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Chemical and Microbiological Evaluation of Plain and Fruit Yoghurt in Khartoum State, Sudan

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This study was conducted to evaluate the quality of yoghurt supplied to consumers from retail outlets in Khartoum State. Yoghurt samples (144 samples), which represent three different manufacturers (A, B and C) beside traditional producers (T) were collected. The samples included 96 plain yoghurt samples and 48 fruit yoghurt samples. All yoghurt samples were analyzed for chemical parameters (total solids, SNF, fat, protein, ash %, titratable acidity and pH) and the microbiological tests (total bacterial count, coliform count and the yeast and molds count). The means for total solids %, solids non-fat (SNF), fat, protein, ash % and pH for the plain yoghurt samples were 14.04 ± 1.83 , 10.86 ± 1.53 , 3.18 ± 1.01 , 3.44 ± 0.58 , 0.678 ± 0.146 and 4.62 ± 0.10 , respectively. Whereas for the fruit yoghurt samples the means were 21.70 ± 1.34 , 19.70 ± 1.27 , 2.00 ± 0.62 , 3.90 ± 0.50 , 0.661 ± 0.087 and 4.68 ± 0.12 , respectively. The means of microbiological measurements for the plain yoghurt samples were $\log 9.10 \pm 9.86$, $\log 4.03 \pm 4.41$ and $\log 4.09 \pm 4.57$ for the total bacterial count, coliform count and yeast and molds count, respectively. Whereas in the fruit yoghurt samples the means were $\log 8.63 \pm 9.99$, $\log 3.59 \pm 4.15$ and $\log 3.15 \pm 3.64$, respectively. Results obtained revealed significant variations ($p \leq 0.001$) between samples obtained from different manufacturers in their chemical composition. One hundred and thirty eight of collected samples (96.5%) were found satisfying the international standard for solids non-fat content, however, 73 yoghurt samples (50.7%) were found to have a lower fat content than the standard. In the microbiological parameters tested, the total bacterial count and yeast and molds count were not significantly different between different manufacturers. The coliform count of samples varied significantly ($p \leq 0.001$) between manufacturers and with a significance higher ($p \leq 0.05$) coliform count in samples collected from traditional manufacturers than that collected from modern manufacturers. (*International Journal of Dairy Science* 4 (1): 1-7, 2009; doi: 10.3923/ijds.2009.1.7)

Suitability of a Moisture Distribution Assay to Assess the Microbial Stability of Butter Produced at a Small Scale

Leen Van Campenhout, Sophie Schittecat, Sofie Vandewijngaarden and Johan Claes

In this study, the suitability of a moisture indicator paper technique was investigated as a fast and readily performable tool to determine the stability of farm

butter. Moisture distribution patterns along with Enterobacteriaceae and fungal counts were monitored during storage of butter produced from raw cream at a dairy farm. The same was done for butter produced from pasteurized cream under very hygienic conditions at a research institute. In dairy science and industry it is generally recognised that a fine and homogeneous distribution of moisture in butter limits microbial growth during storage. It was demonstrated, however, that the relation between moisture patterns and microbial counts during storage is not unequivocal for butter produced at a small scale. It was concluded that the hygiene conditions prevailing during butter production interfere with a relation which is usually considered as a universal principle. (*International Journal of Dairy Science* 4 (1): 8-18, 2009; doi: 10.3923/ijds.2009.8.18)

Comparison of Cervical and Uterine Cytology Between Different Classification of Postpartum Endometritis and Bacterial Isolates in Holstein Dairy Cows

M. Yavari, M. Haghighi, M.R. Ahmadi, H.R. Gheisari and S. Nazifi

The aim of this study was to compare cervical and uterine cytology of the postpartum endometritis and bacterial isolate groups in Holstein dairy cows. Four hundred two postpartum dairy cows from 13 commercial dairy herds were examined once between 21 and 35 days postpartum and 86 Holstein cows with postpartum endometritis were sampled. Endometritis was diagnosed by external observation, rectal palpation, vaginal exam, ultrasonography and cervical and uterine cytological examinations. Bacterial swabs were collected using a transcervical double-guarded swab. In total, cows were classified by clinical signs severity, ovarian status and bacterial culture results. The neutrophil percentage in cervical mucosa and uterine fluid of the cows affected by *Arcanobacterium pyogenes* and clinical signs of purulent discharge (E3) were significantly ($p < 0.05$) higher than other groups. The large vacuolated epithelial cells percentage in cervical mucosa were higher significantly ($p < 0.05$) than that percentage in uterine fluid. The result of this study couldn't show any significant differences between neutrophils percentages of cervical mucosa and uterine fluid smear in cows with three classifications. Therefore, cervical sample is practical and applicable in all commercial herds. In conclusion, the cytological evaluation of cervical smear at fresh cows is suitable for diagnosis of subclinical endometritis, planning for treatment and prognosis of fertility after voluntary waiting period of dairy cows. (*International Journal of Dairy Science* 4 (1): 19-26, 2009; doi: 10.3923/ijds.2009.19.26)

Evaluation of Goat Milk Containing Galactooligosaccharides After Supplementing the Ration with Amino Acids

Mervat I. Foda, S.M. Kholif and A.M. Kholif

The aim of this study was to evaluate the effect of supplementing goat's ration with different forms of lysine and methionine on milk production, its chemical composition and consumer's acceptability. To maximize goat milk benefits, different concentration of β -D-galactosidase were used to form galactooligosaccharides after supplementing the ration with lysine and methionine in protected and unprotected forms. Milk acceptability and its chemical composition were evaluated compared to control samples. The results showed that milk fat, lactose, total protein and milk yield were increased by adding the amino acids in both different forms. Organoleptic evaluation indicated significant increase in taste and overall acceptability of goat milk containing higher concentration of galactooligosaccharides. Also, supplementing goat ration with these amino acids should be recommended to increase milk production and its contents. Formation of galactooligosaccharides in goat milk could be recommended to decrease most of infant's allergy and diseases. (*International Journal of Dairy Science* 4 (1): 27-33, 2009; *doi*: 10.3923/ijds.2009.27.33)

Aflatoxin Transfer from Naturally Contaminated Feed to Milk of Dairy Cows and the Efficacy of a Mycotoxin Deactivating Product

Amedeo Pietri, Terenzio Bertuzzi, Gianfranco Piva, Eva Maria Binder,

This study reports the results of an experiment, testing the aflatoxin B₁ (AfB₁) carry-over from naturally contaminated feed to the dairy cows' milk in the absence and in the presence of a mycotoxin deactivating product-Mycofix® Plus (MPL). The study was carried out using 18 healthy animals divided into 3 homogeneous groups of 6 animals each. The experimental design was a 3×3 Latin square with three periods of 7 days each without washout periods. The treatments were: (1) control diet without MPL (CTR); (2) control diet with 20 g/cow/day of MPL (T₁) and (3) control diet with 50 g/cow/day of MPL (T₂). The diet was a Total Mixed Ration (TMR) and 1 kg of a naturally contaminated maize meal (AfB₁ = 91.7±4.4 $\mu\text{g kg}^{-1}$) was included in the diet of each cow. Each animal ingested daily 97.3 $\mu\text{g kg}^{-1}$ AfB₁ since the analysis of the TMR before inclusion of the

contaminated maize revealed however the presence of $0.24 \mu\text{g kg}^{-1}$ DM of AfB_1 , corresponding to $5.6 \mu\text{g}$ per cow per day. In T_1 and T_2 diets, MPL was mixed with the contaminated maize meal. Feed intake and individual daily milk production were recorded during the study. Morning and evening milk samples from each cow were collected on day seven of each week. Samples derived from individual cows were mixed in proportion to the morning and evening milk production and then again combined in proportion to the daily milk production of each cow to constitute a representative bulk milk sample of each group; these samples were analyzed to determine the aflatoxin M_1 (AfM_1) content. The addition of MPL did not influence feed intake and milk production. The addition of MPL to the diet reduced significantly ($p < 0.01$) the milk AfM_1 content from $0.120 \mu\text{g kg}^{-1}$ (CTR group) to $0.083 \mu\text{g kg}^{-1}$ (-31%, T_1 group) and $0.072 \mu\text{g kg}^{-1}$ (-41%, T_2 group). (*International Journal of Dairy Science* 4 (2): 34-42, 2009; doi: 10.3923/ijds.2009.34.42)

Effects of Partial Replacement of Berseem Hay by Corn Stalk with or without Calcium Salts of Fish Oil on Rumen Fermentation, Productive and Reproductive Performance of Early Lactating Cows

M.A. El-Khalek Soltan and S.A. EL-Aziz AL-Shami

Ninety early lactating Holstein dairy cows were assigned among 6 groups (15 each) to investigate the effect of dietary partial replacement of Berseem Hay (BH) by Corn Stalk (CS) with or without Calcium Salts of Fish Oil (CaSFO) supplementation on ruminal fermentation characteristics, productive and reproductive performance as well as on some blood serum parameters from 1st week after calving through 12 weeks postpartum. Three experimental diets were formulated without or with CaSFO supplementation to be fed to 6 cows groups (15 per each). Cows fed on 10 or 20% of CS diets loss more body weight, suffering from more negative energy balance and eat less dry matter than control, however, milk-to-feed ratio improved by about 2.5 and 3.8%, respectively compared with control. On the other hand CaSFO supplementation reduced body weight loss, improved feed intake, lessened the negative energy balance and slightly improved milk-to-feed ratio by about 1.3, 0.0 and 0.6%. CS significantly affect ruminal fermentation by production more propionate and less acetate compared with control while, fat supplementation had no significant effect on the rumen fermentation characteristics. CS (10 or 20%) feeding reduced milk

production across the experiment by about 1.9 and 5.6%, respectively when compared with control, while milk production improved with fat supplementation. However, either CS or CaSFO supplementation had no significant effect on milk composition. Moreover, CS feeding had no effect ($p > 0.05$) on serum glucose and non-esterified fatty acids at 8th or 12th week postpartum. While CaSFO increased ($p > 0.05$) serum glucose concentration and mostly non significantly reduced NEFA concentration. Also, CS had no effect on the reproductive performance and fat supplementation showed a trend toward improving reproductive performance as indicated by increased percentage of pregnant cows in the first 28 days of breeding. It could be concluded that CS inclusion up to 20% with CaSFO supplementation (11 g kg^{-1} diet) may offer a potential management practice to improve productive and reproductive performance in dairy cattle. (*International Journal of Dairy Science* 4 (2): 43-56, 2009; doi: 10.3923/ijds.2009.43.56)

Weather Effect on Bacterial Mastitis in Dairy Cows

M.S. Shathele

The study was carried out to determine the effect of seasons on bacterial mastitis in dairy cows. Three years health data from A and M Dairy Farm was analyzed to provide baseline information on the incidence and seasonal pattern of mastitis. Mean annual incidence of clinical mastitis at A and M dairy Farm was 16.5%. A clear pattern of higher incidence of mastitis was observed when the ambient temperature was less than 21°C in cold months during the whole study period (3 years) at A and M dairy Farm. In another study, milk samples of new case of mastitis from A and M dairy were examined for the presence of bacteria. The annual incidence of mastitis at the J. B. Dairy Farm was 14.4%. The annual pattern of incidence of mastitis in relation to ambient temperature was similar to that observed at A and M dairy Farm. Environmental and contagious mastitis pathogens were identified in 43.3% of the clinical mastitis cases and the coliform mastitis accounted for 21.1% of the clinical cases at J.B. Dairy Farm. However, out of 90 new cases of mastitis considered at the J.B. Dairy, 21.1% were infected with coliform bacteria, 12.2% with *S. haemolyticus*, 11.1% due to *C. bovis*, 10.0% with *S. aqalactiae* and 45.5% with other isolates. In conclusion, the coliform bacteria were the main cause of bacterial mastitis with higher incidence during the cold months. (*International Journal of Dairy Science* 4 (2): 57-66, 2009; doi: 10.3923/ijds.2009.57.66)

Assessment of Freeze-Dried Hydrodistilled Extracts from Clove; Caraway and Coriander Herbs as Natural Preservatives for Butter Oil

Hanaa F.M. Ali

Antioxidant activities of Freeze-Dried Hydrodistilled (FDH) extract of three herbs; clove, (*Syzygium aromaticum* L.); caraway (*Carum carvil* L.) and coriander (*Coriandrum satvium* L.) was evaluated *in vitro* by iron reduction; iron chelation and inhibition of lipid peroxidation methods. Also, total phenols content and the extraction yield was determined. Furthermore, simple model of butter oil was designed for evaluate the produced extracts as natural preservatives. Acid value, peroxide value and thiobarbituric acid (TBA) test were determined for oxidation system of butter oil. Antioxidant activity of clove FDH extract was significantly higher than caraway and coriander extracts when evaluated in iron reduction; iron chelation and inhibition of lipid peroxidation methods. Based on acid value, peroxide value and thiobarbituric acid test, different FDH extracts exhibited antioxidant effect specially at rate of 400 ppm from individual extracts with order of clove>coriander>caraway. Also, different correlation relationships were recorded in present study. (*International Journal of Dairy Science* 4 (2): 67-73, 2009; *doi*: 10.3923/ijds.2009.67.73)

A Study on Some Factors Affecting Mortality Rates in Sudanese Nubian Kids

Kamal El-Hassan El-Abid and A.M.A. Abu Nikhaila

This study was conducted under natural range conditions at a semi-arid region of Sudan (Abu Deleig), during 1998 B 2000. One hundred and eighteen Sudanese Nubian kids, of both sexes were allowed to suckle freely colostrum for the first three days following parturition. Thereafter, they were allowed to suckle all the morning milk and half of the evening milk, for three months and then weaned. The incidence of death among the kids, were closely monitored and related to a number of factors: including type of birth, sex of kid, birth weight, dam parity order, season of kidding and age of kid. The results revealed that the abortion, pre-weaning and overall kid mortality rates were 21.2, 15.2 and 36.4%, respectively. Type of birth, sex of kid, birth weight of kid, parity order, season of kidding and age of the kid significantly affect kid mortality rates. The study indicated that, by instituting adequate management improvement action in addition to selection for larger kids at birth, the productivity of goat could be improved.

