Received: 10 Jun 2013

Accepted: 08 Sep 2013

Heavy metal concentrations in muscle tissues of white leg shrimp (*Litopenaeus vannamei*)

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ABSTRACT

Aquatic organisms are one of most important human food sources but they can accumulate heavy metals Entered aquatic ecosystems in their tissues and organs same time and can be transferred through the food chain to higher food levels and in the most top into the human body. Shrimps are of the main groups of sea foods; and because they are benthic species, they can absorb high concentrations of heavy metals from the media. Therefore, in this research the concentrations of heavy metals cadmium, nickel, copper and zinc were determined in white leg shrimp (*Litopenaeus vannamei*). Samples were randomly purchased from Tehran market. The samples were caught from coastal ponds of Khuzestan and Bushehr provinces. First, Length, weight and sex of the samples were determined. Then muscle tissues were wet digested and the metal concentrations were determined using atomic absorption spectroscopy (Perkin Elmer, USA). Statistical analysis of data indicated that, there were no correlations between concentrations of metals with morphological variables. No significant differences were observed between the concentrations of metals in two sexes; however, males had higher concentrations of cadmium than females). No significant differences were observed between metals concentrations. The general pattern of metals concentrations were Zn> Cu> Ni> Cd. Comparison of the metal concentrations with standard values showed that the concentrations of nickel, copper and zinc were lower than FDA, WHO, NHMRC and MAFF standards but cadmium concentrations were higher than these standards.

Keywords: aquatic organism, heavy metals, standard, water pollution, white leg shrimp (*Litopenaeus vannamei*).

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Received: 19 May 2012

Accepted: 14 Dec. 2013

Effect of fluctation temperature on Weight- length and condition factors of *Schizothorax pelzami* (Kessler,1870) in two habitat lake and river

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ABSTRACT

In order to evaluate aspects of the fluctation temperature on Weight- length and condition factors of *Schizothorax pelzami* (Kessler,1870) in the two different habitat such as the ferizi River basin and cheshme sabz lake in khorasan province, total of 873 samples were taken monthly from January, 2009 through January, 2010, by means of gill nets. The results showed that lake population was significantly larger and weightier than river population (by T - test ($P<0.001$)). This may be due to better environmental conditions and food supply in lake habitat. This relation (Wt-Lt) was evaluated for all individuals, and for each sex separately (females and males), due to the significant difference between the male and female slopes of Wt-Lt regressions in both ecosystem. Result(Parameter b) showed that Weight increased Isometrically with size in both population but in river females & lake males growth were positive allometrically, (b= 3.102 ,b= 3.107) also river males population and lake females population growth were negative allometrically, (b=2.807,b=2.828). In addition Body weight exponentially increased with SL (mm) by the following relationships: River population: $W = 0.21 \times 10^{-4} TL^{2.80}$ ($r^2 = 0.93$) for males and $W = 0.5 \times 10^{-5} TL^{3.102}$ ($r^2 = 0.96$) for females. lake population:$W = 0.5 \times 10^{-5} TL^{3.107}$ ($r^2 = 0.93$) for males and $W = 0.21 \times 10^{-4} TL^{2.82}$ ($r^2 = 0.96$) for females.

Keywords: condition factor, *Schizothorax pelzami*, temperature

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Received: 15 Sep 2013
Accepted: 24 Nov 2013

Chemical, biophysical and sensory characteristic of beef burgers incorporated with common carp (*Cyprinus carpio*) surimi

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ABSTRACT

In this study, quality characteristics of incorporated burgers containing 25, 50, 75 and 100 common carp (*Cyprinus carpio*) surimi was evaluated. Accordingly, proximate composition, texture profile analysis (TPA), color, water holding capacity (WHC) and sensory attributes of resulted burgers were determined. Based on data, burgers containing surimi showed lower amount of protein, fat and ash compared to the meat burger with no surimi (control) ($P<0.05$), however, the moisture content of former burgers was significantly higher that the later one ($P<0.05$). Consequently, by addition of surimi into burger formula, WHC was improved. Moreover, the whiteness of control burger was significantly lower compared to the incorporated burgers, as addition of surimi increased the L* and b* values and reduced the redness (a*) of burgers ($P<0.05$). According to TPA test, incorporation of surimi into burger caused significant reduction in hardness, chewiness, gumminess, and firmness of resulted burgers as those treatments containing 50, 75 and 100 surimi showed significant ($P<0.05$) difference with control one. However, in terms of cutting shear, the highest values were belong to treatments with 25, 50 and 75 surimi in which the difference was significant ($P<0.05$) compared to 100 surimi burger and control. Sensory evaluation indicated that burgers with 50, 75 and 100 surimi obtained the highest texture and color scores ($P<0.05$), whereas, did not show any significant difference in terms of taste and flavor compared to the control ($P>0.05$).

