ACTA ALIMENTARIA
Vol. 37. No. 2, 2008 June

A study was conducted to develop nutritious unleavened bread (chapati) using partially defatted salt treated soy dhal, wheat and rice flour. Different salt treatments viz. sodium carbonate, sodium bicarbonate, sodium chloride and sodium tripolyphosphate were given which significantly ($P<0.05$) reduced the cooking time of soybean. The organoleptic evaluation of chapatis was conducted by scoring on a 9-point hedonic scale for various sensory parameters i.e. colour, appearance, flavour, texture, taste and overall acceptability, which indicated that the developed chapati was acceptable to human palate. The protein and total soluble sugar contents of the developed chapati were significantly ($P<0.05$) higher than those of the unprocessed control. However, fat, ash and crude fiber contents varied non-significantly. Processing treatments i.e. mixing and roasting involved in chapati making reduced the phytic acid (19.1%) and polyphenols (52.92%) contents significantly ($P<0.05$) over the unprocessed composite flour. As a result, in vitro protein and starch digestibility of chapati also improved significantly to the extent of 6.89 and 26.6 percent, respectively.

Keywords: unleavened bread (chapati), soydhal, composite flour, phytic acid, polyphenols

---

The expression levels of two marker proteins (phosphinotrichin acetyltransferase, PAT and wheat germ agglutinin, WGA) in the transgenic wheat lines and their resistance to digestion in small intestine of rats were studied in comparison with their non-transgenic counterpart obtained from green house and field experiments of two subsequent years. The marker proteins were quantified by ELISA. It was found that the expression of PAT and WGA markedly increased when the wheat was grown in the field compared to that in the greenhouse. There were no significant differences between the WGA contents of the parent and transgenic wheat lines, but a broad range of expression of PAT and WGA was observed in the transgenic lines. PAT did not survive in the small intestine of the rats, while WGA was resistant to digestion in different ratios and was bound to the intestinal epithelium.

Keywords: transgenic wheat, herbicide resistance, PAT, WGA, survival, small intestine

---

In this study, the phage adsorption inhibition type resistance system was investigated in 6 bacteriocin producing strains, Lactococcus lactis subsp. lactis BLL10, BLL27, BLL31, BLL84 and BLL90 and L. lactis subsp. cremoris BLC67. All six bacteriocin producing strains were determined to comprise phage adsorption inhibition type of resistance against three phages (Øpll98-28, Øpld67-41 and Øpld67-43). Genetic determinants of these two systems were also analysed in these strains. The bacteriocin production abilities and phage adsorption inhibition type resistance of these strains were found to be determined by 13.4 kb and 25.3 kb plasmids in BLL10; 9.5 kb and 30.1 kb plasmids in BLL27; 10.4 kb and 29.0 kb plasmids in BLL31; 23.4 kb and 19.0 kb plasmids in BLL84; 7.5 kb and 15.3 kb plasmids in BLL90, respectively. In BLC67, both characteristics were found to be determined by 31.3 kb plasmid. Conjugal mating experiments showed that 30.1 kb plasmid in BLL27, 29.0 kb plasmid in BLL31, 23.4 kb plasmid in BLL84 and 31.3 kb plasmid in BLC67 were conjugally transferable with the frequencies of 3.6x10-3, 8.2x10-4, 1.4x10-6 and 6.6x10-3, respectively.

Keywords: Lactococcus lactis, bacteriocin, phage, plasmid

A. Tsigouri, M. Passaloglou-Katrali and O. Sabatakou: Determination of eucalyptol camphor menthol and thymol in greek thyme honey by gc-fid*. Pp. 181-189. tsigouri.ivra@nagref.gr

Characterisation of unifloral honeys is a hard task that involves evaluation of the results of melissopalynological, physico-chemical and sensory analyses. Finding reliable chemical markers to ascertain botanical origin of honey is of great importance to the beekeeping industry. The purpose of this work was to analyse untreated Greek thyme honeys and evaluate the possibility of establishing chemical markers for this honey by using a simple and reliable analytical method. The analytical method employed consists of extraction on octadecylsilica cartridges, GC separation and FID detection. The limits of detection were 30, 20, 15 and 15 μg kg-1 for eucalyptol, camphor, menthol and thymol, respectively, while the limit of quantification for each substance was 50 μg kg-1. Overall recoveries were > 85%. The results showed that none of the 47 thyme honey samples analysed contained eucalyptol or camphor. All samples contained menthol and thymol, but the concentrations were very low ranging from traces to 51.3 μg kg-1 and 65 μg kg-1, respectively.

