



American Journal of  
**Food Technology**

ISSN 1557-4571



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## **Assessment of Antimicrobial Usage and Antimicrobial Residues in Broiler Chickens in Morogoro Municipality, Tanzania**

H.E. Nonga, M. Mariki, E.D. Karimuribo and R.H. Mdegela

Presence of antimicrobial residues in broiler meat was determined in a cross-sectional study conducted in Morogoro, Tanzania between January and February, 2007. Twenty smallholder broiler chicken farmers were interviewed on the types of antimicrobials used and their awareness on withdrawal period. In addition, 70 broiler chicken liver samples were collected for qualitative antimicrobial residues analysis by use of two parallel tests; agar well diffusion and Delvotest SP<sup>®</sup> assay. Ninety percent of the respondents frequently used tetracycline, amprolium, sulphonamides, trimethoprim, neomycine and flumequine to their chickens. Ninety percent of the respondents had knowledge on antimicrobial withdrawal period. However, 95% of farmers slaughtered their chicken before withdrawal period because were afraid of losses and were unaware of the effects of antimicrobial residues in humans. Laboratory results indicated that 70% (n = 14) of the farms were positive to antimicrobial residues. This shows a widespread misuse of antimicrobials by poultry farmers and reflecting lack of implementation of withdrawal times. It is stressed that stricter regulation for the use of antimicrobials in chicken and inspection of chicken for residues prior to marketing. However, poultry farmers need to be educated on the possible effects associated with use of food with antimicrobial residues. (*Pakistan Journal of Nutrition* 8 (3): 203-207, 2009; doi: 10.3923/pjn.2009.203.207)

## **Prevalence of Bovine Trypanosomosis in Morogoro, Tanzania**

H.E. Nonga and D.M. Kambarage

The prevalence study of bovine trypanosomosis was conducted in 43 smallholder farms which were randomly selected from 350 cattle farms and seven medium scale farms purposively selected in Morogoro, Tanzania. A total of 509 and 102 cross breed and local cattle, respectively aged six months and above were used in the study. The selected animals were examined for clinical signs of trypanosomosis and thereafter screened for haemoparasites using direct blood smears and micro-centrifugation methods. The overall prevalence of trypanosomosis in cattle was 2.3% (95% CI: 1.4-3.8, n = 691). Infected animals (n = 16) had the mean rectal temperature of 39.1°C±1.03. The mean number of parasites and PCV was 8.6±13.6 and 24.8%±7.9, respectively. Specific infection rates based on trypanosomas species were 0.4%, 0.6% and 1.3% for

*T. congolense*, *T. brucei* and *T. vivax* respectively. A highly significant ( $P < 0.05$ ) infection rate was found in cattle on farms located in northeastern part of Morogoro town (4.0%,  $n = 303$ ) than those in the southwest (1.0%,  $n = 388$ ,  $RR = 3.84$ ,  $95\% CI = 1.18 - 16.98$ ). Sex, breed, grazing system, farm size, acaricide application and chemoprophylaxis were not the risk factors for the trypanosomosis infection. It was concluded that, despite a continuous uses of chemoprophylaxis, synthetic pyrethroids, bush clearing and many other methods against tsetse flies, trypanosomosis is still prevalent in cattle in Morogoro. Animals in the livestock-wildlife interphase are at higher risk of infection. It was recommended that trypanosomosis losses due to cattle mortalities, reduced production and reproduction performance, continuous disease treatment and control costs need to be quantified. Knowing the associated losses may call for strengthening the disease surveillance, treatment and control strategies which are aimed at reduction or total elimination of the tsetse flies. (*Pakistan Journal of Nutrition* 8 (3): 208-213, 2009; doi: 10.3923/pjn.2009.208.213)

### **Evaluation of Fat and Vitamin E in Some Cookies Diet**

Ali F. Al-Shawabkeh and Ayman S. Mazahreh

This study was carried out on 5 different products from 3 different firms: Digestive Biscuit, Biscuit with fiber, Biscuit without Sugar but with fiber, Toast bread, Toast Bread without salt. Vitamin E, moisture and fat was evaluated by analysis. At the beginning of the study the content of vitamin E, in mg/100g dry matter in the five products from three different firms, respectively, were 3.16, 2.86, 2.84 and the average was 2.96. Moisture percentages were: 3.97, 3.70, 3.52 the average was 3.73 and fat% was: 10.96, 11.63, 11.75, the average was 11.45. At the end of the storage period (6 months), the content of vitamin E was 2.30, 1.64, 1.81, the average 1.92. Moisture was 5.52, 5.50 and 5.19. The average was 5.40. It may be concluded that 35.47% of vitamin E were lost during the storage period. (*Pakistan Journal of Nutrition* 8 (3): 214-217, 2009; doi: 10.3923/pjn.2009.214.217)

### **Nutrient Intakes Affecting Bone Formation Compared with Dietary Reference Intake (DRI) in Sabzevar Elderly Subjects**

Akram Kooshki and Mehdi Golafrooz

Nutrition is an important and modifiable factor in growth and preservation of bone was as well as prevention of osteoporosis. This research was conducted to survey

the status of nutrient affecting bone formation with reference to DRI. This descriptive - analytical study was conducted on 100 healthy elderly subjects in Sabzevar, Iran. Their weight and height were measured and 24 hour recall of nutritional intake were filled out in 3 successive days. All food were encoded in food processor software to assess the amount of nutrients. One - sample t - test, independent sample t - test and descriptive statistics were used in SPSS for data analysis. Fifty one men and and fourty nine women participated in the study; their mean age were  $69.82 \pm 6.87$  and  $67.34 \pm 5.62$  and their BMI were  $22.92 \pm 3.16$  and  $22.19 \pm 3.43 \text{ kg/m}^2$  respectively. Nutritional intake of PUFA, vitamins C, K, E, D and as well as mineral such as Ca, P, Mg, K, Zn and Cu were less than DRI standards ( $p=0.0001$ ) while protein and Fe intake were higher ( $p=0.0001$ ). Also, a significant difference was found between men and women in their intake of PUFA ( $p=0.04$ ) and protein ( $p=0.03$ ). The findings revealed that the intake of most nutrients, with the exception of sodium, iron and protein, is less than DRI standards in the elderly subjects. Therefore, they are recommended to protect themselves against bone loss to some extent by a diet of food variety, fruit, vegetables and low-fat dairy products that are rich in bone-forming nutrients. (*Pakistan Journal of Nutrition* 8 (3): 218-221, 2009; doi: 10.3923/pjn.2009.218.221)

### **Distribution of Heavy Metals in Leaves, Stems and Roots of Fluted Pumpkin (*Telfeiria occidentalis*)**

Edem, Christopher A. Dosunmu, Miranda I. and Bassey, Fransisca I.

The distribution of heavy metals in leaves, stems and roots of fluted pumpkin (*Telfeiria occidentalis*) was evaluated using chemical analysis. The results show the following sequence Fe ( $3.14 \mu\text{g/g}$ ) > Cu ( $0.88 \mu\text{g/g}$ ) > Mn ( $0.40 \mu\text{g/g}$ ) > Pb ( $0.13 \mu\text{g/g}$ ) > Cr ( $0.08 \mu\text{g/g}$ ) > Zn ( $0.04 \mu\text{g/g}$ ) in the leaves and Cu ( $1.52 \mu\text{g/g}$ ) > Fe ( $1.12 \mu\text{g/g}$ ) > Mn ( $0.20 \mu\text{g/g}$ ) > Zn ( $0.08 \mu\text{g/g}$ ) > Pb ( $0.04 \mu\text{g/g}$ ) in the stem with Fe ( $1.67 \mu\text{g/g}$ ) > Cu ( $0.53 \mu\text{g/g}$ ) > Mn ( $0.25 \mu\text{g/g}$ ) > Zn ( $0.09 \mu\text{g/g}$ ) > Pb ( $0.03 \mu\text{g/g}$ ) in the roots. The results also showed that the concentrations of Fe, Mn, Pb and Cr were highest in the leaves, Cu concentration was highest in the stems while that of Zn was highest in the roots. It was also revealed that Fe concentrations was the highest at all the locations in the leaves and roots. While Cu had the highest concentration in the stems. (*Pakistan Journal of Nutrition* 8 (3): 222-224, 2009; doi: 10.3923/pjn.2009.222.224)

## **Determination of Proximate Composition, Ascorbic Acid and Heavy Metal Content of African Walnut (*Tetracarpidium conophorum*)**

Edem, Christopher A. Dosunmu, Miranda I. and Bassey, Francesca I.

The proximate composition, ascorbic acid and heavy metal content of (African walnut) *Tetracarpidium conophorum* were evaluated using chemical analysis. The result of the proximate composition showed the following; moisture (48.70%), carbohydrate (53.20%), crude protein (35.22%), crude fat (6.21%), crude fiber (3.34%) and ash (2.03%). It also contained 53.50mg/100ml of ascorbic acid. The heavy metal concentrations in the fruit is Fe (0.064ppm), Mn (0.012ppm), Cr (0.001ppm), Ni (0.005ppm) while the concentrations of Hg, Pb and Cd were not detected. The results revealed that the *T. conophorum* is rich in ascorbic acid and carbohydrate with moderate values of crude protein while the ash content was shown to be very low. This result shows that *T. conophorum* nut is not polluted with heavy metals since the concentrations of the heavy metals were all below WHO permissible limits. This nut is therefore shown to be safe for public consumption. (*Pakistan Journal of Nutrition* 8 (3): 225-226, 2009; doi: 10.3923/pjn.2009.225.226)

## **Growth Performance, Survival and Immunostimulation, of Beluga (*Huso huso*) Juvenile Following Dietary Administration of Alginic Acid (Ergosan)**

E. Ahmadifar, Gh. Azari Takami and M. Sudagar

A 60-day feeding trial was conducted to examine the effect of dietary alginic acid on growth performance, survival and immunostimulation in beluga, *Huso huso* juvenile. alginic acid supplemented at 0, 2, 4 and 6 g kg<sup>-1</sup> diet (diets A, B, C and D, respectively). Each diet was fed to triplicate groups of Beluga with initial body weight of 41.7±1.8 g at 10 days intervals (1-10th, 20-30th and 40-50th with non-supplemented diet and 10-20th, 30-40th and 50-60th with supplemented diet). Control group fed non-supplemented diet at total period of the experiment. Final weight, final length, specific growth rate (SGR), condition factor (CF) and percent of weight gain in the fish fed supplemented diets were significantly higher than the control group (p<0.05). Food conversion ratio (FCR) in the fish fed diets C and D were statistically better than the other treatments (p<0.05). Survival was not different among all dietary treatments (p>0.05). Also, use of Ergosan resulted in significance differences in lymphocyte percentage, while there were no statistically

significant differences in hematocrit (Hct), monocytes and myelocyte percentages, hemoglobin (Hb) concentration, number of erythrocytes (RBC), total leukocytes (WBC), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC). Neutrophils and eosinophils percentages in the control group were higher than the fish fed supplemented diet. These results indicated that diet C (4 g kg<sup>-1</sup> alginic acid) had the best effect and dietary administration of alginic acid affected on some growth and immune system parameters in great sturgeon, *Huso huso* juvenile. (*Pakistan Journal of Nutrition* 8 (3): 227-232, 2009; doi: 10.3923/pjn.2009.227.232)

