineates the dual challenge of doubling the output of crops plus quartering the impacts per ton within three decades. First, it is argued that protein supply is underlying and linking the top-3 of anthropogenic impacts based on the planetary boundaries concept, i.e. 1) biodiversity loss, 2) nitrogen cycle acceleration, and 3) carbon cycle acceleration (resulting in climate change). These ecological impacts associated with Western-style diets need to be reduced urgently. Second, so do the health impacts of both food production and consumption. The former include the rise of microbial antibiotics resistance, zoonotic diseases, and pesticide intoxications. The latter include the rise of allergies, certain cancers, cardiovascular diseases, obesity and associated diseases (such as type 2 diabetes), as well as food contents of heavy metals (such as arsenic).

Since health and environmental impacts are largely in sync, these issues may - and should - be addressed in combination, from a multidisciplinary, global perspective, and with the input of all stakeholders. In order to address the inefficiencies inherent to current dietary patterns, therefore, a ranked list of more sustainable options is proposed, based on their order of magnitude. Primarily, a diet transition from primarily animal towards plant protein products is urgently required. Fortunately, new nutrition guidelines are increasingly taking sustainability into account and the contours of a dual protein transition are slowly emerging. Increasing protein supply in developing countries and decreasing caloric intake in developed countries are prerequisite. Such would benefit food and nutrition security, as well as biodiversity and climate. The barriers are plenty, but the benefits are overwhelming.

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Humans just 0.01% of all life... X

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### Of all the mammals on Earth, 96% are livestock and humans, only 4% are wild mammals

Category	Percentage
Livestock	60%
Humans	36%
Wild mammals	4%

60% are livestock

36% are humans

4% are wild mammals

Windows taskbar: File Explorer, Edge, Mail, Photos, Word, PowerPoint, Teams, OneDrive, Settings, Task View, Start, Search, NLD, 07:05, 16-1-2019

## SAFETY OF FOOD CONTACT MATERIALS – TRENDS AND REGULATIONS

Professor Alejandro Ariosti<sup>1,2</sup>

<sup>1</sup>National Institute of Industrial Technology (INTI)– Plastics Centre; Colectora de Avenida General Paz 5445 – (1650), San Martín , Argentina, <sup>2</sup>Department of Food Science, Faculty of Pharmacy and Biochemistry, University of Buenos Aires; Junín 956, 2o. piso – (1113), Buenos Aires, Argentina

**Abstract:** Food packaging protects the product along its shelf-life from external damage and deterioration factors. From the safety point of view, the main interaction of packaging, and other food contact materials (FCMs), is migration of their components to food, which may alter the latter's sanitary, nutritional and sensory characteristics. Migration assessment is central for the clearance of FCMs in several countries (e.g. China, Japan, United States) or regional blocks (e.g. European Union, Common Market of the South (MERCOSUR) in South America). Traditional and new developments in FCMs (e.g. active and intelligent materials, recycled plastics, nanomaterials), may pose analytical challenges to their safety assessment. New approaches to assess the safety of known components and non-intentional added substances (NIAS) present in FCMs have been developed, for instance in vitro and in silico toxicology tools, the functional barrier concept, the threshold of toxicological concern (TTC) prioritization strategy, etc. Non-harmonized methodologies, standards and regulations worldwide may establish different levels of protection of consumers' health or technical barriers to international trade.

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## EFFICACY OF NIGELLA SATIVA SEEDS IN THE DETOXIFICATION OF AFLATOXIN M1 (AFM1) FROM MILK OF FREE-RANGING COWS' IN ABEOKUTA NIGERIA

Mrs. Amina Badmos<sup>1</sup>, Mrs. Eniola Oni<sup>1</sup>, Dr. Tolulope Adeleye<sup>1</sup>

<sup>1</sup>Federal University of Agriculture Abeokuta Ogun State Nigeria, Abeokuta, Nigeria

### **Biography:**

*Mrs. Amina Omodolapo Badmos is a doctoral student and an assistant lecturer in the Microbiology Department, Federal University of Agriculture, Abeokuta, Nigeria. she is currently working on effects of black seed oil, vitamins C and E on AFM1 intoxicated neonatal Wistar rats. she is passionate about research and hopes to get opportunities to learn and bring back to her community*

**Introduction :** Nomadic pasturing have been the cheapest and most common method of feeding cows in Abeokuta, Nigeria, through this means, the cows ingest random mouldy materials, thus giving rise to aflatoxin M1 contaminated milk. **Purpose:** Numerous health risks associated with aflatoxins in Nigeria has driven the need for available and edible materials for its decontamination.

**Methods:** Adsorption studies of AFM1 was performed using Nigella sativa seeds ( 2 and 5%) at aflatoxin contamination rates of 100, 300 and 500ng/l for 5hrs at 4, 16, 28 and 32° C.

**Results :** The aflatoxin-adsorbing efficacy depended on the concentration, contact time and treatment temperature. At 4 and 16° C treatment temperature, Nigella sativa seeds demonstrated mild but significant reduction of AFM1 in the milk, while at 16 and 32°C , a more significant decontamination  $p < 0.05$  was observed at all contamination rates and Nigella sativa concentrations.

**Conclusion:** Results from this study indicate that Nigella sativa seeds demonstrate potentials for aflatoxin decontamination in milk at mild to moderate temperature. The study encourages the use of Nigella sativa seeds if public health must be protected.

**Keywords:** Nigella sativa seeds, Aflatoxin M1, Cows' milk, Nomadic pasturing, Adsorption



## SOME ASPECTS REGARDING FOOD RISK MANAGEMENT IN THE FOOD INDUSTRY

**Prof. Dr. Dumitru Mnerie<sup>1</sup>**, Prof. Dr. Mona Elena Popa<sup>2</sup>, Dr. Oana Suci<sup>3</sup>, Assoc.Prof.Dr. Mihaela Botis-Nistoran<sup>1</sup>, Eng. Vasile Nagy<sup>1</sup>

<sup>1</sup>Politehnica University Timisoara, Timisoara, Romania, <sup>2</sup>University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania, Bucharest, Romania, <sup>3</sup>Department of Public Health Timiș, Timisoara, Romania, Timisoara, Romania

### **Biography:**

*PhD (1997) in Technology of the metals and of the materials, (Piezoceramic materials for transducers construction), Mechanical Engineer (1980), Diplomat Economist (Firm's Management, 2001), Full Professor at Politehnica University Timisoara. In last 25 years vice president in the coordinating boards of Agricultural and Food Industry Machines and Installations (Bachelor's Degree) and Integrated Systems for Agro-Food Production (Master courses). Research Interests: process equipment, special for food industry, design of mechanical technologies, safety and healthy food, food preservation, nutrition, hygienic design for food industry, management and marketing for integrated systems, educational management, nonconventional technologies.*

### Introduction

In the current context of increasing of the global food safety concerns, it is necessary to monitor as closely as possible the presence of various hazards on the food products available on the market.

HACCP is a logical approach to food safety control that allows food businesses to identify potential food safety hazards and implement preventative control measures to minimize risk of consumer exposure (Codex, 2009). Thus, effective food safety management systems based on HACCP principles should ensure that throughout the global food supply chain (production, processing, distribution, storage, consumption, and disposal) food remains safe.

Anyway, food safety remains a key public health challenge and food borne illness outbreak data reported in the EU in 2015 show a total of 4,362 reported foodborne outbreaks (including waterborne outbreaks). Overall these outbreaks caused 45,874 cases of illness (209 more than in 2014), 3,892 hospitalizations (2,546 less than in 2014) and 17 deaths (10 less than in 2014) across 26 EU Member States in 2015 (EFSA and ECDC, 2016). This demonstrates that HACCP-based systems are not always working effectively in practice or that HACCP-based Food safety management systems alone are insufficient.

### Purpose

The aim of this paper is to identify in Romania the main causes of food outbreaks and to determine a package of measures to improve food risk management, with a more responsible involvement of the actors involved along the entire chain: producers; large and small/medium-sized enterprise (SME) industry including processing, transport and storage; retailers; policy makers; regulators and consumers.

### Methods

Experimental research has been carried out in several food factories in Romania, as well as in some restaurants, public catering establishments and supermarkets, which have activities of processing, packaging and / or serving for consumption of certain foods or meals. Investigations have been carried out on the food chain, and various food contaminants were revealed in different points.

### Results

The negative findings have been summarized and some managerial and / or legislative flaws have been identified. A list of 12 proposals has been drawn up to help to reduce food-related hazards, especially due to chemical hazards.

## Conclusions

In the nowadays context, with focus on food diversifying and new marketing techniques, under the most profitable conditions, food risk management systems are sometimes insufficient, without early and predictable measures for food borne disease prevention. An integrated approach to problem-solving with a final focus on consumer health needs to be pursued. Effective strategies to strengthen food safety culture and deliver an integrated culture-practices-systems model for safe food and food integrity across agri-food supply chain organizations are urgent needed.

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## HYGIENIC WELDING - A GUARANTEE FOR A CLEANER FOOD MANUFACTURING

**Prof. Dr. Dumitru Mnerie<sup>1</sup>**, Dr.Eng. Gabriela Victoria Mnerie<sup>2</sup>, Prof.dr. Liviu Gaceu<sup>3</sup>, Eng. Vasile Nagy<sup>1</sup>  
<sup>1</sup>Politehnica University Timisoara, Timisoara, Romania, <sup>2</sup>National R&D Institute for Welding and Material Testing ISIM , Timisoara, Romania, <sup>3</sup>Transilvania University, Brasov, Romania, <sup>4</sup>Politehnica University Timisoara, Timisoara, Romania

### **Biography:**

*PhD (1997) in Technology of the metals and of the materials, (Piezoceramic materials for transducers construction), Mechanical Engineer (1980), Diplomat Economist (Firm's Management, 2001), Full Professor at Politehnica University Timisoara. In last 25 years vice president in the coordinating boards of Agricultural and Food Industry Machines and Installations (Bachelor's Degree) and Integrated Systems for Agro-Food Production (Master courses). Research Interests: process equipment, special for food industry, design of mechanical technologies, safety and healthy food, food preservation, nutrition, hygienic design for food industry, management and marketing for integrated systems, educational management, nonconventional technologies.*

### Introduction

The cleaner food manufacturing assume the running a technological process of processing of the food materials up to obtaining the finished food intended for consumption without the negative interference of other substances and / or undesirable transformations that could damage the quality of the food. The welds applied to stainless steel materials in the construction and maintenance of food manufacturing facilities and equipment can significantly affect the final quality of food. Also, the sanitation of the installations and equipment can not be done in good conditions.

### Purpose

Highlighting of the qualitative differences between of the food materials in contact with the surfaces resulting from the usual welds compared to those obtained from the higienic weldings and the surfaceses processing according to the principles stipulated in the EHEDG guideline.

### Methods

Several samples of mistaken welds and machining have been extracted from various Romanian food factories. The same weldings and machining have been reproduced according to special requirements. Simulation of the technological operations in which different food materials would come into contact with these surfaces was carried out. Afferent hygiene operations have also been applied. It was analyzed food samples from the two situations. The results of the analyzes were centralized and compared.

### Results

The data obtained confirms the deterioration of the food quality due to welding, both during the technological processes and due to the hygienisation. In the case of inadequate welding and machining, traces of different contaminants have been identified.

### Conclusions

It is necessary to impose in Romania and everywhere binding rules and norms for the realization of the welded joints applied in the food industry installations and equipments in compliance with the requirements of the certified hygienic welds.

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## GLOBAL FOOD SAFETY INCIDENT ALERT NETWORK

Dr. Chin-kun Wang<sup>1</sup>, Dr. Veslemøy Andersen<sup>2</sup>

<sup>1</sup>Chung Shan Medical University, Taichung, Taiwan, <sup>2</sup>National Institute of Public Health, Oslo, Norway

### ***Biography:***

Former President of Chung Shan Medical University,

Former President of ISNFF

*Fellow, IAFOST & ISNFF*

**Introduction.** Safe food is a basic right for all individuals in the world. To develop an anonymous system to limit the consequences of dangerous chemicals added to food or the presence of pathogenic microorganisms in food is the objective of the Global Incident Alert Network (GIAN) working group of GHI. GIAN for Unauthorized Food Additives (GIANUFA) and GIAN for Pathogens in Food (GIANPIF) are two major objectives.

**Materials and Methods.** A whistle-blower can report anonymously via an easy-to-find and well-known webpage. The site will have a reporting form with questions to obtain as many as possible details. The questions have to be answered as complete as possible, because there will be no possibility to ask the anonymous whistle-blower later. The whistle-blower needs to realise that the case can only be addressed with sufficient details. Using the GHI network, with emphasis on GHI Ambassadors and experts from all fields, GHI will check if the report is real or only meant to harm the company. Experts' evaluation of the whistle-blower is very critical for the GIAN system. A committee composed of food scientists, nutritionists, toxicologists, risk evaluators and medical doctors could immediately evaluate the collected data or information. If it's real and serious, the GHI Office will alert the local National Public Health Institute or the National Food safety Authority who then has to handle the incident further. The GIAN reporting system could be translated into different languages and the food industry and local governments could benefit from their connection with GHI. The GIAN website will also provide past incidents (e.g. plasticizer, melamin and some others) and their risk and harm to health.

**Conclusions.** The anonymous GIAN reporting network is very important to avoid future scandals. To avoid the food safety problem from unauthorized food additives or pathogens, good and new regulations and monitoring systems are required. In addition, a newly set up database of information will also be very helpful. The network of GHI Ambassadors, National Food Safety Authorities and Public Health Institutes will play an important role when new incidents are detected in the future.

## Valorization of Olive Mill Waste Water to Reduce their Polluting Effect

Dr. Christelle Bou-mitri<sup>1</sup>, Aline Issa<sup>1</sup>, Dr. Jacqueline Doumit<sup>1</sup>, Dr. Milad Al Riachy<sup>2</sup>, Dr. Wadih Skaff<sup>3</sup>, Eng. Roland Andary<sup>4</sup>

<sup>1</sup>Notre Dame University-louaize, Zouk Mickael, Lebanon, <sup>2</sup>Department of Olive and Olive Oil, Lebanese Agricultural Research Institute, P.O. Box 287 Zahlé, Tal Amara, Lebanon., <sup>3</sup>Ecole Supérieure d'Ingénieurs d'Agronomie Méditerranéenne, Saint Joseph University, P.O. Box 159 Zahle, , , Lebanon, <sup>4</sup>Lebanese Industrial Value Chain Development Project, US-AID, Confidence center, Dimitri Hayeck street, Horsh tabet, , , Lebanon

### **Biography:**

Jacqueline Doumit is currently an Associate Professor in the Faculty of Nursing and Health Sciences at Notre Dame

University-Louaize (NDU) Lebanon, where she has been teaching biology, nutrition and biochemistry courses since

1999. She has a BS in Biology from the Lebanese University (1984), and a MS and a PhD in Biomedical Engineering

(Biochemistry) from the Université de Saint-Etienne, France (1996). Her research interests are largely in food quality,

nutrition, the well-being of adults and epidemiological research on elderly. She has published numerous articles in

*international public health journals, presented papers and gave lectures at World Conferences.*

The olive oil production constitutes one of the most important agro-industrial sectors in Lebanon generating huge quantities of olive mill wastewater (OMWW) with potential negative effect on the environment. The study aims to valorize OMWW and assess their total phenolic and antioxidant capacity.