Keywords: incorporated burgers, sensory evaluation, surimi, common carp, texture.

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Received: 09 July 2013

Accepted: 02 Oct 2014

Prebiotic effect of different levels of the cell wall of the yeast *Saccharomyces cerevisiae* on growth, survival, Open retardation and blood indices of rainbow trout (*Oncorhynchus mykiss*)

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ABSTRACT

This study was conducted to evaluate the effect of prebiotic short *Saccharomyces cerevisiae* yeast cell wall (YCW) on growth , nutrition and survival rates , blood indices of rainbow trout *(Oncorhynchus mykiss*) were studied . 600 pieces of salmon with an average weight of (1 ± 20) g 4 treatments and 3 replications (each replication 50 pieces of fish) groups. Treatments 1, 2, 3 and 4, respectively, with diets containing 0, 0.5, 1.5 and 2.5 grams of prebiotic cell wall of the yeast *Saccharomyces cerevisiae* were fed for 60 days. The results showed that the body weight of rainbow trout in the control treatment (treatment 1), treatment 2, treatment 3 and treatment 4, respectively, 48.70± 0.3, 60.50 ± 0.30, 40.52 ±0.20, 30.52 ± 0.15 g. Highest level BW 60 day breeding period was observed in treatment 3 was significantly higher than the control treatment ($P < 0.05$). But with treatment, 2.5 gram difference was not significant ($P > 0.05$). Rainbow trout body length in control treatment (treatment 1) , treatment 2 , treatment 3 and treatment 4 , respectively, 1.16 ± 0.05, 16.4 ± 0.03, 16.8 ± 0.03, 16.7 ± 0.05 cm , so that the period of different doses of 0.5 , 1.5 and 2.5 grams of prebiotic cell wall of the yeast *Saccharomyces cerevisiae* significant differences between treatment and control treatments, 0.5 , 1.5 and 2.5 g per kg of feed for farmed fish were observed during the impact ($P < 0.05$) and treated only between 1.5 and 2.5 gram difference was not significant ($P > 0.05$). Add the yeast *Saccharomyces cerevisiae* cell wall is prebiotic to the diet of fish fingerling rainbow trout, has no effect on increasing survival rates. In this study the prebiotic cell wall of the yeast *Saccharomyces cerevisiae* , though the blood contains red blood cells (RBC), hematocrit (HCT), had no effect ($P > 0.05$), but hemoglobin, RBC indices trout samples Rainbow treatments tested in this study , there was no significant difference ($P < 0.05$). All treatments were well fed with prebiotic growth in the cell wall of the yeast *Saccharomyces cerevisiae* were significantly different from the control ($P < 0.05$) and improve these indicators were compared to the control treatment.

Keywords: growth, hematological, rainbow trout (*Oncorhynchus mykiss*), the cell wall of the yeast *Saccharomyces cerevisiae*, survival.

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Received: 28 Aug 2012

Accepted: 13 Feb 2013

Comparison of fatty acid profile in muscle and liver of male and female of *Schizothorax zarudnyi*

