2ND INTERNATIONAL CONFERENCE
"NUTRITION AND HEALTH"

Riga, Latvia
October 5–7, 2016

CONFERENCE PROGRAM AND BOOK OF ABSTRACTS

ORGANISED BY
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RIGA STRADIŅŠ UNIVERSITY

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PREFACE

Three biggest universities of Latvia (the University of Latvia (UL), Latvia University of Agriculture (LUA) and Riga Stradiņš University (RSU)) since 2006 jointly implemented inter-university Master's study program "Nutrition Science" and now have organized 2nd international conference "Nutrition and Health" in Riga from October 5–7, 2016 (the 1st international conference "Nutrition and Health" was organized in Riga on September 2012).

The aim of the Master's program was to meet the requirement of state for experts and researchers in nutrition science, able to solve problems in the fields of nutrition and health in accordance with the requirements of EU, WHO and laws and regulations of Latvia.

Students' research activities are closely connected with the research of academic personnel of UL, LUA and RSU, and are decided to following topics: nutrition policy, public health and epidemiology, nutrition science, nutrition during human life, clinical nutrition science, new and functional food.

The aim of the International Conference "Nutrition and Health" is to give an opportunity to Latvian researchers to report their achievements and results; to foreign researchers to inform the audience about results of research on international level and on the topical problems for researchers; and to the students of master studies, as well as to all audience interested in problems of nutrition science and health to improve their theoretical and methodological knowledge in nutrition science, food science, health science and research work in these fields.

The Conference is supported by Latvian food producers Food union "Rīgas Piensaimnieks"and "Rīgas piena kombināts" (Riga Dairy Producer Ltd.), Orkla Foods Latvija "Gutta", Institute of Hortikulture (Dobele), Research Farm "Gundegas", Institute of Agricultural Resources and Economics Stende Research centre, SIA "Milzu", "Graci professional cereals" and OrklaHealth (Nutriless, Möllers), A/S OlainFarm, the Riga Tourism Development Bureau "´Live Riga", Global Harmonization Initiative (GHI).

We hope very much that this conference will provide a venue for scientific discussion and exchange of the information, for the development of common ideas, the initiation of trans-national cooperation and the facilitation of interactions between young researches and students and established experts in the area of Nutrition and Health.

Ida Jakobsone
Conference Chair
Director of the Inter-university study program
of the Master of health sciences in nutrition science

2ND INTERNATIONAL CONFERENCE

NUTRITION AND HEALTH

(Latvia, Riga, October 5–7)

PROGRAM

Wednesday, October 5, 2016 Academic Center for Natural Sciences of the University of Latvia (Jelgavas iela 1) Auditorium Magnum		
08.30 – 09.30	**Registration** **Coffee/ tea** – auditorium 107	
09.30 – 10.00	**Opening Ceremony – Auditorium Magnum** Chair: **Indriķis Muižnieks**, Rector, University of Latvia; Rectors and Vice-Rectors (University of Latvia – **Valdis Segliņš**; Riga Stradiņš University – **Iveta Ozolanta**, **Jānis Gardovskis**; Latvia University of Agriculture – **Irina Pilvere**, **Arnis Mugurēvičs**); Latvian Academy of Science – **Pēteris Trapencieris**; The Republic of Latvia Ministry of Health – **Anda Čakša**; Representative office of World Health Organization (WHO) in Latvia – **Aiga Rūrāne**; The Republic of Latvia Ministry of Education and Science – **Kārlis Šadurskis**; The Republic of Latvia Ministry of Agriculture – **Jānis Dūklavs**; The Foundation for the Support of Medical Education and Scientific Research – **Dins Šmits**; Conference Chair: **Ida Jākobsone**	
10.00 – 11.50	**Session 1. Nutrition policy, public health and epidemiology** ***Chair:*** **Anita Villerusa** (Department of Public Health and Epidemiology, Riga Stradiņš University, Latvia), **Iveta Pudule** (The Centre for Disease Prevention and Control of Latvia)	
10.00 – 10.20	**Plenary lecture 1**	**Inga Birzniece** (Latvia) *Ministry of Health (MOH) of the Republic of Latvia,* NUTRITION POLICY IN LATVIA.
10.20 – 10.45	**Plenary lecture 2**	**Randi Julie Tangvik**, A. B. Guttormsen, A. H. Ranhoff, G. S. Tell (Norway) *National Advisory Board on Disease Related Malnutrition, Oslo University Hospital,* NUTRITION AND PATIENT SAFETY.

10.45 – 11.00	**Plenary lecture 3**	**Iveta Pudule**, D. Grinberga, B. Velika, I. Gavare, A. Villerusa (Latvia) *The Centre for Disease Prevention and Control of Latvia,* NUTRITION BEHAVIOUR OF LATVIAN ADULT POPULATION.
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11.20 – 11.30	**O3**	**Evija Keisa**, D. Medne and I. Paudere (Latvia) *State social care center Riga, branch Jugla,* NUTRITION DAY 2015 IN STATE SOCIAL CARE CENTER RIGA BRANCH JUGLA.
11.30 – 11.40	**O4**	**Dace Klava**, E. Straumite and R. P. F. Guine (Latvia) *Faculty of Food Technology, Department of Food Technology, Latvia University of Agriculture,* LATVIAN CITIZENS' KNOWLEDGE ABOUT DIETARY FIBER.
11.40 – 11.50	**O5**	**Ilze Konrade**, I. Kalere, I. Strele, M. Makrecka-Kuka, V. Veisa, D. Gavars, D. Rezeberga, V. Pirags, A. Lejnieks, L. Neimane, E. Liepinsh, M. Dambrova (Latvia) *Department of Medicine, Riga East Clinical University Hospital,* IODINE DEFICIENCY IN LATVIA: CURRENT STATUS AND NEED FOR NATIONAL RECOMMENDATIONS.
11.50 – 12.15	**Coffee/ tea** – auditorium 107 **Poster Session P1 – P19**	
12.15 – 14.40	**Session 2. Nutrition during human life** ***Chair:*** **Lolita Vija Neimane** (Department of Sports and Nutrition, Faculty of Rehabilitation, Riga Stradiņš University, Latvia)**, Andis Brēmanis** (Latvian Association of Dietitians)	
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12.30 – 12.40	**O6**	**Mara Grundmane**, D. Kantane (Latvia) *Department of Sports and Nutrition, Riga Stradiņš University,* SPORTS SPECIALISTS' VIEWS REGARDING ADEQUATE WATER CONSUMPTION FOR ADULTS.
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14.10 – 14.20	**O11**	**Anna Kvasova**, V. Cauce, L. Meija (Latvia) *Department of Sports and Nutrition, Riga Stradiņš University*, EFFECT OF DIFFERENT TYPES OF BREADS ON BLOOD GLUCOSE IN SWIMMERS.
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15.10 – 15.30	**Plenary lecture 5**	**Andrejs Erglis**, K. Erglis, I. Mintale (Latvia) *Institute of Cardiology and Regenerative Medicine, University of Latvia; Pauls Stradins Clinical University Hospital,* HEART HEALTHY DIET AND LIFESTYLE: ROLE OF POLYPHENOLS IN CARDIOVASCULAR DISEASE.
15.30 – 15.50	**Plenary lecture 6**	**Iveta Mintale** (Latvia) *Latvian Cardiology Center, P. Stradins Clinical University hospital,* CARDIO AND ONCOPROTECTIVE DIETARY PATTERNS.
15.50 – 16.00	**O14**	**Maija Dambrova**, I. Konrade, J. Kuka and E. Liepinsh (Latvia) *Latvian Institute of Organic Synthesis,* TRIMETHYLAMINE N-OXIDE: DIET, MICROBIOTA AND CARDIOMETABOLIC HEALTH RISKS.
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16.10 – 16.20	**O16**	**Jolanta Rozite Viskinte**, L. Meija, V. Cauce, D. Seglina (Latvia) *Riga Health Center Imanta,* EFFECTS OF APPLE FIBER CONSUMPTION ON LDL-C CONCENTRATION IN THE ELDERLY.
16.20 – 16.30	**O17**	S. Sausa, **Somit Kumar**, V. Pirags (India) *The Arya Vaidhya Chikitsalayam and Research Institute, Coimbatore,* EFFICACY OF AN INDIVIDUALIZED AYURVEDIC THERAPY AND DIET IN TYPE 2 DIABETES.
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16.30 – 17.00	**Plenary lecture 7**	**Markus Masin** (Germany) *Deutsche Stiftung gegen Mangelernährung,* NUTRITIONAL SUPPORT IN SHORT BOWEL SYNDROME.
17.00 – 17.15	**O18**	**Diana Zandere**, J. Pokrotnieks (Latvia) *Centre of Gastroenterology, hepatology and nutritional therapy*, *Department of Endoscopy & Outpatient Department, Pauls Stradins Clinical University Hospital,* INCIDENCE (FREQUENCY) OF THE FERMENTED FOOD PRODUCT USE IN LATVIAN PATIENTS WITH GASTROINTESTINAL COMPLAINTS.
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17.25 – 17.35	**O20**	**Anda Viksna**, I. Ozola - Zalite, J. Ivanova, A. Udre, I. Kalamasnikova, A. Pukitis (Latvia) *Gastroenterology, Hepatology and nutrition therapy centre, Pauls Stradins Clinical University Hospital,* MALNUTRITION INDUCED SARCOPENIA AS A RISK FACTOR OF SEVERE ACUTE PANCREATITIS.
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Thursday, October 6, 2016 Academic Center for Natural Sciences of the University of Latvia (Jelgavas iela 1) Auditorium Magnum		
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09.00 – 10.30	**Session 4(1). Nutrition science – food safety** ***Chairs:*** **Elena Bartkiene** (Department of Food Safety and Quality, Lithuanian University of Health Sciences, Lithuania)**, Vadims Bartkevics** (Institute of Food Safety, Animal Health and Environment (BIOR), Latvia)	
09.00 – 09.30	**Plenary lecture 8**	**Elena Bartkiene**, I. Jakobsone, G. Juodeikiene, D. Vidmantiene, I. Pugajeva and V. Bartkevics (Lithuania) *Department of Food Safety and Quality, Lithuanian University of Health Sciences,* SAFETY ASPECTS OF HIGHER VALUE BREAD.
09.30 – 09.40	**O22**	**Ignacy Kitowski**, J. Cymerman, D. Wiącek and D. Jakubas (Poland) *State School of Higher Education in Chełm,* USAGE OF LEAD SHOTS AS A THREAT FOR WETLANDS AND FOOD FROM WILD DUCKS – A CASE STUDY OF MALLARDS *(ANAS PLATYRHYNCHOS*) FROM EAST POLAND.
09.40 – 09.50	**O23**	**Kristina Antonenko**, L. Briede, V. Kreicbergs, A. Viksna (Latvia) *Faculty of Food Technology, Latvia University of Agriculture,* ASSIMILATION OF SELENIUM, COPPER AND ZINC IN RYE MALT.
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10.00 – 10.10	**O25**	G. Orymbetova, **Anita Blija**, G. Shambulova, M. Kassymova (Latvia) *Department of Nutrition, Latvia University of Agriculture,* CONTAMINATION OF CORN BY AFLATOXINS IN KAZAKHSTAN.
10.10 – 10.20	**O26**	**Zane Vincevica-Gaile**, D. Varakajs (Latvia) *Department of Environmental Science, Faculty of Geography and Earth Sciences, University of Latvia*, DETECTION OF POTENTIALLY TOXIC ELEMENTS IN BERRIES GROWN IN ALLOTMENT GARDENS OF RIGA CITY, LATVIA.
10.20 – 11.00	**Coffee/ tea –** auditorium 107 **Poster Session P20 – P47**	
11.00 – 15.30	**Session 4(2). Nutrition science – new and functional food** ***Chair:*** **Daina Karklina** (Faculty of Food technology, Latvia University of Agriculture, Latvia)**, Inga Ciprovica** (Faculty of Food Technology, Latvia University of Agriculture, Latvia)	
11.00 – 11.30	**Plenary lecture 9**	**Daina Karklina** (Latvia) *Faculty of Food technology, Latvia University of Agriculture* BIOLOGICALLY ACTIVE COMPOUNDS FROM PLANTS AND NEW PROCESSING TECHNOLOGIES FOR CREATING INNOVATIVE FOOD PRODUCTS.
11.30 – 11.40	**O27**	**Eva Ivanišová**, B. Mickowska, P. Socha, I. Režová, A. Kántor, H. Frančáková, M. Terentjeva and M. Kačániová (Slovakia) *Faculty of Biotechnology and Food Sciences, Department of Plant Storage and Processing, Slovak University of Agriculture,* DETECTION OF BIOLOGICAL AND SENSORY PROFILES OF BISCUITS ENRICHED WITH TEA (*CAMELLIA SINENSIS* L.) POWDER.
11.40 – 11.50	**O28**	**Bouchra Sayed Ahmad**, E. Straumite, M. Sabovics, Z. Kruma, O. Merah, Z. Saad, A. Hijazi and T. Talou (France) *Université Fédérale de Toulouse Midi-Pyrénées, INP-ENSIACET, Laboratoire de Chimie Agro-industrielle,* EFFECT OF ADDITION OF FENNEL (*FOENICULUM VULGARE* L.) ON THE QUALITY OF PROTEIN BREAD.
11.50 – 12.00	**O29**	**Inga Ciprovica**, J. Lakstina and P. Semjonovs (Latvia) *Faculty of Food Technology, Latvia University of Agriculture,* EXOPOLYSACCHARIDES OF LACTIC ACID BACTERIA IN YOGHURT PRODUCTION: CASE STUDY.

12.00 – 12.10	**O30**	**Guna Havensone**, L. Meija, L. Balode, T. Kince, A. Lejnieks (Latvia) *Riga Stradiņš University,* GLYCAEMIC AND INSULIN RESPONSE AFTER CONSUMING BARLEY AND GERMINATED HULL-LESS BARLEY FLAKES.
12.10 – 12.20	**O31**	**Daiga Konrade**, D. Klava, I. Gramatina, S. Kampuse, T. Kince (Latvia) *Faculty of Food technology, Latvia University of Agriculture,* CRISPBREAD IMPROVEMENT WITH CARROT AND PUMPKIN BY-PRODUCTS.
12.20 – 12.30	**O32**	**Guntra Krumina**, D. Babarykin, G. Smirnova, S. Vasiljeva, N. Basova, Z. Krumina, A. Babarykina, J. Markov (Latvia) *Institute of Innovative Biomedical Technology Ltd.,* RED BEET (*BETA VULGARIS*) ROOT JUICE MEMBRANE ULTRAFILTRATION USE TO MODIFY PRODUCT'S FUNCTIONALITY.
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13.40 – 13.50	**O34**	I. Gramatina, **Sanita Sazonova**, Z. Kruma, L. Skudra, L. Priecina (Latvia) *Faculty of Food Technology, Latvia University of Agriculture,* HERBAL EXTRACT APPLICATION FOR EXTENDING SHELF-LIFE OF PORK MEAT.
13.50 – 14.00	**O35**	**Lolita Vija Neimane**, I. Konrade, G. Avotina, A. Klavina, J. Zagorska, I. Martinsone, V. Cauce, V. Baylon, A. Lejnieks (Latvia) *Department of Sports and Nutrition, Faculty of Rehabilitation, Riga Stradiņš University,* EVALUATION OF IODINE CONCENTRATION IN COW MILK IN LATVIA.

14.00 – 14.10	**O36**	**Liga Priecina** and D. Karklina (Latvia) *Latvia University of Agriculture, Faculty of Food Technology, Department of Food Technology,* INFLUENCE OF STEAM TREATMENT AND DRYING ON CARROTS' PHENOLIC COMPOSITION, ORGANIC ACIDS AND CAROTENOID CONTENT.
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15.30 – 17.00	**Excursions (UL Akademic Center for Natural Sciences; National Library of Latvia)**	
17.30	**Conference dinner**	

Friday, October 7, 2016

University of Latvia, Riga, Raiņa bulvāris 19
The Great Hall

08.30 – 09.00	**Coffee/ tea**	
09.00 – 10.00	**Session 5. Nutrition and health aspects of traditional and ethnic foods** ***Chair:*** **Huub Lelieveld** (The Global Harmonization Initiative (GHI), Netherlands)	
09.00 – 09.30	**Plenary lecture 10**	**Huub Lelieveld** (Netherlands) *GHI Board,* THE GLOBAL HARMONIZATION INITIATIVE (GHI).
09.30 – 09.45	**O37**	**Tatjana Golikova,** V. Yurchak (Ukraine) *Department of Nutrition and Restaurant Business, National University of Food Technologies,* INCREASING NUTRITIONAL VALUE OF MACARONI PRODUCTS.
09.45 – 10.00	**O38**	**Mark Shamtsyan** (Russia) *St. Petersburg State Institute of Technology (Technical University)* INFLUENCE OF UPTAKE OF BETA-GLUCANS ON METABOLIC SYNDROME AND PREVENTION OF DIABETES.
10.00 – 10.30	**O39**	**Jevgenija Jansone**, A. Pastare (Latvia) *Department of Human Physiology and Biochemistry, Riga Stradiņš University,* COOKING TRADITIONS AND NUTRITIONAL INFORMATION OF LATVIAN ETHNOGRAPHIC CELEBRATION MEALS FROM TODAY'S PERSPECTIVE.

10.30 – 11.00	**Coffee/ tea**	
11.00 – 12.00	**Session 6. WHO initiative on woman nutrition** ***Chair:*** **Aiga Rurane** (Head, WHO Country Office in Latvia)	
11.00 – 11.20	**Plenary lecture 11**	**Aiga Rurane** (Latvia) *Head, WHO Country Office in Latvia,* WHO REPORT GOOD MATERNAL NUTRITION: THE BEST START IN LIFE (2016).
11.20 – 11.50	**Plenary lecture 12**	**Laila Meija**, **Dace Rezeberga** (Latvia) *Riga Stradiņš University,* DEVELOPMENT OF LATVIAN NATIONAL RECOMMENDATIONS ON NUTRITION DURING PREGNANCY.
11.50 – 12.10	**O40**	**Ilze Straume** (Latvia) *The Centre for Disease Prevention and Control of Latvia,* CENTRE FOR DISEASE PREVENTION AND CONTROL ACTIVITIES PROMOTING HEALTHY NUTRITION.
12.10 – 13.30	**Lunch** **Press conference – Importance of proper eating for prevention of cardiovascular and oncologic diseases. Nutrition and gastroenterology diseases. Food safety. New and functional food.**	
13.30 – 14.30	**Closing of the International Conference NUTRITION AND HEALTH** University of Latvia, Riga, Raiņa bulvāris 19, The Great Hall	
	Conference board, Scientific Committee, Organizing Committee, Guests	
	Conference summary	
	Poster awards	
	Closing remarks	
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PLENARY LECTURES

PL1 NUTRITION POLICY IN LATVIA

I. Birzniece
The Republic of Latvia Ministry of Health (MOH), Latvia

One of the major manageable health risks in Europe resulting in considerable healthcare and social costs is unhealthy nutrition. To address the issues of overweight and obesity, a number of policy planning documents in Europe have been adopted – *EU White Paper on A Strategy on Nutrition, Overweight and Obesity related health issues*[1], the *EU Action Plan on Childhood Obesity 2014-2020*[2]. At the same time, to achieve well-being by improving overall health and reducing inequities, as well as to decrease the burden of non-communicable diseases, European health policy framework *Health 2020*[3] and the *WHO Global Action Plan for the Prevention and Control of NCDs 2013-2020*[4] were adopted.
To increase the number of healthy life years of Latvia's inhabitants and to prevent premature death, aiming at preserving, improving and restoring health, the Ministry of Health of the Republic of Latvia has developed the Public Health Strategy for 2014-2020[5], where the main goal, objectives and policy actions, including healthy nutrition promotion, are closely related to the European policy planning documents referred to above.
Overall, Latvia has implemented a number of legislative measures, such as the regulation on the maximum permissible content of trans fatty acids in foodstuffs[6], a normative act on nutritional norms for educates of educational institutions, clients of social care and social rehabilitation institutions and patients of medical treatment institutions[7], Law on Handling Energy Drinks[8], etc.
In order to succeed in improving healthy nutrition habits among the Latvian population, "health in all policies" approach is important. It is necessary to closely cooperate with other public sector stakeholders, municipalities, NGOs and civil society to create conditions, effective programs and interventions for preserving, promoting and restoring health.

Keywords: healthy nutrition, non-communicable diseases, legislation, health in all policies.