OMWW samples (n= 44) were collected in 2016. The samples were obtained from two different regions (North and South), and from three different processing systems: press, 3-phase and sinolea. There were also obtained at three different harvesting times (early, intermediate and late) in triplicate. Liquid-liquid extraction was conducted using ethyl acetate. Folin-Ciocalteu reagent and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) were used for the total phenolic content (TPC) and antiradical scavenging capacity (ASC) assessment, respectively.

The results showed that the mean TPC was  $789.7 \pm 222.4$  mg GAE.kg<sup>-1</sup> of OMWW and ranged between 125.3 and 2018.0 mg GAE.kg<sup>-1</sup> of OMWW. The mean ASC was  $987.6 \pm 387$  mg Tocopherol Equivalence (TE).kg<sup>-1</sup> and ranged between  $91.9 \pm 0.1$  and  $3328.5 \pm 919.0$  mg (TE).kg<sup>-1</sup>. A strong and positive correlation between the TPC and the ASC was observed ( $r = 0.784$ ). The results also showed that the geographical origin of the olive fruits, the harvesting time and the oil processing system had a significant effect on TPC and ASC. The two-way interaction geographical origin\* harvesting time presented a significant effect ( $p < 0.05$ ). As per each factor alone, only the geographical origin revealed a significant effect on ASC ( $p = 0.001$ ) with higher ASC in Akkar (1880.07 mg TE. kg<sup>-1</sup>) compared to Hasbaya (682.05 mg TE. kg<sup>-1</sup>).

The overall results of this study indicate that the polluting capacity of these by-products is potentially affected by the composition, geographical origin, harvesting time and processing system. All the OMWW could be considered a rich source of natural phenolic and antioxidant compounds. Thus, sustainable OMWW valorization pathways should be thought in agreement with all the factors assessed in this study. The presence of phenolic compounds in the OMWW with potent ASC can be used in food industries and many pharmaceutical industries.

## How Are Genes Modified? Cross Breeding, Mutagenesis and CRISPR-Cas9

Ms. Marie-laurence Lemay<sup>1</sup>, Prof. Dr. Sylvain Moineau<sup>1</sup>

<sup>1</sup>Université Laval, Québec, Canada

### **Biography:**

*I studied Microbiology (BSc, 2011-2014) at the Département de microbiologie, de biochimie et de bio-informatique of the Université Laval. Then, I started graduate studies in Sylvain Moineau's lab and I am now in the final year of my PhD. Sylvain holds the Canada Research Chair in Bacteriophages and he is a recognized authority on phages of lactic acid bacteria and a pioneer in the CRISPR field. Our team works on various research projects, all the way from the control of phages in dairy industries to the development of phage cocktails for therapy. Among others, I work on phage biology, making use of CRISPR-Cas9 and proteomics to study phage-host interactions. I have always been passionate about food science and I hope to soon turn this passion into a career.*

Humans can now decipher the letters of the DNA alphabet at a breathtaking pace. Genes, defined as specific DNA sequences, act as instructions that determine the characteristics of all biological entities. The discovery and adaptation of precise molecular scissors has created new possibilities to modify genes at an unprecedented precision and has led to countless breakthroughs in applications across biology, including agricultural sciences. The tool receiving the most attention in the current genome editing revolution is CRISPR-Cas9. This technology offers a much needed short-cut to conventional breeding and could be harnessed to develop environmentally sustainable agriculture and food systems. Among others, it could be exploited to turn off ripening genes in fruits and vegetables to slow down deterioration and reduce the losses often associated with the lack of refrigeration and inefficient transportation systems in developing countries. Achieving a world without hunger and malnutrition by 2030 is an ambitious goal set by the United Nations, and CRISPR should contribute to achieve this objective.

## Forensic and legal aspects of the impact of genetically modified Organisms on public health

**Mr. Yusuf Rüzgar<sup>1</sup>**

<sup>1</sup>Batman Provincial Directorate of Food, Agriculture and Livestock, Batman, Turkey

### ***Biography:***

*Yusuf Rüzgar was graduated from the Faculty of Law of Marmara University (İstanbul) in 2011. He worked as a lawyer in batman bar Between 2013-2017. Then he got to work as lawyer of Batman Provincial Directorate of Food, Agriculture and Livestock. Yusuf Rüzgar has two thesis studies on administrative law.*

Food Security has been included in the “Universal Declaration of Human Rights” as a Right to Reach Adequate Food (25th article). Agricultural researches have become increasingly important due to the rapid increase in the world population and the necessity of human nutrition. As a result of these researches, especially in the last 50 years agricultural production has increased significantly. However, some new forms of production, such as production of genetically modified Organisms (GMO) may cause food-related health problems (Saltik, 2010). Although transgenic plants were first planted in 1985 for testing, the first efficient results were obtained in 1996. Since 1996, with the introduction of GMO agricultural products into the world trade, increasingly controversy continues.

GMOs are used not only in agriculture but also in medicine, such as in some vaccines, drugs, biomolecules, and studied on industrial and environmental products. The aim of this study was to evaluate the potential negative effects of GMO on public health according to the provisions of the Turkish Criminal Codes.

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## ANALYSIS OF FATTY ACIDS AND AMINO ACIDS IN MEAT

**Bachelor of Marine Biology Roko Kunčić<sup>1</sup>**, Ph. D Ivica Ljubenković<sup>2</sup>, Ph. D. Ivana Mitar<sup>2</sup>

<sup>1</sup>University of Split, Department of Forensic Science, Split, Croatia, <sup>2</sup>University of Split, Faculty of Science, Department of Chemistry, Split, Croatia

### **Biography:**

Roko Kunčić is a University student of the Graduate University of Forensic Chemistry and Molecular Biology in Split (Croatia, EU). He passed all the subjects and only have a master thesis to finish. Roko participated and volunteered at numerous conferences, created and exhibited a poster, published an article in the collection of summaries, and created various projects, among which is particularly important project "Forensic Time Travel" that provided him a scholarship funded by Penn State University and the University of Split. Through this project, he enabled international collaboration with the Penn State University (Pennsylvania) in the United States. In the project, he performed surface scans, CT scans, and a complete anthropological analysis of the bone remains from the 9th century. His biggest interest is exploring the CRISPR Cas system, and he have done lectures on these topics at the "Festival of Science" and "Scientific Wednesday" in Split.

Meat is an extremely important food in human nutrition. The aim of this research work is to carefully consider what man puts on his own plate and above all this work aims to suggest the health aspects of human nutrition habits.

After acid hydrolysis of meat samples, amino acids ratios were determined by high-performance liquid chromatography. Although same amino acids dominate in a particular animal species, they also a little bit differ in different parts of the meat.

The total fat in meat was determined by Soxhlet extraction. The ratio of individual fatty acids was determined by GC/FID chromatography after KOH/MeOH hydrolysis. Results indicate the significant presence of saturated fatty acids in meat, and the lower proportion of the unsaturated fatty acids.

### **Acknowledgment**

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Keywords: meat, Soxhlet extraction, gas chromatography, high-performance liquid chromatography  
Congress and abstract topics: Food chemistry



## ASSESSMENT OF CONTAMINATION OF DRIED THYME BY AFLATOXIGENIC FUNGI IN PERIOD FROM 2012 TO 2017

Dr. Karine Grigoryan<sup>1</sup>, Dr. Lusine Hakobyan<sup>2</sup>, Ms. Mariam Sargsyan<sup>3</sup>, Dr. Varduhi Ovsepyan<sup>4</sup>  
<sup>1</sup>Yerevan State University, Yerevan, Armenia, <sup>2</sup>Yerevan State University, Yerevan, Armenia, <sup>3</sup>Yerevan State University, Yerevan, Armenia, <sup>4</sup>Vanadzor State University, Vanadzor, Armenia

### **Biography:**

Dr. Karine Grigoryan is a professor in Yerevan State University.

*She is also the President of EHEDG Armenia (European Hygienic Engineering and Design Group) and Ambassador of GHI in Armenia*

**Introduction:** *Thymus vulgaris* and other *Thymus* species are widely used not only for medical purposes but also in food and aroma industries due to their well-known aromatic compounds. Therefore the microbiological and mycological quality of thyme is an essential issue.

**Purpose.** The purpose of this work was to perform a comparative analysis of mycoflora of thyme (*T. vulgaris*) at different stages of its processing (drying, grinding, packaging) from 2012 to 2017, to establish the percentage content of potentially aflatoxigenic species.

**Methods:** The analyses were carried out with direct and dilution plating methods [1]. Fungi were identified morphologically based on their macro- and microscopic characteristics [2], [3], [4].

**Results:** Over 123 samples of thyme were analyzed after drying in production and farming conditions. 1430 strains were isolated. In analyzed thyme samples during 2012-2014 the dominance of potentially aflatoxigenic strains from genus *Aspergillus* was observed. No aflatoxins were found in packaged tea samples. There was a noticeable increase in frequency of occurrence of aflatoxigenic strains during processing and storage. Frequency of occurrence of aflatoxigenic fungi was changed before and after processing, as well during storage. This is because of cross contamination and noncompliance of hygienic conditions during grinding and packaging of dried thyme.

In thyme samples analyzed from 2016 to 2017 there was a dominance of fungi belonging to Dematiaceae family from genera *Alternaria*, *Stemphylium* and *Cladosporium*. There was a significant decrease in contamination level of tea by aflatoxigenic species from 85% to 6% and strains from section A. Flavi.

**Conclusions:** Decrease of contamination degree of thymus by aflatoxigenic fungi is associated with climatic changes. There is a tendency to increase summer aridity, which leads to the dominance of fungi from family Dematiaceae in the mycoflora of thymus.

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## Hemp phytocannabinoids for foods and nutraceuticals: To allow or not to allow?

**Prof. Dr. Petras Rimantas Venskutonis<sup>1</sup>**

<sup>1</sup>*Kaunas University of Technology, Kaunas, Lithuania*

### **Biography:**

*Prof. Dr. Petras Rimantas Venskutonis is a leader of research team 'Functional Food Materials' at the Department of Food Science and Technology of Kaunas University of Technology (Lithuania). The main topics of his research have been in the area of development of new natural functional ingredients for foods and nutraceuticals from various plant origin materials. Currently his research is focused on development of biorefining technologies for the separation of valuable substances from agro-food raw materials, processing by-products and waste using multistep supercritical fluid, pressurized liquid, enzyme assisted, chromatographic and other extraction/fractionation methods. He is an author and co-author of over 250 publications in peer-reviewed journals and 8 book chapters. His articles were cited 5173 times, hi=34 (2019 02 07). He has been national delegate in various international scientific organizations (IUFoST, EEFoST, GHI, EHEDG, IFA) and EU research programs (FP, COST); he is a member of international professional organizations (IFT, ISNFF). Lithuanian National Science Award winner in 2004.*

Hemp belongs to the same *Cannabis sativa* species, which has been used as a cannabis drug with high percentage of the psychoactive tetrahydrocannabinol (THC), while industrial hemp is rich in other, non-psychoactive phytocannabinoids, mainly cannabidiol and cannabigerol. The legality of hemp varies between the countries; most of them established the limits for THC in hemp herb less than 0.2-0.3%. In addition, hemp seeds are rich in high nutritional value oil, composed mainly of polyunsaturated fatty acids, and proteins with good amino acid profile, which is comparable to other sources of dietary proteins. The interest in hemp has substantially increased during last decade, mainly due to the increasing information about beneficial health effects of non-psychoactive phytocannabinoids. For instance, such industrial giant as Coca-Cola is planning to launch cannabis-infused drinks. Regulations regarding the uses of preparations with non-psychoactive phytocannabinoids are very dynamic and many changes during the last few years are observed globally. Even THC accumulating cannabis has been recently legalised for recreational purposes in some countries, e.g. Canada, some states of USA.

THC and cannabis extracts are included into the list of narcotics in 1961 by the Single Convention on Narcotic Drugs, which limited "the production, manufacture, export, import, distribution of, trade in, use and possession" of cannabis "exclusively to medical and scientific purposes" and later in 1971 by the Convention on Psychotropic Substances. So far as all currently grown *C. sativa* varieties are assigned to the same botanical species formal conflicts arise in regulation and hemp processing practices. The problem exists not only with the preparations from hemp leaves and inflorescences but also in the production of oil and proteins from the seeds, which, although do not accumulate THC, due to the carry-over from other anatomical plant parts may contain ppm levels of THC. Some countries established the maximum levels of THC in the oil (5-20 ppm) based on the Scientifically Sound Guidelines for THC in Food in Europe, published by Nova-Institut in 2015. These and other issues (processing, bio-activities), which are required to reach the consensus satisfying regulation, consumer protection and industry needs will be discussed in the presentation.

## 'Waste to taste': Biorefining berry pomace into valuable food ingredients

**Prof. Dr. Petras Rimantas Venskutonis<sup>1</sup>**

<sup>1</sup>*Kaunas University of Technology, Kaunas, Lithuania*

### **Biography:**

*Prof. Dr. Petras Rimantas Venskutonis is a leader of research team 'Functional Food Materials' at the Department of Food Science and Technology of Kaunas University of Technology. The main topics of his research have been in the area of development of new natural functional ingredients for foods and nutraceuticals from various plant origin materials. Currently his research is focused on development of biorefining technologies for the separation of valuable substances from agro-food raw materials, processing by-products and waste using multistep supercritical fluid, pressurized liquid, enzyme assisted, chromatographic and other extraction/fractionation methods. He is an author and co-author of over 250 publications in peer-reviewed journals and 8 book chapters. His articles were cited more than 5100 times, Hirsh citation index  $h_i=34$ . He has been national delegate in various international scientific organizations and EU research programs (IUFOST, EFFoST, GHI, EHEDG, FP, COST); he is a member of several international professional organizations, incl. Institute of Food Technologists (IFT) and International Society of Nutraceuticals and Functional Foods (ISNFF). Lithuanian National Science Award winner in 2004.*

According to the FAO, roughly one-third of edible agro-food materials for human consumption is lost or wasted. Many berry species are known for their excellent flavor and abundance of healthy phytochemicals. However, due to a rapid decay after harvesting, the major parts of berry crops are processed into longer shelf-life products. Pressing of juice results in large quantities of by-products, which are rich in valuable compounds; however, currently they are used for animal feeding and composting or even discarded as a waste, mainly due to a lack of scientific, technological and economic studies required for waste valorization. This study proposes and integrated biorefining scheme for processing berry pomace into high value ingredients by using supercritical CO<sub>2</sub> (SC-CO<sub>2</sub>), pressurized liquid, microwave hydro-diffusion and gravity, ultrasound-assisted, bead-milling and enzyme assisted extraction methods. Different high value substances were obtained from berry pomace by the combination of various methods. SC-CO<sub>2</sub> recovered lipophilic fractions consisting mainly rich in polyunsaturated fatty acids triacylglycerols and tocopherols: at optimized parameters the yields of oil extracts were from 3% (chokeberry) to 20% in (raspberry). The residue was further extracted by using subcritical water or its mixtures with ethanol at 10 MPa and different temperatures. This process, depending on berry type and extraction parameters, produced 20-60% of soluble fractions. Finally, enzyme assisted extraction enabled to recover different amounts of water-soluble substances such as oligosaccharides, bound polyphenolics and others.

