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Abstracts

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EDITORS ABSTRACT

Every four years, the Federation of the European Nutrition societies (FENS) organizes a scientific conference that brings together European and Pan-European experts to discuss most recent scientific developments in the food, diet and health arena. The 12th FENS conference took place in Berlin, October 20 to 23, 2015, under the hospice of the German Nutrition Society with the motto “Nutrition and Health during life cycle – science for the European consumer”. Sessions were dedicated to latest research and outcomes of studies on the impact of diet into body functions, on dietary intake and dietary status of the population and of specific groups as well on the role of diets in disease occurrence and prevention. Translational research addressed strategies and approaches to change dietary behavior and policy measures. Four plenary sessions framed the program with distinguished speakers covering health aspects in the life cycle but also the global dimension of food security.

The present supplement comprises the 950 submitted abstracts and additional 320 abstracts of invited and selected speakers. The abstracts are ordered according to the scientific sessions of the conference, and the industry sponsored satellite activities, and posters. Within the program up to eight scientific sessions were held in parallel with thematic areas of (1) Food and nutrient intake, dietary patterns, dietary guidelines, (2) Advances in dietary studies, methodology and design, (3) Metabolic diversity, (4) Nutrition, public health, chronic diseases, and (5) Food quality, food safety, sustainability, consumer, behavior and policy.

The supplement can be searched with pdf-tools by using keywords such as authors, topics, specific compounds, etc.

Keywords: Nutrition, Nutrition policy, FENS, German Nutrition Society

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Introduction: In recent years, interest by consumers for tradi-tional foods has considerably increased. Hydration properties affect cooking time, functional and nutritional quality of legume seeds. So far insufficient work has been carried out on rehydration modelling of lentil and grass pea landraces. The widely used Peleg's equation pre-sents several limitations, making necessary a reevaluation of models for describing hydration kinetics.

Objectives: The present study aimed at the evaluation of the hy-dration properties of lentil and grass pea local ecotypes by comparing different models, including the Peleg's method.

Method / Design: Seeds of lentil and grass pea ecotypes were provided by local farmers in National Parks of Apulia and Campania regions. Mathematical models were applied to weight gain of seeds during hydration in water up to 24 (lentil) and 72 (grass pea) hours. Kinetic constants $\tau(\exp)$ by the exponential method, K1 and K2 by the Peleg's equation and $\tau(\text{sigm})$ (soaking time at 50% saturation) by the sigmoid model were calculated.

Results: The exponential model was successfully applied to re-hydration of all lentil and grass pea seeds from 2 to 24 hours. Some seeds required evaluation for short hydration times (0-2 hours) by a linear model. Peleg's method had limited application, whereas sigmoid model was not suitable to describe hydration kinetics of legume seeds.

Conclusions: The model proposed here, based on the exponen-tial method complemented, for some seeds, with linear model for hydration times up to two hours was suitable to describe water uptake of lentil and grass pea landraces.

The research was funded by the MiPAAF-Project "TERRAVITA".

Keywords: (maximum 5): LENTIL, GRASS PEA, HYDRA-TION, PELEG

149/161. Food systems and climate change impacts

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Introduction: As the global Population climbs steadily towards 9billion, natural systems that support us all may not be able to with-stand the pressure that this growth exerts. Water scarcity, land degra-dation and the loss of natural (ecosystem) services we all depend on, point to fundamental problems caused by unsustainable development. Food safety and factors that determine it are experienced at the level of the household and the individual. The direct causes of inadequate food access are poverty, environmental stressors and conflict. These account for 50% of the identified indirect drivers of food insecurity.

Objectives: This paper provides a short description of the poten-tial influence of climate change, variability on food systems and local adaptation strategies as it affects food security.

Method / Design: With the shift towards Sustainable Develo-pment Goals (SDG) to replace the Millennium Development Goals (MDGs) after 2015, approaches that severe multiple purpose and provide cross-cutting benefits are highly needed. Thus sustainable food systems requires a comprehensive approach, like the Ecological based approach (EbA); that incorporates numerous fields of planning and considers a wide range of factors, which could be socioeconomic; political or environmental in nature.

Results: Adopting Ecological based approaches has helped built efficient food systems and resilient livelihoods, and ultimately achie-ved food security in a changing climate.

Conclusions: If the critical impacts of climate change are not addressed, the impact on sustainable food systems will be numerous, placing added pressure on already limited land space and natural resources.

Keywords: (maximum 5): Global Population, Climate change, Sustainable food systems, Unsustainable development.

149/168. Preparation of α -lipoic acid/chito-san microparticle conjugate and its in vitro antioxidative activity

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Introduction: Alpha-Lipoic acid (LA) has gained considerable attention as a nutraceutical agent due to its various medicinal proper-ties. Despite its safety and effectiveness LA utilization is limited by its low bioavailability and stability. Recently, there has been an increasing interest in the developing of efficient oral delivery systems, such as LA/chitosan conjugate, for protection and controlled release of LA to enhance its oral bioavailability with improved biological potential.

Objectives: The aim of the research was to explore, both in vitro antioxidative activity of LA upon encapsulation into chitosan micro-particles (LA/chitosan conjugate formation) and its release.

