

2460th Conference



International Conference on **Food Safety & Regulatory**
&
3rd International Conference on
Water Microbiology, Water Sustainability and Reuse Technologies
December 03-04, 2018 | Chicago, USA

Poster Presentations

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Biodegradation kinetics of phenol and 2-chlorophenol by mixed cultures in a fixed biofilm process

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Statement of the Problem: Phenols and chlorophenols produced from chemical industries such as petroleum refineries, pharmaceuticals, pesticide industry and plastic manufacture have resulted in a serious ecological problem as environmental pollutants. Various treatment methods such as activated carbon adsorption, chemical oxidation, and aerobic/anaerobic biodegradation have been extensively applied to treat chlorophenolic compounds from wastewater. Compared with physicochemical methods, biodegradation has been widely used to deal with chlorophenolic compounds in wastewater because of low treatment cost and low possibility of byproduct formation. A wide range of study is available on biodegradation kinetics of single phenol or 2-chlorophenol (2-CP) with pure or mixed cultures of microorganisms. However, the study of biodegradation kinetics of phenol and 2-chlorophenol simultaneously by mixed culture is still scarce. In this study, the fixed biofilm reactor was conducted to verify the kinetic model of simultaneous biodegradation of phenol and 2-CP. The modeling and experimental results are compared for the effluent concentration of phenol and 2-CP in the fixed biofilm process.

Methodology & Theoretical Orientation: Three batch biodegradation experiments for phenol, 2-CP, and phenol plus 2-CP were performed in 250ml batch reactors with acclimated activated sludge to determine biokinetic parameters. The effective working volume of biofilm reactor was 1.6L, which yielded a hydraulic retention time (HRT) of 6h. The reactor was maintained at 30±0.2°C through a water jacket using a circulating water bath.

Findings: Experimental results for a mixture of phenol and 2-CP in batch experiments show that the phenol was completely removed within 4.2 days, however, the percentage of 2-CP removal was 55-79% at this stage. Initial phenol and 2-CP concentrations were 25.2 and 19.3mgL⁻¹ with corresponding to the removal efficiencies of 98% for phenol and 89% for 2-CP while the packed-bed fixed biofilm reactor reached a steady-state condition.

Conclusion & Significance: The approaches of model and experiments presented in this study could be used to design a pilot-scale or full-scale fixed biofilm process for the biodegradation of phenolic and chlorophenolic wastewater from the discharges of various industries

Biography

Yen-Hui Lin received his Master in Environmental Engineering at Cheng Kung University in Taiwan in 1987 and PhD in Environmental Engineering program at the Department of Civil Engineering and Mechanics from the University of Wisconsin-Milwaukee in the USA in 1998. From 1998 to 2004, he was appointed as a Research Fellow at Development Center of Biotechnology in Taiwan. He is currently working as Professor at the Department of Safety, Health, and Environmental Engineering at Central Taiwan University of Science and Technology in Taiwan. His primary study emphasized azo-dye decolorization in a biological activated carbon process and chromium(VI) bioreduction by *E. coli* 33456 on chitosan beads. Current funded research projects include removal of textile wastewater by using fly ash-chitosan composite supporting media in a fluidized-bed bioreactor and the removal of organic carbon and ammonium-nitrogen in leachate using fly ash-waste sludge-clay as a composite supporting medium in an oxic/anoxic biofilm reactor.

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Bacterial antibiotic resistance profiles as a possible indicator of bacterial pollution sources: Lake Sevan basin's rivers in Armenia

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Statement of the Problem: Lake Sevan having significant role in the economy of Armenia is not the only main freshwater lake in Armenia, the largest lake in Trans-Caucasus and the largest drinking water reservoir to the South Caucasus, but it is also one of the largest freshwater lakes in Eurasia. Taking into account the importance of the Lake Sevan basin's Rivers for economy and healthcare of Armenia in whole, the main aim of these investigations was to characterize the bacteriological water quality of Lake Sevan basin's rivers in Armenia in November 2016 and in April 2017, and to identify the relationship between the waters and populations living closed to the rivers.

Methodology: The relationship between the rivers and people living closed to rivers were shown through the evaluation of tetracycline resistance (TR) bacteria.