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ABSTRACT

Present study was conducted to find the variations in fatty acid profile between muscle and liver of male and female of *Schizothorax zarudnyi*. Totally, 18 fatty acids of saturated, mono-unsaturated and poly-unsaturated fatty acids were found in both male and female of *S. zarudnyi*. Palmitic acid (C16:0), palmitoleic acid (C16:1) and docosahexaenoic acid (C22:0) were the most abundant fatty acids of SFAs, MUFAs and PUFAs in fish muscle and liver, respectively. There were no significant differences in content of SFAs (with 33.44 and 35.42 g/100 g of total fatty acids in muscle of male and female, respectively), MUFAs (with 42.56 and 42.94) and PUFAs (with 22.00 and 21.68) between male and female of *S. zarudnyi* (P>0.05). The content of SFA, MUFA and PUFAs in liver of male and female of *S. zarudnyi* were 34.51 and 37.04, 42.95 and 44.31 and also 22.55 and 18.62, respectively. N-3/n-6 ratio in muscle and liver of male and female of *S. zarudnyi* was as 3.91, 2.99, 4.96 and 4.43, respectively.

Keywords: fatty acid profile, n-3 fatty acids, n-6 fatty acids, poly-unsaturated fatty acids, *Schizothorax zarudnyi*.

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Received: 27 May 2012

Accepted: 15 Mar 2014

Profiles in the Bone of Gold Stripe Sardine (*sardinella gibbosa*), Anchovy Kilka (*Clupeonella engrauliformis*) and Indian Anchovy (*Stolephorus indicus*)

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ABSTRACT

The aim of this study was to determine the fatty acid and mineral composition in bone of 3 pelagic fish: Gold stripe Sardine (*sardinella gibbosa*), Anchovy Kilka (*Clupeonella engrauliformis*) and Indian anchovy (*Stolephorus indicus*). Fatty acid profiles showed that total saturated fatty acid have no significant differences in 3 species. The content of total mono saturated fatty acids in Anchovy Kilka was minimum ($P<0.05$). Total poly saturated fatty acids and EPA+DHA in the gold stripe sardine and Indian anchovy was maximum and minimum respectively ($P<0.05$). Maximum content of the n3/n6 fatty acids ratio was in the gold stripe sardine and minimum in the Indian anchovy ($P<0.05$). Calcium, iron, and Zn content were maximum and minimum in the gold stripe sardine and Anchovy Kilka respectively. Anchovy Kilka have highest amount of Cu and Cr instead of gold stripe sardine that have highest amount of K and F ($P<0.05$). Based on the result the best chemical composition observed in the gold stripe sardine. This is seems that powder of the bone of these 3 pelagic fish can be used in the food industries as additives.

Keywords: mineral composition, mono saturated fatty acid, poly saturated fatty acid, powder of the bone, saturated fatty acid.

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Received: 25 Apr 2014

Accepted: 15 Apr 2013

Effects of Catechin for preventing black spot forming in cultured whiteleg shrimp (*Litopenaeus vannamei*) during frozen storage

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ABSTRACT

Effects of catechin for preventing black spots forming in whiteleg shrimp (Litopenaeus vannamei) were evaluated. For processing whole shrimp, catechin was used at a concentration of 0.2 and 0.3% for 15 minutes. Sodium metabisulfite was used at a concentration of 3 % for 10 minutes as control samples. Without antioxidant shrimp were used as control samples too. Treatments quality was evaluated by Sensory analysis and chemical experiments during 6 months being kept in frozen storage. pH, total volatile basic nitrogen (TVB-N) and trimethylamine (TMA) factors in 0.3% catechin treatments showed significant differences During the storage period ($P<0.05$). No significant difference was observed in free fatty acids (FFA) of 0.2% catechin treatments ($P>0.05$). TMA, FFA and TVB-N factors in Sodium metabisulfite treatments showed significant differences compared to other treatments ($P<0.05$). In terms of proximate compositions and protease activity in 0.2 and 0.3% catechin treatments, no significant difference was observed compared to control samples ($P>0.05$). PV, Thiobarbituric acid (TBARS), FFA, pH and TVB-N factors in 0.2 and 0.3% catechin treatments showed no significant difference during the storage period compared to Sodium metabisulfite treatments ($P>0.05$). But they showed significant differences compared to without antioxidant treatments ($P<0.05$). No black spot was observed in catechin and Sodium metabisulfite treatments till the end of the storage period but it was formed in without antioxidant treatments in less than a month. According to the results, catechin at a concentration of 0.2% could be a proper substitute for Sodium metabisulfite for preventing black spots forming in whiteleg shrimp during 6 months storage times.