(International Journal of Dairy Science 4 (2): 74-79, 2009; doi: 10.3923/ijds.2009.74.79)

Chemical, Microbial Counts and Evaluation of Biogenic Amines During the Ripening of Egyptian Soft Domiati Cheese Made from Raw and Pasteurized Buffaloes Milk

Rafaat M. Elsanhoty, H. Mahrous and Ghanaimy A. Ghanaimy

This study was conducted to compare the usage of raw, pasteurized and pasteurized buffalo milk with starter culture in the manufacture of Egyptian soft Domiati cheese. In addition, evaluate the chemical, microbial characterization and evaluation of biogenic amines throughout the ripening. The physical and chemical properties of the manufactured cheese were different. Soluble nitrogen, salt as well as pH values were higher in raw milk cheese in comparison with pasteurized milk cheese and pasteurized milk cheese with starter culture. Considerable changes had occurred in raw milk cheese during the storage period more than these with pasteurized milk cheese and pasteurized milk cheese with starter culture. Cheese made from raw milk showed higher microbial counts during ripening than those made from pasteurized milk. Raw milk cheese showed remarkably higher biogenic amines compared with pasteurized milk cheeses. Therefore, pasteurization of milk led to a decrease in final biogenic amine content of cheese as a result of the reduction of its microbial population. The obtained results suggest that, pasteurization greatly improves the keeping quality of soft Domiati cheese and increase its shelf life and decrease the formation of biogenic amines. *(International Journal of Dairy Science 4 (2): 80-90, 2009; doi: 10.3923/ijds.2009.80.90)*

Evaluation the Degree of Whey Protein Concentrate 80 Hydrolysis on the Health Benefits Amino Acids Content Need of the Human Body

A.S. Gad and A.F. Sayed

Whey protein concentrate (WPC 80) was modified by partial hydrolysis with Protamex to 5, 10, 15 and 20% degree of hydrolysis (DH). Whey protein concentrate 80 and its hydrolysates were analyzed, compared to FAO/WHO/UNU amino acid requirement pattern based on amino acid requirements of preschool-age child. The enzymatic hydrolysis of WPC 80 leads to numerous alterations in protein functional characteristics, like changes in

solubility. The pH-protein solubility profiles of WPC 80 and its hydrolysates were used to determine protein solubility. A modified method of AOAC was used to determine Cysteine, Branched-Chain Amino Acids (BCAA) and Tryptophan at various degree of hydrolysis. Results showed that modified whey protein concentrate by partial hydrolysis degree at 15% were highly solubility and the global amino acids determined in an optimal content that makes them appropriate for food formulations as a source of health benefits amino acids. (*International Journal of Dairy Science* 4 (3): 91-99, 2009; doi: 10.3923/ijds.2009.91.99)

Prevalence and Significance of *Staphylococcus aureus* and Enterobacteriaceae species in Selected Dairy Products and Handlers

H.M. Fadel and Jehan Ismail

Some of the Egyptian dairy products are made by traditional methods. This makes them suitable media for multiplication of foodborne pathogens. So, this study aims to assess the microbial quality of selected dairy products prevalent in Ismailia City, the personal hygiene of dairy handlers and the potential hazards to consumers. A total of 120 Ras cheese, Kareish cheese and ice cream samples were collected randomly from different localities in Ismailia city. In addition, 40 nasal and hand swab samples were collected from some dairy workers. All samples were examined for presence of *Staphylococcus aureus* (on Baird Parker agar medium) and Enterobacteriaceae sp. (on Violet Red Bile Glucose agar medium). Molecular typing of *S. aureus* was performed using PCR Assay. The prevalence and significance of *Staphylococcus aureus* and Enterobacteriaceae species in Ras cheese, Kareish cheese and ice cream samples and in swabs of dairy handlers in Ismailia city were studied. The results of this study revealed out that the mean values of *S. aureus* counts (\log_{10} cfu g^{-1}) in Ras cheese was 5.54, in Kareish cheese was 5.59 and in ice cream samples was 4.07. Meanwhile, the mean values of Enterobacteriaceae sp. counts (\log_{10} cfu g^{-1}) in Ras cheese was 2.48, in Kareish cheese was 6.78 and in ice cream was 1.11. Salmonella could not be recovered in the examined dairy products. *Staphylococcus aureus* was isolated from 60 and 70% of dairy handlers hand's and nasal swab samples, respectively. Only one *Salmonella* strain was recovered from a dairy handler swab. Overall, the recovered *E. coli* serotypes from all the examined samples were O15:H11, O22:H5, O25: NM, O26:H11, O86:H34, O91:H10, O113:H21, O114:H2, O119:H6, O124:H7, O128:H2, O127:NM and O145:NM. In conclusion,

the isolated serotypes constitute public health hazards to consumers. (*International Journal of Dairy Science* 4 (3): 100-108, 2009; *doi: 10.3923/ijds.2009.100.108*)

Evaluation of Vaccination with *Brucella abortus* RB51 Strain in Herds Naturally Infected with Brucellosis in Productive Systems Found in Tropical Climate

A. Peniche Cardeña, D. Martínez Herrera, J.L. Franco Zamora, F. Barradas Piña, B. Molina Sánchez, E.J. Gutiérrez Ruíz, J.J. Williams, F. Morales Alvarez and R. Flores Castro

In this study, the efficacy of vaccination with *Brucella abortus* RB51 strain as a measure for bovine brucellosis control was evaluated by a clinical assay in double purpose cattle that are naturally infected under tropical conditions. A herd with eight reactors to rivanol test with an initial serum reaction of 5% was selected. Confirmation of infected herd was carried out by isolation and identification of *Brucella abortus* from reactor animals, using bacteriological procedures. Also, the milk samples were analyzed by PCR technique whereby *Brucella abortus* infection was corroborated. Vaccinated and non-vaccinated groups were formed with 88 females each. Reactors were not eliminated nor segregated from the population. During 18 months of monitoring three new cases happened in the vaccinated group and therefore the initial serum reaction rate increased from 10 to 12.5%. The rate of vaccinated group remained at 0% due to 100% of protective efficacy that RB51 strain provided to the total vaccinated population (RR = 0; C.I. 95% 0-0). The conclusion is that under extensive double purpose livestock rearing conditions tropical climate, strain RB51 is a biological product efficacious for brucellosis control in infected herds with a prevalence of 6%. (*International Journal of Dairy Science* 4 (3): 109-116, 2009; *doi: 10.3923/ijds.2009.109.116*)

Prevalence and Current Antibiogram Trend of Mastitic Agents in Udgir and its Visinity, Maharashtra State, India

Sudhakar P. Awandkar, Narendra V. Khode, Vikas M. Sardar and Mangesh S. Mendhe

The study was carried out to investigate the current antibiogram status of clinical mastitis among bovines in and around Udgir. The prevalence of mastitis was assessed by the results of bacteriological evaluation of milk samples collected from

clinical mastitis cases. A total of hundred clinical cases of mastitis were studied for isolation followed by antibiotic sensitivity test. The major prevalent pathogens isolated were *Staphylococcus aureus*, *Escherichia coli* and *Candida*. Antibiogram studies indicated that ciprofloxacin was the most effective antibiotic followed by gentamicin, enrofloxacin, chloramphenicol and cephalexin. The least effective antibiotics include cloxacillin followed by ampicillin, streptomycin, oxytetracycline, amoxicillin, doxycycline and ceftiofur. It was concluded that microbiological and antibiogram studies are necessary for treatment and control of bacterial mastitis. (*International Journal of Dairy Science* 4 (3): 117-122, 2009; doi: 10.3923/ijds.2009.117.122)

Association of BoLA-DRB3.2 Alleles with Resistance and Susceptibility to Persistent Lymphocytosis in BLV Infected Cattle in Argentina

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The objective of this preliminary study was to describe alleles of bovine major histocompatibility complex class II BoLA-DRB3.2 gene associated with resistance and susceptibility to Persistent Lymphocytosis (PL) in *Bovine leukaemia virus* (BLV) infected cattle, to set a direction for the future studies. A total of 81 dairy cattle in Argentina were investigated for the distribution of BoLA-DRB3.2 alleles. The study cattle were categorized into 3 groups as follows: Category PL⁺ (BLV seropositive with PL); Category PL⁻ (BLV seropositive without PL) and Category BLV⁻ (BLV seronegative). The alleles were identified by polymerase chain reaction with subsequent analysis of restriction fragment length polymorphism. The association between the BoLA-DRB3.2 alleles and the PL⁺ and PL⁻ categories was determined as the odds ratio. Some alleles BoLA-DRB3.2 mediating (1) resistance and (2) susceptibility to PL were observed, respectively. A stochastic model including Shannon's diversity index calculation was run based on Markov-Chain Monte Carlo simulation method. The Shannon's diversity indices in each of the cattle categories indicated that the richness of gene diversity decreased as leading to a clinical stage of BLV. This relates to the existence of alleles mediating resistance and susceptibility to PL. The stochastic prediction with inclusion of uncertainty is important which can serve as a future study beacon. (*International Journal of Dairy Science* 4 (3): 123-128, 2009; doi: 10.3923/ijds.2009.123.128)

Study of Manufacture and Shelf-Life of Indian Dietetic and Diabetic *Rosogolla*

R.S. Chavan, P.S. Prajapati, S.R. Chavan and C.D. Khedkar

Dietetic and diabetic *Rosogolla* was manufactured by using low-fat cow milk. Twelve different combinations viz., type of chhana, cooking medium (double refined cane sugar syrup and sorbitol solution) and two different concentrations (40° and 50° Brix). All of the experimental samples and control samples were then analyzed for physico-chemical, textural and sensory properties. A 40° Brix concentration irrespective of the type of cooking medium was preferred to give a highly acceptable *Rosogolla*. The average composition of dietetic and diabetic *Rosogolla* is, moisture-49.83 and 52.20%, fat-4.66 and 4.46%, protein-11.85 and 12.78%, sucrose/sorbitol-32.41 and 29.66% and ash-0.90 and 0.89%, respectively. The hot *Rosogolla* of both types were packed in polyethylene terephthalate (PET) jars and stored for 40 days and 6 days at refrigerated (7±2°C) and room (26±2°C) temperature respectively. During storage pH of dietetic, diabetic and control *Rosogolla*, decreased, while free fatty acids, 5-hydroxy methyl furfural and soluble nitrogen content increased with the advancement of the storage irrespective of the storage temperature. Total viable count and yeast and mould count increased slowly in the samples stored at 7±2°C, but very sharply when stored at 26±2°C. Coliform count in both temperatures was observed to be zero. (*International Journal of Dairy Science* 4 (4): 129-141, 2009; doi: 10.3923/ijds.2009.129.141)

Evaluation of Vaccination with *Brucella abortus* S19 Vaccine in Cattle Naturally Infected with Brucellosis in Productive Systems Found in the Mexican Tropic

A. Peniche Cardeña, D. Martínez Herrera, J.L. Franco Zamora, F. Barradas Piña, B. Molina Sánchez, E.J. Gutiérrez Ruíz, J.J. Williams, F. Morales Alvarez and R. Flores Castro

Efficacy of vaccination with *Brucella abortus* S19 vaccine as control measure against bovine brucellosis has been controversial; therefore, it is necessary to know the efficacy of this vaccine under different field conditions. In this study, a clinical assay was performed to establish the efficacy of this vaccine on double purpose cattle. Two groups of one hundred animals each were formed. Infected cattle were not eliminated or segregated. One herd was identified as infected, with

four animal reactors to Card Test (CT) and confirmed by Rivanol Test (RT) with a serum reaction rate of 1.2%. Confirmation of infected herd was carried out by isolation and identification of *Brucella abortus* colonies and PCR on milk samples from RT reactor animals. In 18 months, the number of infected animals increased to eight females, seven within the non-vaccinated group and one in the vaccinated group for a serum reaction rate in the non-vaccinated group of 5.8% and the vaccinated one of 0.8%. Thus, in this period the accumulated serum reaction rate for both groups was increased from 1.2 to 3%. Vaccination efficacy of strain S19 was 86% and the risk of getting the disease in these animals was very low (RR = 0.112; I.C._{.95%} 0.014-0.887). It is concluded that strain S19 vaccine is efficacious in the control of brucellosis in herds with a 3% prevalence of the disease; yet, before its use, interference of diagnosis problems that are produced should be assessed to properly evaluate economics and vaccination efficiency. (*International Journal of Dairy Science* 4 (4): 142-151, 2009; doi: 10.3923/ijds.2009.142.151)

A Study on Some Non-Genetic Factors and their Impact on Some Reproductive Traits of Sudanese Nubian Goats

K. El-Hassan, El-Abid and A.M.A. Abu Nikhaila

The objective of the current study was to estimate reproductive parameters of Sudanese Nubian goat under extensive management system. The data of eighty-six parities of Sudanese Nubian goats were used; the parities occurred during the period from October 1998 to August 2000, to a parent stock raised on traditional pastoralism. These parities were used in completely randomized design to investigate the effects of grazing supplementation, season of kidding and parity order on the pattern of recurring estrous cycles during the year, gestation length, service period, kidding interval and kidding rate. The results indicated non seasonal pattern of ovarian cyclicity, the gestation length averaged 148.57±3.60 days. Nutritional supplementation, season of kidding and parity order had non-significant effect on gestation length. The service period averaged 148.29±62.38 days. Nutritional supplementation and season of kidding exerted a significant (p<0.05) effect on service period. However, the parity order had a non-significant effect on service period. The average kidding interval was 278.05±75.19 days. Nutritional supplementation, season of kidding and parity order had non-significant effect on kidding interval. Litter size was 1.12±0.36 kids. Nutritional supplementation, season of kidding and parity order had non-significant effect on litter size. (*International Journal of Dairy Science* 4 (4): 152-158, 2009; doi: 10.3923/ijds.2009.152.158)

Diversity and New Records of Coleopteran Water Beetles (Dytiscidae, Hydrophilidae) in Kenyir Water Catchment of Terengganu, Malaysia