Phytochemical composition of fractions were analysed by chromatography, while antioxidant properties were evaluated by various in vitro assays. The results prove the presence of valuable bioactive compounds in pomace fractions, which might find applications in functional foods and nutraceuticals. For instance, strong antioxidants recovered from raspberry, chokeberry and cranberry pomace improved oxidative and microbiological stability of meat products. Moreover, it is hypothesized that berry pomace phytochemicals might mitigate adverse effects (carcinogenicity) of processed meat products to human health. Currently, preliminary studies of such effects on cancer cells are performed using in vitro digestion models.

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## Research regarding optimization of the drying process for cereals and technical plants, applications for corn and soy bean

Prof. Dr. Gaceu Liviu<sup>1</sup>, Prof. Dr. Mnerie Dumitru<sup>1</sup>

<sup>1</sup>Transilvania University of Brasov, Brasov, Romania, <sup>2</sup>Politehnica University Timisoara, Timisoara, Romania

### **Biography:**

Liviu GACEU is university professor at Transilvania University Brasov, Romania. He is working in the field of optimization of food technology and equipment, focusing on food safety, the key challenge facing the Romanian food and beverage manufacturing industry.

He is GHI ambassador in Romania.

### Introduction

Storage in a dry state of cereals and technical plants is the most widely used system, regardless of usage. The way in which the process of drying takes place has a high influences for both physico-chemical qualities and the energy consumption of the installation.

### Purpose

The paper presents theoretical and experimental research in order to highlight:

- factors that influence the fuel consumption burned in the dryer, in order to maintain the temperature needed to carry out the process;
- optimizing the layout of the sensor, by knowing the distribution of the gradient temperature inside the drying chamber;
- the maximum thermal limits that can be applied to the seeds, depending on their destination (human consumption, animal feeding or germination);
- optimisation the temperature variation vs time for preserving seed germination capacities, for a lower energy consumption.

### Method

The theoretical research were done in MathCAD and Simulink, and aim to improve the automatic adjustment process for a drying phenomena in order to be adapted to a number of factors: temperature and humidity of the environment, of the seeds, caloric capacity of fuel, etc. The mathematical model was improved by a series of experimental research applied to corn and soy beans at a farm in Braila county, Romania.

### Results

The research undertaken in the paper show:

- approximate linear increase in fuel consumption at the environmental temperature decreasing. Thus, a 20°C temperature decreasing causes an increase in consumption by about 5%;
- a hyperbolic variation of fuel consumption on the moisture content of the air; increasing the moisture content from 0.002kg/kg to 0.01kg/kg, cause increasing of fuel consumption by about 2% ;
- for a normal seed temperatures at the drier input (about 20°C) increases in seed moisture values (15...27%) require increases in fuel flow by 5...7%. Instead, lowering seed temperatures by 10...15°C (often occurring in autumn) involves increases of 15...20% in fuel flow.

### Conclusions

The results obtained have direct applicability in practice and allow increasing the efficiency of drying equipment both in terms of improving the quality of agricultural products and in terms of considerable reduction of energy consumption.

## Untapped potential of mushrooms for the well being and for food industry

Prof. Mark Shamtsyan<sup>1</sup>, Prof. Miomir Niksic<sup>2</sup>

<sup>1</sup>*Saint Petersburg State Institute Of Technology (technical University), Saint Petersburg, Russian Federation,* <sup>2</sup>*Belgrade University, Belgrade, Serbia*

### **Biography:**

Prof. Mark Shamtsyan is head of the Department of Technology of Microbiological Syntheses of St. Petersburg State Institute of Technology (Technical University).

He is GHI Ambassador to Russia, Chair of Russian Section of EHEDG (European Hygienic Engineering and Design Group) and B-FoST (Black Sea Association of Food Science and Technology) ExCo member.

IAFoST (International Academy of Food Science and Technology) fellow.

Cultivation of mushrooms can be effectively implemented in various regions of the planet and various climatic zones. It is not just a rapidly growing agribusiness, which can be a significant help to the economies of developing countries, but it can be helpful in solving protein deficiency in the diet of many regions of the world and it is also an important tool for improving the environmental situation.

Mushrooms contain various vitamins, as well as a large number of essential amino acids. They are also rich in proteins, contain fats, glycosides, essential oils, tocopherols, carotenoids, folates, organic acids, phenolic compounds, flavonoids, etc. Mushrooms are not only tasty and nutritious food product, but also can be a source of wide range of valuable biologically active substances.

Mushroom are producers of valuable enzymes, which can be used in food and feed industries, pharmacy, cosmetics, agriculture, forestry, and other fields.

Recently various bioactive compounds obtained from mushrooms, such as polysaccharides (especially beta-glucans and chitin), polysaccharide-protein complexes, polysaccharide-peptides, lectins, triterpenoids, phenolic, and flavonoid compounds possessing antioxidant, immunomodulatory, anticancer, antiviral, antimicrobial, anti-inflammatory, anti-obesity, anti-diabetic, hypocholesterolic, hypotensive, anti-allergenic, hepatoprotective, and other activities have been isolated from the mushroom species. During last decades, mushrooms have been especially used as a source of immunomodulators and antitumor agents. Medicinal mushrooms are the sources of polysaccharides that prevent the cancer and increase the strength of the immune system. In the near future mushrooms may become very important source of drugs and functional food supplements for modern medicine and food industries.

For the same reasons, mushrooms can become a source of valuable feed additives used in animal husbandry, poultry farming and fish farming, strengthening the immunity and survival of animals, birds and aquaculture, and reducing the use of antibiotics.

In addition, mushrooms can also be the source of various improvers and surfactants for the food industry. The huge potential of mushrooms requires the study and application for the benefit of mankind.

## Oral exposure to nanomaterials; possibilities and challenges of current in vitro models and detection of nanomaterials in complex matrices

Dr. Meike Van Der Zande<sup>1</sup>, Anna Undas<sup>1</sup>, Agata Walczak<sup>1,2</sup>, Ashraf Abdelkhalik<sup>1,2</sup>, Deborah Rijkers<sup>1</sup>, Tien Nguyen<sup>1</sup>, Greet van Bommel<sup>1</sup>, Sandra Munniks<sup>1</sup>, Hans Bouwmeester<sup>2</sup>, Ruud Peters<sup>1</sup>

<sup>1</sup>RIKILT (Wageningen Food Safety Research) - WUR, Wageningen, The Netherlands, <sup>2</sup>Department of Toxicology - WUR, Wageningen, The Netherlands

### **Biography:**

Dr. Meike van der Zande holds an MSc in medical biology and she received her Ph.D. degree in medical sciences, focussing on the field of tissue engineering, from the Radboud University. She currently works as a scientist at RIKILT (Wageningen Food Safety Research) – Wageningen University & Research and is specialised in bioavailability and effect based studies, both in vitro and in vivo. She has expertise on advanced in vitro models, including microfluidic based organ-on-a-chip models, and toxicogenomic/bioinformatics approaches, which are applied, amongst other things, in the field of nanotoxicology. She is participating in several national and international projects.

Nanomaterials (NMs) are widely used in various types of industries. One of the fields of application includes the use of NMs in consumer products like food (as food supplements). Consequently, consumers are likely being exposed to NMs. In the past years effort has been put into the risk assessment of nanomaterials for the oral exposure route, but these studies are sometimes conflicting or do not provide sufficient answers. This is often due to the behaviour of NMs and analytical difficulties in relevant biological matrices. We will highlight some of the difficulties we encountered in the past years, using examples from our experimental studies.

Metal and metal oxide NMs like silver, titania, silica and zinc may be used in food and feed. Recent insights in risk prioritization of NMs rank the ability to dissolve as one of the most important parameters. Dissolution of these NMs may be severely altered by the environment (pH, ionic strength etc.) and by other factors like agglomeration. In vitro digestion models and in vitro models for the gut barrier may be used to study bio-accessibility and bio-availability of NMs. We studied the fate of several types of silver, titania and silica NMs during and after in vitro digestion and the uptake and translocation of NMs over the gut barrier. Detection of the particles was done using single particle inductively coupled plasma mass spectrometry (spICPMS), transmission electron microscopy (TEM), and/or confocal microscopy. Quantitative detection methods like spICPMS that detect particles and not just elements are preferred and enable the possibility to detect particles in complex matrices. However, sample prep procedures, system recovery, high background noise due to dissolution, and size detection limits proved challenging as well as the formation of de novo particles from dissolved material (in the case of silver). While spICPMS proved to be a very robust method for quantitative detection of NMs, the technique requires optimisation for each matrix NM combination, and more research is needed to improve sample prep and to lower the detection limits for use in complex matrices like digestion fluids, cells, and tissues.

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## Big data in food safety; prediction of chemical food safety hazards and food fraud

**Dr. Hans Marvin<sup>1</sup>**, Dr Yamine Bouzembrak<sup>1</sup>

<sup>1</sup>Rikilt Wageningen UR, Wageningen, The Netherlands

### **Biography:**

*Dr. Hans, J.P. Marvin is a senior scientist RIKILT Wageningen Research, The Netherlands. RIKILT is specialized in many aspects of food safety, including analysis of foods, research on safety, and risk assessment for authorities. Dr Marvin's personal research specialisms are (i) methods for emerging risk identification, (ii) effect of drivers (among others climate change) on food safety, (iii) application of Bayesian Networks in prediction models for food safety and food fraud, iv) safety of engineered nanoparticles including stakeholders analysis (among others consumer perception), and (v) development of decision support systems. On these topics he has organized and chaired numerous workshops and is author and co-author of > 50 peer-reviewed scientific publications*

Food supply chains are complex and vulnerable to many factors (e.g. climate, economy and human behaviour) having a direct and/or indirect effect on the development of food safety risks and/or food fraud. All of these factors should be taken into account in approaches aiming to predict food safety problems or food fraud at an early stage. Hence, a system approach is needed. At RIKILT such system approach has been developed based on expert elicitation, big data and machine learning technologies. Using Bayesian Networks (BNs), highly accurate prediction models have been developed for food safety hazards on various food products. It was also demonstrated that such approach could be used for hazard ranking of nanomaterials. It is advocated that BN based prediction models may help risk assessors to identify potential food safety problems at an early stage enabling timely intervention actions.



## Forecasting zinc deficiency by application of impact model on zinc-based foods in Pakistan

**Dr. Anwaar Ahmed<sup>1</sup>**, Arshad Mahmood Malik<sup>2</sup>

<sup>1</sup>Institute of Food And Nutritional Sciences, Pmas-arid Agriculture University, Rawalpindi-46300, Pakistan, Rawalpindi, Pakistan, <sup>2</sup>Department of Economics & Agricultural Economics, PMAS-Arid Agriculture University, Rawalpindi, Pakistan

### **Biography:**

*Dr. Anwaar Ahmed did his M.Phil & Ph.D. in Food Science and Technology from University of Agriculture Faisalabad, Pakistan. He started his career in 1988 as Research Officer and engaged in the extension of shelf life of different fruits and vegetables by robust quantitative and qualitative techniques. Then he joined Institute of Food & Nutritional Sciences, as Associate Professor & teaching Food processing, Cereal Technology and Food Safety. He is a member of various food societies, academic boards, and reviewer of several National and International Research Journals. He was awarded Research Productivity Award by the Ministry of Science and Technology Government of Pakistan in 2013 and 2015. His research into food safety (Heavy metals & Pesticide residues), the nutritional quality of neglected crops (Buckwheat) and malnutrition (Iron & Zinc) attracted national and international attention. He is teaching Food Toxicology, Food Safety, and Food Laws to the students for 12 years. He was elected Joint Secretary of the Pakistan Society of Food Scientists and Technologists from 2008 to 2014 and again from the years 2016 to 2018. He has supervised 45 M.Phil and 02 Ph.D. students in Food Science and Technology. Now he is GHI Ambassador for Pakistan since Dec 2018.*

Pakistan is a developing country with an agro-based economy. Cereal products of wheat are often the mainstay of feeding programs. However, the prolonged consumption of a diet consisting of cereal grains leads to multiple nutritional deficiencies. Zinc deficiency is one of the ten biggest factors contributing to the burden of disease in developing countries. Generally, less uptake of zinc from the soil in cereal crops is resulting in serious health issues. Hence, an alarming situation is revealed by National Nutrition Survey of Pakistan 2011, that overall prevalence of zinc deficiency among children in Pakistan was 39.2% (39.3% urban and 39.1% rural). Provincial data showed zinc deficiency at 38.4% in Punjab, 38.6% in Sindh, 45.4% in KP, 39.5% in Baluchistan, 47.2% in AJK and 32.6% in Gilgit-Baltistan. These children are found in the levels of zinc, below 60 µg/dL. Zinc is necessary for more than 300 zinc metalloenzymes and required for normal nucleic acid, protein, and membrane metabolism. Signs and symptoms caused by zinc deficiency are poor appetites, weight loss, and poor growth in childhood delayed healing of wounds, taste abnormalities, and mental lethargy. Zinc deficiency and its effects are well known but the ways it can help in the treatment of different diseases is yet to be discovered. Improving zinc intakes through dietary improvements is a complex task that requires considerable time and effort. Keeping in view the current situation IMPACT (International Model for Policy Analysis of Agriculture Commodities and Trade) model used by IFPRI was further modified for estimating factors affecting supply and demand of zinc-based food in Pakistan. This model takes into account all the socio-economic factors affecting supply and demand behavior of the market. The supply and demand of zinc were estimated by identifying food, feed, and consumption of different ingredients/ crops as part of the food chain. To highlight the future prospects of supply and demand of zinc, projections for the year 2030 have also been made. This model has wider application at an international level, especially under South Asian scenario and can be replicated for policy implications in other South Asian countries.