Keywords: black spot, catechin, sodium metabisulfite, keeping in frozen storage, whiteleg shrimp

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Received: 10 Apr 2013

Accepted: 27 May 2012

Cholinesterase activity evaluation in *Capoeta capoeta gracilis* as Biomarker of enviromental monitoring in Gorgan-roud basin

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ABSTRACT

Biomarkers are assigned as early warning systems regarding aquatic organisms exposed to pollutants. Among which, however, measurement of esterase enzymes activity specially cholinesterase of fish tissues, is a marker for exposure to organophosphate pesticide and carbamates, and this biomarker has been used widely in broad range of investigations. A number of *Capoeta capoeta gracilis* (:Cyprinidae) samples were caught from five determined stations located in Gorgan river basin, followed by sampling from three distinct tissues including liver, muscle and brain. Special activity and inhibition percentage of both esterase enzyme and acethyle cholinesterase (Elman method) were also measured. According to our current results, significant differences were detected between enzyme levels of tree tissues of five stations. The maximum value of inhibition percentage of esterase enzymes of three tissues including liver, muscle and brain were calculated as 38.75, 31.01 and 10.62, respectively, when data of downstream of gorgan river at summer were taken into account. Hence, due to more inhibition as compared with the other enzyme tissues, we strongly propose the utilization of liver acetyle cholinesterase activity in this species as a biomarker regarding determination and classification of lotic water ecosystems pollution. Furthermore, muscle tissue, because of the presence of butyryl cholinesterase (measured in general esterase assay) which is commonly accompanied by more sensivity versus inhibitors, can be used consequently in environmental monitorings. As the last point of view, the study of such reliable markers in diverse seasons showed that the environmental monitoring programs can be more helpful as long as such investigations are carried out in warm seasons in one hand, and based on agronomical calendar plus spraying farms on the other.

Keywords: acethyle cholinesterase, biomarkers, *Capoeta capoeta gracilis*, esterase enzymes, Gorgan river.

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Received: 25 Dec 2013

Accepted: 10 Mar 2014

The effect of dietary supplementation of L-carnitine on resistance to temperature and salinity stresses in Sobaity seabream *Sparidentex hasta*

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ABSTRACT

To investigate the effect of dietary supplementation of L-carnitine on resistance to temperature and salinity stresses in Sobaity fry, an experiment was carried out with 240 pieces of fish with average initial weight of 3.01±0.03 g for 10 weeks. Experimental treatments were consisted of four levels of 0, 500, 1000 and 1800 (respectively control, LC_{500}, LC_{1000} and LC_{1800}) mg L-Carnitine per kg of diet, each with three replicates in a completely randomized design. During the experimental period, feeding was performed by hand and the fish were daily fed to satiation at three intervals. At the end of the experimental period, fish were exposed to two temperatures of 15 and 37°C for 30 minutes for thermal stress test and to two salinity levels of 12 and 70 ppt for one hour for salinity stress test. The results showed that in LC_{1000} and LC_{1800} treatments, the resistance to high temperature, low temperature and high salinity stresses increased significantly compared to control group ($P<0.05$). Furthermore, there was no significant difference in resistance to low salinity stress between the treatments ($P>0.05$). The results of present research revealed that the dietary supplementation of L-carnitine could favorably affect the resistance to temperature and salinity stresses in Sobaity fry. Between the different levels of L-carnitine used, the most effective dose on resistance to temperature and salinity stresses in Sobaity seabream fry was the level of 1000 mg L-carnitine per kg of diet.

Keywords: L-Carnitine, salinity stress, Sobaity Seabream, *Sparidentex hasta*, temperature stress.