1 http://ec.europa.eu/health/nutrition_physical_activity/policy/strategy_en.htm
2 http://ec.europa.eu/health/nutrition_physical_activity/docs/childhoodobesity_actionplan_2014_2020_en.pdf
3 http://www.euro.who.int/en/health-topics/health-policy/health-2020-the-european-policy-for-health-and-well-being
4 http://www.who.int/nmh/events/ncd_action_plan/en/
5 Approved with the Cabinet of Ministers Order No.589 of 14 October 2014.
6 The Cabinet of Ministers Regulation No.301 of 17 May 2016 „Regulation on the maximum permissible content of trans fatty acids in foodstuffs" .
7 The Cabinet of Ministers Regulation No.172 of 13 March 2012 „Regulations Regarding Nutritional Norms for Educatees of Educational Institutions, Clients of Social Care and Social Rehabilitation Institutions and Patients of Medical Treatment Institutions".
8 Adopted by the Saeima on 21 January 2016

PL2 NUTRITION AND PATIENT SAFETY

R. J. Tangvik[1], A. B. Guttormsen[2], A. H. Ranhoff[3], G. S. Tell[4]

[1] National Advisory Board on Disease Related Malnutrition, Oslo University Hospital,

[2] Intensive Care, Haukeland University Hospital, Norway

[3] Research Center for Ageing and Dementia, Haraldsplass Hospital, Norway

[4] University of Bergen, Bergen, Norway

A strategy to improve nutritional care during hospitalisation was introduced at Haukeland University Hospital in 2006. Nutritional guidelines were introduced, hospital staff was educated in basic clinical nutrition and mealtime routines were improved. To facilitate the initiative, nutrition surveys were established. During eight prevalence surveys in 2008-9, 3279 patients were included. According to NRS 2002, twenty-nine percent of the patients were at nutritional risk. This risk was a significant factor for morbidity, increased use of hospitalisation and death. Patients at nutritional risk were identified in all disease categories and all adult ages. Every item of the initial screening tool was found to be a significant independent risk predictor. A positive response to one or more of the initial four questions in NRS 2002 was associated with increased risk of morbidity and mortality, and positive answers to all four questions were associated with a 13 times greater risk of dying during the following year. Our findings support the need for nutritional screening in hospitals. A screening tool is immensely valuable for categorising patients at nutritional risk, and NRS 2002 has been found suitable for identifying high-risk patients. Introducing a nutrition strategy improved the screening performance among the hospital staff, but did not improve nutritional care that the patients received. Therefore, more intense efforts are necessary to improve nutritional practice and staff knowledge in hospitals.

The Norwegian Patient Safety Programme: In Safe Hands, originally launched in 2011 as a patient safety campaign, continues as a five-year programme (2014–2018), commissioned by The Norwegian Ministry of Health and Care Services, and carried out by the Norwegian Knowledge Centre for the Health Services. The overall aim is to reduce patient harm and improve patient safety. During June 2015, nutrition was launched as a new target area in the Norwegian campaign to contribute to patient harm prevention. A group of nutrition experts is established to identify a package of intervention to be carried out. Screening for nutritional risk, prevention and treatment of disease related malnutrition and monitoring of nutritional practices should be given priority. Pilot projects will be implemented in a university hospital and a nursing home during 2016. The pilot project will be evaluated prior to national implementation of the interventions in 2017.

PL3 NUTRITION BEHAVIOUR OF LATVIAN ADULT POPULATION

I. Pudule[1], D. Grinberga[1], B. Velika[1], I. Gavare[1] and A. Villerusa[2]

[1] Department of Research and Health Statistics, Centre for Disease Prevention and Control, Riga, Latvia

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Unhealthy eating behaviour is a severe risk factor, which can lead to obesity and also to several non-communicable diseases, e.g., coronary heart disease and type 2 diabetes.

The survey on the Health Behaviour among Latvian Adult Population was carried out in 2014. The total sample size was 3004 people aged from 15 to 64. The sample was stratified by gender, age, place of residence and nationality. The data was collected by face to face standardised interviews. The survey items included eating behaviour.

There was a low proportion of the daily consumption of fresh vegetables and fruit among both genders; only 29.8% of men and 43.2% of women reported daily vegetable consumption, 13.3% of men and 26.8% women ate fruit daily. Men and women with higher education consumed fresh vegetables and fruit more often than people with a lower level of education.

The proportion of respondents who did not add salt to their food during mealtimes was 28.8% of men and 47.8% of women. There was a difference of 11 percentage points between the lowest and highest educational group.

In conclusion, there were clear differences in eating habits between gender and socio-economic groups: women had healthier eating behaviour than men. The highly educated individuals ate healthier food compared to the people with low educational levels. Consequently, health promotion strategies need to be tailored for different socioeconomic groups.

PL4 NUTRITION AND ITS ROLE IN LATER HEALTH – FOCUS ON PROTEIN INTAKE

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The role of nutrition in early life is essential in supporting later health. The first 1000 days from the day when the egg is conceived are the most influential of the child's future health. Nutrition is one of the factors having a protective impact on the risks of many non-communicable diseases. During the early life, there are several sensitive periods where nutrition has a role in decreasing risks of diseases and thus supporting future health. These sensitive periods are pregnancy, lactation/early nutrition, introduction of complementary feeding and toddlerhood.

After the first year of life the child begins to eat the same meals as the whole family. From energy yielding nutrients, a high protein intake in early life has an association with a later risk of being overweight or obese. According to the Nordic Nutrition Recommendation (2012) based on a systematic review, there is convincing evidence of the association between an abundant protein intake in infancy as well as early childhood and an increased risk of obesity in childhood and adolescence. According to a few studies, animal protein intake, especially dairy protein, has a stronger association with later BMI compared to protein intake from meat or cereal. Since the lack of protein is not a problem in most of the European countries, there should be a focus on the diet during the second half of the first year of life and the second year of life. It is important to limit high protein sources and consume only reasonable amounts of ordinary cows' milk products during this time. The amount of ordinary cow's milk products that a child should consume in toddlerhood is recommended in different quantities in different countries, e.g., there is a recommendation to use 500 ml but no more than 750 ml cow's milk per day in Canada, and 4 dl in Finland. One of the latest scientific opinions recommends 200–400 ml/day. According to scientists, another alternative is to replace the ordinary cow's milk with an alternative with reduced protein content.

The key to future health is the scientific research-based information which the health care professionals should provide to the family at the appropriate time.

PL5 HEART HEALTHY DIET AND LIFESTYLE: ROLE OF POLYPHENOLS IN CARDIOVASCULAR DISEASE

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Countries with similar intakes of cholesterol and saturated fat rich diets have different cardiovascular mortality rates. Countries, in which people also consume more plant foods, including small amounts of liquid vegetable oils, and more vegetables, have lower rates of mortality. The positive health effects of fruits and vegetables are often associated to their multi-nutrient profile (low in fat, high in fibers, low sodium/potassium ratios). In the past few years, identification of different polyphenols and development of phenolic compound extraction from fruits and vegetables has become a field of interest.

Polyphenols are widespread constituents of fruits, vegetables, cereals, olive, dry legumes, chocolate and beverages, such as tea, coffee and wine. Epidemiologic studies have shown an association between a higher intake of polyphenols and a lower risk of cardiovascular disease, diabetes mellitus, cancer and neurodegenerative disorders. We conducted a study to evaluate natural active polyphenol combinations in patients who underwent elective bicycle stress-test examination at our outpatient clinic and who had elevated cholesterol and/or C-reactive protein levels. Two different compositions of the research supplement were tested by adding them to permanent statin therapy. SILVA1 group (n=84) contained quercetin, linseed oil and resveratrol, but SILVA2 group (n=83) quercetin, linseed oil and pycnogenol. Our study demonstrated that the reduction of blood lipid level, particularly triglycerides, and C-reactive protein can be achieved by supplementing the everyday diet with food supplements containing quercetin, linseed oil, resveratrol and pycnogenol. No clinically adverse events were observed in clinical control group (N=664) during 3-month follow up.

Keywords: polyphenols, blood lipid levels, cardiovascular risk factors, bioavailability enhancer, food supplements.

PL6 CARDIO AND ONCOPROTECTIVE DIETARY PATTERNS

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Cardiovascular diseases (CVDs) and cancer are the main threat of population health in the 21st century. Healthy lifestyles and diets at young age are the key factors for a life free of chronic diseases at later ages. Healthy people are a public health priority, it follows that prevention of many chronic diseases through diet and lifestyle should be promoted in every possible manner. The epidemiologic evidence on the CVD protection afforded by adherence to the Mediterranean diet (MeDiet) is strong. The latest evidence comes from PREDIMED trial (published on 2013).

The PREDIMED trial is the largest randomized primary prevention trial showing that an intervention to promote a Mediterranean diet is beneficial against the incidence of several major chronic diseases in subjects at high cardiovascular risk, particularly when improved adherence to the Mediterranean diet includes an increased consumption of extra virgin olive oil and mixed tree nuts. In this trial, an energy-unrestricted Mediterranean diet supplemented with either extra virgin olive oil or nuts resulted in an absolute risk reduction of approximately 3 major cardiovascular events per 1000 person-years, for a relative risk reduction of approximately 30%, among high-risk persons who were initially free of cardiovascular disease. In older subjects at high cardiovascular risk, non-energy-restricted MeDiets enriched with extra virgin olive oil or tree nuts: reduce blood pressure, improve the lipid profile, decrease insulin resistance, reduce oxidation and inflammation, induce regression of carotid atherosclerosis, prevent metabolic syndrome and diabetes. It REDUCES INCIDENCE OF CARDIOVASCULAR DISEASES. These results support the benefits of the Mediterranean diet for cardiovascular risk reduction. They are particularly relevant given the challenges of achieving and maintaining weight loss. There are also data on MeDiet beneficial effect on prevention of some cancers, especially breast cancer, as well as on cognitive function, depression and neurodegenerative diseases.

The MeDiet, a plant-based, high-fat, high-unsaturated fat dietary pattern, appears to be optimal for CV health. Small changes in dietary habits make a great difference in CV risk reduction. MeDiet also has a protective effect on cancer and some neuropsychological diseases.

Keywords: Mediterranean diet, cardiovascular diseases, prevention, olive oil.

PL7 NUTRITIONAL SUPPORT IN SHORT BOWEL SYNDROME

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Introduction: Short bowel syndrome (SBS) is a form of intestinal failure. It is characterized by the inability of the intestine to maintain the balance of water and macro/micronutrients due to its limited absorptive capacity. Limited absorptive capacity is a result of a pronounced resection of the intestinal tract.

Results: Symptoms of SBS often include diarrhoea and absorption disorders. This can result in a massive weight loss, until patients develop malnutrition due to the illness. Appropriate nutritional therapy is based upon the remaining parts of the intestine and the degree to which they have adapted to the condition. Oral nutritional intake should be pursued in cases of less severe resections, where the intestine has adapted well. In cases of severe resections, home parenteral nutrition will frequently be needed.

Conclusion: The clinical picture of SBS is indeed a rare occurrence, but nevertheless presents a severe problem. Patients with SBS often suffer a huge decline in their quality of life, thus requiring complex and multi-professional support to obtain adequate medical care. Dietetic treatment is an elementary component of medical care within the therapy of SBS, and could contribute to an improvement in quality of life.

Keywords: short bowel syndrome, malnutrition, quality of life, parenteral nutrition.

PL8 SAFETY ASPECTS OF HIGHER VALUE BREAD

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Higher value foods with elevated levels of biological active compounds are in high demand due to their associated health benefits, including maintenance of health and protection from diseases like cancer, cardiovascular diseases, and degenerative diseases. Attempts at incorporating bioactive ingredients, for example, dietary fiber, proteinaceous plants, phenolic antioxidants, etc. into popular foods, such as bread, have grown rapidly, as a result of the increased consumer health awareness. Bakery products can be good carriers for higher value raw material incorporation, but one must be careful regarding the safety characteristics of a final product. Also, the physical properties of fiber, including water retention, fat retention, and swelling capacity, viscosity or gel formation significantly affect product processing and quality. However, the use of plants with a high protein, dietary fibre or inulin content for the production of cereal products may cause problems associated with the formation of acrylamide. The tolerable daily intake (TDI) levels of acrylamide for neurotoxicity were estimated to be 40 μg/kg per day, and for cancer – 2.6 μg/kg per day. The acrylamide content in cereal products can be reduced by using lactic acid fermentation. However, it should be noted that lactic acid fermentation is a traditional process for food production that may also result in the formation of undesirable compounds (e.g., biogenic amines and D-lactic acid). Consequently, it is very important to assess the risk of new raw materials and technological procedures, and to evaluate the safety parameters of the finished products.

Keywords: bread, safety, quality, acrylamide, lactic acid, biogenic amines.

PL9 BIOLOGICALLY ACTIVE COMPOUNDS FROM PLANTS AND NEW PROCESSING TECHNOLOGIES FOR CREATING INNOVATIVE FOOD PRODUCTS

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During the last years, a large number of biologically active compounds of plant origin was found for commercial application to create new food products. Cereals play an important role in the everyday nutrition of consumers, being rich in fibre antioxidants – that is the reason why we are looking for possible solutions for using different cereals in the manufacturing of new products, thus diversifying the assortment and increasing the nutritive value of food. Several important studies have been implemented regarding the increase of nutritional value of bread baked from high quality wheat flour with various constituents and products of plant origin – oatmeal, buckwheat flour, biologically activated grain, fortified grain with selenium, immature grain, oat hydrolysate fractions, triticale flour, hull-less barley flour – all components are rich with biologically active compounds. Partial substitution of wheat flour with dried Jerusalem artichoke powder in pastry products (cakes and biscuits) is one of the options to increase the nutrition value of pastry products. Innovative and safe gluten-free products can be obtained by choosing particular cereals and pseudocereals, as well as their combinations.

Vegetables, spices and herbs are an important part of a healthy diet. They are good sources of vitamins, dietary fibre and phenolic compounds. Therefore, it is necessary to find the best solution and investigate new methods how to preserve the content of bioactive compounds and to prolong the duration of products' usability. Different kinds of drying and production of aromatised oil are applied to produce qualitative dried vegetable and spice products and aromatised oil from herbs. Drying of cranberries in a microwave vacuum dryer allows retaining the maximum nutritional value of the berries. A high pressure and *sous vide* are suitable technologies for obtaining new qualitative pulse spreads with extended shelf-life. The fruits of rowan trees are rich in biologically active substances (e.g., carotenoids and phenol compounds), thus, rowan berries can be used in production of various food products.

Keywords: biologically active compounds, new technologies, new products.

PL10 THE GLOBAL HARMONIZATION INITIATIVE (GHI)

H. Lelieveld
GHI Board

The Global Harmonization Initiative (GHI) is the international non-profit network of individual scientists and scientific organizations working together to promote harmonization of global food regulations and legislation. GHI intends to empower food scientists and experts in industry, government and academia to voice scientific consensus and make recommendations on food safety laws and regulations, globally. Our aim is to provide objective and fact-based advice that will help harmonize conflicting regulations and legal policies to eliminate trade barriers that masquerade as food safety protections; reduce the needless destruction of safe foods within and across international borders; promote the use of innovative food safety technologies around the globe and lessen the potential for foodborne illness and pandemic outbreaks. To make harmonized regulations effective, there need also to be consensus on methods of analysis, labelling and inspection, requiring training and education. Last but by far not least, it is essential that the general public understands why regulations are needed and how to discriminate between false and correct information.

PL11 WHO REPORT GOOD MATERNAL NUTRITION: THE BEST START IN LIFE (2016)

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The nutritional well-being of pregnant women affects not only their health and their foetuses' development, but also children's long-term risk of developing NCDs or obesity, according to a new report from WHO/Europe. "Good maternal nutrition. The best start in life" was launched under the auspices of the Minister of Health of Latvia during a consultation on maternal nutrition, which took place in Riga on 27–28 June 2016.

While the importance of good nutrition in the early development of children has been recognized for decades, the report offers a systematized review of the most recent evidence on maternal nutrition and obesity and NCD prevention. The findings confirm that a mother's nutritional status – including overweight and obesity, excessive gestational weight gain and gestational diabetes – affects not only her child's health as an infant but also the child's risk of obesity and related chronic diseases as an adult. In short, maternal nutrition can truly have an intergenerational impact.

The findings of this report further emphasize the need to implement strategies to optimize the nutrition of women in reproductive age. The evidence suggests that such interventions are among the most effective and sustainable means of achieving positive effects on health and reducing health inequalities across the next generation.

This report on good maternal nutrition highlights the importance of protecting and promoting public health through the improved nutrition and well-being of women in reproductive age, especially during the preconception, pregnancy and postpartum periods. It covers different aspects of recent evidence and existing national recommendations, underlining opportunities for action on maternal nutritional health in the context of Health 2020.

The report also analyses countries' recommendations on maternal, newborn and infant nutrition, using the results of a survey completed by 51 of the 53 countries in the European Region. This shows that not all member states have fully adopted and incorporated WHO recommendations, and that the countries vary widely in their standards for health of maternal, infant and young-child.

PL12 DEVELOPMENT OF LATVIAN NATIONAL RECOMMENDATIONS ON NUTRITION DURING PREGNANCY

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Evidence shows that poor nutrition before and during pregnancy have negative short-term effects on duration and outcome of pregnancy. At the same time, there is the concept "foetal programming", which means that maternal nutrition during foetal development has an impact on child`s life, especially affecting the risks of obesity, cardiovascular diseases, type 2 diabetes and cancer. Optimizing nutrition of women in reproductive age could be the most effective way in reducing non-communicable diseases. A new report from WHO/Europe. "Good maternal nutrition. The best start in life" was launched under the auspices of the Minister of Health of Latvia during an international consultation on maternal nutrition in Riga on June 2016. Latvia is the first country in Europe, where national recommendations for health professionals on nutrition during pregnancy were developed based on European guidance and adapted to local needs and circumstances.

Latvian nutrition recommendations for pregnant women focus on healthy, balanced diet including all food groups and a food choice in each food group. Special attention is paid to fat sources including ώ-3 fatty acids. Taking into consideration the burdens of obesity and overweight, there is a focus on the recommended weight gain. Recommendations include a guidance for use of supplements, which has to be done according to the evidence based data. Folic acid supplementation has to be used from the pregnancy planning period and continued until 12 full weeks of pregnancy have passed. All women are recommended to use iodide supplements and vitamin D supplementation in autumn – winter months. Use of other supplements depends on the individual situation, e.g., iron supplements in case of iron deficiency anaemia, or ώ-3 fatty supplements in women who do not consume fish. Potentially vulnerable groups of pregnant women are indicated, like underweight or obese women, teenagers and women with special diets. These women require a special attention and an individual approach. Recommendations contain the information about unhealthy and potentially dangerous substances in pregnancy and food safety. Latvian recommendations are based on the consumption of local products.

Recommendations on nutrition during pregnancy is a promising start for further activities improving maternal and child health, like creating nutrition recommendations for pregnant women with special problems, maternal diet during breastfeeding, and starting a research of dietary habits of pregnant women in Latvia.

Keywords: maternal nutrition, foetal programming, weight gain, supplements.

ORAL PRESENTATIONS

O1 OPPORTUNITIES FOR ASSESSMENT OF THE RETURN ON INVESTMENT OF NUTRITION PROGRAMMES

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The Public Health Policy Guidelines 2014–2020, based on the World Health Organisation's Regional Strategy for Europe "Health 2020" and drawn up in accordance with the National Development Plan of Latvia 2014–2020, define that the main cause of death of inhabitants of Latvia are cardiovascular diseases, and the most efficient prevention measures for cardiovascular diseases are to quit smoking, take up regular physical activities, to choose a healthy diet and to maintain an adequate body weight. The role of preventive programmes increases worldwide, and the investments in these programmes are estimated by the methods of economic analysis. The return on investment (ROI) indicator is mostly used to estimate the vaccinations, screening programmes and smoking control activities, but much less often applied to estimate the nutrition programmes. Consequently, the survey is dedicated to investigation of the opportunities to use ROI for assessment of nutrition programmes by evaluation of the relevant data sources. The results show that ROI is suitable to assess the nutrition programmes and that the preventive activities can be cost-effective, provide value for money and yield returns on investment in both the short and longer term.

Keywords: return on investment, economic analysis, nutrition programmes.