Fauziah Abdullah

A survey on coleopteran water beetles were conducted at Teluk Bewah and Sungai Cicir in Kenyir water catchment revealed the presence of only 4 species in total. These are *Lacconeatus* sp. 1, *Lacconeatus* sp. 2, one unidentified species under the family Dytiscidae and *Hydroratus* sp. under family Hydrophilidae. All the members are new records for Tasek Kenyir. The low abundance (Margalef Index; 1.820) and low diversity value (Simpson Diversity Index; 0.098) of the water beetles implies that the ecosystem is under stress. More samplings of the water beetle from the Kenyir water catchment is needed to elucidate actual species range and biodiversity. (*International Journal of Zoological Research* 5 (1): 1-8, 2009; **doi:** 10.3923/ijzr.2009.1.8)

Mangrove Spiders (Araneae) of Peninsular Malaysia

Y. Norma-Rashid, N.A. Rahman and D. Li

This study examines the diversity and distribution of spiders in the mangrove areas in Peninsular Malaysia which is hoped to contribute towards understanding the dynamics of the mangrove ecosystem. Little research has been done on local spiders and inventory from this habitat is rare. From faunal samples taken along transects from upper to lower zones of Morib mangrove forest and studies on available museum specimens in the Raffles Museum of Biodiversity Research (RMBR), yielded 26 species belonging to 10 family groups. There exist 4 species as new records for Malaysia which are *Clubiona meraukensis*, *Dolomedes mizhoanus*, *Pardosa zhanjiangensis* and *Telamonia dimidiata*. The jumpers or family Salticidae has an overall wide distribution across all zones sampled. Generally, the spider distribution depended on the zone location and floral diversity. Spider zonation pattern is probably influenced by complex factor combinations rather than one factor which include biotic relationships such as competition and predation. (*International Journal of Zoological Research* 5 (1): 9-15, 2009; **doi:** 10.3923/ijzr.2009.9.15)

Integration of Two Newly Formed Couples of *Canis lupus baileyi* at Two Zoos in Mexico

Isabel Escobar-Ibarra, Lilian Mayagoitia, Ramiro Ramírez-Necoechea, Daniel Mota-Rojas and María Alonso-Spilsbury

The study was done to determine when social integration occurs in newly formed Mexican gray wolf couples. Two wolf pairs, at Zacango Zoo (ZZ) and Leon Zoo (LZ) respectively, were observed daily from the time they were put together until 15 days after the breeding season was over. Social behavior frequencies were split out in five periods: Anterior, Previous, During, After and Posterior to the breeding season. The Binomial test was used to analyze the social interactions between the pairs and the differences between genders. During the reproductive season both couples showed a significant increase in neutral behaviors-mainly by the females, all disappearing in the After period. In both groups, males were on the defensive and playful behavior, aggressive behavior was displayed almost exclusively by the bitches. Again, this last behaviour decreased in the After-breeding period. In conclusion, neither playful nor aggressive behavior observed indicate that wolves had socially integrated, since as in neutral interactions, these behaviors were only shown During the reproductive season and then disappeared afterwards. (*International Journal of Zoological Research* 5 (1): 16-26, 2009; doi: 10.3923/ijzr.2009.16.26)

Insectivorous Birds and Environmental Factors Across an Edge-Interior Gradient in Tropical Rainforest of Malaysia

Hossein Varasteh Moradi, Mohammed Zakaria, Abdullah B. Mohd, Ebil Yusof

The study objectives were to test: (1) the effects of the edge-interior gradient on under storey insectivorous bird abundance, density and diversity; (2) effects of environmental variables along an edge-interior gradient at population level (i.e., on each sub-guilds and species abundance); (3) possible effects of environmental structure along an edge-interior gradient at community level (i.e., species richness, diversity and total abundance). Fifteen hundred and four birds belonging to 49 species were recorded. Species composition differed along the edge-interior gradient at the guild and species level. The composition of insectivorous birds was correlated with the latter measured environmental variables. Based on bird-habitat associations along the edge-interior gradient, two groups were distinguished. Arboreal foliage gleaning insectivores were positively correlated with ground cover, light intensity, shrub cover and percent of shrub cover between 0.5 and

2 m high. While terrestrial insectivores, were sensitive to the forest edge and could indicate the quality of forest interior habitats associated with high humidity, dense canopy cover and deep litter depth. Forest remnants in the lowlands of Peninsular Malaysia that have a deep leaf litter layer, a dense canopy cover and high relative humidity are able to support insectivorous species that are sensitive to edge effects. As such these forests have important conservation value. (*International Journal of Zoological Research* 5 (1): 27-41, 2009; **doi:** 10.3923/ijzr.2009.27.41)

Anti-hyperglycemic, Immunomodulatory and Anti-oxidant Efficacy of Vasoactive Intestinal Peptide in Streptozotocin-Induced Diabetic Mice

O.M. Ahmed

The purpose of this study was to assess the effects of vasoactive intestinal peptide (VIP) administration on the glycemic state, insulin secretion, various pro-inflammatory and anti-inflammatory cytokines, liver pathology and oxidative stress as well as antioxidant defense system in streptozotocin-induced diabetic mice. VIP was intraperitoneally administered to normal and streptozotocin-induced diabetic CD1 mice at a dose level of 41.6 ng kg⁻¹ b.wt., 3 times/week for 8 consecutive weeks to form a total dose of 1 µg kg⁻¹ b.wt. at the end of the experiment. The VIP was found to have anti-hyperglycemic and insulinotropic properties and improving effects on the islets of Langerhans and liver pathology of diabetic mice. These VIP ameliorating-changes may be mediated via its augmenting effect on anti-inflammatory cytokines (IL-10 and IL-12) and decreasing effect on pro-inflammatory cytokine, TNF-α, as well as its potency in suppressing the oxidative stress and enhancing the anti-oxidant defense system. However, further clinical studies are required to assess the efficacy and safety of VIP in diabetic human beings. (*International Journal of Zoological Research* 5 (2): 42-61, 2009; **doi:** 10.3923/ijzr.2009.42.61)

Diversity and Distribution of Freshwater Fishes in Aceh Water, Northern-Sumatra, Indonesia

Z.A. Muchlisin and M.N. Siti Azizah

The objective of the present study was to evaluate the diversity of freshwater fish and its distribution and to establish an inventory of the freshwater fish fauna in Aceh water. Sampling was done in five regions of NAD at 17 sites. Explorative

research was conducted from January to June 2008 by investigating rivers based on information by local residents. Sampling was carried out in both lotic and lentic ecosystems. A total of 711 fishes belonging to 114 species, 69 genera, 41 families and 12 orders. Five families were distributed widely and observed in all the five regions i.e., Anguillidae, Clariidae, Cyprinidae, Anabantidae and Channidae. Sixteen families were found in only a single site. The diversity index of fishes in Aceh water ranged from 1.31 to 3.41 with an average of 2.17 indicating moderate values. The highest diversity was found in Lembang River of Aceh Selatan, while regionally, the North and south regions were higher but not significantly different from the West region. Highest similarity was found between Simpang dam and Sibreh irrigation canal of Sibreh. The similarity index between West and North region were relatively higher compared to other regional comparisons. (*International Journal of Zoological Research* 5 (2): 62-79, 2009; doi: 10.3923/ijzr.2009.62.79)

Fatal Aspergillosis in an Ostrich (*Struthio camelus*) Predisposed by Pulmonary Haemangioma in the Kingdom of Saudi Arabia

M.S. Shathele, A. Fadlelmula, F.A. Al-Hizab and M.M. Zaki

A laboratory study was carried out to investigate fatal aspergillosis in an ostrich (*Struthio camelus*) predisposed by pulmonary haemangioma in the Kingdom of Saudi Arabia. The examination of Post Mortem (PM) revealed numerous ulcerated (1×0.5 cm) subcutaneous opaque thick masses with turbid materials (exudates) in the cut section together with fibrosis in between air sacs and the thoracic wall. The microscopic appearance indicated the presence of capillary type haemangioma in ostrich. The proliferating cells were highly differentiated, uniform with spindle-shaped nuclei resembling normal vascular endothelia and were arranged in the form of numerous capillaries distended with large amounts of blood erythrocytes and separated by fibrous stroma. However, large vascular spaces lined by a single layer of endothelium were also observed. The superficial parts of the tumour showed hyperkeratosis of the epidermis and diffuse infiltration of lymphocytes in the interstitial areas. In addition, the fibrous stroma was more abundant and dense with more prominent collagen in the peripheral parts of the tumour. On PM, the tiny yellowish white foci were detected on the lung's specimens and yielded *A. fumigatus* in pure culture. The histopathologic examination of the lesions showed fungal hyphae, inflammatory and multinucleate giant cells. (*International Journal of Zoological Research* 5 (2): 80-85, 2009; doi: 10.3923/ijzr.2009.80.85)

Species Diversity and Feeding Guilds of Birds in Paya Indah Wetland Reserve, Peninsular Malaysia

M. Zakaria, M.N. Rajpar and A.S. Sajap

The objective of this study was to examine the bird species diversity and feeding guilds in Paya Indah Wetland Reserve, Peninsular, Malaysia. Distance sampling-point count method was used to survey the bird species. A total of 13872 birds belonging to 100 species and 38 families were recorded. The results show that *Treron vernans* (12.42%), *Pycnonotus goiavier* (12.13%), *Geopelia striata* (7.58%), *Porphyrio porphyrio* (6.87%) and *Streptopelia chinensis* (6.33%) were the most dominant species in the area. The Ardeidae was the most dominant family with nine species and sixteen families were rarest only with one species each. The highest bird diversity was observed in Marsh swamp (Shannon's $N_1 = 27.16$), while the lowest was in Patchy shrubland (Shannon's $N_1 = 22.51$). The highest bird species richness was observed in Marsh swamp (Margalef's $R_1 = 9.52$), while the lowest was observed in open water bodies (Margalef's $R_1 = 7.35$). The evenness of individuals among the species was higher in Marsh swamps (Pielou $J = 0.71$) and lower in Patchy shrubland (Pielou $J = 0.67$). Analysis of variance and Tukey (HSD) tests showed that bird species among habitats is significantly different ($F_{4, 495} = 8.82$ $p < 0.0001$). Feeding guilds indicated that insectivore was the most dominant group (37%), while Carnivore/Insectivore and Granivore were the least dominant groups (3% each) in all five habitats. This study clearly indicated that Paya Indah Wetland Reserve is highly important in providing food resources, shelter, nesting and roosting sites for wide range of bird species. (*International Journal of Zoological Research* 5 (3): 86-100, 2009; doi: 10.3923/ijzr.2009.86.100)

Reduced and Misexpression of 5-HT₂ Receptors Alters Development, Behavior and CNS Activity in *Drosophila melanogaster*

S. Dasari, L. Wang, D.A. Harrison and R.L. Cooper

The misexpression as well as a knock down of the 5-HT_{2dro} receptor produces slower body movements in larvae and altered development. When 1st instar larvae are raised with altered expression levels a high degree of death occurred. Exposure of the CNS to 5-HT in control larva increases motor unit excitability; however, when the 5-HT_{2dro} expression is decreased the relative sensitivity to exogenously applied 5-HT is enhanced. This is likely a function of reduced basal

CNS activity in this line. No change was observed for the strain with an over-expression compared to controls. Evoked sensory-CNS-motor circuits as well as spontaneous motor neuronal activity are also reduced. Like CNS activity, Heart Rate (HR) in larva is sensitive to 5-HT. When the 1st instar to early 3rd instar were chronically reduced or misexpressed in the 5-HT receptor no alteration to 5-HT sensitivity on HR occurred, although the initial HR was lower in both strains as compared to wild type. Thus, a normal expression of the 5-HT_{2cro} is required for development and CNS responsiveness to 5-HT, but this receptor subtype might not function in acute responsiveness of the heart to 5-HT, although the receptor has some effect on basal heart rate. (*International Journal of Zoological Research* 5 (3): 101-114, 2009; doi: 10.3923/ijzr.2009.101.114)

The Mollusk Gastropod *Lanistes carinatus* (Olivier, 1804) as Abiomonitor for Some Trace Metals in the Nile River

S.S.I. Abd El Gawad

The fresh water gastropod *Lanistes carinatus* was tested to be used as potential biomonitor for the trace metals, Copper, Cadmium and Lead. Some chemical and biological measurements were sampled and measured in two consecutive years 2005 and 2006 in different stations from Damietta Branch of Nile River. Cu level in water not detected in all investigated sites, while concentrations of Cd and Pb in water and the concentrations of Cu, Cd and Pb in sediment varied in different stations. It was found, metals concentrations were higher in sediment than those of water because sediments are important sinks for various pollutants like pesticides and heavy metals. The levels found for determined metals in water and sediment in the area are below of the permissible limits that set by the United States Environmental Protection Agency (EPA) except some deviations in managements of water especially at Kafr Saad. Concentrations of these metals in soft tissues of gastropod *Lanistes carinatus* were higher than those of sediment and vary widely in different sites suggesting that this gastropod accumulate these metals and consequently would be of use for monitoring. The population density of *Lanistes carinatus* decreased sharply opposite to discharge point of Electric Plant of Talkha and Kafr Saad. This may be due to thermal pollution of the plant. The study suggested the use of *Lanistes carinatus* as Cu, Cd and Pb biomonitor in nature and also recommended a construction of closed cycle for cooling water of the power stations to prevent heated water from being discharged into the River and also controlling the discharge of wastes and industrial effluents into Nile. (*International Journal of Zoological Research* 5 (3): 115-125, 2009; doi: 10.3923/ijzr.2009.115.125)

Rove Beetles (Coleoptera: Staphylinidae) of Lanjak Entimau, Sarawak, East Malaysia

