+agro 18 Congresso Congress 3-4 out oct

International Congress on Organizational Management, Energy Efficiency and Occupational Health and Safety in Agrifood Industry

CEi - Centro de Empresas Inovadoras | Castelo Branco - Portugal

International Congress on

Organizational Management, Energy Efficiency and

Occupational Health and Safety in Agrifood Industry

(+AGRO 2018)

Book of Abstracts

October 3-4, 2018

CEi – Center for Innovative Companies

Castelo Branco, Portugal

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Universidade da Beira Interior

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IPG Instituto Politécnico da Guarda

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inovcluster Associação do Cluster Agro-Industrial do Centro

Cofinanciado por

COMPETE 2020

PORTUGAL 2020

UNIÃO EUROPEIA Fundo Europeu de Desenvolvimento Regional

Pedro Dinis Gaspar

University of Beira Interior, Portugal

(Editor)

Date

April 2019

Cofinanciado por:

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Este book include the Abstracts of the papers presented at the International Congress on Organizational Management, Energy Efficiency and Occupational Health and Safety in Agrifood Industry (+AGRO 2018) - *Qualificação organizacional, energética e de segurança e saúde no trabalho da indústria agroalimentar (Sistema de Apoio a Ações Coletivas - SIAC: 04/SIAC/2015, Ref.: 16159)*
The book is available for download at http://maisagro.pt/en/homepage/.

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Partnership

Universidade da Beira Interior	UNIVERSIDADE BEIRA INTERIOR
Universidade de Évora	UNIVERSIDADE DE ÉVORA
Instituto Politécnico de Castelo Branco	Instituto Politécnico de Castelo Branco
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InovCluster - Associação do Cluster Agro-Industrial do Centro	inovcluster Associação do Cluster Agro-Industrial do Centro

Framework

The Project +AGRO: Organizational, Energy and Occupational Health and Safety qualifications in the AgriFood Industry (Project 04 / SIAC / 2015 – SIAC 16159) aims to qualify small and medium-sized enterprises (SMEs) in the agro-food sector, namely in the following product subsectors: Meat, Horticultural, Dairy products and Bakery.

The strategy of the project relies in the creation of solutions that answer effectively and efficiently to the failures identified in the market: (1) In-depth knowledge of the reality of companies by territorial region; (2) Creation of practical computational tools; (3) Creation and dissemination of best practices; (4) Development of technology-based solutions using ICT&E, available to SMEs on a single free access platform; (5) Training SMEs to introduce innovation into their production systems and to use the developed computational tools.

Congress +AGRO

Congress +AGRO is a technical and scientific international event devoted to food science and technology. It brings together researchers, scientists, policy makers, professionals and students from multidisciplinary food-related fields to share the latest advances in the current scientific knowledge, with industrial relevance and new developments in food science and emerging technologies. It aims to discuss innovations either in the approach or in the methods used along the food processing chain, as well as promising food processing technologies, which are significant for the science community or for the food industry. Communications addressing the novel combination of more than one technology are welcome, as well as studies dealing with innovation and advances in all branches of food science.

See all details at https://congresso.maisagro.pt/en/home-en/

Topics

- Novel and emerging technologies for food processing
- Innovations in Food
- Meat Science and Technology
- Processing of horticultural products
- Dairy technologies and processes
- Bakery and pastry trends and innovation
- Occupational Health and Safety in agrifood industry
- Energy Efficiency
- Organizational Management
- ICT in AgriFood industry
- Food Safety and Security
- Waste reduction and sustainability
- Entrepreneurship
- Knowledge transfer, Skills and Qualifications

Details of the "Scientific Sessions" at the Congress +AGRO 2018:

- Food technology: Discussion on food handling techniques, food processing and Equipment, ranging from pure research, practical experiments, technical improvement and engineering practices.
- Food innovations: new product development, new processing, preservation and packaging techniques.
- Meat Science and Technology: This track explores the emerging science and technology, methods, and trends pertinent to meat and/or poultry-processing.
- Processing of horticultural products: Horticultural are very perishables products. Different technologies and methods within processing and storage help reducing its wastage and provide new products with increased market value.
- Dairy technologies and processes: This track discusses method, procedures, techniques and technologies to improve processing and preservation of milk and the development of milk products (cheese, butter, ghee, curd, buttermilk, yogurt, paneer, condensed milk, ice cream, etc.).
- Bakery and pastry trends and innovation: Basic trends in bread, bakery, and pastry innovation are discussed, showing the advances in processes, techniques and

technologies leading to improve market and health.

• Occupational Health and Safety in AgriFood Industry: This track is devoted to the analysis and discussion of OSH topics in handling, preparation and storage of food.

• Energy Efficiency:

• Organizational Management: Perspective of managerial problems confronting firms in the agrifood industry, discussing the increasing interdependence among such companies and focusing on creating consumer value.

• Technical workshops on computational tools developed in the +AGRO project for occupational risk assessment, energy efficiency analysis, industrial management improvement:

Computational tool for occupational risk assessment in agrifood industry:

- Examples of good practices in Occupational Safety and Health in agrifood industry.
- Computational tool for occupational risk assessment in agrifood industry OiRA - Online interactive Risk Assessment and its offline version.
- Discussion.

Computational tool for energy consumption prediction in agrifood industry:

- Examples of good practices of Energy Efficiency in agrifood industry.
- Updated computational tool COOL-OP.
- Discussion.

Computational tool for the application of technological, organizational and management systems of productive systems:

- Examples of good practices in the management of agrifood productive processes.
- Computational tool for organizational and productive processes management.
- Discussion.

• Invited keynotes on the current status of food processing industry and future system technologies.

Committees

General Chair: Pedro Dinis Gaspar, University of Beira Interior, Portugal

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Tânia Lima, *University Beira Interior, Portugal*
Teresa Cotrim, *University of Lisbon, Portugal*
Teresa Paiva, *Polytechnic Institute of Guarda, Portugal*

Program

October 3

09h30 Opening Ceremony **Auditorium**

Mayor of Castelo Branco - **Luís Correia**

President of InovCluster - **Cláudia D. Soares**

Vice-Dean of Universidade da Beira Interior - **José Páscoa Marques**

Pro-Dean of Universidade de Évora - **Miguel Elias**

President of Instituto Politécnico da Guarda - **Constantino Mendes Rei**

President of Instituto Politécnico de Viana do Castelo - **Rui Teixeira**

President of Instituto Politécnico de Castelo Branco - **António Fernandes**

Regional Director of Authority for Working Conditions (ACT) - **Corina Farias**

10h30 Presentation of the Project +AGRO **Auditorium**

Global coordinator of +AGRO - **Pedro Dinis Gaspar**

11h45 Coffee Break and Networking **Entrance hall**

12h30 Risk Assessment in the Agrifood Industry: Auditorium
the key to healthy workplaces.