Findings: Despite of the rivers considered being bacteriologically clean, the waters carried high numbers of resistant bacteria and might be serving as reservoirs of antibiotic resistance genes in environment. The TR patterns of *Escherichia coli* isolates from the waters and populations from the same locations indicated about the relationship between the waters and living closed to waters people. Preliminary studies evidenced about the relationship between fishes from water and water from the River Argichi.

Conclusion & Significance: This is the first investigation to describe the bacterial pollution of rivers through the evaluation of bacterial antibiotic resistance patterns of waters. Probably, the detailed investigations of bacterial plasmid profiles in rivers and possible pollution sources can be more informative during the determination of key human activities responsible for clearness of the waters.

Biography

Zaven S Pepoyan is a member of the International Association for Human and Animals Health Improvement since 2008. He is actively engaged on ecological investigations. He is the author of three scientific publications. Skills and Expertise: Society and Environment

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Maintaining a healthy balanced diet before and during pregnancy

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Talking about diet during pregnancy, is not about restricting calories or trying to lose weight. Dieting to lose weight during pregnancy can be hazardous to mother and baby. Maintaining a healthy balanced diet is important for maintaining optimal health throughout life. Women of childbearing age, good nutrition is important for preparing the body for the demands of pregnancy. A healthy diet before and during pregnancy helps to protect both the pregnant mother and her developing baby from immediate and long-term health risks. Poor maternal nutrition and health women is the key contributor to poor foetal development which will influence it for the rest of its life, before it is even born, increases the risk to give birth to a low weight infant, baby born will be ill or die. During pregnancy, a woman's macronutrient (energy) and micronutrient (e.g. vitamins, mineral) requirements increase. What a woman eats and drinks during pregnancy is her baby's main source of nourishment. She needs more calcium, folic acid, iron and protein daily for about 300 extra kcal compared to her usual diet. She need to take a daily prenatal vitamin. In general, underweight women need more calories during pregnancy; overweight and obese women need fewer of them. A healthy balanced diet should form the basis of a woman's nutritional intake. To keep her dietary intake pregnant woman should avoid food taboos. Good nutrition is most important immediately prior to conception and during the first 12 weeks of pregnancy. It is therefore important for women to maintain a healthy diet throughout their childbearing years, particularly if they are planning to become pregnant. Because the ongoing development of the baby depends on the health of the embryo from which it is formed. That implants in the wall of the woman's uterus (Womb) which leads to form the foetus and the placenta (which provides nutrition to the foetus during pregnancy). The nerves which regulate the foetus's appetite are also programmed while it is developing in the womb and this affects an individual's appetite regulation later in life. Individuals who are programmed to consume high-fat, high-sugar diets in utero (whilst in the womb), also have a greater tendency to consume such diets throughout their life.

Biography

Renjano Humtsoe is professionally trained in Female Health Worker (FHW), specialized in child delivery. She has attended seminars & training on nutrition and diet especially for expectant mother as well as for the newborn babies and also advised best nutrition and diets for both the mother and children. She is very much expert in delivering normal birth including twins and triplets without using any medical equipment. Till date, she had delivered more than 2500 babies. Being a very much dedicated, hardworking and sincere in her field, Government of Nagaland had awarded her Governor Gold Medal in the in the year for being the first and only Lady who had performed extraordinary achievement in her duties.

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The production and application of biofloculants and their nanoparticles in dairy wastewater treatment

