ABSTRACT BOOK

1st INTERNATIONAL VETERINARY CONFERENCE

"EMERGING TRENDS IN VETERINARY & ANIMAL HUSBANDRY SCIENCES: CHALLENGES & OPPORTUNITIES"

(ICVAHS-2026)

Organized by:

ISVAHR Society, New Delhi

Just Veterinary Edu. Group

on

07-08 May, 2026

at

Jaipur

JUST VETERINARY PUBLICATIONS

Abstract Book for

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CONFERENCE PREAMBLE

The 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) aims to bring together distinguished academicians, veterinarians, scientists, researchers, policymakers, industry experts, scholars and students from across the globe to deliberate upon emerging issues, innovative technologies, and sustainable solutions in the field of Veterinary and Animal Husbandry Sciences.

The livestock and animal husbandry sector plays a crucial role in ensuring food security, nutritional sustainability, rural development and economic growth. However, the sector continues to face several challenges including emerging animal diseases, climate change impacts, antimicrobial resistance, sustainable livestock management, animal welfare concerns, and increasing global demand for quality animal products. Addressing these critical issues, ICVAHS-2026 emphasizes the integration of scientific innovation, modern technologies, traditional practices and policy interventions to strengthen resilient and sustainable animal healthcare systems.

The conference focuses on promoting interdisciplinary approaches through the application of advanced technologies such as biotechnology, artificial intelligence, precision livestock farming, genomics, digital veterinary healthcare and climate-smart livestock practices. It aims to encourage innovative research and practical strategies that improve animal productivity, disease prevention, food safety, environmental sustainability and the livelihoods of farming communities.

ICVAHS-2026 also recognizes the importance of collaboration among researchers, veterinarians, academic institutions, industries, policymakers, extension agencies, and livestock farmers. By fostering meaningful dialogue and partnerships, the conference seeks to bridge the gap between scientific research and field-level applications, ensuring effective dissemination of knowledge and sustainable development in Veterinary and Animal Husbandry Sciences.

About Conference Themes

The conference encompasses a wide range of themes addressing current and future challenges in Veterinary and Animal Husbandry Sciences, including:

1. Advances in Veterinary Imaging, Diagnostics and Precision Disease Detection
2. Artificial Intelligence, Digital Technologies and Smart Tools in Veterinary Medicine
3. Farm Animal Infectious Diseases: Epidemiology, Diagnosis and Control Strategies
4. Antimicrobial Resistance and Disease Dynamics & One Health Approaches
5. Advances in Vaccinology and Immunology
6. Farm Animal Non-Infectious Disorders: Metabolic, Nutritional and Production Diseases
7. Companion Animal Medicine (Infectious & Non-Infectious)
8. Companion Animal Health, Cardiology, Nephrology and Dermatology
9. Livestock Production, Reproduction, Breeding and Genetic Improvement
10. Animal Nutrition, Gut Health and Feed Technology
11. Poultry and Avian Health, Production and Precision Farming
12. Fish Processing, Value Addition & Waste Addition
13. Veterinary Public Health, Extension and Field Practices
14. Alternative and Integrative Veterinary Medicine and Ethnoveterinary Practices
15. Livestock Systems, Animal Welfare, Smart Dairy Farming

MESSAGE

It gives me immense pleasure to extend my warm greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) being organized by the ISVAHR Society, New Delhi in collaboration with the Just Veterinary Edu. Group during 7th -8th May, 2026 at Jaipur.

Veterinary and Animal Husbandry Sciences play a crucial role in ensuring animal health, livestock productivity, food security, and sustainable rural development. In today's rapidly evolving scientific environment, there is a growing need for research, innovation, and collaborative efforts to strengthen the veterinary and livestock sectors.

I am pleased to note that ICVAHS-2026 will bring together scientists, academicians, veterinarians, researchers and industry experts from different regions to deliberate on emerging trends and future opportunities in the field. Such conferences provide an excellent platform for knowledge exchange and scientific advancement.

I congratulate the organizers and extend my best wishes for the grand success of ICVAHS-2026. May this conference contribute significantly towards the advancement of Veterinary and Animal Husbandry Sciences.

Droupadi Murmu
President
Republic of India

सत्यमेव जयते

Dr. Will Guntrum

Registrar,

Ross University of Vet, US.

MESSAGE

It is a matter of immense pride and great honor for me to extend my warm greetings on the auspicious occasion of the 1st International Veterinary Conference on “Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities” (ICVAHS-2026) being organized by the ISVAHR Society, New Delhi from 7th–8th May, 2026 at Jaipur**.**

The field of Veterinary and Animal Husbandry Sciences has gained remarkable importance in recent years due to its significant contribution towards animal health care, livestock productivity, food safety, sustainable agriculture, and rural economic development. In the present era of scientific advancement and global challenges, there is a growing need for innovative research, interdisciplinary collaboration, and technology-driven solutions to strengthen the veterinary and livestock sectors. I highly appreciate the dedicated efforts of the organizing committee and collaborating institutions for successfully planning this prestigious international event and bringing together distinguished experts and scholars from different parts of the country and abroad. I am confident that the conference will serve as a valuable forum for academic excellence, professional networking, and future research collaborations.

I extend my heartfelt congratulations and best wishes to all organizers, delegates, researchers, authors, and participants for the grand success of ICVAHS-2026. May this conference create meaningful academic impact and contribute significantly towards the advancement of Veterinary and Animal Husbandry Sciences at national and international levels.

Dr. Will Guntrum Registrar

Ross University of Vet, US.

Dr. Maria Knuston Wedel

Hon'ble VC,

SLU, Sweden

MESSAGE

It is with great pleasure and a deep sense of privilege that I extend my warm greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) being organized by the ISVAHR Society, New Delhi from 7th–8th May, 2026 at Jaipur.

Veterinary and Animal Husbandry Sciences today stand as a cornerstone in addressing critical global issues related to animal health management, livestock productivity, food security, nutritional sustainability, and rural livelihood development. In an era characterized by rapid scientific progress and complex global challenges, there is an increasing need to strengthen research-driven innovation, interdisciplinary approaches, and advanced technological integration within the veterinary and livestock sectors.

I sincerely commend the efforts of the organizing committee and associated institutions for successfully conceptualizing and executing this prestigious international academic platform. The initiative to bring together eminent scientists, academicians, veterinarians, researchers, industry professionals, and students from diverse regions reflects a strong commitment towards promoting scientific exchange and collaborative advancement in the field. I am confident that ICVAHS-2026 will provide meaningful opportunities for knowledge sharing, academic enrichment, and the development of future research collaborations at national and international levels.

I extend my heartfelt congratulations and best wishes to all organizers, contributors, delegates, and participants for the grand success of ICVAHS-2026. May this conference serve as a significant milestone in advancing Veterinary and Animal Husbandry Sciences and contribute meaningfully towards sustainable global development.

Dr. Maria Knuston Wedel

Hon'ble VC, SLU, Sweden

Nick Austin

Acting Chief Executive Officer,
Australian Centre for International Agricultural Research (ACIAR),
Sydney, Australia

Australian Centre for International Agricultural Research

Australian Aid

MESSAGE

It is a matter of immense pleasure and great privilege for me to extend my warm greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) being organized by the ISVAHR Society, New Delhi from 7th–8th May, 2026 at Jaipur**.**

I deeply appreciate the sincere efforts of the organizing committee and collaborating institutions for successfully conceptualizing and organizing this prestigious international academic event. The initiative to bring together distinguished scientists, academicians, veterinarians, researchers, industry experts, and students from across different regions reflects a commendable commitment towards fostering scientific dialogue and collaborative progress in this field. I am confident that ICVAHS-2026 will serve as an excellent platform for meaningful academic exchange, knowledge enhancement, and the development of future research collaborations at both national and international levels.

I extend my heartfelt congratulations and best wishes to all organizers, contributors, delegates, and participants for the grand success of ICVAHS-2026**.** May this conference emerge as a landmark event in the advancement of Veterinary and Animal Husbandry Sciences and contribute significantly towards sustainable and inclusive global development.

Nick Austin
Acting Chief Executive Officer,
Australian Centre for International Agricultural Research (ACIAR),
Sydney, Australia

Dr. DACHANG ZHANG
Water & Eco Crisis
Foundation, United States

MESSAGE

It gives me immense pleasure to extend my heartfelt greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) organized by the ISVAHR Society, New Delhi and Just Veterinary Edu. Group on 7th -8th May, 2026 at Jaipur.

The field of Veterinary and Animal Husbandry Sciences is undergoing rapid transformation with the integration of innovative technologies, sustainable practices and multidisciplinary research approaches. Conferences such as ICVAHS-2026 provide an excellent platform for academicians, researchers, scientists, veterinarians, industry professionals and students to exchange ideas, share research findings and discuss contemporary challenges and opportunities in the sector.

I congratulate the organizing committee, contributors and participants for their dedicated efforts in making this international conference a meaningful academic event. I am confident that the deliberations and outcomes of ICVAHS-2026 will pave the way for innovative solutions and future collaborations in Veterinary and Animal Husbandry Sciences.

I wish the conference grand success and extend my best wishes to all participants for fruitful discussions and knowledge sharing.

Dr. DACHANG ZHANG
Water & Eco Crisis Foundation, United States

WFW
WILL FOR WATER

Dr. BENIGNO VILLALÓN
Texas A&M University,
United States

MESSAGE

It is with profound delight and a deep sense of privilege that I extend my warmest greetings on the momentous occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) organized by the ISVAHR Society, New Delhi and Just Veterinary Edu. Group on 7th -8th May, 2026 at Jaipur.

This prestigious conference promises to bring together an eminent congregation of veterinarians, scientists, academicians, research scholars, policymakers, industry experts and students from across the globe, thereby providing a vibrant platform for meaningful deliberations on emerging innovations, contemporary challenges, and future opportunities in Veterinary and Animal Husbandry Sciences.

The conference stands as a significant milestone for the global scientific community by fostering intellectual exchange, promoting cutting-edge research, and encouraging collaborative approaches towards animal health, livestock production, sustainable animal management, food security, and rural development. The anticipated sharing of innovative ideas, scientific advancements, and research outcomes will undoubtedly contribute towards building resilient, sustainable, and future-ready veterinary and animal husbandry systems.

I wish to place on record my sincere appreciation for Dr. D. P. S. Badwal, President, ISVAHR Society, New Delhi, whose visionary leadership, unwavering dedication, and relentless efforts have elevated this conference series to remarkable international stature. The overwhelming response and enthusiastic participation reflect his inspiring guidance and the commendable commitment of the organizing team.

I extend my heartfelt congratulations to all organizers, collaborators, contributors, and participants, and convey my best wishes for the grand success of ICVAHS-2026. May this conference create lasting academic impact, strengthen global scientific collaborations, and contribute meaningfully towards the advancement of Veterinary and Animal Husbandry Sciences.

Dr. BENIGNO VILLALÓN
Texas A&M University, United States

Prof. Dr. NELIDA LUCIA DEL MASTRO

Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN, Brazil

Instituto de Pesquisas Energéticas e Nucleares

MESSAGE

I feel greatly honored and delighted to convey my sincere greetings on the auspicious occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) being organized by the ISVAHR Society, New Delhi in collaboration with the Just Veterinary Edu. Group during 7th -8th May, 2026 at Jaipur.

The conference serves as an outstanding international forum that brings together distinguished veterinarians, academicians, scientists, researchers, industry professionals, policymakers, and young scholars to discuss the latest advancements and emerging perspectives in Veterinary and Animal Husbandry Sciences. Such academic gatherings play a crucial role in encouraging interdisciplinary dialogue and promoting innovative solutions to the challenges faced by the livestock and animal healthcare sectors.

I am pleased to note that the conference aims to highlight recent scientific developments and sustainable strategies related to animal welfare, disease management, livestock productivity, food safety, and rural empowerment. The exchange of knowledge and research findings during this conference will undoubtedly contribute to strengthening scientific cooperation and enhancing the global outlook towards sustainable veterinary practices and animal husbandry systems. I would also like to express my deep appreciation for Dr. D. P. S. Badwal, President, ISVAHR Society, New Delhi, for his visionary initiative, dedicated leadership and persistent efforts in successfully organizing this international event. The remarkable participation of experts and scholars from different regions reflects the academic excellence and commitment of the organizing committee.

I extend my heartfelt congratulations to the organizers, partners, contributors and participants for their commendable efforts and wish the conference a grand success. I am confident that ICVAHS-2026 will leave a significant academic impact and inspire future collaborations and innovations in the field of Veterinary and Animal Husbandry Sciences.

Prof. Dr. NELIDA LUCIA DEL MASTRO
Instituto de Pesquisas Energéticas e Nucleares, IPEN/CNEN, Brazil

Assoc. Prof. Dr. HAB. DARIUSZ PANKA

Bydgoszcz University of Science and Technology, Poland

POLITECHNIKA BYDGOSKA
im. Jana i Jędrzeja Śniadeckich

MESSAGE

It gives me immense pleasure to convey my heartfelt greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) organized by the ISVAHR Society, New Delhi in association with the Just Veterinary Edu. Group during 7th -8th May, 2026 at Jaipur.

Veterinary and Animal Husbandry Sciences have emerged as vital disciplines in addressing global concerns related to animal health, livestock sustainability, food security, and rural livelihoods. In today's rapidly changing scientific and technological landscape, conferences of this nature provide an invaluable opportunity for experts, academicians, veterinarians, researchers, and students to come together for meaningful academic interaction and exchange of innovative ideas.

I am delighted to know that ICVAHS-2026 is focused on discussing recent advancements, emerging technologies, and practical solutions associated with animal healthcare, livestock management, biotechnology, disease prevention and sustainable development in the veterinary sector. Such scientific deliberations and collaborative efforts are essential for strengthening research networks and promoting progressive approaches for the future growth of animal husbandry sciences.

I appreciate the sincere efforts of the organizing committee for planning this prestigious international conference and bringing together renowned experts and scholars from diverse fields under one platform. I am confident that the conference will provide valuable insights and inspire future scientific collaborations at both national and international levels.

I extend my best wishes and heartfelt congratulations to all organizers, contributors, delegates and participants for the successful conduct of ICVAHS-2026. May this conference achieve great success and contribute significantly towards the advancement of Veterinary and Animal Husbandry Sciences worldwide.

Assoc. Prof. Dr. HAB. DARIUSZ PANKA
Bydgoszcz University of Science and Technology, Poland

MESSAGE

Dr. EDGAR OMAR RUEDA PUENTE

Universidad de Sonora, Mexico

It gives me immense satisfaction and pride to extend my cordial greetings on the occasion of the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) organized by the ISVAHR Society, New Delhi in collaboration with the Just Veterinary Edu. Group during 7th–8th May, 2026 at Jaipur.

The Veterinary and Animal Husbandry sector plays an indispensable role in strengthening the agricultural economy, ensuring food and nutritional security, improving animal welfare, and supporting sustainable rural livelihoods. In view of the emerging global challenges and technological advancements, there is an urgent need to encourage scientific discussions, collaborative research, and innovative approaches in these fields. Conferences like ICVAHS-2026 serve as an excellent platform to unite intellectuals, researchers, academicians, veterinarians, industry experts, and students from across the world for meaningful academic exchange.

I am pleased to note that this conference will focus on contemporary developments and future prospects in veterinary sciences, animal healthcare, livestock management, biotechnology, and sustainable farming systems. The scientific deliberations and exchange of research outcomes during the conference will undoubtedly contribute towards developing practical solutions and promoting advancements in the veterinary and animal husbandry sectors. I appreciate the commendable efforts of the organizers and the organizing committee for conceptualizing and hosting this prestigious international event. Their dedication and vision in bringing together eminent experts and scholars under one umbrella deserve sincere appreciation.

I extend my heartfelt congratulations and best wishes to all dignitaries, researchers, delegates, contributors, and participants for the successful organization of ICVAHS-2026. I am confident that the conference will emerge as a significant milestone in promoting scientific excellence, innovation, and global cooperation in Veterinary and Animal Husbandry Sciences.

Dr. EDGAR OMAR RUEDA PUENTE
Universidad de Sonora, Mexico

Dr. DPS Badwal

Founder & CEO,
Just Veterinary
Education Group

MESSAGE FROM CONFERENCE DIRECTOR

The advancement and application of innovative technologies in Veterinary and Animal Husbandry Sciences have played a transformative role in improving animal health, enhancing livestock productivity, ensuring food security and supporting sustainable rural livelihoods. In the present era of rapid scientific progress and evolving global challenges, the integration of modern research and sustainable practices has become increasingly important for the future growth of the veterinary and livestock sectors.

Keeping these important aspects in view, the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) was organized by the ISVAHR Society, New Delhi in collaboration with the Just Veterinary Edu. Group from 7th -8th May, 2026 at Jaipur. The conference witnessed the gracious presence of eminent dignitaries, distinguished scientists, academicians, veterinarians, researchers, policymakers, industry experts and students from various parts of the country and abroad.

The conference served as an excellent platform for intellectual interaction, scientific deliberations, and exchange of innovative ideas related to animal healthcare, livestock management, biotechnology, disease control, sustainable farming systems and emerging opportunities in Veterinary and Animal Husbandry Sciences. The keynote speakers and technical experts shared valuable insights on contemporary challenges and future prospects in the field, making the conference highly informative and impactful for all participants.

The grand success of this international conference would not have been possible without the sincere dedication, hard work and collective efforts of the organizing committee, collaborators, speakers, volunteers, and participants. Their enthusiastic support and active involvement contributed immensely towards making this academic event meaningful and memorable.

I express my heartfelt gratitude to all delegates, researchers, authors, and guests for their valuable participation and contribution to the success of ICVAHS-2026. I look forward to continued academic cooperation and future conferences that will further strengthen research, innovation, and global collaboration in Veterinary and Animal Husbandry Sciences.

Dr. DPS Badwal
Founder & CEO,
Just Veterinary Education Group

Dr. Sushila Hooda

Vice-President,

Just Veterinary Education Group

MESSAGE FROM SOCIETY PRESIDENT

It gives me immense pleasure to share that the ISVAHR Society, New Delhi in collaboration with the Just Veterinary Edu. Group has successfully organized the 1st International Veterinary Conference on "Emerging Trends in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities" (ICVAHS-2026) at Jaipur during 7th – 8th May, 2026.

I firmly believe that this international conference has served as an excellent platform for bringing together veterinarians, scientists, academicians, researchers, industry professionals, policymakers and students from across the globe to exchange knowledge, share experiences, and deliberate on the latest developments in Veterinary and Animal Husbandry Sciences. Throughout the conference, we witnessed several innovative research findings, emerging technologies and sustainable practices that hold immense potential for improving animal health, livestock productivity, food security, and rural livelihoods.

The conference also emphasized the importance of collaborative efforts among academia, research institutions, government agencies, industry stakeholders and farming communities. Through meaningful discussions and technical sessions, participants explored major challenges related to animal healthcare, disease management, biotechnology, sustainable livestock farming and veterinary innovations, while also identifying practical solutions and future opportunities for the sector.

I take this opportunity to congratulate the organizing committee and all associated partners for their dedicated efforts in making ICVAHS-2026 a grand success. The active participation and enthusiastic support of all delegates, speakers, researchers and contributors greatly enriched the conference proceedings and made this event academically rewarding and memorable.

I express my sincere gratitude to everyone for their valuable participation and support. I look forward to future editions of this conference and hope to witness continued scientific advancements, innovative ideas and stronger collaborations in the field of Veterinary and Animal Husbandry Sciences.

Dr. Sushila Hooda
Vice-President
Just Veterinary Education Group

BOOK OF ABSTRACTS

1st INTERNATIONAL VETERINARY CONFERENCE

"EMERGING TRENDS IN VETERINARY & ANIMAL HUSBANDRY SCIENCES: CHALLENGES & OPPORTUNITIES"

(ICVAHS-2026)

7th to 8th May, 2026

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AI-Driven Crop Modelling for Climate-Resilient Horticultural Production Systems

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Climate change poses significant challenges to horticultural production through rising temperatures, irregular rainfall patterns, and increased frequency of extreme weather events. Developing resilient horticultural systems requires advanced tools capable of predicting crop responses under varying environmental conditions. Artificial intelligence (AI) integrated with crop modelling has emerged as a promising approach for improving the accuracy, efficiency, and adaptability of crop simulation in horticultural systems. AI-driven crop modelling combines machine learning algorithms, large datasets, and process-based crop models to simulate crop growth, development, and yield under different climatic scenarios. Machine learning techniques such as neural networks, regression models, and data-driven analytics can analyze complex relationships among climate variables, soil properties, crop physiology, and management practices. When integrated with established crop modelling platforms such as DSSAT (Decision Support System for Agrotechnology Transfer) and APSIM (Agricultural Production Systems Simulator), AI can enhance predictive performance and improve model calibration for horticultural crops.In horticulture, where crops such as fruits, vegetables, and ornamental plants are highly sensitive to environmental fluctuations, AI-driven crop models can help identify optimal planting dates, irrigation schedules, nutrient management strategies, and climate-resilient cultivars. The integration of AI with remote sensing, Internet of Things (IoT) sensors, and big data analytics further enables real-time monitoring and dynamic decision support for growers and policymakers.Despite its potential, challenges remain in terms of data availability, model complexity, and integration of diverse data sources. Continued advancements in data collection, computational tools, and interdisciplinary collaboration will be essential to fully harness AI-based crop modelling in horticulture.Overall, AI-driven crop modelling provides a powerful framework for enhancing climate resilience, improving productivity, and supporting sustainable horticultural production systems in the face of changing environmental conditions

Keywords: Crop Modelling, Climate-Resilient Agriculture, Horticultural Crops, Machine Learning, Precision Agriculture, Climate Change Adaptation, Decision Support Systems, Sustainable Horticulture, Smart Farming.