O2 LABELLING CONFORMITY OF DAIRY PRODUCTS WITH THE DEMANDS SET IN EU REGULATION NO 1169/2011

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Given the diversity of dairy products, it is important that the regulatory framework on labelling ensures that the consumer receives accurate information about the product. In this context, the labelling of various dairy products (n=451) from one supermarket was assessed. In 89% of the analyzed cases, dairy product's label contained all the mandatory information according to the requirements of EU Regulation No 1169/2011. The main deviations – quantitative indication of ingredients was not specified (n=16), substances or products causing allergies or intolerances were not highlighted (n=15), inappropriate shelf-life date was indicated (n=12). Nutritional value of 26 randomly selected dairy products was experimentally determined. In 81% of the cases, it was within the validated tolerances set in Guidance document. Incompliance was mainly detected in the total carbohydrate and sugar content. It can be explained by the fact that producers, when calculating the nutritional value, sometimes forget to include a disaccharide lactose in total sugar content. In this research, label of eight plain dairy products (with no indication "lactose free") deceptively specified total sugar content as 0 grams. Total carbohydrate content, if calculated by difference, includes, for example, dietary fiber, as well as organic acids. However, it can lead to incorrect energy value of a product, because conversion factors for these nutrients differ.

Keywords: dairy, label, legislation, nutrition, tolerances.

O3 NUTRITIONDAY 2015 IN STATE SOCIAL CARE CENTER RIGA BRANCH JUGLA

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Many of the diseases suffered by older persons are the result of dietary factors. These factors are then compounded by changes that naturally occur with the ageing process. Malnutrition is more common and increasing in the older population.

The NutritionDay project is a world-wide, multicenter cross-sectional audit to assess nutritional care and nutritional status of nursing home's patients. The aim of this analysis was to assess malnutrition prevalence in State social care center Riga branch Jugla.

The questionnaires comprise questions about "nutritional structures and standards" on the ward and "eating behaviour and weight change".

The study included 110 residents, their mean age was 74. The average body mass index (kg/m^2) was 26.9% of all residents are malnourished according to BMI. According to Mini Nutritional Assessment (MNA), 12% are classified as malnourished and 58% are at nutritional risk. More than a half of the patients ate less than the normal servings. 40% of residents who passed away in the last six months, were undernourished according to MNA and 14% ate less than a half of portion on NutritionDay.

Therefore, food intake and nutritional status should be monitored more thoroughly in nursing homes to identify risk patients at an early stage.

Keywords: malnutrition, older people, nursing homes, nutritional assessment.

O4 LATVIAN CITIZENS' KNOWLEDGE ABOUT DIETARY FIBER

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The positive benefits of dietary fibre (DF) are associated with the regulation of the intestinal transit, and the prevention or treatment of diabetes, cardiovascular diseases and regulate colon cancer and obesity. The aim of this research was to collect the information on Latvian citizens' knowledge about dietary fibre.

The questionnaire consists of 22 questions, and their goal was to evaluate the knowledge in three distinct areas: six were dedicated to knowledge about food fibres; six – to the relation between fibres and variety of foods, and 12 – to the relations between fibres and diseases. The methodological study was conducted with 231 participants, 64.9% of which were female and 35.1% male, aged between 17 and 80 years. The respondents were selected according to convenience, although of age, literacy, gender, geographical area of residence, including people from different cities and smaller villages.

67% of the respondents consider that the consumption of sufficient amounts of fibres can prevent or treat different diseases. 85% of respondents have noted that legumes (peas, beans) are a source of fibres, but more often ingest the fibres through a combination of vegetables and animal products.

This research was prepared in the framework of the multinational project by CI&DETS Research Centre (IPV e Viseu, Portugal) with the reference PROJ/CI&DETS/2014/0001.

Keywords: dietary fibre, knowledge, survey, Latvia.

O5 IODINE DEFICIENCY IN LATVIA: CURRENT STATUS AND NEED FOR NATIONAL RECOMMENDATIONS

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In the absence of a mandatory salt iodization program, two nationwide cross-sectional cluster surveys revealed a persisting iodine deficiency among Latvian schoolchildren during the spring season and a noteworthy iodine deficiency in pregnant women in Latvia; these deficiencies warrant intervention. The consequences of a mild-to-moderate iodine deficiency during pregnancy and lactation can adversely affect foetal brain development.

Data from a Latvian population survey revealed the consumption of approximately 100 μg of iodine per day through foods and iodized salt. Therefore, strategies to increase the consumption of iodine-containing products should be improved, particularly for children. In addition, to meet the increased iodine requirement of pregnancy, pregnant women should take daily supplements containing 150 μg of iodine from the earliest time possible. All women of childbearing age should be advised to increase their dietary iodine intake by using iodized table salt and iodine-rich products: seafood, milk and milk products. For women with pre-existing thyroid pathologies, the medical decision should be considered on a case-by-case basis. Urinary iodine concentration (IUC) monitoring among schoolchildren and pregnant women and neonatal thyrotropin (TSH) registry analysis every five years would be an appropriate strategy for maintaining the iodine intake within the interval that prevents iodine deficiency disorders (IDD).

Keywords: iodine deficiency, children, pregnancy, iodine supplementation.

This work was supported by the Latvian National Research Programme BIOMEDICINE

O6 SPORTS SPECIALISTS' VIEWS REGARDING ADEQUATE WATER CONSUMPTION FOR ADULTS

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Information of the necessary daily water amount for adults and water sources published in mass media is often controversial and not based on scientific evidence. European Food Safety Authority (EFSA) Panel on Dietetic Products, Nutrition and Allergies (NDA) concluded that an adequate total water intakes for females would have to be 2.0 L/day and for males – 2.5 L/day. The total amount should include water in the form of drinking water, as well as that contained in beverages of all kinds, and food moisture (EFSA, 2010).

The aim of the survey is to find out the practising sports specialists' views regarding some aspects of adequate water consumption, considering that 72% of them have been asked nutrition-related questions by clients.

The questions with regard to views about water consumption as a part of quantitative, descriptive research were asked to 49 sports specialists working in Riga's fitness clubs.

According to the results, 25 (51%) survey participants agree that the daily water intake of 2.0 to 2.5 l is sufficient, 31 (63%) believe that only the drinking water counts, 24 (59%) rely on the thirst sensation and a habit to drink, 40 (82%) consider the possibility of water overconsumption.

The total water intake assumptions correspond to EFSA's opinion, but the majority of respondents have a complete misconception about water sources included in the total amount.

Keywords: water, adequate total water intakes, sports specialists.

O7 COMPETENCE IN THE FIELD OF NUTRITION AMONG SPORTS SPECIALISTS AND ITS USE IN WORK WITH CLIENTS

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Information about nutrition is easily and widely available from various sources, but it is not always considered critically enough. Among the information sources are sports specialists in sports clubs, but it is unknown, whether their education is appropriate.

The aim of the research was to appraise the existing knowledge about nutrition among sports specialists and the benefits from it for clients.

The research materials included two questionnaires– one intended for sports specialists and another – for sports clubs' clients.

The population – 54 sports specialists/fitness trainers working in sports clubs in Riga and 113 sports clubs' clients found in athletes' groups on the Internet.

The results and conclusions – in order to work as a fitness trainer, the education can be acquired at different level education programs, consequently, these differences could affect the level of trainers' competence. Sports specialists offer their clients advice about nutrition even if they do not feel competent in this field. In general, the knowledge about nutrition among sports specialists can be assessed as mediocre. Sports clubs' customers mainly obtain the information about nutrition in the mass media, but about one third of the respondents listen to the coach's advice and consider it to be useful, therefore it would be important to strive for a better knowledge of coaches.

Keywords: sports specialists, fitness trainers, knowledge about nutrition.

O8 ORANGE JUICE IN NUTRITION OF THE ELDERLY

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With rapidly increasing ageing processes in Europe, healthcare of the elderly becomes an especially topical issue. The elderly frequently have a low intake of fruits and vegetables, which can lead to nutrient deficiency. Nutrition value of orange juice could be beneficial for elderly people. The aim of the study was to assess the impact of orange juice on trace elements, folic acid, and metabolic syndrome components, as well as diet quality.

Elderly people (n=21) in nursing home received 240 ml of commercial orange juice daily for 60 days. Blood tests were taken before and after the intervention. An actual five-day diet analysis was performed.

The concentration of folic acid in blood serum had increased significantly after consumption of orange juice. A significant decrease in both systolic and diastolic blood pressure was observed. Orange juice consumption resulted in higher liquid intake and a considerable reduction in insufficiency of vitamin C, folic acid, potassium and calcium in the daily diet of elderly.

There are indications that orange juice is a valuable product for the elderly, which could help to reduce the insufficiency of folic acid and other nutrients in elderly people's diet.

Keywords: orange juice, nutrition of the elderly, folic acid, vitamin C.

O9 SALT CONSUMPTION IN LATVIAN POPULATION AND FACTORS AFFECTING IT

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The average sodium intake in Latvia is higher than recommended by World Health Organization.

The aim of this study was to determine behavioural factors that affect salt consumption in Latvian adults.

Random sample according to age, gender and region of healthy Latvian adults aged 19 to 64 (n=199) was selected. Data about eating habits, socio-demographic status, dietary records, anthropometric measures were obtained.

Median salt consumption varied from 4.0 g/day for women aged 51–64 to 9.8 g/day for men 51–64 years old. Most of the participants indicated that they add salt during cooking often or always (72.3%). 6.1% add salt to prepared food almost always before even tasting it, and the median salt consumption for this group of people exceeded the recommended amount (p=0.232), similar to 58.9% of respondents, who reported that they include semi-finished products in their everyday diet (p=0.105). 54.3% believed they consume just the right amount of salt, but in reality 61.1% of them exceeded the recommendations. 64.3% indicated that they control their daily salt consumption, and sodium intake in their case was actually lower than that of others (p=0.026).

The results revealed a connection between the behaviour towards salt consumption and the daily salt intake.

Keywords: salt, sodium, consumption, behaviour.

O10 SALT CONSUMPTION AND THE MAIN SOURCES OF SALT IN THE DIET OF YOUNG ADULTS

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Scientific studies regularly confirm that the contemporary salt consumption through food is excessive, and must be reduced. The objective of this study was to ascertain the amount of salt consumed per day, as well as to identify the main sources of salt in the diet of 18–35 year-old Latvians. The tasks of this study were to use the 24-hour dietary record to identify the main sources of salt in the diet and the amount of salt consumed per day, to use the dietary behaviour questionnaire to ascertain the knowledge, attitudes and behaviour toward dietary salt, to perform the sensory evaluation of wheat bread to determine whether people are able to feel the differences of salt content in bread.

The results of this study show that the average intake of salt in the diet of 18–35 year-old Latvians is 7.1 g. 63% of all respondents consume more than the recommended 5 g of salt per day, and none of them consume less than necessary to ensure the physiological needs. The results show that women consume less salt than men – approximately 6 g per day, while men consume 8.2 g of salt per day. It was found that the main sources of salt in the diet of 18–35 year-old Latvians are cereals and cereal products, as well as meat and meat products. The results of sensory evaluation show that consumers feel the differences of salt content in bread.

Keywords: salt, bread, sodium reduction.

O11 EFFECT OF DIFFERENT TYPES OF BREADS ON BLOOD GLUCOSE IN SWIMMERS

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Carbohydrates play an essential role in sports nutrition. Data show that consumption of low glycemic foods could be beneficial, but very little is known about rye effects on blood glucose level in athletes.

The aim of the study was to investigate the blood sugar response after consuming two different kinds of breads – rye and wheat bread.

Ten healthy swimmers received a bread portion calculated according to the content of carbohydrates (1 g of carbohydrates/kg body weight) and consumed it 1 hour before the training. Capillary blood glucose was measured before the exercise, and after 30, 60 and 90 minutes. The 24-hour dietary recall was done before the first test, and participants were asked to maintain similar eating patterns before the second test with another kind of bread.

Consuming rye bread 1 hour before the exercise in swimmers provides a more prolonged glucose response and a slower decrease of glucose concentration in blood in comparison to wheat bread.

The results indicate that rye bread could be a very useful source of carbohydrates in swimmers.

Keywords: rye bread, wheat bread, blood glucose, swimmers.

O12 BODY COMPOSITION AND METABOLISM INTENSITY IN ATHLETES WITH SPINAL CORD INJURY

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The metabolic intensity in athletes or persons with spinal cord injury (SCI) is dependent on muscle mass, the degree of damage, spasticity and load intensity involved. Athletes are more pronounced in lean mass, but in persons with SCI the body composition can be affected by spasticity and the increase in the amount of lean tissue, as well as obesity, and can be one of the reasons for complications in the chronic SCI. To implement the study the calorimetry method was used to determine the metabolic intensity, the necessary energy consumption and the body composition of a particular athlete. The energy consumption and production of energy involved in the composition of the substance is determined by analysing the measurements of oxygen consumption (VO_2) and carbon dioxide (VCO_2) emitted. Athletes' cardiovascular system is evaluated by a complex load test, when the lactate analysis is taken. During the complex load test various indicators are analysed to evaluate the major body systems' response to the load and adaptability to the load. The body composition – a person with large muscle mass requires more fuel and has a faster metabolic rate than the same person with less muscle mass. The level of activity and sports – increased physical activity requires more energy.

Keywords: body composition, level of activity, disability athletes, calorimetry, spinal cord injury.

O13 INFANT FEEDING HABITS IN LATVIA

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The research objective was to collect data on infant feeding habits in Latvia. The data were collected by interviewing method, using 2 types of questionnaires: food frequency questionnaires and nutritional diary. The study included representative sample of 560 infants and toddlers from all regions of Latvia. This research included 266 infants: 127 girls, 139 boys, aged 0 to 12 months. The data were analyzed in SPSS program. To assess the nutritional habits, several product groups were formed: grains, eggs, fruit and berries, vegetables, potatoes, fats, sugar and sweets, meat, fish, legumes, milk, milk products. Almost all complementary food product groups were consumed on the regular basis after 6 months of age. Grains, fruit and berries, vegetables, potatoes were consumed after 6 months of age in over 80% of infants (88%, 81%, 86%, 85% accordingly), milk products – in 78%. Less consumed product groups after 6 months of age were eggs (45%), milk (37%), fish (36%), legumes (28%). Overall, the nutritional habits of infants were healthy and in accordance with European and World Health Organization guidelines. An exception was cow's milk consumption, which is introduced too early and grains, which are consumed less then recommended both in frequency and portion size.

Keywords: nutrition, infants, grains, eggs, fruit and berries, vegetables, potatoes, fats, sugar and sweets, meat, fish, legumes, milk, milk products, complementary food.

O14 TRIMETHYLAMINE N-OXIDE: DIET, MICROBIOTA AND CARDIOMETABOLIC HEALTH RISKS

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Cardiovascular diseases, atherosclerosis, and diabetes emerge as a real burden for health systems in the developed countries. It is long known that high fat and cholesterol diet is associated with increased cardiovascular risks; however, only recently it has been revealed that the intake of meat, egg and fatty milk products results in gut microbiota-dependent metabolism of compounds containing a dietary trimethyl-ammonium moiety and generation of trimethylamine N-oxide (TMAO). Strong associations between systemic TMAO levels and angiographic measures of coronary artery atherosclerosis, poor outcomes in patients with both heart failure and chronic kidney disease, increased risk for major adverse cardiovascular events (death, myocardial infarction, stroke) have been found. In addition, we have shown that also age, diabetes and BMI are associated with higher TMAO concentrations. These studies have reinforced the importance of diet and microbiota in cardiometabolic health, with the TMAO level emerging as a possible biomarker and target for therapeutic interventions. Dietary factors are very important regulators of circulating TMAO levels. TMAO is generated from choline and L-carnitine found in red meat, and TMAO concentrations are increased also after the consumption of fish products and eggs. The association of plasma TMAO concentrations with different medical conditions and dietary factors, including a popular food supplement L-carnitine, should be further investigated.

Keywords: trimethylamine N-oxide (TMAO), gut microbiota, cardiovascular diseases, diabetes.

This work was supported by the Latvian National Research Programme BIOMEDICINE.

O15 PAULS STRADINS CLINICAL UNIVERSITY HOSPITAL CARDIOLOGY UNIT PATIENTS' AWARENESS OF THE NEGATIVE EFFECTS OF TRANS FATTY ACIDS IN RELATION TO CARDIOVASCULAR DISEASES

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Considering the trans fatty acid effects in relation to cardiovascular diseases, it is very important to promote public awareness about trans fatty acids' negative effect on health.

Questionnaire – 20 questions (Modified from the research "*Use of Trans Fat Information on Food Labels and Its Determinants in a Multiethnic College Student Population"* validated questionnaire).

Most respondents had a serious cardiovascular disease, so that they had to think about prevention measures. Besides physical activity, prevention must also include a healthy diet. The greatest part (74%) of respondents had heard and read something about trans fatty acids, but 62% woman and 54% men had some information about trans fatty acids and their negative effect in relation to cardiovascular diseases. Issues unclear for patients were discussed afterwards.

Coronary heart disease (CHD) patients were not properly informed about trans fatty acids and their negative effects related to cardiovascular diseases. An individual approach, explaining the unknown issues, increased comprehension of trans fatty acids can change patient's attitude to the quality of products that are used daily. Individual conversation with each patient on healthy diet is an important part of secondary prevention.

Keywords: trans fatty acids (TTK), cardiovascular disease (CVD), coronary heart disease (CHD), the effect of awareness.

O16 EFFECTS OF APPLE FIBER CONSUMPTION ON LDL-C CONCENTRATION IN THE ELDERLY

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Getting old increases the risk of cardiovascular diseases, which often are linked to abnormal lipid profile. Various studies analyzed the protective effects of fiber intake on lipid levels. This issue in Latvia has not been explored, especially with regard to the senior population.

The study was aimed at creating a new, easy-to-use fiber product and evaluating the effects of these products on low-density lipoprotein level (LDL-C).

The product was made from Latvian-grown large fruited apple varieties. 30 nursing house participants with lipid profile changes who were aged 60 and over received an apple product in form of puree in addition to unchanged daily diet. Blood tests were taken twice: before and after the use of the apple product.

After apple fiber puree usage, statistically significant changes in lipid profile were found, reducing LDL–C.

Apple fiber product may have a beneficial effects on plasma lipid profile.

Keywords: apples, fiber, pectin, serum lipids, dyslipidemia, LDL–C.

O17 EFFICACY OF AN INDIVIDUALIZED AYURVEDIC THERAPY AND DIET IN TYPE 2 DIABETES

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Individualized Ayurvedic treatment of type 2 diabetes (T2D) includes using medicines, exercise and diet modifications.

The aim of our two studies was to retrospectively evaluate the efficacy of customized Ayurvedic therapy for T2D in various treatment subgroups.

A retrospective study cohort of 82 patients was selected based on inclusion/exclusion criteria and completeness of data. Patients were requested to include in their daily diet turmeric, fenugreek, pepper, cinnamon, pumpkin and cucumber seeds, cardamom, nutmeg, whole grain barley.

In the general cohort, statistically significant changes were observed in fasting blood glucose (FBG) after 3 months of treatment ($p<0.015$), and in post-prandial blood (PPG) glucose after three months ($p<0.001$) and after seven months ($p<0.043$). Best results were seen in the *Pitta* subgroup or patients with inflammatory comorbidities.

We attribute the statistically significant improvement to the medicines and to the diet modifications due to antidiabetic, like antihyperglycemic, insulin sensitizing, also antioxidant, anti-inflammatory, antibacterial, antifungal and neuroprotective effect of medicines and spices.

Keywords: diabetes, antidiabetic, anti-inflammatory.

O18 INCIDENCE (FREQUENCY) OF THE FERMENTED FOOD PRODUCT USE IN LATVIAN PATIENTS WITH GASTROINTESTINAL COMPLAINTS

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An increasing amount of data regarding the significance of gut microbiome in the formation of adaptive immunological system and regulation of metabolic pathways supports regular inclusion of fermented food products in the daily diet of chronic internal disease patients. Inclusion of probiotics and prebiotics promotes digestive health maintenance and reduces systemic inflammation background. Traditional regional fermented dairy and vegetable foods could favourably interact with the patients' enterotype. This randomised study of 105 patients (68 females, 37 males, ages 18 to 86) with gastrointestinal complaints in P.SCUH Endoscopy department analysed the data from food habit questionnaires about foods containing probiotics and prebiotics, tests about food knowledge quality and generational continuity of gastronomical culture, background polypharmacy, digestive endoscopic findings (biopsies, H. pylori) and long-term digestive benefits in order to establishing associations. No morphologically verified oncoprotective gain was found for the patients with relevant biopsies (n=54). 2/3 of fermented food users (total fermented food use frequency – 60%) in this study evidenced unsatisfactory fermented food knowledge quality, age groups 19 to 29 years and 30 to 49 years verified loss of gastronomic knowledge (p=0,031) with a negative impact upon digestive health, all groups (users, non-users, uninformed) had significant polypragmasia (antibiotic exposure, PPI, etc.) interfering with healthy dietary choices.

Keywords: gut microbiome, gastrointestinal complaints, digestive endoscopy, fermented foods.

