POULTRY SCIENCE CONFERENCE
(PSC@IPEX2023)

ORGANIZED BY

PAKISTAN POULTRY ASSOCIATION &
UNIVERSITY OF VETERINARY AND ANIMAL SCIENCES, LAHORE

ABSTRACT BOOK

POULTRY SCIENCE CONFERENCE

(PSC@IPEX-2023)

INTERNATIONAL POULTRY EXPO

September 21-23, 2023

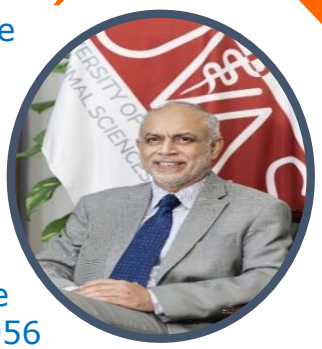
ORGANIZERS

UNIVERSITY OF VETERINARY AND ANIMAL SCIENCES, LAHORE

COLLABORATOR

PAKISTAN POULTRY ASSOCIATION

MESSAGE OF PROF. DR. NASIM AHMAD (*S.I.*)



I warmly welcome all participants to the Poultry Science Conference (PSC@IPEX2023), on behalf of University of Veterinary and Animal Sciences (UVAS), Lahore, and organizers of the Conference on the occasion of International Poultry Expo during September 21 – 23, 2023 at Pakistan Expo Center, Lahore.

Commercial poultry in Pakistan was established in 1962. This sector is one of the most vibrant segments of the livestock industry providing employment to over 1.5 million people. The substantial investment in Poultry Industry is more than PKR 1056 billion. Pakistan poultry is producing 1813 million-day-old chicks. The industry is making tremendous contributions in bridging the gap between the supply and demand of healthy animal protein of high biological value through producing 2160 metric tons of chicken meat and 23819 million table eggs. Poultry today is not only a balancing force to keep a check on the prices of mutton and beef, but also serves as a backbone of Agriculture. Keeping in view the importance of the poultry industry for Pakistan, UVAS and Pakistan Poultry Association (PPA) is organizing the Poultry Science Conference. The themes of this year conference are Antimicrobial Resistance, Role and use of GMOs in Poultry Feed, and Use of Artificial Intelligence in Poultry Health and Farm Management. Through this conference, we are providing a platform to bring together Academia, Researchers, Poultry farmers, professionals, and Industrialists. With this platform, researchers will be able to share their research work and learn from poultry farmers their making discoveries and then transforming them into products and services for the marketplace. It might be one more step but with hard work and determination, we will streamline our research efforts for the benefit of the poultry sector.

As one of Pakistan's Public Sector universities, UVAS's main challenge is to remain competitive and relevant by offering high-quality technical academic programs and research activities, focusing on healthy food production and economic development. New knowledge and findings cannot be generated without research and development. These efforts will undoubtedly generate many interesting results and new knowledge. Therefore, researchers must see this activity as a generator of new knowledge and extend their research outcomes from laboratory experiments to the marketplace and towards commercialization. May be this doesn't appear significant in the short term, but it may make a tremendous impact in the future.

Prof. Dr. Nasim Ahmad, *S.I.*
Patron-In-Chief, PSC-2023
Vice Chancellor, UVAS, Lahore

MESSAGE OF DR. HANIF NAZIR CHAUDHRY

On behalf of the Pakistan Poultry Association, I welcome all distinguished guests, researchers, keynote speakers, oral presenters, farmers, students, and all other participants to Poultry Science Conference 2023 (PSC@IPEX2023). The conference is organized on the occasion of the International Poultry Expo – 2023 with the aim to bridge academia and the poultry industry and promote indigenous research. Pakistan's poultry industry has tremendous potential and is growing at an exponential rate. New technologies are continuously being added to make it more profitable. The purpose of this conference is creating awareness in our young researchers and students about advancements in the poultry sector. This is also providing a platform for the students to interact with industry people who have set up their stalls in the exhibition.

Bringing all poultry sectors together in one conference benefits all industry partners. The nature of the industry is changing at a fast pace and the impacts of the marketplace and government policy have become more supportive. As we continue this format and relationship, we look to strengthen our shared vision and goals to strengthen the industry as a whole.

Recognizing the need for the poultry industry to come together and represent our broad industry community, the Poultry Science Conference aims to benefit from increased exposure and attendance growth by hosting each commodity along with a unique trade show, education sessions, and an industry gala.

On behalf of the Conference team with special mention to VC UVAS, Vice Chairman PPA (North Region), Chief Organizer IPEX 2023, and members of the organizing committee, I would like to thank all the sponsors, exhibitors, speakers, and most of all the delegates that are here to attend the Conference.

Dr. Hanif Nazir Chaudhry
Convener
PSC-2023

CONTRIBUTORS

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POULTRY SCIENCE CONFERENCE
PSC@IPEX2023

Main Auditorium Expo Center, Lahore

SCIENTIFIC PROGRAM

Session – 1: 21st September, 2023 **(Thursday)**
Timings: 09:40 am – 01:00 pm

INAUGURAL SESSION

09:40 am	Arrival of Chief Guest	**Ch. Muhammad Nusrat Tahir** Vice Chairman, PPA North Region
09:45 am	Recitation	
09:50 am	Welcome note and Introduction of Poultry Industry	**Mr. Abdul Haye Mehta** Chief Organizer IPEX-2023
10:00 am	Overview of World Poultry Science Association (WPSA)	**Dr. Nasir Mukhtar**
10:05 am	Overview of World Veterinary Poultry Association (WVPA)	**Dr. Farhan Afzal**
10:10 am	Overview of Collective Wisdom Group	**Dr. Muhammad Ishaq**
10:15 am	Introduction of Poultry Science Conference	**Dr. Hanif Nazir Ch.**
10:20 am	Views/ Remarks of Chief Guest	

FORMAL SESSION

10:25 am	Formal Opening of the Poultry Science Conference	**Mr. Abdul Haye Mehta** Chief Organizer IPEX-2023

Session – I
Moderator: Dr. Muhammad Kashif Saleemi

Chairman	**Prof. Dr. Nasim Ahmad**, ***S.I.***, Vice Chancellor, University of Veterinary and Animal Sciences, Lahore
Co-Chairman	**Prof. Dr. Muhammad Zakaria Zakir,** Vice Chancellor, University of Poonch, Rawalakot
Co-Chairman	**Prof. Dr. Qaiser Abbas,** Vice-Chancellor, University of Sargodha
Guest of Honor	**Dr. Mustafa Kamal**

Time	Topic	Presenter
10:30 to 10:50 am	**Key Note Lecture on "Globalism 2.0"**	**Key Note Speaker: Kevin Roepke**
10:50 to 11:00 am	Genetic Outlook of Multi-Drug Resistant Avian Pathogenic *E. coli* Recovered from Colibacillosis-Infected Broilers	Bilal Aslam
11:00 to 11:10 am	Characterization of Multi-Drug Resistant *Salmonella enterica* Isolated from Broiler Birds Suspected for Fowl Typhoid	Tehreem Ali
11:10 to 11:20 am	Detection and Antibiotic Susceptibility Profiling of Prevalent O Strains of Avian Pathogenic *E. coli* in Lahore division, Pakistan	Mishal Anwar
11:20 to 11:30 am	Unveiling the Effects of *Salmonella enteritidis* on Poultry PBMCs using Flow Cytometry	Namrah Ishtiaq
11:30 to 11:40 am	Investigation of Marek's Disease in Native Chickens of Faisalabad, Pakistan: Molecular Detection and Pathology	Khush Bakhat Shahnawar
11:40 to 11:50 am	Genetic Characterization of Infectious Bronchitis Virus Isolated from Poultry Birds of Punjab Province in 2021-2022	Ammar Danyal Naeem
11:50 to 12:00 pm	Impact of Genotype II and VII Antibodies on the Mutations in the F and HN genes of the Genotype VII Newcastle Disease Virus Strains	Zaib ur Rehman
12:00 to 12:10 pm	Clinico-Pathological Assessment of Virulent Newcastle Disease Virus in Ducks	Mian Mubashar Saleem
12:10 to 12:20 pm	Seroprevalence of Avian Influenza Virus (H9N2) Subtype in the Backyard Poultry of in and around District Multan	Atif Nisar Ahmed
12:20 to 12:30 pm	Molecular Characterization and Effect of Inclusion Body Hepatitis Virus on Cell Mediated Immunity in Broiler Chicken	Maryam Shahzadi
12:30 to 12:40 pm	**Q/A Session**	

Hall of Fame of Honour Award from **Prof. Dr. A. D. Anjum,**

WVPA: Concluding Remarks: **Prof. Dr. Nasim Ahmad, *S.I.,*** Vice Chancellor, University of Veterinary & Animal Sciences, Lahore

Session – 2: 23rd September, 2023 **(Saturday)**
Time: 01:25 pm – 04:00 pm

INFORMAL SESSION

01:25 pm	Guest to be seated	
01:30 pm	Recitation	
01:35 pm	Overview of NDCC, PSC and Collective Wisdom	**Dr. Hanif Nazir Ch.**

FORMAL SESSION

Session – II
Moderator: Dr. Amna Kanwal

Chairman	**Prof. Dr. Talat Naseer Pasha, *H.I., S.I.,*** Vice Chancellor, University of Education, Lahore
Co-Chairman	**Prof. Dr. Muhammad Sajjad Khan**, Vice Chancellor, Cholistan University of Veterinary & Animal Sciences, Bahawalpur
Co-Chairman	**Prof. Dr. Kanwal Ameen, *T.I***, Ex Vice Chancellor, University of Home Economics, Lahore
Guest of Honor	**Dr. Abdul Karim Bhatti**

Time	Topic	Presenter
01:40 to 02:00 pm	Differentiation of US SOY with other sources	**Key Note Speaker: Susil Silva** (Head of Animal Utilization South Asia)
02:00 to 02:10 pm	Transforming poultry farming through artificial intelligence: enabling early disease detection and management in smart poultry systems	Badar un Nisa
02:10 to 02:20 pm	Molecular Characterization of Toxigenic *Aspergillus flavus* Isolated from Sick Broiler Lungs and Risk Factors Analysis	Saba Sana
02:20 to 02:30 pm	Prevalence of Poultry Coccidiosis and Associated Risk Factors in Intensive Farm and Individual Small Holder Poultry Farm in Benadir Region, Somalia	Zakariye Zaakir
02:30 pm to 02:40 pm	*In Vitro* Evaluation of Probiotic Properties and Antimicrobial Activity of *Limosilactobacillus fermentum* against *Salmonella gallinarum* Causing Fowl Typhoid in Poultry	Adnan Mehmood
02:40 to 02:50 pm	Development of a Bivalent Inactivated Oil Adjuvanted Vaccine Using Local Isolates of Low and High Pathogenic Avian Influenza Viruses and	Sajjad Kashfi

	Comparison of its Immunogenic Response with Monovalent Vaccines of Both Strains	
02:50 to 03:00 pm	Hatcher Based Feeding Strategies have the Potential to Modulate Growth Dynamics of Broilers	Jibran Hussain
03:00 to 03:10 pm	Effect of Different Feed Dilutions on Body Weight Uniformity During Rearing Phase and Their Subsequent Effect on Peak Production of Broiler Breeder	Shahid Mehmood
03:10 to 03:20 pm	Bioprospecting Indigenous Bacillus Strains for Detoxification of Ochratoxin A in Poultry Feed	Rabia Manzoor
03:20 to 03:30 pm	Moulting through eight days feed restriction to commercial laying hens affects productive performance and egg quality traits	Amir Saeed
03:30 to 03:40 pm	Precision Lighting for Poultry: Assessing the Benefits of LED Lights with Defined Spectral Proportion on Growth, Reproduction and Welfare	Khurshied Khan
03:40 to 03:50 pm	**Q/A Session**	

Concluding Remarks: **Prof. Dr. Talat Naseer Pasha, *H.I.*, *S.I.*,**
Vice Chancellor, University of Education, Lahore

Formal Closing

Mr. Abdul Haye Mehta

Chief Organizer, IPEX-2023

END OF FORMAL SESSIONS

Judges PSC@IPEX2023

1. **Prof. Dr. Khalid Naeem Khawaja** (Ex-Director, National Reference Lab for Poultry Diseases, Islamabad)
2. **Prof. Dr. Athar Mahmud** (Ex-Chairman, Department of Poultry Production, UVAS, Lahore)
3. **Dr. Muhammad Athar** (Consultant Nutritionist and CEO, "Nutrazone")

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MOLECULAR CHARACTERIZATION OF PHYTASE PRODUCING BACTERIAL ISOLATES TO ENHANCE THE NUTRITIVE VALUE OF POULTRY FEED

Tehreem Ali, Aftab Ahmad Anjum, Rabia Manzoor, Muhammad Asad Ali

Institute of Microbiology, Faculty of Veterinary Sciences, University of Veterinary and Animal Sciences, Lahore-Pakistan

PSC – 01

ABSTRACT

Organic phosphates present in the feed are not effectively used by poultry. Phytases can convert the organic phosphorous to inorganic form to enhance protein digestion and mineral availability in poultry birds. Phytase-producing bacteria were screened and purified from soil samples at the Institute of Microbiology, UVAS, Lahore and clear halo zones on Phyto Pspo *agar* base (PSM) indicated phytase production. Molecular characterization was confirmed by polymerase chain reaction (PCR) targeting 16S rRNA gene primers followed by nucleotide sequencing and sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) for phytase produced by bacterial isolates. Phylogenetic analysis of bacterial isolates (n=09) showed that isolates P3 and P7 had close homology with *Bacillus megaterium* OsR-3 and *B. megaterium* T11-11 respectively. Furthermore, isolates P1, P2, P4, P5, P6, P8, and P17 also shared the clade with *B. megaterium* but the P8 isolate had a comparatively high rate of mutation. SDS-PAGE results indicated that all isolates had the ability to the production of phytase enzyme but the phy16 bacterium showed maximum activity at 1, 3, 5, 7, 9, and 11 days followed by phy12, phy8, and phy9. Phy4 and phy17 exhibited medium activity and phy7, phy11, and phy15 liberated comparatively less inorganic phosphorous. In conclusion, *B. megaterium* (phy16) has the maximum capacity of phytase production and can be used at a large scale to improve phosphorous availability in poultry feed.

Key Words: *Bacillus megaterium*, Phytase, enzyme, Poultry, Feed.

ANTIBIOTIC RESISTANCE MODULATION OF *CLOSTRIDIUM PERFRINGENS* TYPE A ISOLATED FROM NECROTIC ENTERITIS USING PLANT ESSENTIAL OIL FRACTIONS

Tehreem Ali, Aftab Ahmad Anjum, Rabia Manzoor, Nida Nawaz, Ayesha Saeed

Institute of Microbiology, Faculty of Veterinary Science, University of Veterinary and Animal Sciences, Lahore, Pakistan

PSC – 02

ABSTRACT

Clostridium perfringens type A causes necrotic enteritis in the chicken layer because the intestinal damage caused by coccidiosis allows for the overgrowth of *C. perfringens*. The present study was conducted to modulate antibiotic-resistant *C. perfringens* type A using plant essential oils and their solvent fractions. *C. perfringens* type A characterized isolates (n=10) were subjected to antibiotic susceptibility testing followed by the antimicrobial activity of plant EOs and their fraction against MDR C. perfringens. The antibiotics resistance pattern was studied against *C. perfringens* and enrofloxacin exhibited a higher zone of inhibition (mean ZOI±S.D.) as 36.67±0.57mm followed by colistin (19.67±8.38), tetracycline (18.67±16.28), tylosin (12.33±10.69) and ciprofloxacin (11.00±9.53). Plant essential oils were used to check anti-clostridial activity. Among the plant essential oils, *Syzygium aromaticum* gave 10.00±1.00 mm zone of inhibition. Also, *S. aromaticum* MIC against *C. perfringens* was observed lower (11.39±3.94 mg/mL) compared to other plant essential oils. Among the solvent fractions of *S. aromaticum* essential oil, n-hexane + chloroform (16.67±2.51 mm) and n-hexane (15.34±1.1 mm) fractions produced a higher zone of inhibition against *C. perfringens* type A. The n-hexane fraction displayed a lower MIC value compared to n-hexane + chloroform and chloroform fractions. Cytotoxicity assay of n-hexane fraction has revealed 51.42% cell death at 13.56 mg/mL. According to GC/MS analysis of n-hexane fraction, the most effective fatty acid was eugenic acid 53.7%. *S. aromaticum* essential oil and its n-hexane fraction can be used to treat necrotic enteritis caused by MDR *C. perfringens* type A in poultry.

Key Words: Antibiotic resistance modulation, *Clostridium perfringens* type A, *Syzygium aromaticum*, Eugenic acid, Necrotic enteritis

EVALUATION OF ANTIBACTERIAL EFFICACY OF ORGANIC ACIDS AGAINST CAMPYLOBACTER JEJUNI IN COMMERCIAL BROILERS

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[1]Institute of Microbiology, [2]University Diagnostic Laboratory, [3]Department of Epidemiology, University of Veterinary and Animal Sciences, Lahore

PSC – 03

ABSTRACT

Campylobacteriosis is a collective term used for the infection caused by *Campylobacter* that asymptomatically colonizes broilers during development and contaminates it during slaughter. Outbreaks mostly start from the ingestion of contaminated poultry products or infected water. Reducing colonization of *Campylobacter jejuni* in the gut can be useful in decreasing the contamination of the poultry. Different organic acids display potential as a substitute for antibiotics. A total of 120 broiler chickens were randomly distributed into 10 groups including negative and positive controls, a pure organic acid group, and a commercial organic acid formulation group. Excluding the negative control group, all other groups were orally challenged with 0.1 ml of the 6-Log10 CFU/ml of the *Campylobacter jejuni* culture in normal saline via the oral route from day 7. Cloacal samples were determined weekly and cumulatively for 35 days. The birds of a specific treatment group were given organic acid on a daily basis for 6-8 hours. Excluding the negative control group, all groups were tested with a fresh culture of *Campylobacter jejuni* at 14, 21, 28, and 35 days of age. The bacterial count was performed at 6, 8, 13, 15, 20, 22, 27, 29, 34, and 36 days of age. The results suggest synergistic actions of different organic acids present in commercial formulation to be effective in decreasing *Campylobacter jejuni* colonization. This study displayed synergistic actions of organic acid supplementation provided commercially (Acid Punch). It presented higher decline rates of *Campylobacter* spp.

Key Words: Food safety, *Campylobacter jejuni*, organic acid, broiler

MOLECULAR CHARACTERIZATION AND PREVALENCE OF EXTENDED SPECTRUM BETA LACTAMASE (ESBL) PRODUCING ENTERIC PATHOGENS ISOLATED FROM INDIGENOUS CHICKEN IN JHANG, PAKISTAN

Muhammad Saqlain, Usman Waheed, Ehtisham Ul Haque, Muhammad Fiaz Qamar, Muhammad Adnan Saeed, Aman Ullah Khan

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PSC – 04

ABSTRACT

Antimicrobial Resistance (AMR) is becoming an ascending and life-threatening matter worldwide. AMR declines the effectiveness of antibiotics, making infections difficult to treat, and increases the risk of morbidity, illness, mortality, and emaciation. The Extended Spectrum Beta Lactamases (ESBLs) are a set of plasmid-encoded enzymes produced by *Salmonella, Escherichia coli,* and *Klebsiella*. Infection's treatment becomes harder due to the hydrolyzation of antibiotics by enzymes. The present study was designed to examine the molecular confirmation of ESBL marker genes bla-SHV, bla-TEM, and bla-CTX-M, and prevalence in indigenous chicken. The random sampling of cloacal swabs (N=250) from indigenous chicken in the district Jhang, Punjab, Pakistan. The supplementation of cefotaxime(4mg/L) was added in Nutrient Broth and MacConkey agar (MaC-Cef). The DNA was extracted with the help of the boiling method. The phenotypic identification with double disc synergy test (DDST) and genotypic confirmation with Polymerase Chain Reaction (PCR). In total, there were 102/250 (40.8%) *E. coli*, 84/250(33.6%) *Salmonella*, and 33/250(13.2%). Out of these 47/102(46%) were ESBL *E. coli*, 32/84(38%) were ESBL *Salmonella*, and 7/33(21%) were ESBL *Klebsiella*. Out of 86 ESBLs pathogens, bla-CTX-M was 34/86(40%), bla-TEM was 21/86(24%), and bla-SHV was 1/86(1.1%). The prevalence was significantly different ($p<0.05$). The ratio of ESBL genes was very frightening in indigenous chickens. AMR requires collaborative efforts for the development of innovative policies, including new antibiotics, Seminars, a ban on the sale of antibiotics, and diagnostic tools, to combat resistant infections.

Keywords: Antimicrobial Resistance, *Enteric*, Indigenous chicken, ESBL

INCIDENCE AND MOLECULAR CHARACTERIZATION OF EXTENDED-SPECTRUM BETA-LACTAMASE (ESBL)-PRODUCING *SALMONELLA ENTERICA* AND *ESCHERICHIA COLI* OF AVIFAUNA ORIGIN IN PAKISTAN

Muhammad Adnan Saeed, Usman Waheed, Syed Ehtisham-ul-Haque, Aman Ullah Khan, Muhammad Kashif, Muhammad Fiaz Qamar, Aamir Ghafoor, Muhammad Saqlain, Jehangir Asghar

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PSC – 05

ABSTRACT

Members of Enterobacteriaceae are known to produce extended-spectrum beta-lactamases (ESBL) which hydrolyze the beta-lactam group of antibiotics. The existence of ESBL-producing *Salmonella enterica* (*S. enterica*) and *Escherichia coli* (*E. coli*) harbored by urban avifauna was investigated in this study. Dropping samples (n= 180) were collected from six different bird species in the district Jhang, Punjab province, Pakistan. Isolation and identification of ESBL isolates were made by using cefotaxime- (4 mg/L) supplemented MacConkey agar and double disc synergy test (DDST). Polymerase chain reaction (PCR) was performed for the detection of four different ESBL genes including *bla*CTX-M, *bla*TEM, *bla*SHV, and *bla*OXA. A total of 42.69% isolates were confirmed as ESBL via DDST including 30.64% *S. enterica* and 49.54% *E. coli*. The incidence of ESBL *S. enterica* and ESBL *E. coli* was higher in egrets (*Ardea alba*) and pigeons (*Columba livia*) at 64.28% and 78.95%, respectively. The *bla*CTX-M gene was detected in 57.89% and 64.81% of isolates of *S. enterica* and *E. coli*, respectively. Among other genes in *S. enterica* and *E. coli*, *bla*TEM (21.05%, 20.4%); *bla*SHV (15.78%, 9.26%), and *bla*OXA (5.26%, 5.56%) were detected, respectively. All of the tested isolates were found resistant to at least one of the thirteen antimicrobial agents except meropenem. To the best of our knowledge, this is the first study reporting the incidence and genetic diversity of ESBL bacteria associated with urban avifauna in Pakistan. The urban avifauna can serve as a potential subject of bio-surveillance to monitor the emergence of antimicrobial-resistant bacteria.

Key Words: ESBL, genotypic characterization, *Salmonella enterica*, *Escherichia coli*, avifauna, Pakistan

ANTIFUNGAL POTENTIAL OF SYZYGIUM AROMATICUM ESSENTIAL OIL: A COMPARATIVE EVALUATION OF SPICE-DERIVED ESSENTIAL OILS FOR *ASPERGILLUS FUMIGATUS* ISOLATED FROM POULTRY FEED

Muhammad Adnan Ashraf, Aftab Ahmad Anjum, Alishba Naeem, Ali Ahmad Sheikh, Muhammad Asad Ali, Tehreem Ali, Rabia Manzoor

Institute of Microbiology, University of Veterinary and Animal Sciences, Lahore

PSC – 06

ABSTRACT

Aspergillus fumigatus is a respiratory pathogen which has the potential to cause brooder pneumonia in poultry chicks and aspergillosis in birds and farmers. Frequent and irrational use of antifungals has led to the development of resistance in the fungal species. The present study aimed to evaluate the antifungal activity of essential oils (EOs) from four different spices against multi-drug resistant (MDR) *A. fumigatus* isolated from 40 poultry feed samples. Twenty fungal isolates identified to be *A. fumigatus* based on the macroscopic and microscopic characteristics, which were confirmed by targeting and amplifying the species-specific *rodA* gene (313 bp). Five (5/20) isolates found to be MDR by the disk diffusion method. EOs tested as an alternative strategy for 5 MDR isolates of *A. fumigatus*. Clove EO provided better activity by 6 log10 reduction for 30-90 min exposure compared to other EOs, therefore, shortlisted for the well-diffusion and minimum inhibitory concentration (MIC) method. Clove EO provided promising results as compared to fluconazole, amphotericin B, ketoconazole, nystatin, and voriconazole as its mean ZOI (39.6 ± 6.34) was better than all other commercial antifungals ($p < 0.001$). Mean MIC was reported to be 0.195 ± 0.11 µl/ml. Safety testing of the EO produced 74-82% cell viability for the range of 0.390 – 0.097 µl/ml as compared to DMSO. The findings of the present study highlight that clove EO can be a source of a good therapeutic agent for infections of MDR isolates of *A. fumigatus*.