Phytoimmunomodulators: Nature's Green Drug Solutions for Aquaculture

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Aquaculture intensification has led to increased susceptibility to infectious diseases and overreliance on antibiotics, contributing to the global challenge of antimicrobial resistance. Phytoimmunomodulators, derived from plants such as herbs, spices, seaweeds, and microalgae, offer a sustainable and eco-friendly solution by enhancing the immune system of aquatic animals. Commonly used plants include *Ocimum sanctum*, *Allium sativum*, *Zingiber officinale*, and *Moringa oleifera*, while seaweeds like *Ascophyllum nodosum* and microalgae such as *Spirulina* and *Chlorella* provide polysaccharides, antioxidants, and essential bioactive compounds. These natural substances activate both specific and nonspecific immune responses through mechanisms involving cytokine regulation, antioxidative pathways, and gut microbiota modulation. Techniques like ethanol extraction, percolation, and ultrasonic-assisted methods are employed to isolate active compounds. Studies have shown that dietary supplements such as turmeric and garlic extracts significantly improve disease resistance in species like tilapia and seabass. Moreover, novel strategies such as combining synbiotics and herbal extracts enhance growth and immunity. Despite these benefits, challenges include species-specific responses, bioactive compound stability, and limited dosage standardization. Future directions involve refining formulations, understanding synergistic effects, and developing delivery systems such as nanoparticles and phytosomes. The integration of phytochemicals with probiotics and modern biotechnology holds promise for holistic disease management in aquaculture. Thus, phytoimmunomodulators emerge as vital green tools to reduce antibiotic dependence and promote sustainable aquaculture practices.

Keywords -Aquaculture, Phytoimmunostimulants, Herbal Extracts, Immune Modulation, Fish Health, Disease Resistance, Antioxidants, Sustainable Aquaculture, Seaweeds, Microalga

Role of Biofertilizers and Vermicompost in Sustainable Fruit Crop Production Systems

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Sustainable fruit crop production has become an important priority in modern horticulture due to the environmental and ecological challenges associated with excessive use of chemical fertilizers. Organic nutrient sources such as biofertilizers and vermicompost offer eco-friendly alternatives for improving soil fertility, plant growth, and fruit productivity. The present study evaluates the role of biofertilizers and vermicompost in enhancing growth, yield, fruit quality, and soil health in fruit crop production systems. A field experiment was conducted using a randomized block design with different organic treatments including vermicompost, biofertilizers, and their integrated application. Observations were recorded on plant growth parameters, yield components, fruit quality attributes, and soil fertility indicators. Results revealed that the combined application of vermicompost and biofertilizers significantly improved plant growth, fruit yield, and quality parameters compared to control treatments. Additionally, soil properties such as organic carbon content, nutrient availability, and microbial activity showed significant improvement under organic treatments. The findings indicate that the integration of biofertilizers and vermicompost can enhance sustainable fruit production while improving soil health and reducing dependence on chemical fertilizers. Adoption of these eco-friendly practices can contribute to long-term agricultural sustainability and environmentally safe fruit production systems.

Keywords: Biofertilizers, vermicompost, sustainable horticulture, fruit crop productivity, soil fertility, organic farming.

Carbon Sequestration Potential of Forest Ecosystems in the Eastern Himalayan Biodiversity Hotspot

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The Eastern Himalayas represent one of the world's most significant biodiversity hotspots, spanning regions such as Arunachal Pradesh, Sikkim, North Bengal, Assam, and parts of Bhutan. These forested landscapes play a crucial role in global climate regulation by acting as natural carbon sinks. This study examines the carbon sequestration potential of forest ecosystems within the Eastern Himalayan biodiversity hotspot and evaluates their contribution to climate change mitigation. The research focuses on the capacity of different forest types—including tropical evergreen forests, subtropical broadleaf forests, and temperate montane forests—to store atmospheric carbon in both vegetation biomass and soil. Forest ecosystems in this region exhibit high levels of productivity and species diversity, which enhance their ability to absorb and store carbon dioxide through biological processes. In addition, soil organic carbon in forest floors contributes significantly to long-term carbon storage. However, increasing pressures from deforestation, shifting cultivation, land-use change, and infrastructure development threaten the carbon storage capacity of these ecosystems. Sustainable forest management, conservation strategies, and community-based forest governance are therefore essential for maintaining and enhancing carbon sequestration potential. Overall, the forests of the Eastern Himalayas provide vital ecosystem services by supporting biodiversity conservation while simultaneously mitigating climate change. Understanding and protecting these natural carbon sinks is critical for achieving regional environmental sustainability and contributing to global climate goals.

Keywords: Biodiversity**,** Carbon sequestration**,** Climate change**,** Eastern Himalayas**,** Forest ecosystems

Herbal Alternatives to Antibiotics in Bovine Mastitis: An On-Farm Trial (OFT) in KVK Adopted Villages

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Bovine mastitis is a globally significant disease affecting dairy animals and is commonly managed using antimicrobial therapy. However, the indiscriminate use of antibiotics in veterinary practice has contributed to the emergence of antimicrobial resistance, a major global concern. In this context, the present study was conducted as an On-Farm Trial (OFT) in KVK adopted villages of Warangal and Hanamkonda districts of Telangana to evaluate the therapeutic efficacy of Herbolact, an ethnoveterinary formulation in the management of bovine mastitis. A total of 30 cattle with affected quarters were selected for the study. The animals exhibited classical clinical signs such as a hard, hot and painful swollen udder, along with the presence of clots or blood in milk and reduced milk yield. Milk samples from affected quarters were screened using the California Mastitis Test (CMT), which showed positive reactions in all cases. Bacteriological analysis identified Staphylococcus spp. and Escherichia coli as the predominant etiological agents. The ethnoveterinary formulation Herbolact (20 g) was applied topically thrice daily for a period of 3–7 days, depending on the severity of the condition. The formulation was mixed with 100 ml of lukewarm water and uniformly applied over the entire udder, covering both affected and unaffected quarters, followed by gentle massage to ensure proper absorption. Following an average treatment duration of 9 days, significant improvement in clinical signs was observed. Severely affected cases showed marked recovery by the 7th day. CMT results turned negative by the 5th day in several cases, with complete negativity observed between days 8–9.The findings suggest that Herbolact is an effective alternative for managing bovine mastitis under field conditions, with the potential to reduce reliance on antibiotics and help mitigate antimicrobial resistance.

Histopathological Characterization of Surgically Excised Canine Tumours

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The present study was conducted at the Department of Veterinary Surgery & Radiology, College of Veterinary Science & A.H., Junagadh, Gujarat. During the 14-month study period (April 2024 to May 2025), a total of 40 animals underwent a comprehensive clinico-physiological evaluation, including anamnesis, physical examination, and ultrasonographic imaging to assess tumour size, shape, extent, and its relationship with surrounding soft tissues. Out of 40 cases, 16 cases were of mammary gland tumours, 14 cases of cutaneous tumours, 5 cases of abdominal tumours, 3 cases of perineal tumours, 1 case of epulis and 1 case of wart. In 40 cases, surgical removal of tumours was performed and later subjected to histopathology. Surgical management was carried out in 40 various types of tumours. In which lumpectomy, mastectomy, chain mastectomy and bilateral mastectomy like standard surgical procedures, were carried out in the cases of mammary gland tumours and cutaneous tumours underwent total mass resection, while abdominal tumours were removed by laparotomy procedure. After surgery, tumour samples were collected for histopathology. Out of them, 24 cases were confirmed as benign (60 %) and 16 cases were found malignant (40 %). Histologically, found 24 benign tumours were fibroma (6 cases), fibroadenoma (3), adenoma (2), adenochondroma (2), hepatoid gland adenoma (2), hemangioma (2 cases), trichoblastoma (1), myxoma (1), lymphoma (1), plasmacytoma (1 case), histocytoma (1 case) & adeno-osteoma (1). After histopathology, malignant tumours were found such as tubular carcinoma (4), fibrosarcoma (3), ductal carcinoma (2), adenocarcinoma (2), squamous cell carcinoma (2), myxosarcoma (1), mast cell tumour (1) & basal cell carcinoma (1). Appropriate surgical excision combined with histopathological evaluation is effective for diagnosing and managing canine tumours, enabling clear differentiation between benign and malignant cases.

Melatonin Mitigates Carbendazim-Induced Reproductive Toxicity: An Experimental Study in Rats

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Carbendazim (CBZ) is a broad-spectrum carbamate fungicide to control fungal pathogens. Melatonin (MLT), a potent antioxidant and regulatory molecule, exhibits protective roles against diverse toxic insults. The study aimed to evaluate the efficacy of MLT in mitigating CBZ-induced testicular toxicity in male Wistar rats. Twenty-four rats were randomly divided into four experimental groups (each consisting of six), and treatments were administered orally once daily for 28 days. Group I served as control, Group II was administered MLT (10 mg/kg), Group III received CBZ (100 mg/kg), and Group IV rats were treated with a combination of CBZ (100 mg/kg) and MLT (10 mg/kg).Feed intake, water intake, and body weight were monitored weekly throughout the experimental period.On the 29th day, the rats were sacrificed for further evaluations, including hematological, oxidative, hormonal, inflammatory, microscopic, and molecular endpoints. CBZ administration significantly reduced feed intake, water intake, body weight gain, and relative testicular weight, while inducing hematological alterations. Oxidative stress markers indicated elevated ROS and LPO, depletion of GSH, and reduced activities of enzymatic antioxidants (SOD, CAT, GPx, and GR) in the testis. CBZ-exposed rats showed alterations in sperm parameters, *viz* concentration, viability, morphology, motility, and HOST, along with decreased serum testosterone levels, anddysregulation of tissue inflammatory cytokines (increased TNF-α and IL-1β, decreased IL-10). Microscopic evaluation (histopathology and TEM) confirmed seminiferous tubulesdegeneration, germ cell loss, vacuolization, mitochondrial damage and disorganized testicular architecture. MLT co-treatment restored antioxidant levels, attenuated LPO, improved sperm characteristics, normalized testosterone levels, modulated inflammatory cytokines, and ameliorated testicular microscopic structure. In addition, MLT co-treatment improved feed intake, water intake, body weight gain, and modulatedhematological indices.In conclusion, MLT effectively attenuated CBZ-induced testicular toxicity by re-establishing redox balance, modulating inflammatory cytokines, preserving testicular structure, and maintaining reproductive function, thereby highlighting its potential as a therapeutic agent against pesticide-induced reproductive damage.

Keywords : Carbendazim, Melatonin, Testicular toxicity, Oxidative stress, Cytokines.

Impact of Antioxidant Supplementation and Temperature Humidity Index (THI) on Thyroid Function of Crossbred Cattle in Both Summer and Winter Season

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This study examines the impact of the temperature humidity index (THI) on the thyroid function of crossbred cattle and the potential benefits of antioxidant supplementation. In order to shed light on the seasonal subtleties of thyroid function, the research covers the summer and winter seasons equally. Recognizing that changes in temperature and humidity are significant stresses on livestock, especially crossbred cattle. The radioimmunoassay (RIA) technique was used to assess the blood levels of the harmone T3 and T4. In the estimate method, the tracer I-125 was utilized and there was a rivalry between free and isotope-tagged hormones for the few available antibody binding sites. g/100 ml of blood) in suckling, young adult and mature buffalo cattle were 33.1±2.52,μ The values of T3 and T4 (8.40±0.54, 3.17±1.18 and 4.70±0.45 and 33.6±2.20 and 2.10±6.42, respectively. Since heat stress activates the hypothalamo pituitary-adrenal axis, measuring thyroid hormones be a useful signal for stress assessment in animals. This is because the thyroid gland is extremely temperature sensitive. This information is vital for improving the health and production of crossbred cattle that face various environmental stresses via the creation of specific treatments.

Body condition scoring of swine

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Body condition scoring (BCS) is a manage mental tool used by producer to optimize production, evaluate health and assess the nutritional status of pigs and is measured by subjective (manual body scoring) and objective methods (Sow caliper, Flank to flank & Renco Lean Meater). The BCS score ranges from 1 – 5. BCS 1 indicate extreme emaciation, whereas, BCS 5 stands for extreme obesity while at BCS 3 the reproductive performance of sow is optimum. The BCS at weaning, farrowing and gestation affect the litter size at birth, birth weight, growth rate, survival-to-weaning and piglet mortality. Prolonged farrowing, stillbirth, secondary uterine inertia and higher preweaning mortality are observed at higher BCS in pigs. Whereas, in low BCS, shoulder injury and acyclic condition of ovaries are more common.While optimum BCS of pig increases the chances of healthy and viable piglet in the litter. BCS also influence the lameness which affects reproductive performance in pig. Moreover to this, it is also affected by the seasonal changes. Therefore, it can be concluded that maintenance of optimum BCS can improve the reproductive performance of swine besides increasing the life span of swine.

Keywords: Body condition score, subjective methods, objective methods, performances

Stem cell and its clinical application in Veterinary Science

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By offering novel treatments for livestock illnesses with little natural healing potential, stem cell biotechnology is transforming veterinary regenerative medicine. Because of their capacity for self-renewal, multilineage differentiation, and homing, stem cells are useful for immune modulation and tissue regeneration. They are categorized by potency, ranging from totipotent to unipotent and by origin. Its including induced pluripotent stem cells (iPSCs), adult stem cells (ASCs) and embryonic stem cells (ESCs). Because of their accessibility and immunomodulatory potential, mesenchymal stem cells (MSCs) derived from bone marrow, adipose tissue, umbilical cord, and other sources are frequently utilized. Clinical uses in livestock include the management of neurodegenerative diseases, ligament and tendon injuries, wobbler syndrome, osteoarthritis and mastitis. While organoids three-dimensional structures made from ESCs, ASCs, or iPSCs act as physiologically relevant, species-specific models for disease research, drug screening and tissue regeneration without the use of live animals, iPSCs allow patient-specific therapies, lowering the risk of immune rejection. High production costs, donor variability, genetic instability, limited potency in certain sources, a lack of universal biomarkers and ethical concerns regarding the use of ESCs are some of the obstacles that still exist despite tremendous advancements. For widespread clinical adoption, standardized procedures for isolation, culture, delivery and safety assessment are necessary. Future developments that combine organoid and stem cell technologies could help conserve endangered species, increase livestock productivity and improve animal welfare. For stem cell-based veterinary therapies to reach their full transformative potential, more research is needed in the areas of cost-effective production, regulatory compliance, and species-specific optimization.

Keywords: Disease modeling, Embryonic stem cells, Induced pluripotent stem cells, Livestock, Mesenchymal stem cells, Organoids.

Development of deep learning based biometric system for automated individual Identification of cows using muzzle images

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Deep learning based animal's muzzle biometric system can be a promising technology for individual identification of cows, but any user interface system with reasonable accuracy and robustness is not well established for real-time utility and deployment. This study aimed to develop and validate a computer vision based bovine biometrics hybrid app (android & web) for automated individual identification of Sahiwal cows. For this study, 500 cows were covered for muzzle image dataset preparation. The generated dataset had 9422 images from which 6030 images were used for the 'training', 1507 images for validation and 1885 images for 'testing'. YOLOv8n model was used for muzzle detection and cropping of muzzle. Three CNN models (*VGG16_BN*, *Wide_ResNet50_2*, and *ViT-B_16*) were employed as backbone feature extractors. By freezing the backbone layers, only the parameters within newly added custom classification heads were updated during training. Real time testing was also done on new open set dataset (1157 new muzzle images) to check the generalization of models. YOLOv8n achieved high performance with mAP@50 of 0.995 and mAP@50–95 of 0.759. For an individual cow identification, the testing accuracy of 98.14% for the VGG16_BN model, 98.67% for the W_Resnet50_2 model, and 99.15% for the ViT-B_16 model, was obtained on closed dataset. The study also did real time testing and obtained >95% muzzle identification accuracy for all three models on open set, which indicated comprehensive training of models, so, a user-interface was developed for digital identification of cows. The study demonstrates the feasibility of scalable, non-invasive, tamper proof and permanent cow identification, enabling precision livestock management and also very useful for traceability and insurance personals.

Keywords: Automated identification, Biometric, Computer vision, Muzzle imaging, Zebu cattle.

Differential expression of urinary exosome microRNA in buffaloes at the estrus and diestrus stages of estrous cycle

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Silent heat in buffaloes is leading to huge economic losses. MiRNA of urinary exosomes are identified to be better physiological biomarkers in comparison to cell free miRNA. The present study was therefore carried out with the aim of identifying suitable miRNA biomarker in urinary exosomes of buffaloes that can indicate estrus. Grouping of animals as mid-diestrus (G-I/Control group), regular estrus (G-II) and silent estrus (G-III) buffaloes was done using a combinatorial approach. Urinary exosomes were isolated by ultracentrifugation and characterized by transmission electron microscopy. Total RNA isolated from urinary exosomes, representing one sample from G-I, G-II and G-III were used for the generation of miRNA libraries by NGS. Differential expression analysis of miRNAs between the test and control samples was done using DESeq2. The miRNAs with absolute $\log_2$ fold change ≥ 1 and p-value ≤ 0.05 were considered significant. In G-II sample, seven known miRNAs and five novel miRNAs were found to be significantly upregulated and two known miRNAs and 11 novel miRNAs were found to significantly downregulated when compared to G-I. On the other hand, in the G-III sample, one known miRNA and five novel miRNAs were found to be significantly upregulated and two known miRNAs and 16 novel miRNAs were found to be significantly downregulated when compared to G-I. Among the miRNAs that were found to be differently expressed in this study, decreased expression of urinary exosome miRNA-122 in both G-II and G-III when compared to G-I probably be due to either decreased levels of miR-122 in granulosa cells of ovary or decreased levels of circulating miRNA-122. However, for urinary exosome miR-122 to be considered as biomarker, there is a need for further studies integrating *in vivo* and *in vitro* experiments aimed at identifying the biological origin and the regulatory network of miRNA -122 in modulating the target gene expression associated with estrus events.

Assessment of Calcium and Phosphorus in Dairy Cattle and its Association with Metabolic and Reproductive Disorders

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A survey was carried out in Bhavnagar district of Gujarat state from March 2025 to May 2025 in six talukas, *viz.* Bhavnagar, Talaja, Sihor, Mahuva, Palitana and Umrala to estimate the calcium and phosphorus contents in feeds' and fodders' of the district in order to generate information on calcium and phosphorus status of dairy cattle and correlate it with the occurrence of metabolic and reproductive disorders. A multistage random sampling technique was used to select the respondents. From each village, 10 farmers owning dairy cattle producing 6 kg or more of milk per day were chosen, giving a total sample of 120 respondents and data were collected on 153 cattle. Detailed information on the types and quantities of feeds and fodder offered, estimated daily intake by each animal, individual milk yield and fat percentage, feeding schedules and overall feeding patterns was collected from individual farmers through a structured questionnaire specifically designed for the study. Samples of feed and fodders which were used by farmers/respondents were collected from the respondents. Calcium and phosphorus estimation of feeds and fodders was done as per the method of Talapatra *et al*. (1940). Calcium and phosphorus requirement of dairy cattle was calculated as per the guidelines of ICAR (2013) feeding standards based on the body weight, milk yield and fat % in milk of cattle. The levels of calcium and phosphorus in most samples were adequate. However, among the concentrates, cottonseed and several commercially available readymade concentrate mixtures had phosphorus levels below the critical limit. The average Ca and P intake as a % of requirement of dairy cattle in Bhavnagar district were 222.16 ± 5.02% and 153.60 ± 1.90%, respectively. The occurrence of metabolic and reproductive disorders was low. Among metabolic issues, milk fever was most common, whereas retained placenta, anoestrus, and repeat breeding were the leading reproductive concerns. Overall, the findings indicate that calcium and phosphorus intake in dairy cattle of Bhavnagar district was substantially higher than the recommended requirements, reflecting an overall adequate to excess mineral status. Therefore, the occurrence of metabolic and reproductive disorders remained low under the existing feeding practices.

Optimization of tomato pomace meal in the diet of Labeo rohita (Hamilton, 1822) through fermentation and exogeneous enzyme supplementation

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To evaluate the effects of dietary tomato pomace meal (TPM), enzyme-supplemented TPM, and fermented TPM (FTPM) on growth, enzyme profiles, and antioxidant status of Labeo rohita fingerlings, a 60-day experiment was conducted. Three hundred and fifteen acclimated fish (12.08 ± 0.5 g) were randomly assigned to seven dietary groups (three replicates of 15 fish each). Seven isonitrogenous (30% CP), isolipidic (6%), and isocaloric (350 kcal DE/100 g) diets were prepared: control (30% DORB, 0% TPM); TPM15 (15% TPM replacing 50% DORB); TPM30 (30% TPM replacing 100% DORB); TPM15+EE and TPM30+EE (TPM diets with 0.1% cellulase–xylanase, 1:1); FTPM15 (15% FTPM replacing 50% DORB); and FTPM30 (30% FTPM replacing 100% DORB). Fish were fed to satiation twice daily for 60 days. Growth indices (WG, WG%, SGR, FCR, PER) were comparable among control and TPM-fed groups, while FTPM30 exhibited the best performance (highest WG, WG%, SGR, PER; lowest FCR). Dry matter digestibility was reduced in TPM30 but unaffected in other groups. Survival, VSI, and whole-body composition were similar among treatments. ISI was lower in most TPM-based diets except control, TPM15, and FTPM30. Digestive enzyme activities were highest in FTPM30, whereas AST and ALT activities were elevated in FTPM15 and FTPM30. LDH and MDH activities were reduced in enzyme-supplemented and FTPM groups. Hepatic CAT was unchanged, while SOD activity decreased in enzyme-supplemented and FTPMfed fish. Serum glucose declined in TPM+EE groups, with other biochemical parameters unaffected. In conclusion, TPM can replace DORB up to 30% without any detrimental effects, while FTPM at 30% yields superior growth and metabolic responses.