O19 SARCOPENIA AS INDICATOR OF MALNUTRITION IN PANTIENTS SUFFERING WITH CHRONIC PANCREATITIS

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Chronic pancreatitis (CP) can cause severe malnutrition due to exocrine insufficiency. As there is no available test for early exocrine insufficiency detection, sarcopenia may serve as an indication of that, and give an opportunity to improve the nutritional status in these patients.

The aim of the study was to evaluate the prevalence of sarcopenia, analyzed by computed tomography (CT) imaging scans in CP patients.

The study was multicenter retrospective cohort study with data inclusion for a one-year (2015) time period. Body constitution was analyzed by CT examinations using ImageJ v1.49q standard program. The third lumbar vertebra was selected as the standard landmark measurements, these image-level axial cuts were chosen. Muscular, visceral, subcutaneous and intramuscular adipose tissue areas were measured. Values were normalized for height to get the lumbar skeletal muscle index (SMI)in cm^2/m^2. The following sarcopenia cut-off values were used: 52.4 cm^2/m^2 for men, 38.5 cm^2/m^2 for women. Data about pancreas morphological changes by CT imaging, BMI, endocrine and exocrine insufficiency status were collected, sarcopenia influence was evaluated.

The study included 140 patients with the mean age of 48 years (range 30–82 years); 98 males, 42 females. According to the Cambridge classification by CT scans – 41 patients were marked, 76 – moderate, 23 – mild CP. The mean SMI were 44.08 cm/m^2 for men, 38.55 cm/m^2 for women. Sarcopenia was found in 69% (96 patients). In patients with normal BMI, sarcopenia was in 81% (57 patients, n=70), with underweight patients – 70% (7 patients, n=10), with overweight and adipose patients – 53% (24 patients, n=45; 8 patients, n=15) (p=0.02). Sarcopenia was not found significantly more often in patients with marked changes in the CT exam (p=0.06). No significant differences of sarcopenia in patients with diabetes mellitus (n=28), proven exocrine insufficiency with enzyme supplementing therapy (n=16) were found.

Sarcopenia was found quite often (69%) in patients with CP. Even in patients with a normal or higher BMI, muscles depletion still was observed (53–70%). The collected data show the need of treatment optimization with more emphasis on nutritional support to CP patients.

Keywords: chronic pancreatitis, sarcopenia, malnutrition, exocrine insufficiency.

O20 MALNUTRITION INDUCED SARCOPENIA AS A RISK FACTOR OF SEVERE ACUTE PANCREATITIS

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Overall, malnutrition is a known risk factor leading to poor disease outcome. Alcohol abuse, older age, for example, may cause a person to develop nutritional alterations such as sarcopenia. The aim of the study was to assess the sarcopenia or muscle loss as a risk factor of more severe course in patients with acute pancreatitis.

The study was a prospective cohort study in P. Stradins Clinical University Hospital from 01.2015 to 04.2016. In total, 100 patients underwent computed tomography (CT) imaging. Body constitution was analyzed by CT examinations, using ImageJ v1.49q standard program. The third lumbar vertebra was selected as the landmark measurement. Muscular, visceral, subcutaneous and intramuscular adipose tissue areas were measured. The values were normalized for height to obtain the lumbar skeletal muscle index (SMI) in cm^2/m^2. Sarcopenia was defined as muscle index <52.4 cm^2/m^2 for men, <38.5 cm^2/m^2 for women. Acute pancreatitis' severity was determined by Atlanta revised criteria (2012).

From the total of the patients involved in research, 42% were females, 58% – males. Mean age was 51 (range 18–92). Alcohol abuse was aetiology for 58%, biliary – for 23%, miscellaneous – for 20%. A moderately acute pancreatitis was observed in 83% of the cases, a severe form – in 17%. The mortality rate was 6%. There were 38% of patients with normal weight, overweight – 33%, adipose – 28%. Sarcopenia was detected in 51%, of which 25 patients (49%) had an increased BMI (p=0.01). Sarcopenia was found in 6 patients (35%) with a severe pancreatitis, in 45 – a mild pancreatitis (54%). Univariate analysis regarding sarcopenia as a risk factor of severe acute pancreatitis revealed Odds ratio (OR) 3.892 (CI 0.446-0.662, p=0.05).

Sarcopenia can be found in patients with an acute pancreatitis and can be a risk factor of a more severe course. Nutritional status evaluation and early malnutrition prevention could help to avoid severe disease outcome.

Keywords: acute pancreatitis, nutritional status, sarcopenia.

O21 RESEARCH ON THE POTENTIAL PROTECTIVE EFFECTS OF WHOLE GRAINS IN LATVIA

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There is a growing evidence that whole grain consumption reduces the risks of many chronic diseases, including cardiovascular disease, metabolic syndrome, obesity, type 2 diabetes, inflammatory bowel diseases and certain cancers.

Recently, the research of bioactive compounds of rye, hull-less oat, hull-less barley and triticale is increasing in Latvia. Alkylresorcinol and lignan content was assessed in Latvian breads. More recent studies focus on possible protective effects in humans. The fiber sources were studied, and the results showed that the most important source of dietary fiber was the grain products. The food sources lignans and alkylresorcinols were also studied. A potential anticancer activity of rye bread in prostate cancer patients was investigated in an intervention study. Another study investigated possible differences in metabolism of alkylresorcinol metabolites in prostate cancer patients and control. A further research explored potential nutritional benefits of hull-less oats in patients with inflammatory bowel diseases and found a potential anti-oxidative activity of hull-less oats. Hull-less oats were also accepted by taste feeling. The ongoing study investigates glycaemic and insulin index of different traditional and nontraditional grain flakes, including germinated grain products. The first results seem promising with regard to managing the metabolic syndrome.

So far, the findings seem encouraging for further research of whole grains in Latvia to promote evidence-based facilitating of using traditional wholegrains, like rye, oats, barley, and creating new functional grain foods for prevention of metabolic syndrome, cancer and gastrointestinal diseases.

Keywords: whole grains, rye, hull-less oats, germinated grains, prostate cancer, inflammatory bowel disease, metabolic syndrome.

O22 USAGE OF LEAD SHOTS AS A THREAT FOR WETLANDS AND FOOD FROM WILD DUCKS – A CASE STUDY OF MALLARDS (*ANAS PLATYRHYNCHOS*) FROM EAST POLAND

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The mallard *Anas platyrhynchos* is a very widespread species of game duck in Europe. It is also an important component of the diet of local inhabitants. The studied element concentrations in livers of mallards followed the pattern: Fe> Mg > Zn > Cu > Mn > Se > Cd > Pb > Cr > Hg > As > Ni. In the case of Cd, the level > 0.50 mg/kg was found in 65% of the studied mallards, when 44.5% of the examined samples were characterized with the Pb level > 0.50 mg/kg. Mercury level of > 0.05 mg/kg was found in (58.0%) of the examined livers of mallards. In 9% of the examined individuals the concentrations of Pb were classified as subclinical toxicity or moderate clinical poisoning for mallards. Mercury level of > 0.05 mg/kg was found in (57.5%) of the examined livers. HCA analysis suggested that hunters' bullets were the main source of lead and probably cadmium contaminations revealed in livers of studied mallards.

Keywords: mallards, livers, essential and toxic elements, wetlands.

O23 ASSIMILATION OF SELENIUM, COPPER AND ZINC IN RYE MALT

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The trace elements – selenium, copper and zinc are minerals essential for human body. One of the opportunities to increase the micronutrient content in diets is to add them to raw food materials, for example, to enrich grain with micronutrients during production of malt.

To obtain rye malt, 3 kg of grain were soaked in 10 l of water with an addition of three mineral salts – sodium selenate (Na_2SeO_4), copper sulphate ($CuSO_4 \cdot 5H_2O$) and zinc sulphate ($ZnSO_4 \cdot 7H_2O$) at different concentrations and different combination of salts. The content of selenium, copper and zinc was determined in rye malt. The obtained results were used to calculate the degree of assimilation of trace elements in rye malt. The interaction of trace elements selenium/copper and copper/zinc was studied. The total amount of selenium, copper and zinc was analyzed by inductively coupled plasma mass spectrometry (ICP-MS). For the validation purposes, the total amount of copper was quantified by electrothermal atomic absorption spectrometry (ETAAS). Sample preparation for elemental analysis was performed by wet acid digestion in closed microwave mineralization system. Selenium assimilation degree in rye malt was within 10.6 to 12.2%. Accordingly, copper assimilation was calculated from 32.8 to 38.0%, while that of zinc was 49.3 – 57.0%. The simultaneous presence of selenium/copper and copper/zinc during rye grain soaking promotes the assimilation of each mineral, compared with only one mineral additive.

Keywords: selenium, copper, zinc, assimilation, rye malt.

O24 EVALUATION OF FURANOCOUMARINS FROM WILD PARSNIP FRUITS (*PASTINACA SATIVA*) AND IDENTIFICATION OF NEW COMPOUNDS

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Wild parsnip typically blooms from late June to July in Latvia. The herb, including the fruits and roots, is used for flavouring, and possesses carminative properties. The oil extracted from the fruits contain many furocoumarins employed in medicine and in cordial preparations. While parsnip is used in a number of herbal formulations, preparations with this root vegetable need to be used with caution, as it encloses polyacetylenes that have demonstrated cytotoxic actions. Usually, from furanocoumarins in the seeds are contained bergapten, xanthotoxin, isopimpinellin and sphondin. These compounds are used in therapy of skin diseases due to their photosensitising and antiproliferative qualities. However, the chemical composition differs between the mature seed and seed in maturation (fruiting) time.

The aim of this study was to evaluate the qualitative and quantitative composition of a wild parsnip obtained from the fruits harvested in Latvia at the middle of their maturation period. For the extractions of the compounds pyridine was used. Nonpolar compounds of pyridine extract was removed with hexane. Pyridine was evaporated under nitrogen and the solid residue dissolved in water. Furanocoumarins were extracted from water with dichloromethane. The identity of several furanocoumarins was assessed by mass-spectra and retention indices. The identity of the unknown compound was determined by the characteristic of ions' fragmentation.

The most characteristic secondary metabolites of its fruits are essential oils (in particular aliphatic esters – octyl acetate, octyl butyrate, etc.) and furanocoumarins. The most abundant furanocoumarins in the extract of the fruits are bergapten and byakangelicol, 25.1% and 14.5%, respectively. Other detectable furanocoumarins have been identified as methoxsalen(xanthotoxin) (2.0%), pimpinellin (1.5%), isopimpinellin (3.6%), prengenine (heraclenin) (7.3%), pabulenol (2.9%), 4-[(3,3-dimethyl-2-oxiranyl)methoxy]-9-methoxy-7H-furo[3,2-g]chromen-7-one (1.3%), and neobyakangelicol (10.5%). Byakangelicol accounts for almost 1.3% of its dry weight, and the total furanocoumarin-content is estimated as 12–13% of the dry material of the extract.

Keywords: *Pastinaca Sativa*, furanocoumarins, mass spectrometry, fruits of the parsnip.

O25 CONTAMINATION OF CORN BY AFLATOXINS IN KAZAKHSTAN

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Mycotoxins are toxic secondary metabolites produced by moulds. Based on the results of research and data contained in the literature, the problem of the contamination of cereal by mycotoxins in Kazakhstan is discussed. This problem leads to a significant reduction in quality. The effect of mycotoxins on health of humans and farm animals are considered. The current overview presents the results of researching the corn contaminated by mycotoxins (*Aspergillus flavus*). *Aspergillus flavus* is an ascomycete fungus that infects and contaminates many economically important crops with aflatoxins. These include corn, cotton, peanut, and many tree nuts and, in South Kazakhstan region, it constantly threatens corn. Many strains of *A. flavus* have the ability to produce mycotoxins called aflatoxins, which can be acutely toxic and carcinogenic. The conducted researches have shown that the distribution of mycotoxins in cereals each year varies. Widespread and high potential toxigenic fungi *A. flavus* in combination with other binding conditions (temperature and humidity mode, duration of exposure, and others) are the main factors contamination of corn grain by aflatoxin. The most widespread aflatoxin B1.The paper presents the measures of protection against mycotoxins and regulations to ensure the safety of grain.

Keywords: corn, contamination, *Aspergillus flavus,* aflatoxins.

026 DETECTION OF POTENTIALLY TOXIC ELEMENTS IN BERRIES GROWN IN ALLOTMENT GARDENS OF RIGA CITY, LATVIA

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Content of macro- and microelements is an important indicator of food's nutritional value, including cultivated food crops like fruit, berries and vegetables; it differs regionally and is influenced by various factors. Nevertheless, certain chemical elements (As, Cd, Hg, Ni, Pb, Zn, etc.) are known as environmental pollutants and may affect the quality and safety of crops and derived food products. The aim of the study was to reveal the concentration of potentially toxic elements (Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) in samples of berries grown in allotment gardens of Riga city. Dried and triturated samples of raspberries, strawberries, red currants, black currants, gooseberries and cherries were mineralised in a solution of conc. HNO_3/H_2O_2 by heating on a thermoblock. A quantitative analysis of sample solutions was performed using atomic absorption spectrometry, and elements were quantified, as follows: Fe > Zn > Mn > Cu > Ni > Pb > Cr > Cd. The elements of the major concern were detected on average, as follows: Ni 0.54 mg/kg, Pb 0.20 mg/kg, Cr 0.10 mg/kg, Cd 0.03 mg/kg (expressed on dry weight). Results indicated a significant variability of element concentration among the species.

Keywords: environmental pollution, food safety, heavy metals, quantitative analysis, urban gardening.

O27 DETECTION OF BIOLOGICAL AND SENSORY PROFILES OF BISCUITS ENRICHED WITH TEA (*CAMELLIA SINENSIS* L.) POWDER

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A demand for health-oriented bakery products with higher antioxidant activity, dietary fiber and amino acid content is increasing. The aim of this work was to characterize the biological and sensory profile of biscuits enriched with green (1 and 3%) and black tea (1 and 3%) powders. For control, biscuits without the addition of tea were used. Phenolic content was detected using Folin-Ciocalteu reagent, flavonoid content with aluminium chloride method and antioxidant activity with DPPH and phosphomolybdenum method. Amino acid composition (Asp, Thr, Ser, Glu, Pro, Gly, Ala, Val, Ile, Leu, Tyr, Phe, His, Lys, Arg, Cys, Met) was detected using automatic amino acid analyzer AAA 400. Sensory profiles were evaluated by comparison of enriched and control biscuit samples. The enriched biscuits showed higher phenolic and flavonoid content and antioxidant activity with DPPH and phosphomolybdenum method in comparison with the control group. The best results were achieved in biscuits enriched with black tea powder (3%) and DPPH and phosphomolybdenum methods revealed 2.30 mg TEAC/g and of 33.45 mg TEAC/g (Trolox equivalent antioxidant capacity), respectively. Total phenolic content was 1.16 mg GAE/g (gallic acid equivalent) and total flavonoid content was 0.13 mg QE/g (quercetin equivalent). These biscuits had a higher content of crude fiber in comparison with the control group and the best result of 0.65% was found in biscuits with addition of 3% green tea powder. The content of amino acid in samples including control sample was balanced with a slightly higher content of threonine, serine and methionine in enriched samples. Biscuits enriched with green and black tea had higher sensory scores for taste, smell and aftertaste.

In conclusion, the addition of green and black tea powder to biscuits can increase the biological activity and improve the sensory profile of the bakery products.

Keywords: tea, biscuit, antioxidant activity, polyphenols, crude fiber, amino acids.

O28 EFFECT OF ADDITION OF FENNEL (*FOENICULUM VULGARE* L.) ON THE QUALITY OF PROTEIN BREAD

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Fennel (*Foeniculum vulgare* L.) is an aromatic plant belonging to *Apiaceae* family originating in the Mediterranean region having a long history of edible and medicinal uses, and widely cultivated elsewhere for its strongly flavoured leaves and seeds. Fennel seeds are of particular interest as a rich source of both vegetable (VO) and essential oils (EO) with high amounts of valuable components (80% petroselinic acid and 70% trans-anethole). The aim of this study was to valorise residual cakes from fennel seed oil extraction in protein bread production.

Fennel cakes were obtained as co-products of oil production, using mono-screw press extraction technique. For the protein bread making, fennel seeds and cakes in concentration from 1 to 6% were used; thus, moisture content, colour L*a*b*, hardness, total phenolic content, DPPH, ABTS radical scavenging activity, and nutritional value of bread were determined.

The addition of fennel seeds and cakes led to colour browning and decrease of hardness besides larger crumb holes, moreover, a higher antioxidant activity and total phenolic content were observed for breads enriched with seeds and cakes. The overall results showed that by increasing of fennel seed and cake concentration, also the total phenolic content, antioxidant activity increased, and the quality of protein breads was improved. These results suggest that bread production could be an alternative way for valorisation of fennel seed oil co-products.

Keywords: fennel, co-product, protein bread, hardness, total phenolic, radical scavenging activity.

O29 EXOPOLYSACCHARIDES OF LACTIC ACID BACTERIA IN YOGHURT PRODUCTION: CASE STUDY

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The investigations in order to obtain consumers' healthy products with valuable properties have drawn attention to microbial exopolysaccharides (EPS). Microbially synthesized EPS protect the microbial cell due to increased viscosity in dairy products and may remain for longer time in the intestinal tract beneficially influenced colonisation of lactic acid bacteria. The aim of the study was to analyse the potential of yoghurt starter producing EPS in yoghurt production.

The commercial yoghurt starter Harmony 1.0 (*Streptococcus thermophilus, Lactobacillus bulgaricus, Lactobacillus fermentum*) produced by Chr.Hansen (Denmark) was used for yoghurt production. EPS, pH, carbohydrates, lactic acid bacteria (LAB) colony forming units (CFU) and an apparent viscosity were measured in yoghurt, as well as in samples stored for 7 days using an appropriate analytical technique or standard procedures.

Yoghurt starter-synthesized EPS vary roughly from 32.10 to 152.79 mg L^{-1} during fermentation with a tendency to increase EPS concentration from 152.80 to 242.05 mg L^{-1} during the shelf-life of products. The significant differences ($p>0.05$) are not observed between the amount of EPS and LAB CFU in the analysed samples. We found that yoghurt samples with a higher EPS concentration showed reduction of LAB CFU during the shelf-life. The fermentation patterns have a crucial role in development of yoghurt quality and functional properties.

Keywords: exopolysaccharides, lactic acid bacteria, yoghurt, starters, viscosity, prebiotics.

O30 GLYCAEMIC AND INSULIN RESPONSE AFTER CONSUMING BARLEY AND GERMINATED HULL-LESS BARLEY FLAKES

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The epidemiological data indicate that a diet characterized by a low glycaemic index foods and a high fiber content has beneficial effects on insulin resistance and carbohydrate metabolism. Grain products are the main source of dietary fiber in Latvia, but very little is known about potential health benefits to carbohydrate metabolism of different kinds of barley flakes. The aim of the study was to investigate glycaemic and insulin response after consuming wholegrain barley flakes and wholegrain germinated hull-less barley flakes.

The participants received equivalent carbohydrate amounts of test foods and reference food (glucose). Postprandial blood glucose and plasma insulin concentration were measured in according to methodology by the ISO (International Organization for Standardization) method 26642:2010.

Both test products demonstrated lower plasma glycaemic as well as insulin response in comparison to the standard food – glucose. Germinated hull-less barley flakes showed particularly low insulinemic response: 14.2–24.98 mmol/l compared to the standard food-glucose: 31.6–72.9 mmol/l. The results indicate the beneficial properties of barley flakes, especially germinated hull-less barley flakes, on carbohydrate metabolism.

The present research leading to these results has received funding from the Norwegian Financial Mechanism 2009–2014 under the project "Innovative approach to hull-less spring cereals and triticale use from human health perspective" (NFI/R/2014/011).

Keywords: barley, germinated hull-less barley, glycaemic response, insulinemic response, healthy subjects.

O31 CRISPBREAD IMPROVEMENT WITH CARROT AND PUMPKIN BY-PRODUCTS

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The result of carrot and pumpkin production are by-products – peel. Food processing waste has the potential to be converted into useful products and utilized as supplements for the functional ingredient for consumers as a source of functional compounds. Carrot and pumpkin by-products retain carotenoids – the precursors of vitamin A and dietary fibre. The consumption of it is linked to a decreased incidence of cardiovascular disease, diverticulosis, and colon cancer. The aim of the study is to investigate nutrition compound difference in extruded crispbread with carrot and pumpkin by-products. Samples were prepared from wheat flour 70%, rice flour 24% and wheat bran 4%, as control with addition of 5%, 10%, 15%, 20% of dried and grinded carrot and pumpkin by-products. The products were extruded in GÖTTFERT 1 screw Extrusiometer L series. The temperatures for extrusion zones were set at 78/83/98^{0}C. The total carotenoid content for new products was determined by spectrophotometry. The total dietary fibre was determined with Enzymatic-Gravimetric Method, AOAC 985.29. The total carotenoid amount increased significantly by adding pumpkin and carrot by-products. The increase of dietary fibre content was from 13 mg/100 g in wheat crispbread to 19-20.17 mg/100 g in the products with added carrot and pumpkin by products. Protein and fat content of the received samples was not significantly changed. Carbohydrate levels, including sugars, had increased.