## Food safety in the rapid transformation of food systems in Africa

**Dr. Adewale Obadina<sup>1</sup>**, Prof. Saweda Liverpool-Tasie<sup>2</sup>, Ms Oluwatoyin Ademola<sup>3</sup>

<sup>1</sup>Federal University Of Agriculture, Abeokuta, Abeokuta, Nigeria, <sup>2</sup>Michigan State University, East Lansing, United States,

<sup>3</sup>Federal University of Agriculture, Abeokuta, Nigeria

### **Biography:**

*OBADINA Adewale Olusegun is Director of Biotechnology Centre and Associate Professor in the Department of Food Science and Technology, Federal University of Agriculture, Abeokuta, Nigeria. He is a grantee and Research Associateship Fellow of The World Academy of Sciences (TWAS) with research interest in Food Quality and Safety. He was a visiting scholar for an EU Erasmus Mundus programme at Katholie University, Gent, Belgium and Dublin Institute of Technology, Ireland to teach Courses in Food Safety and Food Nutrition. Also, a Visiting Lecturer at Department of Biotechnology and Food Technology, University of Johannesburg, South Africa; a visiting scholar at Department of Food Science and Nutrition, University of Maryland, USA. He also visited Department of Agricultural, Food and Resource Economics, MSU as Project Scholar Supervisor. He has played an integral role in various collaborative projects sponsored by international donors such as DFID, EU, World Bank, Africa-Brazil Innovative Marketplace, M-BoSs and The World Academy of Science (TWAS). He is a member of the Global Harmonization Initiative (GHI) Education and Training Working Group. Also, a member of the International Academy of Food Science and Technology – Early Career Scientist Section (IAFoST-ECSS). He has worked in various food research laboratories, in and outside Nigeria.*

Over the past two decades, food systems in Sub Saharan Africa (SSA) have transformed rapidly. This transformation is driven by several factors including increased incomes and rapid urbanization rates which have caused consumption patterns to change significantly. Two characteristics of this transformation are the rise in food purchases (particularly by rural households) and the consumption of processed and packaged foods. In Nigeria, nationally representative data in 2015 reveals that almost 75% of foods consumed are purchased with over 65% processed in some form. These high and increasing rates of purchased and processed foods are revealed broadly across the continent and in both rural and urban areas within countries. Aflatoxins are highly toxic metabolites produced by the toxigenic fungi species of *Aspergillus*; and usually contaminate agricultural produce such as maize, on the fields, in stores, and the final products. AFB1 and AFB2 are the two most important with AFB1 proven to be the most toxic. In Nigeria, aflatoxins have been found to be present in several key staples including maize and peanuts. As preliminary evidence of this concern, we tested the levels of aflatoxins in three maize products (fermented maize cereal (Ogi) in powder, locally produced custard {produced with imported corn starch}{locally produced cereal products) available in the domestic market in Nigeria in a toxicology lab of the Michigan State University Campus. The result revealed that the mycotoxins detected in the locally produced custard and the cereal from the multinational beverage company were below limit of detection (i.e. less than 2ppb) while the locally produced Ogi had a high level of aflatoxin B1 of 15ppb. The high level of aflatoxin B1 in the locally produced Ogi could be as a result of high levels of contamination of the maize grain and/or inefficient processing in terms of the fermentation process. This confirms that more attention needs to be paid to issues of food security generally and even among processed and packaged foods in Nigeria.

## HORMONIZING REGULATION FOR BORDERLINE PRODUCT: FOOD FOR SPECIAL MEDICAL PURPOSE

Dr. Seunghye Wang<sup>1</sup>

<sup>1</sup>KLRI, Sejong-si, South Korea

### **Biography:**

Dr Seunghye Wang received her Ph.D. in law from Seoul National University, South Korea, previously worked as a researcher in National Food Safety Information Service of KFDA. Since 2014 she is working as a research fellow in Korea Legislation Research Institute of Prime Minister's Office. Her main research area is food safety law and governance.

### o Introduction

- Aging population and increasing demand for food for the elderly

Demand for special-purpose foods is expected to increase due to the aging of the population around the world. Since different national regulatory standards are different, the administrative administration burden of the food administration authorities enforcing the regulations will be increased. Therefore, efforts should be made to harmonize standards of food for special medical purposes.

In Korea, the production amount of special medical food in recent years has increased %. especially the food for patients, by 63.1 billion won, 47.4% for 13 years, and an annual average of 10.

### o Purpose

- Legal protection benefits to protect nutrition and security of vulnerable elderly people

It is the public authority's primary duty to care for the vulnerable elderly people. Nutrition imbalance causes equity problems of fundamental human right, which is a legislative policy issue that needs to be solved fairly. Therefore, it is recognized that the State should make efforts to prevent inequality caused by malnutrition.

### o Methods

- To find an alternative system for regulatory harmonization by comparing and analyzing the regulatory status of special medical food products in each country.

### o Results

- Borderline characteristics of special medical food

Border products are emerging in the food market in recent years. In order to regulate food for special medicinal purposes, it is a question whether to apply general food regulations or drug regulations. The problems caused by such regulatory ambiguities are universal phenomena. It is needed to share the institutional efforts and experiences of each country how to respond to these problems and share information so that public authority can develop alternative way.

### o Conclusions

- Preparation of management plan through step-by-step classification

Special-purpose food has different characteristics and functions for each use. Therefore, it is desirable to regulate foods closer to medicine regulation scheme when they need to be classified according to its complicate safety grade, and to regulate foods closer to those of general foods when it is possible to manage them based on consumer information.

## EVALUATION OF PROTEIN INTERACTION, ADDITIVES AND MOISTURE RETAINING AGENTS UPON TEXTURE IN A FUNCTIONAL BLENDING FOR COOKED CURED HAM

MSc Eddier Martínez-Agudelo<sup>1</sup>, Dr Estrella Sayas-Barberá<sup>1</sup>, MSc Kenneth Roy Cabrera-Torres<sup>2</sup>, M.Sc. Ana Cristina Zuluaga<sup>3</sup>, Dr. Juana Fernandez-Lopez<sup>1</sup>, **Dr Jose Angel Perez Alvarez<sup>1</sup>**

<sup>1</sup>UMH Universidad Miguel Hernández, Orihuela, Spain, <sup>2</sup>Universidad Nacional de Colombia, Medellín, Colombia, <sup>3</sup>Griffith Food Colombia, Medellín, Colombia

### **Biography:**

*B.Sc. in Pharmacy Sciences. Master in Food Science and Engineering and Dr. in Agricultural Engineering. Professor in Food Science and Technology. Head of IPOA Research group (<https://www.youtube.com/watch?v=fbIBW-A-jZw>) Agri-Food Technology Department. Orihuela Polytechnical High School. Miguel Hernandez University. Research line: Food Product Development of healthy meat products with the addition of bioactive compounds and dietary fibre (obtained from the valorisation of co-products from agri-food industries) h index 44. Tutor of Essenza di vega, 2018 National Ecotrophelia prize winner.*

### INTRODUCTION

Processed meat products are complex systems in which heat induced soluble meat protein, produce gels, being responsible for the texture of the final product. Different additives and ingredients to increase water binding without affecting their nutritional and sensory properties have been used.

### PURPOSE

The aims of this work was to offer an alternative for the small and medium Colombian meat processors, through the evaluation of synergies and antagonisms of the ingredients in a protein mixture and to study their effect on their textural characteristics.

### METHODS

Six mixtures to obtain gels was used. Mix of isolated and concentrated soy proteins, mix of a pig collagen protein and porcine globin protein, mix of sodium tripolyphosphate, tetrapotassium diphosphate, sodium hexametaphosphate (food grade) use for meat emulsion type products, mix of vegetable fibres and carrageenan for meat emulsion type products. (x2, x3, x4, x5, x7, x11). Mix design with restrictions of protein level and raw material cost for the mixture was used with (3) three central points of six (6) components. After obtaining the best regions, the best three mixes was used in the preparation of standard cooked ham.( N7, N8 y N8D5)

### ANALYTICAL METHODS

Texture profile analysis using Brookfield CT3 Texture Analyzer (Brookfield Engineering Labs, USA).

### RESULTS

For a Hardness there are synergy between X3 and X2 ingredients, also between X4 and X2, there are antagonist between X3 and X4

We could observe that there are interactions between different ingredients (gums, carrageenans, soy proteins, wheat proteins, alginates, pork proteins) and meat protein.

#### CONCLUSIONS

The mixture N7, N8 and N8D5 does difference ( $>0.05$ ) with a commercial reference and it is technically and economically viable for the Colombian market.

#### ACKNOWLEDGEMENTS

Griffith Food Colombia

## HOW TO INNOVATE IN FOOD SCIENCE AND TECHNOLOGY IN UNCONVENTIONAL ENVIRONMENTS AND NOT DIE IN THE ATTEMPT

Dr. Margarita Brugarolas-Mollá Bauza<sup>2</sup>, Dr. Manuel Viuda-Martos<sup>1</sup>, Dr. Laura Martínez-Carrasco Martínez<sup>2</sup>, Dr. Juana Fernández-Lopez<sup>1</sup>, Dr. Casilda Navarro-Rodríguez de Vera<sup>1</sup>, Dr. Estrella Sayas-Barberá<sup>1</sup>, Dr. Jose Angel Perez Alvarez<sup>1</sup>

<sup>1</sup>IPOA Research Group, UMH Universidad Miguel Hernández, Orihuela, Spain, <sup>2</sup>Agro-environmental Department. UMH Universidad Miguel Hernández, Orihuela, Spain

### **Biography:**

*B.Sc. in Pharmacy Sciences. Master in Food Science and Engineering and Dr. in Agricultural Engineering. Professor in Food Science and Technology. Head of IPOA Research group (<https://www.youtube.com/watch?v=fbIBW-A-jZw>) Agri-Food Technology Department. Orihuela Polytechnical High School. Miguel Hernandez University. Research line: Food Product Development of healthy meat products with the addition of bioactive compounds and dietary fibre (obtained from the valorisation of co-products from agri-food industries) h index 44. Tutor of Essenza di Vega, 2018 National Ecotrophelia prize winner.*

### INTRODUCTION

The Bologna Process represents the ideal framework for improving the quality and relevance of learning and teaching, thereby improving and modernising education systems. Higher education institutions have to educate students to succeed in a complex and interconnected world facing rapid technological, cultural, economic and demographic changes. Under these premises New Food, an innovative educational project of the Bachelor in Food and Science (Universidad Miguel Hernández -UMH), is born. This UMH project is part of the training and research activities to improve consumer welfare.

### OBJETIVES

The general objective is to achieve a new food product, with two premises: the product must be technologically innovative and appropriate to the market, and teaching methodologies based on cooperation in a competitive environment that allows the system of double learning with verifiable results, must be developed.

### MATERIAL AND METHODS

UMH student groups (3-4) work with Erasmus and Latin American students. Each group will make their proposal in a different agri-food sector. Brainstorming is applied to find the right food product for the specific needs of the consumer. Throughout the semester, marketing techniques and R&D procedures are used to produce a prototype that is shown at a food fair, where the students' work opens up to society. The products are exhibited in stands set up by the students, where professional judges and general public attending the presentation, can observe and taste the products. In this way, students develop their social and business communication skills. Professional judges (academics, entrepreneurs and food technology executives) choose the best products and propose awards (innovative, industrial projection, specific interest of the industries supported).

### RESULTS

The creation of innovative, specifically market-oriented foods and the competence among participating groups to present the best product bring out the best in students. In addition, the approach to a quasi-real situation increases the knowledge of the results that can be obtained with the academic degree.

## CONCLUSIONS

All the objectives were covered, students acquired competences, that can be applied exercising their critical thinking faculties and consequently, students will be allowed to work effectively and efficiently in different positions in the agri-food industry, especially, in R&D

## FOOD TECHNOLOGY AS TOOL FOR REINTEGRATION OF FORMER MEMBERS OF COLOMBIAN FARC REBEL MOVEMENT INTO CIVILIAN LIFE IN GUAVIARE, COLOMBIA.

Dr. Jairo Humberto López-Vargas<sup>2</sup>, Dr. Adriana Patricia Muñoz-Ramírez<sup>3</sup>, Dr. Jose Angel Perez Alvarez<sup>1</sup>  
<sup>1</sup>IPOA Research Group UMH Universidad Miguel Hernández, Orihuela, Spain, <sup>2</sup>Instituto de Ciencia y Tecnología de Alimentos (ICTA) Universidad Nacional de Colombia, sede Bogotá, Santa Fe de Bogotá, Colombia, <sup>3</sup>Facultad de Medicina Veterinaria y Zootecnia. Universidad Nacional de Colombia Sede Bogotá, Santa Fe de Bogotá, Colombia

### **Biography:**

*B.Sc. in Pharmacy Sciences. Master in Food Science and Engineering and Dr. in Agricultural Engineering. Professor in Food Science and Technology. Head of IPOA Research group (<https://www.youtube.com/watch?v=fbIBW-A-jZw>) Agri-Food Technology Department. Orihuela Polytechnical High School. Miguel Hernandez University. Research line: Food Product Development of healthy meat products with the addition of bioactive compounds and dietary fibre (obtained from the valorisation of co-products from agri-food industries) h index 44. Tutor of Essenza di Vega, 2018 National Ecotrophelia prize winner.*

### INTRODUCTION:

The FARC army, which signed an historic peace, deal with the Colombian government in 2016. The problem is how reintegrate them. Colombia's ex-fighters thought several skills for peace, thus Food Technology is one of them. This skill is useful to support a productive project, that the Colombian government could give economic support for reintegration.

### OBJECTIVES

The aim of this pedagogical intervention was to provide tools in food science and technology to FARC ex-fighters reintegration, in Guaviare state.

### MATERIAL AND METHODS

These ex-fighters learning activities were taken at “Territorial spaces for training and reincorporation”. Four short courses (40 h theory and practice) were given related to fish, fruit, vegetables processing: (i) jams (onion and green peppers), (ii) juices and concentrate (passion fruit); (iii) fish processing (fillet, hamburgers and sausages). The courses were offered by Universidad Nacional de Colombia and Miguel Hernández University staff, where international cooperation agencies as UNDP, gave primary supplies for fish production and crops.

Each short course was designed to adapt elementary food technology concepts (food safety, processing and preservation) to the specific conditions of Guaviare region. All concepts were applied in a practical situation using local raw materials (native fish, green peppers, onions and passion fruit).

### RESULTS



A total of 85 FARC ex-fighters were involved in these short courses. Raw materials were transformed to obtain valued added products, as pimiento jam and fruit juices, which are being marketed locally. These experiences permitted effective interaction between academic staff and ex-fighters, throughout the elaboration of the products besides of helping to focus productive projects in each area. Some limitations were found with fish processing, since it is necessary refrigeration facilities to preserve food safety.

## CONCLUSIONS

As a result of the courses, the Colombian Amazonian Cooperative composes of 75 ex-fighters, was established to produce and trade with valued added food products, in a small-enterprise scale. The collaborative intervention (theory and practice) of food technologist teams between the Universidad Nacional de Colombia and IPOA-Research Group (UMH-Spain) were successful and could be the basis of future food technology actions, to the reintegration to civilian life and peace process.

## Challenges of Cooking Oils in Fast-food Restaurants: Views of Consumer

**Dr. Fatemeh Esfarjani<sup>1</sup>**, Dr Fatemeh Mohammadi Nasrabadi<sup>1</sup>, Dr Aziz Zargaran<sup>1</sup>, Mrs Yeganeh Salmani<sup>1</sup>

<sup>1</sup>Food And Nutrition Policy And Planning Research Department National Nutrition & Food Technology Research Institute, Tehran, Islamic Republic of Iran

### **Biography:**

*Fatemeh Esfarjani is an academic member of food and nutrition policy and planning research department, in national nutrition and food technology research institute (NNFTRI), in Tehran, Iran. She has years of experience in research, evaluation, teaching, and administration both in hospital and education institutions. Her field of interest is food safety and food security, she published 23 papers in academic journals and more than 124 abstract presentations in congresses. She was involved in many projects as principal in this area.*

The purpose of this study was to explore women's perceptions about the quality and safety of cooking oils in fast-food restaurants and study their behavior toward these challenges, in 2018, Tehran, Iran. A qualitative study with eight focus group discussions was conducted among 82 women using directed content analysis and constant comparison methods. Three categories emerged with 4 themes and 28 sub-themes: 1. High usage of frying foods, 2. Fast-food restaurants, and 3. Building community trust. The majority of women had desirable knowledge about the disadvantages of cooking oils in fast-food restaurants. The participants mentioned that the most challenging problem of fast-food restaurants was the re-used cooking oils. Therefore, the health policymakers should consider developing a guideline for improving the cooking oils' quality and safety of fast-food restaurants. It is recommended that the restaurant inspection system should be examined to identify ways to ensure food safety.