Keywords: Tomato pomace meal; Fermented tomato pomace; Labeo rohita; Growth performance; Digestive enzymes

"Clinical Correlation of Neutrophil Indices and Morphological Changes with Prognosis of Common Disease Conditions of Dogs"

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Neutrophils (Polymorphonuclear cell (PMNs)) are the most abundant leukocytes in dogs, being the main cell population in the inflammatory/infectious response. This study was carried out to aim to correlate the neutrophil indices and morphological changes with different clinical condition in dogs along with their associated prognosis. In this study, 100 clinically affected dogs and 6 healthy controls underwent evaluation, Neutrophil morphology was assessed and correlated with specific diagnosis and prognosis. Final diagnoses were established through supportive tests including rapid immunoassays, cytology, imaging, urinalysis, and histopathology. Among the clinical conditions recorded, viral infections were most prevalent (n=22), followed by gastrointestinal disorders (n=19), pyometra (n=15), ascites (n=12), urinary tract infections (n=8), hepatic dysfunction (n=7), parasitic diseases (n=7), tumors (n=6), and respiratory tract infections (n=4). A mild to severe left shift was observed in cases of pyometra and hepatic dysfunction, while a mild to moderate left shift occurs in canine distemper virus infection, parvovirus infection, ascites, urinary tract infection, parasitic diseases, tumors, and respiratory tract infections. In contrast, a mild left shift was seen in gastrointestinal disorders. Mild to moderate neutrophilic toxic changes were observed in all conditions except gastrointestinal disorders and tumors, where only mild neutrophilic toxic changes were present. Absolute neutrophilia was observed in cases of pyometra, tumors, and hepatic dysfunction with a leukemoid reaction observed in pyometra. In this study, 85% of dogs showed a left shift and 82% had neutrophil toxic changes, with an overall case fatality rate of 36%. Although both survivors and non-survivors exhibited these alterations, severe left shift and marked toxicity were absent in survivors but more common in non-survivors. Among dogs with toxic changes, 8% survived less than a week and 28% lived for one week to two months. Overall, mortality increased in association with greater degrees of toxic changes and left shift.Thus, it can be concluded that the evaluation of alterations in neutrophils number and morphological changes may be helpful in diagnosis and in accessing prognosis of different pathological conditions of dogs.

Keywords*:* Neutrophil Toxic Changes, Dog, Survival Rate

Effect of Environmental Enrichment on Behaviour of Broiler

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Poultry is one of the fastest expanding parts of the Indian agricultural industry, accounting for a significant portion of protein supplements through eggs and meat production. Over the last three decades, the poultry industry in India has progressed from backyard farming to a full-fledged commercial enterprise because of the research and development initiated by the government and later taken up by the organized private sector. Environmental enrichment (EE) is described as employing diverse objects to increase the living quality and normal behavior expression of animals who are housed in cages or in a limited environment. EE is the adding of physiologically appropriate cues to the animal's environment to stimulate natural actions. The study aimed to evaluate the effects of environmental enrichment on behavior in broiler chicken. A total of 120 broiler chicks were randomly assigned to four treatment groups: T_1 (control), T_2 (perch), T_3 (ramp/platform), and T_4 (hanging object), with 30 birds per treatment, further subdivided into 2 replicates. The experiment was conducted up to 5th weeks under a deep litter system, with water and feed provided ad libitum throughout the experimental period. Behaviour observations were recorded using fixed cameras in all treatment groups from the 3rd week and continued throughout the experimental period. Observations were conducted four times per day: morning (9:00–9:15 a.m.), noon (12:00–12:15 p.m.), evening (4:00–4:15 p.m.), and night (7:00–7:15 p.m.), for three days each week. Significant differences were observed in behavioural parameters such as drinking behaviour during the 3rd, 4th, and 5th weeks ($P<0.05$); crouching behaviour during the 4th week ($P<0.05$); huddling behaviour during the 3rd and 5th weeks ($P<0.05$); scratching behaviour during the 4th week ($P<0.01$); leg and wing stretching behaviour during the 4th week ($P<0.01$); and preening behaviour during the 4th ($P<0.01$) and 5th weeks ($P<0.05$). No significant effects ($P>0.05$) were observed in feeding, sitting, and dust bathing behaviours throughout the experimental period. EE improved the behaviour of broiler chickens.

Keywords: Environmental enrichment, behaviour, perches, hanging objects, and ramp.

Cytoprotective effects of *Artocarpus heterophyllus* Lam. seed extract against lead, chromium and thiamethoxam induced renal cell toxicity.

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The growing incidence of nephrotoxicity resulting from exposure to heavy metals and pesticides has become a significant concern for renal health. This study examined the cytotoxic effects of lead (Pb), chromium (Cr), and the neonicotinoid pesticide thiamethoxam (TMX) using NRK-52E rat kidney epithelial cells as an in-vitro model. Building on earlier observations that Pb exposure (IC_{50} = 95.25 µM) enhances Cr (IC_{50} = 3.97 µM) and TMX (IC_{50} = 37.2 µM) induced cytotoxicity, the present work evaluated the cytoprotective efficacy of *Artocarpus heterophyllus* Lam. seed extract (AHSE) across concentrations of 0.195–50 µg/mL. Cell viability and proliferation were assessed using MTT, resazurin reduction, and trypan blue dye exclusion assays. AHSE treatment produced a clear dose-dependent increase in cell proliferation, with an EC_{50} of 7.125 µg/mL compared with gallic acid (EC_{50} = 5.932 µg/mL) in the MTT assay. Similarly, the resazurin assay yielded EC_{50} values of 6.494 µg/mL for AHSE and 7.378 µg/mL for gallic acid. Co-exposure to IC_{50} concentrations of Pb, Cr, and TMX in the presence of AHSE demonstrated marked cytoprotection, with EC_{50} values of 1.94, 7.89, and 3.96µg/mL (MTT) and 2.099, 3.340, and 4.064µg/mL (resazurin), respectively, required to maintain 50% cell viability. Overall, AHSE exhibited strong dose-dependent proliferative and cytoprotective effects, likely due to its bioactive phytoconstituents, highlighting its promise as a plant-derived nephroprotective agent.

Keywords: *Artocarpus heterophyllus*, nephrotoxicity, NRK-52E cell line, thiamethoxam.

Metronidazole-Induced Oxidative Stress and Erythrocytic Genotoxicity in *Cyprinus carpio*

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The present study evaluated the alterations in catalase (CAT) activity, genotoxicity and cytotoxicity in *Cyprinus carpio* following exposure to 10 mg/L of a test compound over a 96 h period. Fish were exposed under controlled laboratory conditions, and CAT activity was assessed at 24, 48, 72, and 96 h intervals. The results revealed significant time-dependent alterations in antioxidant and genotoxic biomarkers. CAT activity exhibited a biphasic response, showing a slight increase at 24 h, a significant elevation at 48 h, a decline at 72 h, and a pronounced increase at 96 h, indicating oxidative stress and compensatory activation of antioxidant defenses. PCE frequency showed a significant increase at 24 h, followed by a gradual decline at later exposure periods, suggesting initial stimulation of erythropoiesis and subsequent physiological adaptation. Micronucleus frequency and erythrocytic abnormalities, including aberrant nucleus and aberrant cytoplasm, increased progressively with exposure duration, indicating substantial genotoxic and cytotoxic damage to erythrocytes. Overall, the findings demonstrate that metronidazole exposure induces oxidative stress and significant genotoxic alterations in *Cyprinus carpio*. The combined use of CAT activity, PCE frequency, micronucleus assay, and erythrocytic abnormalities proved to be effective biomarkers for evaluating the toxic effects of pharmaceutical contaminants in aquatic organisms.

Keywords: Catalase activity; Genotoxicity; *Cyprinus carpio*; PCE; Acute toxicity

Clinical resolution of Idiopathic Evans syndrome in a Rottweiler dog following therapeutic management

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Evans syndrome is a severe immune mediated hemolytic disorder, characterized by sequential occurrence of immune mediated hemolytic anemia (IMHA) and immune mediated thrombhocytopenia (IMTP). The present report describes the successful clinical management of Evans syndrome in a 5-year-old 40 kg intact male Rottweiler dog presented with severe anemia (2.01 x 10^6/ µL), low hemoglobin (3.6 g/dl), low hematocrit (10.8%) and thrombocytopenia (80 x 10^3/ µL) and systemic clinical signs (anorexia, lethargy, melena, pedal edema, scrotal swelling and presence of petechiae on the ventral abdomen). Fecal sample and Blood sample was taken for further examination. Fecal sample was negative for endoparasites. PCR was negative for hemo-protozoan diseases. Saline agglutination test was positive and spherocytes was noticed on the stained peripheral blood smear examination. Based on these findings, the dog was diagnosed with idiopathic immune mediated hemolytic anemia and immune mediated thrombocytopenia, called Evans syndrome. Despite multiple whole blood transfusions (900 ml), no significant improvement was noticed. Further, animal was treated with immunosuppressive agents, haematinics and thrombopoietin receptor agonist (TPO-R). The animal showed clinical improvement like feed intake and resolution of edema and progressive haematological recovery. Marked recovery was noticed after therapy.

Keywords: Evans syndrome, blood transfusion, Immunosuppressive drugs, Anemia

Breed Specific Circadian Surface Temperature Profiles: A Comparative Study of Indigenous, Crossbred and Murrah Heifers across Diverse Housing Environments.

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This study evaluated the circadian surface temperature profiles of indigenous (Sahiwal), crossbred (Karan Fries/KF), and Murrah heifers under sheltered and non-sheltered conditions in a thermoneutral environment. Utilizing infrared thermography, the forehead, muzzle, left flank, and dewlap temperatures throughout the day were recorded. A constant circadian rhythm was observed across all breeds and body regions. The surface temperatures consistently peaked in the afternoon at 3:00 PM and fell to their lowest levels early in the morning at 6:00 AM. Statistical analysis revealed no significant variations ($p<0.05$) between the different breeds at any specific time point, but showed a clear trend. The Karan Fries cattle generally exhibited the highest surface temperatures across all sites, followed by the Murrah buffaloes. In contrast, the Sahiwal breed consistently maintained the lowest surface temperatures, suggesting a naturally enhanced thermoregulatory efficiency intrinsic to indigenous breeds. However, when tracking the temperatures chronologically throughout the day, there was significant thermal variations ($p<0.05$) within each individual breed. The findings indicate that the housing system directly influenced the magnitude of these daily temperature fluctuations. The animals kept outdoors without shelter and exposed to direct sunlight experienced slightly more extreme thermal shifts compared to those housed inside the shed. In conclusion, while inter-breed surface temperature differences were not statistically significant under thermoneutral conditions, the research demonstrates that housing systems play a critical role in buffering daily thermal extremes. Ultimately, the Sahiwal cattle demonstrated a consistently cooler profile, and providing shelter effectively stabilized the daily surface temperature variations for all breeds compared to open-air exposure.

Clostridium Botulinum Outbreak at Arid Region

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Botulism is a fatal neuroparalytic toxemia of animals caused by the exotoxin produced by the anaerobic bacterium *Clostridium botulinum*. *Clostridium botulinum* is a spore-forming, gram-positive anaerobic bacterium that produces potent neurotoxins causing flaccid paralysis in ani mals**.** The disease is characterized by profound functional disturbances at the neuromuscular junction, with minimal gross pathological lesions. A significant outbreak of botulism, locally termed “Karra disease,” was reported in 2025 in Jaisalmer, resulting in the death of over 500 cattle, with previous yearly losses exceeding 1500 animals, highlighting its severe epizootic potential in arid regions. The Jaisalmer outbreak was strongly associated with environmental and nutritional factors. In phosphorus-deficient conditions, cattle exhibit osteophagia (bone-chewing), ingesting carcass remnants contaminated with *C. botulinum* toxin. Improper disposal of dead animals and hot, arid climatic conditions favored toxin production in decomposing organic matter, facilitating rapid spread. Clinical manifestations included salivation, stiffness, progressive paralysis, inability to eat or drink, and death within 4–5 days of onset.

Characterizing Heat Stress Tolerance in Frieswal Bulls Through Integrated Physiological, Biochemical and Gene Expression Analysis

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Global climate change has intensified ecological temperatures, posing serious challenges to agricultural production systems, particularly in tropical and subtropical regions. High-yielding crossbred cattle such as Frieswal are especially susceptible to heat stress, which can adversely influence their physiological, biochemical, and molecular functions, ultimately compromising productivity and overall welfare. The present study aimed to evaluate the heat tolerance of Frieswal bulls during peak summer months. A total of 16 Frieswal bulls were selected and divided into two groups. The control group was maintained in a controlled microclimatic shed equipped with foggers and fans, while the treatment group was housed in traditional sheds directly exposed to ambient heat. The study spanned two months, with April considered the baseline month due to moderate temperatures, followed by May, representing high-heat conditions. Physiological parameters—including rectal temperature, heart rate, and respiratory rate—were recorded twice daily. Serum biochemical markers such as alanine transaminase (ALT), alkaline phosphatase (ALP), aspartate transaminase (AST), creatinine, and blood urea nitrogen (BUN) were analyzed. Molecular responses to heat stress were assessed through the expression profiling of heat shock proteins HSP70 and HSP90, using RPS15A as the reference gene. Results revealed a significant rise in rectal temperature, respiratory rate, and heart rate among heat-exposed bulls during May. Biochemical indicators (ALT, AST, ALP, BUN, and creatinine) also increased markedly under heat stress, suggesting physiological strain and altered metabolic activity. Gene expression analysis further demonstrated upregulation of HSP70 and HSP90 in treatment animals, confirming molecular activation of heat-stress response pathways. In conclusion, Frieswal bulls exhibited clear physiological, biochemical, and molecular signatures of heat stress under high ambient temperatures. The findings underscore the critical need for improved microclimatic modifications, such as controlled shed environments, to mitigate heat stress and enhance the productivity and welfare of Frieswal cattle.

Keywords: Frieswal bulls; Heat stress; Physiological responses; Biochemical biomarkers; HSP70; HSP9.

Emerging Trends & Advanced Technologies in Veterinary & Animal Husbandry Sciences: Challenges & Opportunities

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The veterinary and animal husbandry sciences are undergoing a transformative shift driven by rapid technological advancements, emerging disease challenges, and increasing global demands for sustainable livestock production. This review integrates recent developments across key domains including advanced veterinary diagnostics, artificial intelligence (AI) and digital technologies, infectious diseases and One Health approaches, antimicrobial resistance (AMR), vaccinology and immunology, livestock production and breeding, animal nutrition, poultry and fisheries sciences, veterinary public health, ethnoveterinary practices, and climate-resilient livestock systems. Recent innovations such as AI-assisted diagnostics, precision livestock farming, genomic selection, and mRNA vaccine platforms are revolutionizing animal health management by enabling early disease detection, predictive analytics, and targeted interventions. Simultaneously, the growing threat of zoonotic diseases and antimicrobial resistance highlights the urgent need for integrated One Health strategies that link animal, human, and environmental health. Advances in precision nutrition, alternative feed resources, and microbiome research are improving productivity while reducing environmental impact. Despite these advancements, significant challenges persist, including limited accessibility of technologies in resource-constrained settings, gaps in biosecurity implementation, and the increasing impacts of climate change on livestock systems. Sustainable solutions such as climate-smart animal husbandry, improved biosecurity frameworks, and the scientific validation of ethnoveterinary practices are essential for enhancing resilience and long-term sustainability.This review emphasizes that a multidisciplinary and collaborative approach—integrating veterinary science with data analytics, biotechnology, ecology, and policy frameworks—is critical for addressing present and future challenges. The convergence of innovation, sustainability, and One Health principles will play a pivotal role in ensuring global food security, improving animal welfare, and safeguarding public health in the 21st century.

Keywords:Veterinary diagnostics, Artificial intelligence, One Health, Antimicrobial resistance, mRNA vaccines, Precision livestock farming, Climate-smart livestock, Zoonotic diseases, Ethnoveterinary medicine, Sustainable animal husbandry.

Molecular detection, serotyping, cytotoxicity, and antimicrobial resistance of STEC and EPEC in milk and milk products

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Foodborne E. coli pathotypes, notably STEC, and EPEC, pose significant zoonotic risks via dairy products; this study aimed to detect, characterize, and evaluate their pathogenicity and antimicrobial resistance profiles.A total of 620 milk and milk product samples were collected and subjected to bacteriological examination. Isolation and preliminary identification of *E. coli* were performed using standard cultural and biochemical techniques followed by molecular confirmation targeting the *yaiO* gene in which 196 isolates (31.61%) were found positive for *E. coli*. Pathotyping of *E. coli* isolates were performed through detection of four key virulence genes *stx1*, *stx2*, *eaeA*, *hlyA* associated with STEC and EPEC in which 78 isolates (39.8%) were found to harbour at least one of the above virulence gene, with *stx1* being the most prevalent. Serotyping of all (n= 78) the STEC (n_1=66) and EPEC (n_2=12) positive isolates were done to identify circulating serogroups in the northern India, of which 22 different types of O-serogroups, predominantly O18, O111, O120, O126, and O17 were revealed. Furthermore, *E. coli* isolates bearing *stx1* or *stx2* or both were evaluated to know the pathogenic potential using Vero cell cytotoxicity assay, wherein cytopathic effects (CPE) indicative of Shiga toxin activity were observed in 40 isolates. Antimicrobial susceptibility test (ABST) was conducted in all the 78 isolates using 19 different commonly used antibiotics to determine resistance patterns. High resistance was observed against Ampicillin (88.5%), Tetracycline (88.5%), Oxytetracycline (87.2), Cephalothin (87.2%), and Sulphonamides (80.8%), while Imipenem (1.3%), Gentamicin (6.4%), and Nalidixic acid (7.7%) were most effective. Forty isolates were found to be multidrug resistant (MDR) which were further screened at molecular level targeting four antibiotic resistance gene, namely *CITM*, *tetA*, *tetB*, and *sul1* in which 95% of the isolates carried at least one of the above genes, except *tetA* which was absent in all the 40 isolates. STEC and EPEC in dairy indicate zoonotic risk; presence of virulence and resistance genes signals AMR threats, while Vero cell cytotoxicity confirms functional pathogenicity.

Antimicrobial Resistance: A Paradigm

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A major global health risk that affects people, animals, and the environment is antimicrobial resistance, or AMR. It happens when microbes develop defense mechanisms that make antimicrobial drugs ineffective, resulting in chronic infections and a higher risk of morbidity, mortality, and disease transmission. The abuse and overuse of antibiotics in human medicine, veterinary care, agriculture, and aquaculture is a major contributing factor to the fast increase of AMR. In cattle systems, resistant infections cause longer disease, increased healthcare expenses, and decreased output by undermining the efficacy of conventional therapies. Food safety, public health, and economic stability are all significantly impacted by the problem. Coordinated action through antimicrobial stewardship, enhanced surveillance, infection prevention, and the creation of alternative therapeutic approaches is necessary to address AMR. That is why the problem of antimicrobial resistance is imperative to address.

Keywords: Antimicrobial resistance, One Health, Antibiotic misuse, Drug-resistant pathogens, Public health, Veterinary medicine

A Pathological Study of Ovarian Tumours in Dogs

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Ovarian tumours reflect a unique and complex challenge in oncology, distinguishing themselves from other forms of abnormal cellular growth such malformation growth, reparative growth and hyperplastic growth. While these latter processes involved cellular proliferation that is typically regulated and reversible, ovarian tumours exhibit uncontrolled, often irreversible growth with distinct biological behaviours. The present study aimed to assess occurrence and histopathology of different neoplasms of ovary of dogs in Jaipur city of Rajasthan, India. In the present study, tissue samples of genital tract from 121 female dogs were collected from different Animal Birth Control (ABC) programme and different clinics in Jaipur. Gross examinations of these samples showed 141 various lesions in different parts of genital tract out of which 15 cases of neoplasms of ovaries (15/141) with occurrence (15/141) 10.64 percent. Most commonly recorded neoplasm of ovary was granulosa cell tumour followed by cystadenoma, cystadenocarcinoma, dysgerminoma and luteoma. Histopathologically, granulosa cell tumour showed pathognomonic Call-Exner bodies consisting of a small central round, to oval space with eosinophilic follicular fluid. Cystadenoma showed papillary projections lined by single layer of cuboidal epithelium and at some places tightly packed tall columnar epithelium. Cystadenocarcinoma showed acini formation with proliferating cells having hyperchromatic and more pleomorphic nucleus and mitotic figures. Dysgerminoma showed polyhedral cells which had a moderate quantity of transparent eosinophilic cytoplasm. Luteoma showed proliferation of luteal neoplastic polyhedral cells with abundant, vacuolated cytoplasm and round nuclei forming multi lobulation. Study of canine ovarian tumours provides better understanding, diagnosis and treatment aspect of these tumours which is crucial for improving the overall health and wellbeing of canines.