Key Words: Antifungal activity, Clove, Essential oil, Minimum inhibitory concentration, Cytotoxicity assay

GENETIC OUTLOOK OF MULTI-DRUG RESISTANT AVIAN PATHOGENIC *E. COLI* RECOVERED FROM COLIBACILLOSIS-INFECTED BROILERS

Muhammad Usman, Muhammad Hidayat Rasool, Mohsin Khurshid, Saima Muzammil, Muhammad Qasim, Bilal Aslam

Institute of Microbiology, Government College University Faisalabad

PSC – 07

ABSTRACT

Avian Pathogenic *Escherichia coli* (APEC) is responsible for significant economic losses in the poultry industry. This study aimed to study the genetic dynamics of multi-drug resistant avian pathogenic *E. coli* in broiler chickens infected with colibacillosis. A total of 750 samples were collected from colibacillosis-infected broilers, and conventional microbiological techniques were used to isolate and identify APEC. MALDI-TOF and virulence-associated genes (VAGs) were used for further identification. Phenotypic carbapenem resistance profiling was followed by molecular detection of carbapenem resistance genes (CRGs) and other resistance genes through PCR using specific primers. Isolates were also subjected to PCR for O typing, followed by allele-specific PCR to detect sequence type (ST) 95. Results showed that 154 (37%) isolates were confirmed as APEC, with 13 (8.4%) isolates found to be carbapenem-resistant (CR)-APEC. Among CR-APEC isolates, 5 (38%) were observed to co-harbor mcr-1. All CR-APEC showed the presence of five markers (ompT, hylF, iutA, iroN, and iss) APEC VAGs, and 89% of CR-APEC isolates displayed O78 type. Furthermore, 7 (54%) CR-APEC isolates were observed with ST95, all displaying O78 type. These results suggest that the improper use of antibiotics in poultry production systems is contributing to the emergence of pathogens such as CR-APEC co-harboring the mcr-1 gene.

Key Words: AMR, Colibacillosis, Pakistan

MOLECULAR DETECTION OF COLISTIN RESISTANCE GENE (MCR-1) IN *E. COLI* ISOLATED FROM CLOACAL SWABS OF BROILERS

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PSC – 08

ABSTRACT

The current emergence of antimicrobial resistance against colistin is a major challenge to treating multi-drug resistant Gram-negative bacteria. Broiler chickens can function as a source for the dissemination of antimicrobial-resistant strains to humans. In the present study, 150 cloacal swabs of broiler birds, collected from retail shops in Lahore, were processed for isolation of *E. coli* isolates (n=100) were tested for antimicrobial sensitivity to colistin sulfate using the broth dilution method. The resistant isolates were tested by polymerase chain reaction for mcr-1 and mcr-2 genes of colistin resistance. The isolates, found resistant by the broth dilution method, were also checked for pathogenicity by adding Congo-red dye in nutrient agar. Phenotypically colistin-resistant isolates were also tested for other antibiotics e.g., Amoxicillin (30ug), Cefepime (30ug), Gentamycin (10ug), Chloramphenicol (30mcg), Clindamycin (2ug), Ciprofloxacin (5ug), Norfloxacin (10ug), Amikacin (30ug), Lincomycin (10ug) and Streptomycin (10ug) by disc diffusion method. Out of 100 isolates, 59 showed resistances to colistin while taking MIC at 4mg/L. The colistin-resistant *E. coli* also showed multidrug resistance against other antibiotics tested. Among 59 phenotypically colistin-resistant isolates, only 7 isolates were possessing the mcr-1 gene, but none of the strains observed bore the mcr2 gene. About 15% (5/59) of colistin-resistant isolates were pathogenic by the Congo red dye test. The results indicated the presence of mcr-1 harboring *E. coli* in commercial birds that can contribute to the spread of the mcr-1 gene.

Key Words: Colistin resistance, *E. coli*, mcr-1, mcr-2

EVALUATION OF COMBINED EFFECT OF *LACTOBACILLUS GALLINARUM* PL53 AND ACETIC ACID ON MITIGATION OF *SALMONELLA ENTERITIDIS* IN BROILER

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PSC – 09

ABSTRACT

The present study was conducted to evaluate the combined effect of probiotic *Lactobacillus gallinarum* PL53 and acetic acid on the mitigation of *Salmonella Enteritidis* in broiler chicks. Day-old poultry chicks were divided randomly into various groups with each group receiving the respective combination of probiotic and acetic acid on a daily basis**.** Cloacal swabs were serially diluted and spread on respective media plates for enumeration of bacterial load on a weekly basis and also before and after challenging the birds with *Salmonella Enteritidis* on the 14th day of 35 days trial. The feed conversion ratio and effect on antibody titer against the ND vaccine were also analyzed. The results showed that the group administered with the combination of probiotic and acetic acid had a significant effect ($P<0.05$) on the reduction of *Salmonella Enteritidis* count (3.36 ± 0.31) from poultry gut as well as this group also recorded significantly less FCR (3.54 ± 1.23) at day 35, as compared to other treatment groups. However, no significant effect ($P>0.05$) was observed in the immune response against NDV. It was concluded that the combination of *Lactobacillus gallinarum* PL 53 and acetic acid can be used to reduce the load of *Salmonella Enteritidis* in poultry gut and to improve the growth performance of broilers.

Key Words: *Salmonella Enteritidis*, Broiler, Acetic acid, Newcastle Disease

COMPARATIVE EFFECT OF ORGANIC ACIDS AND AQUEOUS EXTRACT OF GARLIC AND GINGER ON SURVIVAL OF *CAMPYLOBACTER JEJUNI* ON CHICKEN MEAT

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PSC – 10

ABSTRACT

The present study dealt with the comparison of the antibacterial potential of aqueous extracts of garlic, ginger, and organic acids (acetic acid and lactic acid) against the survival of *Campylobacter jejuni* on chicken meat. The antibacterial activity of each aqueous extract and organic acid was determined against five isolates of *C. jejuni* by Agar well diffusion assay. To investigate the Minimum Inhibitory Concentration (MIC) of the aqueous extracts, the broth microdilution method was employed. The highest zone of inhibition was recorded against garlic (22±2.00mm) followed by ginger (20.3±1.5mm), lactic acid (15.3±0.5mm), and acetic acid (13.6±0.5mm). The MIC of garlic and ginger was recorded as 35 and 25 uL/mL, respectively. To evaluate the antibacterial potential of the extracts and organic acids on the food model, a log reduction assay was performed. Aqueous extract of garlic showed the best results (3.31±0.39 log CFU/g) at 25°C followed by ginger (2.36±0.13 log CFU/g) at 4°C, lactic acid (2.22±0.02 log CFU/g) and acetic acid (1.36±0.09 log CFU/g) at 25°C after 100 minutes of contact, respectively. In conclusion, organic acids, garlic, and ginger have strong anti-Campylobacter activity and can be used safely in the processing of chicken meat to reduce the Campylobacter load.

Key Words: *Campylobacter jejuni*, organic acid, ginger, garlic

ANTI-INFLAMMATORY AND BIOFILM INHIBITION POTENTIAL OF METHANOLIC AND AQUEOUS EXTRACT OF ELETTARIA CARDAMOMUM AND CICHORIUM INTYBUS

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PSC – 11

ABSTRACT

Biofilms are a microbial population that causes recurring and chronic infections and are extremely resistant to available antibiotics and host immune systems. The current research aimed to evaluate the antibiofilm and anti-inflammatory potential of methanolic and aqueous extracts of *E. cardamomum* and *C. intybus*. Antibiofilm and antibacterial activities of both the plant extracts were evaluated against potential human pathogens i.e., *Staphylococcus aureus, Pasteurella multocida, and Escherichia coli*. Moreover, *in vitro* antioxidant, thrombolytic, hemolytic, anti-inflammatory, and antiarthritic activities were also performed. Methanolic extract of *E. cardamomum* (MEE) showed the highest antibacterial activities with MIC values of 0.53 mg/mL, 0.71 mg/mL, and 0.60 mg/mL along with biofilm inhibition of 40.45%, 55.92%, 52.32% against *E. coli*, *S. aureus* and *P. multocida*. *In vitro* antioxidant activity results evidenced that both the methanolic extracts of *E. cardamomum* and *C. intybus* have significant amounts of TPC and TFC with antioxidant potential. Methanolic extract of *E. cardamomum* (MEE) exhibited the highest DPPH inhibition and reducing power capability with IC50 values of 8.65 and 41.87%, respectively. Further, aqueous and methanolic extracts of both plants showed significant thrombolytic activities with the least cytotoxicity towards human RBCs. Furthermore, the methanolic extract of *E. cardamomum* exhibited the highest anti-inflammatory and anti-arthritic potential with 81.65%, 89.09%, and 90.65% denaturation of protein, anti-proteinase activity and membrane stabilization against standard Diclofenac sodium, respectively.

Key Words: Biological activities, anti-inflammatory, Chicory, Green cardamomum

CHARACTERIZATION OF MULTI-DRUG RESISTANT *SALMONELLA ENTERICA* ISOLATED FROM BROILER BIRDS SUSPECTED FOR FOWL TYPHOID

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PSC – 12

ABSTRACT

Salmonellosis is a major food-borne disease worldwide. Phytochemicals are alternative therapeutics to treat multi-drug resistant Salmonella. *Salmonella enterica* isolated from suspected cases of Fowl Typhoid was characterized biochemically and confirmed by polymerase chain reaction (n=10). The isolates exhibited resistance to ampicillin, amoxicillin, streptomycin, ciprofloxacin, enrofloxacin, tetracycline, erythromycin, chloramphenicol, and gentamicin. The antibiotic-resistant isolates were evaluated for the antimicrobial activity of plant essential oils. The highest zone of inhibition (mean ZOI±S.D.) was measured for *Eucalyptus globulus* (23.67±1.02 mm) followed by *Curcuma longa* (17.67±2.01 mm) and *Nigella sativa* (13.67±2.01 mm). The lowest mean minimum inhibition concentration (MIC) value (0.43±0.12 mg/mL) was recorded for *E. globulus*. *E. globulus* was processed for fractionation by column chromatography and n-hexane, chloroform, n-hexane + chloroform, and ethyl-acetate fractions were evaluated for antibacterial activity. The lowest mean MIC (10.14±5.91 mg/mL) was recorded for *the E. globulus* n-hexane fraction. The cell survival percentage of the BHK21 cell line was 52% at 55.97mg/mL concentration of *E. globulus* n-hexane fraction. Through gas chromatography-mass spectrometry (GC-MS) analysis of n-hexane fraction, benzene was found abundant (30%) as an active compound. It was concluded that *E. globulus* n-hexane fraction exhibited significantly promising results against *Salmonella enterica* isolated from fowl typhoid.

Key Words: *Eucalyptus globulus*, Gas chromatography, mass spectrometry, Multidrug resistance, *Salmonella enterica*

DETECTION AND REPORTING OF COLISTIN-RESISTANCE MCR-1, AND MCR-2 GENES AMONG *K. PNEUMONIAE* ISOLATED FROM CHICKEN ORIGIN

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PSC – 13

ABSTRACT

The opportunistic pathogen *K. pneumoniae* is gram-negative, rod-shaped, non-motile, and encapsulated. This bacterium is a lactose fermenting facultative anaerobic member of the *Enterobacteriaceae* family, which is on the short list of common causes of nosocomial infections, together with five other bacteria collectively referred to as the *ESKAPE*-pathogens. Excessive use of colistin as a growth promoter in the poultry industry is a major drawback, as it promotes colistin resistance which is the last resort left as a treatment option. The main purpose of this study was the isolation and phenotypic identification of colistin-resistant *K. pneumoniae* from chicken and the molecular characterization of colistin-resistant gene (*mcr-1, mcr-2*) in phenotypically confirmed isolates. In total, 250 cecal samples were collected from a wet market in the Jhang district, Punjab Pakistan. A total of 75/250 (30%) samples were phenotypically confirmed as colistin-resistant *K. pneumoniae* positive. All the phenotypically confirmed isolates were further subjected to PCR for molecular detection of specifically targeted genes (*mcr-1, mcr-2*). Results showed that the *mcr-1* gene was present in 29% (22/75) and the *mcr-2* gene in 13% (10/75) of the isolates. Positive isolates were subjected to AMR profiling findings revealed that 92.8%, 89.8%, and 65.7% were resistant to tetracycline, chloramphenicol, and trimethoprim while it demonstrated reduced resistance to amoxicillin (5.23%) and cefotaxime (2.76%). This study aided in identifying colistin resistance that has been developed due to these *mcr* genes specifically in (*mcr-1, mcr-2).* It also put into consideration the restriction of excessive use of antibiotics as a growth promoter and must be used for treatment purposes only.

Key Words: *K. pneumoniae*; mobile colistin-resistance; mcr-1; mcr-2, chicken

MOLECULAR ANALYSIS OF MOBILE COLISTIN-RESISTANT DETERMINANTS (MCR-1, MCR-2) AMONG COLISTIN-RESISTANT *ESCHERICHIA COLI* ISOLATED FROM BROILER CHICKEN

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PSC – 14

ABSTRACT

Colistin is considered a last resort antibiotic for the treatment of colibacillosis in chicken caused by *E. coli* and is also used as an antimicrobial growth promoter (AMGP) to the chicken. Irrational use of this antibiotic in animal husbandry has a serious impact on the emergence of colistin resistance among the Gram-negative bacteria mostly *E. coli* in chicken. Poultry products serve as an important reservoir of Colistin-resistant *E. coli* (CRE) and are a source of transmission to human populations. This study aimed to detect mobile colistin-resistant (*mcr-1*, *mcr-2)* genes in *E. coli* isolates and their prevalence in broiler chickens in the Jhang district and adjoining areas. A total of 120 vital organs (liver, spleen, heart, cecum, and cloacal) samples were collected from retail shops in the study area. A total of 53/120 (44.1%) samples were phenotypically confirmed as colistin-resistant *E. coli*. All the phenotypically confirmed isolates were subjected to PCR for molecular detection of the targeted genes *mcr-1* and *mcr-2*. The findings revealed that 45.2% (24/53) were positive for the *mcr-1* and 20.7% (11/53) were positive for *the mcr-2* gene. 87.5% (21/24) *mcr-1* positive isolates were from cecal samples while 72.7% (8/11) *mcr-2* positive isolates were from liver (n=3) and spleen (n=5) samples. Of the 53 confirmed colistin-resistant *E. coli* isolates 94.1%, 85.7%, and 79.8% were resistant to tetracycline, chloramphenicol, and sulphamethoxazole/ trimethoprim, respectively. The isolates had lower resistance to amoxicillin (9.52%) and cefotaxime (4.76%). This study revealed that colistin resistance is highly prevalent in broiler chickens and might be a possible source of resistance to the human food chain. The spread of MDR *E. coli* in broiler chicken is a public health problem that needs additional studies on national levels to minimize this emerging threat.

Key Words: Broiler; mobile colistin-resistant; mcr-1; mcr-2; *Escherichia coli*

PREVALENCE OF COLISTIN-RESISTANT ESCHERICHIA COLI AND PLASMID MEDIATED MCR GENES IN POULTRY SAMPLES: A STUDY FROM MURIDKE, PAKISTAN

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PSC – 15

ABSTRACT

A study was conducted to investigate the prevalence of *Escherichia coli* (*E. coli*) and plasmid-mediated MCR genes in poultry samples obtained from Muridke, Pakistan. A total of 80 samples were collected from different areas for analysis. The samples underwent enrichment in nutrient broth followed by streaking onto MacConkey agar and EMB agar for morphological confirmation. Gram staining was performed to confirm the gram-negative nature of the bacteria. The species of *E. coli* were identified using the biochemical kit API-20E. Out of the 80 samples, 74 were confirmed as *E. coli* using the API-20E kit. Molecular identification of *E. coli* was carried out using PCR targeting the *eae* gene. The results revealed a high prevalence of resistance to third-generation cephalosporins, with 85% resistance to ceftriaxone, 75% resistance to ceftazidime, and 78.5% resistance to amoxicillin. Notably, a significant proportion of isolates (45%) showed resistance to colistin, surpassing the defined breakpoint of ≤2µl/L. Plasmids were extracted from the confirmed *E. coli* isolates, and PCR was employed to detect the presence of MCR genes. The findings demonstrated that 31.25% of the isolates harbored the MCR-1 gene, while 17.5% tested positive for the MCR-4 gene. Among the MCR genes, MCR-1 was found to be the most prevalent. These results indicate a high prevalence of *E. coli* and MCR genes in poultry samples from Muridke, Pakistan. Further investigations are necessary to assess the potential implications for public health.

Key Words: *E. coli*, API-20E kit, MCR, Plasmid

PREVALENCE OF POULTRY COCCIDIOSIS AND ASSOCIATED RISK FACTORS IN INTENSIVE FARM AND INDIVIDUAL SMALL HOLDER POULTRY FARM IN BENADIR REGION, SOMALIA

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PSC – 16

ABSTRACT

A cross-sectional study was conducted from September 2021 to February 2022 in Mogadishu, Somalia to determine the prevalence of poultry coccidiosis and associated risk factors in intensive farm and Individual smallholder poultry farms in Benadir region-Somalia. The objective of the study was to determine the prevalence of poultry coccidiosis and to assess the risk factors associated with poultry coccidiosis. However, the floatation technique was used for the isolation of coccidian oocysts obtained from 384 fecal samples of chicken and the prevalence revealed was 19.8%. There was no statistically significant difference in poultry coccidiosis between the different ages of chicken (P>0.05) Where the young chickens (chicks) had shown a slightly higher prevalence (20.4%) than adult chickens (18.8%). The effect of sex on the disease prevalence was assessed and relatively slightly higher prevalence was recorded in male chickens (20%) than female (19.4%). However, the difference between sex groups was not statistically significant (P>0.05). According to the management system of the chickens, the study had shown a significant difference between extensive and intensive management systems, with the extensive system having a higher prevalence (25.5%) than the intensive system (14%). There was a significant difference in poultry coccidiosis between the different body condition scores of chickens, where those poor body conditions (26.6%) are more prevalent than the middle (16%) and good (8.8%) chickens. The study also revealed a statistically significant association between infection rate and housing methods with the chickens kept in floor houses having a higher prevalence (25.5%) than cage houses (14%). However, appropriate control strategies should be designed considering important risk factors such as age, management system, and housing system. Especially, the focus should be given to biosecurity practices in the prevention and control of coccidiosis, and in addition, further studies are needed to be conducted to identify the prevalent Eimeria species for strategic control.

Key Words: Coccidiosis, Risk Factors, Somalia

EFFECT OF FISH OIL AND VITAMIN E ON HISTOPATHOLOGY OF LYMPHOID ORGANS OF BROILERS WITH AVIAN INFLUENZA H9N2 INACTIVATED VACCINE

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PSC – 17

ABSTRACT

Fish oil and vitamin E have a significant effect on the immune organs of broilers. Two-hundred and ten-day-old broilers were distributed into six groups designed as E, F, G, H, I, and J. Group E was supplemented with 2% Fish oil in feed as 2ml/1000g of diet from the 1st day of age. Group F was supplemented with 250IU Vitamin E per liter of water from the 1st day of age. Group G was provided by the combination of both Fish oil and Vitamin E supplementation in feed. Group E, F, and G were also inoculated with 0.1ml of low pathogenic Avian influenza H9N2 killed virus of known ElD50 ($10^{-6.72}$/1ml) through the intranasal route at the 6th day of age. Group H and I were kept as a positive control with only inoculation of oil-based/ killed vaccine and commercial vaccine respectively at the 6th day of age. Group I served as un-inoculated control (without inoculation or feed supplementation) for both phases of the research. Tissue samples (trachea, lungs, liver, spleen, kidney, bursa, cecal tonsils, and thymus) were collected, homogenized, sonicated, and centrifuged for virus isolation. Inactivated oil emulsion killed vaccine was inoculated, and birds were observed regularly for the development of clinical signs and general body condition. The results declared a significant decrease in gross pathological lesions in the trachea, lungs, kidney, and other lymphoid organs (bursa, thymus, and spleen), a fundamental increase in antibody titer (GMT) against avian influenza H9N2 (live attenuated or killed vaccine) and least histopathological lesions on lymphoid organs of broilers in groups provided with a combination of fish oil and vitamin E. Histopathological and antibody titer improvement were slightly visible in groups that were provided fish oil and vitamin E supplementations separately as compared to their combination. However, these improvements in GMT value and histopathology were least visible in positive controls compared to un-inoculated control. The overall study revealed that low pathogenic H9N2 has an immunosuppressive effect on lymphoid organs of broilers while the inclusion of fish oil and vitamin E in broilers feed have represented by the immunomodulatory effect on the histopathology of lymphoid organs of broiler by increasing number of lymphocytes and heterophil to lymphocyte ratio.

Key Words: GMT, H9N2, Fish, Vitamin E

BIOPROSPECTING INDIGENOUS BACILLUS STRAINS FOR DETOXIFICATION OF OCHRATOXIN A IN POULTRY FEED

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PSC – 18

ABSTRACT

Ochratoxins are mycotoxins with pathological significance due to their ability to cause nephrotoxicity, immunosuppression, and carcinogenesis in humans and animals. Toxins are very commonly present in poultry feed. Biological detoxification by the use of microbes, enzymes as well as their metabolites can help to reduce the deadly effects of ochratoxin A (OTA). Biological detoxification is regarded as better than physical and chemical detoxification since they are ecologically friendly. The present study aimed to determine the occurrence of OTA in poultry feed and to evaluate the efficacy of biochemically characterized *Bacillus subtilis* (n=5), *and Bacillus thuringiensis* (n=5) in detoxifying OTA from poultry feed. A total of 40 poultry feed samples were collected from local markets, poultry farms, and poultry feed industries nearby Lahore. Ochratoxin A was detected by TLC after it had been extracted from all samples using acetonitrile: water (86:14). The quantification of OTA in feed samples was performed by ELISA and results showed that 35% of samples were contaminated with OTA within the range of 2.2 ± 0.3 to 38 ± 0.2 ppb. After 72 h of incubation of poultry feed mixed with *B. thuringiensis* at an initial OTA level of 38 ppb, a 97% of OTA reduction was recorded. The OTA level reduction by *Bacillus thuringiensis* and *B. subtilis* was between 83 and 97% as confirmation of detoxification was done by liquid chromatography using reverse phase C18 column. Our findings suggested that Bacillus isolates may serve as an effective biological tool for reducing mycotoxin contamination in feed and agricultural products.

Key Words: Acetonitrile, *Bacillus subtilis*, *Bacillus thuringiensis*, Detoxification

IN-VITRO AMELIORATION OF AFLATOXINS BY SELECTIVE BACILLUS SPECIES IN POULTRY FEED

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PSC – 19

ABSTRACT

The world is currently concerned about mycotoxins as a chemical that could be harmful to both human and animal health. Recent research suggested that the percentage of agricultural products that are contaminated by mycotoxins is substantially higher: 72%. The poisonous Aspergillus species strains have the potential to produce aflatoxins. The study's intended goal was to examine the aflatoxins contamination of poultry feed and discover a better solution to the problem without reducing the feed's nutritional value. A total of 40 samples of poultry feed were collected from Lahore's local markets. These samples underwent enzyme-linked immunosorbent assay (ELISA) for total aflatoxin analysis, and the results indicated that samples obtained from local markets had an 80% positivity ratio. To eliminate the generated toxins, 10 different species of Bacillus were utilized. As the physical and chemical approaches have an impact on the nutritional value of feed and food, microbiological methods were used for detoxification. The detoxification at the three separate time points (24, 48, and 72 h) showed that a significant amount of the AF-B1 had already degraded by 24 h. When the toxin was noticed at 48 h, it was below the limit of detection. *Bacillus thuringiensis* exhibited 94% of maximal detoxification after 24 h. The results confer that *Bacillus thuringiensis* has the potential to detoxify aflatoxins in poultry feed and feed products.