European Agency for Safety and Health at Work: EU-OSHA - **Kate Palmer**

12h00 The use of tools in agri-food **Auditorium**

The PortugalLand company perspective - **Paulo Velho**

The FoodinTech company perspective - **Miguel Fernandes**

13h00 Lunch and Networking **Bar**

14h30 Workshops

Occupational Health and Safety Workshop — **Auditorium**

Energy Efficiency — **Room 1**

16h00 Coffee Break and Networking — **Entrance hall**

16h30 Scientific Sessions

Scientific Session 1 — **Auditorium**

ID **Paper details**

ID003 **EXPERIMENTAL COMPARISON AT OPEN AND CLOSED VERTICAL MULTIDECKS DISPLAY CASES AT STANDARD AND TROPICAL ENVIRONMENTAL CONDITIONS**

Gustavo G. Heidinger[1,2], Samuel M. Nascimento[1,2], Pedro D. Gaspar[2,3] and Pedro D. Silva[2,3]

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3: C-MAST - Centre for Mechanical and Aerospace Science and Technologies, Covilhã, Portugal

ID004 **REAL-TIME DATA COLLECTION TO IMPROVE ENERGY EFFICIENCY IN FOOD MANUFACTURING**

Sandeep Jagtap[1,2*], and Shahin Rahimifard[1]

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2: National Centre for Food Manufacturing, University of Lincoln, Park Road, Holbeach PE12 7PT, UK (sjagtap@lincoln.ac.uk web: https://www.lincoln.ac.uk)

ID029 **CURRENT STATUS AND FUTURE TRENDS OF COMPUTATIONAL METHODS TO PREDICT FROST FORMATION FOR DEMAND DEFROST CONTROL SYSTEMS**

Martim Aguiar[1,2],*, Pedro D. Gaspar[1,2] and Pedro D. Silva[1,2]

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ID032 **EFFICIENT COOLING AT POST-HARVEST PHASE: A COMPARATIVE STUDY BETWEEN PEACH AIR-COOLING AND HYDRO-COOLING PROCESSES**

João Ferreira[1], Pedro D. Silva[1,2], Luís C. Pires[1], Pedro D. Gaspar[1,2] and José Nunes[3]

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Scientific Session 2 **Room #1**

ID **Paper details**

ID011 **INNOVATION REQUIREMENTS AND SPECIALIZED SERVICES IN AGRIFOOD INDUSTRIES OF NORTH OF PORTUGAL**

Ana Patrícia Sousa[1,*], Rita Pinheiro[1], and M. Vaz Velho[1]

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ID14 **EXTRACTION AND QUANTIFICATION OF DNA IN ROCHA PEAR (PYRUS COMMUNIS L.) AND PROCESSED ROCHA PEAR PRODUCTS**

Ana Patrícia Sousa[1,*], Álvaro Queiroz[2], and M. Vaz Velho[1]

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ID022 **TECHNOLOGICAL MODERNIZATION AND INNOVATION OF TRADITIONAL AGRI-FOOD COMPANIES BASED ON ICT SOLUTIONS – THE PORTUGUESE CASE STUDY**

Pedro D. Gaspar[1,2,*], Vasco N. G. J. Soares[3,4,5], João M. L. P. Caldeira[3,4,5], Luís P. Andrade[6,7], Cláudia D. Soares[8]

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5: InspiringSci, Castelo Branco, Portugal
6: Agriculture School, Polytechnic Institute of Castelo Branco, Castelo Branco, Portugal
7: Centro de Apoio Tecnológico Agro-Alimentar, Castelo Branco, Portugal
8: InovCluster, Castelo Branco, Portugal

ID028 **A STUDY OF R&D COLLABORATION AND THE USE OF BIOTECHNOLOGY TECHNIQUES IN THE DEVELOPMENT OF BIO-BASED PRODUCTS AND AGRO-FOOD BUSINESS COMPETITIVENESS**

Teresa Paiva[1,*], José Assunção[2] and Paula Coutinho[1]

1: Instituto Politécnico da Guarda (tpaiva@ipg.pt, coutinho@ipg.pt)
2: AAPIM - Associação de Agricultores para Produção Integrada de Frutos de Montanha (jose.assuncao@aapim.com)

Scientific Session 3 **Room #2**

ID **Paper details**

ID017 **EVALUATION OF MATURE BANANA PEEL FLOUR ON PHYSICAL, CHEMICAL AND TEXTURE PROPERTIES OF VEGETABLE GLUTEN-FREE RISSOL**

Sofia Gomes[1], Bruna Vieira[1], Carla Barbosa[1,2] and Rita Pinheiro[1,3,*]

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3: CEB, Centro de Engenharia Biológica, Universidade do Minho, Braga, Portugal

ID018 **EVALUATION OF NO ADDED SUGAR, GLUTEN- AND LACTOSE-FREE CEREAL BARS MICROSTRUCTURE AND TEXTURE USING DIFFERENT HYDROCOLLOIDS AND DRYING TEMPERATURES**

Vanessa Martins[1], M. Rui Alves[1,2] and Rita Pinheiro[1,3,*]

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3: CEB, Centro de Engenharia Biológica, Universidade do Minho, Braga, Portugal

ID021 **DEVELOPMENT OF A DECISION MATRIX TO SUPPORT THE FILLING MANAGEMENT OF MULTICOLORED DRY PASTA IN STORAGE SILOS**

Catarina Magalhães[1], Susana Fonseca[1,2] and Alberta Araújo[1,3,*]

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ID024 **EVALUATION OF THE EFFECT OF ADDITION OF FRESH AND DRIED STARTER CULTURES ON PHYSICOCHEMICAL AND SENSORY CHARACTERISTICS OF A TRADITIONAL PORTUGUESE SMOKED SAUSAGE CHOURIÇO**

D. Barros*, C. Sobrosa, R. Pinheiro, S. Fonseca and M. Vaz Velho

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October 4

09:00 Reception to the participants **Auditorium**

09:30 Scientific Sessions

Scientific Session 4 **Auditorium**

ID **Paper details**

ID006 **ENZYMATIC TIME-TEMPERATURE INTEGRATOR DEVICE FOR CHROMATIC QUALITY CHECK OF COVA DA BEIRA'S CHERRY (PORTUGAL)**

Adriana S. Quelhas[1], Pedro D. Gaspar[1,2,*], and Miguel Castelo-Branco[1,3]

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ID008 **REVIEW ON THE CONTROLLED AND MODIFIED ENVIRONMENTAL CONDITIONS TOWARDS THE REDUCTION OF THE CHILLING INJURY OF PEACHES**

Cristina Rodrigues[1], Pedro D. Gaspar[1,2,*], Maria P. Simões[3], Pedro D. Silva[1,2] and Luís P. Andrade[3, 4]

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ID012 **EVALUATION OF THE PROPERTIES OF DEHYDRATED CHERRY OBTAINED THROUGH HOT AIR DRYER AND SOLAR DRYER**

J. Nunes[1,4], P.D. Silva[2,3], L.P. Andrade[1,4,5], L.C. Pires[2,3], P.D. Gaspar[2,3]

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5: CERNAS – Centro de Estudos em Recursos Naturais, Ambiente e Sociedade.