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Received: 04 Nov 2013

Accepted: 29 Dec 2013

A study on the effect of rosemary extract (Rosmarinus officinalis) on the quality of fish fingers produced from Silver carp (*Hypophthalmichthys molitrix*)

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ABSTRACT

Plant extracts are rich sources of natural antioxidant and antibacterial compounds. In recent decades, the need for using natural antioxidants in foods, pharmaceuticals and cosmetics has promopted extensive scientific research. The purpose of this study was to investigation of effect of different percentages of rosemary extract (0, 1, 2.5 and 5%) on the quality, chemical and microbial of the produced fish fingers from minced of silver carp. Samples were stored in the refrigerator at a temperature of 4±1°C (for 15 days). Chemical and microbial tests (parameters of pH, thiobarbitoric acid (TBA), volatile nitrogen bases (TVN), total bacterial count) were performed on the prepared samples during the store period. Based on the results, total bacteria counts, showed that rosemary extract has anti-bacterial properties, except 6, every day control samples compared to samples treated rosemary extract total bacterial load is more. The results showed that in samples treated with rosemary extract, pH decreased during storage significantly, this decrease is partly due to the anti-bacterial effect of rosemary extract ($P<0.05$). The antioxidant properties of rosemary extracts inhibit TBA exceed acceptable limits during the maintenance period. TBA values in samples treated with rosemary extract significantly lower than the control samples from day 6 to the end of the storage period. Volatile nitrogen bases in samples treated with different concentrations of the rosemary extract (except 5%) did not exceed acceptable limit during storage period. Based on the results of this study, can be used from rosemary extract (1%) for to keep of the quality of fish finger in cold conditions for a short period.

Keywords: fish finger, rosemary extract, shelf life, silver carp.

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Received: 19 Sep 2013
Accepted: 05 Mar 2014

Morphometric characteristics of the blue swimming crab, *Portunus pelagicus* (Linnaeus, 1758) from the Persian Gulf, Bandar Abbas, Iran

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ABSTRACT

In this study, some external morphometric characters viz. carapace width (CW) and length (CL), chelar propodus width (CHW) and length (CHL) and abdominal width (AW) and also body weight (BW) of the blue swimming crab, *Portunus pelagicus* (Linnaeus, 1758), were examined. Relative growth and regression slope compared among these parameters between 151 males and 158 females. Specimens were collected during one year on a monthly basis from the Persian Gulf waters, Bandar Abbas, Iran. Regression analysis between CW-BW and CL-BW demonstrated that males were 1.07 and 1.14 folds heavier than females, respectively. Besides, females have 1.1 folds wider carapace in compare to males, revealed from considering the relative growth equation. Regression between CHL and BW demonstrated that chelars were significantly longer (1.44 folds) in bias to males. Also regression analysis between AW and BW revealed that difference between male and female is significant, with wider abdomen in later (1.61 folds). Considering the significant discrepancy between males and females, it is concluded that differences in these body parts may be related to reproductive adaptation for more efficiency.

Keywords: blue swimming crab, morphometrics, Persian Gulf, *Portunus pelagicus*, relative growth.

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Received: 27 May 2012

Accepted: 10 Apr 2013

Histological development of the alimentary channel of Caspian Roach (*Rutilus rutilus caspicus*)

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ABSTRACT

The histology of digestive tract of Caspian roach (Rutilus rutilus caspicus) were studied for 53 days from hatching to fingerling size at the natural habitat of the larval stage. Ages 1, 4, 10, 18, 28, 39 and 53 days after hatching (DAH) were selected for the histological studies. after sampling and fixation with 10 percent formalin the histological process were conduct. The newly hatched larvae showed a simple and undifferentiated digestive tube. The oral cavity was still closed. Tubular shape liver and primary swim bladder was other features of this stage. The larvae at 4 DAH had the mouth opened and a few goblet cells between stratified cells of pharynx and a small esophagus with stratified squamous epithelium were observed. The most important incident at 10 DAH was starting the exogenous feeding. The buds and goblet cells in boccopharingeal cavity were changed position deeper in epithelium. Fully absorption of yolk sac and final differentiation of esophagus happened until 28 DPH. The complete differentiate of pharyngeal teeth, deletion of microscopic observed yolk sac and twisting the intestine were other features until the end of the study. Intestine was the first and the pharyngeal teeth were the last region differentiated. Keeping endogenous feed long time after starting exogenous feed shows a good point in this fish to increase survival in lack of food conditions. The ontogeny features were discussed in this study showed that this organ differentiate same in this fish as other Ostariophisy fish although there are some Interspecies differences like what we saw in pharyngeal teeth.

Keywords: Caspian Roach fish, ontogeny, digestive system, histology, larval stage, exogenous feeding.

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