Keywords: carotenoids, crispbread, dietary fibre, extrusion.

O32 RED BEET (*BETA VULGARIS*) ROOT JUICE MEMBRANE ULTRAFILTRATION USE TO MODIFY PRODUCT'S FUNCTIONALITY

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Iron deficiency and anaemia are associated not only with an inadequate intake, but also an impaired absorption or transport. Vegetable juices were tested on capacity to stimulate Fe^{+2} absorption, using cockerel's *duodenum in vitro* and *in vivo.* It was determined that the capacity of red beetroot juice (RBJ) to stimulate iron absorption is higher than that of other vegetables. Non-protein high molecular components of the juice slow down this process.

Gradational microfiltration and membrane ultrafiltration was used to modify RBJ functionality. At experiment *in vivo* fractionated red beetroot juice (F-RBJ) demonstrated 250-times higher than native RBJ Fe^{+2} absorption intensity.

In contradistinction to native RBJ, F-RBJ *in vitro* stimulates rat bone marrow mezenchymal stem cells' osteogenic differentiation, in parallel blocking adipogenic. F-RBJ improved rats' recovery after an experimental polytrauma.

In the experiment on obese rats, F-RBJ provided body weight reduction and blood lipid profile optimization: in females after 1 month's treatment with F-RBJ in dose 0.2 ml/day blood triglycerides level dropped by 62% and fat liver histomorphological structure had been normalized.

Due to containing nitrates, F-RBJ provides vasodilatation. The impact of a single dose of the product (50 ml) on blood microcirculation in the skin on the back of the hand 2 hours after dosing was studied in 27 volunteers aged 27 to 55 years. Laser-dopplerography was used. The blood flow velocity increased by 22% on average in 70% of volunteers.

Thus, RBJ fractionation using ultrafiltration is an essential tool for plant juice health effects modulation.

Keywords: red beetroot, ultrafiltration, iron absorption, blood microcirculation, hepatoprotection.

O33 IMPACT OF UHT ON BIOACTIVE COMPOUNDS AND SENSORY ATTRIBUTES OF ORANGE JUICE COMPARISON WITH TRADITIONAL PROCESSING

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Orange juices are an important source of bioactive compounds. Because of the unique combination of sensory attributes and nutritional value, orange juice is the world's most popular fruit juice. The aim of the study was to investigate the impact of different processing technologies on bioactive compounds of orange juice. The impact of conventional thermal pasteurization (94 °C/30') (CTP) and alternative ultra-high heat (130 °C/2') (UTH) processing on biochemical compounds changes of fresh orange juice of Greek 'Navel' variety (*Citrus sinensis*) was investigated. For antioxidant capacity determination, ABTS radical-cation, DPPH and FRAP assays were used. Sensory attributes of treated juices were evaluated by 12 panellists using a hedonic scale (1–9 points). The results showed that orange juice 'Navel' produced by CPT and UHT technologies significantly changed in vitamin C content in comparison with fresh orange juice. The highest content of antioxidants capacity (vitamin C, total phenols, hesperidin and carotenoids) was observed in orange juice 'Navel' produced by UHT technology. In the ABTS, DPPH and FRAP assay the scavenging activity were 234.47, 85.88 and 141.49 mg Trolox eq100 ml^{-1}, respectively. The sensory results indicated that characteristics of the orange juice produced by UHT technology were liked more than those of the CPT heat-treated juice.

UHT technology emerges as an advantageous alternative process to preserve the bioactive compounds in orange juice.

Keywords: orange juice, biochemical compounds, UHT treatment.

O34 HERBAL EXTRACT APPLICATION FOR EXTENDING SHELF-LIFE OF PORK MEAT

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Oxidation and microbial spoilage have negative effects on the quality of meat and meat products, causing changes in their sensory and nutritional properties. Herbs contain biologically active compounds – phenols with antioxidative and antimicrobial properties. Phenols might be used as substitute for synthetic antioxidants and prevent lipid oxidation, which consequently affects the colour and flavour of the product. The aim of the study was to investigate herbal extract application opportunities for extending the shelf-life of pork meat.

For the purposes of experiment, four herbs growing in Latvia – nettle (*Urticadioica L.*), lovage (*Levisticum officinale L.*), oregano (*Origanum vulgare*) and horseradish (*Armoracia rusticana L.*) were chosen. The optimal ethanol concentration for the extraction of the phenolic compounds was determined. The best results were obtained for samples with ethanol concentration of 50% (v/v). Herbal extracts were added to chilled pork to determine the shelf life of meat. Results showed that the pork meat stored with oregano, lovage and nettle extracts had better organoleptic properties in comparison to the control sample (pork meat without herbal extracts). Statistically significant differences between the meat samples with extract and control sample for total plate count and Enterobacteriaceae CFU were observed.

Keywords: herbal extracts, phenols, meat.

This work was supported by National Research Programme AgroBioRes (2014–2017).

O35 EVALUATION OF IODINE CONCENTRATION IN COW MILK IN LATVIA

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Milk and dairy products are studied as alternative sources of iodine, as salt iodisation is controversial because of high salt consumption leading to arterial hypertension and cardiovascular diseases. Milk is a natural component of the human diet, however, iodine concentration in milk varies greatly. Therefore, the aim of the research was to evaluate the iodine concentration in cow's milk available in the Latvian supermarkets. Analysis, using spectrophotometer "Varian Cary 50" for iodine determination and ISO 2446:2008 for fat concentration was performed for 20 milk samples. The data are presented as the geometric mean ± SD. The average iodine concentration in milk samples was 420.7 ± 179.6 μg/L, winter samples (n=9) had a greater concentration of iodine than the summer samples (n=11), respectively, 399.0 ± 208.3μg/L and 439.3 ± 162.3 μg/L, $p < 0.05$. The iodine concentration in the skimmed milk samples with fat content 0.05-0.5% was 490 μg/L (n=1), semi-skimmed milk with fat content 2.0-2.5% – 470.8 ± 174.8 μg/L, and in the whole milk with fat content 3.0-4.5% – 382.3 ± 192.1 μg/L. The mean iodine concentration for non-organic milk (n=16) was 509.8 ± 164.3μg/L and for organic milk (n=5) – 510.2 ± 353.3μg/L, $p < 0.05$. Regardless of the differences in iodine concentration, milk and milk products are considered an important iodine source in Latvia and their consumption should be promoted.

Keywords: iodine, milk, organic, skimmed.

This work was supported by the Latvian National Research Programme BIOMEDICINE.

O36 INFLUENCE OF STEAM TREATMENT AND DRYING ON CARROTS' PHENOLIC COMPOSITION, ORGANIC ACIDS AND CAROTENOID CONTENT

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Carrots (*Daucus carota* L.) are vegetables used worldwide from *Apiacea* family, containing macro and micro elements, as well as various phytochemicals. The aim of the research was to analyse carotenoids, organic acids, phenolic composition and their antiradical scavenging activity, and colour changes of steam-blanched (for 1.5 and 3.0 min) and dried carrots in convective and microwave-vacuum drier. Gravimetric, spectrophotometric and high performance liquid chromatography (HPLC) methods were used for analysis. Carotenoids in fresh carrots were detected in high amounts, with thermal and drying processes the total amount decreased. The main organic acids detected in highest amounts were oxalic, tartaric, quinic, malonic and citric acids. Ascorbic acid decreased minimally with steam processing, but with drying process the amount decreased. Fresh carrots contain minimal amount of total phenolic's and during thermal processing and all drying processes this content increased, while flavonoid, flavonol, flavan-3-ol and phenolic acid content decreased. The highest amounts detected by HPLC methods were those of 3.4-dihydroxybenzoic and 3.5-dihydroxybenzoic acids, catechin, 4-hydroxybenzoic acid, epicatechin and sinapic acid. The changes in biological active compounds could be explained by chemical processes in heat process, the highest negative effect was observed in long term drying process with convective drier, while a more positive effect – with microwave-vacuum drier processing

Keywords: carrots, steam-blanching, convective drying, microwave-vacuum drying, phenolic compounds, organic acids, total carotenoids.

O37 INCREASING NUTRITIONAL VALUE OF MACARONI PRODUCTS

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Macaroni products are widely used and popular food products in Ukraine and all over the world. However, they have a non-balanced chemical composition (oversaturation of carbohydrates, low content of protein, macro and micro elements). Therefore, the search of ways to enrich macaroni products made of baking flour with essential nutrients is topical. In particular, the use of wild raw materials (berberis, hawthorn, blackberry, rowanberry, whortleberry) is explored. Thus, rowanberry contains β-carotene, vitamins A, C, food fibers in big amounts. All these nutrients are limited in macaroni products made of baking flour.

The effect of whortleberry (*Vaccinium myrtillus L.*) and rowanberry (*Sórbus aucupária)* upon the quality of macaroni products made from wheat baking flour has been investigated. The physical and chemical, sensorial, as well as experimental – statistical methods were used for the quality estimation.

Macaroni products with whortleberry powder acquire a light violet colour, with rowanberry – an amber colour, pleasant taste and better cooking properties – mass and volume of cooked products increase. Increasing of dosage by more than 15% has a negative effect on the quality – the acidity increases, strength decreases on 5–30%. The components of whortleberry and rowanberry detect a dehydrating effect in the macaroni dough. The acceptable quality of macaroni products is achieved with whortleberry powder – 4%, rowanberry powder – 6% to the weight of flour.

The content of β-carotene significantly increases in macaroni with rowanberry. In case of dosage 6 g/100 g the daily maintenance in β-carotene is ensured at 11% and in vitamin C – at 5%. It confirms that such macaroni products are healthy. The content of vitamin C is lower in products with 4 g/100 g of whortleberry powder. The daily requirement for vitamin C is ensured at 2.6%. The content of minerals – calcium, potassium, iron, phosphorus – increases.

Keywords: macaroni products, rowanberry, whortleberry, quality.

O38 INFLUENCE OF UPTAKE OF BETA-GLUCANS ON METABOLIC SYNDROME AND PREVENTION OF DIABETES

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Metabolic syndrome is the name for a group of factors that raises a risk of serious health problems, such as diabetes, cardiovascular diseases, stroke and cancer. Metabolic syndrome is a combination of at least three of the five following medical conditions: abdominal obesity, elevated blood pressure, elevated fasting plasma glucose, high level of serum triglycerides, and low levels of high density lipoproteins.

Our studies demonstrate that consumption of beta-glucans can significantly decrease the levels of serum triglycerides and increase the ratio of high density lipoproteins to low density lipoproteins. Beat glucans were strongly decreasing the elevated fasting plasma glucose levels in streptozotocin-induced diabetic rats.

A significant immune-modulating action of beta-glucans was also demonstrated. Recent studies show that obesity induces a state of chronic, low-grade inflammation that facilitates insulin resistance. Adipose tissue macrophages infiltrate the adipose tissue during obesity and contribute to insulin resistance and pancreatic beta-cell dysfunction. Through the regulation of various inflammatory cytokines, beta-glucans can decrease the insulin resistance and also protect the pancreatic-beta-cells.

O39 COOKING TRADITIONS AND NUTRITIONAL INFORMATION OF LATVIAN ETHNOGRAPHIC CELEBRATION MEALS FROM TODAY'S PERSPECTIVE

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Latvian cuisine has an important role in the exploration of our country's traditions. Nowadays it has become an integral part of the tourism infrastructure. The number of overweight and obese people has been increased in a lot of developed countries, as well as in Latvia. The researches about holiday weight gain have been conducted all over the world. There are no such researches made in Latvia, as well as there is no data about ethnographic meals' nutritional information available.

To promote a solution of the problem, following aim was set up: to explore the nutritional information of Latvian festive ethnographic meals.

The Latvian ethnographic meals' recipes were deeply viewed and analyzed. Historical folkloric materials and analytical folklore researches were used to make the quantitative sampling.

To identify the most widespread Latvian ethnographic meals, 2827 folk songs were looked through. Fourty eight products and 27 meals were included in the selection. Selected folk songs were compared with ethnographic descriptions of meals, and the recipes from recipe books were chosen.

The nutritional information of the prepared meals was calculated and analysed. It was found that the nutritional value of the selected meals does not meet today's WHO recommendations for healthy nutrition, and, the range of products and dishes is monotonous (Christmas table menu has the most diverse menu).

The work consists of 35 pages of text, six images, seven tables, four annexes and 37 sources of information.

Keywords: Latvia, ethnographic meal, ethnographic dish, Folk songs, holiday weight gain, obesity, overweight, nutrirional information, energy value.

O40 CENTRE FOR DISEASE PREVENTION AND CONTROL ACTIVITIES PROMOTING HEALTHY NUTRITION

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To promote healthy eating habits, the Republic of Latvia Cabinet of Ministers has approved a medium term policy planning document Public Health Strategy for years 2014 to 2020. The main public health policy aim of this document is to prolong healthy life years of Latvian population and to prevent untimely death, to maintain, improve and restore health. The main activities to help reach the aim are reducing health inequalities, decreasing the risk factors of non-infectious diseases, including healthy nutrition, improving mother and child`s health, including breast feeding, and improving health care accessibility.

The Centre for Disease Prevention and Control of Latvia is responsible for co-ordination of health promotion measures at national and regional level, as well as for informing the society about the issues affecting health and a healthy lifestyle. The Centre for Disease Prevention and Control has organised public information campaigs and educational events, as well as elaborated informative materials (brochures, posters, infographics, leaflets, etc.) to inform general public about healthy nutrition issues.

Promotion of healthy nutrition to reduce risk factors of non-infectious diseases is one of the public health priorities within the European Structural Funds programme for time period until the year 2020. The activities for health promotion and disease prevention will be developed nation-wide and locally (at the municipal level). The European Structural Funds programme aims to improve the access to health promotion and disease prevention services for all Latvian citizens, especially population at risk of territorial, poverty and social exclusion, in the implementation of local measures.

Keywords: healthy nutrition, public health policy.

POSTERS

P1 THE ACADEMIC INTER-UNIVERSITY MASTER`S STUDY PROGRAM: "STUDY PROGRAM OF MASTER OF HEALTH SCIENCES IN NUTRITION SCIENCE (NUTRITIONAL SCIENCE)"

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The Academic Inter-University Master's Study Program *Nutritional Science* was developed and is implemented since 2006 year by the teaching staff (40 university`s lecturers, including 88% with doctor`s degree) of the Latvia University of Agriculture (LUA), the University of Latvia (UL) and the Riga Stradiņš University (RSU) in accordance with the Cooperation Agreement.

The aim of the program is to train qualified specialists of nutrition science, who would be 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 the 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, LUA and RSU. The subject of the research: health of the society and policy of nutrition; habits of nutrition and eating; provision of wholesome nutrition for population; nutrition – a risk factor of chronic diseases; nutrition therapy; nutrition of athletes, new and functional food. Students have presented their results at some local conferences and/or at international conferences.

Since 2008, the Masters' theses were presented and Health Science Master`s degree in nutrition science was obtained by 212 students; ~20 graduates have studied, are currently studying or are preparing to study to achieve doctor's degree. Most of them are continuing the studies commenced during their Master's studies, just on a higher scientific and academic level.

Keywords: Inter-University Master's program, nutritional science, qualified specialists.

P2 ASSOCIATION OF ANTIOXIDANT PARAOXONASE 1 ACTIVITY AND OXIDATIVE STRESS MARKERS WITH METABOLIC RISK FACTORS IN PATIENTS WITH SCHIZOPHRENIA

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The aim of the study was to investigate the activity and oxidative stress markers of serum paraoxonase 1 and assess its relations with the metabolic syndrome (MetS) components in patients with schizophrenia. The study group consisted of 60 patients with schizophrenia and 60 sex- and age-matched healthy controls. Serum paraoxonase 1 (PON1) activity towards paraoxon and diazoxon, superoxide dismutase (SOD), total sulfhydryl (SH) groups, total antioxidant capacity (TAC) and malonaldehyde (MDA) were measured. Patients with MetS had significantly lower PON1 activity and significantly increased MDA values in comparison with the controls. SOD activities, SH groups and TAC were lower and MDA was higher in patients with 2 or 3 MetS components than the subjects with 4 or 5 MetS components. PON1 activity toward diazoxon was negatively correlated with MetS score. Assessment of oxidative stress markers and PON1 activity might be useful for determining the degree of the MetS in patients with schizophrenia. The improvement in PON1 activity could be a beneficial strategy in the management of MetS in schizophrenia.

Keywords: oxidative stress, metabolic syndrome, paraoxonase activity, schizophrenia.

P3 BALANCED FLUID INTAKE IMPORTANCE IN CHILDREN AND ADOLESCENT ATHLETE DIET

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Water is one of the most important nutrients for athletes because of intensive water loss during exercise. If the recovery during exercise is insufficient, the body will be dehydrated, and it affects not only the athletic results, but can also cause health problems. Dehydration increases the risk of overheating and is a risk factor for suffering a heat stroke. The phenomenon of overheating as a result of dehydration is quite common and may result in death, especially if the diagnosis is delayed and prompt medical attention is not given immediately.

The objective of the research work was to collect and compile information about fluid importance in young athletes' diet, and subsequently to establish whether adolescent drinking habits contribute to dehydration. Research involved 100 children and adolescents, who completed 24-hour dietary recall and filled a questionnaire with 14 questions. The results of the research have been analyzed using IBM SPSS program version 20.

The study showed that drinking habits of children and adolescent athletes contribute to the risk of dehydration. Analyzing the previous 24-hours' full menu it was found that the average uptake of fluid a day with food and drinks was insufficient – 1,795 L. Athletes do not follow a specific rehydration technique. More athletes used fluid after workout, which could be explained by dehydration during their workout. To quench their thirst. athletes mainly use drinking water. On average, the coaches do not talk about hydration issues, and during training do not encourage athletes to drink.

Keywords: fluid intake, athlete, drinking habits, 24-hour dietary recall, dehydration.

P4 STUDY ON ASSESSING THE KNOWLEDGE OF IODINE IMPORTANCE IN NUTRITION AMONG ADULTS IN LATVIA

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FAO "Guidelines for assessing nutrition-related knowledge, attitudes and practices" indicates that having independent access to food is not sufficient to ensure that people are food secure and well-nourished. It is essential that people understand what constitutes a healthy diet and know how to use their resources most effectively.

Iodine is an essential nutrient for mammals, required as a mandatory structural and functional element of thyroid hormones. Previous studies in Latvia highlighted a tendency to have a reduced level of iodine in newborns and school-age children. No studies in adult population have been implemented.

The aim of the study was to evaluate the level of knowledge about iodine's role in nutrition in adult population of Latvia.

In total, 199 adults participated in the survey. The data characterising knowledge about iodine occurrence in nature and foodstuffs, iodine role in nutrition and its deficiency were obtained.

The survey results showed that only 4.5% of respondents use iodized salt in daily diet. One fourth knows that iodine is widely distributed in environment and one third knows all the main functions of iodine in organism. Sea food was mentioned as the most popular iodine source.

Despite the fact that iodized salt is used rarely, public awareness about iodine's role is satisfactory.

Keywords: iodine, iodine deficiency, public awareness, nutrition.

P5 PREGNANT WOMEN'S KNOWLEGDE OF THE RISKS OF EXESS WEIGHT IN PREGNANCY IN RIGA

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The obesity and overweight is increasing worldwide, including women in childbearing age. Data show that maternal obesity and overweight increase a wide spectrum of adverse pregnancy outcomes.

The aim of the study was to investigate pregnant women's knowledge about the health risks of excess weight and the optimal weight gain during pregnancy.

Materials and methods. A cross-sectional study included 100 pregnant women attending maternity hospital and outpatient clinic during the period of 3 months. The questionnaire contained questions about events/complications including stillbirth, macrosomia, complicated vaginal delivery, structural anomaly, caesarean section, high blood pressure, and gestational diabetes mellitus. Sociodemographic data were collected. Participants were asked to identify their status (underweight, normal weight, overweight or obese) and target gestational weight gain.

Women's knowledge is insufficient regarding the adverse outcomes of pregnancy related to overweight or obesity, including the knowledge about risks for infant and mother mortality.