A case study of use of smart sensors and wearable devices for real-time animal monitoring Care in Bagalkot district, Karanaka, India

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Livestock management in Bagalkot taluk of Bagalkot district, located along the Krishna River basin, is being significantly improved through the adoption of smart sensors and wearable devices for real-time animal monitoring. In villages such as Kaladgi, Navanagar, Gaddankeri, Hallur, Bevoor, Muchakhandi, Nayanegali, Benakatti, and Hanchinal, farmers are adopting IoT-based solutions to improve the health and productivity of cattle and goats. The region is known for indigenous breeds like Hallikar and Khillari cattle, which are well adapted to local climatic conditions. These technologies enable continuous monitoring and promote a shift from reactive to proactive livestock care.The objective of this study is to evaluate the effectiveness of IoT-enabled smart monitoring systems in improving livestock health, enhancing productivity, reducing mortality rates, and supporting efficient farm management in rural villages of Bagalkot taluk. The study utilizes wearable devices such as smart neck tags and ear sensors to monitor vital parameters including body temperature, heart rate, and activity levels. Data is transmitted through GSM and low-power IoT networks to cloud-based platforms. Farmers receive real-time alerts via mobile applications. GPS-enabled collars are used for tracking livestock across grazing areas near the Krishna River, while environmental sensors monitor temperature and humidity. Field observations and farmer feedback were used to assess system performance.The adoption of smart monitoring systems like **Cowlar** – A smart neck collar that tracks activity, feeding behavior, and estrus cycles in dairy animals and like **Kisan Know** – An IoT-based farm management device that provides insights into livestock health and farm conditions has led to early disease detection, improved reproductive efficiency, and enhanced livestock security. Behavioral tracking helps identify abnormalities in feeding and movement patterns. GPS tracking reduces the risk of livestock loss, and environmental monitoring helps manage heat stress conditions. Farmers reported reduced labor, lower management costs, and increased milk yield and overall herd productivity.IoT-based livestock monitoring systems like have significantly improved animal health and farm efficiency in Bagalkot taluk of Bagalkot district. By supporting indigenous breeds like Hallikar and Khillari, and leveraging natural resources such as the Krishna River, these technologies promote sustainable and climate-resilient agriculture. Wider adoption with proper training and infrastructure can further strengthen rural livelihoods and ensure long-term economic stability.

Keywords: sensors, livestock, monitoring, Bagalkot villages, farmers.

Application of AI in veterinary diagnostics and livestock management in Bagalkot, Karnataka, India

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In Bagalkot district of Karnataka, India, livestock rearing plays a vital role in rural livelihoods, significantly contributing to the income and nutritional security of smallholder and landless farmers. The region sustains a diverse range of livestock, including indigenous Khillari cattle, buffaloes, sheep, goats, and backyard poultry such as Giriraja birds. Despite its importance, the sector faces several challenges, including frequent disease outbreaks, high poultry mortality, fodder shortages, water contamination, and climate-related risks such as flooding from the Krishna and Ghataprabha rivers and recurring droughts. In this context, Artificial Intelligence (AI) and Machine Learning (ML) technologies are emerging as promising tools to improve livestock management and veterinary services, although their adoption in rural Bagalkot is still limited. This study aims to examine the role of AI and ML in enhancing livestock management and veterinary diagnostics in selected villages of the district. It focuses on how these technologies help address issues such as disease detection, animal health monitoring, climate stress adaptation, and limited veterinary access.The study follows a descriptive research approach using secondary data from government reports, veterinary department records, and digital agriculture platforms. Information is drawn from initiatives of the Karnataka Animal Husbandry Department, particularly in **Bagalkot, Ilkal, Mudhol, and Jamkhandi taluks**. The analysis covers AI-enabled mobile applications, disease surveillance systems, predictive analytics models, telemedicine platforms, and remote advisory services. Findings indicate that AI and ML tools are gradually improving livestock health management in the region. Disease surveillance systems support early outbreak detection, mobile applications deliver timely advisories in local languages, and image-based tools assist in quick diagnosis. Predictive weather analytics help farmers manage climate risks, while telemedicine improves access to veterinary care in remote areas. Additionally, AI-based fodder management and water monitoring systems contribute to better resource use and reduced livestock mortality. Overall, AI and ML technologies hold strong potential to strengthen livestock systems in Bagalkot by improving disease control and resilience. However, challenges such as low digital literacy, limited infrastructure, and lack of awareness continue to restrict wider adoption. Strengthening connectivity, training, and institutional support is essential to maximize their impact.

Keywords: Bagalkot, livestock, AI&ML, veterinary, Disease surveillance

Animal Husbandry in Budget 2026–27: Big Plans or Big Hype?

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The Union Budget 2026–27 marks a strategic shift in India's approach to animal husbandry and fisheries, positioning these sectors as core drivers of rural income, food security, and public health. This article examines key budgetary provisions, including capital subsidies for veterinary infrastructure, expanded vaccination and disease control programs, breed improvement with emphasis on indigenous genetic diversity, support for Livestock Farmer Producer Organizations (LFPOs), and strengthened fisheries investment. It highlights the integration of the One Health framework and the introduction of Bharat Vistar AI for region-specific advisories, signalling a move toward preventive, data-driven livestock management. Beyond financial allocations, the budget reflects structural reforms aimed at workforce expansion, collective farmer empowerment, export facilitation, and women's participation in fisheries. While implementation remains critical, the policy direction suggests a long-term commitment to sustainable livestock development and the evolving role of veterinary science in India's rural and economic landscape.

Effect of lemon extract supplementation in drinking water on growth performance and stress response in broiler chickens

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A study was conducted to evaluate the effect of graded levels of lemon extract supplementation in drinking water on the growth performance and stress response of broiler chickens. A total of 240-day-old commercial broiler chicks were reared under an open-sided deep litter system and randomly allocated into four treatment groups, each consisting of 60 birds with six replicates of 10 birds each. The control group (T_0) received commercial broiler feed with ad libitum plain drinking water, while the treatment groups received the same feed with lemon extract supplementation at 5 mL/L (T_1), 10 mL/L (T_2), and 15 mL/L (T_3) in drinking water. Standard managemental and feeding practices were followed uniformly throughout the experimental period. The results revealed that lemon extract supplementation had a positive dose-dependent effect on broiler performance, with significant improvement in body weight gain, feed conversion efficiency, and livability in the treatment groups compared to control. Among the treatment groups, T_2 and T_3 showed superior performance, indicating better utilization of nutrients and improved physiological status. The heterophil: lymphocyte ratio was significantly lower in lemon-supplemented groups, demonstrating reduced stress and supporting the antioxidant role of lemon bioactive compounds such as vitamin C, citric acid, and flavonoids. It was concluded that lemon extract supplementation at 10 mL/L drinking water may be recommended as a natural phytogenic strategy to enhance growth performance and alleviate stress in broiler chickens.

Keywords: Broiler, lemon extract, antioxidant, H:L ratio, growth.

Involvement of potassium channels in leptin-induced uterine relaxation in late pregnant mice

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The present study aimed to investigate the role of potassium (K^+) channels in leptin-induced uterine relaxation during late pregnancy in mice. Leptin, an adipokine elevated in obesity, is known to modulate uterine contractility; however, the contribution of other K^+ channel subtypes remains unclear. Uterine strips from late pregnant Swiss albino mice (18.5 day) were subjected to cumulative concentration–response curves to leptin (10^{-10} to 10^{-6} M) in the presence of specific potassium channel blockers, including 4-aminopyridine (Kv), barium chloride (Kir2.1), and glibenclamide (K_{ATP}). Isometric contractions were recorded, and changes in maximal response (Emax) and potency (pD2) were analyzed. Blockade of Kv and Kir2.1 channels did not significantly alter basal uterine contractility or leptin-induced relaxation. In contrast, inhibition of KATP channels using glibenclamide significantly reduced leptin potency without affecting its maximal response, indicating a modulatory role of K_{ATP} channels in leptin responsiveness. These findings suggest that while Kv and Kir2.1 channels have minimal involvement, K_{ATP} channels play a role in regulating uterine sensitivity to leptin. This study provides insight into the ionic mechanisms underlying uterine quiescence and may help identify potential therapeutic targets for managing obesity-related pregnancy complications.

Keywords: Leptin; Potassium channels; Uterine relaxation; Late pregnancy; Myometrium

Development and Optimization of a Portable Semen Straw Thawing Device

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Artificial insemination (AI) is an essential tool for the genetic improvement of dairy animals, with the thawing of frozen semen straws being a crucial step that directly affects sperm motility, viability and fertility. The conventional method of water-bath thawing at 35-37°C has several limitations, including inconsistent temperature uniformity and dependence on electricity, which restrict its use under field conditions. To overcome these challenges, the present study aimed to design, develop and optimize a portable Peltier modulated dry-thawing device as a viable alternative to the conventional system. Various heating elements were evaluated and the Peltier module was found to be the most suitable for uniform thawing. Optimization was done based on various time temperature combination and found that 37°C for 60 seconds was best for post thaw motility rate of semen. Performance evaluation showed similar post-thaw sperm motility ($p > 0.05$) compared to conventional system, however, the experimental device reached operational temperatures more rapidly (Experimental: 5-6 min, Conventional: 10-15 min) with less energy consumption (Experimental: 0.3645 Wh, Conventional: 10 Wh). This was achieved because of the dry thawing capability of the device. The total cost of the experimental device was ₹12,700 whereas the conventional system was ₹17,000-₹20,000. Overall, the device demonstrated portability through a compact, battery-powered design with efficient, cost effective, reliable and easily adaptable for field application, highlighting its strong potential to enhance AI outcomes in remote and farm conditions.

Keywords: Artificial insemination, Motility, Optimization, Semen, Thawing

Rationale for using Infrared Thermal Imaging as a Non-invasive Tool for Core Body Temperature Assessment in Buffalo

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The present study was conducted to rationalise the use of infrared thermal imaging as a tool for determination of body temperature without restraining of animals. In this study the correlation between various core body surface temperature, rectal temperature and temperature-humidity index (THI) were determined in *Surti* Buffalo at the Network Project on Buffalo (*Surti*) Improvement, Livestock Research Station (LRS), CVAS, Navania, Vallabhnagar, Udaipur. All the experimental animals were reared under standard management practices. Infrared thermal imaging camera FLIR E53 was used during the experiment for core body surface temperature determination. As thermoregulation mechanism is one of the most important factors of homeostasis in living beings. The metabolism and biochemical reactions are influenced by various physiological stages viz. age, lactation and pregnancy. In this study the effect of these physiological stages on core body surface temperature were also studied in reference of THI and rectal temperature. It was observed that core body surface temperature of eyes showed highest significant ($p<0.01$) correlation with rectal temperature and THI.

Keywords: infrared thermography, buffalo, THI, rectal temperature

Digital Dairying: Revolutionizing Indian Dairy Sector and Rural Economy via Digital Genomics

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The dairy sector serves as a vital economic pillar for rural India, providing financial security to over 80 million households, the majority of whom are small-scale and marginal farmers. This extensive network of smallholders has propelled India to the forefront of global milk production, accounting for approximately 24% of the world's total output—reaching 239.30 million tonnes in the year 2023–24. This growth is further evidenced by the surge in per capita milk availability, which has climbed from 130 grams daily in 1950–51 to 471 grams per day in 2023–24, notably exceeding the international average of 394 grams.Despite this impressive scale, the average productivity per animal in India remains significantly lower than global benchmarks, hampering the farmer profitability. This paper explores the paradigm shift from conventional progeny testing to precision genomic selection facilitated by the use of Unified Genomics Chips developed by India for indigenous breeds. By mapping the genetic blueprints of indigenous breeds, this digital transformation allows for the early identification of high-quality livestock. Such interventions are essential for accelerating genetic improvement, bolstering climate resilience, and safeguarding the long-term socio-economic well-being of millions of rural families.

Evaluating Ashwagandha *(Withania somnifera)* Induced Antioxidant Modulation in Growing Black Bengal Bucks

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This study was intended to evaluate the effect of supplementation of Ashwagandha (*Withania somnifera*) on redox status in 18 growing male black Bengal bucks. The goats were allocated randomly into 3 groups (control, T1, and T2) having 6 animals in each group. The animals of control group were fed with basal diet as per buck farm, animals of T1 and T2 group were supplemented with Ashwagandha root powder @100mg/kg of body weight and @200mg/kg of body weight along with basal diet, respectively for 90 days. The blood samples were collected from treatment and control groups at 30, 60 and 90 days interval and evaluated for attributes of oxidative status. The supplementation of Ashwagandha in treatment group (T1 and T2) exhibited the significant enhancement in catalase activity on 90th day compared to 0 day. Although numerical changes were observed in the values of SOD and LPO, however the difference were statistically non-significant. The lack of statistical significance for SOD and LPO indicate that SOD activity and lipid peroxidation levels remained relatively stable across treatments and time points. It can be concluded from the study that supplementation of Ashwagandha root powder significantly affects the redox status in growing male Black Bengal bucks.

Partial replacement of soyabean meal (SM) with yellow meal worm (YMW) as a protein source in poultry diet

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Chicken meat and eggs are good sources of animal protein and are universally accepted without any taboos. Poultry feed industry needs an integrated nutrient supply system which can be achieved by effective use of non-conventional feed resources such as insect protein as a good source of animal protein in their feed. Therefore, there is need to find an alternative and sustainable protein sources which warrants research in the field of unconventional foodstuffs such as insects**.** Protein quality of mealworms is similar to soybean-extracted meal. The CP content is 46–60%. *T. molitor* larvae has high quality and quantity of protein and amino acid profile, so are considered a highly sustainable protein source alternative to SBM or fishmeal. Four treatments, T1- Corn soya based diet as control diet (100% SM + 0% YMW), T2- (95 % SM + 5% YMW), T3- (90% SM + 10% YMW) and T4- (85 % SM + 15% YMW). There were 24 birds in each treatment and feeding was done for 6 weeks duration to vanaraja birds of 14 weeks old. The result revealed that moisture content was 25.64% for the worm and 10% for the frass, Crude protein content of 56.81% for YMW and 39.75% for the worm casting/frass. The weekly body weight gain was found to be higher in YMW included diet as compared with control corn soya fed group. Significantly better mean weekly body weight gain of 292.8 g inT4, better mean weekly feed intake of 892.2 g in T3 group, and better FCR of 3.067 in T4 group receiving 10% of YMW.

Clinical Management of a Follicular With Concurrent Mucometra In A Crossbred Jersey Cow

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Follicular cysts are follicle-like ovarian structures measuring ≥1.7 cm in diameter that persist for more than 10 days, resulting in impaired reproductive function. One of the consequences of follicular cysts is the development of **mucometra**, characterized by thin-walled distension of the uterus with mucinous fluid accumulation. A pluriparous crossbred Jersey cow was presented for pregnancy diagnosis and last AI was done before 8 months and no estrous signs noticed for the past 8 months. Clinical examination revealed normal vital parameters. Per-rectal palpation of the genital tract indicated the cervix positioned within the pelvic cavity and a uniformly distended uterus extending over the pelvic brim with a fluctuating consistency. Further, examination of both ovaries revealed enlarged, thin-walled, fluctuant cystic structures suggestive of follicular cysts. Trans-rectal ultrasonography confirmed the accumulation of anechoic fluid within the uterine lumen, consistent with mucometra, along with multiple cysts of varying dimensions on both the right and left ovaries. The left ovarian follicle measured 26.35×26.69mm and right ovarian follicle measured around 31.6×23.5mm diameter. Based on these findings, the case was diagnosed as **follicular cysts concurrent with mucometra**. The case was approached for suction drainage of approximately 2.6–3 litres of mucinous fluid from the uterus, followed by trans-gluteal aspiration of the ovarian cysts under local lignocaine infiltration. To further evaluate uterine health, an endometrial biopsy was taken. Postoperatively, 5000 IU of human chorionic gonadotropin (hCG) was administered intramuscularly to induce luteinization, along with streptopenicillin (5 g) and chlorpheniramine maleate for three days. Supportive therapy with uterine ecbolics was also provided to assist uterine clearance. The cow was re-examined after two weeks, when a corpus luteum was identified; prostaglandin was then administered to ensure return to cyclicity. Subsequently, an Ovsynch protocol was started, and artificial insemination was performed on day 10. Pregnancy was successfully confirmed on day 40. The present case highlights the significance of early diagnosis and integrated therapeutic management of mucometra associated with follicular cysts in cows, which is essential for restoring normal reproductive function and improving fertility outcomes.

Keywords: Follicular cyst, Mucometra, Ultrasonography**,** crossbred Jersey cow

Diagnosis and Control of Diseases in Aquatic Animals

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Disease outbreaks remain a major constraint in aquaculture, leading to significant economic losses and threatening aquatic animal health. Effective diagnosis and control strategies are critical for sustainable aquaculture development. Traditional diagnostic methods, including clinical observation and histopathology, are increasingly complemented by advanced molecular techniques such as polymerase chain reaction (PCR), real-time PCR, and next-generation sequencing. These tools enable rapid, accurate, and early detection of pathogens in fish and shrimp. Integrated disease management strategies, including biosecurity measures, vaccination, probiotics, and immunostimulants, play a vital role in disease prevention and control.Additionally, the use of digital surveillance tools and mobile-based reporting systems enhances real-time monitoring and timely intervention. However, challenges such as emerging pathogens, antimicrobial resistance, and inadequate infrastructure in developing regions persist. Strengthening diagnostic capacity, promoting responsible use of therapeutics, and enhancing farmer awareness are essential to mitigate disease risks. This paper emphasizes a holistic approach combining advanced diagnostics, preventive health management, and policy support to ensure aquatic animal health and sustainable aquaculture production.

Keywords: Aquatic diseases, PCR, Biosecurity, Probiotics, Surveillance, Antimicrobial resistance, Fish health.

Advances in Feed Formulation and Processing Technologies

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Feed represents the largest operational cost in aquaculture, making efficient feed formulation and processing technologies critical for sustainable production. Recent advances focus on the development of nutritionally balanced, cost-effective, and environmentally sustainable feeds. The incorporation of alternative protein sources such as plant-based ingredients, insect meal, and single-cell proteins has gained attention as substitutes for traditional fishmeal and fish oil. Innovations in feed additives, including probiotics, prebiotics, enzymes, and phytogenics, enhance nutrient digestibility, growth performance, and disease resistance. Modern processing technologies such as extrusion, microencapsulation, and precision feed delivery systems improve feed stability, palatability, and nutrient availability. Additionally, the use of functional feeds tailored to specific life stages and environmental conditions is becoming increasingly important. Despite these advancements, challenges such as variability in ingredient quality and cost constraints remain. Future strategies should focus on integrating novel ingredients with advanced processing techniques to improve feed efficiency and reduce environmental impact. This paper highlights the role of innovative feed technologies in achieving sustainable and profitable aquaculture.

Keywords: Aquafeed, Feed formulation, Alternative proteins, Extrusion, Functional feeds, Sustainability, Nutrition

Prevalence of Infectious Bursal Disease Coinfection in Inclusion Body Hepatitis Cases in Poultry Flocks of Karauli region

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Inclusion Body Hepatitis (IBH), caused by fowl adenoviruses (FAdV), is an emerging disease of considerable economic importance in poultry. The occurrence and severity of IBH are often influenced by concurrent immunosuppressive conditions, particularly Infectious Bursal Disease (IBD). The present study was conducted to determine the percentage of coinfection of IBD with IBH in poultry flocks in and around the karauli region of Rajasthan. A total of 30 suspected flocks were investigated based on clinical history, postmortem findings, and laboratory confirmation using conventional polymerase chain reaction (PCR) techniques. PCR targeting the hexon gene was employed for the detection of FAdV, yielding a specific amplicon size of 897 bp. Special emphasis was placed on identifying the presence of IBD either as a concurrent infection or as a predisposing immunosuppressive factor. Detection of Infectious Bursal Disease Virus (IBDV) was carried out by PCR targeting the VP2 gene, producing an amplicon of 643 bp. Out of the examined samples, 15 cases were confirmed positive for IBH, of which 3 cases (20%) were also found positive for IBD. The findings indicate that a notable proportion of IBH cases are associated with IBD, suggesting that immunosuppression plays a significant role in the pathogenesis and progression of IBH. Although the prevalence of coinfection varied among flocks, the observed trend is consistent with reports from other regions of India. The study highlights the importance of effective control of IBD to reduce the incidence and severity of IBH. Strengthening biosecurity measures, implementing appropriate vaccination strategies, and adopting integrated disease management practices are essential to mitigate economic losses in poultry production.

Grooming Frequencies Based Evaluation Of Skin And Coat Health of Long - Haired Dog Breed

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The present research work entitled "Grooming Frequencies Based Evaluation of Skin and Coat Health of Long-Haired dog Breed" was conducted to evaluate the effect of grooming frequency on skin and coat health in long-haired shih tzu dog breed.Twenty shih tzu dogs aged 1–5 years, were selected based on existing coat and skin problems such as skin knotting, entaglement, rough coat texture, and associated dermatological conditions. The dogs were equally distrubuted into group T1 (groomed at 15 days interval) and T2 (groomed at 30 day interval). each comprising ten animals. The study was carried out over a period of 120 days. A standardized grooming protocol was followed, including physical examination, gradual acclimatization to minimize stress, visual inspection, bathing, blow-drying, brushing, and combing. Skin and coat health were assessed using a scoring system. Evaluations were performed at the 0th, 60th, and 120th days based on parameters such as alopecia, glossiness, greasiness, softness, scaliness, and overall coat quality. Mean scores were recorded and statistically compared between the groups and within the groups.The mean alopecia scores for T1 and T2 were 1.53 ± 0.1 and 1.73 ± 0.09, respectively, showing no significant difference, although improved skin coat were noted with more frequent grooming. Glossiness scores in T1 (2.83 ± 0.22) than T2 (2.90 ± 0.02) respectively non - significant differences in between the groups.the effect of grooming frequencies on glossiness were highly significant. Greasiness scores were T1 for 3.2± 0.29 and 1.97 ± 0.27 for T2, while scaliness scores T1 was 1.47± 0.13 and 1.57 ± 0.12, respectively, with non-significant differences. Softness scores of T1 was 2.9±0.23 and T2 for 3.0±0.20 did not differ significantly between the groups. Based on the results, it was concluded that grooming at 15 and 30 days of intervals had a significant effect on skin coat health within the group, but no significant difference was found between the two intervals. However, the 15 days grooming showed better skin coat health condition, including reduced alopecia, greasiness, scaliness score enhanced glossines.