Adeleke R Oluwakamiye
University of Ibadan, Nigeria

One of the most pervasive and challenging problems faced by dairy industries is the availability of clean water, reclamation of wastewater and its discharge. This challenge requires modern biotechnological and the fast-growing nanotechnological approaches as robust and newest methods of treating and purifying water at lower cost with less energy in production industries, while at the same time minimizing the use of chemical flocculants and the deleterious health and environmental effects. Biofloculants, and its silver and magnetic nanoparticles were produced and applied in dairy wastewater treatment. The flocculating activity of all the isolates ranged from 12.14-85.39 % in which *Bacillus subtilis* B2 had the highest flocculating efficiency (85.40%). The best three with high flocculating efficiencies were selected for further studies and production of nanoparticles. They were *Bacillus subtilis* B2 (85.39%), *Fusarium sp.* F6. (81.30%) and *Bacillus licheniformis* B5 (70.88 %). The application of the biofloculant nanoparticles brought about a reduction in BOD, COD, TSS, TDS, pH, Salinity, Conductivity and turbidity with percentage reduction ranging from 1.11% - 44.17% for BOD, 16.12–71.44% for COD, 7.61–83.70% for TSS, 2.02%–74.94% for TDS, 4.8–6.2 for pH, 2.38%-85.20% for salinity, 15.25%-85.69% for conductivity and for turbidity 2.56%-85.09%. Metal content reduction ranged from 2.91%-71.46% for Fe, 6.15%-95.38% for Cu and 12.57%-97.96% for Zn. Fourier transform infrared spectroscopy revealed the carboxyl (COH) and hydroxyl (OH) group that gave rise to reduced and stable nanoparticle biofloculants. Scanning electron micrograph showed their crystalline fluffy structures, dendritic nature in different shapes and sizes.

Biography

Adeleke R Oluwakamiye is a first-year PhD student in the Biotechnology and Industrial Microbiology program, University of Ibadan, Nigeria. where she is working to proffer solution to the seemingly unending problem faced by industries in the reuse and discharge of wastewater. She is interested in employing a biotechnological and nanotechnological approach in mitigating and recycling wastewater discharge from factories/industries.

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Wastewater from a pig slaughterhouse as a reservoir for clinically relevant antibiotic-resistant pathogens and their dissemination into surface water

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Background and objectives: Slaughterhouse wastewater is considered a hotspot for antibiotic-resistant pathogens (ARPs). The aim was to investigate the occurrence of selected clinically relevant ARPs in wastewater from a pig slaughterhouse and its municipal wastewater treatment plant (WWTP) and to examine their emergence after the treatment process in the municipal WWTP.

Methods: Wastewater samples (n=38) were taken along the production chain inside a pig slaughterhouse in Germany with a slaughtering capacity of 11,000 pigs/day. Its municipal WWTP was sampled as well (n=12). Samples were screened for the presence of ARP using CHROM agar selective media. The final identification was done by MALDI-TOF MS and resistance was confirmed by determining of MICs using the ID/AST testing system. The resistant strains were further characterized by different molecular typing approaches. The colistin-resistant strains were screened for *mcr-1/ mcr-2/mcr-3/mcr-4*.

Results: All wastewater samples including the outflow and the preflow of the municipal WWTP were positive for ARPs. Their occurrence at the sampling points and species distribution was done. 15.7% of the isolated strains from the slaughterhouse (n=166) were multidrug-resistant (MDR) and 3.0% were colistin-resistant. The percentage of MDR strains from the municipal WWTP (n=28) was 96.5%; of these, 10.7% were colistin-resistant. The colistin-resistant isolates (n=8) were *mcr*-negative. The prevalence of carbapenem-resistant strains was low at 1.2% and 3.4% among the strains from the slaughterhouse and the municipal WWTP, respectively. The abundance of extraintestinal pathogenic *E. coli* was low at 7.1%. The tested MRSA strains from the slaughterhouse (n=57) were known livestock-associated types.

Conclusions: Wastewater from the investigated pig slaughterhouse is a reservoir for clinically relevant ARPs. Despite the elimination of bacterial load in the municipal WWTP, they could still be found in its outflow and preflow. This could pose a threat to human health and needs to be further investigated.

Biography

Mykhailo Savin has studied Food Technology at the University of Bonn and got his MSc degree in 2016. From 2016 on, he has been working as a PhD student at the Institute of Animal Sciences at the University of Bonn. He is involved in the BMBF (Federal Ministry of Education and Research)-joint project "HyReKa", where he investigates the occurrence and dissemination of clinically relevant antibiotic-resistant pathogens from poultry and pig slaughterhouses via wastewater and sewage water treatment plants into surface waters. Based on these results, recommendations for the prevention of dissemination should be formulated.