This study indicates that in majority the pregnant women have an insufficient knowledge about the risks of excess weight in pregnancy and the weight gain appropriate for pregnancy.

Keywords: body mass index, pregnancy, knowledge, risks.

P6 PROTEIN AND / OR AMINO ACID SUPPLEMENTATION EFFICIENCY OF MUSCLE MASS AND FUNCTIONAL PERFORMANCE IN OLDER PEOPLE: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Maintaining muscle function is vital to sustain functional independence. Muscle protein synthesis depends on anabolic stimulus like nutrition and physical activity, and for older adults these processes are slower. Protein interventions could be effective to promote the muscle protein synthesis in elderly.

The aim of this systematic review and meta-analysis was to investigate protein and/or amino acid supplementation efficacy on muscle mass and strength gain and physical performance development in elderly.

Data search was performed in seven databases by pre-determined keywords. The report included randomized trials, where the effects of protein and amino acids on muscle strength, mass and physical performance in elderly was investigated.

A total of nine randomized studies were included in the systematic review. The results showed that muscle mass, strength gain and physical performance could be developed by essential amino acid or collagen supplementation with resistance training and leucine-enriched whey protein nutritional supplementation. A total of four studies were included in meta-analysis. After milk and whey protein intervention, no significant effect was found in the intervention group compared with the control group regarding muscle mass, strength or physical performance. There were no good quality studies to analyse the essential amino acids' usefulness in meta-analysis.

Keywords: muscle mass, muscle strength, protein, amino acids, elderly.

P7 CELIAC DISEASE-RELATED QUALITY OF LIFE IN SCHOOL-AGED CHILDREN AND ADOLESCENTS

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A survey was carried out with the aim of assessing the level of celiac disease-related quality of life in school-aged children and adolescents. The applied research tool was Likert's scale questionnaire of celiac disease-related quality of life developed and validated in Netherlands. Children and adolescents evaluated their celiac disease-related quality of life at 43.87 points. In comparison with the children and adolescents, the parents appraised their children celiac disease-related quality of life at 44.54 points (p 0.009). Comparing genders, the girls demonstrated slightly lower results at 44.40 points, while the boys – gave the evaluation of 42.94 points. Comparing the age groups, the children of 7 to 12 years evauated it at 44.94 points, and adolescents of 13 to 18 years – at 41.08 points. School-aged children and adolescents' celiac disease-related quality of life was appraised as unsatisfactory, and, in comparison with their parents, they evaluated it higher. The assessment of celiac disease-related quality of life is influenced by both age and gender. In the age group of 7 to 12 years, celiac disease-related quality of life is evaluated as unsatisfactory and rated lower than in the age group from 13 to 18 years. While the girls also gave an unsatisfactory score, they rated it lower than the boys.

Keywords: quality of life, health related quality of life, celiac disease, coeliac disease, gluten enteropathy, children and adolescents, milestones, gluten-free diet.

P8 MEAT AND MEAT PRODUCT CONSUMPTION AMONG INFANTS IN LATVIA

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Meat consumption during the first year of life is especially important to provide for the necessary iron requirements. The research objective was to collect data on infant feeding habits in Latvia. The data were collected by interviewing method, using 2 types of questionnaires: food frequency questionnaires and diary. The study included a representative sample of infants and toddlers from all regions of Latvia, amounting to 560 participants. This research included 266 infants: 127 girls and 139 boys, aged from 0 to12 months. The data were collected in Excel program and analyzed in SPSS program. For the purposes of data analysis, 2 age groups were created: 0–5.9 months and 6–12 months. Consumption was analyzed according to two parameters: frequency and amount per feeding. Meat products were defined as offal products, sausages, meat in baby food. Meat is mainly consumed after 6 months of age and by 73% of infants (n=107). The meat from baby food is consumed only after 6 months and by 23% of the survey participants (n=34). Sausages and offal products are consumed after 6 months of age. Sausages are consumed in 18% (n=28) and offal products in 11% (n=16) of cases. Meat consumption for majority of infants was introduced after 6 months of age and this concurs with the recommendations. However, 27% of the survey participants did not consume meat during the first year at all.

Keywords: nutrition, infants, meat, offal, sausages, baby food.

P9 OPPORTUNITIES OF PROVIDING THE NECESSARY BIOLOGICAL VALUE FOR A DEVELOPING BODY

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The resources for optimal growth include biologically valuable, matters required for life, a balanced, moderate consumption of these matters and an eating plan. 84% of the interviewed pupils choose food products with a low biological value and a high energy value. The aim of the research is, by taking an active part to create healthy eating and food consumption patterns for pupils. Catering for pupils is very different in schools of Latvia both concerning mealtimes and charges. The basic criteria are elaborated, and according to these criteria the quality of catering for pupils could be estimated in different schools. 36% of school children in out-of-school conditions regularly (every day) consume snacks with simple carbohydrates. For better utilization of food, the presence of fresh, unprocessed fruits and berries containing minerals and vitamins in the product is of a great significance. Pectin of black currants is used as a natural gelling agent. The most important physical-chemical and sensory parameters are determined in a structured fruit puree. Recommendations to facilitate pupils' healthy eating habits have been developed.

Keywords: pupils, fruits, nutritional value, quality.

P10 DYNAMICS OF PLASMA CARBOHYDRATE CONCENTRATION IN PROFESSIONAL ATHLETES AFTER INTAKE OF HIGH AND LOW GLYCEMIC INDEX DRINKS

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Carbohydrate is the main fuel for exercising muscles, and depletion of glycogen stores has been associated with the onset of fatigue. However, scientific ideas of the importance characteristic to carbohydrate with different glycemic index (GI) in energy supply in athletes with mixed (speed/endurance) load, is still conflicting. The aim of the research was to evaluate the utilization dynamics of the plasma glucose in professional athletes – football players, during physical exercise after intake of drinks with different GI. The study involved 24 athletes and was performed on the practice football field of Football School METTA in the Olympic Sports Center in Riga. Plasma glucose level was measured using Accu Chek Active, Roche glucometer. There were two football practice sessions of 90 minutes. Every 15 minutes, the blood samples were taken from each participant. In the first session, the dynamics of glucose was determined after consumption of a low GI drink (GI-53±6), in the second session – after consumption of a high GI drink (GI-68±6).The study results indicate that after the intake of drinks with different GI, significant differences in plasma glucose concentration exist during the first 15 minutes of exercise, however, during further exercise there are no significant differences based on the GI of the consumed drink. Based on the results of research, we can recommend that it is not advisable to consume drinks with a high glycemic index before physical activity in order to avoid causing a hypoglycemic effect during the beginning phase of the activity.

Keywords: glycemic index, plasma glucose, mixed load physical exercise.

P11 COMPARISON OF BODY COMPOSITION AND ENERGY INTAKE OF YOUNG FEMALE BALLET DANCERS AND ORDINARY SCHOOL GIRLS

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Thirty-nine female ballet dancers (aged 12–14 years) and seventy female respondents from ordinary schools as controls (aged 13–15 years) participated in the study from the end of 2012 to beginning 2013. None of the participants reported dieting. Body composition was measured, using multi-frequency 8-polar bioelectrical impedance analyser (X–Scan pluss II, Korea). Dietary intakes were assessed, using 3-day food record questionnaire.

Body composition parameters differed statistically significantly among the investigated groups. Ballet dancers are slightly shorter, lighter, with less fat and fat-free mass. Body fat (%BF) under 12% (critical level) was found in half of the ballet dancers (51.3% (CI=12.55; 7.45-32.55) and 4% (CI=4.59; 0.59-8.59) of the ordinary school girls. The daily intake of minerals in ballet dancers is lower in comparison with the ordinary school girls ($p<0.001$; Mg $p=0.05$). A deficit of potassium, calcium, magnesium and phosphorus was recognized in both groups in winter period.

A half of the ballet dancers consume less energy than necessary for successful performance, and both groups have an inadequate intake of minerals and vitamins.

Keywords: body composition, nutrition.

P12 TRAINING FOR PATIENTS OF CORONARY HEART DISEASE – ESSENTIAL PROBLEMS AND SOLUTION

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Mortality due to the coronary heart diseases still remains very high despite the extensive information about risk factors leading to coronary heart diseases available today. Every person in Latvia has an opportunity to evaluate the quality of his or her life and also the impending risks. Certainly, one of most significant factors capable of decreasing the occurrence of coronary heart disease is a proper diet.

The goal of the research was to establish the extent of knowledge of the patients with coronary heart disease about their health and nutrition, as well as whether the attitude of the patients towards their health would change, if special practical training programme was elaborated and practised by health institutions.

The study was conducted by Pauls Stradins Clinical University Hospital Interventional cardiology and emergency department (Chapter 32) in 2013. The duration of the study was two months. 60 patients were interviewed.

Patients' knowledge of correct, appropriate diet was insufficient. They had no motivation for lifestyle changes. The methodology for practical food and cooking classes and handouts for patients was created.

Training of lifestyle change for patients of coronary heart diseases, and the choice of the proper diet particularly, can improve the life quality of patients.

Keywords: leading factors, risk, diet, nutrition, lifestyle.

P13 EFFICACY AND TOLERABILITY OF ALKALINE WATER DAILY USE FOR GASTROESOPHAGEAL REFLUX DISEASE TREATMENT: A PILOT STUDY

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Gastroesophageal reflux disease (GERD) is one of the most common disorders of the gastrointestinal tract (Bredenoord AJ, 2013). The objective of the study was to evaluate alkaline water (pH=9.6) efficacy and tolerability as an alternative or combined method of treating GERD patients.

21 GERD patients (13M:8F) were divided into 2 groups: the 1st (n=14) received 1 l of alkaline water (pH=9.6) daily for 2 weeks (manufactured by "Amber coast Ltd.", Latvia). The 2nd (n=7) – 1 l of alkaline water daily and a standard dose of Proton Pump Inhibitor (PPI) for 2 weeks. The results of GerdQ questionnaire were compared before and after the treatment.

The peak age of patients was 60–70 years, mean BMI=29 kg/m^2 (overweight – 52.4%, obesity – 38.1%), endoscopically positive GERD found in 64.3% patients (n=14), the mean heartburn intensity before the treatment was 6 (0–10 max). The mean GerdQ score (1–18) obtained from different treatment groups is shown below: alkaline water (the mean before=10.5±2.3SD, after=7.6±1.1SD; alkaline water and PPI (the mean before=8.4±2.4SD, after=6.6±0.8SD). The decrease of GerdQ score after 2 weeks of treatment in the 1st group was 27.7% ($p<0.001$) and in the 2nd – 22% ($p=0.05$).

Alkaline water treatment alone or in combination with PPI showed a decrease of GerdQ score in GERD patients amounting to more than 20%.

The results of the study showed that no adverse effects were identified.

A larger patient population would be necessary for a subgroup analysis.

Keywords: GERD, PPI, alkaline water, heartburn, GerdQ questionnaire.

P14 EVALUATION OF ENERGETIC SUBSTRATE OXIDATION RATE DURING SUBMAXIMAL WITH INCREASING WORKLOAD EXERCISE IN YOUNG ADULT FEMALES

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Different strategies can be implemented for the body weight and the body fat regulation. For example, a monitored diet and/or consistent physical activity may improve the metabolic profile and lipid oxidation rate.

The aim of the research was to determine a relative oxygen consumption and heart rate range, at which it is possible to reach a maximum lipid oxidation rate during an increasing workload exercise for physically untrained persons with varying body compositions.

The study involved 23 clinically healthy females aged from 23 to 33. The participants were divided into 3 groups according to their body mass index: decreased body fat, normal body fat and overweight/obese body compositions.

Indirect calorimetry was used to determine the rate of gas exchange for an estimation of metabolic rate and energetic substrate (lipids and carbohydrates) oxidation rate during the conditions of rest and increasing submaximal workload exercise achieved by treadmill activity. Heart rate was continuously recorded by a heart rate monitor.

The study results indicate a higher tendency to consume fat as an energy substrate during rest in the participants within the normal body fat group as compared to the participants in either the decreased or the overweight/obese groups.

The study also indicated that for participants within the overweight/obese group, lipid oxidation is most effectively stimulated by a low to medium intensity physical workload. Low to medium intensity physical workload is identified as a 35–55% of maximal oxygen consumption and/or 50–60% of maximal heart rate.

Keywords: metabolic rate, energetic substrate oxidation, heart rate, workload exercise, female.

P15 FOODS MOST FREQUENTLY CONSUMED BY OVERWEIGHT/OBESE PATIENTS WITH TYPE-2 DIABETES IN LATVIAN SUMMER SEASON

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A survey was carried out with the aim to investigate the most frequently consumed foods among overweight/obese type 2 diabetes (T2D) patients during the summer season in Latvia.

A total of 50 non-insulin dependent T2D patients were interviewed, 16 (32%) were men and 34 (68%) were women. The mean age was 61±9 years for women, and 56±10 years for men. The mean duration of diabetes was 8±6 years, HbA1c 7±0.5, BMI 34.3±5 kg/m^2. The actual summer dietary habits were investigated by using single 24-h dietary recall method. The information from patients was collected when visiting the public Pauls Stradiņš endocrinology outpatient clinic from June to August of 2015. The plausibility of reported energy intake was determined by Goldberg cut-off method.

Results: 22% of T2D patients underreported their energy intake. The mean energy intake among the plausible reporters was 2070 kcal/d, carbohydrates 39±7%E, dietary fiber 13±4 g/1000kcal, proteins 23±5%E, fats 38±6%E, of which 16% were saturated fats.

All T2D patients consumed vegetables (305±148 g/d); 93% of patients reported intakes of meat/meat products (240±80 g/d); 75% of patients reported dairy intake (156±92 g); 66% of patients consumed potatoes (140±75 g/d). Only 22% of the patients reported fish intake (130±82 g/d), and 31% of patients consumed grains/beans/legumes (57±34 g/d).

Key words: type II diabetes mellitus, dietary habits, seasonal food intake.

P16 WEIGHT LOSS USING THE HEALTHY PLATE PRINCIPLE

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Over the past few years, it has become clear that weight is an important health issue. Some people, who need to lose weight to maintain their health fail to recognize it, while others who do not need to lose weight would like to become thinner for cosmetic reasons. Research suggests that a safe weight loss involves combining a reduced-calorie balanced diet with physical activity. On the basis of evidence available at the time, guidelines defined an initial goal of weight-loss therapy as 10% of body weight. More recent guidelines noted that "although sustained weight loss of as little as 3–5% of body weight may lead to clinically meaningful reductions in some cardiovascular risk factors, larger weight losses produce greater benefits", and set an initial goal at 5–10%. Successful weight management is a long-term challenge, therefore, the change in eating habits should be healthy.

Our goal was to evaluate the effectiveness of using the plate principle to achieve weight loss. A survey was conducted among 30 persons, aged 24 to 45, mostly overweight, 28 women and 2 men. Participants' average body mass index (BMI) at the start was 29 kg/m^2. We used TANITA BC-1000 for body composition assessment three times during the study. The study lasted for two months, during this time all participants followed the menu developed in compliance with the principle of the plate. For portion control, healthy diet plates OnPlate were used.

24 people remained as participants until the conclusion of the study. All 24 people had succeeded in achieving reduced body weight. The average weight per group decreased by 7.4% of the body weight. The results ranged from 4% to 11% of body weight. Participants' average BMI decreased and was 26,5 kg/m^2 at the last day of study. The results showed that the healthy plate principle can be used for weight reduction. It is an effective method to ensure that the body receives all the necessary nutrients, and furthermore, in optimal proportions. The plate principle can be used for a long time, because it provides a healthy balanced diet, and weight loss is an addition benefit of this method.

Keywords: weight loss, balanced diet, nutrients, healthy eating, overweight.

P17 BODY MASS COMPOSITION (BMC) AND FAT QUANTIFICATION METHODS

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The BMC is an important indicator for describing anthropometry that allows to assess human health. The BMC is characterized by a balance between energy consumption and dietary intake. With an increase of quantity of the fat above the optimal amount, the risk of cardiovascular disease, type 2 diabetes, metabolic syndrome, arthritis and tumours increases significantly.

Body weight is used in assessment of composition in methods like hydrostatic balance, DEXA, plethysmography, caliperometry of adipose tissue folds, bioelectrical impedance measurement method. Precision of caliperometry is affected by the amount of measurement spots, where the measurements are made, though by using different formulas the error exceeds the limit of 3–4% (Hoffman, 2006).

With a measure of the thinness in juxtaposition to obesity, the continuum is characterized by individual differences of the components (for the most part, of the quantity of fat) for body weight. Bioelectrical impedance method is relatively accurate and results are equal to DEXA method that is considered 'gold' for determining the composition of body mass (Kyle, 2000). In order to determine low, normal and increased percentages of fat and obesity in children and young adults aged 10 to 17, a health evaluation has been established with limit values and a percent scale (McCarthy et al., 2006). Gathering of non-contact anthropometric data is ensured by 3D anthroscanner Vitus Smart XXL ® with Anthroscan software. Determination of the human body fat by the fat total mass estimation as a result of 3D scan – fat % obtained by the method of extreme exhalation and scanning of human body.

Simplicity and speed of anthropometry measurements allow to project studies with large number of subjects that can be rather well organized, e.g., pupils, policemen, soldiers, etc. However, usefulness of this method has not been studied sufficiently and it still needs a comparative evaluation with traditional methods.

Keywords: anthroscanning, human body fat mass, caliperometry.

P18 EVALUATION OF ULTRASONOGRAPHIC INDICES FOR SUBCUTANEOUS AND VISCERAL ADIPOSE TISSUE ASSESSMENT

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Ultrasonography offers fast and accurate assessment of visceral adipose tissue (VAT) and subcutaneous adipose tissue (SAT). It can be used to track changes in both depots after dietary or physical activity intervention. The aim of this study was to assess the repeatability of ultrasonographic indices proposed by other authors, and to evaluate their use for SAT and VAT assessment in young adults.

Ultrasonographic abdominal SAT and VAT thickness measurements were performed on 14 body trunk sites using B-mode ultrasound with linear or curvilinear probe in ten young healthy adults aged 18–24 years: 5 females with slightly increased body fat percentage (BF%=26.41±2.02%), and 5 males with low body fat (BF%=13.40±2.61%). These measurements were used as individual adipose tissue indices or their value was used to calculate visceral fat area, volume or ratio between VAT and SAT. Each ultrasonographic measure was tested for its repeatability by calculating a coefficient of variation (CV), and the results were compared to total and regional adipose tissue indicators obtained by anthropometric measurements such as BF% calculated by skinfold caliper measures, waist circumference, sagittal abdominal diameter and waist-to-hip circumference ratio.

The ultrasound measures showed a good repeatability, as the CV ranged in females 2.09–11.69%, in males 3.3–10.08%. No ultrasonographic or anthropometric measure exceeded the cut-off values proposed in literature. All anthropometric measurements (except BF%) were similar ($P>0.05$) between males and females, yet from ultrasound only SAT indices were significantly higher in females ($P<0.05$), whereas VAT indices were similar in both groups. This result implies that normal amount of VAT in men is higher than in women, even though normal total body fat in males is lower. Therefore, ultrasound but not anthropometry measures elucidates the pattern of abdominal fat deposition, however, further studies are needed to develop consistent measurement guidelines.

Keywords: ultrasonography, subcutaneous adipose tissue, visceral adipose tissue, anthropometry, young adults.

P19 ANTIMICROBIAL EFFECT OF SAGE (*SALVIA OFFICINALIS* L.) AND ROSEMARY (*ROSMARINUS OFFICINALIS* L.) ESSENTIAL OILS ON MICROFLORA OF CHICKEN BREAST

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The aim of our study was to evaluate antimicrobial effect of sage (*Salvia officinalis* L.) and rosemary (*Rosmarinus officinalis* L.) essential oils on the microflora of a fresh chicken breast, and to identify the composition of microflora after application of different meat treatment methods. Samples were prepared with five methods: stored without packaging, vacuum-packaged samples, vacuum-packaged samples treated with EDTA 1.5% w/w, vacuum-packaged samples with sage and rosemary essential oil treatment 0.2% v/w. The quality assessment was done by detecting the anaerobic plate count (APC), *Enterobacteraceae*, lactic acid bacteria (LAB) and *Pseudomonas* spp. counts during 16 days of storage at 4 ± 0.5 °C. Bacterial species were identified with mass spectrometry, using MALDI TOF MS Biotyper. The APC counts varied from 2.98 log $CFU.g^{-1}$ on day 0 to 4.72 log $CFU.g^{-1}$ on day 16 with the maximum count in the control group stored without packaging. LAB counts were from 2.01 log $CFU.g^{-1}$ on day 0 to 3.36 log $CFU.g^{-1}$ on day 16 with the maximum in the samples without packaging. *Enterobacteriacea* counts were from 0.33 log $CFU.g^{-1}$ on day 0 to 4.72 log $CFU.g^{-1}$on day 16 in the control group stored without packaging. *Pseudomonas* spp. were found only at days 0, 4, 8 and 12, and the counts were from 0.00 log $CFU.g^{-1}$ on day 16 in all tested groups to 2.89 log $CFU.g^{-1}$on day 4 in the control group stored without packaging. Altogether two bacterial genus were identified during APC detection and they were *Staphylococcus, Kocuria.* In total, three species represented *Lactobacillus* genus. Among *Enterobacteriaceae*, 5 genus were detected as *Buttiauxella, Escherichia, Hafnia, Serratia, Yersinia. Pseudomonas* genus was represented by 10 species. In general, the best antimicrobial effect on APC, *Enterobacteriaceae*, LAB and *Pseudomonas* was achieved by application of sage and rosemary essential oils. The results suggest the possibility of application of *Salvia officinalis* L. and *Rosmarinus officinalis* L. essential oils as natural food preservatives and potential sources of antimicrobial ingredients for food industry.