Key Words: *Bacillus thuringiensis*, Detoxification, Enzyme linked immunosorbent assay, Poultry feed

FLOW CYTOMETRY BASED IN-VITRO INTERACTION STUDIES OF INFECTIOUS BRONCHITIS VIRUS WITH POULTRY PBMCS AND T CELLS (CD8+ & CD4+) PROLIFERATION

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PSC – 20

ABSTRACT

Infectious Bronchitis (IB) is causing huge economic losses to the poultry industry globally. One of the reasons for vaccination failure can be linked to the limited information available on how the IB virus (IBV) affects poultry immune cells. T-cell responses stimulated by vaccines are of great interest in vaccine research because they assure longer-lasting protection at the tissue level and offer a broader strain coverage. With advanced flow cytometry, cellular immune responses can be evaluated and improved after viral infection in birds. We aimed to evaluate the *in-vitro* interactions of IBV with poultry peripheral blood mononuclear cells (PBMCs). PBMCs were purified using the ficoll density gradient method, counted, and infected with IBV at a multiplicity of infection (MOI) of 0.2 & 2. PBMCs were stained with Propidium Iodide (for cell death), Rhodamine 123 (for mitochondrial integrity), Acridine orange (for cell cycle), and Cell Trace™ FarRed (for T-cell proliferation) following CD8-FITC, CD4-PE monoclonal antibodies labeling using flow cytometry. Flow cytometric analysis showed that after 24hr incubation of PBMC with IBV (MOI 2), a significant increase (p>0.05) in cell death of infected PBMCs (18.9%) vs uninfected cells (1.7%). We found a significant decrease (p>0.05) in % mitochondrial integrity of IBV-infected PBMCs (49.8%) vs uninfected (91.2%). The cell cycle results showed a significantly higher % of cells in IBV-infected PBMCs in the S phase (7.5%) and G2/M phase (13.83%) vs uninfected controls. There were no significant changes in cell death, mitochondrial integrity, or cell cycle phases with an MOI of 0.2. Proliferation assays showed a significant reduction (p>0.01) of ConA stimulated CD8+ and CD4+ T cells after 48hr incubation, however after 72hr significant reduction (p>0.01) was seen only in CD8+ T-cell proliferation. In conclusion, our flow cytometric assays for quantification of functional parameters of PBMCs and T-cell proliferation after *in-vitro* interaction with IBV showed a significant impact on immune cells. Our data can contribute to designing improved future IBV vaccines targeting reduce IBV losses across the globe.

Key Words: Infectious Bronchitis Virus; In-vitro; PBMCs; T cells; flow cytometry

UNVEILING THE EFFECTS OF *SALMONELLA ENTERITIDIS* ON POULTRY

PBMCS USING FLOW CYTOMETRY

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ABSTRACT

The control of foodborne zoonotic pathogens represents a major hurdle, as it is crucial to ensure the safety of poultry products for human consumption. Among these pathogens, *Salmonella Enteritidis* (SE) is a major culprit, harbored by poultry, and significantly contributes to the global burden of gastroenteritis in humans. To address these challenges, advanced technologies such as flow cytometry (FCM) have revolutionized the assessment of immune competence in diverse species, including poultry. Understanding the immune response during SE infection is crucial for developing effective strategies and vaccines to combat this pathogen. In this study, we investigated the interplay between SE and poultry peripheral blood mononuclear cells (PBMCs) using FCM. Poultry PBMCs were subjected to *in-vitro* infection with SE at the multiplicity of infection (MOI) of 100 and also exposed to SE culture supernatant separately. After 24 hours of incubation, we quantified cell death, mitochondrial membrane integrity, and cell cycle phase on PBMCs using FCM. Cell death was evaluated by staining the cells with propidium iodide, mitochondrial membrane integrity with rhodamine 123, and cell cycle phase with acridine orange dyes. The flow analysis revealed an increased number of cell death in both the Salmonella-infected and SE supernatant groups. Furthermore, both groups exhibited a decrease in mitochondrial membrane integrity. Additionally, exposure to SE supernatant resulted in G2/M cell cycle arrest, while Salmonella infection led to an increased proportion of cells in the S phase, signifying a change in the normal cell cycle. These findings provide evidence of the detrimental effects of SE on cell viability, cell cycle regulation, and mitochondrial function in poultry PBMCs. By elucidating the interactions between SE and the immune cells of poultry, this study contributes to our understanding of the immune response against SE infection in poultry and aids in the development of effective control measures and vaccines to combat this foodborne pathogen.

Key Words: *Salmonella Enteritidis*; In-vitro interaction; PBMCs; Poultry; flow cytometry

INVESTIGATION OF MAREK'S DISEASE IN NATIVE CHICKENS OF FAISALABAD, PAKISTAN: MOLECULAR DETECTION AND PATHOLOGY

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PSC – 22

ABSTRACT

Marek's disease is one the major viral neoplastic disease that affects birds of all age groups. It is caused by MDV (alpha herpes virus 2) that damages poultry finance with an annual cost of $1-2 billion. In the slackening of specific control measures, this disease can cause devastating losses in native as well as in commercial layer chicken flocks. Therefore, the purpose of this study was the demonstration of epidemiological analysis of Marek's disease serotypes. Clinically positive tissue samples from several poultry farms in the Faisalabad region exhibit tumors on their gross examination. The diagnosis of MDV at the molecular level was done by using PCR at different conditions. The organs showing tumors, especially in the liver, spleen, kidneys, heart, intestine, and bursa from the affected flock of Faisalabad region were collected and preserved at -20ºC for PCR and in 10% NBF for microscopic study. For the PCR process, DNA was extracted from the liver tissues and tested for the different strains of MDV by using strain-specific primers. Then after PCR processing samples were analyzed on 2% agarose gel by using a 100bp ladder under gel doc. As a result, a band for the vaccinal strain of MDV and for the wild strain of MDV was seen. Tissues collected from different affected organs were stored in 10% NBF and subjected to histopathology. The research findings revealed the prevalence of vaccinal strain and wild strain. However, this study disclosed that the disease affected birds of all age groups. As far as the season was concerned maximum positive samples of the vaccinal strain were found in winter and summer while the maximum positive samples for the wild strain were observed positive in autumn and spring. Gross and microscopic changes were also noticed in the study. Grossly lymphomas of diffused and nodular types of varying size were seen on all visceral organs with a marked increase in their size especially of the liver and spleen. While in the histopathological changes respective organs were observed with large infiltration of inflammatory cells and several necrotic changes. However, there is an urgent need to control this devastating disease by developing the best vaccination programs, monitoring the vaccinated flocks, and by developing effective control measures.

Key Words: alpha herpes virus 2, PCR, histopathology, season, lymphomas

GENETIC CHARACTERIZATION OF INFECTIOUS BRONCHITIS VIRUS ISOLATED FROM POULTRY BIRDS OF PUNJAB PROVINCE IN 2021-2022

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PSC – 23

ABSTRACT

Infectious bronchitis virus (IBV) is one of the most devastating pathogens of poultry. Despite regular vaccination, outbreaks are common. The study aimed to isolate and characterize the IB virus during 2021-2022 and to evaluate the circulating isolates of the IB virus for the selection of vaccine. A total of 42 flocks of poultry, including broilers, layers, breeders, and native chickens from the Punjab were screened. From clinically suspected bird's cloacal swabs, trachea, cecal tonsils, and lung tissue samples were collected and tested for isolation of virus by 03 blind passages into 09 days old embryonated chicken eggs followed by RT-PCR targeting partial S 1 gene. After 03 blind passages, eggs were divided into 02 groups based on embryo lesions. 3 out of 42 samples that showed embryo lesions were found positive by RT-PCR, while all the remaining samples 39 proved negative for IB virus. Phylogenetic analysis of this study isolates (partial S1) revealed the circulation of GI-13 in poultry flocks and clustered with United Kingdom (Z83975_UK/7/91), Chinese (JQ739375_ck/CH/LSD/110857_china) and Israeli variant (AF093795_variant_israel) strains with maximum homology, 99% with Z83975 and JQ739375. The study results confirmed the circulation of the GI-13 lineage of IBV outbreaks during 2020-2021. The findings of this study emphasize the continuous epidemiological surveillance and monitoring of IBV genotypes and lineages across the country.

Key Words: PCR, Phylogeny, Poultry

INSIGHTS INTO NDV-INDUCED PANCREATIC DAMAGE AND HORMONE IMBALANCES IN CHICKENS

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PSC – 24

ABSTRACT

Newcastle disease virus (NDV) poses a significant threat to the global poultry industry, causing highly contagious and devastating outbreaks. Despite advancements in vaccine development, vaccinated birds continue to experience NDV infections. This study investigated the impact of NDV infection on pancreatic tissues in vaccinated and specific-pathogen-free chickens. Histopathological examination revealed severe damage to the pancreas, characterized by partial depletion of zymogen granules, acinar cell vacuolization, necrosis, apoptosis, congestion in the vasculature, sloughing of epithelial cells in the pancreatic duct, and mild perivascular edema. Moreover, NDV infection led to increased plasma levels of corticosterone and somatostatin at three- and five-days post-infection (DPI), while a slight decrease in plasma insulin concentration is observed at 5 DPI. No significant changes are noted in plasma glucagon levels. Additionally, NDV infection results in reduced activity and mRNA expression of amylase, lipase, and trypsin in the pancreas. Collectively, these findings highlight the extensive tissue damage caused by NDV in the pancreas, accompanied by diminished pancreatic enzyme activity, and altered hormone levels, and suggest a potential link between pancreatic dysfunction and reduced growth performance following NDV infection in chickens.

Key Words: Newcastle disease virus, chicken, pancreas, pancreatic enzymes, and hormone

IMPACT OF GENOTYPE II AND VII ANTIBODIES ON THE MUTATIONS IN THE F AND HN GENES OF THE GENOTYPE VII NEWCASTLE DISEASE VIRUS STRAINS

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PSC – 25

ABSTRACT

The widespread adoption of the genotype VII Newcastle disease virus (NDV) vaccine in commercial poultry has raised questions about the influence of homologous and heterogeneous anti-NDV serum on the evolutionary dynamics of prevalent NDV strains. In this study, we investigated the effects of genotype II and VII anti-NDV serum on the evolution of genotype VII NDV strains through 30 generations of serial passage in DF-1 cells. The F and HN genes of two NDV strains, ZJ1 (waterfowl origin) and CH/SD/2008/128 (ND128; chicken origin), were amplified and compared with their original viruses at the 10th, 20th, and 30th generations. Our results revealed that genotype VII anti-NDV serum exerted selective pressure, leading to a single mutation at position 248 in the F gene of ZJ1. Similarly, mutations at residue 527 of the F gene and positions 9 and 319 of the HN gene were observed in both anti-NDV serum groups for ND128. Nonsynonymous (NS) to synonymous (S) mutation ratios were calculated for the F and HN genes, indicating ratios of 1.6 and 2.5 in the anti-II serum group, and ratios of 2.1 and 2.5 in the anti-VII serum group for the F gene of ZJ1. In the case of ND128, the NS/S ratios were 0.8 and 3 for the F gene and 0.8 and 2.3 for the HN gene in the anti-II and anti-VII serum groups, respectively. Overall, our findings suggest that the variation of protective antigens in genotype VII NDV strains remains relatively unaffected by the selection pressure of homologous and heterogeneous genotype NDV inactivated vaccines.

Key Words: Newcastle disease virus, antibodies, HN gene, F gene, mutational analysis

MOLECULAR CHARACTERIZATION AND EFFECT OF INCLUSION BODY HEPATITIS VIRUS ON CELL MEDIATED IMMUNITY IN BROILER CHICKEN

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PSC – 26

ABSTRACT

Fowl adenovirus has been reported in many countries and is a contagious agent associated with inclusion body hepatitis (IBH) and hydropericardium syndrome (HPS) in chickens worldwide. Identification of fowl adenovirus (FAdV) serotype is important to understand disease outbreaks and develop effective vaccine strategies. In spite of proper vaccination, FAdV outbreaks caused significant losses in poultry flocks across Pakistan in recent years. This study aimed to molecularly characterize the circulating serotype of FAdV in the Lahore division and study its effect on cell-mediated immunity in Broiler chickens. A total of 40 samples, 10 from each district of the Lahore division were collected, after DNA extraction molecular characterization was conducted by PCR using specific primers. A band of 1219bps was visualized on gel electrophoresis. Subsequently, sequence alignment and phylogenetic analysis based on the hypervariable region of the hexon gene were performed. The effect of the inclusion body hepatitis virus on cell-mediated immunity was evaluated by the PHA-P skin swelling test, 2 groups (n=15) of 25days old chickens were challenged with the virus and then exposed to Phytohemagglutinin-P mitogen, and results were recorded after 24,48 and 72 hrs. After phylogenetic analysis, we identified FAdV-8 and FAdV-11 serotypes in poultry farms of Lahore division which were associated with IBH infection, these isolates showed association with European and Pakistani strains. PHA-P skin swelling test revealed that IBH virus had a significant effect on the cell-mediated immune system in broiler chickens as Fowl adenoviruses have immunosuppressive properties. These findings suggest that immune dysfunction could be a contributing factor to the increased mortality of birds affected by IBH, leading to long-term immunosuppression in birds. This research has contributed by identifying the FAdV-11 serotype associated with recent IBH infections in poultry farms in Pakistan. Using the field virus will help to prepare better vaccines to control FAdVs.

Key Words: Fowl adenoviruses, Inclusion body hepatitis, Hexon gene sequencing, Phylogenetic analysis, broilers, immune response.

DETECTION AND ANTIBIOTIC SUSCEPTIBILITY PROFILING OF PREVALENT O STRAINS OF AVIAN PATHOGENIC *E. COLI* IN LAHORE DIVISION, PAKISTAN

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PSC – 27

ABSTRACT

The scenario of poultry diseases has changed with the emerging and re-emerging diseases flaring up, thus imposing a threat to the poultry industry. Among poultry diseases, avian colibacillosis is the major endemic disease, causing mortality and morbidity in poultry. O1, O2, O35, and O78 are major serotypes responsible for causing avian colibacillosis. It caused localized and systemic infections that include swollen head syndrome, peritonitis, and many respiratory diseases. The present study aimed to isolate and identify the circulating serotypes of Avian pathogenic *E*. coli (APEC) and access their antibiotic susceptibility pattern in the Lahore division, Pakistan. A total of 20 colibacillosis-affected liver samples of chicken were collected from the Lahore division. The isolation tests were performed as a reliable and timely test for the diagnosis of colibacillosis. The isolation and identification were carried out using conventional techniques. Pathogenicity of the serogroups was observed by Congo Red Assay. Primers of the *rfbO* gene clusters specific for the identification of serogroups were used for the confirmation. An antibiotic susceptibility Assay was performed to check the resistivity pattern by Kirby-Bauer Method. Norfloxacin, Oxytetracycline, Doxycycline, Sulfamethoxazole, Furazolidone, Colistin sulfate, and Amoxycillin were used in this study. Based on our results, O78 and O1 are the most prevalent serogroups in the Lahore division, 15% of the samples were affected with O78, while 5% were affected with O1. The isolated strains were resistant to all the antibiotics. This study has identified the circulating serogroups in poultry and their antibiotic susceptibility pattern which will help in the implementation of better prevention and control strategies to manage this disease.

Key Words: Colibacillosis, APEC, Prevalent serogroups, O78, O1, Mortality, Morbidity, Antibiotics, Resistant

MOLECULAR CHARACTERIZATION OF TOXIGENIC *ASPERGILLUS FLAVUS* ISOLATED FROM SICK BROILER LUNGS AND RISK FACTORS ANALYSIS

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PSC – 28

ABSTRACT

Aspergillosis is a respiratory problem in poultry and *Aspergillus fumigatus* is considered a major pathogen. In most of the cases, *A. fumigatus* was isolated from sick birds, and associated risk factors were analyzed. The current study particularly focused on the isolation of *A. flavus* from birds suffering from respiratory distress. It was established from current data that toxigenic *A. flavus* is emerging as a major pathogen in aspergillosis. Brooder's pneumonia is a respiratory disease of poultry caused by fungi of the genus Aspergillus. *Aspergillus flavus* is a toxigenic fungus, which sporulates easily in poor-quality bedding and contaminates indoor air. The objective of the present study was to isolate *A. flavus* from diseased birds, characterize toxigenic potential/variability, and analysis the risk factors associated with brooder's pneumonia caused by *A. flavus*. Litter, air, and morbid Cobb 500 strain from poultry farms (n=10) were selected for sampling. Moisture contents detected in the bedding of sawdust and rice husk were 73 to 46.4 percent and 20.06 to 23.26 percent respectively. Poultry farms that used sawdust were found more contaminated (CFU/30 minutes 80±2.6 to 160±6.0) in comparison to those having rice husk (CFU/30 minutes 28±3a 50±2.6b) as bedding material. *A. flavus* was isolated from the lungs of all infected birds and identified based on colony and microscopic morphology. Infected lung tissues containing fungal plaques were processed for histopathological examination. Tissue was necrosed and contaminated with fungal hyphae. Purified *A. flavus* species were evaluated for aflatoxins (Total aflatoxins and AFB1) production potential by Enzyme-linked immunosorbent assay (ELISA). All species were found toxigenic with the production of total aflatoxin ranging from 1.51 to 8.77 ppm and AFB1 from 0.33 to 3.0 ppm. Molecular analysis by Multiplex Polymerase chain reaction (PCR) revealed genetic variability in the aflatoxin's biosynthetic pathway. The AflR gene was amplified in all species with a 1032bps amplicon size. Multiplex PCR amplified the omt-A gene in 40, ver-1 in 70, and nor-1 in 60 percent toxigenic isolates. It is concluded that toxigenic *A. flavus* is emerging as a major pathogen in Brooder's pneumonia associated with poor litter quality.

Key Words: Brooder's pneumonia, *Aspergillus flavus*, saw dust, rice husk

PATHOLOGICAL ALTERATIONS IN RESPIRATORY SYSTEM DURING CO-INFECTION WITH LOW PATHOGENIC AVIAN INFLUENZA VIRUS (H9N2) AND *ESCHERICHIA COLI* IN BROILER CHICKENS

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PSC – 29

ABSTRACT

Despite the advancements in the field, there is a lack of data when it comes to co-infections in poultry. Therefore, this study was designed to address this issue. Broiler birds were experimentally infected with *E. coli* (O78) and low pathogenic avian influenza (LPAI) strain, alone or in combination. The experimental groups were negative control. The infected birds showed the most severe clinical signs in the *E. coli* + LPAI group along with a significant decrease in weight and enhanced macroscopic and microscopic pathological lesions. The survival rate was 60%, 84%, and 100% in birds inoculated with *E. coli* + LPAI, *E. coli*, and LPAI virus alone, respectively. The results showed that experimental co-infection with *E. coli* and the H9N2 strain of the LPAI virus increased the severity of clinical signs, mortality rate, and gross lesions. The HI titer against LPAI virus infection in the co-infected group was significantly higher than the HI titer of the LPAI group, which may indicate that E. coli may promote the propagation of H9N2 LPAI virus by alteration of the immune response. The present study revealed that co-infection with *E. coli* and H9N2 LPAI virus caused more serious synergistic pathogenic effects and indicates the role of both pathogens as complicating factors in poultry infections.

Key Words: broilers, Escherichia coli, avian influenza virus, co-infection, pathology

DETECTION AND PHYLOGENY OF INFECTIOUS BURSAL DISEASE VIRUS (IBDV) DURING FIELD OUTBREAKS IN BROILERS

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PSC – 30

ABSTRACT

Infectious bursal disease (IBD) is an economically important disease-causing great losses to the poultry industry worldwide. Field outbreaks of IBD in 18 different poultry farms in the Chakwal district were confirmed by clinicopathologic examination and PCR. A total of 6 isolates of IBDV from these outbreaks were genetically characterized based on the hyper-variable region of the VP2 gene. IBDV strains were grouped into two distinct clusters on the basis of nucleotide sequences of the hyper-variable region of the VP2 gene. According to phylogenetic analysis, 5 IBDV strains showed characteristic amino acid signatures in the VP2 gene (A222, I242, I256, I294, S299) and classified as vvIBDV. Furthermore, the sequencing analysis of detected field strains revealed the high similarity and close clustering with vvIBDV strains isolated from neighboring countries, suggesting geographic and temporal relationships among these strains. Interestingly, one IBDV strain clustered together with vaccinal IBDV strains and showed 99% sequence homology with attenuated vaccine strains. Our study revealed the exclusive circulation of vvIBDV and this evidence emphasizes the need for further detailed and more systemic approaches to study IBDV distribution for the implementation of effective control measures.

Key Words: Infectious bursal disease, RT-PCR, Phylogenetic, Poultry, Pakistan

IMMUNO-TOXICOLOGICAL EFFECTS OF DIFFERENT SUBLETHAL DOSES OF CARBOFURAN IN BROILER BIRDS

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PSC – 31

ABSTRACT

Carbamate (Carbofuran) group derivatives of carbamic acid, are commonly used as pesticides/insecticides on maize, wheat, and soybean crops. Carbamates produce reactive oxygen species (ROS) oxidative stress in an animal body. This study was designed to evaluate the immunotoxicological effects of carbofuran in broiler birds. One-day-old broiler chicks (total of 90). In the study, a total of 60 day-old broiler chicks were procured and maintained under standard housing conditions and divided into 6 equal groups. The birds were treated with different dose concentrations of carbofuran i.e., 6mg/kg, 8mg/kg body weight. The highest toxicological alterations were observed in the high-dose carbofuran (8mg/kg) treated group. It was observed that carbofuran-induced toxicity adversely affected the immunological parameters including lymphoproliferative response, Phagocytic response, and humoral immunity response through hemagglutination Inhibition test in a dose-dependent manner. Hence it was concluded from the results that Carbofuran is responsible for immunosuppression in broiler chicken at different sub-lethal doses.

Key Words: Immunotoxicological, Carbofuran, Broiler

IN VITRO EVALUATION OF PROBIOTIC PROPERTIES AND ANTIMICROBIAL ACTIVITY OF *LIMOSILACTOBACILLUS FERMENTUM* AGAINST *SALMONELLA GALLINARUM* CAUSING FOWL TYPHOID IN POULTRY

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PSC – 32

ABSTRACT

Fowl typhoid, a septicemic disease of poultry, is caused by *Salmonella* Gallinarum and leads to severe economic losses. The aim of the present study was to isolate, select and characterize indigenous probiotic lactobacilli with anti-*Salmonella* Gallinarum activity. A total of 55 lactobacilli were isolated from the caeca and ileum parts of healthy chickens and identified to species level by 16S rDNA sequencing. All the isolates were initially screened for antimicrobial activity and selected isolates were further subjected to in vitro evaluation of probiotic properties. Lactobacilli isolates (n = 21) showed varying levels of activity (08–18 mm) against *Salmonella* Gallinarum. These selected isolates also showed tolerance to acidic conditions (pH 3 and 4). Out of these 21 isolates, 13 showed growth (>0.5 OD at 600 nm) and 0.3% bile salts. Moreover, these isolates also had the ability of auto-aggregation (20.05 ± 0.62%–50.70 ± 1.40%), and co-aggregation with *Salmonella* Gallinarum (5.22 ± 0.21%–42.07 ± 0.70%). Results revealed that lactobacilli had a higher level of resistance to vancomycin (100%), streptomycin (100%), ciprofloxacin (95%), gentamicin (90%), doxycycline (90%), oxytetracycline (85%), and bacitracin (80%), and a lower level of resistance to penicillin (33%), erythromycin (28%), chloramphenicol (23%), fusidic acid (23%) and amoxicillin (4%). The *Limosilactobacillus fermentum* PC-10 and PC-76 were sensitive to most antibiotics. The overall results revealed that two *Limosilactobacillus fermentum* strains (PC-10 and PC-76) fulfill the in vitro selection criteria of probiotics i.e., tolerance to low pH, resistance to bile salts, auto-aggregation, co-aggregation with *Salmonella* Gallinarum, and absence of acquired antibiotic resistance. The *Limosilactobacillus fermentum* PC-10 and PC-76 also inhibited the (>5 log10) growth of *Salmonella* Gallinarum in co-culture assay. It is concluded that *Limosilactobacillus fermentum* PC-10 and PC-76 may be further investigated and developed as anti-*Salmonella* Gallinarum probiotics for poultry.

Key Words: Typhoid, *Salmonella Gallinarum*, probiotics, *Limosilactobacillus fermentum*

ANTICOCCIDIAL ACTIVITY OF HERBAL COMPLEX IN BROILER CHICKENS CHALLENGED WITH EIMERIA TENELLA

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PSC – 33

ABSTRACT

The objective of the present study was to evaluate the anticoccidial effect of different concentrations of the herbal complex of 4 plants (leaves of *Azadirachta indica* and *Nicotiana tabacum*, flowers of *Calotropis procera* and seeds of *Trachyspermum ammi*) in broiler chickens in comparison with amprolium anticoccidial. Three concentrations (2 g, 4 g, and 6 g) of the herbal complex were given to the experimental groups once a day, and amprolium (at the dose rate of 125 ppm) was given orally in drinking water from the 14th to the 21st days of age. One group was kept as infected, non-medicated control and one as non-infected, non-medicated control. All groups were inoculated orally with 75000 sporulated oocysts on the 14th day of age except the non-infected, non-medicated control. Among herbal complex medicated groups, the maximum anticoccidial effect was seen in the group medicated with 6 g herbal complex followed by 4 g and 2 g herbal complex medicated groups. Treatment with 6 g of the herbal complex significantly reduced the negative performance and pathogenic effects associated with the *Eimeria tenella* challenge at a level that was comparable with amprolium when using a largely susceptible recent field isolate. In summary, the concentration-dependent anticoccidial activity of the studied herbal complex suggests its use as an alternative anticoccidial agent to chemotherapeutic drugs for *Eimeria tenella* control.