ID026 **DIELECTRIC HEATING AS A TOOL TO REMOVE PESTS IN GRAINS**

J. Saldo[1,*] and I. Codina[1]

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Scientific Session 5 — Room #1

ID **Paper details**

ID010 **SEARCHING FOR SUSTAINABLE HERBICIDE ALTERNATIVES**

Carla Saraiva[1,*], Patrícia Marques[1] and Cristina Galhano[1,2]

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ID011 **MEDICINAL AND AROMATIC PLANTS (MAP) AS POTENTIAL ANTIBIOTICS TO CONTROL FIRE BLIGHT**

Teresa Costa[1], João Pedro Luz[2], Conceição Amaro[2], Susana Dias[1], Fernanda M. Ferreira[1,3], Paula Castro[4] and Cristina Galhano[1,4,*]

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ID020 **OPTIMIZATION OF STORAGE SILOS FOR MULTI-COLOURED DRY PASTA PRODUCTION**

Catarina Magalhães[1], Susana Fonseca[1,2] and Alberta Araújo[1,3,*]

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ID025 **ADDING VALUE AND INNOVATION IN DAIRY SME'S: FROM BUTTER TO PROBIOTIC BUTTER AND BUTTERMILK**

Laura Ferreira[1,2], Ana Borges[1], David Gomes[1], Susana Dias[2], Carlos Pereira[1,3] and Marta Henriques[1,3,*]

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ID005 **LAB2BUSINESS: ECONOMIC VALORIZATION OF KNOWLEDGE TO THE AGRO-FOOD SECTOR**

Leandro Oliveira[1], Graça Teixeira[1] and Eduardo L. Cardoso[1,*]

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Scientific Session 6 — Room #2

ID — **Paper details**

ID015 **PHYSICOCHEMICAL ANALYSIS OF HAM FROM ENTIRE MALE PIGS RAISED WITH DIFFERENT FEEDING AND HOUSING CONDITIONS**

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ID019 **TRUST IN MANAGEMENT AS A KEY ON THE DEVELOPMENT OF A SAFETY CULTURE AT AGRIFOOD INDUSTRY, USING BIOLOGICAL AND PSYCHOSOCIAL RISKS AS ANTECEDENTS**

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ID027 **CONTROLLED ENZYMATIC HYDROLYSIS OF ALMOND SKINS TO INCREASE SOLUBLE FIBRE CONTENT**

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ID030 **ESSENTIAL OILS OF AROMATIC AND MEDICINAL PLANTS PLAY A ROLE IN FOOD SAFETY**

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ID023 **ENERGY CONSUMPTION AND ENERGY EFFICIENCY MEASURES IN THE PORTUGUESE FOOD PROCESSING INDUSTRY**

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11:00 Coffee Break and Networking — **Entrance hall**

11:30 The use of tools in agri-food — **Auditorium**

The ISQ company perspective - **Octavio Lopes**

The EXO company perspective

13:00 Lunch and Networking **Bar**

14h30 Workshops

Organizational Management **Auditorium**

Computational tools to support decision-making **Room 1**

16:00 Coffee Break and Networking **Entrance hall**

16:30 The business development of the regions and territorial cohesion **Auditorium**

Moderator - **Helena Freitas**

State Secretary for Development and Cohesion - **Nelson de Souza**

President of CCDR do Centro - **Ana Abrunhosa**

President of CCDR do Norte - **Fernando Freire de Sousa**

17:15 Funding and Public Incentives in support the companies **Auditorium**

President of IAPMEI - **Nuno Mangas**

Representative of the ANI - **Miguel Antunes**

Representative of the AICEP - **Joao Sequeira**

18:00 Closing Session **Auditorium**

Book of Abstracts

EXPERIMENTAL COMPARISON AT OPEN AND CLOSED VERTICAL MULTIDECKS DISPLAY CASES AT STANDARD AND TROPICAL ENVIRONMENTAL CONDITIONS

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Abstract: *This paper reports the results of experimental tests performed according to ISO 23953 in vertical open and closed multideck display cases to evaluate the influence of double glass doors in the direct energy consumption, product simulator temperature, evaporator total condensed water mass, total heat load and total energy consumption. Tests were performed at climate classes n.º 3 (T_a = 25°C; ϕ_a = 60%) and n.º 6 (T_a = 27°C; ϕ_a = 70%). The direct energy consumption is 46% higher at the closed display case due to the heat load generated by the heated glass doors frame and defrost heaters. The product simulator temperature is higher and more stable at the open display case. The highest product simulator temperature is lower (-1.4°C) at the closed display case and less stable (+2.7°C variation) due to the opening doors period. The total mass of condensed water at the evaporator is reduced 87% and the total energy consumption is 58% lower at the closed display case. In conclusion, the estimated total energy consumption (compressor and components) is reduced at the glass doors display case. Thus, it is verified that the use of refrigeration equipment closed to ambient air is increasingly seen as the definitive solution, given the current concerns with energy consumption and sustainability of the heat exchange processes.*

Keywords: Display case, glass doors, environmental conditions, energy consumption.

Real-Time Data Collection to Improve Energy Efficiency in Food Manufacturing

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Abstract: *The demand for energy is on the rise which is caused by a combination of global economic progress and population growth. The food sector is a significant consumer of energy at each stage of the supply chain, i.e. from farm to fork. Hence, improving efficiency and recognizing potentials for energy conservation has become essential in order to address the challenges faced by the food sector. However, most food manufacturing businesses, especially small and medium scale enterprise, have limited awareness of significant potentials offered through the recent technological advancements in real-time energy monitoring. In this context, the concept of 'Internet of Things' (IoT) has investigated to increase the visibility, transparency and awareness of various resource usage, thanks to the availability of inexpensive and smart sensing devices. This paper presents a case study of a beverage factory where the implementation of IoT-powered sensors and smart meters is based on the embodied product energy (EPE) modelling. This arrangement enabled the collection of real-time data on energy consumption within a food production system to support more informed engineering and operational decisions, leading to an improved energy monitoring and management, as well as substantial cost savings.*

Keywords: Food Supply Chain; Food Manufacturing; Internet of Things; Energy efficiency;