### **Development and Evaluation of Vegetable Milk from *Treculia africana* (Decne) Seeds**

Jane C. Onweluzo and Chizoba Nwakalor

*Treculia africana* seed milks (TRASMS) were developed using two blanching treatments (water and 0.2 % NaHCO<sub>3</sub>) and five seed to solvent ratios (1:1 to 1:5). The developed milks were subjected to consumer acceptance test. The lower solvent TRASMS were most acceptable. Sensory, physico-chemical and microbiological properties of the four most acceptable TRASMS were compared with soymilk and a commercial vegetable milk-vitamilk using standard analytical methods. Blanching in alkali overtly affected the colour and taste scores of TRASMS. Water blanched TRASMS were preferred by taste panelists in terms of flavour, taste, mouth feel and overall acceptability. Sensory scores of TRASMS differed significantly ( $P \leq 0.05$ ) in all attributes from those of vitamilk. Blanching in alkali resulted in 6%-15% decrease in protein content, marginal ( $P > 0.05$ ) increase in pH and significant ( $P \leq 0.05$ ) increase in total solids in comparison to blanching in water. Ether extract was lower by (1.32%-1.81%) in all TRASMS than codex standard. The levels of Calcium in TRASMS was low but iron (0.40-0.52 mg/100ml) and vitamin C (3.38-3.46 mg/100ml) were appreciably high when compared with the levels in dairy and human milk. The microbial load of TRASMS was below the acceptable limit for dairy milk. (*Pakistan Journal of Nutrition* 8 (3): 233-238, 2009; doi: 10.3923/pjn.2009.233.238)

### **Hypoglycemic Potential of the Young Leave Methanolic Extract of *Magnifera indica* in Alloxan Induced Diabetic Rat**

Ugbenyen Anthony, M.1 and Odetola Adebimpe, A.

The study was designed to investigate the hypoglycemic potential of *Magnifera indica* young leave methanolic extract in alloxan induced diabetic rat. Albino rats

each weighing 100-200g were given a peritoneal injection of 120mg of Alloxan per kg body weight. After 7 days the blood glucose level of the animals were checked to ascertain a diabetic state. Those that were diabetic were selected for the study. Oral administration of *Magnifera indica* leave extract (0.5g/kg body weight) or (1.0g/kg body weight) for 14 days resulted in a significant reduction in blood glucose level from 171.4±4.58 (mg/dl) to 103.7±1.45 (mg/dl) in diabetic rat given 1.0g/kg body weight dose and from 134.2±10.34 (mg/dl) to 97.7±7.01 (mg/dl) in diabetic rat given 0.5g/kg body weight dose, dose dependent being more effective at 1.0g/kg body weight dose than 0.5g/kg body weight dose. (*Pakistan Journal of Nutrition* 8 (3): 239-241, 2009; doi: 10.3923/pjn.2009.239.241)

### **Isolation and Partial Characterization of a Bacteriocin Produced by a Newly Isolated *Bacillus megaterium* 19 Strain**

Rowaida Khalil, Yasser Elbahloul, Fatima Djadouni and Sanaa Omar

A *Bacillus megaterium* 19 strain isolated from a mixture of fermented vegetable wastes, produced a bacteriocin that displayed a wide spectrum antimicrobial activity against food-spoilage microorganisms and possessed a bacteriocidal mode of action. The bacteriocin activity against *Salmonella typhimurium* and *Staphylococcus aureus* attained its maximum value during the mid stationary phase. Maximal bacteriocin activity (93% growth reduction) was achieved using MRS broth, at initial pH of 5.5-6.5 and at 30°C incubation temperature. High levels of bacteriocin activity (up to 85% growth reduction) were detected under limited or reduced oxygen levels. The inhibitory activity increased in mMRS broth with 4% sucrose and (0.10%) beef extract. The bacteriocin was thermally stable over a wide temperature range up to 100°C for 15 min and retained its activity at acidic and neutral pH values, but not at alkaline pHs. Full bacteriocin activity was expressed after 30 days of storage at 4°C, for 15 min of exposure to UV light. The bacteriocin was amylase and lipase sensitive, however, treatment with proteolytic enzymes resulted in a remarkable stability. SDS-PAGE analysis of the partially purified bacteriocin revealed an apparent molecular weight ranging from 3.496 to 6.512 kDa. The strain may have a potential use as food biopreservative, because of its promising thermostable technological properties and broad antimicrobial spectrum. (*Pakistan Journal of Nutrition* 8 (3): 242-250, 2009; doi: 10.3923/pjn.2009.242.250)

## **The Effect of Forage Energy Level on Production and Reproduction Performances of Kosta Female Goat**

Salam N. Aritonang

The research on the effect of forages energy level on production and reproduction performances of Kosta female goat was conducted in two phases. The first phase, was observing the growth of Kosta female goat starting from the weaning age of 4 months to first puberty at 7 months and then to mating at 9 months. The variables found at this stage were: daily weight gain, the rations consumed and the puberty age of the herd. The second phase was observing Kosta female goat from mating until giving birth. The variables determined were: ration consumed, body weight gain, length of pregnancy, litter size, birth weight and weaning weight. The research was conducted in experimental methods by using 24 four months old Kosta female goats weighing 6-7kg and 3 ram aged at 3-4 years. The design of the experiment used was completely randomized design. The treatments were 3 levels of ration energy 53% TDN (R<sub>1</sub>), 61% TDN (R<sub>2</sub>) and 69% TDN (R<sub>3</sub>), with relatively equal protein percentage of 12% (isoprotein). Each treatment was replicated 8 times. The rations were forage consisted of field grass, leaves of: waru (*Hibiscus tiliaceum. L*), lamtoro (*Leucaena glauca*), gamal (*Gliricida septium*) and jackfruit (*Artocarpus heterophylla*). Generally, result of this experiment indicated that: (1) the higher the dietary energy up to 61% TDN in the ration, the higher the production performances of Kosta female goats in term of efficiency of ration usage, body weight gain, birth weight and weaning weight; (2) the higher the dietary energy up to 61% TDN in the ration, the higher the reproduction performances of Kosta female goats in term of age of puberty, length of pregnancy and litter size. (*Pakistan Journal of Nutrition* 8 (3): 251-255, 2009; *doi: 10.3923/pjn.2009.251.255*)

## **Proximate Composition and Phytochemical Constituents of Leaves of Some *Acalypha* Species**

O.M. Iniaghe, S.O. Malomo and J.O. Adebayo

Proximate composition and phytochemical constituents of leaves of *Acalypha hispida*, *Acalypha marginata* and *Acalypha racemosa* were investigated. Proximate composition of leaves of *Acalypha hispida* showed that it contained moisture (11.02%), crude fat (6.15%), ash (10.32%), crude protein (13.78%), crude fibre (10.25%) and carbohydrate (44.48%). Similarly, *Acalypha marginata* showed that it contained moisture (10.83%), crude fat (5.60%), ash



(15.68%), crude protein (18.15%), crude fibre (11.50%) and carbohydrate (38.24%); while *Acalypha racemosa* contained moisture (11.91%), crude fat (6.30%), ash (13.14%), crude protein (16.19%), crude fibre (7.20%) and carbohydrate (45.26%). The phytochemicals detected in both aqueous and methanolic extracts of each of the different species of leaves were the same and are phenolics, flavonoids, hydroxyanthraquinones and saponins. Steroids and phlobatannins were detected in *Acalypha hispida* and *Acalypha racemosa*, while glycoside was detected only in *Acalypha hispida*. All these results indicate that the leaves of these *Acalypha* species contains nutrients and mineral elements that may be useful in nutrition. The presence of some phytochemicals like saponins and flavonoids explained the medicinal action of the plant encountered in its therapeutic uses. (*Pakistan Journal of Nutrition* 8 (3): 256-258, 2009; *doi*: 10.3923/pjn.2009.256.258)

### **Iron Deficiency Anemia in School Children of Dera Ismail Khan, Pakistan**

Muhammad Ramzan, Irshad Ali and Abdus Salam

The prevalence of obesity has increased at an epidemic rate and obesity has become one of the most common health concerns in both developed and developing countries. Very few studies in Pakistan have noted a possible association between iron deficiency anemia and obesity. The objective of this study was to investigate the frequency of iron deficiency anemia in obese school children of Dera Ismail Khan (N.W.F.P), Pakistan. This study involved a total of 103 children (6-11 years) with 76 (73.79%) obese and 27 (26.21%) as healthy/normal weights, comprising 58 (56.31%) as the boys and 45 (43.69%) as the girls. Concentration of hemoglobin was used as the sole criteria for iron deficiency anemia. Children were considered iron deficient anemic if their hemoglobin concentration was found below 11.5g/dl. With the use of Centers of Disease Control and Prevention (CDC)'s age and gender specific Growth charts, obese were defined as having BMI of more than 95<sup>th</sup> percentile. In the present study none of the obese boys or girls was suffering from iron deficiency anemia. However, 58.82% healthy/normal weight boys were anemic, with maximum number at the age of 06 years. Similarly 70% healthy/normal weight girls were anemic, with maximum number at the age of 6 (100%), followed by 10 years (66.66%). Both are the ages of physical activity and growth spurt. Given the increasing number of obese children and known morbidities of iron deficiency anemia, screening for iron deficiency anemia may be included in children with elevated BMI for age percentiles. (*Pakistan Journal of Nutrition* 8 (3): 259-263, 2009; *doi*: 10.3923/pjn.2009.259.263)

## **Post Harvest Physical and Mechanical Properties of Apricot Fruits, Pits and Kernels (C.V. Sonnati Salmas) Cultivated in Iran**