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Accepted Abstracts

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Identification and evaluation of biological properties of bioactive peptides derived from tryptic hydrolysis of *Lens culinaris*

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Glycation alters protein structure thus impairs its functions, bioactive peptides might act as a protecting agent via trapping excess sugar. In this study, red and brown *Lens culinaris* protein hydrolysate was prepared by tryptic digestion, using an enzyme/substrate ratio of 1:20(g/g), at 37°C, 12h. Protective ability against protein glycation, antioxidant and antiproliferative activities (on MCF-7, PC3 and HepG2 cell lines) of hydrolysate fractions <3 kDa were assayed *in vitro*. Peptide fractions were sequenced by HPLC-MS-MS. Results showed that those peptide fractions exhibited antiglycation, antioxidant and antiproliferative activities. Three novel peptides were identified from red and brown *Lens culinaris* for the first time.

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The production and application of biofloculants and their nanoparticles in dairy wastewater treatment

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One of the most pervasive and challenging problems faced by dairy industries is the availability of clean water, reclamation of wastewater and its discharge. This challenge requires modern biotechnological and the fast-growing nanotechnological approaches as robust and newest methods of treating and purifying water at lower cost with less energy in production industries, while at the same time minimizing the use of chemical flocculants and the deleterious health and environmental effects. Biofloculants, and its silver and magnetic nanoparticles were produced and applied in dairy wastewater treatment. The flocculating activity of all the isolates ranged from 12.14-85.39 % in which *Bacillus subtilis* B2 had the highest flocculating efficiency (85.40%). The best three with high flocculating efficiencies were selected for further studies and production of nanoparticles. They were *Bacillus subtilis* B2 (85.39%), *Fusarium* sp. F6. (81.30%) and *Bacillus licheniformis* B5 (70.88 %). The application of the biofloculant nanoparticles brought about a reduction in BOD, COD, TSS, TDS, pH, Salinity, Conductivity and turbidity with percentage reduction ranging from 1.11% - 44.17% for BOD, 16.12-71.44% for COD, 7.61-83.70% for TSS, 2.02%-74.94% for TDS, 4.8-6.2 for pH, 2.38%-85.20% for salinity, 15.25%-85.69% for conductivity and for turbidity 2.56%-85.09%. Metal content reduction ranged from 2.91%-71.46% for Fe, 6.15%-95.38% for Cu and 12.57%-97.96% for Zn. Fourier transform infrared spectroscopy revealed the carboxyl (COH) and hydroxyl (OH) group that gave rise to reduced and stable nanoparticle biofloculants. Scanning electron micrograph showed their crystalline fluffy structures, dendritic nature in different shapes and sizes.

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Electrochemical removal of emerging organic contaminants from effluent: Electro-catalytic materials and design influence

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Emerging organic contaminants (EOC) are products or chemicals without regulatory status and whose effects on the environment and human health are still unknown. Pharmaceuticals and personal care products (PPCPs) are recognized as 'emerging' contaminants due to their bioactivity, wide usage, and potential health and ecological risks. The wide range of chemical properties of PPCPs constrains the development of a universal technology for effluent cleaning in wastewater treatment plants (WWTPs). The present work is part of an INTERREG SUDOE project, 4KET4REUSE, which one of the main objectives is to promote innovative capabilities for water reuse promoting a sustainable growth. The electrokinetic (EK) technology is being studied by the team aiming to optimize and to make it suitable as an effluent polishing step in WWTPs. The work here presented focused on the definition of the best electrode materials and design aiming to improve PPCPs removal from the effluent. For that, metal mixed oxide coated titanium (MMO) as a cathode was investigated with (i) different anode materials: graphite, platinized titanium (Pt/Ti) and MMO, and (ii) three different shapes (bar, mesh and circular mesh). The EK experiments were carried out applying 0.3mA cm⁻² of current for 2 hours. In order to optimize the treatment, higher current intensities were also tested. In addition, the microbiologic community was analyzed in the initial sample and after treatment. Differences in energetic costs between electrode materials and shape were also evaluated. The results showed that the Pt/Ti bar and MMO mesh with circular shape had the best EOC removals (<LD-69%). Furthermore, the compounds characteristics did influence the EK removals, being caffeine, carbamazepine, and ibuprofen more difficult to remove.

I am an environmental engineer, currently doing a PhD in Environmental and Sustainability Programme at FCT-NOVA with a strong focus on water sustainability. I have been studying sustainable technologies as phytoremediation and electro-based technologies to remove emerging contaminants from liquid and solid matrices. My main research target has been the design, development, and optimization of an electrokinetic technology for pharmaceuticals and personal care products removal in wastewater treatment plants in order to guarantee it safe re-use in agriculture and improve the quality of the aquatic bodies.