Keywords: thyme honey, menthol, thymol, eucalyptol, camphor, essential oils, volatiles, gas chromatography

---

P.S. Panesar: Application of response surface methodology for maximal lactose hydrolysis in whole milk using permeabilised yeast cells. Pp. 191-203. pspanesarrr@yahoo.com

Kluyveromyces marxianus cells as a source of β-D-galactosidase were employed for the production of lactose hydrolysed whole milk. The yeast cells were permeabilised to overcome the problem of enzyme extraction and poor permeability of cell membrane to lactose. To analyse and optimise the process variables for lactose hydrolysis, the experiments were conducted according to the Central Composite Rotatable Design (CCRD) using response surface methodology. The independent process variables for lactose hydrolysis were biomass concentration, temperature, agitation and incubation time. Statistical analysis of the results showed that, in the range studied, linear terms of biomass concentration, incubation time and process temperature had a significant effect ($P<0.01$) on lactose hydrolysis, however, the

effect of agitation on lactose hydrolysis was significant when compared with stationery conditions. Numerical optimisation technique was applied to achieve the maximum possible lactose hydrolysis value. The optimum process conditions for lactose hydrolysis were 120 mg biomass (dry wt), 33.6°C temperature, 105 rpm agitation and 147 min of incubation time. Corresponding to these optimum conditions, the predicted value of lactose hydrolysis was found to be 88.6%, which was experimentally verified.

Keywords: yeast, permeabilisation, milk, lactose hydrolysis, response surface methodology

---

V.K. Joshi, S. Sharma and N.S. Thakur: Effect of temperature, salt concentration and fermentation type (inoculated vs natural) on lactic acid fermentation behaviour and quality of carrot. Pp. 205-219. vkjoshipht@rediffmail.com

Lactic acid fermentation of carrot as a method of preservation using different lactic acid bacteria, viz. Lactobacillus plantarum, Pediococcus cerevisiae and Streptococcus lactis sub sp. diacetylactis as such and in sequence at different temperatures and with varying salt content (2, 2.5 and 3%) were employed in the fermentation of carrot. The differences in fermentation behaviour of different microorganisms were quite contrasting at 26oC, but the sequential culture started deviating from the very first day and acidity increased up to 6 days. A temperature of 26oC and salt concentration of 2.5% were the best for lactic acid bacteria (LAB) fermentation of Asiatic carrot as highest acidity (1.40% lactic acid), low pH and low reducing sugars were achieved in sequential fermentation. The LAB count of 7.8x108 CFU ml-1 was also higher at these concentrations coupled with higher sensory scores of the products. Among the fermentation types tried, sequential culture fermentation of the vegetables produced the product with higher acidity, low pH and reducing sugars. The sequential culture fermentation imparted the fermented products better flavour, texture and taste than other products fermented naturally or with lactic cultures of Pediococcus cerevisiae, Lactobacillus plantarum and Streptococcus lactis in single separate fermentation. Based on the overall and sensory quality evaluation, the fermented carrot product prepared with sequential culture was the best followed by the product prepared using natural microflora.

Keywords: Lactic acid fermentation, carrot, sequential culture, preservation

---

M. Wróblewska, J. Juśkiewicz, S. Frejnagel, J. Oszmiański and Z. Zduńczyk: Physiological influence of chokeberry phenolics in model diet. Pp. 221-232. monika@pan.olsztyn.pl