Hojat Ahmadi, Hamzeh Fathollahzadeh and Hossein Mobli

The physical and mechanical characteristics of Sonnati Salmas apricot fruits, pits and kernels were studied in this study. Technological properties such as dimensions, geometric mean diameter, sphericity, surface area, bulk density, true density, porosity, volume, mass, true density, bulk density, porosity, 1000-unit mass, coefficient of static friction on various surface and rupture force in 3 axes, were determined at 82.34, 16.48 and 13.03% moisture contents for apricot fruits, apricot pits and apricot kernels respectively. Bulk densities of fruits, pit and kernels were 443.2, 539.4 and 540.1 kg/m<sup>3</sup>, the corresponding true densities were 940.7, 1045.5 and 1023.6 kg/m<sup>3</sup> and the corresponding porosities were 52.87, 48.40 and 47.21%, respectively. The volumes, mass and surface area of fruits were larger than those of pits and kernels. Static coefficient of friction of fruit on all surfaces (wood, glass, galvanize sheet and fiber glass sheet) were measured and static coefficient of friction was less for pits and kernels on glass and their value were 0.474 and 0.188, respectively. Rupture force of fruit, pit and kernel were 10.11, 497.79 and 18.92 N through length, 7.98, 322.59 and 41.97N through width and 7.01, 337.21 and 99.58 N through thickness. Results showed that rupture force through length were minimum and this result is very important factor in design post harvest machines, especially about apricot pit crusher machine. (*Pakistan Journal of Nutrition* 8 (3): 264-268, 2009; doi: 10.3923/pjn.2009.264.268)

## **Chemical Analyses of Groundnut (*Arachis hypogaea*) Oil**

G.N. Anyasor, K.O. Ogunwenmo, O.A. Oyelana, D. Ajayi and J. Dangana

Peanut (*Arachis hypogaea* L.) oil from seeds of six varieties; boro red, boro light, mokwa, ela, campala and guta as well as oil from three geographical zones in Nigeria; northern, eastern and western were investigated. Gas chromatography analysis showed high concentrations of oleic and linoleic acids in the oil samples. Capric (0.0%) and Lauric (8.1%) acids were absent and highest, respectively in the mokwa variety and hence diagnostic. More so, the comparative chemical analysis of peanut oil from the three zones and some selected refined vegetable oil;

sunola, grand, olive and corn oil, indicated that western and grand oil had high iodine value  $1.74 \pm 0.1$  and  $2.63 \pm 0.1$ , respectively, compared to others. The northern oil had high acid and fat value than the others (4.49 and 133%, respectively). Furthermore, the saponification value of the local vegetable oil was found to be significantly higher than the refined vegetable oil ( $P < 0.05$ ), the eastern oil having the highest (140.25mgKOH/g). However, the peroxide values for both the local and refined oil were less than the standard peroxide value ( $10\text{mEqKg}^{-1}$ ) for vegetable oil deterioration. Minerals were present and no rancidity was observed in all the samples. In conclusion, the groundnut oil from Nigeria may have a higher shelf life and serve as a useful substitute in nutrition and industrial applications. (*Pakistan Journal of Nutrition* 8 (3): 269-272, 2009; *doi*: 10.3923/pjn.2009.269.272)

### **Effect of Yeast (*Saccharomyces cerevisiae*) on Apparent Digestibility and Nitrogen Retention of Tomato Pomace in Sheep**

A. Paryad and M. Rashidi

Twenty mature rams were used to determine the effects of yeast (*Saccharomyces cerevisiae*) on digestibility and nitrogen retention of tomato pomace. The animals were assigned randomly to one of the four different treatments (0, 2, 4 and 6 g/head/day yeast) with five rams per treatment in a completely randomized design. Each diet was fed for 14-day adaptation following a 7-day collection period whereas tomato pomace digestibility was measured by difference method using alfalfa as the basal diet. Yeast supplementation significantly ( $P < 0.05$ ) increased digestibility of dry matter (DM), organic matter (OM), crude protein (CP), NDF and ADF of tomato pomace where the gross digestibility derived from the supplementation was superior in 4 gram yeast compared to the control group. In addition, sheep fed yeast had a marked increase in energy digestibility of tomato pomace at 4 gram level, however, yeast did not affect energy digestibility at 2 and 6 gram. Also, the nitrogen retention of tomato pomace was improved by *Saccharomyces cerevisiae* adding at 2 and 4 gram levels. The observed results were attributed to better digestibility and nitrogen retention of tomato pomace of 4 gram yeast group, possibly due to its better supply of rumen fermentation and microorganisms' activity of digestive tract. (*Pakistan Journal of Nutrition* 8 (3): 273-278, 2009; *doi*: 10.3923/pjn.2009.273.278)

## Major Fermentative Organisms in Some Nigerian Soup Condiments

Victor N. Enujiugha

Various types of microorganisms were isolated from fermented products of locust bean seeds (*Parkia biglobosa*), castor bean seeds (*Ricinus communis*), African oil bean seeds (*Pentaclethra macrophylla*) and mesquite seeds (*Prosopis africana*) and characterized. The fermented products, namely, iru, ogiri, ugba and okpei, respectively, are mainly used as condiments in soups, sauces and porridges among consuming populations in Nigeria. The results show that only bacteria were isolated from the fermented condiments. The organisms isolated included species of *Micrococcus*, *Lactobacillus*, *Staphylococcus* and *Bacillus*. From the results of morphological and biochemical tests carried out on the isolated species, *Bacillus subtilis*, *Bacillus cereus*, *Lactobacillus brevis*, *Lactobacillus fermenti*, *Staphylococcus aureus*, *Staphylococcus saprophyticus*, *Micrococcus roseus* and *Micrococcus varians* were found to be present. The isolates were used to ferment freshly prepared oilseed samples, with subsequent evaluation of the desirable quality characteristics of texture, color and aroma. *B. subtilis* was found to give the products with acceptable quality attributes. (*Pakistan Journal of Nutrition* 8 (3): 279-283, 2009; doi: 10.3923/pjn.2009.279.283)

## Nutritive Value of *Lagenaria sphaerica* Seed (Wild Bottle Gourds) from South-Eastern Nigeria

Chinyere G. Chinyere, Emmanuel, I. Akubugwo, Nwaukwa, I. Chinenye and A.E. Ugbogu

The nutritive value of *Lagenaria sphaerica* (Wild Bottle Gourd) from South-Eastern Nigeria was studied. The results show that the nutritional value of this seed is similar to those of *curcubitaceae* (Melon) seeds. Its moisture (7.92%), crude fibre (3.65%) and ash (2.68%) levels compare to those of peanuts, sesame and sunflower but its carbohydrate level is (14.22%) lower. The *Lagenaria sphaerica* seed is rich in protein (23.48%) and minerals (73.12%). It also contains high lipid levels (44.54%) similar to those of the other oilseeds. The fatty acid profile show *linoleate* (18.2) as the most abundant (62%). This seed can thus be considered as a rich source of proteins and oils. (*Pakistan Journal of Nutrition* 8 (3): 284-287, 2009; doi: 10.3923/pjn.2009.284.287)

## **Effect of Processing on Nutritional, Microbiological and Sensory Properties of Kunun-Zaki (A Sorghum Based Non-Alcoholic Beverage) Widely Consumed in Nigeria**

N.A. Amusa and O.A. Ashaye

The effect of processing on Nutritional, Microbiological and Sensory Properties of Kunun-Zaki widely consumed was investigated at Ibadan Nigeria. The result of the analysis indicated that the highest % crude protein was found in the Kunun zaki samples from the Unseieved kunun flour followed by kunun samples from sieve kunun flour, while the least % crude protein was found in Traditionally processed kunun samples. There were no significant differences between the carbohydrates content of the traditionally processed kunun zaki and that processed using kunun flour. The P<sup>H</sup> of the traditionally processed Kunun zaki drinks were highest followed by kunun drinks processed from sieved kunun flour, while the least was found in kunun drinks processed from sieved kunun flour. The yeast and lactic acid bacterial count were highest in the traditionally processed kunun drink samples followed by kunun drinks processed from sieved kunun flour, while they were absent in kunun drinks processed from unseieved kunun flour. Coliform counts were found to be highest in the traditional processed kunun drinks, while the least count were obtained in kunun drinks from unseieved kunun flour. The traditionally processed kunun drinks was most preferred in terms of color, followed by kunun drinks from the sieved kunun flour while the least was found with kunun drinks from unseieved kunun flour. With regards to taste and texture, there was no significant difference between the kunun drinks traditionally processed and that from the sieved kunun flour, however, these were significantly different from the kunun drinks from the unseieved kunun flour. (*Pakistan Journal of Nutrition* 8 (3): 288-292, 2009; doi: 10.3923/pjn.2009.288.292)

## **Dietary Lectins as Disease Causing Toxicants**

Rabia Hamid and Akbar Masood

Lectins are carbohydratebinding proteins present in most plants, especially seeds and tubers like cereals, potatoes and beans. It is now well established that many lectins are toxic, inflammatory, resistant to cooking and digestive enzymes and present in much of our food and sometimes cause "food poisoning." The global

pattern of varying prevalence of diseases such as coeliac disease, autoimmune diseases, rheumatoid arthritis, obesity, cardiovascular disease and insulin dependant diabetes mellitus, suggests that some dietary factor specific to plant foods could initiate these diseases. Of the food lectins, grain/cereal lectins, dairy lectins and legume lectins are the most common ones associated with aggravation of inflammatory and digestive diseases in the body and improvement of these diseases and/or symptoms when avoided. Recent research has suggested that these lectins may effectively serve as a vehicle allowing foreign proteins to invade our natural gut defenses and cause damage well beyond the gut, commonly in joints, brain, skin and various body glands. With continued exposure of the gut by these toxic food lectins a persistent stimulation of the body's defense mechanism in a dysfunctional manner occurs, which manifests as an autoimmune disease. If the lectins in diet are causative in initiating all these diseases, it should be possible to identify the responsible constituents and modify or remove them so as to make the diet healthier. Here we present a brief account of lectin toxicity research and show how these proteins have become the focus of intense interest for biologists. (*Pakistan Journal of Nutrition* 8 (3): 293-303, 2009; doi: 10.3923/pjn.2009.293.303)

### **Nutrient Composition of Traditional Foods and Their Contribution to Energy and Nutrient Intakes of Children and Women in Rural Households in Igbo Culture Area**

E.C. Okeke, H.N. Eneobong, A.O. Uzuegbunam, A.O. Ozioko, S.I. Umeh and H. Kuhnlein