Keywords: Grooming Frequencies, shih tzu dog , skin, coat health.

Grooming Frequency Based Evaluation of External Parasites in Long-Haired Dog Breed

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The study titled *"Grooming Frequency-Based Evaluation of External Parasites in Long-Haired Dog Breeds"* aimed to investigate the impact of grooming frequencies on external parasitic infestations in Shih Tzu dog breed. A total of 20 Shih Tzu dogs were included in the study, with grooming frequency in T1-15 days and T2-30days interval. The data collected on Day 0 (before grooming), Day 60, and Day 120 (after grooming), over a 120 day experimental period. The study focused on ectoparasitic infestations, particularly fleas, ticks, and mites, as well as fecal samples. The overall mean flea infestation in T1 & T2 were 1.1±0.48, 0.6±0.27,0.4±0.22 and 1±0.47, 0.7±0.37, 0.5±0.27 respectively on 0,60 and 120 day. The mean tick infestation was 0.8±0.25, 0.5±0.17, 0.4±0.16 and 0.7±0.21,0.5±0.17, 0.4±16 in T1 and T2 group respectively on 0, 60 and 120 day. Mite infestations were assessed using superglue slide impressions, and the mite index for groups T1 and T2 was calculated. The mite index was 0.83 and 0.75 before grooming, and 0.875 and 0.77 after grooming, indicating no significant change in mite infestation after grooming. Fecal egg counts were also recorded for both groups before and after grooming, with the average EPG for T1 being 160±60, 170±63.33 before and after grooming, and for T2, 150±61.91 and 180±67.99, respectively. In conclusion, the study found that regular grooming reduced flea and tick infestations, with no significant difference between the grooming frequencies in groups T1 and T2. However, mite infestations were largely unaffected by grooming, and fecal examination showed no significant differences between the groups.

Key words: Grooming frequency, Fleas, mites, ticks, Shih Tzu

Impact of Grooming Frequencies on Behavior and Stress in Long-Haired Dog Breed

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The present research work entitled "Impact of Grooming Frequencies on Behavior and Stress in Long-Haired Dog Breed" was conducted to evaluate the effect of grooming frequencies on behavioral responses and stress level in the long-haired Shih tzu dogs. The behavioral responses in long haired Shih tzu dogs were evaluated by compairing behavior categories before and after grooming in two groups T1(15 days grooming) and T2 (30 days grooming). Behavioral observations were classified into aggressiveness, anxiety, fear, and neutral behaviors. The grooming percentages of behavioral categories in experimental Shih Tzu dogs in the T1 group before grooming were 13.59%, 22%, 32.36%, and 32.03% for aggressiveness, anxiety, fear, and neutral behaviors, respectively, and after grooming were 6.78%, 19.66%, 16.94%, and 56.61%, respectively. Similarly, in the T2 group, the percentages before grooming were 16.91%, 22.79%, 30.88%, and 29.41%, and after grooming were 9.01%, 22.31%, 17.35%, and 51.20%, respectively. The stress scores in shih tzu declined significantly ($p<0.05$) in both groups. In T1, scores decreased from 2.01±0.09 (day 0) to 1.41±0.09 (day 60) and 0.66±0.08 (day 120), while in T2 they decreased from 1.92±0.11 to 1.68±0.05 and 0.72±0.03, respectively. The overall mean stress scores were 1.36±0.11 in T1 and 1.44±0.10 in T2, showing no significant difference between groups. Based on the results, it was concluded that behavioural observations indicated calming effect of grooming in Shih Tzu dogs. Before grooming, displayed a higher percentage of aggressiveness, anxiety and fear, which noticeably declined after grooming.Grooming effectively reduced stress in Shih Tzu dogs over time .Both 15-day and 30-day grooming intervals significantly reduced stress from day 0 to day 120, indicating that regular grooming at either interval effectively reduces stress.

Keywords: Grooming Frequencies, behaviour, stress, Shih tzu dog breed

Evaluation of Udder Condition in Dairy Cows Using Essential Oil-based Teat Spray

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The present study was conducted at Gorakshan Sabha, Dhantoli, Nagpur, for 90 days to study the "Evaluation of Udder Condition in Dairy Cows Using Essential Oil-based Teat Spray". 71 dairy cows were screened using the Modified California Mastitis Test (MCMT), of which 24 tested positive and were randomly allocated into three treatment groups (T1, T2, and T3) of eight cows each. T1 received 2% of essential oil-based teat dip (post-milking), T2 received 2% of essential oil-based teat spray (post-milking), and T3 received 1% of essential oil-based teat spray (post-milking). The essential oils used included eucalyptus, lavender, peppermint, and tea tree. The initial UCS values for groups T1, T2, and T3 were 7.75±0.25, 7.12±0.29, and 7.50±0.18, respectively, which improved to 8.62±0.18, 8.87±0.16, and 7.87±0.12 by day 90. While no significant differences ($p<0.05$) were observed at the beginning, a significant improvement ($p<0.05$) in UCS was noted between T1 and T3 and between T2 and T3 on day 90, with T1 and T2 performing better than T3. Results showed that an improvement in udder condition may be attributed to the antibacterial, anti-inflammatory, and skin-conditioning properties of essential oils, as well as improved hygiene management during the trial. These findings highlight the potential of essential oil-based teat sprays as an effective, natural alternative for managing subclinical mastitis, thereby supporting better udder health.

Keywords: udder condition, dairy cows, Essential oils, teat spray, subclinical mastitis

Integrated Haplotype Scores and Selection Signatures for Trypanotolerant and Milk Production Traits in N'dama African Cattle

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N'Dama, West African taurine cattle exemplify African breeds that evolved under distinct ecological and management regimes exhibit a unique trypanotolerant and milk production capacity. The underlying genetic mechanisms behind these potentials are still not well defined. Understanding the genetic basis of milk and adaptive mechanism can guide in developing the effective breeding goals that both conserve the local breeds and improve the commercial cattle. In this study, we evaluated the genome-wide scans with integrated haplotype scores (iHS) in N'Dama cattle using publicly available high density SNP chips for 25 N'Dama cattle. Manhattan plots were used to identify genomic regions under positive selection, while gene interaction networks were analyzed using Cytoscape, and gene annotation alongside QTL analysis was employed to identify candidate genes associated with both adaptation and milk yield traits. iHS hotspots overlapped with milk and adaptation-related genes consistent with trypanotolerance in N'Dama. Manhattan plot and functional enrichment of these regions implicated milk production quantitative trait loci (QTLs) and disease resistance (trypanotolerance) in N'Dama. Notably, iHS hotpot revealed *CDH2, TCN2, ITGA11, ITGA6* for milk production and *SMURF2, TNXB, CD47, THBS1* for adaptation as candidate genes associated with milk production and adaptive (trypanolerant) traits respectively. In conclusion, the contrasting iHS landscapes of N'Dama reflected demographic history in selection and highlighted candidate loci for breeding milk productive and adaptive (trypanotolerant) N'Dama cattle.

Keywords: N'Dama; Selection Signature; iHS; QTLs; Candidate genes; Milk; Trypanotolerant

Pathogenic *Leptospira* contamination in Environmental Water Sources

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Animals and humans are maintenance host for certain serovars of pathogenic Leptospira in renal tubes particularly rodents and domestic animals and acting as source for environmental contaminations through their urine. This contamination can lead to the spread of the bacteria in soil and water. Detecting pathogenic *Leptospira* in environmental samples is essential for assessing the risk of transmission. Understanding the survival of these organisms in various environmental conditions, such as water and soil, can offer valuable insight into their transmission pathways and potential exposure risks to humans. The objective of the study was to detect the presence of pathogenic *Leptospira* in different water sources in and around Orathanadu, Thanjavur district, Tamil Nadu. A total of 30 water samples from different sources (pond water, farm water and paddy field water) were collected and examined for *Leptospira* under Dark Field Microscopy. Additionally, DNA was extracted and subjected to PCR analysis targeting *Lip*l32 gene. Dark field microscopic examination of water samples could not detect live *Leptospira*. However, PCR analysis revealed the presence of *Lip*l32 gene in 2 water samples (6.7%) collected around paddy field. Hence, the farming community has to be continuously informed and create awareness about the transmission of *Leptospira* and its prevention strategies.

Keywords: *Leptospira*, environment, water, Dark Field Microscopy.

In silico ADMET profiling, drug-likeness, molecular docking-guided discovery of natural antivenom leads

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Snakebite envenoming is a neglected public health concern confronting hundreds of thousands of rural populations in both tropical and subtropical countries. The current treatment to counteract envenoming is the intravenous administration of antivenom. However, due to its high cost and insufficient health care centers in remote communities, the snakebite victims are primarily dependent on herbal concoctions and traditionally followed medications. The most dominant protein families that have been identified from the proteomic studies of snake venoms are phospholipase A2s (PLA2s), metalloproteases (SVMP), serine proteases (SVSP), and three-finger toxins (3FTx). Computer-aided drug discovery (CADD) is a valuable tool for searching new molecular entities with reduced time and cost. In this study, reported bioactive molecules from medicinal plants were used to determine their suitability as antidotes against snakebite. Based on the literature reports, 34 compounds were tested for in silico ADMET (absorption, distribution, metabolism, excretion, and toxicity) profiling and drug-likeness properties using the ADMET Lab 2.0 online web server. Molecular docking was performed using Autodock tool to identify the binding affinities of the phytochemicals against four snake venom proteins. The results identified that bromelain, glycyrrhizin, linearol and stigmasterol had lowest binding affinities against snake venom proteins. Among the four compounds, linearol passed four filters for drug-likeness. Based on the protein-ligand interaction analysis, linearol could be a potential compound against phospholipase A2s, metalloproteases, serine proteases and three-finger toxins that can mitigate the effects of viper and elapid venoms. This study highlights the effectiveness of *in silico* approaches as a critical component in the lead optimization, hit-to-lead generation, paving way for further exploration of promising compounds.

Keywords: Antivenom, ADMET, phytochemicals, molecular docking, snake venom.

Therapeutic management of lactic acidosis in dairy cattle

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During the clinical examination, rectal temperature, ruminal motility, respiration rate, and heart rate were recorded. Ruminal fluid was taken for macroscopic, microscopic, and biochemical testing to help diagnose illness. The mean pH of rumen fluid decreased significantly in all cattle, reaching 4.7±0.29 in severe acidosis. The ruminal fluid smelled sour due to the increased concentration of lactic acid. The color of rumen fluid in the study ranged from light grey to grayish. The consistency of rumen fluid was slightly thick. Rumen protozoa exhibited sluggish motility. It could be attributed to low intracellular and ambient pH and significant rumen toxicity in lactic acidic animals. All cattle were administered Magnesium hydroxide, with 400g dissolved in 10 liters of water, which was delivered into the rumen using a stomach tube to counteract acidity. Magnesium hydroxide serves as an effective alkalizing agent for use in ruminants as an antacid. This was followed by fluid therapy, consisting of 1000ml NaCl solution given as an intravenous drip to address dehydration and imbalances in electrolytes. An injection of thiamin was also administered. Sodium bicarbonate, 400g, was prescribed to be given orally twice daily for two days. Other alkalizing medications, including calcium carbonate, magnesium carbonate, and sodium bicarbonate, were provided for oral administration. In addition to antibiotics, benzyl penicillin and oxytetracyclin were employed to eradicate gram-positive germs. B-complex with anti-histaminic preparation and liver extract cud transplantations, diets, and supportive care were utilized to restore the ruminal microflora. After two days of treatment, the cow began to normal feed intake and was clinically sound.

Keywords: Acidosis, bicarbonate, lactic acid, Ph, rumen.

Therapeutic management of ketosis in dairy cattle

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Ketosis affects lactating dairy cattle of all ages, with incidence rising during peak production periods. It can happen two to three weeks before giving birth or up to four months after. Typical signs include reduced appetite, less milk production, anxiety, excessive drooling, abnormal walking, self-licking, biting hard items and injuring the mouth, and becoming wildly overexcited and uncontrollable. Clinically, animals show diminished alertness, dull eyes, a firm and partially empty rumen that is noisy, feces that are unusually hard, and clear urine, exhibiting typical color reactions to the Ross modification of the Rothera test. Factors contributing to stress can induce ketosis, including high production, digestive issues, milk fever, intermittent starvation, metritis, mastitis, and ovarian cysts. Treatment for ketotic animals varies depending on conditions. Intravenous injection of dextrose is the standard treatment. Orally administered propylene glycol after initial use of dextrose or glucocorticoids has given excellent results. Intravenous or intramuscular cortisone has given extremely variable results. Intravenous or intramuscular adrenocorticotropin has given excellent results in prolonged ketosis, preceded by glucocorticoids. Dramatic recoveries have resulted from chloral hydrate for animals suffering from primary ketosis.

Keywords: Ketosis, cattle, management, dextrose, glucocorticoids.

Clinical management of milk fever and its economic impact in dairy cattle production

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Milk fever (parturient paresis) is a metabolic disorder or production illness in dairy cows that occurs shortly before or right after calving as a result of low calcium (Ca^{+2}) levels (hypocalcaemia) in the bloodstream. It is linked to the loss of calcium in the fetus and in milk during gestation and calving, respectively. It can be either clinical or sub-clinical according to the clinical signs present. High-yielding dairy cows are the most vulnerable to milk fever in the peri-parturient phase. The most common factors influencing the occurrence, incidence, and severity of milk fever include milk yield, parity, age, breed, Body Condition Score (BCS), and the composition of the cows' diet. Diagnosis of milk fever is based on history taking, clinical examination and laboratory diagnosis. It is commonly treated with oral calcium solutions and intravenous (IV) calcium borogluconate. Prevention of milk fever is economically important to the dairy producers to minimize production losses, death losses and veterinary costs associated with the disease. Multiple strategies have been utilized to prevent hypocalcaemia including feeding anionic salts, low calcium ion diets, vitamin D supplementation, dietary magnesium supplementation, and managing the body condition score of cows during the peri-partum period. Hence, prevention of milk fever is the key to reduce the economic impacts of the diseases in dairy industry.

Keywords: Milk, fever, calcium, borogluconate, vitamin D

Clinical management of retention of fetal membranes in dairy cows

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The expulsion of fetal membranes after giving birth is a natural process that includes the separation of fetomaternal attachment, along with the contraction of uterine muscles, and typically occurs within 6 hours following calving. Retained placenta occurs when the placenta is not expelled within 6 to 24 hours after calving. This retention leads to several issues by permitting microorganisms to develop within the uterus, resulting in inflammation, fever, reduced milk production, and extended calving periods. The incidence of retained fetal membranes (RFM) seems to fluctuate from region to region, year to year, and breed to breed. Possible risk factors for retained placenta encompass management practices, nutritional deficiencies (such as vitamin E, selenium and carotene), genetics, hormonal influences, maternal immunity, twinning, cow's weight, shortened gestation, abortion, twinning, dystocia, fetotomy, cesarean section, infectious agents such as bovine viral diarrhea virus and immunosuppression. birth weight of calves, age, and parity. Cows that retain their placenta are said to experience a greater frequency of metritis and decreased conception rates. Economic losses from retained placenta in dairy cattle result from extended calving intervals, postponed post-delivery service intervals, lower conception rates, infertility, decreased milk production, and expenses for veterinary services and medications. Prostaglandins and oxytocin are hormones frequently used for treating RFM. The systemic administration of antibiotics is thought to be advantageous in RFM instances when fever occurs. Methods to avert RFM in cattle involve ensuring cow comfort, administering appropriate managing nutrition carefully (including mineral supplementation), especially during the transition phase.

Keywords: Retention, fetal, membranes, placenta, hormones

Heat stress management in dairy bovines

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The steady rise in milk consumption nationwide, it is crucial to create innovative technologies for enhanced milk production. Nonetheless, heat stress negatively impacts the performance of dairy cows, including their milk yield and composition. Heat stress results from a mix of elevated temperatures, humidity, and solar radiation with minimal wind, leading to temperatures exceeding the animal's comfort range. High temperatures influence the performance of dairy cattle in both direct and indirect ways. To maximize genetic potential, it is necessary to adjust environmental conditions and dietary practices. Milk production is directly connected to the amount of feed intake. During hot weather, cattle typically decrease their food consumption. At 40^0C, it is estimated that the feed intake (based on dry matter) is roughly half of what is consumed by cows in their ideal temperature range. Consequently, milk output decreases. A reduction in milk production, reproductive success, and growth rate in high-temperature conditions is directly linked to a rise in body temperature, caused by the equilibrium between heat generation and heat dissipation. Heat stress leads to a reduction in dry matter intake, while simultaneously increasing the energy and protein needs of the cow for maintenance and production. To sustain their performance in hot conditions, it's crucial to boost the energy and protein levels in the diets of dairy cows. Diligent management that can reduce heat stress is the most effective method to sustain high production levels in lactating cows in a warm climate. However, the effective temperature is a simple and useful indicator for estimating the performance of lactating cows. Shade, fans, mist and fan systems, and night grazing and their effects, are presented as methods of modifying the environments of dairy cattle. Therefore, it is important to increase the energy and by-pass protein contents of diets in order to maintain the performance of dairy cows in a hot environment.

Keywords: Heat, stress, management, milk, environments.

Impact of climate change on Livestock Production

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Climate change and severe weather conditions impact flora and fauna either directly or indirectly. The direct effects of human-induced climate change have been thoroughly recorded globally in recent years. The average national temperature has risen by 1 °C since the 1960s. The majority of livestock owners in the nation believe that climate change is impacting animal production and health. The primary effects of climate change on livestock production encompass feed scarcity, water shortages, losses of genetic resources in livestock, lower productivity, and reduced mature weight or extended time to achieve mature weight. Once more, this could lead to decreased body condition, lower milk yield, and inadequate reproductive performance in adult animals. Additionally, the geographic distribution and access to pasture and water greatly rely on the pattern and occurrence of rainfall. Consequently, lack of feed and water leads to decreased productivity and reproductive capabilities in livestock. Elevated temperatures caused by climate change could accelerate the developmental rates of specific pathogens or parasites that possess one or more life cycle stages outside their animal hosts. In general, climate change will impact livestock health through multiple channels, including effects on pathogens, effects on hosts, and effects on vectors; for instance, variations in rainfall and temperature can influence both the distribution and quantity of disease vectors, as well as effects on epidemiology, such as modified transmission rates among hosts. Climate change will significantly impact the production and well-being of animals, particularly in sensitive regions of the globe where it is crucial for both nutrition and the livelihoods of populations.

Keywords: Climate, livestock, production, nutrition, temperature.

Precision poultry farming

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The worldwide poultry sector faces ongoing demands to increase productivity, improve efficiency, and ensure animal welfare while reducing environmental effects and the use of antibiotics. Precision Poultry Farming stands out as a crucial approach to tackle these complex issues by utilizing cutting-edge sensor technologies and data analysis to oversee, manage, and enhance production processes in real-time. The sensor technologies used in commercial flocks consist of environmental sensors (to measure temperature, humidity, and air quality), acoustic sensors for observing vocalizations that indicate health and stress, video and imaging systems for monitoring behavior and growth, and wearable sensors for tracking individual birds. This study examines the combination of sophisticated data analytics with this continuous, high-volume data stream frequently referred to as "Big Data." Methods like machine learning algorithms are being utilized more frequently to convert raw data into practical insights, facilitating early disease identification, forecasting performance results, optimizing feed and water usage, and automatically evaluating welfare indicators such as lameness or plumage injuries. Although Precision Poultry Farming has great potential to transform poultry production, considerable obstacles persist, such as the substantial initial costs, the necessity for sturdy and reliable sensors in tough farm conditions, data compatibility challenges, and the demand for intuitive decision support systems. Nonetheless, the swift progress of sensor technology and computing capabilities establishes Precision Poultry Farming as an essential resource for the sustainable and welfare-aware enhancement of the worldwide poultry sector.

Keywords: Poultry, precision, farming, sensor technologies, data analytics

Smart Monitoring Systems for Animal Health Using Artificial Intelligence

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Artificial Intelligence (AI) is revolutionizing numerous industries, with animal health management being one of them. AI-driven smart monitoring systems are assisting farmers and veterinarians in more effectively tracking the health and behavior of animals than ever. These systems employ cutting-edge technologies like sensors, cameras, and data analysis to constantly oversee livestock and identify early symptoms of illness or distress. A significant aspect of AI-driven monitoring systems is the implementation of wearable gadgets and sensors on animals. These devices can assess critical metrics including body temperature, heart rate, activity levels, feeding habits, and movement patterns. AI algorithms are employed to analyze the gathered data, enabling the detection of unusual patterns that could signify illness or discomfort. This enables farmers to respond promptly before a health problem escalates. In dairy farming, intelligent monitoring systems can identify early indicators of lameness, mastitis, or reproductive issues in cows. Cameras along with AI-driven image analysis can monitor animal posture and behavior to assess if an animal is healthy or experiencing stress. These systems allow farmers to react quickly and enhance animal welfare by delivering immediate alerts. Systems that monitor using AI also enhance productivity and management in farming. Healthy animals develop more effectively, yield greater quantities of milk or meat, and need fewer medical interventions. By decreasing disease occurrences and enhancing early detection, farmers can cut down on veterinary expenses and boost overall farm productivity.

Keywords: Artificial intelligence, *monitoring systems,* wearable gadgets, health, production.