## DNA-BASED MULTIPLEX TECHNOLOGIES FOR IDENTIFICATION OF GENETICALLY MODIFIED FOODS

**Prof. Nelly Datukishvili**<sup>1</sup>, Dr. Tamara Kutateladze<sup>2</sup>, Dr. Inga Gabriadze<sup>2</sup>, Dr. Boris Vishnepolsky<sup>2</sup>, Mr. Kakha Bitskinashvili<sup>1</sup>, Mr. Marina Karseladze<sup>2</sup>, Dr. Tamar Kartvelishvili<sup>3</sup>, Dr. Nino Asatiani<sup>3</sup>, Dr. Nelly Sapojnikova<sup>3</sup>  
<sup>1</sup>Ilia State University, Tbilisi, Georgia, <sup>2</sup>I. Beritashvili Center of Experimental Biomedicine, Tbilisi, Georgia, <sup>3</sup>Andronikashvili Institute of Physics, I. Javakhishvili Tbilisi State University, Tbilisi, Georgia

### **Biography:**

*Dr. Nelly Datukishvili obtained the doctoral degree in 1997 from the I.Javakhishvili Tbilisi State University (Georgia). She worked in the area of molecular biology and biotechnology at the Institute of Molecular Biology and Biological Physics (Tbilisi), Engelhardt Institute of Molecular Biology (Moscow), Agricultural Biotechnology Center (Godollo, Hungary), Gent Agricultural Research Centre (IVLO, Belgium). Since 2004 Dr. Datukishvili has initiated molecular study and analysis of genetically modified plants and foods in Georgia. Currently, she leads the GMO group, is an Associate Professor and a manager of scientific projects. She has more than 50 publications and presentations.*

In recent years, the share of genetically modified organisms (GMOs) in food production has been continuously increased around the globe. By food legislation and labeling regulations of the European Union and Georgia, foods containing GMOs above a threshold of 0.9% must be labeled with a requirement for the traceability of the GMO in the food chains. Reliable detection of GM foods is of crucial importance for food safety and security, labeling, legislative requirements, food production, consumer information and health protection. The objective of this study was to develop, optimize and validate new high-throughput diagnostic technologies for fast, cheap and reliable identification of GMOs in foods. For this purpose, DNA-based multiplex tools namely multiplex polymerase chain reactions (PCRs) and DNA microarrays (low-density biochips) were applied. The analytical procedure includes several steps, such as bioinformatic design of GMO-specific and species-specific PCR primers and probes; genomic DNA extraction; development and optimization of uniplex and multiplex PCR systems; analysis of genomic DNAs and PCR products by agarose gel electrophoresis; microarray development, hybridization and scanning; screening of GM foods. The PCR results and microarray image analysis demonstrated high specificity and sensitivity (at least 0.1%) of the new multiplex PCR methods and low-density biochips to rapidly and precisely detect important GM food crops, namely maize, soybean, wheat, tomato, potato as well as herbicide resistant roundup ready GMOs including epsps gene, insect resistant GMOs including CryI gene, transgenic products consisting of GMO common regulatory elements, such as 35S promoter and NOS terminator. In addition, new technologies allow simultaneous identification of four GMO events, such as maize MON 810, maize Bt-176, Roundup Ready soya (RRS) and soya DAS-68416-4. Analysis of foodstuffs revealed that multiplex PCR methods and microarrays developed in this study may be used for accurate and fast traceability of GM food products.

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## QUALITY CONSIDERATIONS OF SEaweEDS FOR FOOD APPLICATIONS

**Prof. Dr. Ravishankar Gokare A<sup>1</sup>**

<sup>1</sup>*Dayananda Sagar Institutions, Bengaluru, India*

### ***Biography:***

*Dr. Ravishankar is the Vice President at Dayananda Sagar Institutions, Bangalore, India; Professor of Biotechnology and Former Chairman, Board of Studies in Biotechnology of Visvesvaraya Technological University; Former Chief Scientist of Government of India at the Central Food Technological Research Institute (CFTRI) Mysore; Elected Fellow of IFT, IAFoST, IFST and several National Academies in India. Mentored 25 students for Ph. D degree, 80 Masters Students, 4 Post-docs and 6 international guest- scientists. Authored over 280 research papers; 52 authoritative reviews; which received nearly 15000 citations and H index-59. He has obtained 4 US patents and over 12 International Patents. He has presented over 250 lectures in various scientific meetings in India and abroad. Dr Ravishankar received fourteen awards in India. He has been expert member of Government of India Institutions, including Food Safety and Standards Authority of India. He is specialized in the areas plant sciences, microbiology, post- harvest technologies, genetic engineering, food biotechnology, functional foods and biomass production. He has served as visiting Professor in Japan, Russia and visiting scientist in South Korea , USA. He is mentoring young professionals in the field of food biotechnology and is a consultant to food and agro- technology based industries.*

Seaweeds are widely used as food in the eastern countries for several centuries. However, it is now increasingly gaining worldwide popularity. World's seaweed market is estimated to be US\$3.5 billions. Almost 21 million tons of seaweeds are utilized worldwide. Approximately 800,000 tons of seaweeds are harvested from the wild, and the remaining 94% is produced by aquaculture. Seaweeds viz., Ulva , Enteromorpha ( Green Algae ) ; Porphyra, Gracilaria ( red algae); Fucus, Laminaria, Undaria (Brown Algae ) are commonly used as foods. Their production is dominated by Indonesia, China, and the Philippines. Seaweeds are also a source of ingredients in food processing. For example, the thickening agents such as carrageenan, alginate from seaweeds are being used extensively in processed foods. Fucoxanthin from brown seaweeds is a source of pigment for food and health applications of wide utility. The nutraceuticals from seaweeds are used in functional food formulations. Interestingly, they are found to be rich sources of proteins, carbohydrates, specialty lipids, vitamins and minerals. Seaweeds are also reported to contain health promoting attributes viz antioxidant, antidiabetic, anticholesterolemic , anticancer activities. The concern of the quality of the foods derived from the seaweed , or the ingredients extracted from them is a universal issue. Seaweeds are vulnerable to contaminants occurring in the aquatic environment as they have the ability to accumulate toxicants by uptake mechanisms. As the seaweeds are either collected from the habitats or cultivated in environments prone to contaminations, the quality assessment and constant surveillances are of prime importance. Global perspectives of cultivation methods, harvesting, utilization and product development will be presented vis a vis safety aspects. Studies done in India on the seaweed cultivation and utilization will also be discussed.

## FURFURYL ALCOHOL A POTENTIALLY TOXIC COMPOUND FORMED DURING ROASTING OF COFFEE

Dr. Michael Murkovic<sup>1</sup>, Dr. Abdullatif Albouchi<sup>2</sup>, Dr. Reni Swasti<sup>3</sup>

<sup>1</sup>Graz University Of Technology, Graz, Austria, <sup>2</sup>International University For Science & Technology, Damaskus, Syria,

<sup>3</sup>Universitas Atma Jaya Yogyakarta, Yogyakarta, Indonesia

### **Biography:**

*Michael Murkovic studied Technical Chemistry at Graz University of Technology with a focus on biotechnology. He did his postdoc at ETH Zuerich and was employed after this at Sandoz in the Research and Development Department working on process optimisation of penicillin production. In 1993 he started as a food chemist at Graz University of Technology. His research interest is in the formation of carcinogenic compounds during food manufacturing. The most interesting compounds studied are heterocyclic aromatic amines, lipid oxidation products, and furan derivatives.*

### **Introduction:**

Furfuryl alcohol is a compound that is not commonly found in foods in higher concentrations, except in roasted coffee. The reason for this single occurrence is not clearly solved but it is definitely related to the high temperatures of roasting. The temperature at which furfuryl alcohol is formed at higher concentrations is in the range of the roasting temperature which can be up to 270 °C.

### **Purpose**

Furfuryl alcohol can be activated to a highly reactive compound by sulfotransferases in the human metabolism. This sulfated compound can react with the DNA forming adducts and induce mutations. As coffee is practically the only known commodity which contributes to the exposure the purpose of the experiments was to investigate the formation and measure the concentrations in coffee which will be a contribution to estimate the exposure to furfuryl alcohol.

### **Methods:**

HPLC analysis is done using a C8-RP measuring the UV absorption at 217 nm.

Roasting is carried out using 80 g of coffee in a Probat laboratory roaster (normally ca. 8 min).

### **Results:**

In the standardized coffee brews the concentration of furfuryl alcohol is in the range of 55 to 68 µg/ml. Practically all furfuryl alcohol is extracted during brewing. The formation kinetics show a peak quickly after the onset of roasting and after that a decrease, which can be attributed to evaporation and polymerisation. The furfuryl alcohol emission during roasting, is high (up to 57%) leading to a lower amount of furfuryl alcohol determined in samples roasted under these conditions.

The maximum concentration of furfuryl alcohol is reached faster with higher roasting temperatures. It has to be pointed out that the highest amount of furfuryl alcohol observed was at 240 °C (512 µg/g) and that the amount of furfuryl alcohol produced at 180 °C was the lowest in the experiments described here (92 µg/g).

### **Conclusions:**

Furfuryl alcohol is formed during roasting of coffee. At present, it is not possible to reduce the amount of furfuryl alcohol in the coffee without changing the roasting conditions significantly.

## Economic Harmonization: Opportunities and Challenges in the New World Order 2" (A Case study: Lebanon & EU)

**Dr. Maged Eid<sup>1</sup>**, Mr. Atef Idriss

<sup>1</sup>Mefosa, Beirut, Lebanon

### **Biography:**

*Maged Eid (Ph.D.) he is currently working as a Consultation Manager at MEFOSA sarl and a part time instructor at AUL University. He possesses a PhD degree in Development and International Cooperation, a Master's degree in Economic Development and International Cooperation, a Master's degree in Agrofood Marketing and a BS degree in Agrofood Science and Technology. He has relevant years of experience in Marketing, Agro-food industry and in Development and Cooperation areas.*

Lebanon signed the European neighborhood policy agreement through which the EU offers its neighbors a privileged relationship, building upon a mutual commitment to common values (including democracy and human rights, rule of law, good governance, etc.)

Its implementation was foreseen to allow Lebanese industrial as well as most agricultural products to benefit from free access to the EU market. This is in theory, but in practice it is evident that Lebanon didn't benefit from the Association Agreement given that the trend of exports registered minor increases since 2000 while the trend of imports from the EU increased enormously.

There are many challenges facing Lebanese bio and agro-economy with EU. In Lebanon, lack of transparency, business environment and investment climate, bad infrastructure (transport, electricity, IT, and telecom technologies), services, logistics, customs are all hindering the quality and competitiveness of the Lebanese bio and agro-food products.

In a recent EUROMED meeting, MEFOSA witnessed poor harmonization on full regulatory compliance in pharmaceutical products, food safety, and quality designations on wine products as per consumer interest from one hand, and from the other hand as per public interest there are SPS, TBT, and TRIPS gaps.

Moreover as China, Turkey and other developing nations with the U.S. edge closer to trade wars; agriculture may be again one of the sectors most vulnerable to higher tariffs or higher SPS agreement. There is a huge tendency to renegotiate trade agreements toward more protectionist ones, and that could affect trade relations between EU and other Mediterranean countries.

Finally, there is a huge need to a renewed European Neighborhood Policy based on collaboration and regulatory reforms a view to closer integration into EU market, through insuring not only food security but also social security fostering growth and creating job opportunities for Lebanese and refugees in Lebanon.

## Effectiveness of hermetic technology in limiting aflatoxin exposure in women and children from smallholder farming areas

Dr. Loveness Nyanga, M.P. Dembedza<sup>1</sup>, C. Chidewe<sup>2</sup>, M.A. Benhura<sup>2</sup>, B.M. Mvumi<sup>3</sup>, L.R. Manema<sup>1</sup>, L.K. Nyanga<sup>1</sup>

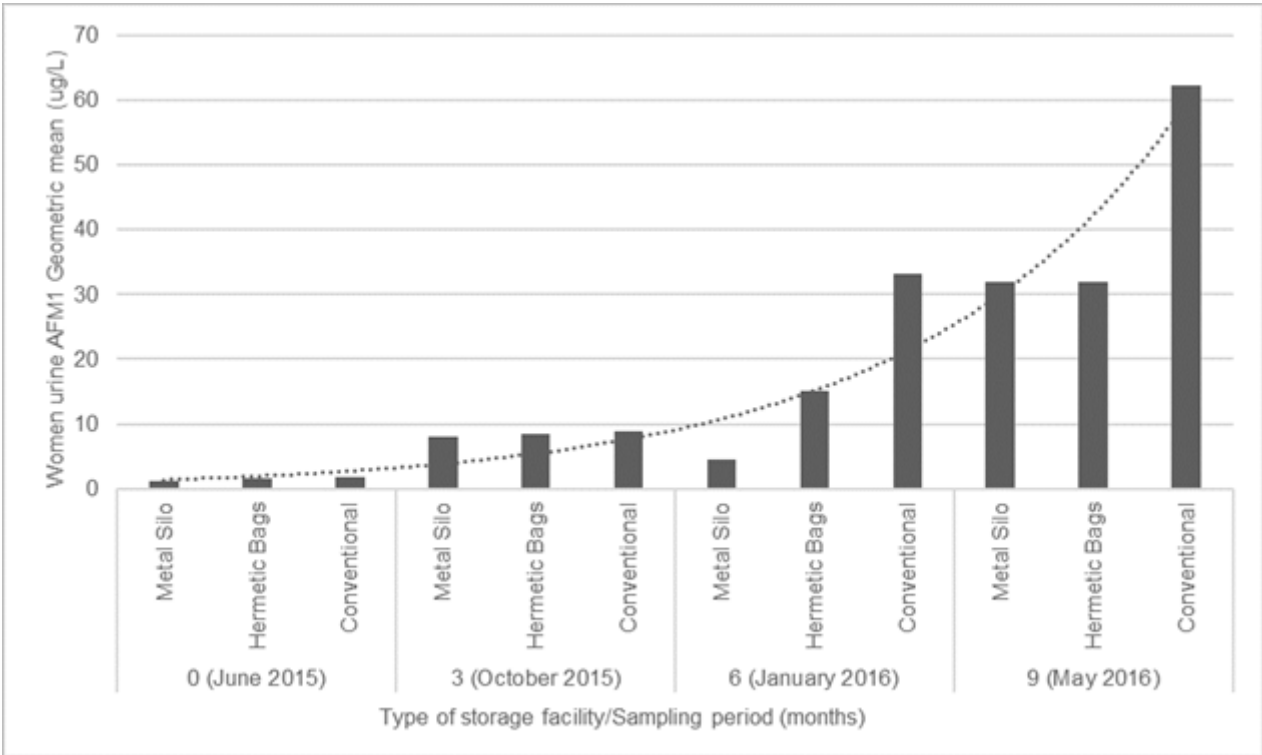
<sup>1</sup>University of Zimbabwe, Institute of Food, Nutrition and Family Sciences, Mt Pleasant Harare, Zimbabwe, <sup>2</sup>University of Zimbabwe, Department of Biochemistry, Mt Pleasant Harare, Zimbabwe, <sup>3</sup>University of Zimbabwe, Department of Soil Science and Agricultural Engineering, Faculty of Agriculture, Mt Pleasant Harare, Zimbabwe