Micronutrient deficiency, namely: vitamin A, iron, iodine, zinc and burden of chronic diseases are prevalent. Eight communities selected from four States were used for this study. Key informant interviews, focus group discussions, nutrient composition and food intakes were used to ascertain use of local foods by households. Nutrient analysis on food recipes was carried out for all dishes collected from the field survey. Two communities out of the eight were randomly selected for detailed weighed food intake study which was done on a sub-sample to determine contribution of traditional foods. Results revealed that most of the recipes had reasonable energy content, at least over 90% of the energy was contributed to the diet of respondents from traditional foods. Moisture content was high and ranged from 44.3% in bambara fufu to 76% in palm nut soup/sauces. Protein content ranged from 0.2% in dried cassava fufu to 14.6% in plain bambara fufu. The recipes had reasonable nutrient content but were low in the

m micronutrients that were of public health importance, namely; iron, zinc and folic acid. Intakes of fruits and vegetables were low in these communities. In Anambra State, nuts and seeds made substantial contribution to energy, protein, calcium and iron while in Enugu State, legumes and cereals contributed to energy, protein, calcium and iron intakes. Further more, the bulk of the ascorbic acid came from vegetables in Anambra State (34-62%) while in Enugu State the ascorbic acid came from starchy roots and tubers (51-58%). The red palm oil (RPO) used in preparing many traditional dishes was the major source of vitamin A in the diet of the Igbo culture area. It contributed 70 - 85% of the vitamin A. Although traditional foods/diet made substantial contribution to the nutrient intakes of the populations studied, the results showed that in almost all the age groups low intakes of energy, calcium, riboflavin and niacin were observed. Low intakes were recorded more for children 6 - 12 years of age. Interventions to solve these problems must consider these issues in order to make a significant impact. (*Pakistan Journal of Nutrition* 8 (4): 304-312, 2009; doi: 10.3923/pjn.2009.304.312)

### **Physicochemical Properties of Starches of Sweet Potato (*Ipomea batata*) and Red Cocoyam (*Colocasia esculenta*) Cormels**

A.O. Oladebeye, A.A. Oshodi and A.A. Oladebeye

Starches of sweet potato (*Ipomea batata*) and red cocoyam (*Colocasia esculenta*) cormels were extracted by milling and their proximate compositions, physicochemical properties and pasting properties were analyzed. The starch of sweet potato was observed to possess higher percentage values of crude protein, crude fibre and carbohydrates by difference than that of red cocoyam cormels whereas an opposite trend was observed in terms of their percentage ash content and moisture content. Their fat contents were significantly similar ( $p < 0.05$ ). The results of the physicochemical properties, including bulk density, water absorption capacity, amylose and amylopectin contents, swelling power and solubility of the starch samples were significantly different ( $p < 0.05$ ). These properties were found to be influenced by their varying contents of amylose and amylopectin. The results of pasting properties revealed that the paste of sweet potato exhibited higher value of viscosity (405.92 RVU) at lower pasting time (4.37 minutes) than the starch of red cocoyam with paste viscosity of (244.33 RVU) obtained at 4.99 minutes. (*Pakistan Journal of Nutrition* 8 (4): 313-315, 2009; doi: 10.3923/pjn.2009.313.315)

## **Effect of Processing Methods on Nutritive and Antinutritive Properties of Seeds of *Brachystegia eurycoma* and *Detarium microcarpum* from Nigeria**

Friday O. Uhegbu, Chioma C. Onwuchekwa, Emeka. E.J. Iweala and Ijeoma Kanu

Proximate analysis of the seeds of *Brachystegia eurycoma* and *Detarium microcarpum* were carried out on both the dehulled and unde-hulled samples of the flour. The protein content of the seeds are quite low 9.1;7.2 and 11.4;8.2 for unde-hulled and dehulled *Brachystegia eurycoma* and *Detarium microcarpum*, respectively. Crude fibre is less than 3% in each, while ash was less than 5% each per 100gm dry weight of sample. *Detarium microcarpum* has a higher crude fat composition 18.5±0.03, 15.5±0.02 while *Brachystegia eurycoma* 15.5±0.04, 14.0±0.01 for the unde-hulled and dehulled samples respectively. Moisture content is higher in dehulled samples 14.3±0.01 and 16.7±0.03 for both seed types. The available carbohydrate is equally higher in the dehulled samples 59.0±0.01 and 57.0±0.01, respectively for both seeds. The sodium, potassium, calcium and magnesium contents were less than 1% each, with calcium having the highest concentration, followed by phosphorous. The phytochemical analysis showed the presence of alkaloids, tannins, saponins and flavonoids. *Brachystegia eurcoma* showed no presence of tannin. The findings are of nutritional relevance since these seeds are used for soup thickening by many homes in the southeastern Nigeria. (*Pakistan Journal of Nutrition* 8 (4): 316-320, 2009; doi: 10.3923/pjn.2009.316.320)

## **Determinants of Food Acceptance and Micro-Nutrients Deficiency in Preschoolers: A Case Study of Households from Karachi, Pakistan**

Zammurud Subzwari, Abid Hasnain and Muhammad Ali

This study attempts to find out the determinants of food acceptance and micro-nutrient deficiency in preschool children from Karachi, Pakistan. Primary data was collected through survey from 400 households by interviewing and filling up the questionnaire. Index for food acceptance and micro-nutrient deficiency were constructed with the help of related questions from the questionnaire. Econometric models were developed and Logit techniques was employed to estimate probability of end indicator. Our results show that increase Micro-Nutrient Deficiency (MND) may cause lower level of Food Acceptance and vice versa. On



the other hand, modeling food acceptance may indicate higher level of MND among preschoolers reduce the acceptance level of appropriate food. Other important variables like Household Income, Mother's Literacy and Mother's Maternal Knowledge showed significant effects and appropriate signs of coefficients as per expectations. On the basis of these findings, if government targets the core independent variables that are identified in the analysis, Food Acceptance level can be increased amongst the children and Micro-Nutrient Deficiency could then be reduced. Consequently government intervention, both long term and short term are needed to provide and regulate the food acceptance behavior either at household level or at other form so that our generation could be healthier and more productive which would lead the economic growth of a country which is abundant in labor. (*Pakistan Journal of Nutrition* 8 (4): 321-326, 2009; doi: 10.3923/pjn.2009.321.326)

### **Consumption and Cooking Patterns of Chicken Meat in Hyderabad District**

A. Memon, M.U. Malah, N. Rajput, A.S. Memon, I.H. Leghari and A.H. Soomro

In order to ascertain the consumption and cooking patterns of chicken meat in Hyderabad district, a survey based study was carried out during, 2006-2007. The sample size of 200 was comprised of 180 male and 20 female respondents having education from primary level to graduation, mostly married and all the respondents employed in public (40%) or private sector (60%) along with low monthly income in the range of 1000-10000 rupees (68%). The 85% respondents liked to purchase broiler meat, while only 15% respondents showed their liking in meat of desi hen (indigenous poultry breed). 38% respondents consumed once a week, while 36% consumed monthly. 73% respondents purchased upto 1 kilogram, while 15% purchased 1-1.5kg. 68% respondents were having current knowledge of nutritive value and 32% respondents did not showed their knowledge over the nutritive value of commercial poultry meat. It was noted that at 74% told that their wives were responsible for cooking, 11% their daughters and 8% their mother/sister. 47% liked to cooked and consumed fried chicken, while 33.00% preferred to cook chicken curry, 20.% liked to prepare broast, 72% liked whole chicken, 18% showed their liking for breast meat and only 10% respondents expressed their liking towards leg meat. While enquiring the respondents whether they consumed meat during out break of diseases especially in bird flu disease, 58% respondents responded positively and told that they feel no hesitation in consuming meat during outbreak of diseases. 72% respondents enhanced their

consumption in winter season and remaining 36% respondents commented that they did not enhance their consumption. 86% respondents responded optimistically and perceived that the meat is consumed normally at their homes in summer season. The respondents were asked to express consumption of meat in case of increased prices and 61% respondents had positive response and 37% showed negative response to this aspect. 70% respondents preferred first to eat chicken meat, 15% had choice of fish and 10% showed preference for beef/mutton, while only 5% expressed their preference for vegetables. (*Pakistan Journal of Nutrition* 8 (4): 327-331, 2009; doi: 10.3923/pjn.2009.327.331)

### **Nutritive Value of Seven Varieties of Meat Products (Sausage) Produced in Jordan**

Jihad M. Quasem, Ayman Suliman Mazahreh and Ali Faleh Al-Shawabkeh

In developing country including Jordan, the per capita consumption average is 31.1 kg/person per year. In Jordan there is an increased 10% per capita consumption of meat and meat products between 2006 and 2008. This increase in meat consumption is mainly due to the highly nutritive value that added by meat and meat products to the Jordanian consumer. This study described the quality of some sausages as Mortedella plan, Mortedella with olive, Mortedella with pepper, Mortedella with pistachio, silsio, Frankfurters, Smoked salami and their proximate composition and nutritional values for Jordanian consumer. The proximate analysis as percentage of carbohydrate, fat, protein, ash, moisture and pH, of mentioned local sausages were: 4.3, 16.7, 12.7571, 2.2714, 63.9429 and 6.3429, respectively. (*Pakistan Journal of Nutrition* 8 (4): 332-334, 2009; doi: 10.3923/pjn.2009.332.334)

### **Study of Bacteriocin as a Food Preservative and the *L. acidophilus* Strain as Probiotic**

V. Karthikeyan and S.W. Santhosh

Bacteriocin producing *Lactobacillus acidophilus* strain was isolated from the gut of marine prawn (*Penaeus monodon*). This bacteriocin has broad range of antibacterial activity against major food born pathogens. Maximum bacteriocin production was observed at temperature 50°C, pH 4 and 0.9% sodium chloride. The bacteriocin was purified by ammonium sulphate precipitate and ion exchange (DEAE cellulose) chromatography. Biochemically it was pure protein moiety and its molecular weight was 2.5 KDa. This study revealed the possibility of using

bacteriocin as a food preservative and the *L. acidophilus* strain as probiotic. (*Pakistan Journal of Nutrition* 8 (4): 335-340, 2009; doi: 10.3923/pjn.2009.335.340)

### **Use of Soybean Meal Supplemented with Cell Bound Phytase for Replacement of Fish Meal in the Diet of Juvenile Milkfish, *Chanos chanos***

Sajad Hassan, K. Altaff and T. Satyanarayana

This study was designed to determine the influence of cell bound phytase supplemented in soybean meal on growth and survival of juvenile milkfish *Chanos chanos*. Four diets were formulated with different levels of fish meal, soybean meal and phytase. The first diet (control) (F) contains 61.35% of fish meal. The fish meal was replaced by the same level of soybean meal in the second (S), third (SP<sub>500</sub>) and fourth (SP<sub>1000</sub>) diets, however, SP<sub>500</sub> and SP<sub>1000</sub> were supplemented with 500 and 1000 phytase activity units (FTU) kg<sup>-1</sup>, respectively. The replacement of fish meal by soybean meal, with out phytase supplementation reduced weight gain, specific growth rate and crude protein content in the milkfish. The growth performance in fish fed diet SP<sub>1000</sub> was as good as those fed diet F. Results indicated that soybean meal supplemented with 1000 FTU kg<sup>-1</sup> phytase can be used for the mass culture of milkfish. (*Pakistan Journal of Nutrition* 8 (4): 341-344, 2009; doi: 10.3923/pjn.2009.341.344)