Key Words: Herbal complex, anticoccidial activity, *Eimeria tenella*, coccidiosis, broiler

COMPARATIVE EFFICACY OF DIFFERENT ORGANIC ACIDS AGAINST SALMONELLA ENTERICA SEROTYPE ENTERITIDIS ON THE SURFACE OF CHICKEN MEAT

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PSC – 34

ABSTRACT

Poultry meat consumption is increasing day by day due to its nutritional value. Poor hygiene practices during meat handling are a major reason for food-borne illness. *Salmonella enteritidis* is a major food-borne pathogen transferred through poultry meat due to poor hygiene. Organic Acids are considered safe preservative agents to increase the shelf life of meat products. In this study, organic acid (acetic acid, citric acid, and lactic acid) alone and their combination were used to see their decontamination effect against *Salmonella enteritidis* on the surface of poultry meat. Anti – *S. enteritidis* activity of the organic acid (by using individual and in combination) on chicken meat was determined through the relationship between temperature and time of exposure. For this, 10gram boneless chicken meat was taken and converted into small pieces according to groups divided. Then samples were exposed to 0.5 McFarland *S. enteritidis* suspensions. These exposed samples were placed in tubes containing organic acids (individually or in combination) for a specific temperature of 4°C and 25°C and time duration of 10, 40, 70, and 100 min. After these steps, chicken meat pieces were shifted separately to the stomacher bag and homogenized. Homogenized solution diluted serially 10-folds. Dilutions were made up to 1010 and spread 0.1mL on SSA plates and were incubated at 42°C for 24 hours. The efficacy of organic acids against *S. enteritidis* was determined by comparing the log reduction results. In our study highest log reduction while using a single effect was shown by Lactic acid then acetic acid and then citric acid. The highest mean log reduction (0.94±0.86) of *S. enteritidis* by Acetic acid were recorded at 4°C temperature and 100-minute time, while in comparative effect the highest log reduction was shown in the combination of all (acetic acid, lactic acid, and citric acid). The highest mean log reduction (0.95±0.86) of *S. enteritidis* was recorded by using a combination of acetic acid, citric acid, and lactic acid at 4°C temperature and 100-minute time followed by a combination of other organic acids. Lactic acid alone is sufficient to reduce the *S. enteritidis* titer to a safe level.

Key Words: Poultry, Organic acid, *Salmonella enteritidis*, Meat

OCCURRENCE OF *CAMPYLOBACTER JEJUNI* IN RAW BROILER MEAT AND BY-PRODUCTS FROM RETAIL SALE POINTS IN JHANG

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PSC – 35

ABSTRACT

Campylobacter is a microscopic organism that belongs to the class *Campylobacter*. The most prevalent type of *Campylobacter* in birds and mammals are *C. jejuni* and *C. coli*. Poultry meat, especially broiler meat and its organs are considered to be contaminated at sale points due to unhygienic conditions. Many reports suggested that the bacteria transferred to humans through contaminated broiler meat and by-products. This is the reason that *Campylobacter* is thought to be a major cause of gastroenteritis in humans in many countries including Pakistan. *Campylobacter jejuni* is a major cause of human infections, but mostly these infections are self-limiting. Complications may cause bacteremia, arthritis, Guillain-Barre syndrome, and abortion. A total (n=432) samples of different meat tissues (broiler muscle = 72, liver = 72, gizzard = 72, ileum = 72, cecum = 72, and large intestine = 72) were taken from different areas of district Jhang. *Campylobacter* was isolated from these samples by culturing an aliquot of homogenized meat in buffered peptone water on mCCDA agar having specific supplements for isolation and growth of *Campylobacter*. The number of isolates that were screened for *Campylobacter* positive was 229. The average occurrence of *Campylobacter* in district Jhang including its four tehsils was found to be 53.01% and the average occurrence of *Campylobacter jejuni* in district Jhang including its four tehsils was found to be 49.78%. While the average occurrence of *C. jejuni* in broiler muscle, liver, gizzard, ileum, cecum, and large intestine in District Jhang including its four tehsils was found to be 50.00%, 52.78%, 51.39%, 50.00%, 45.83%, and 48.61% respectively. There was no significant difference found statistically in the occurrence of *Campylobacter* and *C. jejuni* in different edible organs of broiler at (P>0.05. This research work indicated the occurrence of campylobacter through poultry products. There is a need to improve hygiene and biosecurity at farm and sale points.

Key Words: broiler, campylobacter, sale points, hygiene

EVALUATION OF FEEDSTUFFS AS A POTENTIAL CARRIER OF AVIAN INFLUENZA VIRUS BETWEEN FEED MILLS AND POULTRY FARMS

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ABSTRACT

Migratory waterfowl commonly introduce avian influenza virus (AIV) to poultry. Since most commercial poultry production takes place in controlled confinement, which limits migratory waterfowl–poultry interaction, further virus spread likely takes place via vectors. Contaminated feed trucks can help spread the virus among poultry farms. Strict biosecurity compliance is sometimes hard to achieve in feed mills and feed trucks, as some companies outsource their services. Present study was conducted to assess the potential vector role of feedstuffs for the area spreading of AIV. Firstly, feed samples were collected from commercial poultry facilities that experienced highly pathogenic avian influenza (H5N2) in 2014–2015 for AIV testing by a real-time RT–PCR specific for the viral matrix gene. Secondly, feed materials obtained from an AIV-negative farm were spiked with various concentrations of a low pathogenic AIV H5N2. Virus-spiked cell culture media were prepared in the same manner and used for comparison. The spiked feed and media samples were tested by a multiplex real-time RT–PCR ran in a quantitative manner, either immediately or after incubation at −20, 4, 22, and 37 °C for 24, 48, and 72 h. Some of the feedstuffs collected from the poultry facilities or feed mills were positive for AIV RNA but negative by the virus isolation (VI) test, while all the formaldehyde-treated feedstuffs were PCR-negative. In the spiked feeds, the AIV titer was 1–3 logs lower than that in the corresponding media, even when tested immediately after spiking, suggesting that feed might have a negative impact on the virus or PCR detection. The half-life of AIV RNA was shorter at a higher temperature. A significant decay in the viral RNA over time was noted at 37 °C ($p < 0.05$), suggesting that feedstuffs should be maintained in the cold chain when testing is desired. Furthermore, the thermal degradation of AIV suggests that the heat treatment of feeds could be an alternative to chemical treatment when contamination is suspected. Collectively, the study observations indicate that AIV survivability in feed is relatively low, thus rendering it a low risk.

Key Words: Complete layer mash; real-time polymerase chain reaction; half-life

DEVELOPMENT OF A BIVALENT INACTIVATED OIL ADJUVANTED VACCINE USING LOCAL ISOLATES OF LOW AND HIGH PATHOGENIC AVIAN INFLUENZA VIRUSES AND COMPARISON OF ITS IMMUNOGENIC RESPONSE WITH MONOVALENT VACCINES OF BOTH STRAINS

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PSC – 37

ABSTRACT

The poultry industry is the largest agro-based industry in Pakistan with 6-7% growth per annum. Highly pathogenic avian influenza (HPAI) and Low pathogenic avian influenza (LPAI) viruses pose a serious threat to the productivity and survival of poultry. HPAI implicate serious public health concerns because of their zoonotic nature. Currently, the majority of the industry relies on imported vaccines and only small-scale vaccine manufacturing is carried out from locally isolated strains. Vaccine development using locally isolated strains and preventing inoculation stress using bivalent vaccines is highly desirable. This study aimed to develop a bivalent inactivated oil adjuvanted avian influenza vaccine using both LPAI (H9N2) and HPAI (H5N8) viruses and a comparison of its immunogenic efficacy with monovalent vaccines. Both these strains were separately cultured on chicken embryonated eggs and inactivated separately. Bivalent vaccine (H5+H9) was manufactured by combining the inactivated harvest of both strains in equal ratio and homogenization with Montanide ISA-70 (MVG) in 40:60 respectively. Monovalent vaccines were prepared separately using H5 and H9 strains and mixing antigen with oil at 30:70 respectively. The immunogenic response of bivalent and monovalent vaccines was checked in 3 weeks old layer chickens. The booster dose was injected at day 21 post-priming. The antibody titers were measured using hemagglutination inhibition tests 14, 28-, 42-, 56-, and 70 days post booster. The immunogenic response of bivalent vaccine was checked at 0.3 ml/bird and 0.5 ml/bird while monovalent vaccines were inoculated at 0.3 ml/bird. The control group was injected with Phosphate buffer saline (PBS) at 0.3 ml/bird intramuscularly. Bivalent vaccine performed equivalent to monovalent vaccines at both doses, however, the titers were higher using a 0.5 ml dose, and no antigen dominance was observed in the locally isolated strains. All the vaccines remained stable for the period of 1 year. The bivalent vaccine using H9 and H5 strains is equally effective and can be a good replacement for monovalent vaccines in order to minimize the inoculation stress on the birds.

Key Words: Avian Influenza Vaccine, H5 H9, bivalent vaccine

ASSESSMENT OF TOXIGENIC FUSARIUM SPECIES AND THEIR MYCOTOXINS IN POULTRY FEED

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PSC – 38

ABSTRACT

Fusarium fungal species may lead to contaminate poultry feed and the species have the potential to produce various mycotoxins. To overcome this issue, isolation, and confirmation of Fusarium and its toxins from poultry feed has its own significance. A total of 40 poultry feed samples of various types were collected from different areas of Punjab and the highest fungal load was observed in crushed corn seeds followed by cotton seed cakes, home mixed, and commercial poultry feed and ranged from 5×101 to 9×1010 CFU/g. Isolation frequency and relative density of various genera (n=110) such as Aspergillus, Trichoderma, Fusarium, Mucor, and Zygomycetes fungi were recorded. Macroscopically, a prominent pattern of whitish to light purple, dark purple, pure white, and deep orange color cottony mycelia and spores were observed and pointed leaf-shaped spores or sickle shape conidia and septate hyaline hyphae scattered like thread were recorded under a microscope. Fusarium (n=07) were isolated such as *Fusarium guttiforme, Fusarium globosum, Fusarium semitectum, Fusarium subglutinans, Fusarium armeniacum, Fusarium solani, and Fusarium oxysporum.* Fusarium isolates were screened for toxin-producing potential and detected positive for fumonisin, deoxynivalenol, T2- toxin, and zearalenone showing blue-colored illuminant bands by thin layer chromatography (TLC). *Fusarium* genus-specific Internal transcribed spacer (ITS) regions were amplified exhibiting 398 bp bands followed by polymerase chain reaction (PCR) toxin-typing using trichothecene toxin gene-specific primers and confirmed the trichothecene production potential of 07 isolates. Poultry feed can be assessed for toxigenic Fusarium by TLC technique as well using genus and toxin-specific PCR.

Key Words: Fusarium species, Internal transcribed spacer regions, Isolation frequency, Thin-layer chromatography

IN SILICO ANALYSIS OF NON-SYNONYMOUS SINGLE NUCLEOTIDE POLYMORPHISMS IN THE ALPHA TOXIN OF CLOSTRIDIUM PERFRINGENS TOXINOTYPE A ISOLATED FROM NECROTIC ENTERITIS CASES

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PSC – 39

ABSTRACT

Necrotic enteritis is one of the common diseases of poultry caused by *Clostridium perfringens* toxinotype A. The alpha toxin produced by *Clostridium perfringens* toxinotype A is responsible for the pathogenic effects of the disease. The current study is conducted to identify the mutations and genetic variations in the alpha toxin responsible for necrotic enteritis. The *Clostridium perfringens* toxinotype A was confirmed by PCR amplification of specific genes. The nucleotide sequence of the Alpha toxin gene was processed in Blastx to identify mutations specifically single nucleotide polymorphism (SNPs). The identified mutations were subjected to the application of bioinformatics software for SNPs annotations viz., PolyPhen2, PhD SNP, PROVEAN, and SIFT to study the functional impact of the designated mutation on the alpha toxin. Moreover, the impact of the mutation on the stability of alpha toxin was assessed by using Mupro and I-MUTANT. Furthermore, the structure and function of the alpha toxin were predicted by PSIPRED, InterProScan, and I-TASSER. It was revealed that T62I and A83S projected a possibly damaging impact on the alpha toxin as predicted by PolyPhen2. Whereas, all other identified mutations had least to no impact on the function and stability of alpha toxin. The structure predicted by PSIPRED indicated that the secondary structure of alpha-toxin consists of a helix, strand, and coil which is also verified by I-TASSER. The web tool InterProScan revealed that alpha toxin is involved in molecular functions like hydrolase activity along with Phospholipase C activity and Zinc ion binding which was verified by I-TASSER. Further, I-TASSER also predicted that the model has a C score of 0.27 with an estimated TM-score of 0.75±0.10 and estimated RMSD 3.3±2.3Å whereas alpha toxin has thirteen (13) ligand binding sites and as per GO terms indicated that alpha toxin has been involved in the biological process like hemolysis. *In Silico* studies of alpha toxin identified multiple antigenic variations along with in-depth analysis of functional impacts, molecular structure, and gene ontology terms.

Key Words: In Silico, bioinformatics, functional impact, stability, structure, alpha toxin, Clostridium perfringens

PREVALENCE OF CAPILLARIA SPECIES IN PIGEON POPULATION OF DISTRICT NAROWAL, PUNJAB, PAKISTAN

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ABSTRACT

Pigeons are omnipresent birds that belong to the order Columbiformes and cover a large part of every town and city, worldwide. Among the parasites of pigeons, *Capillaria* is found to be more prevalent in them after *Eimeria*. These worms penetrate deeply into the intestinal mucosa leading to hemorrhages and epithelial necrosis thereby presenting clinical disease, and death occurs if left untreated. The major purpose of this study was to determine the burden of *Capillaria* spp. in domestic pigeons (*Columba livia domestica*) of district Narowal. A total of 210 fecal samples from pigeon flocks were processed qualitatively through direct microscopy and floatation method while quantitatively through McMaster technique. The parasitic eggs were diagnosed using standard keys. In this study, 154 (73.33%) out of the 210 samples were found infected with *Capillaria* spp. The quantitative examination presented the lowest eggs per gram (EPG) of 300 in the Narowal tehsil and the highest EPG of 800 in the Shakargarh tehsil among the study areas. This study will be helpful in raising awareness among pigeon owners to improve pigeons' health status through better control of capillariasis.

Key Words: Domestic pigeons, Capillaria spp., Prevalence, Floatation method, EPG

CLINICO-PATHOLOGICAL ASSESSMENT OF VIRULENT NEWCASTLE DISEASE VIRUS IN DUCKS

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ABSTRACT

Newcastle disease (ND) is an infectious, highly contagious, and lethal disease of avian species. It is considered that ducks are natural reservoirs or carriers of Newcastle disease virus (NDV) and are resistant to different strains of NDV. The current study was designed to evaluate the pathogenesis of Newcastle disease in domestic ducks through histopathology, immunohistochemistry (IHC), and serum biochemical changes. For this purpose, eighty ducks were reared for 42 days and divided into two groups A and B. Ducks in group A were challenged with (NDV) at the rate of 0.1 ml of ELD50 (virus titer 10 7.32/ 100µl) on the second week of age, whereas Group B was control negative. Splenomegaly, atrophy of the thymus, and necrotic lesion in the kidney were observed on the 9th day of post-infection. Hepatic degeneration and mononuclear cell infiltration were noticed in the proventriculus and intestine in challenged ducks. Viral antigens were detected in the lungs, intestine, proventriculus, and lymphoid organs of infected ducks through IHC. Albumin and total protein values were significantly low in infected group A as compared to control group B. ALT, AST, and ALP values were significantly high in infected group A. On 5th and 7th day post-infection, oropharyngeal swabs were negative for NDV and cloacal swabs were positive for NDV through Reverse transcriptase polymerase chain reaction. It was concluded that ducks are susceptible to NDV and virulent strain of NDV caused disease in ducks.

Key Words: Ducks; Newcastle Disease Virus (NDV); histopathology; polymerase chain reaction; serum Biochemistry

ANTIMICROBIAL ACTIVITY OF ETHANOLIC EXTRACTS OF SELECTED MEDICINAL PLANTS AGAINST MULTIPLE DRUG RESISTANT *STAPHYLOCOCCUS AUREUS*

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ABSTRACT

Staphylococcus aureus is one of the important organisms present in septic wounds in humans, animals, and poultry. The organism is gram-positive round-shaped catalase and coagulase-positive organism. The current study was conducted to characterize the *S. aureus* isolates using biochemical testing and molecular methods along with the assessment of the antibacterial effect of ethanolic plant extracts. The *Staphylococcus aureus* isolates were confirmed by amplification of the 16S rRNA gene by polymerase chain reaction (PCR). The amplified product was sequenced by chain termination sequencing and phylogenetic analysis was performed. Molecularly confirmed isolates were subjected to antibiotic sensitivity testing for Vancomycin, Cefoxitin, Oxacillin, Norfloxacin, Levofloxacin, Ciprofloxacin, and Ceftazidime by Kirby Bauer disk diffusion method. These isolates were further subjected to the antibacterial activity of ethanolic extracts of *Moringa oleifera*, *Cinnamomum verum*, *Azadirachta indica*, *Zingiber officinale*, *Allium sativum*, *Trachyspermum ammi*, *Nigella sativa L.* and *Punica granatum* by well diffusion method. The minimum inhibitory concentration (MIC) of these plant extracts was also evaluated against *Staphylococcus aureus* isolates. The nucleotide sequence of the 16S rRNA gene of *Staphylococcus aureus* was submitted to NCBI GenBank via accession numbers OP631665.1, OP631666.1, OP631667.1, OP631668.1, and OP631669.1. The highest zone of inhibition was recorded for ciprofloxacin (29.20±6.979mm) followed by levofloxacin (24.00±2.345mm) while the least zone of inhibition was recorded for Cefoxitin, Oxacillin, and Norfloxacin (0.0±000mm). Whereas, among plant extracts highest zone of inhibition was recorded for *Moringa oleifera* (16.20±2.280) followed by *Allium sativum* (12.40±11.632mm) while the least zone of inhibition was recorded for *Azadirachta indica*, *Zingiber officinale* and *Nigella sativa L.* (0.0±000mm). The least MIC was recorded for *Allium sativum* (3.12± 0.53mg mL-1). Ethanolic extracts of *Allium sativum* are a potential alternative to commercially available antibiotics for the cure of diseases caused by *Staphylococcus aureus*.

Key Words: 16S rRNA gene, *Staphylococcus aureus*, Ciprofloxacin, *Moringa oleifera*, *Allium sativum*

IMMUNOMODULATION WITH BACTERIAL OUTER MEMBRANE PROTEIN COATED NANOPARTICLES IN THE CONTROL OF SALMONELLOSIS IN POULTRY

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ABSTRACT

Immunity against salmonellosis is always challenging due to unavailability of a suitable vaccine strategy. Mostly, antibiotics are used to control salmonellosis in poultry which pose health hazards because of drug residues and resistance. One solution is development of a novel antibacterial immune stimulation therapy with local isolates using nanotechnology for a sustained and effective immune response against this disease. Therefore, the present formulation was developed from the outer membrane proteins (OMPs) of *Salmonella gallinarum* after isolation and identification. The quantification of the bacterial protein concentration was determined by bicinchoninic acid assay. The characterization of membrane-coated nanoparticles was done by Zeta size and Zeta potential. The coating of bacterial outer membrane protein onto the surface of gold nanoparticles was confirmed by TEM and FTIR. The in-vitro antigenicity of prepared plain OMPs alone and coated with gold nanoparticles (AuNPs) was assessed by macrophage phagocytosis assay. Sterility, stability, and safety studies of prepared antigens were conducted. In-vivo study was conducted for the evaluation of immune response in experimental trials by using ELISA kits to quantify the interleukin-1, 2, 4 and gamma interferon under subcutaneous (S/C) and oral route (PO) of inoculation using OMPs alone and AuNPs coated antigen. The results demonstrated that bacterial membrane-coated gold nanoparticles have enhanced stability in biological buffer solutions as compared to bare gold nanoparticles and vaccination with OMPs-AuNPs has a greater immune response compared to OMPs alone. In addition, there was observed greater production of interferon-gamma (IFN-γ) and IL-1, IL-2 in the S/C route as compared to the oral route in comparative immune responses. Elevated production of IFN-γ, IL-1, 1L-2 but not IL-4 demonstrated strong Th1-based cell responses against bacterial infection. In addition, when vaccinated SC, the resulting OMPs-AuNPs and OMPs alone induced greater antibody titers (IgM, IgG) compared to oral route. It was estimated that OMPs-AuNPs formulation at 100 µg/100 g live bodyweight through S/C route produced 100% protection against oral *S. gallinarum* challenge.

Key Words: proteins, Gold nanoparticles, Immunomodulation, Salmonellosis

OPTIMIZATION OF PARAMETERS FOR PHYTASE PRODUCTION USING SUBMERGED FERMENTATION BY *ASPERGILLUS NIGER*

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ABSTRACT

A number of microbes have the potential to produce the enzyme phytase, which releases inorganic phosphorus by hydrolyzing phytate present in cereals and legumes used in feeds for monogastric animals. It is employed commercially in the food and feed industries. The present study was conducted to optimize parameters for phytase productions under submerged fermentation by a novel strain of Aspergillus Niger isolated from the soil. The best phytase-producing isolate was selected based on the size of the zone of hydrolysis on the Phytase Screening Medium plate and identified as Aspergillus Niger by morphological and molecular methods. Using one variable approach, parameters such as temperature (20, 25, 30, 35, 40, 450C), pH (3, 4, 5 & 6), and concentration of wheat bran (1, 2, 3, 4 & 5 %) were optimized for phytase production in inoculated flasks of phytase screening medium broth. Maximum phytase production (2.87 µm/mL at temperature 35 0C, 2.83 µm/mL at pH 5, and 4.97 µm/mL at 4% wheat bran concentration) was observed. Agricultural by-products like wheat bran can be used for cost-effective phytase production using optimized culture conditions.

Key Words: *Aspergillus Niger*, submerged fermentation, monogastric animals, phytase

SEROPREVALENCE OF AVIAN INFLUENZA VIRUS (H9N2) SUBTYPE IN THE BACKYARD POULTRY OF DISTRICT MULTAN

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ABSTRACT

Avian Influenza Virus (H9N2) Subtype is widely prevalent in domestic and commercial poultry as well as in wild birds. The current study was designed to evaluate the seroprevalence of the avian influenza virus H9N2 subtype from district Multan. A total of 204 samples were collected and processed by Hemagglutinating inhibition test and ELISA. An overall prevalence of 10.78% was found in backyard poultry birds from the district of Multan, Pakistan. The backyard poultry is commonly reared outdoors completely and has more chance to contact with wild birds thus having an increased chance for the occurrence of avian influenza. A strong association ($P \leq 0.05$) of infection was seen between feeding and drinking with wild birds. For the transmission of the avian influenza virus, water can play an important role between backyard poultry and wild birds. The health status of the poultry birds was also found to be a significant ($P \leq 0.05$) risk factor for infection with Avian Influenza. Keeping in view the current research it is concluded that avian influenza virus H9N2 subtype is prevalent in the target area. However further studies are required to access the exact prevalence and burden of infection throughout the country.

Key Words: Avian Influenza, Hemagglutinating inhibition test, ELISA, backyard poultry

EFFECT OF PHOTOPERIOD DURATION WITH COMBINATION OF DIFFERENT LIGHTS ON PHYSICOCHEMICAL CHARACTERISTICS OF BROILER MEAT

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PSC – 46

ABSTRACT

The present study aimed to evaluate the meat quality traits of broiler strains under the dichromatic light combination (red and green) during incubation. In the incubator, a total of 875 hatched broiler eggs (ROSS 308) were incubated subject to one dark (control) and combinations of dichromatic light for the different photo-periodic intervals of 0, 4, 8, 12, 16, 20, and 24-hour every day throughout the whole incubation period. Photo stimulation during incubation in the incubator is considered a treatment for broiler eggs. After rearing for 35 days, broilers were slaughtered to evaluate meat quality in terms of color, cooking loss, lipid oxidation, metmyoglobin value, myofibrillar fragmentation index, pH, tenderness, and water-holding capacity. The significant difference was considered at $p < 0.05$. Results show that light duration has a potential role in meat quality variables. Light duration has increased the tenderness, color, water holding capacity, and meat pH has improved in 12h exposure to the light group. It is suggested that LEDs can be used for the potential significance of avian incubation in commercial broilers, layers, breeders, and many other avian species.