Lab2Business: Economic valorization of knowledge to the agro-food sector

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Abstract: *The Agrifood Sector is a relevant area of the European and national economy, having undergone considerable evolution in the last years, adapting products to the taste of the consumers while trying to process them in a healthier way and presenting innovative characteristics in order to make them more competitive. Lab2Business is a project that aims to strengthen the transfer of knowledge and technology to the agro-food business sector, thus promoting value creation. The project includes integrated actions from research to innovation: 1. Content production; 2. Promotion at national level; Promotion at international level; 4. Knowledge valorization activities based in a pre-acceleration program of knowledge-based business ideas contributing to the readiness of people and knowledge (business projects) in relation to the market, whether for entrepreneurship opportunities, or for business development. Lab2Business project allowed us: to expose R&D+I capacities trough different means like video interviews with researchers (200 videos) or the portfolio of knowledge (200 entries); to support our participation in national and international networks; and to implement the BIOTECH_agrifood Innovation Program where 30 participants from different Universities developed 12 business projects presented to an ecosystem involving companies, business mentors and investors in early stage projects. An Intellectual Property Rights investment in 16 technologies took place, looking forward to raise business awareness and technology transfer. Lab2Business promoted the knowledge transfer across the agro-food sector and foster the matching between research and innovation.*

Keywords: Innovation; Entrepreneurship; Knowledge Transfer; Agrofood; Research.

Enzymatic time-temperature integrator device for chromatic quality check of Cova da Beira's cherry (Portugal)

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Abstract: *Cherry is a fruit widely appreciated by consumers in general. In Portugal, within the Beira Interior region, and particularly, Cova da Beira, is the most representative area with a production of more than 50% of the national production. The peculiar characteristics of cherries, such as color, firmness, palate, among others, increase the demand for this fruit, which can only be commercialized during a short period. Its high perishability interferes with the shelf life and consequently generates undesirable changes in the cherry flow chain. In order to ensure food quality and safety and prevent food waste, a time-temperature integrator (TTI) device to monitor the quality of the cherry in real time is proposed. This device suffers a chromatic change with the temperature variation over time. For the specific case of the cherry, the kinetic parameters for thermal inactivation are determined which leads to the proposal of an enzymatic-type TTI, where the degradation of the phenolic compounds occurs, which are substrates of the polyphenol oxidase enzyme, whose hydroxylation reaction of a monophenol in o-diphenol leads to the oxidation in o-Quinone. This device aims to help retailers to decide when and where to sell the food items taking into account the remaining shelf life, as well as support the decision of purchase by the consumer predicting through a chromatic and expedite stamp the food quality and safety*

Keywords: Cherry; TTI (Time-Temperature Integrators); enzymatic reaction; Temperature; Quality.

Review on the controlled and modified environmental conditions towards the reduction of the chilling injury of peaches

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Abstract: *The peach is a stone fruit with a very juicy yellow flesh, smooth skin and a taste that satisfies the most demanding palate. The quality of this fruit is usually determined by texture, appearance, scent, flavor, nutritional value and food safety. At the marketing level, there is a concern for valuing visual properties, resistance, manipulation and fruit preservability, allowing a longer lifetime and less food waste. Being the peach a very sensitive fruit, which deteriorates and ripens very quickly at environment temperature, it requires conservation in cold. This is the usual method for delaying the product deterioration, both in perception of the consumer as in nutritional value, allowing to extend its shelf life. However, this process causes the chilling injury. This damage is a physiological disturbance, induced by low temperatures, which affects the quality of the fruit, reduces its storage and shelf life and impairs the organoleptic characteristics of the peach. This paper provides a review of the studies assessing the chilling injury and evaluates its consequences on peaches, providing the ideal conservation parameters of air temperature and humidity, in order to improve or enhance organoleptic characteristics.*

Keywords: *Peach, Organoleptic characteristics, Chilling injury, Environmental conditions.*

MEDICINAL AND AROMATIC PLANTS (MAP) AS POTENTIAL ANTIBIOTICS TO CONTROL FIRE BLIGHT

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Abstract*: Erwinia amylovora, the fire blight bacterium, causes high economic losses essentially in pome fruit, namely apple, pear, and quince crops. In addition to yield reduction, growers are forced to adopt costly eradication and control programmes. Presently, no effective control methods for this disease are known and control strategy is being focused mainly on prevention and inoculumreduction. Thus, this study aims to evaluate the biocidal potential of several Medicinal and Aromatic Plants in relation to E. amylovora. The antibacterial effect of water extracts, obtained by maceration of 5 g of plant in 30 mL of water, of Acacia dealbata,Allium sativum, Cinnamomum camphora, Eucalyptus globulus, Laurus nobilis, Origanum vulgare, Rosmarinus officinalis, Thymus mastichina, and T. vulgaris wasassessed using antibiogramsthrough the disk diffusion method in solid medium, with streptomycin (0.02%) and water as positiveand negative control, respectively. Biocidal effects of C. camphora, E. globulus, O. vulgare, Ricinus communis, Rosmarinus officinalis, T. mastichina, and T. vulgarisessential oils were alsoevaluated. Results showed that the water extracts did not inhibited E. amylovora growth.Nevertheless, apart from Ricinus communis, all oils inhibited the bacterium growth, inducing alarger zone of inhibition than streptomycin. The plant oil withthe largest zone of inhibition of3.3 cm, was O. vulgare, followed by T. vulgaris and Rosmarinus officinalis, with 3.2 and 2.4 cm,respectively. These results suggest that further studies with these plants should be conducted toachieve valuable alternatives to synthetic chemicals, in accordance with the European and national guidelines for sustainable development.*

Keywords: Antibiograms; Biocides; *Erwinia amylovora*; Organic Farming.

Evaluation of the properties of dehydrated cherry obtained through hot air dryer and solar dryer

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Abstract: *The cherry in the fresh state has a very high-water content giving rise to a rapid deterioration which provides a shortening of its shelf life. Modern preservation processes at temperatures ranging from 0 to 2 ° C and high relative humidity (RH) allow for a period of commercialization of up to 1 month. This period of time may be short in periods of higher fruit yield making it difficult to dispose of the products, leading to the loss of products with a consequent loss of income for producers. Lower-class cherries, but of significant economic value, may also not be marketed, further lowering the economic situation of producers. The availability of this product in the dehydrated state is now a good opportunity to reduce losses, improve producers' incomes and offer new products of interest to consumers In the present study, we performed the dehydration of the "DO SACO" type fresh cherry from the Central Portugal, in the hot air dryer (15 kg) and in the solar dryer (15 kg), as well as dehydration of fresh ginned cherry involved in an ascorbic acid solution in the solar dryer (15 kg). We also evaluated the physic-chemical and microbiological characteristics of the cherry in the fresh state and the dehydrated products obtained in both dryers. The results obtained in the drying processes allow us to conclude that both dryers have a good performance for cherry dehydration, being drying faster in the hot air dryer and slower in the solar dryer. The physicochemical characteristics of the final products are similar in both drying processes, with slight alterations in some analyzes of the cherries involved in ascorbic acid dehydrated in the solar drier caused mainly by the effects of environmental conditions. In relation to the results of the microbiological analyzes we can conclude that they are quite satisfactory, proving the harmlessness and salubrity of the products.*

Keywords: *Cherry, cherry pass, hot air dryer, solar dryer*.