Keywords: chicken breast, sage, rosemary, essential oils, EDTA, vacuum-packaging, bacteria.

P20 MICROORGANISMS OF GRAPE BERRIES

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Grape surface is an unstable habitat that changes greatly according to the stage of grape ripening. Different bacteria and yeasts can colonize the surface of grape berry and the diversity of microorganisms depends on the stage of ripening, pesticide application and health condition. The aim of this research was to study the microflora on the surface of grape berries. Altogether, an amount of 19 grape samples from Slovakia were collected. The spread plate method was applied, and a 100 µL inoculum of each dilution (10^{-2}, 10^{-3}) was plated on TSA, MEA and MRS agar for isolation of microorganisms from the grapes. Proteins were extracted from cells by ethanol/ formic acid extraction procedure. MALDI-TOF Mass Spectrometry was used for identification of microorganisms. Totally, 11 genus of Gram-negative bacteria, 11 of Gram-positive bacteria and nine of yeasts were identified. Among 200 isolates, Gram-negative, Gram-positive bacteria and yeasts represented 11%, 27% and 62% of the total number of isolates studied. The most common genus of isolated yeasts were *Hanseniaspora* (37%), *Metschnikowia* (31%), and *Rhodotorula* (10%). The most frequently isolated among Gram-negative bacteria were *Acinetobacter* (22%), *Pseudomonas* (22%) and *Sphingomonas* (13%). The most common genus of Gram-positive bacteria were *Bacillus* (20%), *Lactobacillus* (19%), *Leuconostoc* and *Staphylococcus* (11%), respectively.

Keywords: grape berries, microorganisms, isolation and identification, MALDI-TOF Mass Spectrometry.

P21 CEREAL BARS: COMPOSITION AND CONSUMPTION

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The aim of this study was to analyse the ingredients of cereal bars as indicated on the labels of these products, and to perform a factual analysis of nutritional values specified therein, as well as to assess the consumption of cereal bars by physically active residents of Latvia. The analysis of the nutrients of cereal bars was performed at the laboratory of the Institute BIOR. 167 graduates and students of the Sports Education Agency participated in a survey about consumption of cereal bars. Results showed that the information about nutrients indicated on the labels mostly does not correspond to the actual value, however, it lies within the tolerance range and is lower than the actually determined value. Cereal bars are a source of fiber, but have a high sugar content. The total number of calories of cereal bars per 100 g is within the range from 326 kcal to 553 kcal. More than a half of respondents consume cereal bars, and most use the cereal bars as snacks between meals. The second in popularity is eating the cereal bars before or after an exercise. More than a half of respondents believe that cereal bars are healthy, but a portion of respondents have wrong perceptions about the nutritional value of cereal bars.

Keywords: cereal bar, nutritional value, label accuracy, fiber, sugar.

P22 CHANGES OF POLYPHENOL COMPOUNDS IN HYBRIDS OF *NANTE* TYPE CARROTS DURING STORAGE

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The main purpose of the present research was to determine the changes of polyphenols in hybrids of *Nante* type carrots during storage. Fresh *Nante* type 'Forto' variety carrots and carrot hybrids 'Bolero' F1, 'Champion' F1 and 'Maestro' F1 were cultivated in Zemgale region of Latvia. Carrots were stored for six months in air ambiance (+3±1 °C, RH=89±1%) and polyphenol compounds were analysed every two months. The application of a high-performance liquid chromatography allowed to detect eight polyphenols in carrots: gallic acid, catechin, epicatechin, caffeic acid, chlorogenic acid, ferulic acid, vanillin and routine. The summary of the acquired scientific data on the polyphenol compounds of fresh *Nante* type variety 'Forto' carrots and several hybrids as 'Bolero' F1, 'Champion' F1 and 'Maestro' F1 during their harvesting and during storage revealed a significant difference in polyphenol content. After six months of storage, the content of polyphenol compounds of *Nante* type carrots decreased – caffeic acid by 64.6%, chlorogenic acid – by 37.9% and vanillin – by 81.5%. However, experimentally it was ascertained, that during storage the contents of some polyphenols increased, for example, catechin – by 30.5%, epicatechin – by 85.2%, gallic acid – by 48.5% and ferulic acid – by 87.9%.

Keywords: carrots, polyphenols compounds, storage.

P23 CHEMICAL COMPOSITION OF WHOLEGRAIN AND PEARLED GRAIN FOR VARIOUS SPRING BARLEY GENOTYPES

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The differences in the chemical and bioactive compounds of covered and pearled grain were studied for various barley genotypes; the relationship between these properties was investigated. Covered and pearled grain of hulled spring barley genotypes (5 promising lines from Latvian spring barley breeding program; 4 barley varieties – currently most widely grown in Latvia; 3 genotypes from working collection) were examined from a chemical perspective. Two hull-less barley genotypes and commercial sample of pearled barley were included for comparison. The grain samples were pearled using a small-scale barley pearler to varying degrees to obtain whole grain and commercial pearled barley fraction. The grain samples were analysed for crude protein, starch, crude ash, total phenolic content, antiradical scavenging activity, viscosity and amino acids. Barley genotype had significant influences on variation of chemical composition of wholegrain and pearled grain. Significantly ($p<0.05$) higher average crude protein and crude ash, and lower starch content in dry matter was detected for wholegrain samples without difference in β-glucan content. The content of phenolic compounds in the whole grain barley fractions was 1.14 to 1.39 times higher than for pearled grains. The average content of the essential amino acids for pearled barley genotypes varied from 16.7 to 27.2 g kg in the dry matter but a significant difference in comparison with the hulled wholegrain samples was not detected.

Keywords: spring barley, genotypes, pearled barley, wholegrain, chemical composition.

P24 COMPARATIVE STUDY OF BEVERAGE: BEFORE AND AFTER FREEZE DRYING REHYDRATION CYCLE

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Beverage production is a significant component of food industry in almost all the countries worldwide. Traditionally, beverage production is in liquid form, but powdered form is also possible as an option. One of the used methods is freeze drying or lyophilization process, which allows to make powdered state with minor changes in properties after rehydration. The aim of the research is to compare the beverage before and after freeze drying rehydration cycle. The pH, bitterness, extract, colour, foam, etc. compound changes were determined. Most of beverages and rehydrated samples were analyzed using the standard brewing analysis methods of the *Mitteleuropäische Brautechnische Analysenkommision* (MEBAK). The results show that it is possible to obtain powdered beverages of a good quality in lyophilization process. With freeze dried beverage powder it is possible to make beverage rehydrations with different concentrations of extract substances as desired, and that can influence the sensory properties like colour, foam and bitterness. Positively, the usage of freeze dried beverages has an extremely wide range of applications in food industry. For example, it is possible to dissolve them as additives in drinking water, using them as a component in alcoholic and non-alcoholic cocktails, they may also be used as a spice or additive in bakery, confectionery, etc.

Keywords: beverage, freeze drying, lyophilization, rehydration, powdered beverage, compound changes, quality, additive, food industry.

P25 MICROWAVE FACILITIES FOR THERMALLY TREATING HONEY

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There are frequent occasions, when a need for thermal treatment of honey arises. Traditionally this is done by heating the honey. This process requires a certain time consumption. Thermal treatment can be greatly accelerated by the use of microwaves. The indicators for thermal treatment and storage of honey traditionally are the hydroxymethylfurfural (HMF) content and the activity of enzymes.

HMF is an organic compound, which is created when carbohydrates are dehydrated. The HMF content increases, when honey is stored for a long time or thermally treated.

The objective of the study was to establish how the different types of heat treatment affect the honey enzyme, invertase activity and HMF content.

HMF content in honey wase is determined by using a high performance liquid chromatography, applying the following parameters: photodiode array detector (PDA), analytical chromatography column Alltech C18, 4.6 mm x 250 mm, sorbent particle diameter of 5 μm, isocratic elution, eluting solvents: acetonitrile and water (ratio 10: 90), column temperature +20 °C, sample volume 10 ml, the total analysis time is up to 8 minutes, eluent flow rate 1.8 ml min^{-1}. The analysis was made using 280 nm wavelength.

Invertase activity is determined by spectrophotometry. p–nitrophenyl–α–D-glucopyranoside (pNPG) is used as a substrate for the determination of the invertase number in honey. pNPG is split into glucose and p-nitro phenol by α-glycosidase (invertase, sucrose). By adjusting the pH value to 9.5 the enzymatic reaction is stopped and at the same time nitro phenol is transformed into the nitrophenolate anion, which corresponds to the amount of converted substrate and is determined photometrically at 400 nm.

The study results proved that using microwaves for thermal treatment of honey significantly impacts invertase activity, and HMF content increases. Invertase activity reduction is more severe compared to the HMF content increase.

Thermally treating honey with microwaves, even if the treating process lasts only 10 seconds, affects the quality of honey.

Keywords: honey, high-performance liquid chromatography, spectrophotometry, invertase activity, content of HMF, microwave.

P26 BIOACTIVE COMPOUNDS IN TOMATOES AT DIFFERENT STAGES OF MATURITY

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Tomatoes are known as having several health benefits due to their high level of bioactive compounds, especially lycopene, phenolics, vitamin C.

The effect of tomatoes' variety and stage of maturity on the bioactive compounds content was studied.

Ten varieties of tomatoes were grown and collected from greenhouse at different stages of ripening. The content of vitamin C was determined titrimetrically, the content of total phenols, flavonoids and lycopene – spectrophotometrically.

The obtained results showed that there were significant differences in the mean values between the analysed parameters according to the stage of ripening and variety. The highest content of vitamin C was determined in variety 'Sakura' F1 at the red stage, but the lowest – in variety 'Sunstreem' F1 in the green stage. The content of phenols and flavonoids increases during the ripening of tomatoes and the highest rate was observed for the variety 'Nugget': phenols from 7.86 mg $100g^{-1}$ to 14.34 mg 100 g^{-1} and flavonoids from 6.09 mg 100 g^{-1} to 10.03 mg 100 g^{-1}. The content of lycopene at the green stage was low (mostly about 1 mg 100 g^{-1}), but the highest content in the red stage was determined for varieties SV0946TS and 'Nectar' F1 (to 27.11 mg 100 g^{-1} and 16.81 mg 100 g^{-1}, respectively).

Keywords: tomatoes, bioactive compounds, ripening.

P27 PHENOLIC COMPOUNDS AND THE ANTIOXIDANT ACTIVITY OF THE WHOLE GRAIN OF DIFFERENT OATS AND BARLEY VARIETIES GROWN IN LATVIA

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Total phenolic content and 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activities of the extracts from whole grain were determined. The total phenolic content in the extracts was determined using the Folin-Ciocalteu reagent; the results were expressed as mg of gallic acid equivalent per 100 g of grain. Radical scavenging activity of the extracts was determined by using DPPH solution; the results were expressed in %. Forty eight different oat samples of three oat varieties and sixty four different barley samples of four varieties were analyzed (samples from 4 year harvests were used for annual analyses: 2011, 2012, 2013, 2014). Oats and barley were grown under both conventional and organic conditions.

The highest phenol compounds' concentration in barley was found in the variety '1165+120' (186.30 ±24.55 mg GAE/100g), the lowest – in the variety 'Kornēlija+Bio' (165.66 ± 41.15 mg GAE/100g). The highest phenol compounds concentration in oats was found in the variety 'Emīlija+120' (147.65 ±51.92 mg GAE/100g), the lowest – in the variety 'Lizete+80' (124.60 ± 28.02 mg GAE/100g).

Pearson correlation coefficient for determined total phenolic contents and DPPH radical scavenging activities of the extracts from barley grain was 0.664, the level of significance – 0.000, from oat grain – 0.744, the level of significance – 0.000.

Keywords: barley, oats, phenols, antioxidant activity, DPPH, grain growing conditions.

P28 LIGNANS IN OATS (*AVENA SATIVA L.*) AND BARLEY (*HORDEUM VULGARE L.*) BREED IN LATVIA DEPENDING ON VARIETY, ENVIRONMENT AND AGRICULTURAL PRACTICE

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Cereals are an important source of vitamins, minerals, dietary fibre and various phytochemicals, such as plant lignans. Lignans are a group of phenolic compounds and are commonly found in plants as their secondary metabolites. Lignans are found in foodstuffs like grains and seeds.

Lignans are biologically active antioxidants that have been shown to reduce the occurrence of diabetes and cardiovascular diseases and to prevent the progression of breast and prostate cancer.

The aim of the research was to determine lignans' amount in different barley and oats genotypes breed in Latvia depending on the environment and agricultural practice. Oats and barley were cultivated both organically and conventionally. The samples were collected in 2013 and 2014.

The content of lignans was determined by high-performance liquid chromatography with tandem mass spectrometry detection (HPLC-MS/MS). The following lignans were used as reference standards: matairesinol (Mat), secoisolariciresinol (Seco), pinoresinol (Pino), lariciresinol (Lar), 7-hydroxymatairesinol (HMR).

The highest quantities of total lignans were found in oat grains: 503.3 ± 10.1 (year 2013) and 507.0 ± 0.1 (year 2014) $\mu g \cdot 100^{-1} g$. In barley grains 380.6 ± 7.6 (year 2013) and 440.6 ± 8.8 (year 2014) $\mu g \cdot 100^{-1} g$ were detected. The content of some lignans, like Pino and HMR, was higher in oat grains. The content of Seco was higher in barley grains.

Keywords: oats, barley, plant lignans (Mat, Seco, Pino, Lar, HMR), HPLC-MS/MS.

P29 MACROELEMENTS AND TRANCE ELEMENTS IN OATS (*AVENA SATIVA L.*) AND BARLEY (*HORDEUM VULGARE L.*) BREED IN LATVIA DEPENDING ON VARIETY, ENVIRONMENT AND AGRICULTURAL PRACTICE

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The aim of the research was to determine macro element and trace element concentration in different barley and oat genotypes depending on the environment and agricultural practice. Thirteen macro elements and trace elements (Cd, Pb, Ni, Cr, Al, Cu, K, Na, Mn, Fe, Zn, Mg, Ca) were detected in three oat and four barley variety/genotype samples (n = 87). Oats and barley were cultivated both organically and conventionally (with different N supply). The samples were collected in the time period from 2011 to 2013. From the cluster analysis it was found that the major factor for barley samples was the genotype, while for oat samples it was both the genotype and the agronomical practice. From the nutritional point of view, barley and oat samples under the cluster group IV and II respectively had higher concentrations of essential macro elements and trace elements. Regarding toxicity, in barley and oat samples the lowest concentrations were found under the cluster group I and II, respectively.

Keywords: barley, oats, variety, genotype, macro elements, trace elements, minerals, environment, agricultural practice, organic, conventional, cluster.

P30 ANTIOXIDANT PROPERTIES OF *CAMELINA SATIVA* OIL AND PRESS-CAKES

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Camelina sativa is well known due to a high content of polyunsaturated fatty acids. Till now this oil has been studied mainly for applications in technique as a raw material for synthesis of resins, biodiesel and hydrocarbon fuels. This paper is devoted to the studies of oxidative stability of cold-pressed *Camelina sativa* (also known as camelina, false flax or gold-of-pleasure) oil and its extracts of spices. Despite the high level of polyunsaturated fatty acids *Camelina sativa* oil appeared more rigid against oxidation than rapeseed or flax oil. The oily extracts of spices were prepared by maceration at a room temperature for 24 h. The oxidative stability of extracts was determined under accelerated oxidation conditions and monitored by peroxide values. It was found that most of the additives (e.g., bay leaves, thyme, clove, barley`s sprouts, coriander, ginger) do not influence or even decrease the oxidative stability of the oil. On the contrary, the *Camelina sativa* oil demonstrated a remarkably higher stability, when thyme additive was used. The press-cakes of camelina seeds were extracted with different solvents (ethanol and water) or their mixtures under variable conditions (room temperature, reflux or ultrasound). Both the prepared oily extracts of spices and press-cakes' extracts were characterized by total polyphenol content (Folin–Ciocalteu method) and antiradical activity against 1,1-diphenyl-2-picryl hydrazyl and galvinoxyl.

Keywords: *Camelina sativa*, oil, press-cake, total polyphenol content, antiradical activity, antioxidant activity.

P31 COMPARATIVE EVALUATION OF LOVAGE AND HORSERADISH PHENOLIC EXTRACTS FOR ACRYLAMIDE REDUCTION IN FOOD

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Acrylamide is urotoxic, genotoxic and probably carcinogenic chemical compound formed during thermal processing of food rich in reducing sugars and proteins. Many investigations are carried out to find novel methods for reduction of acrylamide in food, and one of them is application of plant phenolic extracts in technological process.

The aim of current research was to evaluate lovage and horseradish phenolic extraction conditions for obtaining extracts with capacity to reduce acrylamide formation in food.

Lovage and horseradish grown in Latvia were analysed in the experiments. Extraction of plant material was performed at different temperatures for different time periods with and without ultrasonic treatment. In plant extracts, the total phenol, the total flavonoids content, individual phenolic compounds and antioxidant activity (DPPH and ABTS assay) were tested. Evaluation of extracts was performed using the results published in scientific literature about effectiveness of certain phenolic compounds in reduction of acrylamide formation in model systems.

Lovage leaves were selected for further experiments because they contain significant amounts of rutin and other compounds with capacity to reduce acrylamide formation.

Extraction conditions influenced the content of target compounds and optimal parameters are one hour in ultrasonic bath at 80 °C, using water as a solvent.

Keywords: phenolic compounds, rutin, acrylamide, lovage, extract.

This work was supported by National Research Programme AgroBioRes (2014–2017).

P32 THE EVALUATION OF RAW BUCKWHEAT AND ITS SUITABILITY IN NUTRITION

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The aim of this study was to compare the chemical composition of raw and roasted buckwheat, to develop extruded raw buckwheat products and to carry out a sensory evaluation of them. The total content of dietary fibre and protein was determined using standard methods, whereas the phenolic compounds and essential amino acids content by chromatographical methods. Hedonic scale was used for sensory evaluation. Raw buckwheat contained a high amount of protein (14.26 g 100 g^{-1}) and dietary fibre (14.97 g 100 g^{-1}). Significant variation existed in the content of essential amino acids like lysine, valine, leucine, phenylalanine and phenolic compounds like rutin, chlorogenic acid, vanillic acid, caffeic acid, sinapic acid and epicatechin between raw and roasted buckwheat. Raw buckwheat and water blend was extruded at temperature regime: 75/90/100 °C and baked at temperature 145 °C for 25 minutes. In order to improve the taste of the new product, two variations were developed: a sweet product with brown sugar and cinnamon, as well as a salted product with salt and garlic. Extruded buckwheat products with and without additives had acceptable sensory properties and there were no significant differences between the products.

Keywords: buckwheat, amino acids, dietary fibre, phenolic compounds, extrusion, sensory evaluation.

P33 INHIBITION OF CONJUGATED DIENE FORMATION IN LINSEED OIL

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Oxidation of fats and oils reduces the nutritional value of food and causes various health problems. The addition of antioxidants prevents the oxidation of fats in the food and antioxidant activity represents the ability to inhibit the process of oxidation. Usually, antioxidant activity of herbal extracts was determined in a linoleic acid emulsion system. The aim of the present study was to evaluate inhibition of conjugated diene formation in Latvian linseed oil. The ethanol extract of the calyx of *Hibiscus sabdariffa* L., vanillin, a-tocopherol and 2,6-di-tert-butyl-4-methylphenol as additives were compared according to their antioxidative activity. The samples of linseed oil with additives were incubated 24 h at 60 °C and then analyzed by using UV spectrophotometry (l=234 nm). The antioxidant activity of additives was characterized by the percentage of formation of conjugated dienes. The ability of additives to inhibit the process of oxidation in linseed oil decreases, as follows: extract of *Hibiscus sabdariffa* L., vanillin, 2,6-di-tert-butyl-4-methylphenol and a-tocopherol. Our results indicate that linseed oil can be used to test antioxidative activity of substances.