### **Carcass Composition of Crossbred and Straightbred Lambs Finished on a High Concentrate Diet**

S.A. Mohammed, M.A. Razaque, R.C. Malik and N.M. Al-Khozam

The body measurements and carcass composition of 35 Naeemi x Border Leicester Merino (NaeemixBLM) crossbred and 9 Naeemi straightbred lambs were investigated. The Naeemi lambs were, on average, 2 kg heavier and had the Body Conditioning Scores (BCS) that were 0.78 points lower and body lengths that were 10.2 cm shorter than the crossbred lambs. There were no significant differences between the genetic groups for (GR) or (BT) but crossbred lambs had significantly more kidney fat. They also had 5.5% higher dressing percentages and 14% higher carcass yields than the Naeemi lambs. Carcass moisture and protein were 6.3 and 1.6% higher and fat was 7.8% lower in the whole carcasses of the Naeemi lambs than in those of the crossbred lambs. It is concluded that the Naeemi x BLM lambs produce heavier carcasses but also

accumulate more carcass fat than straight Naeemi lambs. (*Pakistan Journal of Nutrition* 8 (4): 345-348, 2009; doi: 10.3923/pjn.2009.345.348)

## **Performance and Biochemical Responses in Early-Weaned Piglets Fed Diets with Different Protein and Zinc Levels**

Yang Mei, Wang Zhi-Sheng and Zhou An-Guo

A 2×2 factorial experiment was used to investigate the interaction between dietary Crude Protein (CP) concentration (23 and 17%) and zinc supplementation (100 and 3,000 mg/kg, from zinc oxide) on performance and biochemical responses in 32 crossbred piglets weaned at 21 days of age (4 groups of 8 each, 6.3±0.4 kg live weight). Pigs were offered four diets for 28 days after weaning, i.e., 23% CP + 100 mg/kg Zn; 17% CP + 100 mg/kg Zn; 23% CP + 3,000 mg/kg Zn and 17% CP + 3,000 mg/kg Zn. There were no interactions between CP and Zn concentration on performances except for on ADG during 3 and 4 weeks. As CP content increasing, ADG, ADFI and Gain: Feed ratio (G:F) were increased across feeding period ( $p < 0.01$ ), however, the incidence of diarrhea was also increased ( $p < 0.05$ ). Supplemented those diets with pharmacological concentrations of Zn improved ADG ( $p < 0.01$ ), ADFI ( $p < 0.05$ ) and G:F ( $p < 0.01$ ) during first 2 weeks after weaning and decreased the incidence of diarrhea significantly ( $p < 0.01$ ), compared to the low-Zn diets. Dietary treatments also affected some enzymes and urea nitrogen in serum, but interactions were observed on AST and LDH from samples of 14 days only ( $p < 0.05$ ). In conclusion, pharmacological concentrations of Zn supplementation was favourable to ensure benefits of high-CP diets on performance of weanling pigs and this may due to its effect on lowering incidence of diarrhea at high CP concentrations. Pharmacological concentrations of Zn had no negative influence on pig health when period was 2 weeks post-weaning. (*Pakistan Journal of Nutrition* 8 (4): 349-354, 2009; doi: 10.3923/pjn.2009.349.354)

## **Digestibility and Nutrient Utilization of Some Agro-Industrial By-Products Fed to Growing Pigs in the Humid Tropics**

K.U. Amaefule, S.F. Abasiokong, S.N. Ibe and O.C. Onwudike

Digestibility and nutrient utilization of some agro-industrial by-products fed to growing pigs in the humid tropics were determined with twelve castrated male hybrid (Large White x Landrace) pigs whose weights ranged from 15.33 to 17.67 kg (average 16.17 kg) and aged 13 weeks. The experimental design was

a Completely Randomized Design (CRD). Each of the four treatments had three replicates and a castrated male per replicate. Locally constructed metabolism cages (107 cm x 60 cm x 50 cm) were used in the experiment. Parameters measured were nutrient intake, digestibility coefficients of DM, CP, CF, Ether Extract and Nitrogen Free Extract (NFE). Others were energy utilization, nitrogen (N) balance and protein utilization. Wheat offal fed to growing pigs significantly ( $P < 0.05$ ) increased DM (418 g) and organic matter (391 g) intakes but significantly depressed apparent digestibility coefficient of ether extract (67.50%) and nitrogen intake (16.00 g). Other nutrient and energy utilization indices were not significantly ( $P > 0.05$ ) affected. The conclusion was that Palm Kernel Meal (PKM), Brewers Dried Grain (BDG), wheat offal or equal proportions of PKM+BDG fed to growing pigs have similar apparent nutrient digestibility coefficients, energy utilization, nitrogen balance and protein utilization. However, wheat offal could decrease digestibility coefficient of Ether Extract (EE) and also nitrogen intake. (*Pakistan Journal of Nutrition* 8 (4): 355-360, 2009; doi: 10.3923/pjn.2009.355.360)

### **Nutrient Utilization and Digestibility of Growing Pigs Fed Diets of Different Proportions of Palm Kernel Meal and Brewers Dried Grain**

K.U. Amaefule, O.C. Onwudike, S.N. Ibe and S.F. Abasiokong

Nutrient utilization and digestibility of growing pigs fed diets of different proportions of Palm Kernel Meal (PKM) and Brewers Dried Grain (BDG) in the humid tropics were determined with twelve intact male hybrid (Landrace x Duroc) pigs aged 15 weeks. Their live weights ranged 16.78-19.50 kg (average 18.36 kg). The experimental design was a Completely Randomized Design (CRD). The diets were control, 30% PKM+40% BDG, 35% PKM+35% BDG and 40% PKM+30% BDG for diets I, II, III and IV, respectively. Each diet had three replicates and a male pig per replicate. Locally constructed metabolism cages (107×60×50 cm) were used for the experiment. Measurements were nutrient intake, faecal nutrient output, digestibility coefficient of nutrients, energy utilization, Nitrogen (N) balance and protein utilization. Results showed that growing pigs fed diets of different proportions of PKM and BDG did not significantly ( $P < 0.05$ ) differ in digestibility coefficient of CP, protein utilization and N balance while 40% PKM+30% BDG diet significantly ( $P < 0.05$ ) increased N intake of growing pigs. The energy utilization indices of pigs fed diets of 35% PKM+35% BDG and 40% PKM+30% BDG were consistently superior to that of pigs fed control diet except ME as percentage of Gross Energy (GE). In conclusion, growing pigs could be fed

diets different proportions of PKM and BDG without adverse effect on nutrient utilization and digestibility; however N intake would increase with 40% PKM+30% BDG diet. (*Pakistan Journal of Nutrition* 8 (4): 361-367, 2009; *doi: 10.3923/pjn.2009.361.367*)

### **Chemical Composition and Nutrition Information of a Newly Developed Immune Enhancing Power Bar for Immune Deficient Patients**

Djoule Darman Roger, Vusi Shabangu, Valerie Erasmus, Christa Van Wyk and Wilna Oldewage-Theron

A immune enhancing power bar currently developed in the Vaal University of technology were screened for its nutritional information considering both analytical and calculated nutritional information. It was found that apart of moisture and total carbohydrate which were underestimated, all values of proximate composition were a bit higher than values obtained by calculation, thus overestimated. There is globally a reduction of micro nutrients like the one of Vit. A and E which show a gap of 70% and 48% respectively between calculated values and analytical values. The differences were found to be less significant for all minerals. Despite this, the new power bar can be considered as a powerful immune-enhancing meal, as it present most of required energy and key nutrients needed by people living with HIV/AIDS. However, in order to complete the development process all ingredients used need to undergo further refinement and optimization in the form of chemical and scientific analysis. This newly developed immune enhancing power bar can be linked to a prompt diagnosis and treatment of people living with HIV/AIDS, including use of antiretroviral treatment (ART) when indicated to improve their nutrition and health status. (*Pakistan Journal of Nutrition* 8 (4): 368-372, 2009; *doi: 10.3923/pjn.2009.368.372*)

### **Effect of Carrot Extracts on *Pseudomonas aeruginosa***

Nadia Ibrahim Abdulaali

The aim of this study is to evaluate the effect of alcoholic and watery extracts of carrots on the growth of *Pseudomonas aeruginosa*. The effect of cold alcoholic and watery extracts of carrots on the growth of *Pseudomonas aeruginosa* was done by wells and filter papers methods, in addition the sensitivity of bacteria to the antibiotics as Ampicillin Tetracycline and Trimethprim on the growth of the bacteria *in vitro* was performed by serial dilutions of the carrot extracts. The

results revealed that the treatments with carrot extracts especially the alcoholic extract was more efficient to inhibit the growth of *Pseudomonas aeruginosa* *in vitro*. (*Pakistan Journal of Nutrition* 8 (4): 373-376, 2009; *doi*: 10.3923/pjn.2009.373.376)

### **Sunflower Based Rations for Small-Medium Milk Producing Dairy Cows**

N.T. Ngongoni, C. Mapiye, M. Mwale, B. Mupeta and M. Chimonyo

Two dairy concentrates (ram press sunflower and sunflower heads) were formulated locally and their effects on the performance of crossbred dairy cows were compared with that of a commercial dairy concentrate. There were no significant differences in body condition and milk production responses by crossbred dairy cows to sunflower based diets compared to commercial dairy concentrates ( $p > 0.05$ ). It was suggested that the sunflower based rations can be used as cheaper alternatives to conventional dairy concentrates. The ram press sunflower cake, in particular is an option that may be used by smallholder dairy farmers to formulate local dairy concentrate, which influence dairying to a similar extent as the commercial dairy concentrate but cheaply. More research is required to determine fermentation patterns, rumen microbial protein synthesis, true intestinal digestibility and absorption of nutrients from sunflower-based diets at the small intestines in crossbred dairy cows. (*Pakistan Journal of Nutrition* 8 (4): 377-383, 2009; *doi*: 10.3923/pjn.2009.377.383)