Fauziah Abdullah and Ibnu Sina

A study to determine the abundance of rove beetle (Coleoptera: Staphylinidae) was conducted from 15 to 28 June, 2008 at the dipterocarp forest of Lanjak Entimau, Sarawak, Malaysia. Collections were made at five sites namely Kawi River, Menyaring II, Satap, Begua and Joh River. A total of 175 rove beetles comprising of 17 species were sampled from all 5 sites of Lanjak Entimau. There was a high abundance (Margalef index, 3.097) and moderate diversity (Simpson diversity index, 0.798) of rove beetles at Lanjak Entimau. Four species were identified to species level, *Orphnebius bakerianus* Motschulsky, 1858, *Eleusis kraatzi* LeConte, 1863, *Belonuchus quadratu* Nordman, 1837, *Bledius gracilicornis* Casey, 1889. Seven species were identified to genus level *Orphnebius* sp., *Coproporus* sp., *Paederus* sp1, *Paederus* sp2, *Hesperus* sp., *Lispinus* sp., *Bledius* sp. and six species could not be identified even to genus level. Six unidentified species probably new for Science. Moderate diversity and high abundance of rove beetles at Lanjak Entimau are due to diverse habitats. Some differences in species sampled from peninsular Malaysia is explained in terms of isolation between Sarawak in Borneo island with peninsular Malaysia. (*International Journal of Zoological Research* 5 (3): 126-135, 2009; doi: 10.3923/ijzr.2009.126.135)

Morphogenesis of the Acrosomal Vesicle During Spermiogenesis in the House Gecko *Ptyodactylus hasselquisti* (Squamata, Reptilia)

O.A. Al-Dokhi

The present study aimed to describe the morphogenesis of the acrosomal vesicle during spermiogenesis in the lizard *Ptyodactylus hasselquisti*. Five adult male lizards were captured during the period of sexual activity (April and May, 2005) from old houses in the city of Riyadh (25° 10' N, 46° 50' E), Saudi Arabia. Ultrastructural examination revealed proliferation and hypertrophy of Golgi complex elements as the initial event in formation of the acrosomal vesicle. Numerous small vesicles were released from Golgi complex and then coalesced to form a large proacrosomal vesicle which later attached to the proximal surface

of spermatid nucleus. A proximal concavity appeared in the spermatid nucleus to completely lodge the acrosomal vesicle, then the spermatid nucleus with the lodged vesicle were transported to be directly apposed to the spermatid plasmalemma. This was associated with the appearance of a single acrosomal granule at the vesicle base. Subsequently, the progressively pushed acrosomal vesicle was flattened on the proximal nuclear surface. Some acrosomal vesicle deformities were also illustrated. The successive morphogenetic stages of the acrosomal vesicle were discussed in comparison with that reported in the previous studies concerned with spermiogenesis in other reptile species. (*International Journal of Zoological Research* 5 (4): 136-149, 2009; doi: 10.3923/ijzr.2009.136.149)

Genetic Manifestation of Hybrid Vigor in Cross Breeds of Mulberry Silkworm, *Bombyx mori* L.

S.V. Seshagiri, C. Ramesha and C.G.P. Rao

The genetic manifestation of hybrid vigor among newly developed silkworm hybrid combinations over the parents was analyzed for the identification of superior cross breeds. Ten homozygous inbred polyvoltine breeds as Lines viz., APMG1, APMG2, APMG3, APMG4, APMW1, APMW2, APMW3, APMW4, APMW5 and APMW6 and three bivoltine breeds as Tester viz., APS8, APS12 and APS45 were used for the study. Adopting the Line×Tester method, thirty hybrid combinations were prepared and reared at standard conditions. The data was measured on the nine important genetic traits viz., fecundity, yield per 10,000 larvae, pupation%, cocoon weight, shell weight, shell ratio%, filament length, reliability and neatness%. The data was analyzed for their Mid Parent Heterosis (MPH) and Better Parent Heterosis (BPH), six hybrid combinations viz., APMG1×APS8, APMG1×APS45, APMG3×APS12, APMW1×APS8, APMW2×APS8 and APMW4×APS45 were shown as significant heterotic combinations over mid parents for all the economical traits studied. The hybrid combination, APMW2×APS45 with seven traits and APMG1×APS8, APMG1×APS12, APMG3×APS12, APMW1×APS8 and APMW1×APS8 exhibited positive heterosis for six out of nine traits over better parent heterosis. Further, based on the evaluation index the study sturdily demonstrate that two new hybrid combinations viz., APMW1×APS8 (59.58) and APMG1×APS8 (58.68) were adjudicated as superior heterotic hybrid combinations and recommended for large scale laboratory trial. (*International Journal of Zoological Research* 5 (4): 150-160, 2009; doi: 10.3923/ijzr.2009.150.160)

Detection of Apoptosis Induced by Gentamicin in Rat Hepatocytes

Saad Alkahtani, Saud A. Alarifi and Amin Abdullah Al-Doaiss

The aim of the present study was to investigate the effect of antibiotic gentamicin on the apoptotic pathway in rat liver cells. For this purpose, four groups of rats were injected intramuscularly (im) with gentamicin at a dosage of 80 mg kg⁻¹ b.wt. once daily for 1, 2, 3 and 4 weeks successively. The induced apoptosis in hepatocytes was evaluated as early as one day post-injection, the gentamicin started to induce apoptosis as assessed histologically and with the aid of Poly (ADP-ribose) polymerase (PARP) test. Histopathological examination and PARP test revealed relevant apoptosis markers at every weekly interval compared with the negative control. Irregular and condensed nuclear materials, organelles deteriorations and PARP fragmentation were the most alternations. This study demonstrated the potentiality of gentamicin to induce apoptosis in rat liver cells and the usefulness of the obtained data in daily clinical practice regarding the associated development of hepatotoxicity. (*International Journal of Zoological Research* 5 (4): 161-170, 2009; **doi**: 10.3923/ijzr.2009.161.170)

Genetic Diversity Between Two Populations of *Heteropneustes fossilis* (Bloch) Using RAPD Profile

R.K. Garg, P. Sairkar, N. Silawat, N. Vijay, N. Batav and N.N. Mehrotra

The present study was aimed to elucidate its genetic diversity based on RAPD markers from 6 individuals belonging to two ecological habitats i.e., upper lake and lower lake of Bhopal. Ten random 10-mer primers were scored in each of the individuals from two locations out of which three primers, which gave polymorphism, were selected for Polymerase Chain Reaction (PCR) and used in the final RAPD analysis. The complementary approach of RAPD was used to evaluate the genetic diversity among all the accessions using 3 highly polymorphic primers. Using these primers, 128 scorable DNA fragments were found, of which 24 (18.75%) were polymorphic. By comparing RAPD banding patterns, small variations were found between and within the populations. The present study yielded data elucidating the usefulness of complementary approaches to make diversity analysis more explanatory and purposeful for optimum genetic amelioration and effective conservation of its genotypic variability. (*International Journal of Zoological Research* 5 (4): 171-177, 2009; **doi**: 10.3923/ijzr.2009.171.177)

Reproductive Biology and Histological Studies in Abu Mullet, *Liza abu* in the Water of the Khozestan Province

M. Chelemal, S. Jamili and I. Sharifpour

To study the reproductive biology of *Liza abu*, 360 samples of this species were collected during the period from February 2007 to January 2008. Reproductive characteristics of *Liza abu* showed that sex ratio is 1: 2.7 male to female, respectively. This means that females predominate males. Monthly variation in GSI of both sexes were quiet apparent. Maximum values were recorded in March (10.26 and 11.51% for males and females, respectively) and reached to the minimum levels in August (0.42 and 1.15% for males and females, respectively). These cyclic changes in GSI indices are considered as a proof that maturation season is started from January and spawning occurs in April. The maturity stages of male and female *Liza abu* are separated to 6 different successive stages. These stages in female are immature, resting, developing, developed, spawning (ripe) and post spawning. The testes maturation classified to virgin (immature), maturing virgin, maturing virgin, developing, developed, ripe and spent. The ova diameter ranged from 16.02 to 470.3 μ . It can be classified into transparent eggs ranging from 16.02 to 106.97 μ in diameter and yolked egg ranging from 126.82 to 470.3 μ in diameter. (*Journal of Fisheries and Aquatic Science* 4 (1): 1-11, 2009; doi: 10.3923/jfas.2009.1.11)

Distribution of Fish Assemblages in Two Floodplain Lakes of North 24-Parganas in West Bengal, India

D.K. Mondal and A. Kaviraj

Assemblage of fish and their seasonal variation in two floodplain lakes in the Bongaon subdivision of the north 24-parganas district of West Bengal in India was investigated during the period 2004 to 2006. These lakes are locally called as baur. Forty nine species belonging to 23 families were recorded from these two bours. Cyprinidae was the most dominant family with eleven species. Overall species composition of the two bours almost resembled each other. But average number of species in a month significantly varied between the bours. Species richness and the total number of individuals caught per each sampling varied significantly between seasons. *Amblypharyngodon mola* (Cyprinidae) and *Gudusia chapra* (Clupeidae) were the most abundant among the eighteen frequently available species from these two bours. But more than fifty percent of the species were sparsely available. (*Journal of Fisheries and Aquatic Science* 4 (1): 12-21, 2009; doi: 10.3923/jfas.2009.12.21)

Increasing in Growth of *Rutilus frisii kutum* Larvae with Using Slurry (Fermented Organic Manure) in Yosefpoor Propagation and Rearing Center (Iran)

M. Fallahi Kapoorchali, S.M. Reza Fatemi, G. Vosoghy, M. Matinfar and M. Sharifian

The main objective of this study is to investigate the effect of slurry on larval growth in comparison with common methods; thus, cow manure was fermented under anaerobic conditions for 40 days. Then the following two treatments were examined: concentrated food as common method and slurry as the new method. To study, the two treatments and each with three replications, 6 ponds were selected, each measuring 1.7 ha with depth of 1.7 m. The larvae population density was 1.7 m ha^{-1} . The results showed that the mean weight and length, in slurry treatments were $77.16 \pm 25.3664 \text{ mg}$ and $22.03 \pm 2.31 \text{ mm}$ and in control treatment were $63.13 \pm 17.8552 \text{ mg}$ and $19.6 \pm 2.296 \text{ mm}$, respectively. Condition factor was found to be 0.9 for slurry and 0.8 for control treatment. During culture period some other factors such as DWG (Daily Weight Gain), DLG (Daily Length Gain), CF (Condition Factor) and SGR (Specific Growth factor Rate) were measured. In comparison with control group, all parameters had higher values in slurry treatment. The statistical analysis indicated that there is a significant difference ($p < 0.001$) for parameters of length and weight for both treatments in the first week of culture and also there was a significant difference ($p < 0.05$) for the items in the 2nd week too. The obtained results showed that the slurry, due to high concentration of nutrients, had more effect on growth and increased the abundance of zooplanktons, which are the main food of larvae in early stages of life cycle. (*Journal of Fisheries and Aquatic Science 4 (1): 22-31, 2009; doi: 10.3923/jfas.2009.22.31*)

Patterns of Reproduction and Spawning of the *Scomberomorus commerson* in the Coastal Waters of Iran

M.S. Sadeghi, F. Kaymaram, S. Jamili, M.R. Fatemi and M.S. Mortazavi

Patterns of reproduction and spawning were studied for the king fish (*Scomberomorus commerson*) in the Persian Gulf (Hormozgan province). During one year of sampling, 599 fish were collected from different landing sites along the Persian Gulf. Analysis of the reproductive stages and gonadosomatic index revealed a single yearly reproductive cycle beginning in March and ending with a single spawning period in August-September. The mean length at first

maturity (Lm 50%) for females was 75 cm. The sex ratio was M/F = 0.97 in the samples. (*Journal of Fisheries and Aquatic Science 4 (1): 32-40, 2009; doi: 10.3923/jfas.2009.32.40*)

The Influence of Photoperiod in Farming Beluga Sturgeon (*Huso huso*): Evaluation by Growth and Health Parameters in Serum

F. Askarian and A. Kousha

Data on the concentrations of some blood constituents of reared Beluga sturgeon, *Huso huso*, including Serum cortisol, glucose, triglyceride, cholesterol, osmolality, Na⁺, K⁺, Ca²⁺, ALP that reared under different light regimes were measured. The light regimes were consist of natural photoperiod (NP), continuous dark (0L:24D), continuous light (24L:0D) and long day regime (16L:8D) and tested on 4 group of 30 one year old reared Beluga for 6 month which sampled four times during the experiment. No significant difference in serum cortisol and ALP levels was found between treatments ($p > 0.05$). Elevations of serum cortisol, glucose, cholesterol and triglyceride concentrations were reported in continues dark regime. Increase of serum osmolality, Na⁺, K⁺ and decrease of Ca²⁺ were also associated with increase of cortisol levels. Results are compared with the few data available in condroestean fish and with those on teleosts. (*Journal of Fisheries and Aquatic Science 4 (1): 41-49, 2009; doi: 10.3923/jfas.2009.41.49*)

Preservative Effect of Quanats Water to Reduce Lead Acetate Toxicity (LC₅₀, 96 h) on *Capoeta fusca*

Arash Omid, Sohrab Mazloomi and Homayoon Farhangfar

This study was conducted to determine the acute toxicity of lead acetate on *Capoeta fusca*. A total of 580 fishes with mean length of 12.28±0.14 cm and mean weight of 16.64±0.52 g. were divided into 15 control and treatment groups of fish. The fish were kept in 20 L aquariums and the procedure designed in static condition according to the Organization Economic Cooperation and Development (OECD) method. Mortality rate was recorded in 96 h and lead acetate LC₅₀ was calculated by standard statistical method. LC₅₀ of 10.992, 10.594, 9.338 and 7.575 mg L⁻¹ were determined at 24, 48, 72 and 96 h post exposing respectively. In addition, minimum and maximum lethal concentrations of lead were determined as 4 and 12.5 mg L⁻¹ and MAC was 0.7575 mg L⁻¹. Lead acetate in soft water (Hardness 10 mg L⁻¹) was highly toxic for fish but in hard water (Hardness:

310 mg L⁻¹) had a little toxicity. High trend of lead for interaction with minerals such as calcium and carbonates is the major reason of this phenomenon. Lead toxicity is decreased with increase of water hardness and this is the cause of fish tolerance against some heavy metals pollution in natural environment. Lead intoxicated fish showed abnormal behaviors, restless and rapid circling. (*Journal of Fisheries and Aquatic Science* 4 (1): 50-56, 2009; doi: 10.3923/jfas.2009.50.56)