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Effect of heat treatment on protein profile of whey protein beverages

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There is interest in the production of heat-stable and clear beverages containing high levels of whey proteins. A challenge of incorporating whey proteins into sports beverages is that hot-fill treatment (88°C for 2min). The objective of this research is to study the effects that undergo the profile of whey proteins on a whey protein beverage (WPB) when exposed to the thermal treatment. WPB was prepared to mix 5% whey protein with 0.04% potassium sorbate, and 0.5M H₃PO₄ was used to adjust pH to 3.0 and 7.0. The protein particle size and zeta-potential were tested using a spectrophotometer. Lastly, the protein profile of beverages containing whey was determined by SDS-PAGE. Hot-fill treatment had a negative impact on the physicochemical properties of whey proteins. The formation of protein-protein complexes produced an increase in particle size and absolute zeta potential in WPB formulations at both pH 3.0 and 7.0.

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Milk vita cooperative dairying: A legendary era in Bangladesh

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Milk Vita-the largest pioneering dairy cooperative venture in Bangladesh deals with about 350,000L/day liquid milk production, collection, processing, and marketing with a diversified set of dairy products nation widely & relentlessly proving the myth of successful rural prosperity as a model of least developed countries. In Bangladesh year round (January–December) rate of milk production took place as 9.97%, 10.01%, 9.20%, 8.59%, 8.17%, 8.37%, 7.27%, 6.50%, 6.46%, 6.86%, 8.73% and 9.88% respectively (1 Azad, MAK, 2001). In Bangladesh, Milk Vita has successfully developed a cooperative milk production model like AMUL, India beyond existing traditional or informal systems as well as combating all sorts of identified challenges. Milk Vita covers annual growth rate about 17% in raw liquid milk production for the whole nutrition thrust folk in hectic mode augmenting smart synchronization of year-round milk production (9.283 MMT i.e. 62.44 % of demand), requirement (14.865 MMT) & deficit (5.582 MMT, i.e. 37.55% of demand) (2 DLS:2016-2017) in Bangladesh. Dairying in Bangladesh is generally characterized by small-scale, widely dispersed and unorganized milk animal holders, low productivity, lack of assured year-round remunerative producer price for raw milk, inadequate basic infrastructure for provision of production inputs, services and above all lack of professional management practices. Milk yield is also too low; 200-250L during the 10 months lactation period in contrast to 800L for Pakistan, 500L for India and 700L of all Asia (National Livestock Development Policy, 2007). Appropriate research and dairy development interventions are needed to improve this situation and ultimately Milk Vita—a legendary era in Bangladesh relentlessly doing the same. In Bangladesh, milk production increases 5.98% per year where demand increases by about 10% due to an increase in purchasing capacity and food habit change of consumers. Therefore, the potential plenty requirements for dairy entrepreneurship development/business opportunities in Bangladesh awaits and it may be synchronized by the establishment of small-scale dairy enterprises and processing plants through Milk Vita a lot providing appropriate national & international dairy policy and institutional support services forwarding rural prosperity overcoming identified challenges. In this paper, the picture of successful cooperative dairying in Bangladesh through Milk Vita has been displayed accordingly.

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Impact of a high fructose diet in Wistar rat, its metabolic and behavioral disorders and the effect of supplementation of flaxseed

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Background: The deregulation of the energy balance by the malnutrition leads to the dysfunction of the neuro and the metabolic mechanisms but these homeostatic problems can be corrected by nutritional supplements. In this study, we investigated the effects of flaxseed on metabolism and anxiety-depressive-like disorders in high fructose-fed (23%) Wistar rat.

Methods: One-month-old female Wistar rats were divided into four groups of six rats: (1) Control: (30g of standard food + 30ml of tap water), (2) Control supplemented with flaxseed (27g standard food + 7g flaxseed + 30ml tap water) (3) Fructose (30 g standard food + 23% fructose) (4) Fructose supplemented with flaxseed (23g standard food + 7g flaxseed + 23% fructose), after two months of diet, the rats underwent a battery of tests to evaluate the effective behavior (Open Field, Elevated Plus Maze and Forced Swimming Test) and biochemical analyses of glucose, cholesterol, and triglycerides.