Innovation requirements and specialized services in agrifood industries of North of Portugal

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Abstract: *Innovation is a determining factor for the development of territories, countries and regions being considered a competitive key advantage and a survival issue for companies in the near future. Innovation can result from a conscious, methodical and systematic search and analysis of opportunities. Studies divide the concept into different types or categories: product innovation, process innovation, technical innovation, administrative management innovation or management innovation, radical innovation and incremental innovation, and other authors that state there are no different types of innovation, but just attributes of innovation. The aim of this work was to identify the requirements and specialized services of innovation in the agrifood industry of North of Portugal, namely Alto Minho, Cávado, Ave and Porto Metropolitan Area. The empirical study was elaborated through the construction of a questionnaire, and implemented, face-to-face, to the selected industries: meat, dairy, wine and horticultural sectors. It was possible to cover 15 companies and validate their responses. According to the data obtained, 80% of the companies surveyed, do not have a diagnostic or an innovation plan. The main obstacles to innovation are the lack of economic resources (21%), the lack of technical resources (21%) and the unawareness of the state support measures and services (17%). More than 70% of companies have never participated in R&DI projects (research, development and innovation). The major requirements of specialized services, pointed out, are mainly: development of new products or their improvement (30%); developments in the area of nutrition and health (19%); and improvement of processes and food quality (16%). In addition, more than half of the companies surveyed would be interested in participating in funded R&DI projects.*

Keywords: *Innovation; Agrifood Industry; Innovation requirements.*

Extraction and quantification of DNA in Rocha pear (*Pyrus communis L.*) and processed Rocha pear products

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Abstract: *The authentication of food products is essential for the protection of the consumer, and to verify compliance with legislation. The use of DNA markers allows the identification of varieties, breeds and species used in food production. The aim of this work is to compare methods of DNA extraction in Portuguese traditional pear cultivar Rocha (Pyrus communis L.) and its processed products to ensure good quality and quantity of extracted DNA for further analysis. Extraction of genomic DNA was carried out in green leaves, fresh fruits and their processed products (jam and juice) by the following methods: method I - a modified CTAB method; method II – a DNA extraction kit (Dneasy®PowerPlant®Pro Kit) and method III - a popular school recipe (homogenization in salt solution with commercial detergent, precipitation of DNA with cold alcohol). The quality and quantity of the DNA obtained was verified by electrophoresis and DNA quantification by fluorometry. Method I, widely used in the extraction of DNA in leaves, revealed satisfactory results for leaf and fresh fruit, but not for the remaining products. Method II proved to be the most effective for leaves and fresh fruits. DNA extracted with method III didn´t yield DNA with the necessary quality. The suitability of these methods in producing DNA with sufficient quality for marker amplification is further discussed.*

Keywords: *Genomic DNA, Pyrus communis L., Rocha pear.*

Physicochemical analysis of ham from entire male pigs raised with different feeding and housing conditions

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Abstract: *This study aims the evaluation of physicochemical parameters of cooked ham producedwith entire male pigs raised under specific conditions of feeding and housing. Meat from entiremale pigs raised under six different conditions (normal housing versus improved housing, fed withdifferent levels of added inulin: 0%, 3% and 6%) was used to produce six batches of cooked ham,processed under the same conditions. Samples were coded as N0%, N3%, N6%, C0%, C3% and C6%, where "N" means normal housing, "C" improved housing and 0, 3 and 6 correspond to percentage of added inulin in animal feed. Texture Profile Analysis, pH and moisture content were determined. ANOVA and a Principal Component Analysis (PCA) based on correlations using allcases and also using the means were carried out to emphasize variation and check if there werepatterns in the dataset. Results showed that 6% of inulin led to significantly lower values ofhardness and chewiness, and groups with improved housing had lower values of pH. No differencesin moisture content and cohesiveness were found although PCA patterns revealed groups of meatsamples from animal fed with 6% of inulin with similar behaviour in every housing conditions. It can be concluded that different feeding and housing conditions have effects on ham characteristics.*

Keywords: Cooked ham; entire males; inulin feeding; improved housing

EVALUATION OF MATURE BANANA PEEL FLOUR ON PHYSICAL, CHEMICAL AND TEXTURE PROPERTIES OF VEGETABLE GLUTEN-FREE RISSOL

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Abstract: *The peel of banana that represents about 35% of the total fresh mass of ripe fruit has been underutilized despite the beneficial health advantages for humans and the ability of offering new product with standard composition for various industrial and domestic uses. The banana peel is rich in dietary fiber, protein, essential amino acids, polyunsaturated fatty acids, antioxidant compounds and potassium. Recently, it has been reported the possibility of using banana pulp or peel flour as a functional gluten-free ingredient to produce gluten free products with high nutritional value and good quality. The objective of this study was to develop a nutritious gluten-free vegetable Rissol with mature banana peel flour.*
The work focused on texture, color, water activity and chemical (carbohydrate, total sugar, crude fiber, chlorides and lipid content) properties behavior of gluten-free Rissol. At the same formulation base two concentrations of mature banana (Nanica Cavendish) peel flour were added: 5% and 10%. A trial without addition of banana peel flour was also made (control). Results showed that the replacement of 10% of rice flour for mature banana peel flour increased 5-fold the fiber content when compared to the control ($p<0.05$). No significant differences ($p>0.05$) were found on carbohydrate, total sugar, crude fiber, chlorides and lipid content and on water activity. Regarding Rissol texture characteristics, the increase of banana peel flour content increased slightly the hardness, springiness and chewiness values. The addition of 10% of banana peel flour to the formulation caused a darkening of the color (L/b) by 1.5 fold ($p<0.05$). From this work it was concluded that mature banana peel flour can be added to a gluten-free Rissol with positive impact on its nutritional, texture and color properties without changing its typical characteristics.*

Keywords: Banana peel flour, Rissol, texture, gluten-free

EVALUATION OF NO ADDED SUGAR, GLUTEN- AND LACTOSE-FREE CEREAL BARS MICROSTRUCTURE AND TEXTURE USING DIFFERENT HYDROCOLLOIDS AND DRYING TEMPERATURES