Feeding and Spawning of *Sphyraena jello* in the North-West of Persian Gulf

S.A. Hosseini, S. Jamili, T. Valinassab, G. Vosoghi and S.M.R. Fatemi

This study, being conducted in 2006-2007, attempts to investigate its biological habit and characteristics in Iran's water of the Persian Gulf. For the sampling purpose, three major landings namely Bushehr, Deylam and Genaveh were selected to obtain samples from commercial catches. The sampling is composed of 655 males and 515 females during a twelve month period. By studying the feeding through the counting method, it is revealed that, *Liza subviridis* characterized by 42.8% and *Sepia pharaonis* by 8.4% made the highest and lowest stomach content, respectively. The findings showed that male fish in smaller size will mature sooner than females specimen but this sex ratio or proportion was not significantly different except during October and September. Such a difference between male and female in different months could be originated from longer residing of female group in spawning ground compared to male group. The earlier spawning lasted during September-October and there was a peak of spawning in feeding in August. The lowest fat proportion for both male and female genders was reported 0.10 and 0.11, respectively in October; but the highest level of condition factor was reported to be 0.59 and 0.63 during November and June. (*Journal of Fisheries and Aquatic Science* 4 (1): 57-62, 2009; doi: 10.3923/jfas.2009.57.62)

Detection of Genetic Variation in the Wild Populations of Indian Major Carps Using Random Amplified Polymorphic DNA Fingerprinting

Sameer R. Phale, Shivkumar Chauhan, Yogesh V. Bhute and Vidya V. Baile

Genetic variations in wild populations of Indian Major Carps (IMCs) from six geographically isolated locations of Central India Rivers were examined using

Randomly Amplified Polymorphic DNA (RAPD). Thirty six specimens of each species from each location were collected. Genomic DNA was isolated from the liver tissues. Out of twenty RAPD primers used, thirteen were found to be scorable on agarose gel, of which 83.33% were polymorphic for *Labeo rohita*, 80.0% for *Cirrhinus mrigala* and 75.0% for *Catla catla*. A total of 576 RAPD bands were amplified. Dendrogram generated for species-specific genetic evaluation revealed that *C. catla* was genetically dissimilar from *L. rohita* and *C. mrigala*. The present investigation is the first report on wild varieties of IMCs while the available data on farmed varieties suggest that *C. catla* and *C. mrigala* are more genetically similar to each other than to *L. rohita*. This study also revealed high intra-specific genetic variation in the wild populations of IMCs. To conclude, the present study suggest high levels of genetic variation and population differentiation required for dynamic evolution and RAPD assay therefore may have potential use for establishing genetic relationship, genome specificity and phylogeny among wild species of IMCs. (*Journal of Fisheries and Aquatic Science* 4 (1): 63-70, 2009; doi: 10.3923/jfas.2009.63.70)

Influence of 17-Alpha Methyl Testosterone on Masculinization and Growth in Tilapia (*Oreochromis mossambicus*)

M. Marjani, S. Jamili, P.G. Mostafavi, M. Ramin and A. Mashinchian

In the present study, effect of different dose rates of synthetic androgen 17-alpha Methyl Testosterone (MT) i.e., 50, 75 and 100 mg of hormone in per kg of feed, on sex reversal and growth performance of Mozambique tilapia was evaluated. MT was administrated orally by using pellet dry starter and Ethanol Alcohol, diet to tilapia fry for 21 days in glass aquaria. The fry were also kept for 2 weeks after feeding to monitor its growth performance. At the end of the experiment the sex ratio was determined by examining the gonads after dissecting the fish. Growth performance was monitored by recording the morphometric characteristics. Wet body weight and total length of fish on start of feeding end of feeding and two weeks after feeding were measured. The results of the present study showed that all MT receiving treatment showed a significantly higher male proportion than the control experiment. Dose rate of 75 mg kg⁻¹ MT of feed resulted in maximum male population (98.09%) with 1.91% sterilized fish. The dose rate of 75 mg kg⁻¹ MT gave the maximum gain in body weight i.e., 11.8 g, which is 1.2 times greater than the control. (*Journal of Fisheries and Aquatic Science* 4 (1): 71-74, 2009; doi: 10.3923/jfas.2009.71.74)

Trophic Seasonal Behavior of the Ichthyofauna of Camaronera Lagoon, Veracruz

Carbajal-Fajardo Zuleica Shareet, Franco-López Jonathan, Héctor Barrera Escorcia, Luis Gerardo Abarca Arenas, Carlos Bedia Sánchez, Ángel Moran Silva and Horacio Vázquez-López

The objective of this study was to analyze the seasonal behavior of the ichthyofauna, considering the trophic relationships between the species that live in Camaronera Lagoon, their food composition, diversity and trophic amplitude, as of the captures obtained in Camaronera Lagoon inlet during February-June, 2000. We realized seasonal tables of the fish species and items of identified foods. The data were grouped in diurnal and nocturnal samplings in order to know the abundance, specific richness, evenness and McNaughton's community dominance index. The amplitude of the niche was calculated as of Levin's standardized index. Costello's graphic method was used to evaluate the preference and feeding behavior of any given type. The families with more species were *Cichlidae*, *Eleotridae* and *Gobiidae*. The most representative species regarding biomass and abundance were *Gambusia affinis*, *Petenia splendida*, *Cathorops melanopus*, *Diapterus auratus* and *Bathygobius soporator*. (*Journal of Fisheries and Aquatic Science* 4 (2): 75-89, 2009; doi: 10.3923/jfas.2009.75.89)

Using Reefcheck Monitoring Database to Develop the Coral Reef Index of Biological Integrity

Hai Yen T Nguyen, Ole Pedersen, Kou Ikejima, Kengo Sunada and Satoru Oishi

The coral reef indices of biological integrity was constituted based on the reef check monitoring data. Seventy six minimally disturbed sites and 72 maximally disturbed sites in shallow water and 39 minimally disturbed sites and 37 maximally disturbed sites in deep water were classified based on the high-end and low-end percentages and ratios of hard coral, dead coral and fleshy algae. A total of 52 candidate metrics was identified and compiled. Eight and four metrics were finally selected to constitute the shallow and deep water coral reef indices respectively. The rating curve was applied for each metric to identify two lower a_i and upper b_i threshold values. A set of scores 1, 3 and 5 was used to score and narrate individual metric values. Each metric value at a site presented a poor, moderated or good condition of reefs. The index was calculated by averaging all

selected metric scores. The overall site classification efficiencies were of 65.97 and 66.13% for shallow and deep waters, respectively. Importantly, the strong negative correlation between indices and dynamite fishing -0.286 ($p < 0.01$) and number of yacht within 1 km -0.185 ($p < 0.05$) in shallow water and with poison fishing -0.279 ($p < 0.05$) and coral damaged by other factors -0.283 ($p < 0.05$) in deep water indicated that coral reef indices were sensitive responses to stressors and can be capable to use as the coral reef biological monitoring tool. (*Journal of Fisheries and Aquatic Science* 4 (2): 90-102, 2009; doi: 10.3923/jfas.2009.90.102)

Evaluation of Antifungal Activity of New Combined Essential Oils in Comparison with Malachite Green on Hatching Rate in Rainbow Trout (*Oncorhynchus mykiss*) Eggs

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The aim of this study was introducing a new herbal constitution for malachite green in hatcheries. In this study, antifungal activities of a new Combination of Essential Oils (CEO) from the herbs; *Thymus vulgaris*, *Salvia officinalis*, *Eucalyptus globulus* and *Mentha piperita* in *Oncorhynchus mykiss* eggs and its effects on hatching rate in comparison with malachite green (a specific treatment for the control of saprolegniasis) were studied. After fertilization, eggs were transferred to incubators and then treated with five concentration of the combined essential oils with concentrations: 10, 50, 100, 150 and 200 ppm, respectively and malachite green (1 ppm) using constant flow treatment method for incubation period. One incubator was as control without any treatment The water quality factors were controlled over the study period. In the end of hatching rate, the mold infection and hatching rate were calculated. The hatching percentage in five treatment groups of CEO were 69.99% at 10 ppm, 63.61% at 50 ppm, 62.1% at 100 ppm, 60.53% at 150 ppm, 54.63% at 200 ppm, 60%. 83 at 1 ppm of malachite green group and 53.48% in control group, respectively. The results revealed significant antifungal effects of the combined essential oils in comparison with malachite green on fish eggs so that it could decrease mold infection and increase hatching rate on concentration 10 ppm ($p < 0.05$). This indicated that this combination of essential oils may be a promising antifungal agent in aquaculture. (*Journal of Fisheries and Aquatic Science* 4 (2): 103-110, 2009; doi: 10.3923/jfas.2009.103.110)

Length-Weight Relationship of *Sphyraena obtusata* Cuvier, 1829 (Pisces: Perciformes) from the Jaffna Lagoon, Sri Lanka

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The present study was carried out to gain some knowledge on length-weight relationship parameters, growth pattern and difference between the growth parameters of male and female *Sphyraena obtusata*. The knowledge of length-weight relationship has numerous practical applications in fishery biology. Such a mathematical equation enables conversion of one parameter in to another as is often required during monitoring field measurements. Length-weight regression equations were derived for male and female *Sphyraena obtusata* collected from the Jaffna lagoon, Sri Lanka. Regression coefficients were estimated by using the logarithms of the total lengths and the corresponding weights. The curvilinear relationships of length-weight relationships for male and female were $W = 0.0117 * L^{2.898}$ and $W = 0.0138 * L^{2.843}$, respectively. Covariance analysis for length-weight relationships of males and females revealed that there is no significant difference ($p > 0.05$) between male and female and hence a common formulae of $W = 0.0133 * TL^{2.857}$ was derived for *S. obtusata*. The 'b' values 2.898 and 2.843 obtained for male and female, respectively indicate that the fish follows the cube law and its growth is negative allometry. (*Journal of Fisheries and Aquatic Science* 4 (2): 111-116, 2009; doi: 10.3923/jfas.2009.111.116)

Effect of Rearing Systems (Mono- and Poly-Culture) on the Performance of Freshwater Prawn (*M. rosenbergii*) Juveniles

M.S. El-Sherif and A.M. Ali Mervat

This study was carried out to investigate the effect of mono and polyculture of freshwater prawn with Nile tilapia fry on growth performance and survival rate. Freshwater prawn-juveniles, (*M. rosenbergii*) averaging (0.30±0.02 g) in weight [Trial 1 (monoculture)] were cultured for 90 days, with different stocking densities (50, 100, 150 and 200 prawn m⁻²) using 12 circular fiberglass tanks (0.36 m² and 0.6 m in water depth). Prawns were fed manufactured diet contained 35% protein. Water exchange occurred daily with 20% of water size. Growth measurements of prawn were recorded at 15 days intervals. The results showed that growth performance was significantly ($p \leq 0.05$) decreased with increasing the stocking density. Survival rate was inversely related to stocking density, since there were significant differences among the four densities, while the difference between stocking density of 50 and 100 prawn m⁻² was not significant. The food

conversion ratio FCR increased with increasing the stocking densities, since the fourth density (200 prawn m^{-2}) was significantly higher than that achieved in the first one (50 prawn m^{-2}). Prawn juveniles, of average weight 0.30 ± 0.02 g [Trial 2 (Poly culture)] were stocked (as declared in Trial 1) in poly culture with Nile tilapia fry (average weight 0.3 ± 0.03 g) at stocking density 12 fish per m^2 for each treatment, for 90 days. Growth measurements of prawns and fish were recorded at 15 days intervals. Results showed that growth performance for fish and prawn were significantly ($p \leq 0.05$) decreased with increasing of the stocking density of prawn. Survival rate was inversely related to stocking densities, since, there were significant differences among the four treatments. Also, the food conversion ratio FCR for fish and prawn increased with increasing stocking density, since, the differences were significant among the four stocking densities. Therefore, polyculture system is more suitable at stocking density of 100% prawn m^{-2} for optimum growth and survival rate than of monoculture. (*Journal of Fisheries and Aquatic Science* 4 (3): 117-128, 2009; doi: 10.3923/jfas.2009.117.128)

Causes and Mitigations on Trap Ghost Fishing in Oman: Scientific Approach to Local Fishers' Perception

Hussein S. Al-Masroori, H. Al-Oufi and Paul McShane

This study aims to investigate the ghost fishing problem in Sultanate of Oman. The questionnaire survey on trap ghost fishing in Oman provided information on rates of trap loss, the financial cost to fishers, the cause of trap loss and the circumstances leading to non recovery of fish traps. Each trap fisher in the Omani fishery owned and fished on average 20.4 traps per fishing day and each trap had a mean useful lifetime of 5.7 months. The study revealed that a total of 15,390 traps or 18 traps per fisher are lost every year in the study area. Once lost, these traps remain functional and on average continue to ghost fish for a period of 3.1 months per year. The three main causes of trap loss were gear interference, theft and/or vandalism, and collisions with boats and ships. Economic losses resulting from ghost fishing by traps was estimated to be 1,011,594 O.R. (US\$ 2.63 million), equivalent to 2.1% of the total landing value of the Omani fishery in 2006. To reduce ghost fishing it is recommended that traps be better marked, that they be equipped with timed-release or degradable sections or panels, and that openings be included in the traps for the release of sub legal size fish. Conflicts with other fishing vessels and other types of gear could be reduced by implementing a zonation policy. (*Journal of Fisheries and Aquatic Science* 4 (3): 129-135, 2009; doi: 10.3923/jfas.2009.129.135)

The Fluctuation of Coralline Fish Larvae of Khark and Kharko (Persian Gulf)

G.H. Vosoghi, M.R. Fatemi, S. Jamili, A.R. Nikoyan and M. Rabbaniha

This study was undertaken due to identification, abundance and diversity, temporal and spatial fluctuation of coralline fish larvae in Khark and Kharko Islands water. Khark and Kharko Islands are the last Northern point for fringing coral reefs in Iranian side of the Persian Gulf. These Coralline habitats are the Protected Area and Wildlife Refugees with the total area of 2400 ha which located in the territory of Bushehr Province. This research carried out during 2006-2007 with monthly sampling from 9 stations, which selected around Islands inshore waters with maximum depth of 20 m. Sampling was conducted using by Bongo-Net plankton sampler with 500 μ of mesh size. Totally 494 specimens from: 22 coralline fish larva families were identified in studied area, such as pelagic and demersal fishes. The results was shown that coral reef diversity in coral reefs (Khark and Kharko Islands) is more than other habitats such as estuary and river mouth, creeks, mangrove forest sites and off shore water of the Persian Gulf and Oman Sea Iranian side. The pick of fish larvae abundance family were estimated in spring. (*Journal of Fisheries and Aquatic Science* 4 (3): 136-142, 2009; *doi: 10.3923/jfas.2009.136.142*)

Reproductive Biology of the Japanese Threadfin Bream, *Nemipterus japonicus*, in the Northern of Persian Gulf

M. Kerdgari, T. Valinassab, S. Jamili, M.R. Fatemi and F. Kaymaram

Since the *N. japonicus* comprises the most abundant commercial fish in the Persian Gulf, an evaluation of the stock status of this species is needed. Reproductive biology of *Nemipterus japonicus* in the northern part of Persian Gulf is described, based on 595 specimens collected between November 2006 and October 2007. Length range of females was 11.0-26.3 cm FL and their weight range was 21.7-325.65 g. Males ranged from 9.4-27.3 cm FL and 14.04-351.89 g in weight. The relationship between Body Weight (BW) and Fork Length (FL) for all individuals was estimated as $BW = 0.0181 \times FL^{3.0001}$ ($r^2 = 0.9797$, $n = 503$). The overall sex ratio was estimated as M: F = 1.0: 2.6. The length at 50% maturity was estimated to be 19.1 cm for females and 19.6 cm for males. The smallest size at first maturity was 9.4 cm for males and 11.0 cm for females. The spawning behavior was investigated based on macroscopic observations of gonads and determination of gonadosomatic index.