Method / Design: LA was encapsulated by dip-coating method onto ready-made chitosan microparticles of predetermined particle size, prepared by reverse emulsion polymerization technique and the encapsulation efficiency was determined, as well. Structural interactions of LA with chitosan within the conjugate were revealed by Fourier Transform Infrared (FT-IR) spectroscopy and Differential Scanning Calorimetry (DSC). Also, the prepared LA/chitosan con-jugates were evaluated for in vitro released LA antioxidative activity.

Results: The applied technique allowed the production of chito-san microparticles with an average diameter between 135 μm and 169 μm , in its dried state. Furthermore, the encapsulation efficiency of LA

was up to 50%. FT-IR analyses confirmed the presence of LA within synthesized microparticles. The disappearance of melting peak of pure LA upon encapsulation, observed at DSC thermogram, could be ascribed to the formation of LA/chitosan conjugate. A satisfactory level of antioxidative activity after sustained release of LA in pH 6.8 has been confirmed by FRAP (showing up to 56 $\mu\text{molFe(II)/gmicroparticles}$) and ABTS (showing up to 85 $\mu\text{molTrolox/gmicroparticles}$) assays.

Conclusions: The results showed that the prepared LA/chitosan microparticles conjugate could be used for encapsulation of LA and exhibited the potential of preserving its activity for a longer period of time, by improving its stability and functionality.

Keywords: (maximum 5): Alpha-lipoic Acid, Chitosan, Microparticles, Antioxidative Activity, Oxidative Stress

149/177. Performance and mineral metabolism of broiler fed commercial diet replaced by rice polish and citric acid supplementation

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Introduction: Citric acid considered as an alternate to antibiotic growth promoter in food animal. But its addition in commercial diet may not show further growth promotion effect in broiler due to saturation of all the micronutrients related to growth performance.

Objectives: Citric acid (CA) was tested for the performance of broiler using 0.5% level in commercial diet replaced by rice polish (RP) at 0, 5, 10, and 15% which is low in nutrient and economic.

Method / Design: A number of 240 day old broiler chicks were distributed into eight dietary groups (3 replicate cages having 10 birds in each) as 1=Control (commercial diet), 2=Commercial diet+0.5% CA, 3=5.0% rice polish (RP), 4=5.0%RP+0.5%CA, 5=10.0%RP, 6=10.0%RP+0.5%CA, 7=15.0%RP, 8=15.0% RP+0.5% CA. Acid insoluble ash (1% Celite) was added to the diets as a marker. At the end of the trial blood sample was collected from all the birds. Few birds were sacrificed to measure carcass characteristics and mineral content in tibia.

Results: There was no significance difference for body weight gain and feed intake among the groups. Feed conversion ratio (kg feed intake/kg weight gain) varied ($P<0.05$) among the groups where improved in CA groups comparison to non-CA group. Retention of Ca, P and Mg improved in CA group comparison to non CA groups but replacement of 5% commercial diet (with or without CA) caused higher retention level. Numerically higher dressing percentage observed in CA group comparison to non citric acid groups. Bone mineral

concentration slightly (total ash, Ca, P and Mg) increased in CA groups ($P>0.05$).

Conclusions: Replacement of commercial diet by rice polish up to 15% would be possible maintaining growth performance of broiler where further supplementation of 0.5% CA showed more advantages for mineral metabolism.

Keywords: (maximum 5): Broiler, citric acid, rice polish, performance, mineral metabolism

149/178. Effect of dietary α -tocopherol on the bioavailability of lutein in laying hen

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Introduction: Lutein and its isomer zeaxanthin is an essential dietary carotenoid required to prevent age related macular degeneration (AMD) in human, and responsible for the coloration of egg yolk in chicken.

Objectives: Considering instability of lutein α -tocopherol (α -T) was added in layer diet as an antioxidant to observe bioavailability of lutein ester (LE) reflected in egg yolk.

Method / Design: Wheat-soybean based low lutein layer diet was offered to a number of 42 Lohmann Brown laying hens for 21 days. Then birds were divided into 3 dietary groups like: control (basal diet), LE group (40 mg LE/kg feed) and LE+ α -T group (40 mg LE plus 100.0 mg α -T/kg feed) for 21 days. Carotenoid components (lutein and zeaxanthin) and α -tocopherol of yolk, blood, follicle and liver were determined by HPLC. Egg yolk was also analysed for total carotenoid using a one stop spectrophotometric method (iCheck[™]). The colour of yolk was assessed using a Roche yolk color fan (RYCF) as well as Minolta Chroma Meter.

Results: Eggs of LE+ α -T group contained higher amount of lutein, zeaxanthin, α -tocopherol and total carotenoid comparison to LE group. Blood serum of LE+ α -T group contains higher lutein, zeaxanthin and tocopherol comparison to LE group. Follicle of LE+ α -T group contains higher lutein, zeaxanthin and tocopherol comparison to LE group. RYCF score was higher in the yolk of LE+ α -T group ($p<0.05$) comparison to LE group. Similarly redness (a^*) was higher in the egg of LE+ α -T group comparison to LE group (-1.76 vs -2.28). Yellowness (b^*) and lightness (L^*) was similar ($p>0.05$) in LE and LE+ α -T groups but higher than control ($p<0.05$).

Conclusions: Dietary α -tocopherol enhances bio availability of lutein observed in yolk, blood serum and yolk follicle and supported by color parameters of egg yolk especially higher values for RYCF score and redness.