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Abstract: *Organizations responsible for public health throughout the world have been increasingly concerned with the feeding of populations, by encouraging a nutritious and balanced diet in order to decrease the occurrence of chronic diseases, which are constantly related to an inadequate diet. Cereal bars were introduced over a decade ago as a "healthy" alternative confectionery, and became a practical food, as it can be easily consumed, do not require any preparation and are a source of essential nutrients (vitamins, minerals, fibers, proteins and complex carbohydrates).*
In this work a gluten- and lactose-free cereal bar with no added sugar, suitable for lactose intolerants and for celiac people was developed. The cereal bar was formulated with extruded rice, oat flakes, flaxseeds, sesame, sunflower lecithin, hydrocolloids, maltodextrin, mannitol, maltitol syrup and sodium chloride. The effect of different hydrocolloids, locust bean gum, pectin and carboxymethilcellulose, and drying temperatures, 20°C, 60°C and 70°C, on microstructure, physical and texture properties of the cereal bars was assessed by an experimental design based on Taguchi method.
Results indicated that despite the type and levels of the hydrocolloids studied water activity and moisture content showed no differences ($p>0.05$). On the contrary, these same parameters decreased with the increase of the drying temperature. Hardness and fracturability values increased with temperature increase ($p<0.05$). From the Scanning Electron Microscopy analysis, it was concluded that highest temperature studied provided a more uniform microstructure of the cereal bars. The application of the Taguchi method, allowed identifying the temperature as being the factor of greater influence on the characteristics of the cereal bars. In addition, according to this method, the composition of the optimum formulation is with 0.05% locust bean gum and 0.1% pectin at 70°C.

Keywords: Cereal bars, no-sugar, gluten-free, lactose-free, texture, microstructure, sensory analysis.

TRUST IN MANAGEMENT AS A KEY ON THE DEVELOPMENT OF A SAFETY CULTURE AT AGRIFOOD INDUSTRY, USING BIOLOGICAL AND PSYCHOSOCIAL RISKS AS ANTECEDENTS

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Abstract: *This paper intends to present the theoretical frame that supports the development of a new concept on the safety culture at agrifood industry. There are still some difficulties on the definition of what constitutes a safety culture, which are the dimensions that can be integrated and how they are related. Fernández-Muñiz, Montes-Peón e Vazquez-Ordáz (2007) present a conceptual model that aims to identify some of the critical dimensions of this safety culture. The model was adapted to Portugal by Job and Silva (2017) and one of the main results is that managers have a key role in the development of the safety culture. Therefore, we intend to test organizational trust in management as a key dimension in the building of the safety culture, using biological and psychosocial risks as antecedents. Organizational trust in management in this paper will be tested as a mediator or moderator of biological and psychosocial risks, and its role will be analyzed towards the building of a safety culture. Organizational trust in management is a key psychological construct that has no previous studies conducted on this sector, neither on this specific dimension, such as safety culture. Previous work on trust as showed that it can be a moderator or a mediator depending upon the context, and has a key role on organizational efficiency, commitment and development.*

Keywords: Organizational trust; Organizational Management; Occupational Health and Safety; Agrifood Industry; Biological and Psychosocial risks.

Optimization of storage silos for multi-coloured dry pasta production

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Abstract: *The objective of this study was the management of storage silos in a dry pasta production process company between the manufacturing and packaging stages (silage), in order to optimize the mass production of multi-coloured dry pasta. This industrial unit has 60 silos, all with the same storage size, distributed into 4 batteries, each with 15 silos. For this study, the database of manufacturing and packaging lines was updated to support the planning and quantification of the minimum batches for multicolour dry pasta production. The good management of silos is a difficult task that depends on several factors and it is of special importance in the production of the bicolour, tricolour or four colour dry pasta, called specialties. This production requires extreme attention, since the factory has 60 silos of cut pasta and the final production can only start when all the colours were in the respective silos. It is defined that for each mass production with more than one colour, should be used no more than 15 silos. Therefore, it is important to define minimum batches of mass production with more than one colour, so that the production can be optimized, and the waste reduced without affecting the quantity of silos available to the normal operation of the packaging lines. In this way, the data and the capacities of the lines were crossed and the ideal quantities of these products were calculated. The decision matrix was elaborated on the basis of updated data and takes into account essentially the sieves and packaging lines, to which the mass should be forwarded. Thus, a smooth flow of each of the coloured pasta is achieved, reducing waste and a normal operation of the production and packaging lines.*

Keywords: *dry pasta, decision matrix, optimization of production.*

Development of a decision matrix to support the filling management of multicolored dry pasta in storage silos

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Abstract: *The objective of this work was the development of a decision matrix to support the management of silage between the production and the packaging of multi (bi, tri and four) coloured cut pasta in a dry pasta industry. During this work, the management of silos was done together with the manufacturing and packaging in a programmed way, taking into account only the experience and dedication of both teams, without the support of any tool. Thus, it was intended to create a matrix that helps the decision to conduct the mass after production, taking into consideration the availability of silos and packaging lines. The decision matrix will connect the manufacturing outputs and the packaging inputs. For an efficient silo management, it is also necessary to define the maximum quantity of cut pasta produced with more than one colour, to minimize waste product with colour change, and maintain correct silo management.*

The decision matrix was developed in Microsoft® Excel- It is a simple matrix that relates the products /references, the moulds of manufacture and the preferential and alternative packaging lines, if it exists, and the consequence of the mass being placed in the first, second, third or fourth battery. Using this table, it is known immediately which the best battery is to put the pasta and if it is not available which one is necessary to pack. The set of matrix information with the most realistic planning data are the tools necessary for the normal and continuous operation of the manufacturing and packaging lines. It is also concluded that with the use of adequate planning, production of pasta with more than one colour with maximum and minimum quantities defined and using the decision matrix, it is not necessary to purchase new equipment.

Keywords: *dry pasta, decision matrix, optimization of production.*

Technological modernization and innovation of traditional agri-food companies based on ICT solutions – the Portuguese case study

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Abstract: *This paper assesses the potential for technological modernization and innovation based on Information and Communication Technologies (ICT) in traditional agri-food companies located in the central region of Portugal. A survey was applied to 50 agri-food companies of Cereals, Cheese, Olive oil, Dry sausages, Honey, Wine, and Horticultural sectors. Survey results can be summarized as: The majority of companies use computers and have Internet service. Most of companies do not have a webpage and neither use Internet for advertising campaigns, selling or buying products. Half of companies use social networks for business purposes. Most companies have not promoted the training in ICT of their collaborators in the last year. Companies claim that possessing a webpage and attending ICT training will be the technological solutions that will improve their productivity and/or marketing products and services. For each sector, recommendations and suggestions were provided in order to promote the use of ICT for business purposes. The required ICT solution was developed to a limited set of companies. The main ICT-based solutions developed were company webpages and Facebook pages. A CRM system was developed for one company. A satisfaction survey was carried out at the end of the implementation of the ICT solution. Companies' managers were highly satisfied with the ICT specific solution developed for its company and they affirmed that the company sales increased due to the web visibility gained by the company products.*

Keywords: ICT; agri-food industry; innovation; survey; case study.