### **Feedlot Performance of Sudan Baggara Bulls Fed Pelleted and Unpelleted Baggase Based Diets**

Izeldin Adam Babiker, Amir M.S. Mukhtar and Omer A. El Khidir

The present study was conducted to evaluate the effect of physical form of the diet, use of sugarcane baggase as basal roughage in complete diet system and the joint effect of dietary energy and protein on Sudan Baggara bulls performance. Two experimental baggase based diets(BBD) were used in feeding 18 entire Sudan Baggara bulls (1.5 year old and at average weight  $200 \pm 7.56$  kg). These bulls were randomly divided into 2 treatment groups of nine animals each. Further, each group blocked into three subgroups of three animals. Following an adaptation period of 3 weeks, 2 experimental diets of the same ingredients, metabolizable energy and CP content (but differed physically were diet A is unpelleted and diet B is pelleted were used. The experiment in this study showed variable results

between the two treatment groups due to the difference in the physical form of the diets, but no significant differences ( $p>0.05$ ) between the two treatment groups in many parameters, these are, the Average Daily Gain (ADG), daily DMI, total DMI, feed intake as percent of the body weight and, ME intake and the period of feeding. Feed Conversion Ratio (FCR) was significantly ( $p<0.05$ ) influenced by the physical nature of the diet by being improved in bulls fed pelleted diet (B) as (5.7) over these fed the unpelleted diet (A). (*Pakistan Journal of Nutrition* 8 (4): 384-387, 2009; doi: 10.3923/pjn.2009.384.387)

### **Quality Assessment of Milk Powders Packed in Sudan**

Murwan Khalid Sabah El Khier and Abu El Gasim A. Yagoub

Physicochemical, microbiological and sensory characteristics of milk powders packed in Sudan were investigated and compared with international quality standards. The compositions (moisture, fat, protein, ash and lactose) of the locally packed milk powders are almost insignificantly different ( $p\leq 0.05$ ) and they are comparable to the compositional quality in US and Argentina. Despite the significant ( $p\leq 0.05$ ) variations in acidity and pH between milk powder samples, their levels remained within the acceptable standard levels. Results also showed that most milk powders packed in Sudan had partial solubility in water, in comparison with the instantly soluble standards. Microbiologically the samples were safe, but organoleptically they considered of fair quality. (*Pakistan Journal of Nutrition* 8 (4): 388-391, 2009; doi: 10.3923/pjn.2009.388.391)

### **Growth and Survival of *Clarias gariepinus* Fry Raised on Plankton from Cow Dung and Poultry Manure**

J.B. Ogunremi and S.O. Obasa

The effect of zooplankton raised from cow dung and poultry dropping on the growth and survival of *Clarias gariepinus* fry was investigated weighing  $0.01 \text{ g} \pm$  and length  $\pm 7.00 \text{ mm}$ . Among the treatments, poultry manure source of zooplankton used for feeding fry six times daily had the highest specific growth rate 7.45, mean percentage body weight gain 45% and survival rate 53.33%. In terms of mean length gain, treatment fed nine times daily had the highest 2.88 mm. The specific growth rate and mean length gained were significant ( $p<0.05$ ) where as the values for mean weight gained and mean length increase were insignificant ( $p>0.05$ ). The survival rate for the period were found to be the same for treatments where fry were fed nine times daily with different food sources, also



applicable to treatment fed thrice daily with poultry manure as the source. (*Pakistan Journal of Nutrition* 8 (4): 392-394, 2009; doi: 10.3923/pjn.2009.392.394)

## **Effect of Dietary Fish Meal Replacement by Poultry By-Product Meal with Different Grain Source and Enzyme Supplementation on Performance, Feces Recovery, Body Composition and Nutrient Balance of Nile Tilapia**

M.A. Soltan

The efficacy of replacing Fish Meal (FM) with Poultry By-product Meal (PBM) in Nile tilapia diets on an ideal protein basis with different grain sources and enzyme supplementation was evaluated under condition of cement pond culture. An experimental diet was formulated contain 30% crude protein, 5% ether extract and 3355 Kcal ME/Kg. Four other diets were formulated to be isonitrogenous and isocaloric as the basal diet No. 1, in which FM protein was substituted completely by PBM protein (Basal diet No. 2), while diet No. 3, 4 and 5 sorghum grain replaced 100% of wheat grain (w/w) or 100% of corn grain or 50% of both wheat and corn for the three diets respectively. The fish experimental diets were fed to the fish without or with enzyme supplementation. Statistical analysis of data revealed that inclusion of PBM instead of FM with wheat or sorghum grain plus corn (group 2 and 3) in Nile tilapia diet had no significant ( $p>0.05$ ) effect on Body Weight (BW), Daily Body Gain (DBG), Daily Feed Intake (DFI), Feed Conversion Ratio (FCR), Protein Efficiency Ratio (PER) and Efficiency of Energy Utilization (EEU) when compared with the control. While corn replacement by sorghum (group 4) or 50% of both corn and wheat by sorghum (group 5) had no effect on DFI, but significantly ( $p\leq 0.05$ ) reduced BW, DBG, FCR, PER and EEU when compared with fish group fed on PBM with corn and wheat (group 2). On the other hand nutrient digestibilities were improved with PBM inclusion in Nile tilapia diet. At the end of the experimental period the dressing percent, head weight percent, visceral fat percent and hepatosomatic index were not significantly ( $p>0.05$ ) affected when FM replaced by PBM with different grain sources. Carcass chemical composition data indicated that there is no significant effect of different experimental diets on fish body dry matter, organic matter, crude protein and carbohydrate and phosphorus contents. PBM as FM alternatives has a high potential as feed ingredients replacing FM. Nutrients balances and fecal recovery data showed that PBM with corn + wheat or corn + sorghum results in good fish performance for a similar replacement of FM on protein percent basis. However,

they result as well in slightly higher waste loads, in particular of N and C to the system. Sorghum grain as alternative to corn (weight/weight) results in lower fish production and higher nutrient fecal and non fecal losses and prefer to rejected because it has a negative impact on the system. Moreover, enzyme supplementation highly improved the fish performance, nutrient digestibility, carcass traits and fecal recovery and reduces the excessive losses of the nutrient to the environment. (*Pakistan Journal of Nutrition* 8 (4): 395-407, 2009; *doi*: 10.3923/pjn.2009.395.407)

### **Biological Evaluation of Protein Meals for Making Nutrient Dense Food Bar**

Omer Mukhtar Tarar, Salim-ur-Rahman, Tahir Zahoor, Khalid Jamil and Aamer Jamil

The study was undertaken for biological evaluation of protein meals, differing in raw or processed chickpea (*Cicer arietinum* L.) and vetch (*Lathyrus sativus* L.) flour for nutritionally rich food bar making. The indigenous food processing technologies such as controlled and natural fermentation and germination were utilized to improve the protein quality of legumes. The resultant flours were thereafter blended with other protein sources to produce balanced protein meal. The protein quality of these diets was assessed by implying *in-vivo* rat assays. The values for relative protein efficiency ratio (RPER) and relative net protein ratio (RNPR) in close proximity to each other for processed meals are an indicator of good protein quality of these meals. It could be concluded that food bars with good protein quality can be produced by using meals carrying processed vetch or chickpea. (*Pakistan Journal of Nutrition* 8 (4): 408-413, 2009; *doi*: 10.3923/pjn.2009.408.413)

### **Effect of Gari Diet on Marker Enzymes of Mice Liver Mitochondria**

E.U. Ezeji, O. Obidua, I.G. Kalu and I.N. Nwachukwu

Male and female albino mice were fed on maize (control) and gari (a dried cassava product) based diets for 5 weeks. Liver mitochondrial fractions were assayed for succinate dehydrogenase and Cytochrome C oxidase activities. There was an overall reduction in the activity of the two enzymes studied throughout the experiment. The reduction in activity was pronounced in Cytochrome c oxidase.

Kinetic studies of succinate dehydrogenase showed an apparent increase in the Km of the gari fed animals-further supporting that inhibition took place. There was also a reduction in the mitochondrial respiratory control ratio (RCR) for the gari fed mice. The percentage reduction in RCR increased from 4.4% in the 2<sup>nd</sup> week to about 45% in the 5<sup>th</sup> week. (*Pakistan Journal of Nutrition* 8 (4): 414-418, 2009; *doi*: 10.3923/pjn.2009.414.418)

### **Complementary Feeding-A Challenge to Be Addressed in Rural Uttar Pradesh, India**

Aashima Garg and Ravinder Chadha

This study was planned to give education to children in primary education and their mothers through their children on breakfast and its importance and to determine the efficiency of this education method in Turkey. The schools were classified as groups of experiment and control. A questionnaire form was prepared in order to determine the nutrition levels of the students and their mothers and this form was applied as pre-test and post-test. The research was conducted on 31 students between ages of 11-13 and their mothers in two private primary schools. When education was given, education techniques such as research and discussion, illustrated explanation, role-playing, painting, poster design, lyrics writing and composing and poem-writing were enjoyed. Non-parametrical test of Wilcoxon Matched-Pairs Signed-Ranks Test and Independent-Samples t-test were also used. It has been determined in the outcome of the educational activities conducted that there is a significant difference ( $p < 0.05$ ,  $p < 0.001$ ) between the awareness levels of both children and their mothers about breakfast and its importance. The results of this study claim that both children and their families fail to comprehend the importance of breakfast sufficiently and also they need information on accurate usage of the time. (*Pakistan Journal of Nutrition* 8 (4): 419-424, 2009; *doi*: 10.3923/pjn.2009.419.424)

### **Eating Behaviors among Female Adolescents in Kuantan District, Pahang, Malaysia**

Chin, Y.S. and Mohd Nasir, M.T.