Meat Preservation by the Use of Cold Plasma Technology

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Cold plasma technology has emerged as a non-thermal preservation technique in the meat industry, offering effective microbial decontamination while maintaining the nutritional and sensory quality of products. Unlike conventional thermal treatments, cold plasma utilizes ionized gases containing reactive oxygen and nitrogen species (RONS) that inactivate microorganisms on meat surfaces without significant temperature rise. This technology effectively reduces pathogenic bacteria such as *Listeria monocytogenes*, *Salmonella spp.*, and *Escherichia coli*, thereby enhancing food safety and extending shelf life. Additionally, it minimizes lipid oxidation and color deterioration when optimized for exposure time and gas composition. Cold plasma can be applied in both direct and indirect modes, including dielectric barrier discharge (DBD) and atmospheric pressure plasma jets (APPJ), making it adaptable to various processing lines. Integration of cold plasma with modified atmosphere packaging (MAP) and vacuum systems further improves product stability and consumer appeal. However, challenges remain regarding process standardization, potential effects on protein structure, and scalability for industrial applications. Ongoing research focuses on plasma chemistry, treatment uniformity, and regulatory acceptance to ensure commercial feasibility. Overall, cold plasma technology represents a sustainable, chemical-free, and energy-efficient innovation for meat preservation, aligning with consumer demand for minimally processed and safe animal products.

Keywords: Cold plasma, non-thermal processing, meat preservation, microbial inactivation, shelf life, food safety.

Effect of Different Led Light Colors on Egg Quality, Fertility and Hatchability of Japanese Quail (Coturnix Coturnix Japonica) Reared Under Semi-Arid Region of Rajasthan

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Light color plays a crucial role in regulating avian reproductive physiology through neuroendocrine mechanisms. The present study evaluated the comparative effects of white, red, blue and green color LED light on egg production, egg quality traits, fertility and hatchability of Japanese quail (Coturnix coturnix japonica) reared under semi-arid climatic conditions. A total of 144 day-old quail chicks were randomly allocated to four treatment groups with three replicates of 12 birds each. Birds were exposed to white (control), red, blue and green LED light at a constant intensity of 20 lux for 15 weeks. Egg production and egg quality parameters were recorded from 7 to 15 weeks of age. Fertility and hatchability were calculated using standard formulas. Data were analyzed using one-way ANOVA followed by Duncan's multiple range test. The Result revealed that the Red LED light significantly enhanced egg production, fertility and hatchability ($P < 0.01$), while green LED light significantly improved egg weight, shell weight and shell thickness. Blue light resulted in comparatively lower reproductive performance across most parameters. These findings demonstrate that spectral manipulation using LED systems can be effectively utilized to optimize reproductive efficiency in Japanese quail under semi-arid production conditions.

Keywords: Japanese quail, LED light color, egg quality, fertility, hatchability, semi-arid condition.

Study of Knowledge Level about Improved Animal Husbandry Practices among Livestock Farmers of Ladpura Tehsil in Kota District of Rajasthan

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The study was conducted to assess the level of knowledge about improved animal husbandry practices among livestock farmers of Kota district of Rajasthan. The study was carried out in 6 selected villages of tehsil Ladpura of Kota district by interviewing 180 livestock owners, 30 from each village. The information regarding knowledge level was collected on pretested schedule and assessment of knowledge level was measured on four point scale i.e. No Knowledge, Awareness Knowledge, Principal Knowledge and Technical Knowledge. Finding regarding awareness knowledge revealed that maximum knowledge among livestock farmers was found regarding artificial insemination (94.44%), deworming (91.11%) vaccination (86.66%), concentrate feeding (72.22%), and as compared to mineral mixture feeding (63.88) to their animals. Study further revealed that mnimum level of knowledge was found regarding urea treatment of roughage (19.44%), azola cultivation (17.77%) and silage making from green fodder (14.44%), urea molasses mineral block (8.33%), and hydroponics fodder (4.44%).

Keywords*:* livestock farmers, knowledge level, improved animal husbandry practices.

Influence of Multistrain Probiotics on Gut Health and Performance of Broilers and Layers

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In order to improve productivity, health, and product quality while lowering dependency on antibiotic growth promoters, the poultry industry is constantly looking for sustainable solutions. Because of their synergistic benefits on gut health and nutrient utilisation, multistrain probiotics have become a promising alternative. This study assesses how multistrain probiotic supplementation affects grill and layer performance under typical management circumstances. A specified multistrain probiotic containing species of Lactobacillus, Bifidobacterium, Enterococcus, and Saccharomyces was added to the diets of a total of broiler chicks and layer birds that were split into control and treatment groups. While egg production, egg weight, shell quality, and feed efficiency were evaluated in layers, broiler performance metrics included body weight growth, feed intake, feed conversion ratio (FCR), and mortality. Indicators of gut health were also assessed, such as intestinal shape and microbial load. The results showed that probiotic administration greatly enhanced broiler growth performance, as seen by increased body weight gain and better FCR in comparison to the control group. Additionally, mortality rates decreased, indicating improved disease resistance. Probiotic treated birds in layers produced more eggs, had heavier eggs, and had thicker shells, all of which are signs of improved mineral and nutrient utilisation. Additionally, a positive change in the gut microbiota was noted, with a decrease in the pathogenic load and an increase in beneficial bacteria. The study comes to the conclusion that Multistrain probiotics are essential for enhancing gut health, productivity, and general performance in both layers and broilers. Their application can support sustainable chicken production by acting as an efficient, environmentally beneficial substitute for antibiotics. These results encourage the use of Multistrain probiotics in chicken feeding regimens to maximise profits and guarantee food safety.

Marek's Disease in Broiler Chickens: A Case Report Based on Gross, Cytological, Histopathological and Molecular Diagnosis

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Marek's disease (MD) is an oncogenic viral disease of poultry characterized by lymphoid neoplasia and substantial economic losses. The present case report describes MD in broiler chickens presented for necropsy from Assam based on gross, cytological, histopathological and molecular findings. Clinically, affected birds were markedly emaciated with a prominent keel bone, imparting a characteristic "knife-edge" appearance. On postmortem examination, the liver was enlarged with multifocal greyish-white nodules, while the spleen was markedly enlarged, occupying a considerable portion of the abdominal cavity and exhibiting diffuse nodular infiltration with soft consistency on sectioning. Kidneys were enlarged with nodular and necrotic changes and the sciatic nerve was distinctly thickened. Additional lesions included nodular involvement of lungs, haemorrhages in the gizzard and a haemorrhagic bursa, whereas the proventriculus showed both haemorrhagic and ulcerative lesions. The thymus exhibited nodular changes in some birds and atrophy in others. Cytological evaluation of impression smears from liver and spleen revealed increased cellularity with pleomorphic lymphoid cells showing marked anisocytosis and anisokaryosis, suggestive of a neoplastic lymphoproliferative condition. Histopathological examination confirmed these findings by demonstrating diffuse infiltration of pleomorphic lymphoreticular cells in liver, spleen and kidney, resulting in disruption of normal architecture. Molecular confirmation was achieved by PCR targeting the *Meq* gene of Marek's disease virus, yielding the expected amplicon of 897 bp. Based on the integration of gross, cytological, histopathological and molecular findings, the condition was diagnosed as Marek's disease.

Keywords: Marek's disease, Broiler chickens, Lymphoid neoplasia, Cytology, Meq gene

Visceral Gout in Chickens Associated with Nephropathogenic Infectious Bronchitis Virus: A Case Study

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Visceral gout (visceral uricosis) is a frequent metabolic disorder in poultry associated with renal dysfunction and increased mortality. The present case study describes the occurrence of visceral gout in chickens from Assam, with concurrent detection of nephropathogenic Infectious Bronchitis virus (IBV) in a subset of cases. A total of 12 birds presented for necropsy exhibited clinical signs of lethargy, poor growth and dehydration. Gross examination revealed extensive chalky white urate deposits on serosal surfaces of major organs, including the heart, liver, lungs, air sacs, intestines, kidneys and ureters. The kidneys exhibited lobar atrophy with compensatory hypertrophy of the remaining renal parenchyma, while the ureters were markedly distended and obstructed by semi-solid chalky white urates. Histopathological examination revealed tubular degeneration and interstitial nephritis in the kidneys, while De Galantha staining demonstrated needle-shaped urate crystals as black deposits in affected tissues. Molecular analysis using RT-PCR targeting the S1 gene of IBV yielded an amplicon of 656 bp in selected samples, indicating the involvement of nephropathogenic IBV in renal pathology. Based on the combined findings, the condition was diagnosed as visceral gout, with IBV-associated nephropathy contributing to its occurrence.

Keywords: Visceral gout, Uricosis, Nephropathogenic infectious bronchitis virus, Kidney lesions, Urate crystals.

Computer-assisted sperm kinematic characteristics of excellent, good and poor Malpura ram (*Ovis aries*) semen

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The present study was conducted to evaluate fresh semen characteristics, motion attributes, and computer-assisted sperm analysis (CASA) kinematic parameters of Malpura ram semen categorized into different quality groups. A total of 45 ejaculates were evaluated and classified based on initial progressive motility (IPM) assessed subjectively at 40× magnification. Group I comprised excellent ejaculates (≥80% IPM, n=9), Group II included good ejaculates (60–79% IPM, n=26), and Group III consisted of poor ejaculates (<50% IPM, n=10). Fresh semen characteristics differed significantly ($p<0.05$) among groups. Semen volume, mass motility, sperm concentration, viability, HOST response, and acrosome integrity were significantly higher in Group I and Group II compared to Group III, whereas sperm abnormalities were significantly higher in poor quality ejaculates. The excellent group exhibited superior progressive motility along with improved membrane and acrosomal integrity, indicating better functional competence of spermatozoa. Motion characteristics revealed significant variation among groups. Total motile and progressive motile sperm percentages were significantly higher ($p<0.05$) in Group I and Group II compared to Group III, with Group I showing the highest progressive motility. In contrast, static sperm percentage was markedly elevated in Group III, while slow motile sperm did not differ significantly among groups. These results indicate reduced sperm motility efficiency in poor quality ejaculates. CASA-derived kinematic parameters also demonstrated clear differences in sperm movement patterns. Linearity, straightness, elongation, average path velocity (VAP), and straight-line velocity (VSL) were significantly higher ($p<0.05$) in Group I, indicating more directional forward progression of spermatozoa. Conversely, beat cross frequency, average path distance, and curvilinear distance were comparatively higher in lower quality ejaculates, reflecting increased non-linear movement. Parameters such as amplitude of lateral head displacement, head area, straight-line distance, curvilinear velocity, and wobble did not differ significantly among groups. Excellent quality Malpura ram ejaculates were characterized by superior directional sperm movement, reflected by significantly higher straight-line velocity (VSL), average path velocity (VAP), linearity, and straightness. These parameters indicate improved forward progressive motility and enhanced functional competence of spermatozoa. Thus, VSL, VAP, linearity, and straightness emerge as key CASA-derived indicators that reliably distinguish excellent and good quality ejaculates from poor quality semen in Malpura rams.

Unveiling Cholesterol Binding Landscapes in P2RX7 Receptors through Molecular Docking and MD Simulations

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The P2RX7 receptor is an ATP-activated trimeric ionotropic receptor characterized by a double membrane-spanning architecture and an extensive C-terminal tail. Despite its physiological importance, the specific structural basis for its modulation by cholesterol remains poorly understood. In this study, we employed an integrated computational framework to map the cholesterol binding pockets (CBPs) within the P2RX7 transmembrane domain (TMD).Using Conan GMX mindist analysis across 12 distinct P2RX7-cholesterol models with varying lipid concentrations, we identified a conserved set of interacting residues. This data was further refined through Solvent Accessible Surface Area (SASA), physicochemical, and topographical analyses to delineate high-affinity binding sites. Our results reveal that cholesterol binding sites are primarily organized as cavity-like structures nestled between the □1 and □6 of adjacent TMD subunits. The key findings of this study delineate the structural and biochemical basis for cholesterol interaction within the P2RX7 receptor. The predicted binding pockets are defined by a specific cluster of residues—including I36, F33, L346, S39, C42, Y40, I337, S339, L341, Y343, Y336, I37, F344, A347, K30, F353, D9, K387, K17, T19, Y384, W31, H34, S342, V349, and F350—which form a sophisticated structural topology. These cholesterol binding pockets (CBPs) are characterized by a core of buried hydrophobic patches, primarily composed of F, C, I, Y, L, V, S, and K residues, which are strategically surrounded by solvent-exposed residues. This arrangement suggests a specialized recruitment mechanism that facilitates the movement of cholesterol from the lipid membrane bilayer into the receptor interface.To validate these findings, molecular docking was executed using cholesterol structures sourced from the PubChem and ZINC databases. The resulting P2RX7-ligand complexes were subjected to Molecular Dynamics (MD) simulations, where trajectory analyses confirmed their structural stability over time. Ultimately, this research provides a comprehensive topographical map of cholesterol-P2RX7 interactions, offering essential insights into the mechanisms by which the lipid environment modulates receptor stability and downstream signaling pathways.

Serial CT documentation of thoracolumbar Hansen Type I intervertebral disc extrusion with concurrent frontal bone calcified lesion and its therapeutic response to progesterone therapy with adjunct transcutaneous electrical nerve stimulation in a Shih Tzu dog

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Computed Tomography (CT) serves as a valuable triage and diagnostic tool in canine neurological emergencies by rapidly localizing spinal cord compression, differentiating surgical from non-surgical conditions and guiding timely therapeutic decisions. A three year-old male Shih Tzu dog was presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with a history of abdominal pain and progressive dragging of both hindlimbs. Neurological exam shows paraplegia with loss of conscious proprioception in the hindlimbs but nornmal in the forelimbs. Deep pain is intact in the forelimbs and reduced in the hindlimbs. The cutaneous trunci reflex is absent and no apparent cranial nerves deficit detected. Radiography showed no osseous involvement. Ultrasonography revealed a distended urinary bladder, splenomegaly with loss of corticomedullary differentiation. Haematobiochemical analysis showed elevated blood urea nitrogen, mild anaemia, hypocalcaemia and hypophosphatemia. Serial helical CT evaluation of head revealed normal brain parenchyma with a calcified lesion beneath the frontal bone. Three-dimensional CT thoracic spine reconstruction showed vertebral canal narrowing at the level of the T10 due to a space-occupying extradural lesion. Novel therapeutic approach consisting of hydroxyprogesterone, neurotrophic supplements and Transcutaneous Electrical Nerve Stimulation (TENS) therapy followed for 15 days. Progressive neurological recovery was achieved within six weeks. Follow-up CT showed resolution of the T10 extradural lesion and gradual reduction of the frontal calcified lesion, with continued regression at nine months. This case highlights the importance of advanced imaging and serial CT follow-up in diagnosis, monitoring and successful non-surgical management of spinal cord compression using hydroxyprogesterone with TENS therapy.

Keywords: Computed Tomography, Spinal Cord Compression, Thoracic Vertebrae, Progesterone, TENS.

CRISPR-based Editing of *TYRP1*: A Path toward Climate-Resilient Buffalo

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Phenotypic traits, particularly coat characteristics, play a vital role in the thermoregulation and productivity of dairy animals in heat-stressed environments. Animals with lighter, thinner coats demonstrate superior heat tolerance, which correlates with sustained milk production. This study aimed to knock out the Tyrosinase Related Protein 1 (*TYRP1*) gene - a key regulator of coat pigmentation using CRISPR-Cas9 technology to develop a cellular foundation for heat-resistant water buffalo. Guide RNAs (gRNAs) were designed via CHOPCHOP and transfected into buffalo fibroblast cells. Following the establishment of single-cell colonies, the target genomic regions were PCR-amplified and validated through Sanger sequencing. Editing efficiency for both mixed and single-cell populations was assessed using TIDE and ICE analysis. Furthermore, AlphaFold Colab was utilized to predict the structural impact of the edits on the resulting protein. Screening of 28 single-cell colonies identified one bi-allelic and three mono-allelic *TYRP1* knockouts. Protein prediction using AlphaFold colab, for the bi-allelic colony confirmed a significant truncation of the TYRP1 protein, indicating a successful loss of function. The successful knockout of the *TYRP1* gene in buffalo fibroblasts provides a viable biomaterial for somatic cell nuclear transfer. Further studies are warranted to produce cloned embryos from *TYRP1* gene edited cells, and determine their in-vivo developmental competence.

Keywords: *Buffalo, Heat stress, CRISPR Cas9, TYRP1, Fibroblast*

Network Pharmacology and Molecular Docking Based Investigation of *Syzygium Cumini* Phytochemicals Targeting Pi3kγ/Akt Signalling In Chronic Kidney Disease

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Chronic kidney disease (CKD) is a progressive and multifactorial disorder that poses a significant global health burden due to its high morbidity and mortality. Medicinal plants have long been explored for their therapeutic potential, and *Syzygium cumini* is recognized for its beneficial effects in managing various diseases, including CKD. In the present study, an *in-silico* approach was employed to investigate the therapeutic potential of phytochemicals derived from the leaves of *Syzygium cumini* against CKD. Phytochemical data were retrieved from the IMPPAT database, and their potential protein targets were predicted using Swiss Target Prediction. Concurrently, CKD-associated targets were collected from the Open Targets Platform and Therapeutic Target Database. Intersection analysis using the Venny tool identified 47 common protein targets, suggesting their potential involvement in the therapeutic action. These shared targets were further analysed using Cytoscape to construct a protein–protein interaction network. Topological analysis, along with MCODE clustering and STRING enrichment, highlighted key proteins and pathways implicated in CKD progression. Among these, proteins such as PIK3CG and GLI1 emerged as critical regulators. Pathway enrichment analysis indicated that modulation of the PI3Kγ/AKT signalling pathway may contribute to the alleviation of CKD. To validate ligand–target interactions, molecular docking studies were performed using AutoDock Vina and PrankWeb, utilizing selected PDB structures of key targets, including PIK3CG (PDB IDs: 6AUD and 4ANV) and GLI1 (PDB IDs: 4KMD and 7T91). Notably, docking analysis revealed strong binding affinities of selected phytochemicals with PIK3CG. For the mutated structure (PDB ID: 6AUD), quercetin and myricetin exhibited binding energies of −8.653 kcal/mol and −8.689 kcal/mol, respectively. For GLI1 (PDB ID: 4KMD), Piperitone and Citral exhibited binding energies of −3.105 kcal/mol and −2.662 kcal/mol, respectively. Interaction profiling using PLIP further confirmed stable ligand–protein interactions. Overall, this study provides a systematic computational insight into the multi-target therapeutic potential of *Syzygium cumini* phytochemicals, suggesting their role in modulating key proteins involved in CKD and supporting their potential as candidates for further experimental validation .

Assessment of Awareness and Adoption of Vaccination Practices among Goat Farmers and Its Impact on the Occurrence of Peste des Petits Ruminants (PPR) foot hill region of Jammu

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Peste des Petits Ruminants (PPR) is a highly contagious viral disease causing significant economic losses in small ruminant production systems. Despite the availability of effective vaccines, the disease persists in many regions, primarily due to gaps in farmer awareness and adoption of preventive practices. The present study aimed to evaluate the level of awareness and adoption of vaccination practices among goat farmers and to determine their impact on the occurrence of PPR in the Jammu region. A cross-sectional survey was conducted among 250 goat farmers from Jammu, Kathua and Samba districts. Data were collected through a pre-structured questionnaire covering management practices, farmer awareness and animal health interventions. Descriptive statistics were computed using MS Excel and SPSS software and univariate analysis of variance was applied to assess the association between management practices and animal health outcomes. The study revealed that semi-intensive farming was the dominant production system with Beetal as the major breed. Most farmers maintained small herd sizes. Awareness regarding PPR, including its transmission and preventive measures, was found to be low. Adoption of vaccination, deworming, quarantine and sanitation practices was inadequate. Limited veterinary access, insufficient extension services and socio-economic constraints were major factors influencing poor adoption. These gaps contributed to the continued occurrence and spread of PPR in the study area. The findings highlight that improving farmer awareness, strengthening veterinary extension services and ensuring better access to vaccination programs are critical for effective control and eradication of PPR. Integrated herd health management strategies are essential to reduce disease burden and enhance small ruminant productivity.

Keywords: Peste des Petits Ruminants (PPR), goat farmers, vaccination adoption, disease awareness, health management.

Analysis of managemental caveats for prevalence and resurgence of Pestes-des petits ruminants (PPR) in goat breeds of foothill region of Jammu

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The present study was undertaken to investigate management-related factors contributing to the occurrence of peste des petits ruminants (PPR) among goat-rearing households. A cross-sectional survey was conducted involving 250 goat-farming households using a predesigned and structured questionnaire to collect information on husbandry practices, animal health management, vaccination status and farmers' knowledge and awareness regarding PPR. Data were collected through direct personal interviews, with questions explained in the local language to ensure accurate responses. Nasal swab samples were collected from clinically suspected PPR cases and preserved in TRIzol reagent for molecular analysis. Laboratory confirmation of PPR was performed through partial amplification of the nucleocapsid (N) gene of PPR virus using end-point polymerase chain reaction (PCR) and real-time PCR assays. The major managemental caveats identified included inadequate awareness and adoption of deworming schedules, vaccination programs, disinfection practices and quarantine measures. Molecular analysis revealed a low incidence rate of PPR (3.33%) among the tested samples. The disease occurrence was sporadic in nature, with no evidence of resurgence observed in the surveyed districts. The findings highlight the need for targeted extension and awareness programs to improve management practices and strengthen PPR control strategies at the farmer level.