Energy consumption and energy efficiency measures in the Portuguese food processing industry

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Abstract: *In the present study, simple energy surveys and audits were performed in 60 companies of the processing industry of meat, dairy, horticultural and bread and pastry products. 20 of the companies analyzed were located in the North region, 21 in the center region and 19 in the Alentejo region. The number of refrigeration chambers, the building infrastructure and the energy consumptions of the equipment used in the manufacturing processes were evaluated. This study allows to compare the energy consumption of the different manufacturing processes of regional food products. The aim of the study is to present several measures and best practices aimed for the improvement of the energy efficiency of the food sector as all. The implementation of simple and very cost-effective transversal electricity savings measures such as awareness and/or training of operators, proper maintenance and monitoring tasks, can benefit the sector. The tailored energy efficiency measures by sector are discussed. These energy efficient practice measures can offer savings on several levels, which may increase productivity and competitiveness and improve the environmental impact, and thus the global sustainability of the Portuguese food sector.*

Keywords: energy, surveys, meat, dairy, horticultural, bread and pastry, consumptions, efficiency.

Evaluation of the effect of addition of fresh and dried starter cultures on physicochemical and sensory characteristics of a traditional Portuguese smoked sausage *Chouriço*

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Abstract: *Traditional sausages - smoked, fermented or dried - have a long history in Portugal where there is a wide variety of typical preparations. Bacteriocins production by lactic acid bacteria (LAB) for food biopreservation is one of the technologies that has attracted the attention of the food industry, which is interested in decreasing chemical additives in their products to meet consumer's expectations for healthier foods.*

This work aimed to ascertain the effect of the addition of fresh and dried starter LAB cultures- an autochthonous lactic acid bacteria strain (Lactobacillus plantarum ST153Ch), on physicochemical and sensory characteristics of "Chouriço Vinha d'Alhos".
"Chouriço" with addition of fresh and dried culture and control (no starter culture added) were produced at industrial level. Samples were stored at 4 ºC for 120 days. Water activity (a_w), pH, moisture content, instrumental hardness, adhesiveness and instrumental colour (L, a*, b*) were determined. Sensory evaluation through a QDA test was carried out. ANOVA with Tukey HSD test was used to investigate significant differences in physicochemical parameters and Canonical Variables Analysis (CVA) was performed to discriminate groups of samples in sensory evaluation.*
Significant differences were observed ($p<0,05$) in moisture content, pH, a_w, hardness, adhesiveness and in colour, during storage period. CVA revealed that the panel did not found differences in both inoculated samples compared to the control.
Both, fresh and dried starter cultures changed "Chouriço" physicochemical characteristics, however those changes were well accepted by the panelists, meaning that biocontrol with L. plantarum ST153Ch, fresh or dried, can be applied successfully.

Keywords: Chouriço; Cured smoked sausages; Lactic acid bacteria; Physicochemical characteristics; Sensory evaluation

ADDING VALUE AND INNOVATION IN DAIRY SME'S: FROM BUTTER TO PROBIOTIC BUTTER AND BUTTERMILK

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Abstract: *Enhancing the nutritional and economical value of the existing products of small/medium size dairy enterprises (SMEs), as well as optimizing their preparation, are two key steps for their survival in today's competitive market. The use of probiotic fermented dairy products is a trend in the food industry driven by consumer´s acceptance and awareness of their health benefits.*

This investigation works as a case study on how dairy SMEs can innovate and add-value to their existing products with small investments. The aim was the production of probiotic butter, a novel dairy product, with the side possibility of buttermilk (byproduct) valorization. The process was monitored to confirm the quality and the minimum microbial counts required to claim the probiotic properties of the products (10^6-10^7 CFU g^{-1}).

Pasteurized milk inoculated with the commercial probiotic starter Lyofast CPR1 was added to cream, alone or in combination with aromatic starters (conventional product) and allowed to ferment during 34 h. The number of probiotic microorganisms throughout cream maturation remained high, with a final value of around 2.2×10^8 CFU mL^{-1}. The pH decreased from 6.5 to 4.6 reflecting the lactic acid production. The obtained butter presented values higher than 9.7×10^6 CFU g^{-1}, within the reference values required to be considered as a probiotic. Butter samples with probiotics were softer and presented higher humidity levels. Simultaneously, fermented buttermilk was obtained also the potential to be commercialized as a probiotic dairy beverage.

Keywords: Probiotic, butter, buttermilk valorization, SMEs innovation

DIELECTRIC HEATING AS A TOOL TO REMOVE PESTS IN GRAINS

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Abstract: *Pests thriving on stored cereals are a problem of increasing concern as global warming make the warm seasons longer. With higher temperatures and longer growing period the need of toolsto control pests are more necessary. The use of toxic pesticides as phosphine is unrewarded and physical methods of control are preferred. Dielectric heating can heat up the eggs and larvae insidethe kernel without increasing the average temperature of the grain, thanks to the larger dielectric loss coefficient of the insects as compared with characteristics of the grains. This differential is higher aswavelength becomes shorter, accompanied with a greater penetration of the radiation.*

Rice batches were prepared by placing a large number of insects on rice and letting them for 5 daysto achieve an oviposition degree of 2 eggs/g before removing the adults. These samples were exposedto different dielectric treatments (both on microwave or radiofrequency) with an energy densityof upto 250 J/g. The number of insects emerging from treated grains were reduced largely without anexcessive increase on the bulk temperature, but the efficiency of the treatment was dependent on thegrain moisture. Rice moisture has a technical bottom limit since kernels which are too dry would reak on the mill.