This study examined eating behaviors among female adolescents. A total of 407 female students aged between 13-19 years were randomly selected from two secondary schools in Kuantan district, Pahang, Malaysia. All participants were

required to complete a self-administered Eating Behaviors Questionnaire and their weight and height were measured by the researchers. A majority of the participants were Malays (65.3%), followed by Chinese (28.3%) and Indians (6.4%). There were 5.9% underweight participants, 75.4% were normal-weight and 18.7% were overweight. About one third (35.9%) never skipped any of the daily three meals, but another half (52.6%) skipped at least one meal a day and the remaining (11.5%) had even skipped all three meals in a day. The most frequently missed meals were breakfast (47.4%). Half (51.4%) snacked between meals daily and three in four (76.9%) had their meals with family members. No differences were found between the socio-demographic variables (age, household members, parent's total year of schooling, parental monthly income and living arrangement) and meal skipping behaviors. However, those who usually skipped meals were those who usually eat alone ( $\text{Chi}^2 = 16.933$ ,  $p < 0.0001$ ), overweight ( $\text{Chi}^2 = 15.943$ ,  $p < 0.05$ ) and were Malays ( $\text{Chi}^2 = 33.827$ ,  $p < 0.05$ ). In conclusion, meal skipping, snacking and practicing various weight loss behaviors were some of the unhealthy eating behaviors depicted among adolescent girls. Focusing on promotion of healthy eating that stresses on the importance of regular intakes of main meals during adolescence is crucial for their current and future health and well-being. (*Pakistan Journal of Nutrition* 8 (4): 425-432, 2009; doi: 10.3923/pjn.2009.425.432)

## **The Tensile Strength, Gelling Properties and Temperature Dependence of Solubility and Swelling Power of Five Legume Starches**

H.N. Ogungbenle

The tensile strength, gelling properties and the effect of temperature on solubility and swelling power of starches of guard seed, white melon, yellow melon, benniseed and bulma cotton seed have been investigated. The results showed that bulma cotton starch has the highest tensile strength with the value of  $0.081 \pm 0.02 \text{N/mm}^2$  while gourd seed has the lowest value of  $(0.015 \pm 0.001 \text{N/mm}^2)$ . Gourd starch has the best gell strength amongst the samples studied with value 4% w/v. Both the native and modified starches studied show remarkable increases in swelling power between 60-90°C. The oxidized starches is more soluble than the native starches due to weakening of the starch granules but also decrease swelling power of the starches studied. Acetylation of starches increases the swelling power and makes modified starches less soluble than the native starches. (*Pakistan Journal of Nutrition* 8 (4): 433-438, 2009; doi: 10.3923/pjn.2009.433.438)

## **Milk Adulteration by Adding Water and Starch at Khartoum State**

Ali Ahmad Hassabo Adam

This research investigates the Adulteration of marketable fresh milk adulterated with water and starch at Khartoum state . Also the research shows the incidence of the adulteration to the consumers in addition to the economical loss which may happen during the processing. Three hundreds samples from Khartoum, Omdurman and Bahri were collected. All samples were chemically examined and analyzed to observe their quality. Then EKO milk device was used to find whether there was starch added to the milk or not on the other hand. Lactometer was used for testing the density of the samples . Further more an oven under (105)<sup>o</sup> was used to detect the total solids of the samples. The lish meddall equation was used for that analysis. The research concluded that the adulteration at Khartoum state is due to addition of water( 35.3%) rather than Starch. The research recommended to control the marketing of milk by regulation and rules which include the standards of the sold milk. Distribution, nominations of the producer and the distributors, good labs and Skilled technician in order to control the quality then to save consumer health and economy. (*Pakistan Journal of Nutrition* 8 (4): 439-440, 2009; *doi*: 10.3923/pjn.2009.439.440)

## **Supplementation of Malate Level and Cassava Hay in High-Quality Feed Block on Ruminal Fermentation Efficiency and Digestibility of Nutrients in Lactating Dairy Cows**

Sittisak Khampa, Songsak Chumpawadee and Metha Wanapat

Four, lactating dairy cows were randomly assigned according to a 2x2 Factorial arrangement in a 4x4 Latin square design to study supplementation of malate level at 500 and 1,000 g and cassava hay in high-quality feed block. The treatments were as follows: T1 = supplementation of high-quality feed block without cassava hay + malate at 500 g; T2 = supplementation of high-quality feed block without cassava hay + malate at 1,000 g; T3 = supplementation of high-quality feed block with cassava hay + malate at 500 g; T4 = supplementation of high-quality feed block with cassava hay + malate at 1,000 g, respectively. The cows were offered the treatment concentrate at a ratio to milk yield at 1:2 and urea-treated rice straw was fed *ad libitum*. The results have revealed that rumen fermentation and blood metabolites were similar for all treatments. The populations of protozoa and fungal zoospores were significantly different as affected by malate level and cassava hay

supplementation. In conclusion, the combined use of cassava hay and malate at 1,000 g in high-quality feed block with concentrates containing high levels of cassava chip at 65% DM could highest improved rumen ecology and nutrients digestibility in lactating dairy cows. (*Pakistan Journal of Nutrition* 8 (4): 441-446, 2009; **doi**: 10.3923/pjn.2009.441.446)

### **Effects of Supplementation of Yeast-Malate Fermented Cassava Chip as a Replacement Concentrate on Rumen Fermentation Efficiency and Digestibility of Nutrients in Cattle**

Sittisak Khampa, Pala Chaowarat, Rungson Singhalert and Metha Wanapat

Ten, one year old male cattles with initial body weight of 150±10 kg were randomly divided into 2 groups and received concentrate at 14% CP (T1) and Yeast-Malate Fermented Cassava Chip (YMFCC) (T2). The cows were offered the treatment concentrate at 1 %BW and urea-treated rice straw was fed *ad libitum*. Means were compared using t-test. All animals were kept in individual pens and received free access to water. The results have revealed that replacement of YMFCC on feed intake was non-significantly different, while Average Daily Gain (ADG) and digestibility of nutrients were higher ( $p<0.05$ ) in cattle fed YMFCC (T2) treatments than received concentrate at 14% CP (T1) (235 and 203 g/d). In addition, the ruminal pH, ammonia-nitrogen and blood urea nitrogen concentration were significantly different ( $p<0.05$ ). The concentration of volatile fatty acid was significantly different especially the concentration of propionic acid was slightly higher in cattle receiving T2 than T1 (23.9 and 17.8 mol/100 mol). Supplementation of YMFCC (T2) could improve population of bacteria and fungal zoospore, but decreased populations of *Holotrich* and *Entodiniomorph* protozoa in rumen ( $p<0.05$ ). The results indicate that supplementation of Yeast-Malate Fermented Cassava Chip (YMFCC) as a replacement concentrate at 14% CP could improve rumen fermentation efficiency and digestibility of nutrients in cattle. (*Pakistan Journal of Nutrition* 8 (4): 447-451, 2009; **doi**: 10.3923/pjn.2009.447.451)

### **Reduction of Carbon Tetrachloride-Induced Rat Liver Injury by Coffee and Green Tea**

Shafaq Noori, Nayab Rehman, Madiha Qureshi and Tabassum Mahboob

Cirrhosis is one of the most degenerative, world wide diseases and can be lead to an inability of liver functions. Green Tea (GT) and Coffee are natural products and

considered as powerful antioxidant, chemoprotective, antiinflammatory and antitumorigenic agent. The present study was designed to investigate the protective effect of green tea and coffee against Carbon tetrachloride (CCl<sub>4</sub>)-induced liver cirrhosis by using biochemical and histopathological parameters. 24 Male Albino Wistar rats were randomly divided into 6 groups; each group consists of 4 rats. Group I comprises normal healthy rats remains untreated; Group II comprises of CCl<sub>4</sub> (0.8 mg/kg) induced Cirrhotic rats; Group III was administered coffee orally (1 gm/100 mL) daily; Group IV administered CCl<sub>4</sub> (0.8 mg/kg) intraperitoneally once a week for 8 weeks+ 1% oral administration of coffee; Group V was administered 5% Green tea orally; Group VI comprises of CCl<sub>4</sub> (0.8 mg/kg) intraperitoneally once a week for 8 weeks+ 5% oral administration of Green Tea. The volume of green tea and coffee ingested by rats of group III and V was measured daily. The effect of antioxidants on CCl<sub>4</sub>-induced liver cirrhosis were estimated by plasma ALT, ALP, total and direct bilirubin, tissue MDA, tissue SOD, tissue catalase. CCl<sub>4</sub>-induced cirrhosis is indicated by increased level of plasma ALT, direct bilirubin, tissue MDA and decreased level of tissue SOD. Pathological changes induced by CCl<sub>4</sub> were characterized by fibrotic scar tissue as well as regenerative nodules, the parenchyma deteriorates; the lobules are infiltrated with fat and structurally altered; dense perilobular connective tissue. Coffee and green tea reduced these changes and also restored antioxidant and liver enzymes. Our results showed the possible protective effect of coffee and green tea in association with liver and antioxidant enzymes, indicated that administration of coffee and green tea not only reversed the pathological effects of CCl<sub>4</sub> but also counteracted on deleterious effects of CCl<sub>4</sub>-induced liver injury. (*Pakistan Journal of Nutrition* 8 (4): 452-458, 2009; doi: 10.3923/pjn.2009.452.458)

### **Obtention of Enzymatically Hydrolyzed Product from Cactus (*Opuntia boldinghii* Britton and Rose) Cladodes Whole Flour**

C.A. Padron - Pereira, M.J. Moreno - Alvarez, C.A. Medina - Martinez and D.M. Garcia - Pantaleon

The objective of this work was to obtain an enzymatically hydrolyzed product from cactus cladodes whole flour (*Opuntia boldinghii* Britton and Rose). The whole flour was subjected to the action of the commercially prepared enzymes Pectinex® Ultra SP-L and Cellubrix® L (1:1 ratio). The experiments were carried out under fixed conditions of temperature of 50°C ± 1°C and with pH of 5.5±0.1 under continuous agitation at 150 rpm. The kinetic parameters: enzyme and substrate optimal concentration, reaction time, K<sub>M</sub>, V<sub>max</sub> and K<sub>3</sub> were established.

It was observed that the fibrous constituents in the hydrolyzed flour decreased ( $P < 0.05$ ) with the exception of the reducing sugars ( $P < 0.05$ ) which increased. The yield in sugars was 6.96% (w/w). It is presumed a non competitive inhibition caused by the mucilage and there was an evident synergism between the enzymes. The hydrolysis produced modifications of the functional properties of the flour. (*Pakistan Journal of Nutrition* 8 (4): 459-468, 2009; doi: 10.3923/pjn.2009.459.468)

### **Characterization of Tannin and Study of *in vitro* Protein Digestibility and Mineral Profile of Sudanese and Indian Sorghum Cultivars**

Amir Mahgoub Awadelkareem, G. Muralikrishna, A.H. EL Tinay and A.I. Mustafa

The study was conducted to investigate chemical composition, mineral profile, tannin content and effect of cooking on *in vitro* protein digestibility and separation and identification of free and bound phenolic acids of Sudanese sorghum cultivar (namely feterita) and Indian sorghum cultivar (namely CSH5). Chemical composition of the two sorghum cultivars was determined. Sudanese cultivar showed significantly ( $p \leq 0.05$ ) high moisture, ash, protein and fat while Indian cultivar was significantly higher ( $P \leq 0.05$ ) in fiber and carbohydrate contents. Copper, calcium, iron, phosphorus, potassium and sodium were determined for the two cultivars. Results revealed that, Sudanese cultivar was significantly higher ( $P \leq 0.05$ ) in copper, calcium, iron and sodium while Indian cultivar was significantly higher ( $P \leq 0.05$ ) in phosphorus and potassium content. Tannin content in Sudanese cultivar was significantly ( $P \leq 0.05$ ) higher compared to Indian cultivar. Effect of cooking on *in vitro* protein digestibility revealed that cooking significantly ( $P \leq 0.05$ ) reduced the *in vitro* protein digestibility of the two sorghum cultivars. The phenolic acids (PAs) as free and bound form content were separated and identified using high performance liquid chromatography (HPLC) for the two sorghum cultivars. Syringic, p-coumaric, ferulic acid were detected as free form of phenolic acids of Indian cultivar while gallic, protocatechuic, gentisic, caffeic, p-coumaric and ferulic acids were detected in free form of Sudanese cultivar. Gallic, protocatechuic, gentisic and p-coumaric were not detected in free form in Indian cultivar while syringic acid was not detected in Sudanese cultivar in free form. Indian cultivar contained high caffeic and ferulic acid in free form compared to Sudanese cultivar. Syringic, caffeic, p-coumaric and ferulic acids were detected in bound form in Indian cultivar while gallic, protocatechuic, caffeic, p-coumaric and ferulic acid were detected in bound form in Sudanese cultivar.