### Abstract

The study assessed aflatoxin exposure levels among women aged 15-45 years and children under five years of age from households in selected smallholder farming areas of Zimbabwe who were using hermetic metal silos and hermetic grain bags compared to conventional grain storage methods. Exposure levels were determined by measuring urinary Aflatoxin M1 (AFM1) in urine samples from women and children every three months during the 2015/2016 storage season for nine months. After extraction and immunoaffinity column clean up, AFM1 was determined by high performance liquid chromatography. Generally, the proportion of AFM1 positive urine samples from women increased throughout the grain storage season from 5.4% (n=23) (geometric mean (GM) 1.62 µg/L) at harvest to 75% (n=315) (GM 48.35µg/L) nine months later (range <LOQ-217.29 µg/L). In urine samples from children, AFM1 positive samples increased from 2.2% (n= 4) (GM 0.78 µg/L) at harvest to 72.5% (n=98) (GM 22.81 µg/L) nine months later (range <LOQ-135.00 µg/L). Urinary AFM1 was significantly higher in samples from participants using conventional storage (GM 62.28 µg/L; range <LOQ-217.29µg/L) compared with samples from participants using hermetic technology (GM 31.95µg/L; range <LOQ-157.71µg/L). There was no significant difference in AFM1 concentrations in urine samples from participants consuming grain from metal silos and hermetic bags ( $p > 0.05$ ) hence the two technologies are equally effective in limiting exposure to aflatoxins in humans. The study concluded that aflatoxin exposure levels among women and children from small-holder farming areas increase throughout the postharvest season and the use of hermetic storage technology resulted in up to 33.2% decrease in frequency of detection and 48.7% decrease in levels of AFM1 compared to conventional storage technologies. Thus, hermetic grain storage can be recommended for limiting aflatoxin exposure in smallholder farming populations.

### Acknowledgements

This work was funded by the International Development Research Centre, Canada, Australian Centre for International Agricultural Research and Australian International Food Security Research Centre, Grant No. 107838. Our research partner Action Centre' la Faim for providing technical and logistical support. Authors are thankful to women and children in study districts, Ministry of Health and Child Care, and Ministry of Agriculture, Mechanisation and Irrigation Development staff.





## An IoT (Internet of Things) enabled architecture for product traceability in food manufacturing.

Prof. Zhipeng Wu<sup>1</sup>, Prof. Dr. John Gray<sup>1</sup>

<sup>1</sup>*School of Electrical and Electronic Engineering, Manchester, United Kingdom*

A recent EC project 'PicknPack' which was concerned with automated adaptive packaging of fresh and processed food products explored the application of electronic bar code reading for product traceability from factory input material bins to supermarket shelves.

The challenge was to design a production/packaging line that would automatically adapt to different product flows and hence differing packaging and sealing requirements. Total product traceability was, of course, a key requirement, as well as automatic robotic purging and cleaning between the different product runs to ensure overall safe hygienic operation. A benefit of the robotic cleaning process was found to be the consistency of the measured results.

A multimodal sensor module for product quality monitoring was included with the measured data being directly integrated within the traceability portfolio. There is a provision for printing any appropriate measured product quality information on line prior to label printing.

A novel digital communication network, based on IoT technology was utilised to ensure a high rate of data transmission also the resulting software architecture allows flexibility in the arrangement of the packaging process, to accommodate a wide range of different products.

The IoT architecture can be extended to include a complete supply chain from primary source to consumer outlet and this is the focus of current work.

## Correct, reliable, globally harmonized determination of protein in food

Joe Regenstein<sup>1</sup>

<sup>1</sup>*Department of Food Science, Cornell University, Ithaca, United States*

The use of the Kjeldahl test has been the official test for proteins for many years in many countries. But what does Kjeldahl measure. Certainly NOT protein. And one conversion factor with or without a non-protein nitrogen measurement are just as fraught with serious limitations. And the laboratory tests like Lowry, Biuret, and Bradford are really no better. So the question that must be ask is if we have here an example of harmonization having happened successfully but in fact hindering the application of science and future attempts to actually properly define and measure proteins in various beneficial ways.

## How to harmonize religious food laws respectfully

Joe Regenstein<sup>1</sup>

<sup>1</sup>*Department of Food Science, Cornell University, Ithaca, United States*

Kosher and halal as religious laws are the original food auditing systems. The religious personnel are there to determine that you are following the rules. They are not there to bless the food. But who decides the rules? Generally the agencies' leadership make this decision. So there are issues of transparency and of lack of harmonization. Transparency and consistency within an agency are areas that the larger agencies are working on. But harmonization is more difficult and it is not clear whether it is the best long term interest of the religion and possibly even the food industry. The various differences provide opportunities for companies with different products and goals, thus allowing for more marketing opportunities. And a chance to respect religious diversity.

## The evolution of genetic manipulation of biological materials

Joe Regenstein<sup>1</sup>

<sup>1</sup>*Department of Food Science, Cornell University, Ithaca, United States*

Humans have been breeding plants and animals since the beginnings of agriculture and thus interfering with nature. Natural really should be reserved for wild things. But classical breeding has a problem, it moves chromosomes and not genes. So it is riskier as unknown traits may also be transmitted. And then breeders learned to use mutagens and radiation. The payoff is greater but so are the risks. So finally scientists have learned to move or to modify genes. So the risks are less and the potential payoff much greater. The safety has been demonstrated, but some of the ethical issues, mainly for human medicine and not food remain to be addressed. But in the world of greater population and climate change, The use of GMO technology will be an important part of the solution.

## Evaluation And Management An Audit Objective Findings With Innovative Approaches At Public Consumption Areas

### Ms. Gönül Silav<sup>1</sup>

<sup>1</sup>TMG Food Safety Ltd. Company, Istanbul, Turkey

#### **Biography:**

Technical Manager at TMG Food Safety Limited Company. She performs third party audits as an independent auditor under the privacy principles. Support companies for official and special audits. ISO 22000 quality system, ISO 17020:2012 with documentation, creating and managing HACCP system. Conducted food safety inspections of hundreds companies in the food sector. Worked at various global and domestic enterprises where food safety and public health are primary importance; has carried out inspection services in accordance with national and international legislation in many fields and sectors.

#### Volunteer Experience

1. Consultancy Services on Food Safety and Public Health Management issues at “Turkish Social Service And Children Protection Institution”
2. Coordinator in Various Projects in Civil Society Organizations
3. Chairman of Corporate Relations Commission at Chamber of Food Engineers Turkey

#### Recent Publications

- Silav G., 2017. “Determination Of Physicochemical And Sensory Properties of Gluten Free Biscuits Comprising Different Flour Sources” Istanbul Aydın University.

-Silav G.,2017. “Investigation of physicochemical and sensory properties of gluten-free biscuits produced by using chestnut and buckwheat flours”. 1st Innovations In Food Science & Technology Conference Munich, Germany.

- Silav G.,2017. Investigation of Quality and Shelf Life Properties of Gluten Free Biscuits Enriched with Chia Seed. 10. Food Engineering Congress.

The rapid rise in popularity for out-of-home consumption in Turkey especially in recent years sustainable food safety and quality management issues have gained importance substantially. However, recent studies have shown that some health problems are especially common in individuals who have a high level of habitual consumption, besides serious economic losses are being experienced in the treatment of diseases that are the result of food poisoning or health trouble in the world. Whereas these inconvenient results could be minimized by innovative business model approaches with a series of comprehensive studies including feasibility studies, cuisine design, engineering calculations, selection of the right equipments, installation services, staff training, sustainable food safety and quality systems setup, waste management and the creation of sustainable traceability systems. However, the objective findings obtained from the

third-part inspection studies that I have carried out since 2013 will constitute an important source of data for the statistical evaluation of the issues that may pose a risk at public consumption areas. With this awareness I intend to develop an innovative enterprise research project for management sustainable food safety and healthy out-of-home consumption model. In this context, I aim for my future plans to establish a foundation as research and development center which will be the first in the field with the scope of innovative business model to improvement and development of public consumption fields by versatile consultancy services.

Best Regards,

M.Sc. Food Engineer GÖNÜL SİLAV

## THE COMPLAINT INDEX - A VALUABLE TOOL FOR RISK MANAGEMENT

**Dr. Johannes Lueckl<sup>1</sup>**

<sup>1</sup>Austrian Agency For Health and Food Safety, Graz, Austria

### **Biography:**

*Johannes Lueckl works at AGES as senior expert for food safety and the National Control Plan. He is involved in formulating the plan and in summarising the results of the controls. He is responsible for coordinating the Food Safety Report of Austria. This annual report provides a comprehensive overview of the results of the official food control in Austria. Furthermore he is the head of the working group 'Nicht Sicher'. The aim of this working group is to achieve a uniform interpretation of the term 'not safe' in Regulation (EC) No 178/2002 and to harmonise assessment practices within the framework of official food control in Austria.*

The official food control in Austria is based on the National Control Plan, which lays down the details of inspections of food businesses and sampling. The plan is prepared every year considering results and findings from previous years and the risk category of each business type. From 2010 until 2016 244,240 establishments were inspected and 209,209 samples were analysed. In 24,380 establishments (10.0 %) non-compliances with food law were found with a significant decrease from 2010 to 2016. For the samples, the rejection rate was highest in 2010 (22.0 %) and lowest in 2011 (14.1 %). Since then, the rate increased steadily up to 16,9 %.

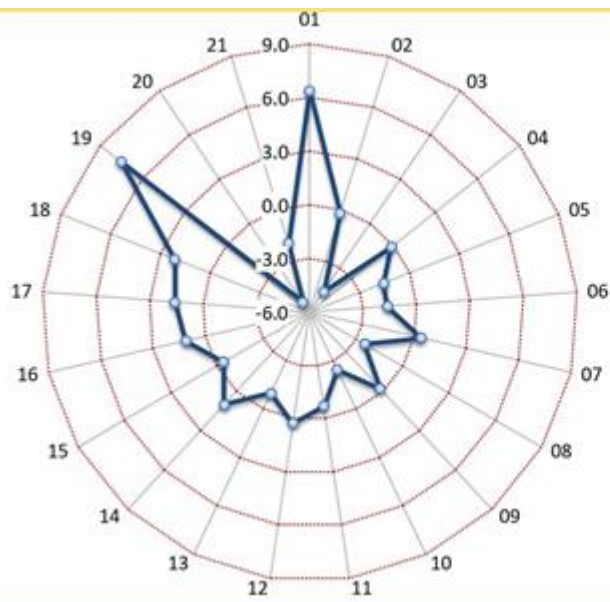
Food safety is often measured by non-compliance rates, although these indicators are strongly influenced by the design of the sampling plan. As food production in Austria is subject to constant change, it is not possible to precisely define the proportion of establishments and products to be inspected. For this purpose, the Complaint Index (ComIn) was implemented (1). This Index compares the proportion of non-compliances with the proportion of controls and allows to rate different product groups or business categories. The higher the ComIn value, the more imbalanced is the relationship between non-compliances and controls. The ComIn therefore serves as good indicator to assess whether the number of controls is appropriate.

The presentation shows the calculation of different ComIn indicating some imbalances in the Austrian control system. Fig. 1 shows, for example, the ComIn for rejected samples taking into account all complaints weighted according to the different reasons for rejection. The ComIn was appreciably high for utility items (+7.5) and meat and meat products (+6.4). In contrast, the ComIn was clearly negative for ready-to-eat food (-5.3) and milk and milk products (-4.6).

Considering these calculations the ComIn can be used to adjust control activities to improve food safety and is a valuable decision-making tool for risk managers.

Fig. 1: Complaint Index for rejected samples taking into account all complaints weighted according to the different reasons for rejection

(1) Lueckl et al. (2019), Food Control, 99, 190-201; <https://doi.org/10.1016/j.foodcont.2018.12.016>



01	Meat and meat products
02	Fish and fish products
03	Milk and milk products
04	Fats, oils and related products
05	Grain and grain products
06	Bread and pastries
07	Sugar and honey
08	Ice cream
09	Cocoa and confectionery
10	Fruit and vegetables
11	Spices and seasonings
12	Fruit juices and non-alcoholic beverages
13	Coffee and tea
14	Alcoholic beverages
15	Drinking water and packaged waters
16	Additives and flavourings
17	Foodstuffs for special target groups
18	Cosmetic products
19	Utility items
20	Ready-to-eat food
21	Egg and egg products



## RECENT MYCOTOXIN ISSUES IN SERBIA AND GLOBALLY RELEVANT LESSONS LEARNED

Prof. Dr. Miomir Niksic<sup>1</sup>

<sup>1</sup>*Department of Industrial Microbiology, Faculty Of Agriculture, Zemun-Belgrade, Serbia*

### **Biography:**

Full professor with 37 years of professional experience working with undergraduate, graduate and postgraduate students in Food Microbiology, Industrial Microbiology and Hygienic engineering & design. Also huge experience in microbial control of food and solving technological troubleshooting traceback problems in food and pharmaceutical companies. Researcher and developer of new products for food and pharmaceutical industry and trainer of specialist in food microbiology and food technology. Published 190 scientific papers and books in domestic and international journals and conferences; Chairman of European Hygienic Engineering Design Group (EHEDG-Serbia), General Secretary of Serbian Society for Nutrition, President of Serbian Mycological Society (1999-2008), Member of Executive board of The Serbian Association of Food Technologist. Participant, leader and coordinator of 16 national and 7 international scientific project.

Senior international consultant with strong experience in the field of food safety, namely in policy development, in drafting legislation as well in supporting institutional reforms through inspections reforms and also the delivery of capacity building initiatives as training and/or advice. Working in World Bank, IFC, as International consultant for Mongolia, Cambodia, Greece, China for Food Safety System

Mycotoxins are secondary metabolites of toxicogenic molds, which exhibit full toxicity when reach people or animals. Of the known mycotoxins, the highest toxicity is attributed to aflatoxin B1 (AFB1) and M1 (AFM1), which belongs to substances with acute toxicity of the first category. The presence and control of mycotoxins in the food chain is serious problem which has an inevitable food safety but also economic, trade and social impact for the whole world. Serbia has moderate continental climate, but due to climate changes some worm and high humid conditions appeared in 2012 which was good basis for development of toxigenic fungi in cereals. As a consequence, at the beginning of 2013 the contaminated corn used for dairy cows diet had negative impact on the safety of cow milk. The main sources of aflatoxins were corn samples, whole meal and feed mixtures derived from contaminated corn. The contamination peak was during March 2013, when 65% of milk samples contained amounts of AFM1 higher than 0.05 µg/kg, and 13% of milk samples contained amounts higher than 0.5 µg/kg.