The maximum GSI values were recorded in April (2.70%) and September (0.45%) for females and males, respectively. Spawning occurs in spring and autumn seasons. (*Journal of Fisheries and Aquatic Science* 4 (3): 143-149, 2009; **doi**: 10.3923/jfas.2009.143.149)

Effects of Pollutants on Some Aquatic Organisms in Tamsah Lake in Egypt

M.S. El-Sherif, M.T. Ahmed, M.A. El-Danasoury and Nagwa H.K. El-Nwishy

Tamsah lake is considered one of the wild life features in Egypt in general and in the Suez Canal region in particular. Through field experiment, concentrations of some pesticides which are used around the area, were monitored in the tissues of some birds of prey (wild birds), some species of algae, fish and crustaceans. The results obtained revealed: (1) The presence of some Organochlorines (OC) in the tissues of many of the tested birds represented in (DDE, Heptachlore, HCH, Dicofole). (2) The presence of high residues of Organophosphorus (OP) pesticides represented in malathion and diazinon in most of the tested birds. But they were not detected with high levels in any of fish, crustaceans or algae. (3) The presence of high concentrations of (OC) compounds in the tissues of algae, crab, mullet and some birds (moorhen-cormorant and gulls). Meanwhile, none of those compounds was detected in the water samples. (4) The presence of high levels of all detected pesticides in the tissues of crab makes it the very acceptable bioindicator to mirror the pollution of the lake, then followed by algae. (5) Pollutants can be transferred through the food chain which causes biomagnification of them in the bodies of the higher organisms in the food chain. It could be concluded that implementation of the environmental management practices in Lake Tamsah is still needed to protect these ecosystems from more pollutions which could affect human health and environment. (*Journal of Fisheries and Aquatic Science*, 4 (3): 150-160, 2009; **doi**: 10.3923/jfas.2009.150.160)

Population Genetic Structure of Pikeperch (*Sander lucioperca* Linnaeus, 1758) in the Southwest Caspian Sea Using Microsatellite Markers

M. Gharibkhani, M. Pourkazemi, M. Soltani, S. Rezvani and L. Azizzadeh

The aims of this study were to analysis the population genetic structure and genetic diversity among and between populations of *Sander lucioperca* based on microsatellite markers. For this purpose, 149 samples of adult pikeperch from

three regions of Southwest Caspian Sea (Talesh Coasts, Anzali Wetland and Chaboksar Coasts) were collected. DNA was extracted and using 13 pairs of microsatellite primers, Polymerase Chain Reaction (PCR) was conducted. DNA bands were analysed using Biocapt and GenAlex software package. Out of 13 microsatellite primers, 11 loci were produced, in which 6 of them were polymorphic and 5 monomorphic. Analysis revealed that the average number of alleles per locus and observed heterozygosities were not statistically significant ($p > 0.05$) for all 3 populations. The F_{ST} value between populations was low but significant ($p < 0.01$), suggesting that the 3 populations are genetically differentiated. Deviation from Hardy-Weinberg equilibrium was obvious in most cases, mostly due to the deficiency of heterozygosities. The highest genetic distance was between Anzali Wetland and Chaboksar Coast populations. The data generated in this study provide useful information on the genetic variation and differentiation in populations of Southwest Caspian Sea pikeperch. (*Journal of Fisheries and Aquatic Science*, 4 (3) 161- 168, 2009; doi: 10.3923/jfas.2009.161.168)

Evaluation of Diazinon Toxicity on Nile Tilapia Fish (*O. niloticus*)

M.S. El-Sherif, M.T. Ahmed, M.A. El-Danasoury and Nagwa H.K. El-Nwishy

Diazinon was used in the laboratorial study to investigate its biochemical effect on tilapia as it is the most popular fish in Egypt. Two hundred and twenty appeared 40 ± 2 g adult male Nile tilapia were reared in glass aquaria of 60 L capacity, provided with a good air supply and dechlorinated tap water, Fish were maintained under suitable condition for the fish growth. Results of the study are summarized as follow: (1) The bioassay test revealed that the LC_{50} for tilapia after 96 h of exposure was 2.8 ppm, (2) Fish was very excited after being exposed to lethal concentrations of diazinon (5, 10, 200 ppm) for 96 h. Meanwhile, fish exposed to sublethal concentrations of diazinon for 30 days didn't cause mortality to fish and (3) Exposing fish to 0.28 and 1.87 ppm for 30 days caused the following changes: (A) A reduction in total protein content in muscles up to 13.69 and 21.5% for 0.28 and 1.87 ppm, respectively, (B) A reduction in total protein content in blood serum up to 22.23 and 24.32% for 0.28 and 1.87 ppm, respectively and (c) 52, 27 and 6.8 kDa proteins were not scanned in the treated or the recovered samples in both treatments, a slight reduction in the 33.55, 31.72, 24.31 and 20.8 kDa proteins in both treatments, (4) Exposing the treated fish to 7 days of recovery in un poisoned water caused the following changes: (A) A recovery in total protein content in muscles up to 95.59 and 90.58% for 0.28 and 1.87 ppm, respectively, (B) A recovery in total protein content in blood serum up

to 89.36 and 95.14% for 0.28 and 1.87 ppm, respectively and (C) 52.27 and 6.8 kDa proteins were still not scanned after recovery of both treatments. A slight increase in the rest of affected proteins after recovery of both treatments was recorded. Therefore, it can be emphasized for good environmental administration of the water bodies to save human health and environment from the dangerous pesticides. (*Journal of Fisheries and Aquatic Science* 4 (4): 169-177, 2009; doi: 10.3923/jfas.2009.169.177)

Protective Effect of Antioxidant Medicinal Herbs, Rosemary and Parsley, on Subacute Aflatoxicosis in *Oreochromis niloticus*

Manal Ibrahim El-Barbary and Ahmed Ismail Mehrim

The object of this study was to conduct the ability of two medicinal herbs, namely rosemary and parsley, for amelioration of aflatoxicosis in *Oreochromis niloticus*. Two herbs' extracts at three concentrations of either (0, 2 and 4 g kg⁻¹ b.wt. divided into 2 doses at the start and the 6th day of the experiment) and three concentrations of aflatoxin B₁, (AFB₁ 0, 9 and 18 mg kg⁻¹ b.wt. as a single intraperitoneal administration) were tested either individually or in combination. The herbs and AFB₁ were dissolved in Dimethylsulphoxide (DMSO 25%) and injected to fish groups. Sixteen groups of fish were investigated in this study, where A group (control) was injected with saline 0.89%, group B injected with DMSO (control solvent), groups F₁ and F₂ were injected with AFB₁ alone (9 and 18 mg kg⁻¹ b. wt., respectively), R₁ and R₂ groups were injected with rosemary alone (2 and 4 g kg⁻¹ b. wt., respectively), groups F₁R₁, F₁R₂, F₂R₁ and F₂R₂ were injected with AFB₁ + rosemary, while groups P₁ and P₂ were injected with parsley alone (2 and 4 g kg⁻¹ b. wt., respectively); however, F₁P₁, F₁P₂, F₂P₁ and F₂P₂ groups were injected with AFB₁ + parsley. At the 12th day of the experiment, blood and liver samples were taken from each group. The results indicated that the AFB₁ injected groups revealed a significant increase in mortality rate (MR%) compared with AFB₁-not injected, group F₂ was the highest while F₁R₁ and F₁P₁ were the lowest in MR% among all AFB₁ injected fish groups. Also, AFB₁ led to reduction of haemoglobin (Hb), total protein (TP) and globulin (GL) concentrations and increase in activity of aspartate aminotransferase (AST) and alanine aminotransferase (ALT). These alterations were significantly ameliorated when fish were injected with herbs' extracts. AFB₁ residues showed that the herbs level of 2 g kg⁻¹ b.wt. have higher potency of reducing the AFB₁ residues than the level of 4 g kg⁻¹ b.wt. in case of AFB₁ level 9 mg kg⁻¹ b.wt. While, in case of AFB₁ level 18 mg kg⁻¹ b.wt., the groups F₂ and F₂P₁ showed absence of AFB₁ residues. Microscopically, AFB₁ presented histopathological changes in

hepatopancrease which increased in severity with increasing AFB₁ level. These lesions may become less severer in all fish groups injected with AFB₁ combined with herbs' extracts especially with the lowest levels of herbs' extracts and AFB₁. So, this study concluded that either of rosemary or parsley was found to be safe and successful in protection from aflatoxicosis, particularly at the low level. (*Journal of Fisheries and Aquatic Science* 4 (4): 178-190, 2009; *doi: 10.3923/jfas.2009.178.190*)

Accumulation of Lipofuscin and Preliminary Estimation of Age-Structure in Wild Mud Crab (*Scylla paramamosain*) Population in Tropical Mangrove Swamps, Thailand

Md. Sherazul Islam and Hisashi Kurokura

The age structure of wild mud crab (*Scylla paramamosain*) was explored using autofluorescent age pigment, lipofuscin. Samples were collected from the mangrove swamp area in Pak Phanang mangrove swamps, Thailand. The carapace width-frequency distribution did not show any distinct modes of the sample population, whereas lipofuscin concentration showed positive correlation with carapace width. Lipofuscin concentration in the Olfactory Lobe Cell Mass (OLCM) of the brain was measured using image analysis of fluorescent micrographs. The lipofuscin concentration (% of area fraction) ranged from 0.06 to 0.26 with the formation of three regularly-spaced modes developed by modal analysis that could be regarded as distinct age classes. Strong correlation was found between lipofuscin concentration and modes observed in the lipofuscin concentration histogram ($R^2 = 0.99$) and the lipofuscin accumulation rate was almost constant (0.08% of area fraction) in each year. Although, existence of wide size ranged population in a lipofuscin concentration mode, the analysis suggested that *S. paramamosain* live in the mangrove ecosystem at best of 2⁺ year class. (*Journal of Fisheries and Aquatic Science* 4 (4): 191-202, 2009; *doi: 10.3923/jfas.2009.191.202*)

Effects of Different Protein and Energy Levels on Growth Performance of Caspian Brown Trout, *Salmo trutta caspius* (Kessler, 1877)

Hamid Ramezani

The objective of this study is to assess the effects of protein and energy levels of diet on fish performance and growth efficiency of Caspian brown trout in order to

develop optimum protein and energy level during the preparation of diet for this species. Fish were fed with six experimental diets containing three protein levels (45, 50 and 55%) and two energy levels (3.5 and 4 kcal g⁻¹) according to a 3×2 factorial design. The diet was assigned to 18 tanks with 50 fish each, with three replicates for each diet. The experiment was conducted for 8 weeks with Caspian brown trout with an initial body weight of around 7 g. Protein content of diet influenced feed conversion ratio ($p < 0.05$) and specific growth rate statistically ($p = 0.052$). Caspian brown trout demonstrated a better feed conversion ratio and a larger specific growth rate at lower protein levels (45 and 50%) in comparison to high protein level (55%). Protein efficiency ratio improved by a decrease in protein content of the diet ($p < 0.05$), but energy content of diets does not affect any growth related parameter such as feed conversion ratio, specific growth rate and protein efficiency ratio. There was also no interaction between protein and energy levels in the growth related parameters, suggesting the effect of protein on the growth parameters in Caspian brown trout did not depend on energy levels of diet. In conclusion diet containing 50% protein can support the maximum growth and protein sparing by the use of high-energy diet did not occurred in this study. (*Journal of Fisheries and Aquatic Science*, 4 (4): 203-209, 2009; **doi**: 10.3923/jfas.2009.203.209)

First Remarks on Abalone Biology (*Haliotis pustulata*) on the Northern Coast of Aden Gulf, Yemen

A.M. Ali, A.A. Basmidi, M.Sh. Aideed and Al-Quffail A. Saeed

Abalone has been exploited by humans around the ocean coasts of the world. On contrary, it is still neglected in the Gulf of Aden. This study is a first attempt to explore the biological and ecological status of the absolutely unexploited abalone *Haliotis pustulata* in the Aden Gulf, Yemen. Between Jan 2004 and June 2006, about 700 abalones were collected and analyzed from Intertidal and sublittoral zones along 6 sites of Hadhramout coast. It is revealed that the studied species is relatively small, measuring up to 62 mm, with a slow growth rate of 4-10 mm year⁻¹ and has moderate fertility compared with many other species in other localities. The highest GSI as well as the highest proportion of mature Sufaylah were prevailed from March to May. Morphological traits, spread, age-size structure and reproduction behavior are discussed in the light of the absence of local similitude studies and well documented world wide haliotids. Results call for necessity of more detailed studies. (*Journal of Fisheries and Aquatic Science* 4 (5): 210-227, 2009; **doi**: 10.3923/jfas.2009.210.227)