Key Words: Incubation; Light exposure; Broiler; Meat Quality

HATCHER BASED FEEDING STRATEGIES HAVE THE POTENTIAL TO MODULATE GROWTH DYNAMICS OF BROILERS

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ABSTRACT

In normal practice, chicks are taken out of the hatcher after 21 days (504 hours) of incubation and it comprises of hatch window around 36-48 hours. Many factors affect the hatch window but the most important include the age of parent stock, egg storage time, and incubation conditions So, the chicks that hatch in the early hours of the hatch window face high stocking density, variations in conditions due to multiple opening and closing of hatcher machine, and dehydration which ultimately resulted in low-quality chicks. The late collection of chicks from hatcher resulted in a body weight loss of around 2.6 % and 2.3 % in males and females respectively as the absence of feed and dehydration during their initial hours caused in lowering of their growth rate. This happened because yolk sac feeding is not sufficient and chicks need exogenous nutrients to maintain their high growth rate. It is estimated that 70 % of chicks must have to wait around 20-35 hours in a hatcher before hatch pull, hence, negative results on early growth due to variation in hatching time. To avoid these risks, the Patio hatchery system is a new trend in the commercial poultry industry. In it, hatching chicks brooded in the hatchery for a week with proper provision of feed and water. This system reported higher body weight, better chick quality, and lower mortality rates in broilers. Keeping in mind this scenario present study was planned to study the effect of different hatcher-based feeding strategies (Patio strategies) on subsequent growth performance, and welfare aspects of birds. For this, a total of 1000 eggs of Hubbard broiler breeders were equally divided into four different patio strategies i.e., P0, P3, P5, and P7. Here, feed and water were provided to the chicks for 0, 3, 5, and 7 days in the hatcher right after hatching and then the birds were shifted to the rearing house. Data were collected for growth performance and welfare aspects of broilers. Statistical analysis showed that post-hatch growth performance was significantly ($p<0.05$) better in P3 birds. Physical asymmetry and scores of feathers and gait were not affected by any of the patio treatments ($p>0.05$), however, better growth with improved feed conversion was yielded in chicks offered feed and water for three days within the hatcher. Hence, it is recommended that the chicks should be provided with feed and water within the hatcher for at least three days for enhanced growth performance in rearing facilities.

Key Words: Broilers, Hatcher feeding, Growth Performance, Welfare traits

EFFECT OF DIFFERENT FEED DILUTIONS ON BODY WEIGHT UNIFORMITY

DURING REARING PHASE AND THEIR SUBSEQUENT EFFECT ON PEAK PRODUCTION OF BROILER BREEDER

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ABSTRACT

The present study was conducted to evaluate the effect of different diet dilutions on body weight uniformity and peak production of broiler breeders at the commercial level. For this purpose, a total of 6400 broiler breeders (Ross 308) were randomly picked up at the age of 04th week and were fed 04 different types of diluted diets up to the 18th week of age. Diets used were; CON or 0% dilution (controlled diet; 2800ME + 14% CP); LES or 05% dilution (less diluted diet; 2660 ME + 13% CP); MED or 10% dilution (medium diluted diet; 2520ME + 12% CP) and EXT or 15% dilution (extra diluted diet; 2380ME + 11% CP). Rearing and production parameters were measured at each week of age as indicators of growth and production. Data regarding pen uniformity and flock uniformity revealed that MED produced maximum flock uniformity while EXT produced maximum pen uniformity during the rearing phase, while, the lowest mortality was observed among EXT and MED treatments, however, the highest culling was found among MED-fed birds. During the production phase, the highest peak egg production was observed in MED treatment despite avian influenza infection. Similarly, the highest number of total eggs, hatch-able eggs, and chicks per hen-housed were found in MED treatment while the lowest was found in EXT treatment. Furthermore, the lowest mortality was observed in MED treatment during the production phase despite avian influenza. While a non-significant difference was observed in terms of the economics of feed probably due to a proportionate increment of feed intake with respect to diet dilution. In conclusion, MED or 10% diet dilution (2520ME + 12% CP) may produce better flock uniformity with a minimum frequency of manual weight grading and the best production performance. However, diet dilution of more than 10% can be detrimental on a commercial scale probably due to difficulty in balancing the nutrient profile of diet.

Key Words: broiler breeder, qualitative feed restriction, body weight uniformity, peak production

ASSESSING THE CHEMICAL, MICROBIOLOGICAL AND NUTRITIONAL PROFILE OF DIFFERENT TYPES OF DEAD BIRD COMPOST DURING SUMMER SEASON

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ABSTRACT

In Pakistan, the broiler population is around 1.5 billion/annum with 4-5 % average mortality during rearing, resulting in the production of 48 million Kg or 48M tons/annum dead birds. The situation becomes worse in case of any viral disease outbreak that causes mortality up to 50-75%. In the current scenario, to obtain 1.5 billion DOCs, the hatchery produces 18 million kg of waste per year. Moreover, the processing of these broilers produces a huge number of visceral organs as waste products. These mammoth poultry waste materials may pose serious health risks and potential threat of disease spread if not disposed of properly. All over the world, different methods are used for the proper disposal of poultry wastes (mortality, visceral organs, and feathers) including incineration, burial, rendering, and composting, each having its own merits and demerits. Through composting, these massive poultry wastes can be disposed of properly into highly enriched end products along with a reduction in environmental pollution and risk of disease spread. The present study has been planned to compare the chemical, nutritional, and microbiological characteristics of different types of dead bird compost (broiler, layer, and breeder) and to access its further potential as a poultry feed ingredient and bio-fertilizer. During this study, different poultry dead birds (broiler, layer, and breeder) composts were prepared following bin composting methods and were chemically analyzed for mineral, microbial, and nutritional profiles. It was revealed that the time duration for the preparation of breeder compost was a bit longer than broiler and layer due to its body confirmation, however, it has a superior nutritional and mineral profile. Dead breeder compost showed superior proximate, amino acid, and mineral profiles with the least bacterial load compared to broiler and layer compost. Based on the findings of this study, it can be concluded that composting can be used for the safe and hygienic disposal of various poultry wastes and have a good prospect for its further utilization as a bio-fertilizer and poultry feed ingredient.

Key Words: Poultry waste, Composting, Dead birds, Litter material, Bio-fertilizer

EFFECTS OF GLABRA (HERBAL PRODUCT) ON RESPIRATORY HEALTH, GROWTH PERFORMANCE, IMMUNE RESPONSE AND ECONOMIC APPRAISAL IN BROILERS

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ABSTRACT

Resistance has been developed in most microbes due to persistent respiratory distress and residual effects of dietary antibiotics in broilers production, making it difficult to address human health issues. To address this problem, an appropriate plant-based alternative to antibiotics is required. It was hypothesized that the inclusion of Glabra through drinking water and spray may enhance the growth performance, respiratory health, immune response, and carcass characteristics of broilers. The present study was conducted at experimental broiler house C block, University of Veterinary and Animal Sciences, Ravi Campus Pattoki, comprising 35 days. A total of 300 commercial broilers (Ross-308) were distributed into five treatment groups having four replicates of 15 birds each based on a completely randomized experimental design. C was designated as a control group, Group B was treated with 0.25ml of Bronchodilator (Mentobin) through drinking water, G1 was treated with 0.25ml Glabra through drinking water, G2 was treated with 1.2ml / 60ml Glabra by spray and G3 was given 0.25ml Glabra through drinking water and 1.2ml / 60ml by spray. Ad libitum feed and water were provided. Growth performance (feed intake, body weight, FCR, feed efficiency, livability, production number, mortality %) was calculated weekly and at the end of the trial, 02 birds from each replicate were randomly picked up and slaughtered for carcass characteristics (Carcass, Breast, and Thigh yield, Giblet, Abdominal fat, Intestinal weight) and immune response. Effects of Glabra were evaluated using one-way ANOVA through the GLM procedure in SAS software (version 9.1). For the comparison of significant treatment means, Duncan's Multiple Range test was applied. The present study showed that the birds treated with Glabra through all routes showed significant results in weight gain and production number. Whereas Glabra through drinking water showed the highest feed intake and Glabra through the spray had the highest feed efficiency, also, in respiratory parameters a higher effect on intra clavicular air. In carcass yield, Glabra treated birds had higher wings (%) and drumsticks (%). Glabra also affected abdominal air sacs through all routes.

Key Words: Glabra, Respiratory Diseases, Antibiotics, Growth, Carcass

MOULTING THROUGH EIGHT DAYS FEED RESTRICTION TO COMMERCIAL LAYING HENS AFFECTS PRODUCTIVE PERFORMANCE AND EGG QUALITY TRAITS

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PSC – 51

ABSTRACT

The aim of the study was to compare three molting procedures and their effect on productive performance, egg quality, and antibody response of leghorn hens. For this, a total of 324 laying hens were distributed into three treatment groups having 12 replicates of 9 birds each according to a completely randomized design. Treatments consisted of three molting procedures based on feed and light restriction. The targeted weight at the end of molting was 1450-1470g. As soon as the molting procedure is complete, the comparative analysis of post-molt productive performance (feed intake, egg production, egg weight, egg mass, feed per dozen eggs, feed per kg egg mass, livability), egg quality characteristics (egg weight, egg length, and width, shape index, surface area, volume, albumen height, weight, Haugh unit score, yolk width, height, index, egg shell pores number, shell weight, thickness, breaking strength) and antibody response against Newcastle Disease and Avian Influenza (H-9) were evaluated. Birds subjected to molting procedure 3 (8 days fasting and gradual decrease in light) showed improvement in productive performance, egg geometry and quality traits, and antibody response against Newcastle Disease virus. Birds who experienced molting procedure 1 (11 days fasting) had improved feed intake, egg production, and livability. However, birds molted with procedure 2 (6 days fasting) revealed intermediate results in all the studied parameters. In conclusion, molting through feed and light restriction with 8 days of fasting and gradual reduction in light has the potential to improve the performance of leghorn hens.

Key Words: Moulting, Feed Restriction, Productive Performance, Commercial Layer

EFFECT OF SUPPLEMENTATION OF FLEX SEED MEAL ON OMEGA-3 FATTY ACIDS CONCENTRATION OF JAPANESE QUAIL EGGS

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ABSTRACT

The effect of supplementation of flex seed, canola meal, or fish meal on the performance and lipid content of eggs was studied in Japanese quail. Day-old quails (n= 240) were kept in 12 replicates of 20 birds. The trial duration was 1-70 days. Quail broiler (days 01 to 42) and breeder diets (days 43 to 70) were prepared as per stander specifications and supplemented with either flex seed, canola meal, or fish meal at the rate of 15% each. The better 6th-week body weight and feed conversion ratio were obtained in quails fed on a diet supplemented with flax seed meal followed by treatment supplemented with fish meal, control (basal diet), and canola meal. The serum glucose concentration was highest in control followed by flax seed meal, canola meal, and fish meal. The serum cholesterol concentration was highest in treatment with fish meal, followed by control (basal diet), canola meal, flax seed meal, canola meal, and fish meal. No effect of treatments on egg weight, albumen weight, and shell weight was observed. An increase of 56% in total n-3 PUFA concentration was observed in the egg yolk of quails fed with flex seed meal compared with control and all other treatments. We concluded that the supplementation of the quail diet with flex seed meal improve egg n-3 PUFA concentration of egg yolk without effecting.

Key Words: Production performance, Designer eggs, Cholesterol. Consumer health

SUPPLEMENTATION OF BROILER DIET WITH A-GALACTOSIDASE IMPROVES ITS GROWTH AND ECONOMICS

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PSC – 53

ABSTRACT

Cereals, grains, and other plant feed sources contain galactosides which are generally indigestible for simple stomach animal species such as chicken. α-Galactosidase act on galactosides and liberate some energy that may be useful in improving nutrient uptake and gut health in chicken. The objective of this study was to evaluate the effect of α-Galactosidase supplementation on growth performance in broilers. The basal diet for starter, grower, and finisher phases were prepared and broiler chicks (n=156) were divided into two groups. Group I (control) was fed the commercial, fully balanced diet without α-galactosidase, while group II was fed the same commercial diet supplemented with 2% α-Galactosidase for five weeks. Data on mortality, feed intake, body weight, and feed conversion ratio were recorded on a weekly basis. Results showed that 2% α-Galactosidase supplemented birds gained 1.5% more body weight compared with the other group and fetch 2.0% higher economic return per kg live weight. No mortality was observed during the course of the study in either of the treatment groups. No significant difference was observed for feed intake and feed conversion ratio for the starter, grower, and finisher phases between the treatments. The present study concludes that supplementation of α-Galactosidase enzyme improves overall body weight gain without affecting feed intake and increases economic returns in broilers.

Key Words: Gut health, Antibiotics, organic production, nutrient digestibility

TIBIA BONE MORPHOLOGY IN JAPANESE QUAIL (*COTURNIX COTURNIX JAPONICA*) THROUGH DIETARY INTERVENTION OF SYMBIOTIC AND CINNAMON ESSENTIAL OIL

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PSC – 54

ABSTRACT

The aim of the current study was to investigate the effects of dietary supplementations of symbiotic and Cinnamon essential oil on tibia bone morphological characteristics in Japanese quails. Due to their quick growth rates, resilience to disease, and unique flavor of their flesh and eggs, Japanese quail have grown to be a substantial sub-segment of the poultry industry A 35-day research experiment was performed on One -day old Japanese quails into four treatment groups at the ARTC, UVAS, Lahore. The control group (CG) was given Basal diet (BD), the symbiotic group (SG) was given BD plus 1g/kg of symbiotic, the cinnamon essential oil group (CEO) was given BD plus 1g/kg of cinnamon essential oil, The fourth group received BD plus 200mg/kg of cinnamon essential oil plus 1g/kg of symbiotic. Tibia bone was used for morphometric parameters such as the bone length, width, and medullary canal diameter, and bone wall thickness. Bone robusticity index, bone ash percentage, and measurement of phosphorus content were done. Data were analyzed by using SPSS, through one-way ANOVA. Bone weight, bone length, bone thickness, and bone morphometry were significantly decreased in the control group. In contrast, dietary inclusion with cinnamon essential oil and symbiotic both alone and combined improved these morphological parameters There were no noticeable changes in the bone ash content, weight to length index, or robusticity index. All supplemented groups had substantially better results on bone morphology.

Key Words: Cinnamon essential oil, tibia bone morphology, Bone robusticity index

EVALUATION OF THE EFFICACY OF EXOGENOUS PROTEASE ENZYME ON GROWTH PERFORMANCE IN BROILER CHICKENS: A PROMISING SOLUTION FOR ENHANCING FEED EFFICIENCY AND COST SAVINGS

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PSC – 55

ABSTRACT

In the current scenario, the escalating costs of poultry feed have emerged as a major challenge. However, the strategic implementation of protease enzymes presents a compelling avenue for mitigating these concerns by optimizing feed efficiency and reducing expenses. The present research trial aimed to evaluate the efficacy of Cibenza EP150, a protease enzyme product by Novus, on the growth performance of broiler chickens. A total of 2000 broilers were assigned to four treatment groups with five replicates of 100 birds each. The experimental design included a control group (T1) without enzyme supplementation, a negative control group (T2) with reduced nutrient levels by 5%, and two treatment groups (T3 and T4) receiving diets supplemented with Cibenza EP150 at rates of 300 and 500 grams per ton of feed, respectively. Throughout the trial, growth performance parameters, including body weight, feed intake, and feed conversion ratio were monitored and recorded. Results showed that birds fed the negative control diet (T2) exhibited a significant decrease in growth performance parameters, including body weight gain, feed conversion ratio (FCR), and an elevated mortality rate compared to the other treatment groups. Conversely, the groups receiving diets supplemented with Cibenza EP150 (T3 and T4) demonstrated substantially improved growth performance, characterized by higher body weight gain, enhanced FCR, and a lower incidence of mortality compared to the control group (T1). These findings suggest that the inclusion of Cibenza EP150 in broiler diets can promote optimal growth in commercial broiler chickens.

Key Words: Protease, Cibenza EP150, Cost Saving, Growth performance, broiler chicken

COMPARATIVE STUDY OF GROWTH PROMOTERS IN COMMERCIAL BROILERS: EVALUATING PREBIOTICS, PROBIOTICS, AND ANTIBIOTICS

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PSC – 56

ABSTRACT

This study compared the effects of prebiotics like Manan-oligosaccharides (MOS) and probiotics like Bacillus subtilis and their combination on growth performance, carcass parameters, and gut health in broilers, thereby replacing traditionally used antibiotics like zinc bacitracin 10% in broilers. Two hundred broiler chicks from a hatchery were used in this investigation. They were split into five treatment groups, each of which had four duplicates (n=10). The groups comprised probiotics (Bacillus subtilis), prebiotics (MOS), antibiotics (Zinc Bacitracin 10%), and a combination of probiotics and prebiotics. When feeding iso-nitrogenous and iso-caloric diets to birds, measurements of body weight and feed intake were made. The birds were ultimately slaughtered to get information on intestinal health and carcass quality. A completely randomized design (CRD) was used to analyze the data, and Tukey's HSD test was used to compare results. In birds fed diets containing probiotics and prebiotics in combination, body weight gain was greater (P 0.05). In birds fed diets containing prebiotics alone or in conjunction with probiotics, improved (P0.05) FCR was observed. In comparison to control birds, birds fed a meal containing probiotics and prebiotics had a greater dressing percentage (P 0.05). In birds fed probiotics and prebiotics, breast yield was higher (P 0.05). An increase in villus height and a considerable shift in villus surface area were found in the gut morphometric parameters. It can be concluded that, generally, the addition of prebiotics in symbiotically with probiotics had a more beneficial effect on growth performance, carcass yield with concomitant growth in the intestinal morphology in commercial broilers than that of antibiotics.

Key Words: Mannan oligosaccharide, probiotic, broiler, performance, gut morphometry

DIETARY INORGANIC SELENIUM IMPROVES MORPHOLOGY AND MINERAL RETENTION OF TIBIA BONE AS WELL MUSCLE CHARACTERISTIC OF BROILER UNDER DEXAMETHASONE INDUCE STRESS

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PSC – 57

ABSTRACT

In this research work the effective dose of inorganic selenium which is suitable for the supplementation to broiler will be identified and their effect on growth performance will be observed. The poultry industry is playing a vital role to fulfill the protein requirement globally. However, the meat quality is affected when the broilers are coming into stress during farming and transportation. To minimize the effect of stress on the broiler's growth the free radicles in the body are neutralized with the help of antioxidants. This research study is designed to introduce the broilers with induce stress by supplementation of Dexamethasone in their diet. While to cope with their effect inorganic selenium is provided with different doses. A day-old 120 were distributed in five groups having 4 replicas with 05 chicks per replica. The dietary plan for the chicks is as follows. Group A supplemented with only basal diet; B group supplemented with dexamethasone 15mg /01 kg diet. Group C, D, and Group E with 0.2mg Se /kg, 0.3mg Se/kg, and 0.4mg /kg respectively. 0.3mg of Inorganic selenium improved the calcium and phosphorous deposition in the tibia bone as well the ash content. The muscle histomorphometry and tibia bone morphology also improved with 0.3mg/Kg Se supplementation to the broilers in their diet. We conclude that supplementation of selenium improves breast muscle histomorphometry, tibia bone health, mineral retention in tissue, and resulting meat quality in chickens.

Key Words: Bone health, poultry, trace minerals, muscle, minerals, Glucocorticoids

AUTOLYZED YEAST: A PROMISING INTERVENTION FOR COUNTERING OCHRATOXIN-INDUCED HEMATOBIOCHEMICAL AND HISTOPATHOLOGICAL ALTERATIONS IN BROILER BIRDS

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ABSTRACT

This study investigated the ochratoxin-induced toxic pathological effects and their amelioration with autolyzed yeast (AY). A total of six groups of 120-day-old chicks were formed (A-F). Group A was used as a control negative. Groups B and C were treated with two doses of AY, i.e., 1ml/2L and 1m/1L of water, respectively. Group D was fed 400 ppb of ochratoxin (OT) through contaminated feed. OT (400 ppb) in conjunction with AY (1 ml/L and 1 m/2L of water, respectively) were given to groups E and F. The duration of the experiment was 35 days. The birds in group D were clinically depressed and showed decreased feed intake and body weight gain in comparison to other groups. Hematological parameters in group D were significantly decreased as compared to other groups. Serum values of creatinine, urea, ALT, and AST of group D were significantly higher as compared to the control group whereas groups E and F indicated lower concentrations of these as compared with group D. Microscopically, the liver of group D revealed a severe degree of congestion along with clouding swelling of hepatocytes than the control group, but the microscopic lesions in group F were decreased in comparison with OTA-treated group D. Similarly, kidney of group D showed severe tubular necrosis along with pyknotic nuclei than the control group, but amelioration of these changes was observed in groups E and F. Thus, the study concluded that AY tends to mitigate the OTA-induced pathological changes in broiler birds.

Key Words: Ochratoxin, Autolyzed Yeast, Pathology

EFFECT OF DIMETHYL SULFOXIDE ON CRYOPRESERVATION OF JAPANESE QUAIL SPERM

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PSC – 59

ABSTRACT

Successful semen cryopreservation not only reduces the requirement for a high number of males for natural mating, increases the usage of the best males, and improves their welfare but also eases the process of artificial insemination. Commercial chicken breeding operations are getting benefitted from artificial insemination across the globe and there has been significant development in semen cryopreservation for chicken. Nevertheless, for other poultry species such as Japanese quail, semen cryopreservation is just in the preliminary stage, yet there is a need to develop this technology to improve breeding and genetic gains. In this study, the effect of different concentrations of Dimethyl Sulfoxide (DMSO) on cryopreservation of Japanese quail semen was investigated. For this purpose, Japanese quail males (n=30; age 10 weeks) were used. Pooled semen from 8 to 10 males was used and the experiment was repeated twice. Different concentrations of DMSO i.e., 0%, 4%, 6%, 8%, and 10% were prepared in the lake's diluent. Immediately after collection semen was diluted in a 1:2 ratio with Lake's diluent containing either of the above-mentioned treatments. After dilution semen was cooled to 5°C in 30mins. At this point, data on sperm motility, viability, and membrane integrity were recorded. After that, Semen was loaded into straws and kept at 6cm height from the liquid nitrogen for 5mins and then plunged into liquid nitrogen for cryopreservation. Rapid thawing was carried out one week after the cryopreservation at 37°C. Duplicate samples were assessed for sperm mass motility, plasma membrane integrity, and viability. Before freezing the mean values for each of the parameters i.e., sperm motility (70%), membrane integrity (80%), and viability (83%) did not differ significantly ($P<0.05$) between the treatments. After freezing, however, no sperm motility, viability, and membrane integrity were observed in any of the treatments. It was concluded that whether the DMSO does not make good media for quail semen cryopreservation or a different protocol is required for semen freezing in Japanese quail.

Key Words: Artificial Insemination, Cryopreservation, Semen quality, Sperm motility

COMPARATIVE IMPACT OF WATER SOLUBLE AND FAT-SOLUBLE VITAMINS ON GROWTH & EGG PRODUCTION OF BLACK AUSTRALORP & RHODE ISLAND RED DURING HOT CLIMATIC CONDITION

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PSC – 60

ABSTRACT

A study was designed to compare the impact of water-soluble and fat-soluble vitamins in rural poultry during hot climatic conditions. A total of 600 unsexed chicks of Rhode Island Red (RIR) and Black Australorp (BA) of purebred backyard poultry breeds were obtained from the hatchery of Poultry Research Institute, Rawalpindi. The birds were maintained on a deep litter system for 52nd weeks. The results revealed that fat-soluble and water-soluble vitamins have a significant effect on the growth performance of rural birds as compared to the control group ($P < 0.05$) while there is a non-significant ($P > 0.05$) difference between fat-soluble and water-soluble vitamins as far as their impact on growth is concerned. Fat-soluble and water-soluble vitamins have a non-significant effect on Production performance when compared to each other ($P > 0.05$), while fat-soluble and water-soluble vitamins have a significant effect on production performance as compared to the control group ($P < 0.05$). It was concluded from the results of this study that Black Australorp showed the same performance during summers as was of RIR, so it can be reared in hotter areas by following heat stress management and vitamin supplementation. Fat-soluble vitamins are economically more viable than water-soluble Vitamins, but they may vary with their source.

Key Words: Rural Poultry, Hot climatic condition, Vitamins, production performance

EMBRYONIC GROWTH AND POST-HATCH PERFORMANCE OF CHICKEN IN RESPONSE TO DIFFERENT DICHROMATIC LIGHT INTENSITIES

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ABSTRACT

Light is an important environmental factor that can help to improve the performance of the hatchery industry; however, commercial eggs are incubated in a dark environment. Therefore, this study was planned to evaluate the impact of various intensities of dichromatic Green-Red (GR) light during the incubation period on the hatching and post-hatch performance of broiler and layer chickens (Ross 308 & White Bovans). This study was conducted at Avian Research and Training Center, UVAS, Lahore. For that purpose, 0, 150, 250, and 350-lux of dichromatic light were provided for 12 hours per day during the incubation period [Genotype (2) × Lighting intensity (4) × n (125) = 1000 eggs] and 125 eggs were assigned to each of 8 treatments in a Randomized Complete Block Design (RCBD). Results indicated that embryo index was significantly improved in broilers in 250 lux GR light. Hatching time was also significantly decreased in 250 and 350-lux light intensities. Moreover, hatchability and hatch of fertile were significantly improved in broilers and layers in 250 lux. Results showed that significantly better body weight was observed in broilers that were incubated at 350 lux. Similarly, improved FCR was noted in the broiler chicks that were given lighting intensities during incubation. It was concluded that 250 lux light can improve the embryonic growth and hatch window and decrease the late embryonic mortality while 350 lux light during embryogenesis can help to improve post-hatch growth performance.