Keywords: Peste-des-petits ruminants (PPR), goats, incidence, resurgence, nucleocapsid sporadic

Early Prediction of First Lactation Milk Yield in Murrah Buffaloes Using Machine Learning

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The presented study aimed to evaluate the performance of various machine learning algorithms for predicting first lactation 305-day milk yield (FL305MY) in Murrah buffalo using five test day milk yield (TDMY) records. The dataset comprised 3,166 daughters sired by 117 bulls, recorded under field conditions from 2006 to 2023. Five machine learning algorithms were used-Artificial Neural Networks (ANN), Bayesian Regression (BR), Gradient Boosting Machines (GBM), Multiple Linear Regression (MLR), and Random Forest (RF). Model performance was assessed by using coefficient of determination (R^2), root mean square error (RMSE), mean absolute error (MAE), mean absolute percentage error (MAPE), and bias. Among all models, the Random Forest (RF) algorithm demonstrated superior predictive performance, with R^2 of 82.2%, RMSE of 108.05, MAPE of 3.45%, and bias of 0.2. In contrast, MLR, ANN, and BR showed comparatively lower accuracy, while GBM showed good performance but remained inferior to RF. The results suggested that the RF model might be a suitable approach for predicting production performance under field conditions. Its application enables early and reliable selection decisions, thereby enhancing the efficiency of genetic evaluation by reducing generation interval and associated costs. In the long run, this strategy can support higher productivity and greater economic returns for farmers.

Keywords: Machine learning, Milk yield, Murrah, Field study.

Single-Step Genome Wide Association Studies for 305 days milk yield in Sahiwal using Whole Genome Sequencing data

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Sahiwal is one of the most important indigenous dairy breeds, contributing significantly to milk production and adaptation to tropical climate. However, genetic improvement programmes for indigenous cattle have relied heavily on SNP chip data, which only captures pre-identified variations and may induce ascertainment bias. Whole genome sequencing (WGS), on the other hand, gives a more complete picture of the genome by detecting both common and rare variants, increasing the strength and precision of association studies. Conventional GWAS is often limited in Indian conditions due to small genotyped populations, population stratification, and the polygenic nature of variables, resulting in reduced statistical power and increased false positives. Single-step GWAS (ssGWAS) overcomes these limitations by integrating pedigree, phenotypic, and genomic information through the H matrix, increasing the effective sample size without additional genotyping costs. The present study aimed to identify significant SNPs associated with 305-day milk yield (305DMY) in Sahiwal cattle using ssGWAS based on WGS data. To evaluate and stabilise the model for a limited genotypic dataset, ssGBLUP was first compared with pBLUP using the Legarra–Reverter forward-prediction approach (partial data up to 2014; complete data from 1955–2025). With tuned parameters which is essential for effective blending of G and A matrix (Tuned G = 2; $\alpha = 0.7$, $\beta = 0.3$), ssGBLUP showed lower bias (0.59) than pBLUP (1.41), slightly better dispersion (0.82 vs. 0.81), and a 0.049% increase in predictive accuracy. Heritability estimates were identical for both models ($h^2 = 0.31 \pm 0.07$). ssGWAS, performed using postGSF90 on ~15 million SNPs, identified the top 1% significant SNPs based on SNP effect and variance explained at both genome and chromosome levels. These SNPs revealed key candidate genes associated with 305DMY, including GHR (BTA20), CSN2 (BTA6), ACSL1 (BTA27), ME1 (BTA9), FGF2 (BTA17), and SLC36A2 (BTA7), highlighting their role in milk yield and composition in Sahiwal cattle. This study lays the foundation for developing a breed-specific SNP panel based on the identified significant variants, which can be utilized to enhance genetic improvement programs in indigenous breeds.

Bilateral Entropion in a Scottish Fold Cat: Surgical Correction and Outcome

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A two-year-old male Scottish Fold cat was referred for evaluation of chronic bilateral epiphora, mucopurulent ocular discharge, and pronounced blepharospasm. Previous treatment with topical tobramycin–dexamethasone ophthalmic drops had failed to produce clinical improvement. Comprehensive ophthalmic examination confirmed bilateral entropion, with more severe inward rolling of the eyelid margin affecting the right eye. Adnexal assessment ruled out trichiasis and ectopic cilia. Schirmer Tear Test values were within normal limits (16.8 mm/min), and fluorescein staining revealed no corneal ulceration. The Jones test yielded negative results, indicating patent nasolacrimal ducts. Based on these findings, primary bilateral entropion was diagnosed as the sole cause of the clinical signs. Surgical correction was performed under general sedation induced with medetomidine (2 µg/kg IM) and ketamine (11 mg/kg IM). A standard Hotz–Celsus blepharoplasty technique was employed bilaterally: elliptical skin incisions were created approximately 2 mm from the lower eyelid margin, with a parallel second incision 3 mm distant, excising a crescent-shaped skin segment. Lateral upper eyelid involvement was included where necessary. The surgical margins were apposed using 5-0 polyglycolic acid absorbable sutures in a simple interrupted pattern. Postoperative medical therapy included oral amoxicillin–clavulanate (50 mg q12h for 10 days), oral meloxicam (0.3 mg/kg once daily for 3 days), and topical chloramphenicol ophthalmic ointment for 10 days . An Elizabethan collar was maintained continuously until suture removal. At suture removal on postoperative day 12, the cat exhibited markedly reduced epiphora, resolution of blepharospasm, and anatomically normal eyelid conformation bilaterally. No surgical complications or recurrences were observed. This case highlights that primary bilateral entropion, though uncommon in Scottish Fold cats, should be considered in the differential diagnosis of chronic ocular irritation, and that early surgical intervention with a modified Hotz–Celsus technique provides excellent functional and cosmetic outcomes.

Relaxation Effect of Biochanin- A on Different Vasoconstrictor-Induced Responses in Goat Coronary Artery

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This experiment is designed to compare the relaxant effects of Biochanin-A on contractions induced by 5-hydroxytryptamine, phenylephrine, and KCl, both in the absence and presence of preincubation with the nitric oxide synthase inhibitor (NOS), N(omega)-nitro-L-arginine methyl ester (L-NAME). Goat coronary artery contraction responses to vasoconstrictors were observed in the absence or presence of L-NAME. Biochanin-A was added in increasing cumulative concentrations, in the absence or presence of L-NAME, once the contractile response had reached a stable plateau. In the presence of L NAME, 10^{-2} M biochanin- A on precontracted 5-hydroxytryptamine rings caused significant relaxation in comparison with precontracted phenylephrine, KCl rings. In the presence of L-NAME, 10^{-5} M and 10^{-6} M doses of Biochanin-A showed no significant difference in relaxation in 5-hydroxytryptamine-precontracted rings. Biochanin-A doses of 10^{-4} M, 10^{-3} M, and 10^{-2} M on phenylephrine-precontracted rings caused concentration-dependent relaxations. The results of this study indicate that acute vasorelaxation induced by Biochanin-A is largely mediated through NO-independent pathways, primarily by inhibiting Ca^{2+} influx from the extracellular space and Ca^{2+} release from intracellular stores.

Reliability and Accuracy of Genomic evaluation based on first lactation milk yield and age at first calving in Sahiwal cattle

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The dairy cattle in India were selected solely on milk yield and continued selection since past has although resulted in genetic improvement in milk yield but simultaneously reduced the reproductive efficiency of higher yielder. Thus, it is important to assess various genetic model for improvement in both traits by combining all sources of information i.e. pedigree, phenotype, and genomic information on sparsely genotyped dairy populations (only193 animals). Keeping this in view, present study was planned to estimate the breeding value for first lactation milk yield (FLMY) and age at first calving (AFC) by various approaches in Sahiwal herd at ICAR-NDRI, Karnal. Model performance was assessed using the Legarra–Reverter forward-prediction validation method with partial dataset containing records up to 2014 and the whole dataset spanning 1955 to 2025. In the univariate analyses, ssGBLUP heritability estimates (h2) were 0.32 ± 0.07 for FLMY and 0.36 ± 0.05 for AFC, while the corresponding PBLUP estimates were 0.31 ± 0.07 and 0.37±0.05, respectively. In the present study for FLMY, ssGBLUP improved univariate predictive accuracy over PBLUP by 2.95% in all animals and 3.27% in non-genotyped animals, while for AFC the main gain was observed in genotyped animals (+2.13%). Results showed that pure GBLUP was frequently over-dispersed and unstable, particularly for FLMY, whereas ssGBLUP provided more balanced predictions across genotyped and non-genotyped animals. In the bivariate analysis for FLMY–AFC trait, PBLUP yielded h2 of 0.30 for FLMY and 0.35 for AFC, with a genetic correlation of 0.13 among them with corresponding estimate with ssGBLUP as 0.31 and 0.35 respectively and genetic correlation of 0.13 indicating a small positive association between two traits and close agreement with pedigree-based estimates. In contrast, GBLUP produced h2 of 0.19 for FLMY and 0.98 for AFC, with a genetic correlation of −0.41, suggesting inflated and biologically unstable parameter estimates under the genomic-only model. From the study it can be concluded that the overall, ssGBLUP emerged as the most robust and practically useful approach for genetic evaluation for getting improvement in both the traits in this population.

A Clinico-Haematological Study on Theileriosis in a Calf with Special Reference to Laboratory Diagnosis

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This case report presents the clinical, parasitological, and haematological findings of bovine theileriosis in a 4-month-old crossbred calf. The calf was presented to the Veterinary Clinical Complex, College of Veterinary and Animal Science, Bikaner, with a history of high fever, anorexia, marked weakness, recumbency, and heavy tick infestation. Clinical examination revealed hyperthermia (41°C), tachycardia, increased respiratory rate, enlargement of the prescapular and pre-femoral lymph nodes, and pale to icteric mucous membranes. Laboratory diagnosis was carried out using Giemsa-stained thin blood smear examination, which revealed intraerythrocytic piroplasms of *Theileria annulata*. Additionally, Koch's blue bodies (schizont stage) were observed in lymphocytes, confirming the diagnosis. Haematological analysis showed marked alterations, including decreased haemoglobin (5.8 g/dL), packed cell volume (20%), total erythrocyte count (3.32 × 10^6/µL), and total leukocyte count (3,500/µL). Differential leukocyte counts revealed neutropenia along with thrombocytopenia. The calf was treated with Buparvaquone (2.5 mg/kg, intramuscular), along with supportive therapy including oxytetracycline, antipyretics, haematinics, and fluid therapy. Tick control measures were also implemented. The animal showed gradual clinical improvement and recovered. In conclusion, bovine theileriosis results in significant clinico-haematological alterations, particularly anaemia and leukopenia. Early diagnosis through blood smear examination and timely therapeutic intervention with buparvaquone can markedly improve prognosis. Effective tick control strategies are essential for prevention and control of the disease.

Keywords: Calf, Theileriosis, Tick-borne disease, Anaemia, Pyrexia

A Case Report on Cystic Endometrial Hyperplasia-Pyometra Complex in Labrador Bitch

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Pyometra, a life-threatening diestral syndrome characterized by the cystic endometrial hyperplasia (CEH)-pyometra complex, commonly affects older intact bitches due to progesterone-induced immunosuppression and bacterial ascension from the vagina, particularly *E.coli* and streptococci during oestrus. This case report details the successful clinical management of a 5-year-old Labrador bitch presented with brownish vaginal discharge, anorexia, polydipsia, and polyuria one month post-proestrual bleeding. Clinical findings included mild hyperthermia (103.0°C), pale mucous membranes, leukocytosis (21.4 × 10^3/µL) with neutrophilia (83%), and ultrasonographic evidence of cystic uterine horns (~5.6 mm endometrium) with anechoic fluid pockets (~24.2 mm). On the basis of Clinical signs and symptoms as well as diagnostic tests, the bitch was diagnosed with Cystic endometrial Hyperplasia Pyometra Complex. Following 5 days of stabilization with ceftriaxone-tazobactum (20 mg/kg), aseptic ovariohysterectomy (OHE) was performed under diazepam-ketamine anesthesia, revealing purulent uterine contents confirmed histopathologically as cystic glandular dilatation with inflammatory infiltrates. Postoperative care with 7-day antibiotics and 3-day analgesics ensured uneventful recovery and suture removal at day 14. This case underscores OHE as the gold standard for pyometra despite surgical risks, emphasizing preoperative stabilization, ultrasonographic diagnosis, and histopathological validation to optimize outcomes.

Keywords: Pyometra, CEH complex, ovariohysterectomy, canine, histopathology, ultrasonography

A Comparative Study of Different Treatments in Canine Transmissible Venereal Tumour

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Canine Transmissible Venereal Tumour (TVT) is a malignant, transplantable tumour spread by living cancer cells, mainly via sexual contact. It affects dogs' external genitalia, appearing as irregular, soft, friable, ulcerated, cauliflower-like masses that bleed easily. In the present study, two groups of dogs each contain 6 females, aged 4-6 years of age irrespective of breed were presented at Veterinary Clinical Complex, Shourabh College of Veterinary Science, RAJUVAS, Kheda and diagnosed with CTVT based on gross lesions, haematology and cytology. The haematology showed leucocytosis with neutrophilia. The cytology revealed cytoplasm of the cells was blue in colour with many clear distinct cytoplasmic vacuoles and the nucleus was round to oval in shape. They were given Vincristine sulphate @ 0.025 mg/kg b.w. administered I/V once in a week for 4 weeks and combined Vincristine sulphate @ 0.025 mg/kg b.w. administered I/V once in a week + Ivermectin @ 200 mcg/kg b.w. administered S/C at 2 weeks interval in Group I and Group II, respectively. In Group I, 66.66% dogs showed regression of tumour mass in response to the treatment and completely cured however 33.33% dogs were not completely cured though they showed regression in tumour mass with side effects of vomiting and anaemia in 83.33% animals. In Group II, 83.33% dogs showed clinical improvement after 3rd week of treatment with side effects of vomiting and diarrhoea in 33.33% animals after 2nd dose of treatment. Based on the results of the study, it has been concluded that combining vincristine injections with ivermectin yields quicker responses in dogs with TVT and milder chemotherapy side effects. Vincristine alone effectively eliminates tumours but acts more slowly and causes stronger adverse effects

Keywords: Canine Transmissible Venereal Tumor (CTVT), Vincristine, Ivermectin, Chemotherapy, Tumor regression, Cytology.

Effect of Inclusion of Subabul Pod on Goat Growth Performance

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Rising concentrate costs and feed shortages in India's small ruminant sector necessitate economical alternatives like *Leucaena leucocephala* (subabul) pods, valued for their protein content and availability. This study examined the impact of minimal subabul pod inclusion on growth efficiency in growing goats reared in Livestock Farm Complex, Shourabh College of Veterinary Science, Kheda. Twelve non-descript goats (initial body weight 13.5 ± 1.0 kg; 3-6 months old) were randomly assigned to two groups (n=6/group) in a 90-day trial: control (T0: ad libitum dry roughages, green fodder, 100% concentrate) and treatment (T1: basal diet with 5% concentrate replaced by ground subabul pods). Fortnightly body weights, daily dry matter intake (DMI), and feed conversion ratio (FCR) were assessed using standard protocols. Treatment goats displayed modest but significant improvements, achieving average daily gain (ADG) of 0.078 ± 0.005 kg versus 0.074 ± 0.006 kg in controls, slightly higher DMI (0.89 ± 0.06 vs. 0.87 ± 0.05 kg/d), and marginally better FCR (0.088 vs. 0.085 kg gain/kg DMI). Total weight gain was 7.02 kg in T1 compared to 6.66 kg in T0. Even at 5% inclusion, subabul pods enhanced nutrient utilization and growth parameters without toxicity risk, confirming its viability as a safe, low-cost supplement for sustainable goat production in tropical farming systems.

Keywords: Subabul pods, Growth performance, Growing goats, Feed efficiency, Dry matter intake, Non-conventional feed.

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Impact of Crushed Tamarind Seed Supplementation on Growth Efficiency in Growing Calves

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The dairy sector has a significant economic significance in India. One of the main things preventing efficient animal production is the lack of both quantity and quality in conventional feed supplies. The growing expense of traditional feed ingredients and their limited supply necessitate the formulation of compound animal feed and their usage by non-conventional feed resources. Base on that, this investigation assessed the potential of crushed tamarind (*Tamarindus indica)* seed as an economical protein-energy source to optimize growth in growing calves amid escalating conventional feed prices in Livestock Farm Complex, Shourabh College of Veterinary Science, Kheda. In a randomized 90-day feeding trial, 12 crossbred calves (initial weight 105.2 ± 2.8 kg; aged 6-8 months) were divided into two groups (n=6/group): control (T0: ad libitum dry roughages, green fodder, 100% concentrate) and treatment (T1: basal diet with 10% concentrate replaced by crushed tamarind seed). Fortnightly body weights, daily dry matter intake (DMI), and feed conversion ratio (FCR) were measured using standard protocols. Treatment calves showed enhanced performance, achieving average daily gain (ADG) of 0.233 ± 0.018 kg versus 0.207 ± 0.022 kg in controls, with elevated DMI (1.93 ± 0.12 vs. 1.79 ± 0.10 kg/d) and superior FCR (0.120 vs. 0.115 kg gain/kg DMI). Over the trial, total body weight gain reached 26.4 kg in T1 compared to 22.5 kg in T0. These findings demonstrate that 10% crushed tamarind seed supplementation improves nutrient efficiency and growth metrics, advocating its adoption as a viable, low-cost strategy for calf production in developing regions.

Keywords: Tamarind seed, Growth performance, Crossbred calves, Feed efficiency, Dry matter intake, Non-conventional feed.

Parasitic gastrointestinal nematodiasis in a Beetal Buckling: A Clinical, Hematological, and Parasitological Investigation

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An eight-month-old beetal buckling was presented to the Large Animal Outpatient Department, College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, with a history of weakness, emaciation, pale mucous membranes, loose faeces and inability to bear weight on the hind limbs. Blood and faecal samples were submitted to the Animal Disease Research Centre for diagnostic evaluation. Hematological analysis revealed severe hypochromic anemia (hemoglobin: 1.8 g/dL; packed cell volume: 9.8%) and leukocytosis (total leukocyte count: 12,800 cells/mm³) with absolute neutrophilia, moderate left shift, and activated platelets. Microscopic fecal examination demonstrated the presence of Strongyle eggs(heavy infection). Further, fecal culture was done for confirmatory diagnosis that revealed a mixed gastrointestinal nematode infection. The cultured larvae were morphologically identified as Haemonchus spp., Trichostrongylus spp., and Strongyloides papillosus with predominance of Haemonchus spp..Affected animal was treated with oral Ivermectin and other supportive therapy. Therefore, based on clinical, hematological and parasitological examination, it was concluded that the animal was suffering from heavy parasitic gastrointestinal nematodiasis (especially Haemochus contortus) which likely contributes to the observed anaemia and clinical ability. To avoid production losses and guarantee animal health, early diagnosis by faecal examination, followed by targeted anthelmintic medication and improved management techniques, are crucial.

Pathomorphological investigation of an advanced case of mixed *Eimeria* infection in a broiler bird

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Avian coccidiosis is one of the predominant pathogenic disease responsible for estimated global losses of approximately £10.4 billion cost annually including India (Blake et al. 2020). Coccidiosis is caused by several species of *Eimeria* belonging to phylum Apicomplexa. In the present case, based on the history of emaciation and bloody droppings a 5–6-week-old broiler was submitted to the post-mortem annex of the Department of Veterinary Pathology at Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana. On gross examination, the carcass appeared dehydrated and pale. The liver was enlarged (hepatomegaly) with rounded edges. The middle portion of the intestine and caeca were distended with blood clots and necrotic debris, forming characteristic caecal cores. The serosal surface showed hemorrhages. The lungs exhibited mild congestion, and the kidneys were pale and swollen numerous pin- point to ecchymotic hemorrhages. Microscopic examination of direct wet smears from the caecal contents and intestinal material revealed a massive number of oocysts of variable size and shape. Histopathological findings of the liver showed widened sinusoidal spaces with inflammatory cell infiltration in the centrilobular and periportal regions. The lungs showed emphysematous changes and vascular congestion in the parabronchial region. The kidneys exhibited tubular degeneration and areas of coagulative necrosis. The intestines showed severe hemorrhages, vascular congestion, and infiltration of mononuclear cells, along with various developmental stages of the parasite, including macrogamonts, microgamonts, schizonts containing numerous banana-shaped merozoites, and other sexual stages. For species identification, faecal content and intestinal scrappings were subjected to sporulation in 2.5% potassium dichromate for 5-7 days. Fully sporulated oocyst of *Eimeria* was measured using MagVision image analysis software. Based on morphometric analysis, the infection was identified as mixed coccidiosis caused by *Eimeria tenella, Eimeria necatrix, and Eimeria maxima*. Therefore, it was concluded that the bird died due to severe mixed coccidial infection involving multiple *Eimeria* species, leading to extensive intestinal damage and systemic pathological changes.

Keyword: Coccidia; Eimeria; Faecal; Oocyst; Intestine.

Effect of Dietary Incorporation of *Moringa oleifera* Leaf Meal on Biochemical Parameters of broiler Japanese Quail

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A feeding trial was conducted to discern the influence of dietary incorporation of *Moringa oleifera* leaf meal on biochemical parameters of Japanese quail during broiler phase. A total 288 day-old Japanese quail chicks were randomly distributed into eight treatments of 36 Japanese quail chicks per treatment with three replicates of 12 quail in each. Japanese quail of treatment T_1 (control group) were fed a basal diet (starter and finisher), whereas in treatment group T_2 basal diet was incorporated with Vitamin C @200 mg/kg, T_3 basal diet was incorporated with Vitamin E @10 IU/kg, and in diets T_4, T_5, T_6, T_7, and T_8, the basal diet was incorporated with 1.0%, 3.0%, 5.0%, 7.0% and 9.0% *Moringa oleifera* leaf meal, respectively. Results showed that significantly ($P \leq 0.05$) reduced the serum glucose level, serum cholesterol, serum triglycerides, serum LDL, serum VLDL cholesterol, alkaline phosphatase and serum creatinine concentration of Japanese quail fed diet with 3.0% *Moringa oleifera* leaf meal. Significantly ($P \leq 0.05$) improved in the serum HDL, serum calcium, serum phosphorus level of Japanese quail fed diet with 3.0% *Moringa oleifera* leaf meal as compared to control. Non-significant ($P \geq 0.05$) effects on serum uric acid (mg/dl) and serum total protein concentration were observed when Japanese quail was fed diet with different levels of *Moringa oleifera* leaf meal. It can be concluded that 3.0 % *Moringa oleifera* leaf meal can be incorporated in feed for improvement in lipid profile, liver function enzyme of Japanese quail during broiler phase.