Results: High fructose diet induces adverse metabolic effects (increases blood sugar, cholesterol, triglycerides) and behavioral ones (depression). For flaxseed, it does not correct anxiety but decreases depression-like and metabolic disorders.

Conclusion: Our results suggest that a high fructose diet induces metabolic and behavioral dysfunctions. Flaxseeds have improved these conditions.

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The diversity of cyanobacteria from lake Andraikiba Antsirabe (Vakinankaratra region): First public health risk analysis

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This study was conducted at Andraikiba lake (Antsirabe, Vakinankaratra) in December 2017 till January 2018. It stands to physical and chemical parameters analysis, cyanobacteria's diversity and the risk likely caused by species founding there. The lake is a volcanic crater and have a 5km circumference, 51m maximal depth and is the principal water spring of Antsirabe's town. Seven (07) genre of cyanobacteria was founding there and have a stump toxins production as four of them were responsible for health problem leading to mortality in some countries. Andraikiba doesn't have any bloom's risk or toxicity but phosphor spreading by detergent, and other mineral erosions are lakes future problem. Some activities must be prohibited on the lake, and cells density evolution have to be followed for preventing sanitary security of Antsirabe consumable water.

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Broiler meat yield and its quality under natural grain feeding regimens

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To respond to consumers' and wholesalers' demands for the poultry niche market, this study assessed a corn grain feeding approach to compare carcass yield and physiochemical properties of meat in the broiler. An experiment was used to compare various feeding patterns to broiler birds using four hundred unsexed broilers. Birds were distributed into four treatment groups (100 birds each) subdivided into 20 replicates with 20 birds each. The four treatments within the study were: (1) Commercial diet (control); (2) Control diet (75%)+25% grains; (3) Control diet (50%)+grains (50%); (4) Control diet (25%)+grains (75%). At 56 days of age, five broilers from each group were processed to meat yield and its quality in terms of average weights and carcass yields from breasts, wings, and leg quarters, meat pH, color and sensory attributes. Data were analyzed using SAS 9.4 through one-way ANOVA by applying Duncan's Multiple Range test. Results showed that carcass and cut-up part weights were significantly lower ($P < 0.05$) in all grain fed groups (avg. $3217g \pm 32.78$) compared to control ones (avg. $3371g \pm 29.11$). But, the quality was much improved ($P < 0.05$) in treatment 4. Birds consuming 75% grains as diet had the more appealing appearance ($L^* = 52.54 \pm 0.32$ and $a^* = 6.36 \pm 0.29$) than any other group. Additionally, the panel gave a maximum hedonic score to the meat from birds of treatment 4. It was concluded that natural grain feeding regimens should be encouraged with conventional feed for better meat quality.

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Growth response of broiler chicks to graded levels of lysine in low protein diets

Mehaad Ahmad

University of Agriculture, Pakistan

A feeding trial involving four hundred and twenty-day old chicks was carried out to assess the effect of graded levels of lysine in low protein diets on the growth performance and body composition in broiler chicken. A basal diet (CP 19.8%; ME 3000kcal/Kg) formulated without synthetic lysine source served as control. The diet was supplemented with synthetic lysine to achieve 1.0% digestible lysine level. Other experimental diets contained 1.1%, 1.2%, 1.3%, and 1.4% digestible lysine. Four hundred and twenty (n=420) one-day-old broiler chicks were distributed into six dietary treatments. Each treatment was randomly allotted to 30 replicates with fourteen broiler chicks/replicate. Ad libitum feeding was offered to the birds. Water was offered round the clock. Same environmental conditions like light, ventilation, and temperature were offered to the birds. Birds were vaccinated according to the prescribed schedule. The experimental diets were fed from the first day till the end of the trial on day 21. Data on body weight gain, feed intake was recorded weekly to calculate feed conversion ratio. Nitrogen retention, net protein utilization, and protein efficiency ratio was also calculated. Effect of different graded levels of lysine on the performance of the broiler birds during 1-21 day demonstrates that as the lysine level increased there was an improvement in the performance of the bird. Results of the feed intake on day 1-21 indicate that higher feed intake was observed as the lysine supplementation increased. The highest feed intake was observed with T3 (1.3%). Weight gain (1-21 d) increased linearly with incremental levels of lysine with highest weight gain observed in T4 (1.4%) dig. lysine. Similar results were observed with FCR as it went better with an increase in lysine levels. The best FCR was observed in T4 (1.4%) dig. lysine. It was also noted that nitrogen retention, net protein utilization, and protein efficiency ratio was also improved with graded levels of lysine. Work of this trial can be extended by checking the performance of the bird with energy to lysine ratios.