Mycotoxin control in Serbia, from the aspect of the legislation is based on Food Safety Law and a set of secondary regulations were adopted, defining the maximum permitted quantities of mycotoxins in various foodstuffs and animal feeds. The regulations were harmonized with EU regulations in year 2011, but since that outbreak, more than 12 changes (amendments) have been made until the present. Amendments to the maximum permitted values of AFM1 in milk were ranged from 0.05 µg/kg (in 2012, same as EU value) and changed to 0.25 µg/kg, which is today's value. It is gradually reduced and harmonized with EU regulations that would have had a substantial impact on production of food and feed and economic stability. Overall and analytical control was strengthened, but there were also many legal disputes related to the quality and safety of corn produced from that year.

National Laboratory for quality control of milk was opened recently which will help that quantity of aflatoxin in milk decrease from presently 0,25µg/kg to recommended 0,05µg/kg which is today in EU.

## CHEMICAL COMPOSITION AND FATTY ACID COMPOSITION OF CANNED SARDINES (*Sardina pilchardus*) IN REFINED OLIVE OIL AND IN REFINED SARDINE OIL

Madame Hind MKADEM<sup>1</sup>, Phd Amar KAAANANE<sup>1</sup>

<sup>1</sup>INSTITUT AGRONOMIQUE ET VETERINAIRE HASSAN II, RABAT, Morocco

### *Biography:*

Hind MKADEM, PhD student at the Agronomic and Veterinary Institute Hassan II of Rabat, Morocco. My research field is Agronomic and Food Sciences.

Publication: Treatment of Olive Mill Wastewater from Traditional Presses (Maasra) Using Filtration and Adsorption Processes [2013] (H. MkaDEM, A. Kaanane, A. Sadek, S. Altimimi, A. Crolla, Kinsley, C.) DOI: 10.13031 / aea.29.9727.

Degrees: Master 2 in Biodiversity in Sustainable Development in Marseille (2012)  
Engineer in Food Industries in 2011.

## CHEMICAL COMPOSITION AND FATTY ACID COMPOSITION OF CANNED SARDINES (*Sardina pilchardus*) IN REFINED OLIVE OIL AND IN REFINED SARDINE OIL

Hind M'KADEM, Institut Agronomique et Vétérinaire Hassan II- Rabat, Morocco.

Amar KAAANANE, Institut Agronomique et Vétérinaire Hassan II- Rabat, Morocco.

### ABSTRACT

The object of this study is to identify the benefits of using sardine oil as a covering juice for canned sardines (*Sardina pilchardus*). The physicochemical composition and fatty acid composition of canned sardines in refined sardine oil (CSO) and canned sardines in refined olive oil (COO) were studied. Fatty acids were analyzed and quantified using gas chromatography after being converted into methyl ester derivatives. An analysis of variance (ANOVA) at a 5% level of significance revealed no significant differences between the two canned recipes regarding protein, total lipid, ash, fiber, total carbohydrate, and salt contents. However, the fatty acid composition varied significantly depending on the covering oil. The sum of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) concentrations were 4.15 g and 8.88 g per 100 g net weight of canned sardines in olive oil and in sardine oil, respectively.

In CSO, polyunsaturated fatty acids (PUFAs) represent the primary fatty acids, followed by saturated fatty acids (SFAs) and monounsaturated fatty acids (MUFAs). In these categories, the principal fatty acids were EPA (C20:5), palmitic acid (C16:0), oleic acid (C18:1), myristic acid (C14:0), and DHA (C22:6). In the case of COO, the fatty acids profile reveals a different distribution, with a significantly higher MUFAs fraction and lower SFAs level than those of CSO. The dominant fatty acids were oleic acid (C18:1), palmitic acid (C16:0), and linoleic acid (C18:1), followed by EPA (C20:5) and DHA (C22:6). This study confirmed that using refined sardine oil in canned sardines enhances the nutritional properties and n-3 fatty acid content, which are highly demanded by customers for their health benefits.

Key words : *Sardina pilchardus*, canning process, sardine oil, olive oil.

## Study on Chronic Nephrotoxicity of *Penthorum chinense*

**Prof. Huibo Xie<sup>1</sup>**

<sup>1</sup>*Southwest Medical University, Luzhou, Sichuan, China*

***Biography:***

*Xie Huibo is a professor at Southwestern Medical University and a master's tutor. He is mainly engaged in food nutrition and food safety research.*

*Penthorum chinense Pursh (P. chinense), called Ganhuangcao in China, is the authentic medicinal material of Gulin County, Sichuan Province, China. It has been listed as a new food raw material by the State Food and Drug Administration in 2019. P. chinense was first published in the Ming Dynasty " Herbal for Relief of Famines ". This plant has been used for a long time as health food and folk medicine for the treatment of liver damage by Miao people, which is called Fairy grass. Previous reports showed that P. chinense can be used for the treatments of jaundice, cholecystitis, edema, traumatic injury, adiposis hepatica, and infectious hepatitis. Objective To provide a scientific evidence for the development and application of P. chinense. Methods 48 SD rats were randomly divided into 4 groups (n =12), a physiological saline group and three P. chinense treat groups. The P. chinense groups were treated by intragastric administration with 5,10,20 g·kg<sup>-1</sup> crude drug once a day for 90 days. The levels of Urea, UA, Crea in serum were detected, and the HE dyeing was chosen to observe the kidney morphology. Results The body weight, nephritic organ quotiety, and the level of Urea, UA, and Crea in each exposure group have no statistically significant difference compared with the physiological saline group (P>0. 05). There were no obvious kidney morphology changes in the P. chinense group(F =1. 37,P =0. 268).*

**Conclusion** The kidney morphology and function of rat showed no apparente damage after long term intragastric administration of P. chinense.

## TECHNO-FUNCTIONAL PROPERTIES OF AMERICAN ANCIENT GRAINS AS POTENTIAL ANIMAL PROTEIN REPLACEMENT IN MEAT PRODUCTS

M.Sc. Miguel Angel Alarcón-García<sup>3</sup>, Prof. Dr. Jose Angel Perez Alvarez<sup>1</sup>, Dr. Maria Jesús Pagán Moreno<sup>3</sup>, Dr. Jairo Humberto López-Vargas<sup>2</sup>

<sup>1</sup>IPOA Research Group. Agri-Food Technology Department. Universidad Miguel Hernández (UMH), Orihuela, Spain,

<sup>2</sup>Instituto de Ciencia y Tecnología de Alimentos (ICTA) Universidad Nacional de Colombia, sede Bogotá, Santa Fe de

Bogotá, Colombia, <sup>3</sup>CUINA Food Research and Innovation Group,. Food Technology Department. Polytechnical University of Valencia, Valencia, Spain

### **Biography:**

IPOA Research Group (<https://youtu.be/fb1BW-A-jZw>). Research line: Food Product development of healthy meat products with the addition of bioactive compounds and dietary fibres (obtained from co-products valorisation from agri-food industries). h index 44. Tutor of *Essenza di Vega*, 2018 Spanish Ecotrophelia winner.

### INTRODUCTION

Ancient grains (quinoa, chia and amaranth) are widely recognized as balanced nutritional ingredients, where the food industry can find high-value added nutrients (dietary fibre, protein, omega-3 fatty acids and phenolic compounds) and are recommended by OMS, UN and FAO for several reasons. In Western countries, these pseudo-cereals have not been widely used, since cultural prejudice and availability limited their use. All of them are gluten-free thus; the adverse effects over the celiac population can be avoided. New type of consumers are looking for new meat products in which less animal proteins and fats are contained. To introduce in meat products, techno-functional properties of ancient grains must be determined.

#### OBJECTIVES:

The main objective of this work is to evaluate most important techno-functional properties of American ancient grains as potential meat protein replacement.

#### MATERIAL AND METHODS

Commercial American ancient grains (chia [*Salvia hispanica*, L.], quinoa [*Chenopodium quinoa* W.] and amaranthus [*Amaranthus hypochondriacus*]) were purchased in a local market. Seed, flour and flakes were analysed. Water and oil holding capacity, foaming and emulsifying properties, pH and water activity (Novasina) were determined. Conventional methods for all parameters were used.

#### RESULTS

Water and oil holding capacity, foaming and emulsifying properties were statically different ( $P < 0.05$ ) for all samples. Quinoa and chia samples (seeds and flours) showed the highest values meanwhile amaranth (seeds and flours) the lowest. Highest pH values for amaranth seeds ( $6.55 \pm 0.02$ ) and white quinoa seed ( $6.62 \pm 0.01$ ) and the lowest chia seed ( $5.55 \pm 0.04$ ) were found. For water activity, the lowest value was found for amaranth flour ( $0.496 \pm 0.019$ ) and the highest for black chia seed ( $0.655 \pm 0.020$ ).

#### CONCLUSIONS

According with techno-functional properties results, quinoa and chia seems to be the best American ancient grains to be used as potential meat protein replacement.

#### ACKNOWLEDGEMENT

Research project "ESPACIOS DE RECONOCIMIENTO PARA LA PAZ, UMH-UNAL".

## High Pressure susceptibility of *Campylobacter jejuni* strains in broth and minced poultry meat

**Mr. Norton Komora<sup>1</sup>**, Ms. Cláudia Maciel<sup>1</sup>, Ms Maria João Cardoso<sup>1</sup>, Dr. Sónia Marília Castro<sup>1,2</sup>, Professor Jorge Saraiva<sup>2</sup>, Professor Paula Teixeira<sup>1</sup>

<sup>1</sup>Universidade Católica Portuguesa, CBQF - Centro de Biotecnologia e Química Fina – Laboratório Associado, Escola Superior de Biotecnologia, Rua Arquiteto Lobão Vital, 172, 4200-374, Porto, Portugal, <sup>2</sup>QOPNA - Organic Chemistry, Natural Products and Food Stuffs, Chemistry Department, University of Aveiro, Campus Universitário de Santiago, 3810-19, Aveiro, Portugal

### **Biography:**

Graduate of Department of Food Science and Technology (CAL) of Universidade Federal de Santa Catarina (UFSC, Brazil) with B.Sc. in Food Science and Technology (2015). Actually holds a research fellowship in the ModelMeat Project, co-founded by European Regional Development Fund. His subjects of study are natural alternatives to chemical food additives as natural peptides, natural polymers and bacteriophages, as well as nonthermal food processing technologies. He has been author/co-author of 7 original articles in peerreviewed journals, 2 oral communications and 22 posters in international meetings.

*Campylobacter* spp. is recognized as the leading cause of bacterial foodborne enteritis worldwide, imposing a burden on public health. It is a bacterium often present in the poultry gut and contamination of the poultry meat may occur during the slaughtering process, resulting in raw poultry meat contaminated with *Campylobacter* spp. The application of innovative food processing technologies such as high hydrostatic pressure (HHP) ensures a minimal impact on food biochemical and organoleptic parameters. The aim of the present study was to evaluate the survival of *Campylobacter jejuni* submitted to high pressure processing in broth and minced poultry meat.

Six strains of *C. jejuni* (three from culture collections and three collected from clinical cases occurred in Portugal) were selected to study the pressure susceptibility in Mueller Hinton (MH) broth and minced poultry meat (107 colony forming units (CFU)/mL or g). Stationary phase cells were pressurized at 200, 300, 400, and 500 MPa at 10 °C for 5 min. Pressure-treated and control (0.1 MPa) samples were serially diluted and plated in triplicate in MH supplemented with FBP (ferrous sulfate, sodium metabisulfite, and sodium pyruvate) and mCCD agar. Plates were incubated at 41.5 °C for 48 h, under microaerophilic conditions and CFU/mL or g determined.

*C. jejuni* strains were able to survive up to 300 and 400 MPa, in broth and minced poultry meat, respectively. All strains were completely inactivated at 500 MPa in both tested matrices. No significant differences were observed on the inactivation behaviour of different isolates; selective enumeration in mCCD or in MH supplemented with FBP was similar ( $P > 0.05$ ). Overall, HHP seems to be a promising technology to ensure *Campylobacter* spp. elimination solving a relevant problem in the poultry industry.

## Declaration for improving food safety and food security standards globally

Firouz Darroudi<sup>1</sup>

<sup>1</sup>*Genome Scan Unlimited, Oegstgeest, The Netherlands*

By examining and investigating the existing models in vivo and in vitro and available data-set to detect genotoxic and carcinogenic potential of chemicals to human, it becomes evident that a new paradigm is needed to modify and/or replace the existing guide-lines for human risk assessment.

Though, it may sound critical of the past, but actually we should credit regulatory agencies, industry, and those people for decisions in detecting chemical hazardous potential and introducing new chemicals (across industrial applications) in the workplace that have delivered continuous increases in life expectancy over the past century as well as a decrease in age-adjusted cancer rates in the past 3 decades.

We must critique the past to build foundations for the future and we need to know how our current testing paradigms are performing for the hazardous identification and cancer risk assessment of chemicals in air, water, soil, food as well as new drugs, in order to protect public health.

For pharmaceutical chemicals, however, it becomes evident that most of the genetic-toxicology assays and tools used for regulatory assessment rely on high-dose animal (in vivo) studies and default extrapolation procedures and have remained relatively unchanged for decades, despite the scientific revolutions of the past half-century.

the costs of carcinogenicity assessments using animals can run into millions of Dollars/Euros. Doses exceeding those likely to be used clinically are often tested; the high dose in a cancer bioassay is often a maximally tolerated dose. Exposing animals to maximally tolerated doses can alter biologic processes that are not relevant at clinical exposures and can produce artifacts, necessitating careful interpretation of positive tumor results. In addition, carcinogenicity studies frequently are criticized because rodents are perceived as too biologically different from humans and therefore poor models for assessing cancer risks. Finally, rodent bioassays can result in drug-induced tumors that arise by mechanisms of questionable relevance to human risk.

Consequently, the United States Food and Drug Administration as well as European and international drug-regulatory counterparts, were committed to the 3Rs, by reducing, refining, and replacing the use of animals in genetic toxicology and drug development testing protocols. Because drugs are designed to have biologic effects and because they are often taken for prolonged periods of time, potential toxicities are concerns. Although most potential toxicities are discovered in the course of clinical trials, some endpoints such as carcinogenicity, mutagenicity, and teratogenicity can only be assessed in nonclinical studies in light of ethical and practical considerations.

In the mid-1970s, Ames made the important observation in vitro that chemicals known to be carcinogens often induced mutations in bacterial (prokaryotic) cells. Salmonella typhimurium reverse-mutation assay, often referred as the Ames assay was standardised. Other endpoints of genotoxicity using eukaryotic cells (in vitro) were known as well, including chromosomal aberrations in metaphase cells, micronuclei, sister chromatid exchanges and unscheduled DNA synthesis. At that time, it was thought that a battery of in vitro assays could successfully identify potential carcinogens and thereby substitute for 2-years rodent bioassays. Although, in all above mentioned in vivo and in vitro studies a major problem encountered was high percentage of false positive and false negatives, however, still these assays are being considered to be predominant tools in most of existing guide-lines.