Key Words: Incubation, LEDs, Light intensity, Poultry, Embryogenesis

PRECISION LIGHTING FOR POULTRY: ASSESSING THE BENEFITS OF LED LIGHTS WITH DEFINED SPECTRAL PROPORTION ON GROWTH, REPRODUCTION, AND WELFARE

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PSC – 62

ABSTRACT

The welfare and performance of broiler breeders are greatly influenced by the lighting conditions they are exposed to. We used three light sources in the study; compact fluorescent lamps (CFL), general energy-saving lamps (ESL), and poultry-specific light CORAX. The results revealed significant differences among the three light sources in terms of light distribution and lux levels. The house equipped with CORAX lighting demonstrated superior performance compared to the other two lighting options. It provided better light distribution throughout the space and maintained optimal lux levels. There was a notable 60% reduction in energy costs associated with the CORAX lighting installation, showcasing its energy efficiency. Additionally, the house with CORAX lighting exhibited a 2% increase in hatchability, indicating a positive impact on reproductive performance. Furthermore, the CORAX lighting system contributed to a 25% reduction in the number of eggs found on the floor, enhancing egg quality and minimizing losses. It also resulted in a 2.5% peak production increase, indicating improved productivity. Lastly, the CORAX lighting system led to a 4% increase in bird uniformity, which is advantageous for management and marketability purposes. Implementing poultry-specific lighting systems like CORAX can significantly contribute to the success and profitability of broiler breeder operations in Pakistan.

Key Words: Light source, energy saving, hatchability, productivity

LATER EXPOSURE TO DIFFERENT PERCH MATERIAL AND DESIGN AFFECTS BEHAVIOR AND PERFORMANCE OF LEGHORN HENS

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ABSTRACT

Perching behavior is natural and evident in Red Jungle fowl, from which modern-day chickens originated. A positive impact of perching is the improvement of a bird's physical condition. In this experimental study, 540 LSL lite laying hens were randomly distributed according to Complete Randomized Design in 6 treatments with 6 replicates of 15 birds each. The experiment was set up as a 2 × 3 factorial arrangement of treatments; treatments consisted of 2 perch materials (wooden and plastic) and 3 perch shapes (square, round, and triangle). Effects of perch material and shape were evaluated on productive performance, behavior and welfare traits, and egg characteristics. Egg weight was higher in wooden perch materials than in plastic. Regarding perch design, egg weight, production percentage, and feed conversion ratio per kg of egg mass of commercial layers differed significantly. Moreover, wing flapping and perching behavior were significant among different perch designs. Egg volume, egg weight, albumen height, Haugh unit score, and shell thickness differed significantly among perch designs. In conclusion, the provision of different perch designs especially wooden and triangular perches positively influences productivity, behavior, and egg quality traits in laying birds.

Key Words: Perch material, Perch design, Productive performance, Egg quality

SEASONAL VARIATION OF NUTRITIONAL REQUIREMENTS OF SCAVENGING CHICKEN IN DISTRICT TOBA TEK SINGH

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PSC – 64

ABSTRACT

Food insecurity is a common issue for masses living in rural, semi-urban, and urban areas. The number of people who are facing a severe food crisis in Pakistan ranges from 5.96 to 8.62 million while around 10 million children are facing stunting. To counter issues of malnutrition, among many strategies, rearing chicken for the production of meat and eggs is the most common in countries like Pakistan. Chicken, however, has specific needs for energy, protein, and certain other critical nutrients to grow well and produce eggs. Rural/backyard chickens characteristically grow slowly and produce fewer eggs. One of the important causes of poor production of backyard/rural/scavenging chicken is poor/improper nutrition. To figure out whether the rural scavenging chicken is getting enough food to produce meat and eggs, data on the availability of nutrients during winter, summer, and rainy seasons were investigated. For this purpose, two villages each from Toba Tek Singh, Gojra, Kamalia, and Pir Mahal were selected. During each season 5 growers and 5 adult chickens were selected on a random basis from each village. The chickens were killed to get crops and gizzard contents. The contents were separated for grains, insects, and grass and weighed separately before they were pooled in one sample. The samples were analyzed in a laboratory to estimate dry matter, crude protein, fat, fiber, calcium, and phosphorus. The chickens were kept in captivity and fed on kitchen waste, fruits, and vegetable waste to mimic the field conditions. On an overall basis, deficiencies of crude protein, calcium, and phosphorus were observed in all regions of field samples. In field samples, the deficiency was highest in the rainy season followed by the summer and winter. So, supplementation of protein, Ca, and Phosphorus seems mandatory to improve the production in these regions.

Key Words: Rural chicken, Nutrition, Feed requirement

A GLOBAL MEDIA ANALYSIS OF THE IMPACT OF THE COVID-19 PANDEMIC ON CHICKEN MEAT FOOD SYSTEMS: KEY VULNERABILITIES AND OPPORTUNITIES FOR BUILDING RESILIENCE

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PSC – 65

ABSTRACT

Food systems are increasingly under threat, with climate, biological, economic, or policy shocks and stressors occurring at an increasing frequency and scale. Their complex and fragile nature has become even more apparent during the COVID-19 pandemic. A systematic review of news articles published globally between December 2019 and April 2020 was conducted to describe the impacts of the COVID-19 pandemic on the chicken meat system and to identify key vulnerabilities and intervention points to build resilience. Most of the impacts identified were caused by a combination of the different mitigation measures implemented by the system actors such as movement restrictions rather than by the direct effects of the virus, thereby demonstrating the importance of interconnections and coordination in the system. Social media were found to have played a crucial role in amplifying, mitigating, or mediating the impact of the pandemic. The findings highlight the importance of adopting a holistic approach that integrates the multiple dimensions of food systems for effective responses to systemic shocks.

Key Words: food systems; COVID-19; chicken; media; systematic review

SINGLE AND COMBINED SUPPLEMENTATION OF SELENIUM AND VITAMIN E IMPROVES GROWTH PERFORMANCE AND GUT DEVELOPMENT IN PHYSIOLOGICALLY STRESSED JAPANESE QUAILS

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ABSTRACT

Antibiotics are traditionally used in poultry production to improve growth and immunity against microbial diseases. However, it leads to the development of antimicrobial resistance in consumers and there is a need to explore alternatives to enhance production performance without compromising consumer health. The objective of the present study was the assessment of synergistic effects of selenium and vitamin E as alternatives to antibiotics on growth performance and gut development in physiologically stressed Japanese quails. For this purpose, a total of 210 day-old Japanese quails were divided into five groups with seven replicates each (NC: basal diet (BD); PC: BD+Dexamthesone 0.6mg/kg (DM); Se: BD+DM+0.2mg Se per kg feed; VitE: BD+DM+Vitamin E 250mg/kg feed; Se+VitE: BD+DM+Se 0.2mg/kg feed +Vitamin E 250mg/kg feed). Feed consumption, body weight, and FCR were calculated during a 35-day trial, after which 2 birds per replicate were sampled. Data were subjected to 1-way ANOVA and Tukey's post-hoc test. In the 4th and 5th weeks, feed intake and body weight were higher ($P<0.05$) in the Se+Vit E group and the VitE and Se+Vit.E groups, respectively than the PC group. The body weight was lower ($P<0.05$) in the PC group than in the NC group in the 3rd, 4th, and 5th weeks. In the 4th and 5th weeks, Se+Vit.E group had lower FCR ($P<0.05$) than the PC group. Compared with the PC group, VitE and Se-VitE groups improved the villus height and surface area in all 3 intestinal segments. Similarly, the Se+VitE group improved lamina propria, tunica muscularis, and crypt depth in the duodenum and ileum when compared with the PC group. The results revealed that combined supplementation of Se and VitE has the potential to ameliorate the effects of stress in Japanese quails.

Key Words: poultry, intestine, trace elements, AGP, AMR

EFFECT OF BUTYRIC ACID SUPPLEMENTATION ON GROWTH PERFORMANCE, CARCASS CHARACTERISTICS, MEAT QUALITY AND INTESTINAL MORPHOLOGY OF BROILER CHICKEN

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ABSTRACT

This study was executed to investigate the effects of butyric acid (BA) supplementation via drinking water on broiler growth performance, carcass characteristics, meat quality, and intestinal morphology. In total, 400 newly hatched broiler chicks were stratified into 4 treatment groups, replicated 5 times and each replicate had 20 chicks. Butyric acid was added to water in different concentration of 0.1% (T 2), 0.2% (T 3), and 0.3% (T 4), while control group (T 1) was without butyric acid supplementation. Completely randomized design (CRD) was applied. Data for growth performance (feed intake, body weight gain, and FCR), carcass characteristics (live weight, carcass yield, breast yield, fat pad weight, liver, heart, gizzard, proventriculus, and spleen) meat quality (breast meat color and drip loss), and intestinal morphology (villus height and crypt depth) parameters were collected and analyzed using analysis of variance technique under CRD. Performance parameters, including feed intake, body weight gain, and FCR were not affected (P>0.05) by the butyric acid supplement to the water whereas slaughter parameters were improved for chicks offered butyric acid at 0.3% level in drinking water compared to chicks offered the simple water. Furthermore, the intestinal morphology and meat quality parameters were also improved. In view of these resulted, it can be concluded that butyric acid supplementation in drinking water of broiler chicken at 0.3% level may improve carcass quality and intestinal morphology.

Key Words: Butyric acid, growth, slaughter traits, meat quality, intestinal morphology

EFFECT OF DIFFERENT LEVELS OF FEED-BASED NUTRITIONAL SUPPLEMENT ON GROWTH PERFORMANCE, SLAUGHTER TRAITS, IMMUNE RESPONSE AND HEMATOLOGY OF BROILER CHICKEN

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ABSTRACT

This research aimed to investigate how feed-based nutritional supplements affected growth performance, slaughter traits, blood profile, and immune response of broiler chickens. A total of 200 newly-hatched broiler chicks (Cobb-500) were randomly assigned to four treatments (T1, T2, T3, and T4), each of which contained five replicates of ten chicks. A completely randomized design (CRD) was applied. T1 was provided with a normal diet (without supplements) and acted as a control group. While experimental diets were; T2=1g/kg: T3=2g/kg: and T4=3g/kg of supplement in feed. Parameters of growth performance, slaughter traits, blood profile, and immunological response were examined for a period of 35 days. The 2g and 3g nutritional supplement groups outperformed the other two groups in terms of body weight gain, feed efficiency, and mortality. Feed consumption, however, did not significantly change between treatments. The carcass yield, breast yield, and thigh yield of the birds fed nutritional supplements at 2 and 3g were higher ($P<0.05$) than those of the other groups, while all other parameters—including wing weight, liver weight, gizzard weight, heart weight, and abdominal fat weight—were not significantly different ($P>0.05$) between treatments. Similarly, the blood profile parameters did not differ significantly across the treatments. More immunological antibody titers against the ND and IB vaccinations were observed in the birds provided nutritional supplements at 2g and 3g than in the other groups. In conclusion, adding 2g of a nutritional supplement to the diet could improve the broiler's overall performance while being more cost-effective.

Key words: Feed-based nutritional supplement, growth, slaughter traits, immune response, blood chemistry

EFFECT OF WATER-BASED NUTRITIONAL SUPPLEMENT ON GROWTH PERFORMANCE, CARCASS CHARACTERISTICS, SERUM BIOCHEMISTRY, AND IMMUNOLOGICAL RESPONSE OF BROILER CHICKEN

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ABSTRACT

Broiler lines are currently rigorously selected for faster growth and greater final body weight. Nutrition has a critical role in maintaining broiler body growth. This study aimed to determine how water-based nutritional supplements affected broiler chickens' growth performance, carcass characteristics, serum biochemistry, and immunological response. A total of 200 newly hatched broiler chicks (Cobb-500) were divided into four treatment groups (T1, T2, T3, and T4) that were replicated five times with ten birds in each, under a completely randomized design. Different concentrations of the supplement, 0% (control), 2.5%, 5%, and 7.5%, were added to the water. Growth performance, carcass characteristics, serum biochemical profile, and immune antibody response parameters were evaluated for a span of 35 days. The findings demonstrated that body weight gain and feed efficiency significantly improved in the birds provided nutritional supplements at 5 and 7.5% than in the 2.5% and control group. The 5% and 7.5% nutritional supplement groups displayed lower mortality rates compared to the other two groups. However, feed consumption did not significantly differ between treatments. The birds fed nutritional supplements at 5 and 7.5% showed enhanced ($P<0.05$) carcass yield than other groups whereas all other metrics, such as breast yield, thigh yield, wing weight, liver weight, heart weight, gizzard weight, and abdominal fat weight, were not significantly different ($P>0.05$) between treatments. There were no differences in albumin, total protein, globulin, cholesterol, uric acid, triglycerides, or glucose levels in serum between the various treatments. In comparison to the other groups, the birds administered nutritional supplements at 5% and 7.5% had higher immunological antibody titers against the ND and IB vaccinations. In conclusion, adding 5% of a nutritional supplement to the water may improve the broiler's overall performance while being more cost-effective.

Key words: nutritional supplement, growth, carcass characteristics, blood serum profile, immune response

EFFECT OF BLEND OF ESSENTIAL OILS ON GROWTH PERFORMANCE, CARCASS CHARACTERISTICS, MEAT QUALITY, GUTMORPHOLOGY, SERUM BIOCHEMISTRY, AND IMMUNE RESPONSE OF BROILER CHICKEN

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ABSTRACT

A total of 240 day-old chicks were divided into four groups (T_1, T_2, T_3, and T_4), each of which had six replicates and contained ten birds. Different concentrations of the blend oil, 0mL/kg (T_1), 0.15mL/kg (T_2), 0.30mL/kg (T_3) and 0.45mL/kg (T_4), were added to the diet. Growth performance, carcass characteristics, meat quality, gut morphology, serum biochemistry, and immune-related parameters were assessed in this study. The results demonstrated that the birds who received a blend of essential oils at levels of 0.30 and 0.45mL/kg exhibited enhanced weight gain and feed efficiency compared with other groups. Feed consumption and mortality, however, did not differ significantly between the regimens. The birds that received a blend of essential oils at doses of 0.30 and 0.45mL/kg showed enhanced carcass yield in comparison to other groups. All other metrics, including the weights of the liver, wing, heart, gizzard, and abdominal fat, as well as the yields of the breast and thighs, did not differ statistically significantly between treatments. The addition of a blend of essential oils at doses of 0.30 and 0.45 mL/kg significantly lowered the pH of the meat in comparison to the other groups. All other measures, including meat lightness, meat redness, meat yellowness, and meat drip loss, did not differ significantly between treatments. In comparison to the other groups, birds receiving a blend of essential oils at 0.30 to 0.45mL/kg showed increased villus height and crypt depth. The villus height: crypt depth ratio, however, did not reveal any significant differences between the regimens. All blood biochemical markers, including serum total protein, albumin, globulin, glucose, cholesterol, triglyceride, and uric acid, revealed no variations between the treatments. The birds given a blend of essential oils at 0.30 and 0.45mL/kg showed greater immunological response against Newcastle disease vaccination relative to other groups. The antibody titer against IB, however, did not differ significantly between regimens. In conclusion, supplementing the diet with 0.30mL/kg of a combination of essential oils may enhance broiler overall performance without having a negative impact on blood biochemical profile.

Key words: essential oils, growth, carcass traits, meat quality, blood chemistry

EFFECT OF PROBIOTIC SUPPLEMENTATION ON PRODUCTION PERFORMANCE, HATCHING TRAITS, EGG CHARACTERISTICS, BLOOD

BIOCHEMISTRY, AND IMMUNE RESPONSE OF BROILER BREEDERS

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ABSTRACT

Including healthy bacteria in the diet improves the function of the gastrointestinal system, stimulates immunity, and avoids metabolic disorders, all of which have a good effect on the health and production indicators of the bird. The current study's objective was to ascertain how probiotics affect broiler breeder production performance, hatching features, egg characteristics, blood biochemical profile, and immune response. This experiment was carried out in a breeder house with controlled environmental conditions. Under a completely randomized design (CRD), 240 Arbor Acres broiler breeder hens were divided into four treatments, each of which contained six cage replicas with ten hens each. Different concentrations of the probiotic, 0g (control), 0.1g, 0.2g and 0.3g were added in 1 litre of drinking water (w/v), respectively. Production performance, hatching traits, egg characteristics, serum biochemical profile, and immune antibody response parameters were evaluated for a span of 8 weeks. The results showed that probiotic treatments of 0.2g and 0.3g in drinking water increased egg production, egg weight, egg mass, and feed efficiency when compared to the untreated control group. However, the percentage of livability did not differ ($P<0.05$) between treatments. Similar to this, probiotic treatment at doses of 0.2g and 0.3g improved hatching features (settable egg, fertility, hatchability, and hatch of fertile eggs) and lowered embryonic mortality. Probiotic supplementation in drinking water to hens at 0.2 and 0.3g levels increased egg length and egg width compared to other treatment groups, but no other metrics significantly differed between treatments. In comparison to control hens, the hens treated with probiotics at doses of 0.2 and 0.3g had lower blood levels of triglycerides. However, there were no differences in other serum profile parameters between the regimens ($P>0.05$). In similar vein, adding probiotics at 0.2 and 0.3g doses increased antibody titers against NDV and IBV compared to the untreated control group. In conclusion, 0.2g of probiotic added to drinking water may increase broiler breeder hens' overall performance while being more affordable.

Key words: probiotic, production, hatching traits, blood chemistry, immune response

EFFECTS OF SELENIUM-ENRICHED DIETS ON THE GROWTH PERFORMANCE, SLAUGHTER CHARACTERISTICS, AND BLOOD BIOCHEMISTRY OF RHODE ISLAND RED CHICKEN

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ABSTRACT

The goal of the current study was to determine how selenium-supplemented diets affected the growth performance, carcass traits, and blood biochemistry of Rhode Island Red (RIR) chicken. The Organic and inorganic selenium was fed to the birds at 0.30ppm whereas control diet was not supplemented with selenium either organic or inorganic form. A total of 225 day-old RIR chicks were indiscriminately distributed to three groups according to the experimental diets in a complete randomized design. Each treatment group was repeated 5 times (replicates) and each replicate had 15 birds. Parameters of growth performance, carcass characteristics, and blood biochemistry were assessed. Birds fed an inorganic selenium-supplemented diet had higher feed intake than those fed an organic selenium-supplemented diet or the control diet, whereas birds fed an organic selenium-supplemented diet had higher body weight gains and better feed conversion ratios. Birds fed organic selenium in the diet showed higher breast and thigh weight than inorganic Se whereas dressing percentage, drumstick yield, and weights of liver, gizzard, heart, and wing were not significantly different across treatments. The organic Se fed group showed higher values for total protein and globulin in blood relative to those fed inorganic Se and control diet. Similarly, organic Se fed birds showed higher blood Se concentration than other two groups. However, no significant differences in albumin, glucose, cholesterol, triglycerides, and uric acid were observed among the diets. These results lead to the conclusion that organic Se may be utilized in diet to improve the poor performance of RIR chicken.

Key words: Selenium, growth, slaughter characteristics, blood chemistry

REVIEWS & EXTENSION ABSTRACTS

NANOTECHNOLOGY: A NEW FRONTIER IN POULTRY PRODUCTION

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ABSTRACT

Nanotechnology is a cutting-edge, promising technology with socioeconomic benefits for the poultry business. In comparison to their bulk counterparts, nanoparticles (NPs) demonstrate the benefits of high absorption and bioavailability with more efficient delivery to the target region. Nanomaterials exhibit a wide range of shapes, sizes, and uses as well as surface alterations, charges, and natures. The two most popular ways for preparing NPs are top-down and bottom-up. There are several ways that NPs could exert their influence. In the poultry industry, NPs have been used for a variety of purposes, including the diagnosis of numerous diseases using various techniques, the preparation of vaccines and immuno-stimulation, sanitation, production enhancement, the detection of food adulteration, and antimicrobial activities (antiviral, antibacterial, antiparasitic, antifungal, and anti-mycotoxin). The challenge of antibiotic medication resistance can be solved by increasing poultry production and lowering the bacterial burden after utilizing NPs. Although employing NPs in poultry production has several advantages, certain safety, and harmful impact issues need to be taken into consideration. To maintain the health of both humans and poultry, safety and toxicity risks should be taken into account and thoroughly examined before the application of NPs in poultry farms. The fate of NPs in the body, NPs kinetics, and dynamics in the host, the number of NPs left in tissue after treatment, potential toxicological side effects in the host, as well as the response to various concentrations, sizes, and shapes of these particles, should all be the subject of further in-depth research.

Key Words: Nanotechnology, antibiotic resistance, one health

REVOLUTIONIZING POULTRY HEALTH: HARNESSING THE POWER OF PROBIOTICS AND VACCINES TO TACKLE ANTIMICROBIAL RESISTANCE

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ABSTRACT

Antimicrobial resistance is a serious concern to public health, necessitating innovative strategies to combat its spread in poultry production. This abstract explores alternative approaches to address AMR specifically in the poultry industry, focusing on probiotics and vaccines. Probiotics are live microorganisms that confer health benefits, and have gained attention as a promising tool to reduce the use of antibiotics in poultry. Several studies have demonstrated that specific strains of probiotics can inhibit the growth of pathogenic bacteria, improve gut health, and enhance the overall immune response of poultry. By creating a competitive environment in the gut, probiotics help prevent the colonization of antibiotic-resistant bacteria, thereby reducing the selection pressure for AMR development. Additionally, probiotics may enhance the efficacy of vaccines by stimulating immune responses, leading to improved protection against pathogens. Vaccination represents another alternative approach to combat AMR in poultry. Vaccines can stimulate the immune system to recognize and neutralize specific pathogens, reducing the need for antimicrobial interventions. Developing vaccines targeting common poultry pathogens, such as Salmonella and Campylobacter, can help mitigate the spread of antibiotic-resistant strains by using the food chain links. Furthermore, vaccination programs can enhance flock health, decrease production losses, and improve animal welfare. Combining probiotics and vaccines in integrated strategies holds even greater promise. Probiotics can serve as adjuvants, augmenting the immune response generated by vaccines. This synergistic approach may enhance the overall efficacy of vaccines, reduce the need for antibiotics, and limit the emergence of AMR in poultry. In conclusion, probiotics and vaccines offer alternative approaches to combat antimicrobial resistance in poultry production. By improving gut health, bolstering the immune response, and reducing pathogen transmission, these interventions have the potential to reduce the reliance on antibiotics and safeguard both animal and human health.

Key Words: antimicrobial resistance, probiotics, alternative approaches

ANTIBIOTICS: SUBSTITUTES TO COMBAT ANTIBIOTIC RESISTANCE IN POULTRY

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ABSTRACT

With the advancement of the poultry business the use of antibiotics as both therapeutic drugs and growth promotor has been increased. Thus, concerns to investigate substitutes that could replace antimicrobials without negatively affecting product quality have increased. Antibiotic substitutes in poultry involve the use of organic acids, probiotic microbes, prebiotic substances that augment the growth of advantageous bacterial populations, or symbiotic microflora, which enhance the production and overall health of poultry. Furthermore, it also includes phytobiotics, herbal extracts, antimicrobial peptides, minerals and vitamins, and plant extracts. Probiotic bacteria act as competitors of pathogens to get colonized in the digestive tract, allowing fewer nutrients to be affected by pathogenic organisms and their toxins, and boosting immunity by acting as a stimulant. The use of prebiotics could also be a choice as they positively alter the immune system and intestinal microbial population, inhibit the colonization of pathogens in the gut, and enhance the beneficial microorganisms' growth. Conclusively, to select the best microbial strains that can perform well in the gut, further research is required in the selection of prebiotic, probiotic, or synbiotics, either alone or in combined form.