Calcium Pre-Exposure Reducing Histopathological Alteration in Nile Tilapia (*Oreochromis niloticus*) After Lead Exposure

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This study was evaluated the influence of calcium to reduce the toxicity of sub-lethal lead concentration in Nile tilapia with emphasis on histopathological analysis. The values of 24, 48, 72 and 96 h LC₅₀ of lead to tilapia were 247.51, 197.47, 183.74 and 182.38 mg L⁻¹, respectively. Fish were pre-exposed to vary dosages of calcium carbonate: 0 (G1 and G2); 20 (G3 and G4) and 60 (G5 and G6) mg L⁻¹ for 4 days. After that, fish were post-exposed to 45 mg L⁻¹ lead, which correspond to 25% of the 96 h LC₅₀ (G2, G4 and G6) for 96 h. Histopathological changes were especially most evident in the group (G2) exposed to lead without calcium pre-exposure. The gills were observed edema, lamellar cell hyperplasia, epithelial lifting, lamellar fusion and aneurysm. There were blood congestion in sinusoids, vacuolation of hepatocytes and necrosis. Glomerulus's atrophy, tubular swelling and also necrosis were seen. However, the only observable lesion in the muscle was the infiltration of inflammatory cells and there were no histopathological changes observed in the brain and intestine of the lead treated fish. Fish with pre-exposed calcium (G4 and G6) showed slightly alteration when compare the only lead treatment groups. The results suggested that calcium pre-exposure may play an important role in the reduction of lead toxicity in fish. (*Journal of Fisheries and Aquatic Science* 4 (5): 228-237, 2009; *doi: 10.3923/jfas.2009.228.237*)

Response to Increased Sediment Load by Three Coral Species from the Gulf of Suez (Red Sea)

M.L. Ebeid, M.H. Hassan and Y.A. Geneid

This study examines the hypothesis that sedimentation, as a result of anthropogenic activities, has a measurable effect on the growth rate (in terms of linear extension) of branching corals of a subtropical site in the northern Gulf of Suez. Three of the dominant branching coral species; *Stylophora pistillata* (Esper) 1792, *Acropora pharaonis* (Milne Edwards and Haime) 1860 and *A. hemprichi* (Ehrenberg) 1834 were chosen for monitoring their growth rate after the cessation of construction works. At the beginning of the study, the three study species had very low rates of growth in response to increased sediment load. Over time sedimentation rates decreased significantly while linear extension rate per branch of the three study species showed a significant gradual increase. The study

reaches the conclusion that coral growth is negatively related to sedimentation. (*Journal of Fisheries and Aquatic Science* 4 (5): 238-245, 2009; doi: 10.3923/jfas.2009.238.245)

Hematological Parameters and Erythrocyte Osmotic Fragility in Rainbow Trout, *Oncorhynchus mykiss*, Experimentally Infected with *Pseudomonas putida*

S. Bektas and O. Ayik

In the present study, selected hematological and osmotic fragility values in rainbow trout, following experimental *Pseudomonas putida* infection have been described. Blood samples were collected at day, 1, 3, 7, 14 and 21 post inoculation and examined for the above parameters. Erythrocyte values were significantly decreased at all days. Hematocrit values at day 14 was significantly higher than other days. Hemoglobin values revealed significant decrease from day first onwards. Among red blood cell indices, MCV were found significantly higher from day 1 to 21. Significant decrease in MCHC were also reported. MCH remain unchanged in all days examined. Leukocyte values at day 21 were significantly higher than at day 7. In addition, thrombocytes values at day 21 were significantly higher than at day 7 and 14 . On the other hand, erythrocyte osmotic fragility values were significantly increased at day 14 and 21 post infection. Interpreted hematological data in the present study, can be used to assess an abnormality or disease process in pseudomonas infected rainbow trout. (*Journal of Fisheries and Aquatic Science* 4 (5): 246-253, 2009; doi: 10.3923/jfas.2009.246.253)

Effects of Pre-Drying on Quality of Fried Breaded Black Pomfret (*Parastromateus niger*) Fillet

Y. Moradi, J. Baker, Y. Che Man and S. Kharidah

The objective of this study was to investigate the effects of pre-drying process on quality of fried breaded fish fillets. For this study, breaded black pomfret (*Parastromateus niger*) fillets were pre-dried in conventional oven at 180°C for 0, 30, 60, 90 and 120 sec. The pre-dried fillets were pre-fried in sunflower oil and stored at -20°C for 1 week. They were then finally cooked in the combination oven. Fat, moisture, texture and color of the cooked fillets were evaluated. Results indicated that moisture loss and the fat uptake of cooked fillets decreased with

increasing pre-drying time. Instrumental texture analysis showed that hardness of the pre-dried samples increased as compared to the control. Results from color evaluation showed that the b^* (yellowness) values of the samples increased, while L^* (whiteness) and a^* (redness) values did not change significantly ($p < 0.05$). The best quality product was prepared when 90 sec pre-drying time was applied. (*Journal of Fisheries and Aquatic Science* 4 (5): 254-260, 2009; doi: 10.3923/jfas.2009.254.260)

Effect of Dietary Supplementation of Biogen® (Commercial Probiotic) on Mono-Sex Nile tilapia *Oreochromis niloticus* under Different Stocking Densities

A.I. Mehrim

The present study was carried out to evaluate the effects of dietary supplementation of a commercial probiotic Biogen® on growth performance, carcass composition, blood hematological and biochemical parameters, histometric characteristics of fish dorsal muscles and economic efficiency of mono-sex Nile tilapia *Oreochromis niloticus* under different stocking densities. Therefore, fish with similar body weight (12.71 ± 0.17 g) were distributed randomly into seven treatments at different stocking densities, being 10 fish m^{-3} which fed a basal diet without Biogen® (T_1), 10 fish m^{-3} (T_2), 20 fish m^{-3} (T_3), 30 fish m^{-3} (T_4), 40 fish m^{-3} (T_5), 50 fish m^{-3} (T_6) and 60 fish m^{-3} (T_7), which were fed the basal diet but supplemented with 3 g Biogen® kg^{-1} diet for 14 weeks. The obtained results indicated that T_4 was the best treatment which realized significantly ($p \leq 0.05$) increases of all growth performance parameters (final weight, AWG, ADG and SGR), hematological parameters (hemoglobin, RBCs count, PCV, blood platelets and WBCs count), plasma proteins (total protein, albumin, globulin and albumin/globulin ratio), improved FCR, blood indices (MCV, MCH and MCHC), differentiation of leukocytes, carcass composition, histometric characteristics of fish dorsal muscles and best economic efficiency. There were no adverse effects on water quality criteria among all experimental treatments. Consequently, from the obtained results, it could be concluded that the inclusion of the commercial probiotic Biogen® at a level of 3 g kg^{-1} diet at stocking density rate of 30 fish m^{-3} of mono-sex Nile tilapia *O. niloticus* is useful to get the best fish performance with friendly effects on the environment. (*Journal of Fisheries and Aquatic Science* 4 (6): 261-273, 2009; doi: 10.3923/jfas.2009.261.273)

The Use of Stable Isotopes and Stomach Contents to Identify Dietary Components of the Spotted Rose Snapper, *Lutjanus guttatus* (Steindachner, 1869), off the Eastern Coast of the Southern Gulf of California

Arturo Tripp-Valdez and Francisco Arreguín-Sánchez

The food habits of the spotted rose snapper, *Lutjanus guttatus* (Steindachner, 1869), living off of the Eastern coast of the Southern Gulf of California (off the coast of Nayarit) are described based on their stomach contents and isotopic analysis. Fish were collected from the bycatch of shrimp trawling during the 2005-2007 shrimp fishing seasons. Twenty-six taxa were identified in the stomach contents and the geometric importance index suggested xanthid crabs and engraulidae fish are the most important species in the *L. guttatus* diet. Isotopic analysis and mixing models also led to the identification of crustaceans as important species in diets, but fish were considered only as secondary prey in these models. Notably, the diet and trophic level of the spotted rose snapper tend to change as it matures; young fish mainly feed on crustaceans, while larger *L. guttatus* can incorporate fish into their diets. Furthermore, Morisita-Horn index suggests that there are significant differences between the diets of juvenile and adult fish. The estimates of the trophic level for *L. guttatus* from stomach contents ($TL_{sc} = 3.7$) and isotopic analysis ($TL_{iso} = 3.5$) are very similar. (*Journal of Fisheries and Aquatic Science* 4 (6): 274-284, 2009; doi: 10.3923/jfas.2009.274.284)

Median Lethal Concentration (LC₅₀) for Suspended Sediments in Two Sturgeon Species, *Acipenser persicus* and *Acipenser stellatus* Fingerlings

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Median lethal concentration (LC₅₀) of suspended sediments in the Sepidrud River on two sturgeon species *Acipenser persicus* and *Acipenser stellatus* were determined to provide reliable criteria and guidelines for the protection of aquatic resources. Static bioassays were performed for 24 and 96 h periods on *A. persicus* and *A. stellatus* one control was used for *A. persicus*. Three replicates were used for each trial. Ten fish were stocked in each aquarium (35×30×35 cm²) containing 30 L of water. pH, dissolved oxygen concentration and water temperature was measured and recorded throughout the experimental period. The LC₅₀ for 24 and 96 h for median lethal concentration were determined

following Probit analysis. The LC_{50} for 24 and 96 h for suspended sediments was 46294 and 8539 $mg L^{-1}$ in *A. stellatus* fingerlings, respectively. However, *A. persicus* fingerlings showed higher tolerance and median lethal concentration for suspended sediments but this species LC_{50} was 15367 $mg L^{-1}$ for 96 h and 60802 $mg L^{-1}$ for 24 h. (*Journal of Fisheries and Aquatic Science* 4 (6): 285-295, 2009; doi: 10.3923/jfas.2009.285.295)

Stability of Effective *Edwardsiella tarda* Vaccine Developed for Japanese Eel (*Anguilla japonica*)

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This study aimed to design to evaluate the immunogenicity as well as the stability of inactivated bacterins in storage conditions to prevent edwardsiellosis in fish species. Three vaccine formulations, formalin (0.4%, FKC), pressure (600 $kgf cm^{-2}$ for 5 min, PKC) and electric current (100 mA at 12v DC for 5 sec, ECKC) killed bacterin and a routes of administration with intraperitoneal injection (i.p.) was tested. The effectiveness of the immunization strategies was evaluated in terms of Relative Percent Survival (RPS) and antibody levels. On the basis of the results pressure inactivated vaccine via i.p. which confers RPS values over 85% at least 6 months post-vaccination. In the search for a more stable bacterin, inactivated *E. tarda* antigen was subjected to different storage temperatures. Storage at 4°C did not significantly affect the titer of PKC and antigenic potency remained stable for 6 month. However, with the bacterins FKC and ECKC there is a considerable loss of potency during stored at 4°C. Bacterins were discarded if exposed to temperature of 0°C or below, because the precise freezing point is not established. Bacterins loosed significant potency after 1 month when stored at 25°C. (*Journal of Fisheries and Aquatic Science* 4 (6): 296-305, 2009; doi: 10.3923/jfas.2009.296.305)

The Relation Between Egg Viability, Selected Aspects of Egg and Ovarian Fluid Composition and Time of Stripping in Endangered Caspian Brown Trout (*Salmo trutta caspius*)

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The effects of egg retention time in the abdominal cavity after ovulation on egg viability were studied in Caspian brown trout (*Salmo trutta caspius*). Eggs were retained in the parental abdominal cavity for 40 days post ovulation. Partial volumes of eggs stripped from 10 individually identified females and fertilized with

fresh semen obtained from 8 males at 10 days intervals for 4 stages. The biochemistry of the eggs and ovarian fluid were studied to investigate possible links with post-ovulatory oocyte aging. The eyeing and hatching rate of the eggs declined with over-ripening time: that is, the expected amounts ($90.60 \pm 6.28\%$ for eyeing and $86.33 \pm 6.82\%$ for hatching) in newly ovulated eggs (0-10 days post ovulation) decreased to $0.67 \pm 1.34\%$ and $0.49 \pm 0.98\%$, respectively, in over-ripened eggs (30-40 days post ovulation). However, larval abnormalities remained constant for 30 days after ovulation. Over the course of post-ovulation oocyte aging, the pH of the ovarian fluid significantly decreased and the concentration of glucose, protein, calcium, iron and aspartate aminotransferase activity significantly increased. Moreover, the concentration of protein, triglycerides and aspartate aminotransferase activity in the eggs also changed. The present study demonstrated that the best time to take Caspian brown trout eggs after ovulation at $7 \pm 0.6^\circ\text{C}$ was up to 10 days post ovulation. Also, egg viability was related to both ovarian fluid parameters (e.g., pH, protein, aspartate aminotransferase, glucose, cholesterol, triglycerides, iron, calcium) and egg parameters (e.g., cholesterol, triglycerides, iron, aspartate aminotransferase) which can be used to detect egg quality defects associated with oocyte post-ovulatory aging. (*Journal of Fisheries and Aquatic Science* 4 (6): 306-315, 2009; doi: 10.3923/jfas.2009.306.315)

Population Genetic Study of *Rutilus frisii kutum* (Kamansky 1901) from the Caspian Sea; Iran and Azerbaijan Regions, using Microsatellite Markers