Seven groups of Wistar rats (8 males in each) were fed for 4 weeks diets with chokeberry products. Chokeberry juice was added every day to diets at a dose of 1.5, 3 and 6 ml per rat (corresponding to the intake of about 0.5, 1 and 2 l of juice by an adult person) or diets were supplemented with polyphenolics extract to reach the same level of phenolics. The addition of juice or extract did not affect food intake and body gain. Chokeberry juice increased stomach pH from 3.44 (control group) to 3.69-3.85, and ileal pH from 6.16 to 6.23-6.46. Alkalisation of digesta was less distinct with diets containing polyphenolics extract. Both chokeberry products decreased the concentration of caecal ammonia, especially at medium and high doses. The highest dose of chokeberry -glucosidase and hadβ-glucosidase, decreased αjuice increased microbial -glucuronidase activities in the caecal digesta. Toβno effect on compare

with the control group, the highest dose of chokeberry juice and extract numerically decreased triglycerides (from 265 to 211 and 219 mg dl-1, respectively) and significantly decreased total cholesterol level in the serum (from 133 to 118 and 114 mg dl-1, respectively) and increased content of butyrate in short chain fatty acids sum of caecal digesta. Indices of the antioxidant status of rats were similar in all treatments. Physiological results of applying relatively low amount of phenolic extract in the diet were similar as when applying high doses of chokeberry juice.

Keywords: chokeberry juice, polyphenolics, gastrointestinal tract, metabolism, rat

---

J. Jakopic, A. Solar, M. Colaric, M. Hudina, R. Veberic and F. Stampar: The influence of ethanol concentration on content of total and individual phenolics in walnut alcoholic drink. Pp 233-239. jerneja.jakopic@bf.uni-lj.si

The influence of the ethanol concentrations on the phenolic content was analysed in walnut liqueur, which is traditionally prepared from green walnut fruits. At the end of June, green walnut fruits from cultivars Elit and Franquette were picked and steeped into three concentrations (40, 60 and 96%) of ethanol. In the walnut liqueur, total phenolic content was measured using spectrophotometer. Furthermore, twelve individual phenolics were investigated using HPLC with PDA detector such as gallic, protocatechuic, syringic, ellagic, sinapic, p-coumaric, chlorogenic, vanillic and caffeic acid, (+)-catechin, 1,4-naphthoquinone and juglone. The content of total phenolics increased with increasing ethanol concentration. Similar results were achieved for some individual phenolic compounds such as protocatechuic, sinapic and p-coumaric acid as well as 1,4-naphthoquinone. The levels of some other phenolic content were highest at 40% ethanol and lowest at 96% ethanol. This was exhibited for gallic, chlorogenic, vanillic and syringic acid, (+)-catechin and juglone.

Keywords: phenolics, total phenolics, walnut, Juglans regia L., liqueur, ethanol concentration

---

M. Michalczyk, K. Surówka and A. Kalusińska: The effect of packaging method on he shelf life of gravad rainbow trout (oncorhynchus mykiss). Pp. 241-253. rtsurowk@cyf kr.edu.pl

In this study gravad – a minimally processed product made from rainbow trout was investigated in order to establish its shelf life under different storage conditions. Trout fillets rubbed with 1:2 mixture of salt and sugar in the amount of 350 g kg-1 of raw material, and matured for 48 h at 3ºC were then packaged in vacuum, ambient air and two different modified atmospheres (15% N2, 25% O2, 60% CO2 and 40% N2, 60% CO2) and stored for 12 weeks at 3ºC. In addition, a vacuum packaged product was stored for 24 weeks at –30ºC and the effect of storage on quality was investigated. Sensory and microbiological analyses were performed as well as amino nitrogen content, the thiobarbituric acid (TBA) value and acidity (pH) were determined. It was shown that the changes in lipid fraction are mainly responsible for limited storage stability of the product. Vacuum packing proved to be the best method of chilled storage, where the shelf life was 8 weeks, although frozen storage of vacuum packed gravad exceeds 6 months without substantial, negative changes in sensory attributes.