Key Words: Antibiotic resistance, Probiotic, Plants extracts, Prebiotic

ANTIMICROBIAL RESISTANCE IN POULTRY: A LOOMING THREAT TO PUBLIC HEALTH

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ABSTRACT

Antimicrobial resistance (AMR) has emerged as a global concern, posing significant challenges to animal and human health. This abstract presents a comprehensive overview of the current understanding of antimicrobial resistance in poultry, focusing on the factors contributing to its development, the mechanisms involved, and the potential implications for public health. Poultry production systems often rely on excessive use of antibiotics to promote growth and prevent infectious diseases. The resistant genes transfer between bacteria, both within the poultry gut and between poultry and humans, further exacerbates the situation. As a consequence, poultry products can serve as reservoirs of antimicrobial-resistant bacteria, exposing consumers to potential health risks. The mechanisms underlying antimicrobial resistance in poultry are multifactorial. These include genetic mutations, horizontal gene transfer, and the presence of mobile plasmids. Additionally, the co-selection of resistance traits through the massive use of AM agents in both fields of human and veterinary contributes to the increase of poultry pathogens resistance. The Implications of antimicrobial resistance in poultry extend beyond the sector itself. The consumption of poultry products contaminated with antimicrobial-resistant bacteria can lead to treatment failures in human infections, as similar or identical resistance genes may be present in bacteria affecting both animals and humans. Furthermore, the transmission of resistance determinants from poultry to humans may occur through direct contact, environmental contamination, or the food chain. Addressing the challenge of antimicrobial resistance in poultry requires a holistic approach encompassing surveillance, responsible use of antimicrobials, and the development of alternative strategies. Enhancing biosecurity measures, promoting vaccination programs, and adopting good management practices can help reduce the reliance on antimicrobials in poultry production. Furthermore, robust monitoring systems, effective regulations, and public awareness campaigns are essential to mitigate the risks associated with antimicrobial-resistant bacteria in poultry products.

Key Words: antimicrobial resistance, public health, genetic transfer, biosecurity

PHYTOCHEMICALS AS AN ANTIMICROBIAL AGENT: AN ALTERNATIVE FOR ANTIBIOTICS IN POULTRY FEED

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ABSTRACT

Despite the significant progress in the improvement of antimicrobial agents, the occurrence of epidemics due to multidrug resistance in microbes leads to an enormous threat to mankind. Microbial resistance to traditional antibiotics and its prompt development has elevated the severe concern in the cure of infectious diseases. Currently, several studies have been focused to discover a favorable solution to combat this problem. Massive affluence of the classical system of medicine gained significance in health therapeutics over again. With the earliest identification of effective medicinal plants, several herbal medications came forward for managing microbial infection. This method assists the progress of novel therapeutic agents due to the functional and structural variation between the phytochemicals. The variety and abundance are liable for the categorization of novel structures from the therapeutic plants. Industrial awareness has been enhanced due to modern research advancement through the synergistic and high-output screening method for the assessment of huge diversity of phytochemicals. Phytochemicals have exerted probable antimicrobial actions against resistant and sensitive pathogens through various modes of action. This review definitively emphasizes traditional medicines as a promising alternative to a conventional chemotherapeutic agent and briefly designates the mechanism of action of numerous antimicrobials and resistant mechanisms. This review also emphasizes the chemical variation and numerous modes of action of phytochemicals against pathogenic microbes. Seeing these facts, it could be stated that phytochemicals signify a vital source of bioactive compounds with effective antibacterial actions.

Key Words: Medicinal plants, phytochemicals, antibiotics, microbial resistance

ANTIMICROBIAL RESISTANCE IN THE POULTRY INDUSTRY: IMPLICATIONS AND CHALLENGES FOR ONE HEALTH

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PSC – 78

ABSTRACT

Antimicrobial resistance (AMR) has emerged as a significant global health concern, with the poultry industry playing a crucial role in its development and dissemination. In the present days the excessive use of antimicrobial agents in poultry production, primarily for growth promotion and disease prevention, has been identified as a major driver of resistance. The use of antibiotics, in particular, has been associated with the selection and dissemination of resistant bacteria. Furthermore, studies reveal a high prevalence of resistance genes in poultry environments, which can be transferred to human pathogens, posing a significant public health risk. Moreover, overcrowding, poor hygiene, and inadequate waste management create favorable conditions for the transmission and persistence of resistant bacteria within poultry flocks and their surrounding environments. These factors increase the likelihood of zoonotic transmission, affecting both animal and human health. The study highlights the interconnectedness between the poultry industry and AMR from a One Health perspective. Resistant bacteria and resistance genes can transfer between animals, humans, and the environment, intensifying the global AMR crisis. This necessitates an entire approach that considers the complex interactions between humans, animals, and the environment to effectively mitigate AMR in the poultry sector. The spread of AMR in the poultry industry highlights the need for collaboration and coordination between human and veterinary medicine, environmental science, and policy-making. Efforts to combat AMR in the poultry sector should involve implementing antimicrobial stewardship programs, promoting the responsible use of antimicrobials, and improving biosecurity measures to prevent the transmission of resistant bacteria. By recognizing these connections and implementing appropriate interventions, we can work towards mitigating the global threat of AMR and safeguarding the health of both humans and animals.

Key Words: Antimicrobial Resistance, Poultry industry, One health

MYCOTOXICOSIS IN POULTRY

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ABSTRACT

Mycotoxins produced by fungi in grains or poultry feed result in significant financial losses for the poultry industry, either directly or indirectly. The term "mycoses" refers to fungal illnesses where parasitic pathogens attack living tissues, such as candidiasis (thrush), aspergillosis, etc. The most common mycosis in birds, aspergillosis is a serious respiratory condition that has a significant economic impact on poultry. The primary fungal infection of a chicken's digestive system is called candidiasis. In contrast, mycotoxicosis is a disease syndrome brought on by secondary metabolites of specific fungi that infect various feeds. Currently, mycotoxins are seen as a serious threat to poultry farming in terms of diseases that can interact synergistically with other infectious agents. A number of mycotoxins, including aflatoxins, ochratoxins, trichothecenes, citrinin, sterigmatocystin, and diacetoxyscirpenol (DAS), have been identified as contaminants in poultry feed. Poultry houses could also pose a health risk for mycotic dermatitis. Mycotoxins are the main factor inducing immunosuppression in birds, making them more susceptible to a number of bacterial and viral infections, which causes significant financial losses for the poultry industry. Recent research has focused on using molecular biological tools to quickly and accurately diagnose serious fungal infections. Adequate hygiene, a strict biosecurity program, and routine surveillance/monitoring of fungal infections are all necessary measures. Precautionary measures can help to prevent fungal infections, including the health risks of mycotoxins/mycotoxicosis, during the production, harvesting, and storage of crops, as well as in feed mixing plants.

Key Words: fungal diseases, economic loses, diagnosis, control measures

UNDERSTANDING MAREK'S DISEASE: IMPLICATIONS FOR POULTRY HEALTH AND MANAGEMENT

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ABSTRACT

Marek's disease (MD) is a highly contagious viral infection affecting poultry around the globe. MDV, primarily transmitted through inhalation or ingestion of virus-laden dust and dander, infects chickens, turkeys, and other avian species. Once inside the host, the virus targets T-lymphocytes, which play a vital role in the bird's immune system. Marek's disease presents a wide range of clinical signs, including paralysis, weight loss, tumors, and immunosuppression. Birds affected by the disease are susceptible to secondary infections, leading to increased mortality rates. The economic impact is significant, with reduced productivity, impaired growth rates, decreased egg production, and increased medication costs. Accurate and timely diagnosis is crucial for effective disease management. Various diagnostic methods are available, including histopathology, serology, polymerase chain reaction (PCR), and virus isolation. Histopathology involves examining tissues for characteristic MDV-induced lesions, while serology detects antibodies produced in response to the virus. PCR and virus isolation aid in identifying the presence of the virus itself. Vaccination programs play a central role, with attenuated, recombinant, and vector vaccines available. Genetic resistance to MDV is another promising avenue being explored. Additionally, stringent biosecurity protocols are vital to limit the introduction and spread of the virus within flocks. A comprehensive understanding of preventive measures aids in developing robust disease management strategies. Emerging technologies like gene editing hold promise for developing genetically resistant poultry breeds. Continued collaboration, research, and knowledge sharing are essential for staying ahead in the fight against Marek's disease.

Key Words: contagious, immunosuppression, economic impact, disease control

COCCIDIOSIS IN POULTRY

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ABSTRACT

Coccidiosis is a poultry disease importantly affecting chickens. The causative agent of this disease is Eimeria. More than the half of world's population depends on poultry protein. The poultry industry is encountering many hurdles though it has overcome many, coccidiosis remains a big question. The life cycle of a parasite is completed in its host. Eimeria has different species and every specie is effective on some specific part of the chicken digestive system. Molecular biologists have made different tools to identify the strains of Eimeria. The host gets the egg entered into it through fecal material and dung. Anti-coccidial feed additives have been used and proved fruitful against it. Albendazole, mebendazole and live attenuated vaccines may be used to treat it. Moreover, a shuttle program has been developed to overcome the resistance of drugs, but the major drawback of the live attenuated vaccine is their limited shelf life and relatively high production of cost. As the parasite Eimeria is present in the feces the caked material should be cleaned in the housing of the chicken for every two to three weeks to prevent the coccidiosis in the poultry. Strict biocontrol measures should be carried out to overcome this disease.

Key Words: Eimeria, coccidia, poultry

PARASITISM IN BACKYARD POULTRY - ISSUES TO ADDRESS

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ABSTRACT

Backyard poultry farming in Pakistan has the potential to bridge the large gap between supply and demand for poultry eggs and meat. Backyard poultry farming will be more successful if farmers use scientific poultry farming practices to battle parasitic diseases such as good health care, proper and balanced feed supply, timely vaccination, and better housing management. Parasitic infection is extremely common in backyard poultry flocks. However, the presence of a few parasites is usually not a cause for concern; however, an increase in the number of parasites can have a disastrous effect on growth, egg production, and overall health. The severity of the infection is determined by the concentration of parasite eggs in the chicken's environment. The chickens consume parasite eggs directly by consuming contaminated feed, water, and litter that may contain the eggs. The birds in backyard systems are constantly in contact with dirt, a variety of intermediate hosts, and wild birds. Because of their scavenging nature, birds come into touch with a multitude of intermediate hosts such as beetles, ants, and houseflies, which are regularly seen on poultry litter, droppings, feeds, and so on, and are responsible for the spread of numerous helminth parasites throughout the flock. As a result, parasite illness is difficult to avoid in such systems. Furthermore, the village poultry birds are typically mistreated and fed little or no supplementary feed supplement, leaving them emaciated. The living conditions are also exceedingly unsanitary, with many people crammed into small spaces with little or no ventilation. All of these factors, alone or in combination, play a significant impact on the high occurrence of ecto- and endo-parasite illnesses in backyard poultry. Awareness programs to reduce parasite disease risk factors among farmer communities are urgently needed to boost backyard poultry production to meet the country's protein requirements.

Key Words: Backyard poultry, Parasitism, Risk factors, Farmer’s awareness

REGULATION MECHANISM OF MICRO RNA IN CHICKEN METABOLIC DEVELOPMENT

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PSC – 83

ABSTRACT

The miRNA database miRBase contains 882 precursor miRNAs, generating 1,232 mature miRNA for *Gallus gallus*. Chicken miRNA regulates developmental and physiological processes, contributes to disease development, and influences microbial pathogenesis. New sequencing technologies have discovered numerous functional RNA species, including microRNA (miRNA), which regulate biological processes in most eukaryotic species. These small, noncoding RNA molecules bind to complementary sequences in protein-coding genes, inhibiting translation and regulating gene expression. Dysexpression of miRNA is linked to various pathological conditions. The metabolism is one of an organism's most dynamic processes because it has to react quickly to constantly shifting dietary cues and energy requirements. About hepatic illnesses like hepatosteatosis and other pathologies like obesity and diabetes, disruption of the homeostatic balance of these systems frequently has disastrous effects. It follows that it is not surprising that regulatory RNAs, such as miRNA, not only perform a variety of roles in preserving healthy metabolic processes but also help to cause metabolic diseases. As a result, metabolism is a sophisticated physiological mechanism with several mechanisms that are continually in motion as a result of fluctuating nutrition supplies and energy requirements. It is not unexpected that miRNAs have extensive effects on metabolic development and function because they are assumed to have developed as a rapid response mechanism to "finely tailored" gene expression in response to physiological and environmental stimuli. Early in the development of a chicken's metabolism, miRNAs are expressed and have a lifelong impact on metabolic pathways in poultry.

Key Words: Micro RNA; Poultry; Metabolism

GLOBAL IMPLICATIONS AND SUBSTITUTES FOR ANTIBIOTIC UTILIZATION IN BROILER FARMING

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PSC – 84

ABSTRACT

Antibiotics play a crucial role in combating bacterial infections, but their extensive use has led to the emergence of antibiotic-resistant bacteria. This development has raised concerns among scientists regarding the potential risks to both human and animal health. To address this issue, various strategies have been explored to reduce the reliance on antibiotics in poultry farming. A significant amount of research has been conducted to identify natural substances that can offer similar growth-promoting effects. The primary objective of these alternatives is to ensure a low mortality rate and achieve optimal animal yield, all while safeguarding the environment and consumer well-being. Some of the most popular alternatives include probiotics, prebiotics, enzymes, organic acids, immunostimulants, bacteriocins, bacteriophages, phytogenic feed additives, nanoparticles, and essential oils.

Key Words: Antibiotics, Bacteriocins, Nanoparticles, Essential oils

VACCINE TYPES AND VACCINAL CANDIDATES: REVIEW OF NOVEL APPROACHES FOR THE CONTROL OF COLIBACILLOSIS IN POULTRY

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PSC – 85

ABSTRACT

Colibacillosis is a major cause of morbidity, mortality, and economic loss for all types of poultry worldwide. Avian pathogenic *Escherichia coli* (APEC), the causative agent of colibacillosis, encompasses a diverse grouping of *E. coli* strains. The present work was aimed at exploring various vaccinal candidates and vaccines developed for the prevention of colibacillosis in poultry through a literature skimming technique. Most of the vaccines developed for colibacillosis belong to one of the three categories including live attenuated, inactivated, and subunit (or recombinant) vaccines. Live attenuated vaccines provide sufficient immunity but not against all strains. One commercially available vaccine (Poulvac® E. coli, Zoetis) is made from a live attenuated strain, *E. coli* O78. Another successful strain for the preparation of live attenuated vaccines includes carAB mutant *E. coli* O2. However, live attenuated vaccines do not effectively protect against heterologous strains. Inactivated autogenous vaccines work well against homologous strains. O1, O2, and O78 strains of *E. coli* are effective for the preparation of inactivated vaccines. Another laboratory mutant strain known as "bacterial ghost (BG) of *E. coli* O78:K80" has been used to prepare the killed vaccine. A subunit vaccine based on recombinant outer membrane protein known as increased serum survival gene (iss) has been found effective. Most of the killed or inactivated vaccines produced represent autogenous types (produced from the very indigenous strains of poultry flocks for which the vaccine is being tailor-made). In conclusion, the high diversity of APEC strains renders vaccine failure of any monovalent vaccine because of the heterologous strains which infect naturally. Therefore, the use of autogenous vaccines for a given flock is recommended and becomes more effective when coupled with the live attenuated vaccine of *the E. coli* O78 strain.

Key Words: Colibacillosis, vaccinal candidates, poultry

PARASITISM AND COCCIDIOSIS: CHALLENGES AND STRATEGIES FOR POULTRY HEALTH AND PRODUCTIVITY

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PSC – 86

ABSTRACT

Parasitism is a major health concern in the poultry industry, causing significant challenges and setbacks for poultry farmers worldwide. The outbreak of parasitic diseases, particularly coccidiosis, caused by different species of the genus *Eimeria* poses a significant threat to the efficiency and productivity of the poultry industry. This obligate and intracellular parasitic disease affects poultry farms globally. Parasitic diseases, including coccidiosis, not only result in economic losses for poultry farmers but also create health and management hazards in developing countries. Coccidiosis is a highly infectious parasitic disease caused by Eimeriidae species that affects the intestinal tract of poultry, leading to tissue damage and reduced food intake and nutrient absorption. Consequently, poultry farmers experience substantial losses in meat and egg production. Parasite infestation can also result in economic losses due to decreased productivity, increased mortality, and increased medication costs. Therefore, parasite control is an important aspect of poultry health management. Parasite control can be challenging due to the development of resistance to commonly used medications. Parasite control strategies include regular monitoring, sanitation, biosecurity, rotation of pastures or litter, reduction of intermediate hosts, and judicious use of approved anthelmintics or acaricides. Parasite control should be tailored to the specific type and level of infestation as well as the species, age, and production system of poultry.

Key Words: Parasitism, Coccidiosis, Poultry Health, Farm Management

SURGICAL REPAIR OF HUMERUS FRACTURE IN PEAFOWL BY INTRAMEDULLARY PINNING

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PSC – 87

ABSTRACT

Fractures are common in avian species but fractures in peacocks are rare. A peafowl aged four years was presented with a recent history of trauma with a resultant fracture. On examination, an exposed humerus fracture was revealed. The physical examination further explored skin tearing along with muscle damage. Open reduction, bone fixation, and closure of the fracture site were performed under general anesthesia. The bird was anesthetized with xylazine, ketamine, and diazepam combination and prepared for intramedullary pinning. An intramedullary pin was passed into the medullary cavity through the retrograde method. Postoperatively, the fracture site was immobilized by a lightweight bandage. Radiography was done to see the placement of the intramedullary pin. Oral antibiotics and analgesics were recommended. Callus formation was observed on day 21 through radiography with a good prognosis.

Key Words: Keywords: Fracture, Humerus, Intramedullary pin, peafowl

REGULAR USE OF ANTIBIOTICS IN POULTRY: A LEADING CAUSE OF DYSBIOSIS OF GUT MICROBIOTA

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PSC – 88

ABSTRACT

The regular use of antibiotics in poultry farming has become a significant concern due to its potential impact on gut microbiota and subsequent health implications. Antibiotics are widely used in the poultry industry to promote growth, prevent diseases, and maintain flock health. However, their frequent administration can lead to dysbiosis, an imbalance in the composition of the gut microbiota. This article explores the relationship between antibiotic use in poultry and the dysbiosis of gut microbiota. It begins by discussing the reasons behind antibiotic use in poultry farming and the widespread nature of this practice. The importance of gut microbiota is then highlighted, explaining its role in maintaining overall health and various vital functions, such as digestion, nutrient absorption, and immune system regulation. The article delves into the mechanisms by which antibiotics disrupt the balance of gut microbiota, leading to dysbiosis. It addresses the reduction in beneficial bacteria, the emergence of antibiotic-resistant strains, and alterations in microbial diversity. The potential impact on human health is also examined, including the transfer of antibiotic-resistant bacteria from poultry to humans and the potential consequences of dysbiosis on human gut microbiota and well-being. Furthermore, the article explores alternatives to antibiotic use in poultry farming, such as probiotics, prebiotics, and improved hygiene practices. It discusses the importance of adopting a holistic approach to poultry health management that focuses on prevention rather than relying solely on antibiotics. The regulatory measures and industry practices related to antibiotic use in the poultry sector are also discussed, including current guidelines and initiatives to reduce antibiotic usage and promote sustainable practices.

Key Words: poultry, dysbiosis, gut microbiota, antibiotic-resistant bacteria, human health, transfer, and implications

IT CONTRIBUTION IN POULTRY INDUSTRY

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PSC – 89

ABSTRACT

The poultry industry is gaining global importance and plays a significant role in economics. Modern technology involvement in the poultry industry results in better and more efficient products with greater accuracy details. Information technology contributes to the poultry industry as in other sectors of livestock facilitating the farmer with low-cost and more manageable strategies. Information technology is basically the use of different software and systems for performing different functions information and communication technology lead to precision farming, domains of which are data analysis, integration, and sensor advancement. Implementation of these notches of IT helps in maintaining data on farm food supply, electricity bills, diseased birds and treatment history, etc. Sensor technology is the most advanced out of all three as it can operate well even with poor data results into detailed and correct data. Sensors are integrated into poultry houses that can detect any change in the humidity, carbon dioxide, temperature, and oxygen level. Each sensor is specific for a specific category. Biosensors help in monitoring crop growth and production but poultry houses with such sensors have a high risk of bacterial growth e.g., E. coli, and Salmonella. Hardware integration gathers all the collected data in one place. This eases the farmer and also provides security. The ceaseless advancements in Information technology provide new ways to overcome the challenges of the poultry industry and also lessen the farmer's burden. Adopting technologies like IT and ICT is the need of time.

Key Words: information technology, sensors, precision, advancement

TRANSFORMING POULTRY FARMING THROUGH ARTIFICIAL INTELLIGENCE: ENABLING EARLY DISEASE DETECTION AND MANAGEMENT IN SMART POULTRY SYSTEMS

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PSC – 90

ABSTRACT

The poultry industry faces substantial challenges associated with infectious diseases, necessitating effective disease diagnosis and management strategies to safeguard flock health and ensure sustainable production. With the rapid advancements in artificial intelligence (AI) technology, there is significant potential to transform poultry farming through early disease diagnosis. The utilization of AI techniques, including machine learning, deep learning, and data analytics, helps to process and analyze large and diverse datasets generated in smart poultry farming environments. By integrating AI algorithms with various data sources, such as sensor data, imaging data, and environmental parameters, the AI can identify subtle disease patterns and indicators at an early stage. This enables poultry farmers to proactively detect and respond to potential disease outbreaks, minimizing economic losses and optimizing flock health. Furthermore, the integration of AI technology with Internet of Things (IoT) devices, wireless sensor networks, and edge computing, enables real-time data acquisition, transmission, and analysis. The AI-enabled smart poultry farming systems provide continuous monitoring of bird health, allowing for early detection of anomalies and rapid intervention. There are challenges and considerations associated with implementing AI technology in smart poultry farming, including data security, system robustness, and interpretability of AI models that emphasize the importance of interdisciplinary collaboration between researchers, veterinarians, and industry stakeholders to ensure responsible AI adoption and effective disease management. By leveraging AI algorithms and smart monitoring systems, poultry farmers can detect diseases at their earliest stages, leading to improved flock health, reduced antibiotic usage, and enhanced sustainability of poultry production.

Key Words: Artificial Intelligence (AI) Technology, Poultry Farming, Early Disease Detection, Machine Learning

DIGITALIZATION AND POULTRY INDUSTRY: A NEW AND NOVEL PERSPECTIVE LEADING TO LOSS FREE POULTRY REARING IN PAKISTAN

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PSC – 91

ABSTRACT

Pakistan is the world's seventh-largest poultry-producing country with a 7.3% growth in the poultry industry in the previous decade. Advances in management and disease control strategies are growing day by day. Unfortunately, poultry farmers are experiencing a lack of complete consultancies and guidance about rearing different forms of poultry. Digitalization took the first step in Pakistan to provide local farmers with consultancies and required poultry products including vaccination, feed, and medicine. Currently, Digitalization is serving poultry and all its forms as a whole market. A unique feature of its service is to provide history, research, and analysis-based prescriptions and consultancies to emerging problems in poultry. Digitalization is unique in its veterinary approach from this perspective. In the future, Digitalization aims to introduce artificial intelligence-based guidance to poultry farmers in Pakistan through all the data sets collected in recent years and expected in the future. It will lead to disease prediction, utilization of effective drugs, and provision of effective and required equipment on specific farms through proper analysis. Future aspects of Digitalization may be associated with translational research for the poultry industry in Pakistan. This kind of scientific and analytical approach is deficient in the rearing of fancy birds and Digitalization is determined to fulfil the gap. If it grows as predicted, it will be the leading platform with its unique features in Pakistan. It may be giving a new peak to the poultry industry by making it loss-free.

Key Words: Digitalization, Poultry, Industry, Consultancy, Translational Research

THE ROLE OF INFORMATION TECHNOLOGY IN THE POULTRY INDUSTRY

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PSC – 92

ABSTRACT

The poultry industry has a significant impact on meeting the growing demand for animal protein. As the industry continues to expand, the utilization of information technology (IT) has become increasingly essential for optimizing production, enhancing efficiency, and ensuring the overall sustainability of poultry operations. The IT has revolutionized data collection and analysis in the poultry industry. Through the use of sensors, automated systems, and real-time monitoring, valuable data on temperature, humidity, feed consumption, and animal health can be gathered. This data enables farmers to closely monitor and manage poultry conditions, leading to improved animal welfare, early disease detection, and timely intervention. In the realm of genetics and breeding, information technology has expedited the selection process and improved breeding outcomes. Genetic algorithms and predictive modeling aid in identifying desirable traits, resulting in the production of healthier and more productive poultry breeds. Additionally, IT tools support the monitoring and management of breeding records, simplifying data analysis and enhancing breeding programs. Data-driven analytics and forecasting models enable farmers to make informed decisions regarding feed formulation, production planning, and resource allocation. This leads to optimized production efficiency, reduced costs, and increased profitability. In conclusion, the utilization of information technology has revolutionized the poultry industry, bringing significant improvements in various areas. From data collection and analysis to supply chain management and decision-making, IT has emerged as a powerful tool for enhancing productivity, efficiency, and sustainability within the poultry sector.