These sources of information lead us to develop and modify new test models as well as different biological assays using either human hepatoma cells and human hepatocytes.

Furthermore, efforts were made to expand utility of these human liver cell systems by applying SAR and QSAR models as well as genomic testing, these assays allowed the identification of correlations across large

datasets and to identify gene(s) responsible for carcinogenic and anti-carcinogenic potential of series of chemicals which human is being exposed to on a daily bases, and in particular via food-chain.

A comparative analysis (including advantages and pitfalls) will be made between the existing assays in current guide-lines and the human hepatoma / human hepatocyte assays.

Though, it is obvious that both human liver cell systems need to be further studied, on the bases of their potentials and existing findings we strongly believe in order to perform human risk assessment to chemicals properly, it is time to modify and / or change the existing guide-lines, and we can!

## Application of animal and animal alternative models for food safety assessment. Advantages and pitfalls

Firouz Darroudi<sup>1</sup>

<sup>1</sup>*Genome Scan Unlimited, Oegstgeest, The Netherlands*

Large numbers of chemicals present in air, water and soil (natural and synthetic, including human dietary food components) as well as pharmaceutical drugs / chemicals are tested each year worldwide for potential genotoxic properties to protect humans and the environment against the consequences of exposure (cancer, infertility, accelerated ageing, and instability of ecosystems) to such chemicals. These testing studies are primarily divided in two parts: In vivo, using animals and in vitro (in the presence and absence of mainly rat liver S9-derived extracts). Generally, by examining in vivo studies, it becomes evident that most of the genetic-toxicology assays and tools used for regulatory assessment rely on treating animals at high-doses and default extrapolation procedures were made to estimate the risk for human. Though, it was proven to be inadequate for a proper risk assessment to humans, but have remained relatively unchanged for decades. For primary screening, fast in vitro tests (using Eu- and Pro- karyotics) are also being used, but it becomes evident that their predictive value is limited to the fact that they reflect the CYP-450 metabolism in humans inadequately. Consequently, a series of work initiated and cellular models derived from human liver (hepatocytes as well as hepatoma cells) were developed and established. These models were further explored by validating wide varieties of cytogenetic and molecular biological assays (i.e. cytotoxicity, chromosomal aberrations, sister-chromatid exchanges, micronuclei, aneuploidy, chromosome painting, Rad 51, gamma-H2AX, genes- and protein-expression analysis), plus statistical models (i.e. SAR and QSAR) were established in order to generate a large data-set and to elucidate the potential of these models as reliable test systems for assessing hazardous of different classes of chemicals and drugs to humans. In these studies efforts were made to make a comparative analysis between existing in vivo and in vitro tests with these models of human liver origin (i.e. HepG2) following treatment with different classes of human dietary component to which humans are exposed daily via the diet or via the environment, including polycyclic aromatic hydrocarbons, heterocyclic aromatic amines and acrylamide, nitrosamines, aromatic amines, heavy metals, pesticides, plant constituents, mycotoxins, complex foods (beverages, plant juices), environmental mixtures (in air and water), cytostatic drugs and nitrosamines. The results provide information required to develop measures to protect humans against exposure to dietary and environmental genotoxins. The comparisons of the potencies of established DNA reactive carcinogens will contribute substantially to the assessment of their health risks for humans. Using HepG2 cell system for large numbers of compounds (e.g. mycotoxins and heterocyclic aromatic amine), it was shown for the first time that they cause DNA damage in human cells which strongly supports the assumption that they cause possibly cancer in man. In addition to detecting genotoxicants, this cell system could as well detect anti- and co-mutagens/carcinogens. By analysing gene- as well as protein expression profiles, we might be able to elucidate the causes of induction as well as protection of DNA damage with different classes of chemicals, and their mode(s) of action. Moreover, a positive correlation was found between outcomes of tests to elucidate the genotoxic potential of human dietary compounds using HepG2 cells and in vivo tests. Taking into account that the initial- and/or induced- level of Phase I as well as Phase II enzymes in human hepatoma (HepG2) cells by using mRNA was found to be rather similar to human hepatocytes. Consequently, it can be concluded that cellular models of human liver origin (i.e. HepG2) might be suitable alternatives to use of animals in mutagenicity testing. These new models established should be further investigated using a large panel of chemicals and the outcomes shall help national and international health authorities to define acceptable levels of exposure to dietary and environmental carcinogens and may also provide food industries with information needed to produce safer products.



## FOOD SAFETY AND TECHNICAL UPSKILLING IN THE WELSH FOOD INDUSTRY: IMPACT OF THE KITE PROJECT 2008-2015

Dr. Elizabeth Redmond<sup>1</sup>, Ms Rhiannon Facey-Richards<sup>1</sup>, Miss Leanne Ellis<sup>1</sup>, Mrs Sharon Mayho<sup>1</sup>, Professor David Lloyd<sup>1</sup>

<sup>1</sup>ZERO2FIVE Food Industry Centre, Cardiff Metropolitan University, Cardiff, United Kingdom

### **Biography:**

My key academic interests and specialisms include determination and linking cognitive (knowledge, attitudes, risk perceptions and self-reported practices), behavioural and microbiological data to assess/evaluate food safety risks. This also includes the development and evaluation of highly focused food safety education/communication materials and interventions for targeted 'at-risk audiences' and sectors in the food and drink industry.

*My role within the ZERO2FIVE Food Industry Centre (FIC) includes a variety of research approaches to facilitate evaluation of Welsh Government / European Union food and drink industry projects including KITE (2008-2015) and project HELIX (2016- to date). This includes benchmarking food safety/technical conformances in the food industry and evaluation of intervention effect; linking and comparing cognitive behavioural influences and using data to assess food safety culture within food (and drink) processing and manufacturing companies. In addition, research includes application of a value chain and supply chain analysis of food and drink manufacturing and processing (FDMP) businesses.*

### Introduction

A shortage of food-sector technical workers has been reported in Wales, UK, with ~14000 workers failing to have necessary skills to deliver business needs. This, and a critical need to for food-sector small-and-medium-sized enterprises (SMEs) to meet food-safety/technical demands resulted in development/implementation of the KITE (Knowledge, Innovation, Transfer, Exchange) feasibility project. The KITE model was based on a collaborative partnership between an industrial (SME) partner, a knowledge-based partner and an affiliate (graduate/individual with industrial-experience) and aimed to increase food science/technology knowledge and improve technical compliance in food-sector SMEs.

### Purpose

This study aimed to evaluate development of food science and technical skills in the Welsh food-sector with associated potential effectiveness of the KITE project.

### Methods

An output/outcome evaluation was undertaken to determine KITE primary/secondary impacts associated with upskilling/knowledge-transfer/third-party accreditations. A quantitative, online affiliate survey was implemented for profiling; qualitative approaches included in-depth interviews (n=30) with KITE and SME Managing-Directors (MDs), Affiliates and Technologists. Project approaches/reports and media reports (n=>90) were analysed using content analysis.

### Results

Implementation of the KITE project enabled employment of 39 affiliates; this facilitated increased employment of female, science graduates aged 18-24 years in senior, skilled jobs in the Welsh food-sector. Food-sector growth enabled >1700 jobs created/safeguarded, indicating increased employment in the

Welsh food-sector. Achievement of 83 third-party accreditations in SME KITE-partners occurred as a direct result of KITE knowledge-transfer/upskilling/SME intervention. These included 37 British-Retail-Consortium(BRC) accreditations, 13 Safe-And-Local-Supplier-Approval(SALSA) accreditations and 33 retail standards for leading UK supermarkets. SME MDs highlighted how KITE intervention/knowledge-transfer had strengthened company workforces and food scientists'/technologists' knowledge/skills base; achieving/retention of BRC certification was perceived to be "the key that opens the door" to new business and retaining existing (retail) customers.

#### Conclusions

The transfer of food-safety/technical knowledge to KITE SMEs is essential for the development of technical systems in food-sector SMEs in Wales; such technical systems are an essential prerequisite for the supply to major retailers, and thus business growth and sustainability. KITE knowledge transfer / exchange has resulted in a more technically skilled workforce in the Welsh food-sector.

#### Acknowledgements

The KITE project was delivered by the ZERO2FIVE Food Industry Centre in Cardiff Metropolitan University and financed by the Welsh Government and the European Agricultural Fund for Rural Development 2008-2015.

## FOOD SAFETY MALPRACTICES OBSERVED IN PUBLICLY TELEVISED IN UK COOKERY PROGRAMMES: IMPLICATIONS FOR CONSUMER FOOD SAFETY

Miss Lucy Davis<sup>1</sup>, Dr. Elizabeth Redmond<sup>2</sup>, Miss Hannah Wadley<sup>1</sup>, Dr Vitti Allender<sup>1</sup>

<sup>1</sup>Cardiff School of Sport and Health Sciences, Cardiff Metropolitan University, Cardiff, United Kingdom, <sup>2</sup>ZERO2FIVE Food Industry Centre, Cardiff Metropolitan University, Cardiff, United Kingdom

### **Biography:**

My key academic interests and specialisms include determination and linking cognitive (knowledge, attitudes, risk perceptions and self-reported practices), behavioural and microbiological data to assess/evaluate food safety risks. This also includes the development and evaluation of highly focused food safety education/communication materials and interventions for targeted 'at-risk audiences' and sectors in the food and drink industry.

*My role within the ZERO2FIVE Food Industry Centre (FIC) includes a variety of research approaches to facilitate evaluation of Welsh Government / European Union food and drink industry projects including KITE (1998-2015) and project HELIX (2016- to date). This includes benchmarking food safety/technical conformances in the food industry and evaluation of intervention effect; linking and comparing cognitive behavioural influences and using data to assess food safety culture within food (and drink) processing and manufacturing companies. In addition, research includes application of a value chain and supply chain analysis of food and drink manufacturing and processing (FDMP) businesses.*

### Introduction

Food safety information can be provided to consumers from a variety of sources, including television media. Television cookery programmes have increased in popularity in recent years and are reported as being a trusted source of food-related information and thus have potential for being a positive tool for communicating information about risk-reducing home-based food safety behaviours to large consumer audiences.

### Purpose

The research aims to evaluate the extent and nature of food safety communication approaches delivered in broadcast televised cookery programmes.

### Methods

Over 20hours of publicly broadcast televised cookery programmes was observed and verbal and visual food safety malpractices were recorded on an observational checklist structured according to the UK Food Standards Agency 4 C's (Cleanliness, Cross-Contamination, Chilling and Cooking).

### Results

Overall, findings indicated substantial food safety malpractices and missed opportunities to communicate safe food-handling, cooking and storage practices to consumers. Hand washing was not referenced in any observed programmes (n=20), but hand-washing facilities were observed in 75% programmes (32% included soap); adequate drying facilities were not observed in any programmes. Hand washing behaviour was only demonstrated in 14% of programmes, however, such behaviours were not in-line with recommended practice. Concernedly, 21% programmes exhibited use of the same utensils for raw and read-to-eat foods, a practiced widely reported to be associated with microbial cross-contamination. No programmes

demonstrated/discussed cleaning practices and 93% failed to mention parameters associated with cooking adequacy. Hygiene inadequacies observed included tasting foods using the same utensil/finger up to 11times in one programme. Eighteen percent of programmes provided information about the need to tie hair back during food preparation and 7% informed regarding removal of jewellery and nail varnish.

#### Conclusions

Overall, limited positive food safety messages were identified in observed cookery programmes. Where positive food safety messages were communicated, they were inconsistent throughout the broadcast and were frequently inaccurate. Data indicates there is a need to improve TV chefs verbal food safety cues and observed food safety behaviours.

## CONSUMERS ACCEPTABILITY OF TURMERIC FORTIFICATION OF EXISTING STREET VENDED DRINKS IN NIGERIA

Mrs. Folake Idowu-Adebayo<sup>1,2</sup>, Dr. Anita. R. Linnemann<sup>1</sup>, Prof. Matthew. O Oluwamukomi<sup>3</sup>, Prof. Vincenzo Fogliano<sup>1</sup>

<sup>1</sup>Food Quality and Design Group, Wageningen University and Research, Wageningen, The Netherlands, <sup>2</sup>Department of Food Science and Technology, Federal University Oye, , Nigeria, <sup>3</sup>Department of Food Science and Technology, Federal University of Technology, Akure,, Nigeria

### **Biography:**

Folake IDOWU-ADEBAYO a lecturer in the department of Food science and Technology, Federal University Oye, Nigeria, a Fellow Mentee of African Women in Agricultural Research and Development (AWARD) and a junior faculty member of USAID Partnership for Enhanced Engagement in Research (PEER) women in science mentorship program. She is currently a PhD candidate in Food Quality and Design group, Wageningen University and Research, Wageningen, The Netherlands. She earned both her B.Sc. Food Science and Technology and M.Sc. Food Quality and Assurance in Federal University of Agriculture, Abeokuta, Nigeria in 2004 and 2013 respectively.

Skilled in Food Technology, Food & Beverage, Food Processing, Food Quality/Safety, Analytical skills and Food Security. She has a vision of adding value to neglected tropical crops to improve the youths and women livelihood in Nigeria. Her motivation for this vision started during her master thesis when she conducted survey on the socio-economic status of fried street vended cocoyam chips processors in Ogun State, Nigeria. She is currently working on enhancement of economic and health benefits to turmeric (*Curcuma longa*) to the turmeric growing communities of Ekiti state, Nigeria.

She has attended workshops and conferences locally and internationally with the support from IFS, EU-ACP, AWARD and TETFund.

Currently, turmeric is receiving increased research attention in Nigeria for its large potential for rural farmers, local industries and export. In these studies, a survey was conducted to gather information on consumers' preferences and willingness to accept turmeric fortified drinks. A total of 500 questionnaires were distributed and the data were collected within 3 weeks in the fall/winter of 2018 in Akure, Ondo state of Nigeria. The majority of the respondents 93.0% were Yorubas (N=442), followed by Igbos 5.4% (N=26) and Hausas 3.1% (N=15). The gender distribution was higher for a male when compared to female consumers. Among 483 respondents, the majority (55.9%, N=270) were male, and the rest (44.1%, N=213) were female. Most of the respondents (46.6%, N=225) were in the range between 18 to 20 years old. 34.6% (N=167) of the respondents were in the range of 26 to 35 years old, 13.0% (N=63) were in the range of 36-50 years old and the rest 5.8% (N=28) were in the range of 50-75 years old. The sensory results showed that there was a direct relationship between sensory attributes of appearance, aroma, taste, flavour, mouth-feel and overall acceptability and addition of different proportions of turmeric to the soy milk and zobo drinks. The more the quantity of turmeric added to the soy milk and zobo drinks the higher the sensory scores of appearance, aroma, taste, flavour, mouth-feel and overall acceptability. In conclusion, consumer awareness could enhance acceptance of turmeric fortified soy milk and zobo drinks which in returns improve the livelihood of the rural communities.

Keywords: consumer acceptability, survey, turmeric fortification, street-vended drinks, Nigeria

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