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The genetic diversity and population structure of *Rutilus frisii kutum* from three regions in the Iranian coastline and one region from Azerbaijan were investigated using microsatellite DNA markers. Genomic DNA from 140 specimens was extracted and using PCR approach nine loci with reasonable polymorphism were amplified. The results showed that the lowest mean number of alleles per locus (5.22) was observed in Tonekabon River and the highest (5.77) in Azerbaijan population. The observed heterozygosity in the Tonekabon River (0.625) population was higher than those of the other two populations in Iran and Azerbaijan population (0.473). Significant deviations from HWE were found at more loci in the Iranian populations than Azeri population. In spite of geographical distance, both the highest and lowest population differentiation (F_{st}) value was between Iranian populations not among the Iranian and Azerbaijan populations. The highest and significant was between Khoshkrud and Tonekabon (0.098) and

the lowest and significant was between Khoshkrud and Gorganrud (0.062). The genetic distance was the lowest (0.27) between the Khoshkrud and Gorganrud populations, whereas the highest distance (0.493) was between Khoshkrud and Tonekabon River. The AMOVA analysis with consideration of 2 sampling regions (Iran and Azerbaijan) and 4 sampling locations (Iran: Khoshkrud, Tonekabon, Gorganrud and Azerbaijan: the Kura mouth) revealed that almost all of the variance in data namely 86% ($p = 0.01$) was within locations, genetic variances among locations was 12% ($p = 0.01$) and among regions was 2% ($p = 0.01$). The reported results could be of interest for management and conservation programmes of this species in the Caspian Sea. (*Journal of Fisheries and Aquatic Science* 4 (6): 316-322, 2009; doi: 10.3923/jfas.2009.316.322)

Effect of Pb and Cd on the Iron Solute in Blood (*Chalcalburnus chalcoides*)

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This study was carried out within inland Aquaculture Research Center Bandar Anzali (Guilan Province) through Southwestern part of the Caspian Sea; to examine the effect of two heavy metals (lead, cadmium) on (Fe) amount in blood of *Chalcalburnus chalcoides*. This fish is widespread and lives through Southern and Western part of the Caspian. The sampling was randomly done in two stages. The size of fish was 15-16 cm. After transferring fish to the pool, in order to adaptation, has been provided 12 aquariums in which 9 fish were released to each one. Regarding to the lowest capacity (LC50) for these fish, chose the selective densities to pollute aquariums' environs. In such a way that for each aquarium cell with a constant density, we account 0.05, 0.15 and 0.03 ppm for lead and 0.15, 0.25 and 0.75 ppm for cadmium, respectively; while a stereotype aquarium was considered as a non-polluted environ. In each stage, we left 3 fish out of them to take blood from their heart and tail-stem, then we transferred the frozen samples to the lab. This experiment was repeated for the second metal as the same. Acid nitric digested the blood to provide a transparent and colorless solution for the atomic absorption device. With respect to the obtained absorptions by Pb, Cd and Fe in lab, the variance analysis (ANOVA) was carried out in (SPSS) and (Excel) systems. Based on statistical results, cadmium with ratio $p < 0.05$ replaced with ferritin (Fe) over the time, but metal (Pb) couldn't so. The results indicated that by increase in lead density within various times, this metal was absorbed by other fish's tissues. (*Journal of Fisheries and Aquatic Science* 4 (6): 323-329, 2009; doi: 10.3923/jfas.2009.323.329)

Isolation and Characterization of Saprolegniaceae from Rainbow Trout (*Oncorhynchus mykiss*) Eggs in Iran

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The goal of this study was to identify Saprolegniaceae fungi isolated from affected rainbow trout eggs in six hatcheries in Mazandaran Province (Northern Iran) from December 2006 to February 2007. The isolated oomycetes were classified according to their morphological characteristics on hemp seed media at 18-24°C. Seven fungal species belonging to three genera of *Saprolegnia*, *Achlya* and *Brevilegnia* were identified. The fungal species were morphologically characterized as *S. parasitica*, *S. mixta*, *S. monilifera*, *Saprolegnia* sp., *A. oblongata*, *Achlya* sp. and *Brevilegnia* sp. This is the first recorded oomycetes infection in rainbow trout hatcheries in Iran. (*Journal of Fisheries and Aquatic Science* 4 (6): 330-333, 2009; doi: 10.3923/jfas.2009.330.333)

Influence of Essential Oils Supplementation on Digestion, Rumen Fermentation, Rumen Microbial Populations and Productive Performance of Dairy Cows

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Sixty lactating Holstein dairy cows were assigned to investigate the effect of Essential Oil Mixture (EOM) addition (mixture of eucalyptus oil 7%; menthol crystal 6.6% and mint oil 2.0%) on digestion, rumen fermentation, rumen microbial populations, milk production and milk composition. Cows were allotted into four groups (15 animals per each) and received EOM at (0, 16, 32 or 48 mg L⁻¹ of drinking water) for successive eight weeks. Addition of EOM at 16 mg L⁻¹ drinking water increased body weight gain, decreased feed intake and improved milk-to-feed ratio by about 7.4, 3.8 and 4.4%, respectively, across the whole experimental period when compared with the control, while moderate and higher addition levels of EOM (32 and 48 mg L⁻¹ water) had variable results and not confirm the stability of animal performance. Addition of EOM had no significant effect on ruminal pH and ruminal fluid ammonia concentration and increased total Volatile Fatty Acid (VFA) by about 2.5, 2.9 and 0.7, respectively when compared with control. On the other hand, EOM (16 or 32 mg L⁻¹ water) decreased molar proportion of acetate, whereas that of propionate increased compared with control and with the higher addition level (48 mg L⁻¹) of EOM receiving cows. Total viable bacteria, cellulolytic bacteria and protozoa counts

were not changed with EOM supplementation. However, protozoa counts numerically decreased with EOM addition. Apparent digestibility of dry matter, organic matter and crude protein were slightly improved ($p>0.05$) with EOM supplementation compared with control. Addition of EOM (16 mg L^{-1}) improved ($p>0.05$) milk production across the whole experimental period, while the higher levels decreased ($p>0.05$) milk production when compared with control. Lower milk fat and higher milk protein was observed for cows received EOM than control and the milk protein showed the opposite direction. Results from this study suggest that EOM addition at 16 mg L^{-1} water slightly improved milk-to-feed ratio and productive performance and had limited effect on digestion and ruminal fermentation characteristics of dairy cows while, the higher dose may have negative effect of the productivity and ruminal fermentation of dairy cows. (*Asian Journal of Animal Sciences* 3 (1): 1-12, 2009; doi: 10.3923/ajas.2009.1.12)

Carcass Composition of Jungle Fowl in Comparison with Broilers and Indigenous Chicken

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Carcass composition of three breed of chicken was compared: jungle fowl, broiler and Malaysian indigenous chicken. The chickens were sacrificed and were divided into forequarter and hindquarter. The forequarter was further divide into breast, wing and ribs. The muscle, bone, fat and skin of all different portions were separated, weighed and recorded. The results showed that broilers have significantly higher muscle weight compared to indigenous chicken and jungle fowl. The jungle fowl has significantly higher bone weight with least fat compared to the other two breeds The carcass composition of indigenous chicken is always in between the broiler and jungle fowl. Present results show that different habitat and feeding pattern of these chickens do contribute to these changes. (*Asian Journal of Animal Sciences* 3 (1): 13-17, 2009; doi: 10.3923/ajas.2009.13.17)

Supplementation of Yeast Fermented Cassava Chip as a Replacement Concentrate on Rumen Fermentation Efficiency and Digestibility of Nutrients in Cattle

S. Khampa, P. Chaowarat, R. Singhalert and M. Wanapat

Ten, one year old male cattles with initial body weight of $150 \pm 10 \text{ kg}$ were randomly divided into two groups and received concentrate at 14% CP (T_1) and

Yeast Fermented Cassava Chip (YFCC) (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 YFCC on feed intake was non-significantly different, while Average Daily Gain (ADG) and digestibility of nutrients were higher ($p < 0.05$) in cattle fed YFCC (T₂) treatments than received concentrate at 14% CP (T₁) (235 and 203 g day⁻¹). 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. Supplementation of YFCC (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 (YFCC) as a replacement concentrate at 14% CP could improve rumen fermentation efficiency and digestibility of nutrients in cattle. (*Asian Journal of Animal Sciences*, 3 (1): 18-24, 2009; **doi**: 10.3923/ajas.2009.18.24)

Economic Efficiency of Caspian Cattle Feedlot Farms

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The objective of this study was to measure Technical Efficiency (TE), Allocative Efficiency (AE) and Economic Efficiency (EE) in Caspian cattle feedlot farms. In this research, 70 farms were selected and efficiency estimated by Data Envelopment Analysis (DEA) approach. The results showed that for the case of Constant Returns to Scale (CRS), mean technical, allocative and cost efficiencies were 67.66, 80.57 and 53.5%, respectively and for the case of Variable Returns to Scale (VRS), mean technical, allocative and cost efficiencies were 87.23, 74.87 and 65.90%, respectively. crsTE were significantly affected by farm size ($p < 0.05$). vrsTE were not significantly affected by farm size ($p > 0.05$). crsTE and vrsTE were not significantly affected by farmer's age, farmer's education and farmer's experience ($p > 0.05$). On the basis of results of this research, we can improve efficiency of Caspian cattle feedlot farms by correct using of production inputs, such as increasing length of fattening period, decreasing farm size and decreasing metabolizable energy and crude protein intake of calve. (*Asian Journal of Animal Sciences*, 3 (1): 25-32, 2009; **doi**: 10.3923/ajas.2009.25.32)

Effects of Malate and Cassava Hay in High-Quality Feed Block on Ruminal Fermentation Efficiency and Digestibility of Nutrients in Dairy Steers

S. Khampa, P. Chaowarat, S. Chumpawadee, R. Singhalert and M. Wanapat

Four, one-year old of dairy steers were randomly assigned according to a 2×2 factorial arrangement in a 4×4 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 is supplementation of high-quality feed block without cassava hay+malate at 500 g; T₂ is supplementation of high-quality feed block without cassava hay+malate at 1,000 g; T₃ is supplementation of high-quality feed block with cassava hay+malate at 500 g; T₄ is supplementation of high-quality feed block with cassava hay+malate at 1,000 g, respectively. The cows were offered the concentrate and high-quality feed block at 1.3 and 0.5% BW and urea-treated rice straw was fed *ad libitum*. The results have revealed that feed-intake, rumen fermentation and blood metabolites were similar for all treatments. Apparent digestibility of nutrients were significant (p<0.05) for all diets. 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 digestibility of nutrients in dairy steers. (*Asian Journal of Animal Sciences*, 3 (1): 33-38, 2009; **doi:** 10.3923/ajas.2009.33.38)

Quality Evaluation of Meat, Skin and Wool from Garole Sheep-a Promising Breed from India

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The aim of this study was to evaluate meat quality of Indian Garole sheep for human consumption and to provide better understanding about its skin and wool quality to stimulate its utilization and marketing. Meat production in India is much lower than the actual demand might be due to improper exploitation of animal resources particularly sheep and goat. West Bengal in India is having a unique sheep breed named as Garole with outstanding genetic potentialities. Total 60 meat, 60 skin and 200 wool samples from 12 different sources were used in this study. The meat quality parameters viz. pH, water holding capacity, refrigeration loss, muscle fiber-diameter, proximate analysis viz. moisture, protein, fat, ash and

carbohydrate contents, mineral analysis for common macro and micro minerals viz. sodium, potassium, calcium, phosphorus, magnesium, iron, copper, zinc, manganese and chloride contents were studied in this research. The study revealed that dressing percentage (55.87%) was higher than other sheep breeds and pH (5.96) water holding capacity (43.33%) and refrigeration loss (0.86%) was comparatively better than known sheep standard. The average value of moisture, protein, fat, ash and carbohydrate contents (76.02, 18.20, 3.53, 1.65 and 0.60%, respectively) is comparable to average sheep standards with lower fat content. The macro and micro minerals contents are optimum or higher than average sheep standards indicating its higher nutritive value. The skin quality parameters viz skin length (61.43 cm), skin width (53.37 cm), skin weight (wet-1.188 kg, dry-0.59 kg), total skin area (3403 cm²) and skin weight percentage (12.02%) was good and comparable with other sheep breed. Wool parameters like fiber length (4.95 cm), fiber diameter (54.77 μm), coefficient of variation (57.48%), type of wool (carpet type), medulation (88.13%), crimp (2.21 cm), bundle strength (7.36 g t⁻¹), elongation (29.56%) and weight of wool per shearing (308 g) are almost similar to common sheep breed of India. The high genetic potential and good quality of meat, skin and wool of Garole sheep of West Bengal, India is highly encouraging and shows a great promise for improving rural economy if proper developmental efforts are made. (*Asian Journal of Animal Sciences* 3 (2): 39-46, 2009; **doi**: 10.3923/ajas.2009.39.46)

Allelic Frequency in Chicken Thyroid Hormone Responsive Spot 14 Alfa Gene (*THRSP*α)

C. d'Andre Hirwa, W. Paul, W. Yan, C. Luo, Q. Nie, G. Yang and X. Zhang

In this study, we describe the insertion/deletion (indel) polymorphism of the *THRSP* gene evaluated using 1% agarose gel and 8% polyacrylamide gel electrophoresis in a sample of (17 breeds of chicken including 3 foreign breeds and 14 chinese native breeds). For the *THRSP*α gene indel polymorphism result, allele frequencies varied, between chinese native chicken and a foreign chicken. A high frequency of allele B (0.91) and a low frequency of allele A (0.09) were observed in Leghorn chicken, which has been selected for laying performance. Based on variation in allele frequencies among populations, either the low frequency of allele A or the high frequency of allele B could be linked to fatness trait of the chicken. In conclusion, *THRSP*α gene might be used as a molecular marker in high quality broiler assistant selection breeding program. (*Asian Journal of Animal Sciences* 3 (3): 85-91, 2009; **doi**: 10.3923/ajas.2009.85.91)

New Observation of Two Species of Sea Cucumbers from Chabahar Bay (Southeast Coasts of Iran)

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Although, sea cucumbers are well known animals in Eastern Asia, in Iran they are not popular marine animals. Divers recorded these animals in their dives but this is the first scientific approach in identification of holothurians in Southeast coast of Iran. All sea cucumbers were collected with SCUBA diving and species identification was done through morphological keys and review of their dermal ossicles. There are two species of sea cucumber belong to genus *Holothuria* were collected on subtidal zone of Chabahar Bay in the late of 2007. This is the first report of *H. hilla*, *H. parva* from Chabahar Bay (North of Oman Sea). This study is revealed the special characteristics of the presented species in order to just identification of them. In the studied areas, *H. parva* has known as a rare species. (*Asian Journal of Animal Sciences* 3 (4): 130-134, 2009; **doi:** 10.3923/ajas.2009.130.134)