Key Words: Information technology, Poultry, improved breeding, Genetic algorithm

INFORMATION TECHNOLOGY IN POULTRY FARMING: UTILIZING THE POTENTIAL OF IT IN POULTRY FARMING; A PARADIGM SHIFT

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PSC – 93

ABSTRACT

The poultry industry plays a pivotal role in encompassing the global demand for affordable protein-rich food. However, the poultry industry faces numerous challenges, including the need for increased efficiency, sustainability, and improved animal welfare. In recent years, the integration of Information Technology (IT) solutions has emerged as a promising avenue to address these challenges and revolutionize poultry farming practices. This abstract explores the various contributions of IT in poultry production, highlighting its potential to optimize operations, enhance animal health, and improve overall farm management. One significant aspect of its impact on poultry farming is the adoption of precision agriculture techniques. These advanced monitoring systems utilize sensors, drones, and Internet of Things (IoT) devices for authentic data records, humidity, temperature, feed consumption, and animal behavior. By leveraging this data, farmers can make informed decisions regarding disease prevention, feed management, and environmental controls, resulting in optimized production and improved animal welfare. IT tools facilitate automated data analysis and decision-making through machine learning algorithms. These algorithms can predict disease outbreaks, identify potential bottlenecks, and optimize feed formulation. By reducing reliance on manual monitoring and enabling proactive management, IT contributes to higher productivity, reduced costs, and improved resource utilization. Its role extends beyond on-farm operations, as it also revolutionizes the supply chain and market access for poultry products. E-commerce platforms, mobile applications, and online marketplaces connect farmers directly with consumers, eliminating intermediaries and improving market transparency. This direct link enables better price realization for farmers while offering consumers traceability and quality assurance. Moreover, IT empowers poultry farmers with access to relevant information, best practices, and expert knowledge through online forums, webinars, and training modules. This knowledge exchange fosters innovation and helps farmers stay updated with the latest advancements in poultry production, leading to continuous improvement and sustainable growth.

Key Words: precision agriculture, automation, data analysis, knowledge exchange

EXPLORING THE ROLE OF DATA SCIENCE IN SUSTAINABLE GROWTH AND MARKET COMPETITIVENESS OF PAKISTAN'S POULTRY SECTOR

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PSC – 94

ABSTRACT

The poultry industry plays a vital role in the country's economy, contributing significantly to employment, food security, and GDP. However, various challenges such as disease outbreaks, market fluctuations, and resource management require innovative solutions for long-term sustainability and competitiveness. Data science offers immense potential in addressing these challenges through advanced analytics, machine learning, and predictive modeling. By harnessing the power of data, stakeholders in the Pakistan poultry sector can make informed decisions, optimize production processes, and improve overall efficiency. Firstly, in disease management, data-driven approaches can help identify patterns and risk factors associated with disease outbreaks, enabling early detection and timely intervention. By analyzing data from various sources, such as farm records, weather patterns, and disease surveillance, predictive models can be developed to anticipate and prevent the spread of diseases, thereby reducing economic losses and ensuring the health and well-being of poultry populations. Secondly, data science can contribute to optimizing feed formulation and nutrition. By analyzing nutrient requirements, ingredient characteristics, and performance data, data scientists can develop models that optimize feed formulation, resulting in improved growth rates, feed conversion ratios, and overall profitability. Furthermore, data-driven insights can help identify the impact of environmental factors on feed efficiency, enabling better resource allocation and waste reduction. Thirdly, data science techniques can enhance quality control and risk management in the poultry value chain. By monitoring and analyzing data throughout the production, processing, and distribution stages, potential bottlenecks and quality issues can be identified and addressed proactively. This ensures product safety, compliance with regulatory standards, and improved customer satisfaction. Moreover, data science can empower decision-makers in the poultry industry with accurate market intelligence and forecasting. By analyzing historical sales data, consumer trends, and external factors, predictive models can aid in demand forecasting, pricing strategies, and identifying emerging market opportunities. This enables industry stakeholders to adapt their strategies, remain competitive, and drive sustainable growth. In conclusion, the role of data science in the sustainable growth and market competitiveness of Pakistan's poultry sector is undeniable.

Key Words: Data Science, Sustainable, Competitiveness, Pakistan's Poultry Sector

BIOENERGY GENERATION FROM POULTRY WASTE: AN ASSESSMENT OF POTENTIAL IN PAKISTAN

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PSC – 95

ABSTRACT

The availability of environmentally friendly energy is a major task of the day. The current study deals with the feasibility of poultry waste for bioenergy production in Pakistan. The production of bioenergy from waste is of paramount importance to achieve energy security. Currently, more than twenty-five thousand poultry farms are in operation to achieve the protein demand in Pakistan, and this is going on to increase annually. Various types of waste are produced from poultry farming in the country, from manure to slaughtering waste. Produced waste from poultry farming to slaughtering is estimated and technology for the conversion of poultry waste into bioenergy is discussed finally, the electricity generation based on poultry waste is estimated. A 280 MWh/day of electricity can be generated from the biogas produced from poultry waste and this adaptation would be a valuable addition of bioenergy in the country. The application of poultry waste for energy generation is feasible and environmentally benign.

Key Words: Poultry waste; Climate changes; Bioenergy; Green electricity

HATCHERY MANAGEMENT: A GOOD START FOR HEALTHY CHICKS

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PSC – 96

ABSTRACT

Hatchery management practices play a significant role in successful poultry production. A well-managed hatchery ensures the production of healthy and high-quality chicks, which is essential for the growth and profitability of the poultry industry. These practices encompass various aspects, including temperature control, ventilation, sanitation, egg handling, and personnel training. Temperature control is one of the critical factors in hatchery management. Maintaining the appropriate temperature throughout the incubation process is crucial for the development of embryos and the hatching of healthy chicks. Deviations from the optimal temperature range can result in reduced hatchability and compromised chick quality. Ventilation is another crucial aspect of hatchery management. Proper air exchange helps to maintain oxygen levels and remove harmful gases, ensuring a healthy environment for embryo development. Therefore, maintaining well-designed ventilation systems and monitoring air quality is essential for optimal hatchery performance. Regular cleaning and disinfection of incubators, hatchers, and all equipment minimize the risk of microbial contamination. This helps in preventing the transmission of pathogens to the developing embryos and subsequent chicks, reducing mortality rates and improving overall chick quality. Proper egg-handling techniques are crucial to preserve the viability of embryos. Removing cracked or contaminated eggs before incubation prevents the potential spread of pathogens to other eggs. Additionally, implementing proper egg turning and positioning techniques during incubation helps to optimize embryo development and hatchability. In conclusion, good hatchery management practices are essential for the success of poultry production. By focusing on temperature control, ventilation, sanitation, egg handling, and personnel training, hatcheries can ensure the production of healthy and high-quality chicks. This, in turn, contributes to the growth, profitability, and sustainability of the poultry industry.

Key Words: temperature control, ventilation, sanitation, egg handling

ALTERNATE FEED SOURCES IN POULTRY

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PSC – 97

ABSTRACT

The poultry industry has always been an important and cheap source of energy in the human diet, but due to the high demand for some good quality feedstuffs like soybean meal and yellow corn used in poultry feed and humans has increased competition among them so we should consider the alternative sources of energy that are cheaper in price and high in nutrients for poultry. The most important thing in this regard is the use of food industry wastages or byproducts of organic food like date waste, but in a defined percentage only. Wheat bran, the byproduct from flour mills can be used up to 8% with supplementations to avoid any deleterious effects. Millet being drought resistant can grow where major feedstuffs fail to, but its high levels in the diet contain tannin content and fiber so should be used in a low percentage of the diet. Sorghum has nutritional value almost as high as yellow corn at a cheaper rate, but it contains tannins that harm broiler growth, procedures like soaking in an alkali solution help lower tannin levels. Low tannin Sorghum can replace yellow corn in poultry feed. Millets, wheat bran, and sorghum replaces yellow corn but need to be processed to minimize the Anti-nutritional factors (ANFs). Canola meal, cotton seed meal, feather meal, sesame meal, insects, worms, Azolla, algae, single cell protein can replace Soybean meal if we overcome the factors that make them less viable. In addition to protein and energy, these feedstuffs are rich in oil, and vitamins and provide omega-3 and omega-6 PUFA to poultry at low cost.

Key Words: Poultry industry, feed sources, byproducts, ANFs, Soybean

INHIBITION OF LIPID PEROXIDATION AND BIOTRANSFORMATION OF AFLATOXINS AND IMPROVE BIRD HEALTH THROUGH THE CURCUMINOIDS AGENT FROM TURMERIC POWDER

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PSC – 98

ABSTRACT

Aflatoxins are toxic agents produced by some species of fungi, mainly *Aspergillus flavous and Aspergillus parasiticus*. Mainly four types of aflatoxins that are B1, B2, G1, and G2. Biological point of view, the most active part of aflatoxin is AFB1 which is responsible for many damages in the body like poor performance, hemorrhages on the liver, depressed immune status of birds and increase susceptibility to other diseases. They may also be involved to some degree in primary liver cancer in humans. They cause high damage in poultry industries. Aflatoxin cause cell damage and produce free radical and lipid peroxide level and decrease the level of antioxidant enzymes. A small amount of aflatoxin and its metabolites can be found in several edible tissues and risk to public health. That's why intensive research has been required to decrease the risk for birds and humans. For this purpose, turmeric powder is best because it has antioxidant, anti-inflammatory, and anti-cancer properties. The major active ingredient in turmeric powder is curcuminoids containing yellow pigments. Curcuminoids are the main phenolic compound of turmeric powder having an antioxidant effect that inhibits lipid peroxidation that is involved in aflatoxicity and also inhibits the biotransformation of AF to their epoxide metabolites that leads to reduced toxicity of aflatoxin. Those curcumins may block the action of free radicals and stimulate the action of other antioxidants. Curcumins may help against various degenerative processes in the brain by increasing BDNF brain hormones. It prevents and reduces stress levels and stimulates growth performance in broiler chickens. In conclusion, it is suggested that turmeric extract (Curcuminoids) can provide protection against the negative effects of aflatoxin on the performance of birds' health.

Key Words: Curcuminoids, Aflatoxins, Antioxidant, Bird health performance, Anti-cancer

EXPLORING ALTERNATIVE PROTEIN SOURCES FOR SUSTAINABLE AND COST-EFFECTIVE POULTRY NUTRITION

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PSC – 99

ABSTRACT

The global demand for poultry products has been steadily increasing due to population growth, rising income levels, and changing dietary preferences. However, the conventional reliance on soybean meal and other animal-based protein sources for poultry nutrition poses significant sustainability and cost challenges. As a result, there is a pressing need to explore alternative protein sources that are both environmentally friendly and economically viable. This study aims to investigate and evaluate alternative protein sources for sustainable and cost-effective poultry nutrition. It encompasses a comprehensive review of existing literature and research on various potential alternatives, including insect proteins, single-cell proteins, algae, and novel plant-based protein sources. The analysis considers their nutritional composition, digestibility, palatability, and potential effects on bird growth, health, and meat quality. Furthermore, the study assesses the feasibility and scalability of incorporating these alternative protein sources into commercial poultry feed formulations. It examines their availability, production methods, processing techniques, and potential economic implications. Additionally, it investigates potential challenges, such as regulatory constraints, consumer acceptance, and supply chain considerations that may hinder the widespread adoption of alternative protein sources in the poultry industry. The findings of this study will provide valuable insights into the viability and potential benefits of utilizing alternative protein sources in poultry nutrition. By diversifying protein sources and reducing reliance on traditional feed ingredients, the poultry industry can achieve greater sustainability, reduce environmental impact, and enhance cost-effectiveness.

Key Words: Protein sources, Insect proteins, Single-cell proteins

BOTANICAL CONTROL OF COCCIDIOSIS IN POULTRY

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PSC – 100

ABSTRACT

The intestinal parasites of the genus Eimeria are thought to be the primary cause of the infectious protozoan disease known as avian coccidiosis. As a result of the disease, broilers have significant economic losses due to low development and feed efficiency, which can even result in high mortality. Poultry sectors and livestock play a significant role in the agriculture industry worldwide. To control coccidiosis, chemicals called coccidiostats and anti-coccidial agents have traditionally been added to feed and water. Pathogens have evolved resistance to chemotherapeutic drugs as a result of their overuse. Alternative approaches are being investigated, though, after the EU banned their use due to public health concerns and resistance. Several active substances found in plants, including saponins, phenolics, sulfur compounds, and terpenes can destroy oocysts and sporozoites and prevent Eimeria from replicating. Numerous poultry experts are currently working on research into the use of plants and products derived from plants to combat and lessen the significant financial losses in the poultry sector brought on by coccidiosis. Some commercial products have also been developed because of the medicinal properties of botanicals. Anticoccidial vaccines can be utilized as an alternative in this regard, but because of their high production costs, antioxidant chemicals, and plant-derived biological response modifiers are seen as possible replacements.

Key Words: Coccidiosis, Eimeria, botanical control, drug resistance

IMPACT OF MYCOTOXINS ON POULTRY FEED AND STRATEGIES FOR THEIR MITIGATION

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PSC – 101

ABSTRACT

Extensive research conducted in the past few decades has unequivocally demonstrated the widespread prevalence of mycotoxins in the majority of feed ingredients. These toxic substances pose a significant global challenge, leading to adverse health and performance issues in poultry as well as causing financial losses in production industries. This article provides an overview of the impact that mycotoxins have on poultry. Hundreds of different mycotoxins exist, and they vary in their chemistry and mode of action. Aspergillus, Fusarium, and Penicillium are the predominant molds typically found in animal feed. Consequently, the mycotoxins of utmost concern are those produced by these molds, which include aflatoxins, deoxynivalenol, zearalenone, T-2 toxin, fumonisins, and ochratoxins. Ergot, another mycotoxin, is frequently present in animal feed as well. Contaminated feeds or ingredients typically contain a combination of several mycotoxins, and it appears that multiple contaminations have a more pronounced negative impact on health and productivity than exposure to a single mycotoxin. As a result, poultry often exhibits symptoms characteristic of mycotoxicosis, even when feed analyses indicate very low or nonexistent concentrations of individual toxins. The toxicity can be attributed to interactions between different mycotoxins, which amplify the symptoms of toxicity. Despite meticulous management practices, low levels of mycotoxins may exist in poultry feed. poultry feed may still contain trace amounts of mycotoxins. To effectively tackle mycotoxin-related concerns, it is often necessary to adopt a multifaceted approach that combines various strategies to address the issue comprehensively. Recent advancements in mycotoxin control strategies involve the utilization of a combination of binders, microbial enzymes, yeast cell walls, nanoparticles, and natural antioxidants. These innovative approaches work together to mitigate the detrimental effects of mycotoxin consumption in poultry. Hence, it is necessary to employ diverse strategies that can effectively target specific mycotoxins without compromising the quality of feed. However, there is a notable lack of awareness among producers regarding the prevalence of mycotoxins, the availability of modern techniques for their analysis, the consequences of mycotoxicosis, and the recent advancements in safe methods to eliminate mycotoxins from the feed.

Key Words: Mycotoxins, detoxification, poultry, feed

ROLE OF POULTRY MEAT IN NUTRITION AND HUMAN HEALTH

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PSC – 102

ABSTRACT

With the expansion of the global human population, there is a significant shortage of quality protein and many micronutrients. Poultry meat has a crucial potential in human growth and development as an animal protein source. Besides containing reasonable amounts of quality protein and micronutrients, poultry meat is relatively low in fat percentage (2.8 g/100 g breast and 13 g/100 g thigh) and cholesterol levels. Moreover, it is rich in n-3 polyunsaturated fatty acids, vitamins B-group (vitamin B6, thiamin, and pantothenic acid), and minerals (copper, zinc, iron). However, the quality and quantity of these elements can be enhanced by genotype selection and proper feeding. In this way, the consumption of poultry meat is linked with a low risk of developing overweight and obesity, type 2 diabetes mellitus, cancer, and cardiovascular diseases. It also contains a good range of bioactive components, including taurine, glutathione, and anserine. Moreover, it contributes to the overall quality of nutrition in human health of specific ages and conditions, i.e., from prior conception, during pregnancy up to the finale of breastfeeding, and in old age. Much more efforts are needed at the government, consumer, and industry levels to uplift the poultry meat industry and make it a future promising functional food.

Key Words: Poultry Meat, Quality protein, Bioactive, Cancer

COMPOSTING OF POULTRY WASTE: A SUSTAINABLE METHOD FOR SOIL ENRICHMENT AND WASTE MANAGEMENT

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PSC – 103

ABSTRACT

In the form of chicken litter that is made up of a mixture of bedding material, excrement, feathers, and spilled feed, poultry farming produces a sizable quantity of waste. Poultry litter disposed of improperly can harm the environment and present problems with waste management. In terms of waste reduction, nutrient recycling, and soil enrichment, composting has emerged as a practical and long-term solution for the efficient management of chicken waste. The regulated microbial degradation of organic compounds occurs during the composting of poultry manure. By facilitating the breakdown of organic material, this technique turns poultry litter into compost, a useful byproduct. In addition to reducing waste volume, composting chicken litter also helps to minimize odors and get rid of diseases, weed seeds, and parasites that are frequently found in the litter. Composting poultry waste has a variety of benefits. First off, it offers a waste management strategy that is friendly to the environment, reducing any potential ill effects on the quality of the air and water. Poultry litter that has been composted is a great organic fertilizer since it is full of nutrients including nitrogen, phosphate, and potassium. Composted poultry litter is used in agricultural areas to improve soil quality, increase nutrient availability, and promote the growth of strong crops. Composting also lessens greenhouse gas emissions, which helps to slow down climate change. In a nutshell, composting chicken waste offers a practical and environmentally friendly method for managing waste in the poultry sector. It has several advantages, including less waste, more fertile soil, and fewer negative environmental effects. Composting poultry waste can help create a more ecologically conscious and long-lasting poultry farming system.

Key Words: Poultry waste, Composting, Soil enrichment, Organic fertilizer, Waste

BILE ACIDS IN POULTRY NUTRITION: ENHANCING FAT UTILIZATION AND PROMOTING LIVER HEALTH

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PSC – 104

ABSTRACT

Bile acids are essential components synthesized and secreted by the liver that plays a crucial role in the digestion and overall health of poultry. This comprehensive review explores the benefits of incorporating bile acids in poultry diets, with a specific focus on their impact on fat utilization and liver health. Fat digestion is a critical process for poultry, as it directly affects growth performance and nutrient utilization. Bile acids facilitate fat digestion by emulsifying dietary fats into smaller droplets, which significantly increase their surface area for efficient enzymatic breakdown. This improved fat digestion leads to enhanced nutrient absorption, resulting in better growth rates, feed conversion efficiency, and overall body weight gain in poultry. The mode of action of bile acids involves their interaction with dietary lipids in the small intestine. Bile acids form micelles, which are microscopic structures that encapsulate dietary fats, facilitating their digestion and absorption. This mode of action ensures effective utilization of dietary fats, maximizing nutrient absorption in poultry and promoting their overall health. Beyond their role in fat digestion, bile acids also contribute significantly to promoting liver health in poultry. Acting as natural detergents, they play a vital role in the excretion of metabolic waste products, toxins, and excess cholesterol from the liver. Bile acids help prevent liver diseases and maintain optimal liver function in poultry by facilitating liver detoxification. Furthermore, bile acids actively participate in the regulation of lipid metabolism and cholesterol homeostasis in the liver. This balanced regulation ensures proper fat utilization and cholesterol management, which are crucial for the overall health and well-being of poultry birds. It can be concluded that the inclusion of bile acids in poultry nutrition offers a wide array of benefits, including improved fat digestion, enhanced nutrient absorption, and promotion of liver health. Their mode of action involves emulsifying and solubilizing dietary fats, leading to efficient lipid digestion and absorption.

Key Words: Bile acids; fat utilization; liver health, bird

REVOLUTIONARY FEATHERS: UNLEASHING THE GENETIC POTENTIAL OF POULTRY THROUGH GMOS

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PSC – 105

ABSTRACT

Genetically modified organisms (GMOs) have the potential for significant advancements in poultry production. This abstract explores the concept of GMOs in poultry, drawing upon authentic sources to present a comprehensive understanding of this innovative approach. Through genetic engineering techniques, scientists have been able to introduce specific genetic modifications into poultry species, aiming to enhance various desirable traits such as disease resistance, growth rate, feed efficiency, and egg production. These modifications involve the manipulation of special genes for desired results. Genetic modifications enable poultry to produce antibodies against specific diseases, thereby reducing susceptibility and minimizing the need for antibiotics. This has the potential to enhance poultry health and welfare, while also addressing the concerns regarding antibiotic resistance in human medicine. They enhance the growth rate and feed efficiency of poultry. By introducing genes that regulate growth and metabolism, poultry can achieve rapid growth and convert feed into body mass more efficiently. This can lead to increased productivity, reduced production costs, and improved sustainability in poultry farming. Additionally, GMOs have the potential to enhance egg production by modifying the reproductive processes in poultry. Genetic modifications can optimize egg quality, quantity, and size, ultimately benefiting both consumers and producers. Regulations and strict monitoring are crucial to ensure the responsible development and deployment of GMOs in the poultry industry. In short, the concept of GMOs in poultry holds significant potential for improving disease resistance, growth rate, feed efficiency, and egg production. However, thorough evaluation and regulation are essential to address safety and environmental concerns. Further research and development in this field are required to fully explore the benefits and implications of GMOs in poultry production.

Key Words: poultry production, genetic engineering, egg production, antibiotic resistance

THE CONCEPT OF GENETICALLY MODIFIED ORGANISMS (GMOS) IN THE POULTRY INDUSTRY

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PSC – 106

ABSTRACT

The use of genetically modified organisms (GMOs) in the poultry industry has sparked considerable debate in recent years. Genetically modified organisms (GMOs) are living organisms whose genetic material has been altered through genetic engineering techniques. In the poultry industry, GMOs are commonly used to enhance the productivity, health, and efficiency of poultry production. These modifications can involve introducing specific genes to enhance traits such as disease resistance, growth rate, feed efficiency, and egg or meat quality. GMOs offer several potential benefits to the poultry industry. Firstly, they can improve poultry health by introducing genes that enhance resistance to diseases, such as avian influenza or Newcastle disease. Secondly, GMOs can enhance growth and feed conversion efficiency, leading to increased productivity and reduced resource consumption. Additionally, genetic modifications can improve the nutritional content of poultry products, such as increasing omega-3 fatty acids in eggs. Despite the potential advantages, GMOs in the poultry industry are not without concerns. One major concern is the impact on biodiversity and ecosystems if genetically modified poultry were to escape and reproduce in the wild. There are also concerns about the potential for unintended effects on human health, although extensive studies have shown no significant differences between GMO and non-GMO poultry products. Ethical and social concerns, such as transparency, consumer choice, and the potential monopolization of seed markets, also surround the use of GMOs. The concept of GMOs in the poultry industry represents a complex and multifaceted topic. While GMOs have the potential to enhance productivity, improve poultry health, and provide more nutritious products, concerns about environmental impacts, human health effects, and ethical considerations remain. Further research, transparency, and responsible regulation are necessary to navigate the complexities of GMOs in the poultry industry.

Key Words: Influenza, Poultry, Human Health

GMOS: POSITIVE APPROACH TOWARDS EGG AND CHICKEN PRODUCTION

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PSC – 107

ABSTRACT

Modifications of genomic DNA by using genetic engineering techniques give us GMOs (i.e., Genetically Modified Organisms), which have been widely accepted due to their potential results in every industry including agriculture, poultry, livestock, and fish feed. Scientists are looking forward to many advancements that will result in the production of such products that will be considered more efficient both in terms of quality and quantity. The introduction of GMOs in the poultry industry is a positive approach and over the past few years, it has been observed that these modified genomes have a very potential impact on the poultry industry. For instance, the production of transgenic birds that expresses the human proteins in chicken eggs is an anticipating approach. Additionally, as the world population is doubling, we need to assure the availability of food but not compromise on its nutritional requirements, that's why introducing GMOs in our industries can ensure us safe handiness of food.

Key Words: GMO, Poultry, transgenic birds

EFFECT OF QUINOA FLOUR ON TEXTURAL QUALITY AND SENSORY ATTRIBUTES AS A FAT REPLACER IN CHICKEN MEAT BALLS

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PSC – 108

ABSTRACT

The demand for meat products with added valuable functional qualities which enhance consumer health as well as prevent human ailments is increasing. The concern about eating foods that have not only a source of diet but also have special attributes that stimulate to development of a novel product. Meat is widely used around the world, especially chicken, which is a major source of high-biological value protein. The digestibility and tenderness make distinct chicken meat from red meat. Moreover, it contains low fat and cholesterol content as well as essential micronutrients. Meatballs are a cooked meat product that is being consumed widely all over the world. It is traditionally made with minced meat mixed with water and different additives being added and after that applied with a thermal treatment. Therefore, this work evaluated the different concentrations of quinoa flour as a functional ingredient added to the chicken meatballs. Thus, adding quinoa flour to the meatballs for analysis of different properties of meatballs like chemical composition, pH, cooking time, flavor, color, and texture profile. Hence, the addition of quinoa flour to poultry meatballs improved the taste, texture, and overall acceptability of the product. Quinoa and quinoa flour have also been documented as good binders, fillers, extenders, and gelling agents in meat preparations.

Key Words: Quinoa, Chicken, meat balls, cooking, sensory quality

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