Keywords: gravad, vacuum pack, modified atmosphere pack, rainbow trout, shelf life

T. Gelencsér, R. Juhász, M. Hódsági, Sz. Gergely and A. Salgó: Comparative study of native and resistant starches. Pp. 255-270. : salgo@mail.bme.hu

Resistant starches (RS) can be used in the food industry aiming to enhance the dietary fibre content and reduce the glycaemic response of food. The aim of the present study was to investigate the physical and chemical properties of different resistant starches (origin, type of resistance) and their comparison with native starches in pure form and in stoichiometric mixtures. Measurements were carried out to determine enzymatic digestibility, water absorption, thermogravimetric parameters (DSC), and viscometric characteristics (RVA) of resistant and native starches and their mixtures. Enzymatic digestibility and water absorption were reduced linearly by adding resistant starches into the mixtures. RVA parameters have shown non-proportional character in the stoichiometric mixtures. The results of DSC measurements proved that the gelatinisation of resistant starches is quite different and only chemically modified resistant starch was heat-sensitive. Results indicated that circumspect evaluation is needed in the selection of resistant starch products for the development and innovation of food products with reduced glycaemic response.

Keywords: resistant starch; glycaemic response; enzymatic digestion; water binding capacity; differential scanning calorimetry; rapid visco analyser

---

E. Majajoros, M. Csóka, M. Amtmann, and K. Korány: Comparison of the volatile compounds of fresh and dried apricot fruits by gc-ms measurements. Pp. 271-282. kornel.korany@uni-corvinus.hu

The effect of the drying dehydration process on the characteristic aroma structure of apricot samples has been studied. A close mass spectrometric examination of the relating gas chromatograms revealed the fundamental differences between the fresh and parched fruits. The comparability of the records has been created by the normalisation of both chromatographic axes. The procedure is called aroma spectrum method. The measurements prove that the drying process destroys the fine scent structure to a surprisingly high extent. The two most important constituents responsible for the apricot character disappear, as well.

Keywords: Likens-Nickerson SDE, MS identification, PTRI measurement, aroma spectrum method

---

C.J. Contreras-Castillo, M. A. Trindade, and P.E. De Felício: Physical and chemical characterisation of spent hens mechanically separated meat (mshm) from the brazilian. Pp. 283-291. ccastill@esalq.usp.br

The objective of this study was to characterise and compare the quality of the MSMs obtained from carcasses from breeding and laying hens to provide useful information for the processing industry. The composition of the mechanically separated meat (MSM) varied between the two groups. Laying hens contained the most crude protein ($P<0.05$) and high ash content ($P<0.05$). Calcium concentrations and bone contents were higher ($P<0.05$) for laying (448 mg.100 g-1 and 1.25%, respectively) than for breeding hens (299 mg 100 g-1 and 0.78%, respectively). Levels of unsaturated fatty acids for laying and breeding hens (75.89 and

72.82%, respectively) and cholesterol concentrations (73 and 61 mg 100g-1, respectively) were higher (P<0.05) for laying hens than for breeding ones.

Keywords: chemical composition, mechanically separated meat, physical characteristics, spent hens

---

Sz. Sárosi and J. Bernáth: The antioxidant properties of prunella vulgaris l. Pp. 293-300. szilvia.sarosi@uni-corvinus.hu

Nowadays, plants from the Lamiaceae family (rosemary, garden thyme, sage) are used mainly as natural antioxidants. However, their strong smell and taste are not desirable in the food industry. From this point of view, self-heal (Prunella vulgaris L.) can be considered as one of the most perspective plants, since it is almost taste-, and odourless, and it is rich in phenolic compounds. Taking into account its advantageous characteristics, in 2005, we were the first who examined the morphological and chemical diversity of seven populations of self-heal collected from different natural habitats in Hungary. Our results were compared to a cultivated population, too. The total phenolic compounds ROSSI, 1965) and the&(measured by modified method of SINGLETON antioxidant powers (measured by the FRAP method) as well as the rosmarinic acid content of the samples were significantly different from 0.01 mg GAE/ml) and±each other. The highest total-phenol (0.43 0.03 mg/g) was observed in the±rosmarinic acid content (1.84 one-year-old population under cultivation, while the strongest antioxidant activity was measured in the samples collected in Mátra 0.04 mg AAE/ml). According to our results, in the future, it±Hills (0.35 will probably be possible to optimise the cultivation conditions of Prunella vulgaris providing high quality for the food-industry.

Keywords: self-heal, total-antioxidant capacity, total phenolic compounds, rosmarinic acid