Gallic, protocatechuic and gentisic acids were not detected in free and bound form in Indian cultivar while p-coumaric acid was only detected in bound form in Indian cultivar. Syringic, caffeic, p-coumaric and ferulic acids content in bound form were high in Indian cultivar than Sudanese cultivar. Generally phenolic acids of the two cultivars exist mostly in bound form. (*Pakistan Journal of Nutrition* 8 (4): 469-476, 2009; doi: 10.3923/pjn.2009.469.476)

### **Chemical Composition of Faba Bean (*Vicia faba* L.) Genotypes under Various Water Regimes**

Salem S. Alghamdi

A set of thirteen faba bean genotypes were grown at three water regimes (13200, 7600 and 4800 m<sup>3</sup>/ha) severe, moderate and normal irrigation during the growing season of the crop, to examine the variability of seed chemical composition. The result showed that faba bean genotypes vary greatly in their chemical composition at various water regimes and proximate analysis showed that faba bean genotypes had low moisture contents that ranged from (7.09 - 7.59%). Carbohydrate contents were fairly high (42.4- 47.3%). The highest protein contents under water stress condition and normal irrigation was recorded for Kamlin (36.8 and 39.1%), while the lowest was observed in Sakh1 (35.2 and 37.5%), respectively. Simultaneously, the crude protein content in the seeds varied from 31.8% to 39.7% and consisted of 18 amino acids. Kamlin had the highest (117g/1000g protein) total essential amino acids while Giza<sub>402</sub> had the lowest (82.2 g/1000g protein). Methionine and cysteine were the limiting amino acids in the faba seeds. The Protein fraction varied among these genotypes, globulin was followed by glutelin, prolamin and albumin respectively. Evidence was found that protein content increased during water stress treatment. (*Pakistan Journal of Nutrition* 8 (4): 477-482, 2009; doi: 10.3923/pjn.2009.477.482)

### **Relationship Between Annual Rainfall Oscillations and Mohair Production in Lesotho Between 1935 and 1996**

J.W. Ng'ambi, D. Norris and C.A. Mbajjorgu

This study was conducted to determine trends in annual rainfall oscillations and mohair production in Lesotho between 1935 and 1996. An exponential regression equation of the form  $\text{Ln}Y = \text{Ln}A + bx$  was used to estimate trends. Between 1935 and 1965 Angora goat numbers, mohair production and mohair yield per goat increased ( $p < 0.01$ ) at annual rates of 1.1, 1.9 and 1.1%, respectively. During

years of independence (1966-1996) annual goat numbers remained, largely, stagnant ( $p>0.05$ ) at around one million animals. Mohair yield per goat declined ( $p<0.01$ ) at an annual rate of 1.2% to around 0.85 kg in 1996. Similarly, mohair production declined ( $p<0.01$ ) at an annual rate of 1.2% to 970,000 kg in 1996. A long-term (1935-1996) annual rainfall mean of 700 mm was calculated. There were recurrent wet (rainfall above long-term mean) and dry (rainfall below long-term mean) years. However, no clear alternate rainfall oscillations of wet and dry years were observed. It was, thus, difficult to predict years of drought (rainfall below long-term mean) from alternate annual rainfall oscillations. A positive but non-significant ( $p>0.05$ ) relationship between annual mohair yield per goat (kg) and rainfall (mm) was observed. Policy implications of the results on drought preparedness are discussed. (*Pakistan Journal of Nutrition* 8 (4): 483-486, 2009; doi: 10.3923/pjn.2009.483.486)

### **Improving the Quality of Tapioca by Product Through Fermentation by *Neurospora crassa* to Produce $\beta$ Carotene Rich Feed**

Nuraini, Sabrina and Suslina A. Latif

An experiment was conducted to improve the nutrient content of tapioca by product to produce  $\beta$  carotene rich feed as alternative poultry feed through fermentation by using carotenogenic fungi (*Neurospora crassa*) as inoculums. The experiment was determination of substrate composition (carbon source and nitrogen source) based on nutrient quality and quantity of these fermented products. The study was conducted in experimental methods, using the completely randomize design in factorial with 2 treatment were : 1. A factor, ( tapioca by product as carbon source with nitrogen sources: A 1 = tapioca by product+tofu waste, A 2 = tapioca by product + palm kernel cake and A 3 = tapioca by product + rice bran. 2. B factor (Percentage of composition of carbon source with nitrogen source), B 1 = 90% : 10%, B 2 = 80% : 20%, B 3 = 70% : 30% and 60% : 40%). Results of study showed that optimum substrate composition of the fermentation by *Neurospora crassa* was the mixture 60% tapioca by product with 40% tofu waste. This conditions can increase  $\beta$  carotene and crude protein and also decrease crude fiber which made the nutritional value of the product based on dry-substance was 295.16  $\mu\text{g/g}$ ,  $\beta$  carotene 20.44% crude protein, 2.75% crude fat, 11.96% crude fiber, 0.24% calcium, 0.17% phosphor, metabolic energy 2677 Kcal/kg, 67.05% nitrogen retention and 35.44% fiber digestion. (*Pakistan Journal of Nutrition* 8 (4): 487-490, 2009; doi: 10.3923/pjn.2009.487.490)

## **Use of Soy Bean Products as Cheap Sources of Protein in Child-Nutrition in Akpuoga Nike Community, in Enugu State South East, Nigeria**

Uchenna V. Okolie and Ijeoma O. Ehiemere

Protein-energy malnutrition among children is a global problem. It is more devastating in developing countries because of high poverty level among rural dwellers. Akpuoga Nike is a typical rural community where social amenities are lacking, commercial and income generation activities are very low. Majority of the people engage in subsistence farming and petty trading. Consequently they cannot afford animal protein due to its high cost. The aims of the study were to find out the use of soy bean products as source of protein for children under-five by mothers in Akpuoga Nike and also to determine their positive and negative attitudes towards the use in the nutrition of their children nutrition. Descriptive survey research design was used to carry out the study on 100 women of childbearing age attending Akpuoga Nike Health Centre. Researchers' developed interview guide and focus group discussion were instruments used for data collection. Sixty percent of the respondents fed their children with soy bean products while 40% had never used any. In their mean rating, the respondents agreed that soy bean products have positive features such as being cheap, nutritive and a good alternative source of animal protein. While the negative features identified were; not easy to prepare, foul odor/taste and abdominal upset and flatulence. Soy products provide excellent sources of disease busting antioxidants, B. vitamins (including folate) and iron. They remain good alternative sources of animal protein in child nutrition especially in poverty stricken rural communities and mothers should be counseled on their use in the nutrition of their children. (*Pakistan Journal of Nutrition* 8 (4): 491-494, 2009; doi: 10.3923/pjn.2009.491.494)

## **Marketing Manners of Milk Producing Units-A Case Study of the Purvanchal Region of Uttar Pradesh, India**

Bhupendra V. Singh, Guru Prasad Singh and Bhartendu Kr. Chaturvedi

Despite the fact that India is the largest producer of milk, the milk producing units are not economically viable. This is substantiated by the fact that usually milk producers do not grow wealthy as manufacturers do. The researches in the area, generally aim at breed improvement, feeding, milking, animal health care, etc. the economic aspect of researches generally evaluate cost and benefits. However, the failure lies in the milk marketing. The present paper endeavors to capture the

marketing manners of milk producing units of the Purvanchal region of Uttar Pradesh India based on a sample of size 280 drawn randomly from the region using a questionnaire. The questionnaire contained, besides general information such as yearly value of milk, number of animals and their diet, questions regarding marketing that included type of marketing. Order getting cost, product differentiations and differentiation cost, type of advertisement and cost and method of physical distribution and cost. It is found that there are miles to go in the direction of marketing. People are generally not aware of the fact that marketing can add to the performance. They have no marketing strategies. Marketing variables are playing negative role in determination of value of output. The significant variable that emerges in such determination is the quantity of output. (*Pakistan Journal of Nutrition* 8 (4): 495-499, 2009; doi: 10.3923/pjn.2009.495.499)

### **Effect of Food Intake on Weight Gain, Liver Weight and Composition in Rats Fed Dehulled African Yam Bean and Bambara Groundnut Supplemented with Sorghum or Crayfish**

J.U. Anyika, I.C. Obizoba and P. Ojmelukwe

Forty-eight adult Wistar albino male rats (75-128g) of age 8 weeks were used to study the effect of dehulled African yam bean (DYB) and dehulled soaked bambara groundnut combined with sorghum or crayfish on food intake, weight gain, liver weight and composition of rats fed for 10 days. Three out of the ten days were for adjustment and the rest for the balance period. Eight diets were formulated and fed to the rats. The mixed protein diets provided 10% protein daily for the entire study period. Casein (CA) served as a reference protein. Rats fed dehulled bambara groundnut brown (DBGB) and sorghum soaked for 18 hours ( $S_{18}$ ) had the least food intake, weight gain, liver weight and liver nitrogen (N). Dehulled African yam bean (DYB) supplemented with sorghum soaked for 18 hours ( $S_{18}$ ) had the highest liver lipids which was significantly higher ( $P < 0.05$ ) than those of the other test groups and control (Casein). DYB: $S_{18}$  also has the least liver moisture which was significantly lower ( $P < 0.05$ ) than those of the other test groups and casein. Addition of crayfish (CR) to soaked brown bambara groundnut (SBGB) and sorghum soaked for 24 hours ( $S_{24}$ ) produced significant increase ( $P < 0.05$ ) in liver N (183.7g) but a significant decrease in liver lipids (3.2g). As judged by liver nutriture, SBGB: $S_{24}$ : CR appears to be a better supplement than the test groups and control. This result suggested that different cultivars, varietal difference and treatment affected food intake, weight gain, liver weight and composition of rats fed dehulled African yam bean (DYB) and bambara groundnut supplemented with sorghum and/or crayfish. (*Pakistan Journal of Nutrition* 8 (4): 500-504, 2009; doi: 10.3923/pjn.2009.500.504)