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Isolation and characterization of antibiotic resistant *Escherichia coli* found on superficial water from Honda River, Costa Rica

Paulette Ramirez

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Inappropriate use of antibiotics leads to the emergence of drug-resistance strains that give rise to bacterial infections that may be difficult to treat. Although tetracycline and penicillin are among the most commonly used antibiotics in aquaculture and farming around the globe, there is scarce information on environmental consequences linked to these uses. The objective of this study was to test the antimicrobial susceptibility of the *Escherichia coli* isolates found along the Honda River to explore their natural resistance. Four consecutive weekly water samples taken from four different altitude points of the river were analyzed (sixteen total samples). Using membrane filtration with Coliblu[®]24, 41 dilutions from which we isolated 38 bacteria were characterized as *E. coli* and later confirmed by Indole test. The Kirby Bauer method was employed to determine the susceptibility of the isolated bacteria to nine antibiotics. Based on the results, amoxicillin and cephalothin had the highest frequency of resistance (95% and 87%); and 24% of the bacteria showed resistance to 3 or more antibiotics. Multi-resistant bacteria were identified at the highest and lowest altitude sampled points of the river showing resistance to amoxicillin, cephalothin, tetracycline, and chloramphenicol. Additionally, we performed a 16S-gene analysis where only 6 isolates corresponded to *E. coli*. Subsequently, the presence of *int1* and *int2* genes was analyzed and found in 66% of the isolates. Future work concerns molecular analyses of antibiotic-resistant genes present in these bacteria. These results suggest that Honda River might play a role as a reservoir of antibiotic-resistant bacteria. In this context, water from Honda River might not be appropriate for human consumption, and awareness should be brought up on the responsible use of antibiotics among the Costa Rican community.

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Microbial community structure in an innovative membrane bioreactor treating sugar mills spent wash-water

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The sugar industry is the largest industry in Pakistan, contributing 3.2% of GDP in agriculture. It produces alcohol and byproducts like molasses. However, it is also producing a significant amount of untreated wastewater, which is disposed of directly into canals by the distilleries and sugar manufacturer industries which causes serious problem to water resources and pollutes the environment. Only a few sugar industries are treating wastewater, but they have unsuitable treatment methods. Among wastewater and effluent treatment methods anaerobic digestion with a membrane bioreactor (AnMBR) is a most suitable method of treatment, in which waste is biologically broken down into biogas in the absence of oxygen, while filtration membrane helps to separate a tiny particle from wastewater sludge. In the present study, a pilot-scale AnMBR assembly was inoculated with sludge, taken from an anaerobic digester. The reactor was first accumulated using synthetic wastewater, followed by distillery wastewater. The pH of the reactor was maintained between 7.2 to 8.5. Two samples from the initial stage (AnMBR) of synthetic wastewater and two samples after stabilizing the membrane bioreactor of distillery wastewater were collected. DNA extraction was carried out by using GeneJet DNA purification kit. For 16S rDNA-based metagenomics for bacterial community characterization, a V3-V4 region of 16S rRNA gene was amplified and amplicon libraries were sequenced by using Illumina MiSeq sequencer (Illumina Inc. USA). Quantitative insights into microbial ecology 2 (Qiime2) was used for quality control analyses, quality filtration, taxonomic characterization, alpha, and beta diversity analysis. Furthermore, fluorescence in situ hybridization (FISH) technique, comprising of eight bacterial oligonucleotide probes (labeled at 5' site with different fluorescent dyes, purchase from biomer.net) will also be used to detect microbial cells of different lineages. This study provides detailed insights into bacterial genera present in the sludge sample, responsible for favorable wastewater treatment.

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