Keywords: dielectric heating; microwaves; radiofrequency; dielectric loss factor; cereal pests

CONTROLLED ENZYMATIC HYDROLYSIS OF ALMOND SKINS TO INCREASE SOLUBLE FIBRE CONTENT

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Abstract: *Food industry produces large amounts of by-products of potential value. These by-products arediscarded because they fail on some properties. One of the strategies to valorize these by-products is to obtainextracts rich in one substance of interest. In this piece of work the authors propose an approach to improvethe quality of almond peels to amend some of their deficiencies and still stay as close as possible to theoriginal product. Almond peels are known to be rich on polyphenols, but the fibre that contains is mainlyinsoluble fibre. From the dietary point of view soluble fibre is more interesting for its prebioticeffect. By a partial hydrolysis a large part of the insoluble fibre will be converted into soluble. Thefollowing parameters were included into a Plackett-Burman experimental design: Temperature, reactiontime, concentration of Pectinex enzyme, concentration of Viscoflow enzyme, pH, ionic strength, substrateconcentration. Lignin and cutin, hemicellulose and cellulose contents (Van Soest method) were measured,along with the soluble dietary fibre content (Prosky method) as response factors. The factors thatsignificantly modify the ratio between soluble and insoluble fibre were ionic strength and dilution. The bestconditions were with short reaction time, high ionic strength, moderate temperature and acidity. Pectinexenzyme can be avoided without any significant effect on the outcome of the hydrolysis.*

Keywords: enzymatic hydrolysis; soluble fibre; prebiotic; almond peel

A study of R&D collaboration and the use of biotechnology techniques in the development of bio-based products and agri-food business competitiveness

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Abstract: *The competitiveness of the agroindustrial sector depends not only on its specific performance but also the character and degree of the innovation performance, vital to the creation of added value and differentiation in the bio-based value-chain. The great advantage of biotechnology as a tool for technological and economic innovation is its character, sustainable nature and technological excellence.*

This work involves the diagnosis of biotechnological tools use, as the ideal technology for developing appropriate solutions from food safety to food quality, improving health and achieving new ingredients and/or foods products within AAPIM (Farmers association for mountain fruit integrated production) SMEs associates, integrated into the study of R&D existing collaboration practice. In this sense, this work analysed the innovation degree and its source in different agri-food subsectors (wine culture; fruticulture; olive culture) to sustain a future action plan and the creation of a stock exchange of ideas with solutions to enhance the business competitiveness. The methodology chosen was through a survey launched to a convenient sample of the AAPIM SMEs associates.

In general, we registered that the business companies inquired do not do research in biotechnology activities or develop other biotechnology activities. Also, were registered businesses as primary companies with a low volume of commercial billing, regardless of the activity subsector where are included. Only 27.3% claimed to have developed research activities in partnership with external research centres, not associated with higher education institutions. The barriers to the implementation of biotechnology techniques considered as more relevant by respondents were the access to capital and specialized human resources, and the less relevant were the development of patent or industrial properties rights, the access to the international market, channels of distribution, public acceptance or legal requirements.

In the future and considering the results from the SMEs diagnosis, it will be developed as an action a plan targeted to launch new products and analyse their market acceptance with the support of R&D network.

Keywords: Innovation, biotechnology, Agri-food sector, R&D collaboration

Current status and future trends of computational methods to predict frost formation for demand defrost control systems

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Abstract: *Nowadays, the increasing energy prices and associated environmental concerns lead the refrigeration systems' developers and manufacturers to develop more energy efficient and sustainable equipment and devices. On the most demanding systems, intense usage results in the fast accumulation of ice on the evaporator fins that reduces the efficiency and may even clog the system. These systems often have time-controlled defrost cycles, that heat the evaporator, melting the ice and allowing the system to keep working normally after the defrost cycle. This cycle consumes extra energy and causes a thermal imbalance on the refrigerated space, that may result in a worst refrigeration quality. If it was possible to avoid the defrosting cycle passively (without energy consumption) its efficiency would greatly increase, and the refrigeration temperature would be more stable. Currently defrost cycles cannot be avoided in an economically viable way, although new designs, materials and configurations show promising results, and are currently being investigated. These studies require experimental tests that may become expensive as several geometries, topologies, materials and surface treatment combinations should be evaluated. To access the efficiency before these experimental tests, computational models that simulate frost formation could predict with some accuracy which of the most promising configurations should be then tested experimentally. The present paper aims to review the computational methods to predict frost formation and compare them for possible usage in the computational study of evaporators. Additionally, the future trends of the simulations are discussed, taking into account physical and mathematical models, numerical procedures and the accuracy of the dynamic pattern of the predictions.*

Keywords: Demand defrosting, frost measurement, controlling strategy, frost detection, evaporator design, finned tube evaporators.

Essential Oils of Aromatic and Medicinal Plants Play a Role in Food Safety

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Abstract: *The consumers' demands for more traditional, and healthier food products, such as the Mediterranean diet foods, have led to a search for alternatives that may replace synthetic by natural ones. Essential Oils (EOs) are natural substances extracted from Aromatic and Medicinal Plants (AMPs) that are important in food preservation contributing to safety and shelf-life extension of food products. A number of studies have shown that both AMPs themselves, as well as their EOs have antimicrobial activity, particularly antibacterial and antifungal activities. Indeed, our in vitro studies have shown that oregano and thyme. EOs are effective against foodborne bacteria, isolated from fermented meat products and cheeses, such as Escherichia coli, Listeria monocytogenes, Salmonella sp., and Staphylococcus aureus. On the other hand, EOs of thyme and oregano seem to control the growth of fungi, namely Botrytis cinerea, and Aspergillus spp., affecting the shelf-life of fruits during postharvest. The EOs of sage and rosemary have shown little or no antimicrobial activity. Shelf-life extension studies using several EOs (cinnamon, clove, oregano, rosemary, sage, and thyme) and AMPs were performed using pork meat, goat cheese, strawberries and table grapes. An impregnated dressing containing the EO was put on the inner surface of plastic packages for meat and fruits, while EOs were directly used as ingredients in the manufacture of soft cheese. Preliminary results regarding food safety and sensory acceptability are discussed. Furthermore, AMPs may be interesting alternatives to replace or reduce food additives.*

Keywords: aromatic and medicinal plants; essential oils; food safety; food preservation; shelf-life.

Efficient cooling at post-harvest phase: a comparative study between peach air-cooling and hydro-cooling processes

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Abstract: *The pre-cooling of peaches is a very demanding process regarding energy conservation and management. Inappropriate cooling techniques and cooling times lead to post-harvest phase losses, resulting in wasted energy and produce. This work studies the difference in cooling time between air and hydro-cooling and the influence of peach size in their cooling time in the post-harvest phase. A numerical model was developed to evaluate the peach temperature during the pre-cooling stage. The results from the model were compared with experimental data and a set of correlations of the half-cooling time and the seven eighth cooling time as a function of the peach size were developed. Globally, the information provided in this work in terms of cooling times in both air and hydro cooling equipments could be used to improve the efficiency of the pre-cooling process by keeping the quality of the produce but reducing the energy consumption by peach.*

Keywords: Pre-cooling; Computer modeling; Post-harvest; Peach; Experimental behavior

Para mais informações sobre o projeto, contactar através de **geral@maisagro.pt** ou diretamente os promotores do projeto

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