Keywords: UV absorption, conjugated diene, antioxidant activity, *Hibiscus sabdariffa* L., vanillin, a-tocopherol, 2,6-di-tert-butyl-4-methylphenol.

P34 EFFECT OF HIGH-PRESSURE PROCESSING ON MICROBIAL QUALITY OF SKIMMED MILK

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High pressure processing (HPP) is an alternative to traditional thermal treatment and can be used in the dairy industry for increasing the microbiological safety of milk and for preserving its biologically active substances. HPP effectiveness on microbiological quality of product is still under discussion, thus, the aim of the research was to evaluate the effect of HPP technology on microbiological quality of skimmed milk. Raw, pasteurized (78 °C, 15-20 s), HPP (following regimes: 250 MPa, 15 min; 400 MPa, 3 min; 400 MPa, 15 min; 550 MPa, 3 min) and skimmed milk, processed by combining pasteurization and HPP were analysed and compared. The colony forming units (LVS ISO 4833-1:2013) and presence of coliforms (LVS EN ISO 16654:2002) were detected in the analysed skimmed milk samples. A significant decrease ($p<0.05$) of colony forming units was established in samples processed by combining two treatment types: pasteurization and HPP. The minimum treatment regimes for extending the shelf-life of skimmed milk were detected: pressure not less than 400 MPa and the holding time at least 15 minutes.

Keywords: high pressure, skimmed milk, microbial load reduction.

P35 EFFECT OF PROCESSING ON PIGMENT CONTENT IN SPRING WILD PLANTS

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In spring, when human body requires a greater quantity of additional phytonutrients, it is very useful and popular to supplement our diets with some spring wild edible plants.

The aim of the current research was to evaluate the effect of processing on the colour intensity and pigment content in leaves of edible wild plants grown in Latvia.

Samples of stinging nettle (*Urtica dioica*), common goutweed (*Aegopodium podagraria*), dandelion (*Taraxacum officinale*) and chickweed (*Stellaria media*) were collected in April 2016 in Latvia. Chlorophyll *a*, *b* and carotenoid content were determined spectrophotometrically in the ethanol extracts of fresh, frozen and dried leaves at wavelength 470, 649 and 664 nm, the colour was measured in CIE L*a*b* system.

The obtained results showed a significantly higher content of total chlorophyll and carotenoids in fresh (1.64 and 0.809 mg g^{-1}) and frozen nettle leaves (2.08 and 0.944 mg g^{-1}). Freezing promotes better extraction of pigments from all the analyzed plants. After drying, the content of pigments decreases 3 times. The ratio between chlorophyll *a/b* was higher in goutweed leaves regardless of processing type. Significant differences were determined between the colour components L*a*b* of fresh, frozen and dried plant leaves.

Keywords: pigments, colour, edible wild plants.

P36 WATER SOLUBLE VITAMINS IN IMMATURE GRAINS

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The interest in cereals as a source of bioactive and functional ingredients has lately increased. In recent studies, it has been proven that grains during maturation contain many valuable compounds. The present study contains the research dedicated to the content of water soluble vitamins (thiamine, riboflavin, niacin, ascorbic acid) of immature wheat, hull-less barley and triticale grains obtained from the experimental farm of Latvia University of Agriculture in immature condition (milk stage) in 2015. The amount of the vitamins was determined by AOAC official methods. The average content of vitamins in immature cereals was different (on a basis of weight of the product) and depended on cereal type. The amount of vitamin B_1 (thiamine) was higher in immature triticale (0.39±0.0202 mg 100^{-1}) compared with immature hull-less barley (0.24±0.01 mg 100^{-1}) and wheat (0.20±0.05 mg 100^{-1}). The same tendency we observed regarding vitamin B_2 (riboflavin) and vitamin C. Immature triticale kernels contain 0.47±0.02 mg 100^{-1} vitamin B_2 and 11.60±0.58 mg 100^{-1} vitamin C. Vitamin B_3 (niacin) amount was higher in hull-less barley 6.95±0.35 mg 100^{-1}, but in triticale – 5.88±0.29 mg 100^{-1}.

Keywords: immature grains, thiamine, riboflavin, niacin, vitamin C.

P37 DETERMINATION OF GLUTEN IN SELECTED FOODS NOT CONTAINING WHEAT, RYE AND BARLEY AVAILABLE IN LATVIA

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A survey was carried out with an aim to evaluate the level of gluten in 30 samples of commercially available food from different food groups, where labelling does not indicate the presence of wheat, barley, rye and related grains in the product. The quantity of gluten was determined by colorimetric monoclonal antibody enzyme immunoassay method (AOAC Official Method 991.19). The study was performed during the first half of 2014. Samples were selected to reach the widest possible range of products, not having or being short of gluten-free alternatives: non-alcoholic beverages, dairy products, meat products, pre-cooked products and sweets. Products were purchased in *Top*, *Rimi* and *Maxima* stores, as well as in Kauguri market. Intentionally one product labelling has also been chosen, which contains the warning about possible presence of gluten, as well as one product labelled as gluten-free. Gluten quantification was carried out on Microplate reader "Assy Expert Plus", using commercially available ELISA test kit for determining the gliadin RIDASCREEN® Gliadin (R7001) (R-Biopharm AG, Germany). The samples were extracted with the RIDA® extraction solution (colourless) (R-BIOPHARM AG, Germany). Detection limit of test kit was up to 3 ppm of gluten (depending on matrix), limit of quantification – 5 ppm. Recovery of controls was 94–102%.

Generally, in most of the tested samples the gluten level was below 20 ppm (the scientifically determined level of gluten tolerated by most of the patients having celiac disease). In 6 samples, the gluten level was below the limit of quantification. In 5 samples, the gluten level was 20 ppm and more. Possible causes – contamination during the manufacturing process or food additives. The highest determined gluten content was 47 ppm for curd cheese dessert *Lauku*, containing starch, whose origin was not specified on the label.

A further evaluation of testing method should be implemented to evaluate the possible matrix effect and to exclude a possibility of increased or reduced results.

It is necessary to continue the research with a wider range of samples in each product group in the Latvian market to establish the trends of products not labelled as containing gluten.

Keywords: gluten, gliadin, food, ELISA, AOAC, enzyme-linked immunosorbent assay, RIDASCREEN® Gliadin.

P38 NUTRITIONAL QUALITY OF TRITICALE (× *TRITICOSECALE*) GROWN UNDER DIFFERENT CROPPING SYSTEMS

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Triticale is mainly used for animal feed, but the results of recent studies show its possible beneficial effect for human health. The objective of this study was to investigate nutritional quality of triticale grown under different cropping systems in Latvia.

Three varieties and five breeding lines of triticale from Institute of Agricultural Resources and Economics in Priekuļi cultivated in 2014 and 2015 under conventional and organic cropping systems were used for the current study. Protein, starch and total dietary fibre content were determined using the standard methods. Ultrasound assisted extraction was used for the isolation of phenolic compounds. For all extracts, the total phenol content (TPC) and DPPH, $ABTS^+$ radical scavenging activity were determined spectrophotometrically.

Overall, the highest content of protein, TPC and ABTS cation scavenging activity was in triticale harvested in 2014 due to meteorological conditions. The type of cropping system had no significant effect ($p > 0.05$) on protein and starch content. TPC, DPPH and $ABTS^+$ scavenging activity was influenced by cropping system, but the tendency differs between varieties and lines.

Keywords: triticale, biological active compounds, cropping system.

The present research leading to these results has received funding from the Norwegian Financial Mechanism 2009-2014 under the project "Innovative approach to hull-less spring cereals and triticale use from human health perspective" (NFI/R/2014/011).

P39 INFLUENCE OF HORSERADISH *AMORICA RUSTICANA* L. AND LOVAGE *LEVISTICUM OFFICINALE* L. EXTRACTS ON THE STABILITY OF RAPESEED OIL

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In this study the efficiency of horseradish leaves, lovage leaves and stem extracts for stabilization of rapeseed oil during storage was evaluated. Plant extracts were added to unrefined rapeseed oil in concentrations of 1% that was chosen based on the results of previous experiments. As a control, rapeseed oil without extracts was analysed, and for comparison BHT in maximal allowed concentration was added to the oil. Efficiency of extracts in oil was tested in the dark and in the light/dark cycles (day/night regime). For all samples, peroxide value, acid value and $DPPH^·$ scavenging activity were determined. Oil samples with the added plant extracts stored in the dark oxidized significantly ($p < 0.05$) slower than the control sample and the sample with synthetic antioxidant BHT. After 24 weeks of storage, the lowest peroxide value was in sample with lovage stem extract. In light/dark conditions chlorophyll that was not separated from the extracts showed its negative effects and accelerated oxidation of the oil. Among the analysed extracts, the most effective oil oxidation inhibitor was lovage stem extract, but DPPH radical scavenger – horseradish leaf extract.

Keywords: horseradish, lovage, extract, rapeseed oil, oxidation.

This work was supportedby National Research Programme AgroBioRes (2014–2017).

P40 DEVELOPMENT AND OPTIMIZATION OF NEW CALCIUM PERORAL FORMULATION: AMORPHOUS SALT COMPOSITION WITH HIGH SAFETY AND BIOAVAILABILITY

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Despite of the market saturation with a wide range of calcium preparations in dietary supplements as well as in pharmaceutical status, calcium preparations' safety and efficacy remains the item for further optimization. Bones and teeth consist of calcium phosphate, but the tablets and capsules predominantly are produced from calcium carbonate. On the other hand, in human food Ca^{2+} is bound with a lot of anions – carbonates, sulphates, chlorides, phosphates, citrates, oxalates, etc. It seems that the traditional calcium formulations cannot provide all spectra of biological calcium-depending effects and dietary calcium might be safer than the traditional supplements and medicines.

To increase safety and efficacy, a new formulation of calcium salts has been developed (patent pending). It is a mixture (water suspension) of amorphous calcium carbonates, citrates, hydrocarbonates, magnesium hydrocarbonates and hydrocitrates. The capacity of cockerel's duodenal mucosa to absorb Ca^{2+} after oral ingestion of that composition *in vivo* was by 126% higher in comparison with $CaCO_3$ suspension intake.

D_3 vitamin enhanced amorphous calcium salts antirachitic activity and *Salvia miltiorrhiza* root extract promoted the new food supplement's osteoprotective effect in cockerels with experimental steroid osteoporosis.

Keywords: calcium bioavailability, amorphous calcium, osteoprotection.

P41 DEVELOPMENT OPPORTUNITIES OF SEED-BASED SWEETS AND EVALUATION OF THEIR QUALITY INDICATORS

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The seeds are a great source of biologically active substances, valuable fatty acids, protein and fibers. Hemp, pumpkin, sunflower and sesame seeds were used in the preparation of seed-based sweets, where as a sweetener suitable ingredients with high nutritional value were used, such as honey and agave syrup, which are a great alternative to the traditional fine white sugar (sucrose).

Sensory evaluations were carried out in 5-point hedonic scale, and the overall preference of seed-based sweets was within the range from 3.2 (not sure) to 4.0 (quite good).

The seed-based sweets contain 19.6 to 29.3 g protein and 41.1 to 56.1 g 100 g^{-1} fat, and sugar content is from 10.0 to 11.8 g 100 g^{-1}. The highest fiber content is characteristic to sesame seed (11.2 g 100 g^{-1}) and sunflower (10.5 g 100 g^{-1}) samples with agave syrup. The new products nutrition assessment was carried out by using physico-chemical parameters. The newly developed products have a low moisture content (3.7–4.2%) and water activity (0.391–0.448), which ensures a longer shelf-life.

The results of the research showed that it is possible to produce sweets from seeds, similar in visual appearance to the existing nut chocolate creams, but have a higher nutritional value – low in sugar and saturated fat quantity, higher in protein and fiber.

Keywords: hemp, pumpkin, sunflower and sesame seeds, sweets, nutritional value, physicochemical parameters.

P42 THE INFLUENCE OF HEAT TREATMENT METHODS ON THE NUTRITION COMPOSITION OF GUELDER ROSE (*VIBURNUM OPULUS*) – PUMPKIN SAUCES

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The objective of this study was to examine the suitability of heat treatment methods on pumpkin - guelder rose sauce nutrition composition. Berry hybrids 2-30-K, 2-45-K and variety 'Krasnaya Grozdj' were selected for further research. The juice of these fruits was used to create pumpkin – guelder rose sauce samples, where the pumpkin puree and guelder rose fruit juice ratio is 15:85 in all the samples, an heat treatment under normal conditions (traditional cooking) and vacuum cooking in various modes 0.6 bar pressure at 85 °C and 0.2 bar pressure at 75 °C temperature was performed, all of the samples were compared with uncooked pumpkin – guelder rose sauce samples. The chemical evaluation of the sauce showed a better retention of vitamin C to 0.2 bar pressure cooked guelder rose variety 'Krasnaya Grozdj' sauce sample compared to the fresh sample, amount of vitamin C calculated on the dry matter. Samples that were prepared with vacuum cooking methods, on average in dry matter showed a higher total phenol, antiradical activity and total anthocyanins content than the control samples cooked under normal conditions. Such observations coincide with the information provided in the literature of better preservation of bioactive compounds in plant-based products that are cooked under vacuum heat treatment at lower temperatures.

Keywords: vacuum boiling, vitamin C, total phenols, anthocyanins, total carotenes, antiradical activity (DPPH).

P43 PHENOLIC CONTENT IN BUCKWHEAT FLOURS

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The objective of the current study was to analyse the total phenolic content (TPC), total flavonoid content (TFC), phenolic compounds and DPPH˙ radical scavenging activity of four buckwheat (raw, roasted, white and dark) flour samples obtained from Latvian market, comparing to wheat flour. TPC, TFC and DPPH˙ radical scavenging activity values were determined by using the express spectrophotometric methods. Phenolic compounds were determined on the basis of the high pressure liquid chromatographic method (HPLC). All the buckwheat flour samples had a significantly higher TPC and TFC values than the wheat flour. The highest TPC (789.69 mg 100 g^{-1}) and TFC (423.48 mg 100 g^{-1}) was found in raw buckwheat flour ($p<0.05$). As to DPPH˙ radical scavenging activity, all the buckwheat flour samples demonstrated similar results. DPPH˙ radical scavenging activity was from 21.067 to 22.644 mM TE 100 g^{-1} of dry matter, which was significantly higher ($p<0.05$) in comparison with the wheat flour (0.731 mM TE 100 g^{-1} dry matter). The dark buckwheat flour contained the highest level of rutin (4.613 mg 100 g^{-1}), whereas raw buckwheat flour - the highest level of 3,5-diOHbenzoic acid (6.356 mg 100 g^{-1}), sinapic acid (0.947 mg 100 g^{-1}) and epicatechin (2.608 mg 100 g^{-1}) of all analysed samples.

Keywords: total phenols, flavonoids, phenolic compounds, DPPH˙ radical scavenging activity, buckwheat.

P44 EVALUATION OF THE QUALITY PARAMETERS OF GERMINATED SPRING GRAIN BREAKFAST CEREALS DURING STORAGE

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Development of new breakfast cereals with high nutritional value is essential for food value improvement. The aim of the current research is to evaluate the changes in quality parameters of germinated spring grain breakfast cereals during storage in different packaging materials.

The three types of breakfast cereals were prepared: S1 - with high fibre content, S2 – a high protein content and (S3) – a source of B group vitamins. Two types of Standup pouches – Pap50g/Alu7/Pe60 (AL) and Pap40g/PELD20/PE40 (PE) were used in the study. For the accelerated shelf-life test, the samples were stored for 5 months (at 35±2 °C). The moisture content and total dietary fiber content were determined by using the standard methods. For breakfast cereals, the total phenol content (TPC) and DPPH, ABTS+ radical scavenging activity were determined spectrophotometrically.

Sample S-3 had the highest TPC and antioxidant activity, and the main source of bioactive compounds was germinated barley. The moisture content of breakfast cereals significantly decreased in PE packaging, but in AL no significant differences were observed. The packaging materials significantly influenced TPC and ABTS, DPPH scavenging activity during storage.

Keywords: breakfast cereals, storage, germination, phenols, fibers.

The present research leading to these results has received funding from the Norwegian Financial Mechanism 2009-2014 under the project "Innovative approach to hull-less spring cereals and triticale use from human health perspective" (NFI/R/2014/011).

P45 HORTICULTURAL SIDE STREAMS FROM SEA BUCKTHORN AND JAPANESE QUINCE AS A POTENTIAL SOURCE OF BIO-COMPOUNDS FOR MEAT PRODUCTS

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Various plant materials and their side streams are being used for development of novel and safe food additives, thereby improving the quality of the food products. Project SUSMEATPRO will provide innovative and sustainable solutions for healthier meat products based on local produce. The horticultural side streams are characterised as valuable sources of biologically active compounds that, besides their antioxidant properties, can also be considered as antimicrobial agents. Utilization of Japanese quince and sea buckthorn by-products as a source of biologically active compounds is feasible due to high concentration and low cost. The objective of the present study was to investigate chemical compounds in agro-industrial waste materials from Japanese quince and sea buckthorn leaves with shoots. A detailed analysis of individual sugars, polyphenols and organic acids was performed and antioxidant activity of the samples evaluated. Results show that shoots together with the leaves, obtained from sea buckthorn, as well as flesh with core parts from Japanese quince are a rich source of polyphenols, including tannins. Besides, the antioxidant activity of freshly prepared extracts measured by three methods (ABTS, FRAP and DPPH) has showed significant ($p<0.05$) differences both between extracts and methods.

Keywords: *Chaenomeles japonica, Hippophae rhamnoides* L., sugars, acids, polyphenols, antiradical activity.

P46 VARIATION IN B-GLUCAN, PROTEIN, FAT AND STARCH CONTENT OF OATS GROWN IN LATVIA

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A good potential to improve nutrition and health is held by the consumption of dietary fibre. Oat (*Avena sativa* L.) is a well-known crop in temperate climate, it is recognised in the world as a healthy food containing significant amounts of soluble dietetic fibre, β-glucans, fat-soluble vitamin E and polyunsaturated fatty acids. For further breeding of oats, it is necessary to increase our knowledge on variation in content of fibre and bioactive components in oats. Therefore, the aim of the present research was to study the extent of variation in β-glucan content of oats grown in Latvia and to correlate the β-glucan content with protein, fat and starch content. In the studied samples, the content of protein, fat, dietary fibre, β-glucan was determined. The obtained results showed a wide range of fat content among the varieties, it ranged from 5.1 to 11.5 g 100 g^{-1}. The content of β-glucan ranged from 2.0 to 4.39 g 100 g^{-1} depending on the year. The β-glucan content was significantly positively correlated with fat and protein content, and significantly negatively correlated with starch.

Keywords: human health; new varieties, protein, β-glucan.

P47 INFLUENCE OF *SOUS VIDE* TREATMENT AND HIGH PRESSURE PROCESSING ON NUTRITIONAL VALUE AND OVERALL ACCEPTANCE OF PULSE SPREADS

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An investigation was carried out to determine whether *sous vide* treatment (80 °C/15 min) and high pressure processing (700 MPa/10 min/20 °C) had an influence on nutritional value and overall acceptance of cowpea (*Vigna unguiculata* (L.) Walp. cv. Fradel) and maple pea (*Pisum sativum* var. *arvense* L. cv. Bruno) spreads after processing and 62-day storage at 5 °C temperature, and to analyse the nutrient coverage of pulse spreads compared to the recommended daily allowance (RDA) for adolescents and adults. Pulse spreads were made of ground re-hydrated cooked pulse seeds to which salt, citric acid, oil and seasoning were added, and a total of four different spreads were made. Pulse spreads were filled in PA/PE and PET/ALU/PA/PP film pouches, packaged in vacuum and hermetically sealed. Nutritional composition was determined according to the standard methods; the overall acceptance was determined by using 5-point hedonic scale. Nutrient coverage by one serving of pulse spreads for adolescents and adults was compared to nutrient recommendations given by the national legislation. The results suggest that processing technologies and packaging materials did not influence the nutritional value of pulse spreads ($p>0.1$). The hedonic evaluation by consumers ($n=90$) showed that processing technologies did not influence the overall preference for cowpea and maple pea spreads ($p>0.1$).

Keywords: pulse spreads, *sous vide* treatment, high pressure processing, recommended daily allowance, hedonic scale.

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