Keywords: Biochemical parameters, Japanese quail, *Moringa oleifera* leaf meal,

Gross Anatomical Comparative Studies of Pancreas in Ducks

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The aim of this research is to present a complete comparative anatomical description of the pancreas in healthy duck. The present study was conducted on the samples of pancreas of 40 ducks irrespective of sex which were obtained from a recognized duck farm in Muzaffarpur, Bihar. The whole experimental ducks were divided into four groups i.e. Group-I comprised of ten post hatched ducks, Group- II comprised of ten ducks of one month, Group- III comprised of ten ducks of three months and Group- IV comprised of ten ducks of six months. In all age group of duck, the pancreas was located on the right side of the median plane in the loop of duodenum. In group I the pancreas showed well separated ventral lobe, however, the dorsal and splenic lobe was not well differentiated at this age group. From group II onwards, all three lobes of the pancreas were well differentiated. The colour of the pancreas was light pink in group I, while it gradually changes from light pink to creamy white in all experimental ducks towards the group IV.

Scope and Importance of Abattoir By-Product Utilization

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The meat sector in India plays a vital role in supporting rural livelihoods and contributing significantly to the national economy. Animal slaughter not only yields meat but also generates a large proportion of by-products, accounting for nearly 50–60% of the live animal weight, while only about one-third is utilized as meat. With over 100 million livestock and more than 650 million poultry birds slaughtered annually, a substantial quantity of by-products and waste materials is produced, further augmented by fallen and dead animals. Traditionally, edible by-products such as liver, kidney, blood, and tripe were widely consumed; however, their demand has declined due to changing consumer preferences and health concerns. Consequently, increased emphasis has been placed on the utilization of inedible by-products for value addition. Efficient processing and utilization of these by-products offer immense potential for economic gain, environmental sustainability, and industrial development. Animal by-products can be converted into a wide range of products including livestock feed additives, fertilizers, biofuels, pharmaceuticals, cosmetics, and pet foods. Similarly, poultry and fish processing wastes can be utilized for the production of biogas, biodiesel, chitosan, collagen, and natural pigments. Such practices not only generate additional revenue for the meat industry but also significantly reduce waste disposal costs and environmental pollution. Proper utilization of by-products aligns with the principles of circular economy by promoting resource recovery and minimizing waste. It also contributes to organic farming through the use of by-product-based fertilizers, thereby reducing reliance on synthetic inputs. Moreover, effective waste management prevents public health hazards and enhances sustainability in meat production systems.In conclusion, the scientific and systematic utilization of abattoir by-products is essential for maximizing economic returns, ensuring environmental protection, and strengthening the sustainability of the meat, poultry, and fish processing industries in India.

Keywords: Abattoir, by-product utilization, meat industry, waste management, value addition, sustainable meat production.

Enhancing shelf life of meat product by incorporation of natural antioxidant

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The present study was conducted to develop functional chevon patties with improved shelf life through the incorporation of natural antioxidants derived from wheat grass powder (WGP) and barley grass powder (BGP). The investigation focused on evaluating physicochemical, microbiological, and sensory characteristics of the developed products under different storage conditions. Initially, fat standardization was carried out using varying ratios of animal fat and vegetable oil (7:3, 5:5, and 3:7). Among these, the 7:3 ratio was found most acceptable based on sensory attributes and was selected for further formulation.The antioxidant potential of WGP, BGP, and their 1:1 combination was assessed using in-vitro biochemical assays, which revealed that BGP exhibited the highest antioxidant activity, followed by WGP and their combination. To optimize incorporation levels, each grass powder was added at 0.1%, 0.2%, and 0.3% in chevon patties. Based on sensory evaluation, 0.2% inclusion level was found optimal for both WGP and BGP. Accordingly, three treatments were finalized: T1 (0.2% WGP), T2 (0.2% BGP), and T3 (combination of WGP and BGP in 1:1 ratio), along with a control. The incorporation of grass powders had no significant effect on cooking yield, emulsion stability, or pH of the patties. However, a significant reduction ($p<0.05$) in lipid oxidation (TBA values), protein degradation (tyrosine values), and free fatty acid content was observed in treated samples compared to control, indicating enhanced oxidative stability. Microbiological analysis showed lower total plate count, psychrophilic count, and yeast and mold counts in treated samples, particularly in T2, demonstrating the antimicrobial efficacy of barley grass powder.Storage studies conducted under refrigeration (4±1°C) in vacuum and aerobic packaging, and frozen conditions (-18±2°C), indicated that antioxidant-treated patties had improved shelf life and quality retention. Sensory evaluation revealed that T1 scored highest in flavor, texture, juiciness, and overall acceptability, followed by T2, T3, and control. Economically, the treatments were comparable in production cost.In conclusion, incorporation of natural antioxidants, especially barley and wheat grass powders, effectively enhanced the shelf life and quality of chevon patties, offering a promising strategy for developing healthier and more stable meat products without synthetic additives.

Keywords: Chevon patties; Natural antioxidants; Wheat grass powder; Barley grass powder.

Exotic Birds as Pets: Managing Infections, Health and Biosecurity Challenges

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The growing global interest in aviculture has significantly increased the popularity of exotic birds as companions, both as a recreational pursuit and a commercial enterprise. This trend has led to the rapid expansion of organized bird-breeding facilities, including aviaries, particularly in countries such as India. The shift toward structured and large-scale breeding systems aims to ensure genetic quality, species conservation, and a consistent supply of birds to meet market demand. However, this expansion has concurrently intensified concerns regarding disease transmission, animal welfare, and environmental sustainability. Exotic birds are susceptible to a wide range of infectious diseases of bacterial, viral, fungal, and parasitic origin, many of which have zoonotic potential. Inadequate management practices, high stocking densities, stress, and poor hygiene in captive environments further intensify disease outbreaks, leading to significant economic losses and public health risks. Effective disease management in aviculture requires early diagnosis, appropriate therapeutic interventions, and the implementation of robust preventive strategies. Biosecurity plays a significant role in mitigating these challenges by preventing the introduction and spread of pathogens within and between aviaries. Measures such as quarantine protocols, sanitation practices, vaccination and deworming where applicable, and routine health monitoring are essential components of a comprehensive biosecurity framework.Additionally, there is a critical need to address the ecological implications of exotic bird trade, including the risk of pathogen spillover into native wildlife populations. This paper provides an overview of the major infectious diseases affecting exotic pet birds, highlighting their etiology, clinical manifestations, diagnostic approaches, treatment options, and preventive strategies. It also emphasizes the importance of integrated biosecurity measures in ensuring the health of captive birds, safeguarding public health, and protecting biodiversity.

Keywords - Biosecurity; Aviculture; Exotic Birds; Infectious Diseases; Parasites; Zoonotic Infections

Smartphone-assisted comparative fundoscopic evaluation of retinal fundus in Camel and Sheep: Establishing species-specific diagnostic baselines for clinical ophthalmology

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The eye is a structurally and functionally complex organ that serves not only for vision but also reflects the status of the vascular and central nervous system. The retinal fundus exhibits species-specific characteristics, showing interspecies variation with minimal individual differences. The present study was undertaken to characterize and compare the normal retinal fundus in sheep and camel, while also exploring a cost-effective imaging approach applicable in field conditions. The study was conducted on six healthy adult sheep and camels presented to the Teaching Veterinary Clinical Complex, Orathanadu. Fundus examination was performed using a direct ophthalmoscope with a smartphone attachment following proper restraint of the animals, demonstrating an accessible technique for routine ophthalmic evaluation. Images obtained were analyzed for the morphology of the tapetum, non-tapetal areas, optic nerve head, Bergmeister's papilla, and retinal vascular pattern. In sheep, the tapetum appeared bluish-green in colour with the presence of Stars of Winslow as small, uniformly scattered red or dark pink dots or lines throughout the tapetal region. The non-tapetal area was homogeneous brown to black with prominently visible choroidal vasculature. The optic nerve head was kidney-shaped and the optic disc was located at the junction of tapetal and non-tapetal regions with colour varying from pale pink to pink. Bergmeister's papilla was present. In camel, the tapetum was absent. The optic nerve head appeared bean-shaped or elongated circular and the optic disc ranged from pink to red in colour. Bergmeister's papilla was comparatively larger than in sheep. The retinal vascular pattern was holangiotic in both species. These findings establish baseline reference data, highlight distinct interspecies variations, and emphasize the clinical utility of smartphone-assisted ophthalmoscopy as a cost-effective and practical tool for enhancing diagnostic accuracy in veterinary ophthalmology.

Keywords- Ophthalmoscopy, Retinal fundus, Retinal vascular pattern, Camel, Sheep

Surveillance of Antimicrobial Resistance in Wild Birds: A One Health Perspective

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Antimicrobial resistance (AMR) is an emerging global health concern with significant implications for human, animal, and environmental health under the One Health framework. Wild birds are increasingly recognized as potential reservoirs and disseminators of antimicrobial-resistant bacteria due to their mobility and interaction with diverse ecosystems. The present study aimed to evaluate the antibiotic susceptibility patterns of bacterial isolates recovered from wild birds. Samples were collected from wounded wild birds and subjected to bacteriological isolation and identification using standard microbiological techniques. Antibiotic susceptibility testing (ABST) was performed using the Kirby–Bauer disc diffusion method in accordance with Clinical and Laboratory Standards Institute (CLSI) guidelines. A panel of commonly used antibiotics representing different classes, including β-lactams, aminoglycosides, tetracyclines, macrolides, and fluoroquinolones, was tested. The results revealed varying degrees of resistance among isolates, with notable resistance observed against β-lactam antibiotics and tetracyclines. Multidrug resistance (MDR) patterns were identified in several isolates, indicating exposure to antimicrobial agents or resistant bacteria in the environment. Some isolates remained susceptible to aminoglycosides and fluoroquinolones, suggesting their continued efficacy. The findings highlight the role of wild birds as carriers of antimicrobial-resistant bacteria and underline their potential in the environmental dissemination of AMR. This study emphasizes the need for continuous surveillance and monitoring of antimicrobial resistance in wildlife populations to better understand its ecological spread and to inform strategies for mitigating AMR under the One Health approach.

Keywords: AMR, Wild Birds, Antibiotic.

Understanding Behavioral and Systemic Drivers of Antibiotic Misuse and AMR: A Multi-Sectoral Survey Approach

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Antimicrobial resistance (AMR) has emerged as a critical global public health challenge driven largely by the misuse and overuse of antibiotics across human, veterinary, and environmental sectors. The present study was designed to assess the awareness, attitudes, and practices related to antibiotic use and AMR among medical and veterinary professionals, students, and the general public using a structured questionnaire-based survey. The questionnaire was divided into three major respondent categories: professionals, students, and the general public. It covered key domains including awareness of AMR guidelines, access to microbiological diagnostic facilities, prescribing behavior, infection control practices, system-level gaps, One Health perspectives, and antibiotic usage patterns in humans and animals. Additionally, the survey explored factors influencing irrational antibiotic use such as patient pressure, lack of time, inadequate training, and over-the-counter availability of drugs.Among professionals, the study evaluated adherence to antibiogram-guided therapy, diagnostic testing prior to antibiotic prescription, and institutional support systems such as microbiology laboratories and AMR awareness programs. The questionnaire also assessed behavioral drivers like fear of complications, patient expectations, and perceived competition among practitioners. For students, emphasis was placed on curriculum adequacy, practical exposure to antimicrobial sensitivity testing, and understanding of One Health concepts. In the general public, the survey examined self-medication practices, knowledge of antibiotic indications, compliance with prescribed courses, and awareness regarding AMR and antibiotic residues in food. The findings highlighted significant gaps in awareness, diagnostic support, infection control practices, and responsible antibiotic use across all groups. The study underscores the urgent need for strengthening AMR education, promoting rational prescribing, enhancing intersectoral collaboration, and implementing effective policies aligned with the One Health approach. These insights can contribute to designing targeted interventions and awareness programs to combat the growing threat of antimicrobial resistance.

Keywords: AMR, Wild Birds, Behaviour drivers, One Health.

Clinical Evaluation of "Safty Milk Forte®" For Sub Clinical Mastitis (one of the major / hidden reason of loss in milk production)

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Subclinical mastitis is a hidden but serious problem in dairy animals, especially in Rajasthan, India. Unlike clinical mastitis, it shows no visible signs, yet it silently reduces milk yield and quality. This leads to significant economic losses for small and marginal farmers who depend on daily milk income. In Rajasthan, with its native breeds like Tharparkar and Rathi and unique husbandry practices, the prevalence of subclinical mastitis is notably high due to poor detection methods, limited veterinary support, and traditional milking hygiene. This paper highlights the urgent need for simple, affordable, and region-specific solutions to detect and manage subclinical mastitis, thereby protecting animal health and farmer livelihoods. The next step will present a practical approach tailored to Rajasthan's conditions. For detection we use CMT-type Safety Milk Mastitis Test Kit (Sodium alkyl benzene sulphonate) - by adding equal millilitres of milk and test kit solution a gel formulation indicates the degree of Mastitis (Thick Gelly- Very High Sometic cell - More Severe Mastitis , no gelly (watery) indicates low sometic cell count means health udders.There are **10 animals** representing **40 quarters** showed evidence of **subclinical mastitis**, where at least one quarter per animal did not produce a watery solution. This indicates the presence of infection without visible clinical signs. The higher proportion of animals with subclinical mastitis suggests that **hidden infections are prevalent** within the studied population**.** Controlled field trials were conducted to document **field-level innovations** and productivity metrics. As each pack of safety milk have 10 pouch in side so we use 1 sachet B.D. for 5 Days and evaluated the results. As Safety Milk Forte contains proteolytic enzymes, vitamins and minerals, it is expected to support udder health and metabolic recovery.The results demonstrated a **90% success rate** in preventing subclinical metabolic declines during peak lactation. Furthermore, the study recorded an average increase of **12-15% in milk fat content** and a significant improvement in Solids-Not-Fat (SNF) percentages. These findings indicate that the supplement enhances the **immune response** and metabolic efficiency of the animal.

Keywords: Animal Nutrition, Safety Milk Forte, Metabolic Disorders, Gut Health, Lactation Persistence.

Anti-Microbial Resistance – A One Health Approach

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Anti- microbial resistance in humans is inter-connected with AMR in livestock and the environment, in which we all live together. Anti-microbial drugs are medicines that counter against a wide range of infection and diseases caused by bacteria [antibiotics], viruses [antivirals], fungi[antifungals] and parasites [including anti-malarials]. Anti-microbial resistance occurs when the micro-organisms which cause infection endures on subjection to drugs that would normally destroy them or inhibit their growth in the body of the organism. The availability and use of anti-microbials in terrestrial and aquatic animals and in agriculture is essential. It also plays a part in food security and safety, but the growing concerns about AMR will counter all the merits of anti-microbials. The occurrence of AMR could be due to the increased use of anti-microbials in humans and livestock and this could be related to climate changes as well. Climate change has been identified as conceivably the greatest health challenge of the 21st century. It is increasing the risk of non-communicable diseases, the spread of highly infectious diseases and also the occurrence of emerging diseases. Hence, due to the prevalence of infectious diseases due to constant climatic changes, there is an increased use of anti-microbials. One Health is the collaborative effort of multi-disciplines working locally, nationally and globally to attain optimal health for people, animals and the environment we all share. The One Health concept understands that the health of humans is connected to the health of animals and the environment in which we all dwell. Anti-microbial resistant microbes can develop livestock animals and can spread to human beings by direct exposure or through the food chain and the environment. The resistant genes in the microbes do not recognize the ecological borders, and therefore it can spread easily to different areas. In this article, the relevance of AMR in humans, livestock and the environment, how this centres on One Health, the impact of climate changes on AMR and the mitigation strategies have been elaborated.

Abiotic Stress-Induced Alterations in Liver Semiology as Physiological Adaptive Gambits in Indigenous Female Cattle

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Liver semiology as an indicator of abiotic stress was assessed in female non-descript indigenous cattle, including calves, heifers and cows (3 weeks to 11 years), exposed to four environmental temperature periods (ETPs): comfortable (October–November), extreme hot-dry (April–June), extreme hot-humid (July–September), and extreme cold (December–January) in Bikaner. Liver function biomarkers, particularly gamma-glutamyl transferase (GGT) and alanine aminotransferase (ALT), exhibited significant variations across ETPs, reflecting stress-induced hepatic responses. Mean ± SEM values of GGT increased from 69.33 ± 4.97 during comfortable conditions to 241.00 ± 6.98 in extreme hot-dry, peaked at 271.00 ± 7.09 during extreme hot-humid conditions, and declined to 181.00 ± 3.96 in extreme cold conditions. Similarly, ALT values increased from 19.00 ± 0.41 under comfortable conditions to 28.00 ± 0.48 in hot-dry, reached 37.00 ± 0.49 during hot-humid ETP, and were 23.00 ± 0.43 in extreme cold. These alterations indicate enhanced hepatic activity and stress, particularly under high temperature-humidity conditions. Among the analytes studied, serum GGT exhibited the greatest percent change during extreme hot-humid conditions, identifying it as the most sensitive biomarker of abiotic stress and a potential indicator of hepatic adaptive responses in cattle. The findings highlight liver semiology, as a valuable tool for early detection and management of environmental stress in cattle.

Growth Performance of Japanese Quail Supplemented with Amla (*Emblica officinalis*) Fruit Powder and Organic Acid

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The present investigation was undertaken to evaluate the effect of dietary supplementation of amla (*Emblica officinalis*) fruit powder and organic acid, individually and in combination, on growth performance and nutrient utilizationin Japanese quails. A total of 144 day-old Japanese quail chicks were randomly allotted to four treatment groups with three replicates of 12 chicks each. The dietary treatment consisted of a basal diet without supplementation (T_1), basal diet supplemented with amla (*Emblica officinalis*) fruit powder at 1% (T_2), organic acid at 0.2% (T_3) and a combination of amla (*Emblica officinalis*) fruit powder (1%) and organic acid (0.2%) (T_4). Birds were fed *ad libitum* from day-old to 12 weeks of age. Growth performance parameters were evaluated up to five weeks, followed by a metablolic trial, while laying performance and egg quality traits were assessed from 6 to 12 weeks of age . The cumulative feed intake did not differ significantly among the treatment. However, body weight, body weight gain, feed conversion ratio, performance index and protein efficiency ratio showed significant improvement, in both amla (*Emblica officinalis*) fruit powder and organic acid supplementation. Nutrient utilization studies revealed a highly significant improvement in crude protein and ether extract digestibility, as well as nitrogen balance, in supplemented groups as compared to control. It was concluded that dietary supplementation of both amla (*Emblica officinalis*) fruit powder at 1% as well as organic acid at 0.2% significantly improved growth performance, of Japanese quails. However, combined effect of amla fruit powder and organic acid showed moderate result on growth performance. Thus, inclusion of amla fruit powder and organic acid in quail diets may serve as a safe and natural alternative to commercial growth promoters for efficient quail production.

Keywords: Amla, Digestibility, Growth performance, Japanese quails, Nutrient utilisation Organic acid

A Unique presentation of Disseminated Lymphoma with Lymphocytic Leukemia Manifestations in a dog

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Lymphomas are a diverse group of tumors that arise from lymphoreticular cells and can arise in almost any tissue of the body, although they most commonly involve lymphoid tissues such as the lymph nodes, bone marrow, and spleen. Leukemia, in contrast, is a malignant disorder of the hematopoietic system characterized by uncontrolled proliferation of abnormal leukocytes in the bone marrow and peripheral blood, often leading to infiltration of multiple organs. In dogs, leukemic manifestations may occur as a primary condition or develop secondary to lymphoma during its leukemic phase, necessitating careful clinicopathological differentiation. A 10-year-old dog was presented with a history of anorexia, diarrhea, hematochezia, and respiratory distress for 10 days. Clinical examination revealed dullness, a poor body condition score (2.5/5), and generalized lymphadenopathy. Hematological evaluation showed a marked increase in total leukocyte count (TLC: 186,030/cu mm), along with anemia (Hb: 7.1 g/dL; PCV: 18.8%; TEC: 2.41 × 10^6/cu mm) and thrombocytopenia. Peripheral blood smear examination revealed a predominance of intermediate to large population of lymphocytes with evident mitotic figures, suggestive of lymphocytic leukemia, a highly proliferative and aggressive disease. Serum biochemical analysis demonstrated markedly elevated alkaline phosphatase (572 U/L), with mild increases in alanine aminotransferase (84 U/L) and aspartate aminotransferase (52 U/L). Total bilirubin was at the upper limit of the reference range (0.8 mg/dL) with hypoproteinemia (total protein: 3.9 g/dL) with hypoalbuminemia (1.8 g/dL). These findings suggest hepatobiliary involvement along with possible protein loss, likely associated with gastrointestinal pathology. Renal parameters (BUN: 29 mg/dL; creatinine: 1 mg/dL) and electrolyte levels (sodium: 147 mEq/L, potassium: 4.6 mEq/L, chloride: 107 mEq/L) were within normal limits. Ultrasonographic examination revealed enlargement of mesenteric and jejunal lymph nodes, along with loss of normal duodenal wall layering, suggestive of infiltrative gastrointestinal lymphoma. nalung lobes, indicating pulmonary involvement. Fine needle aspiration cytology (FNAC) of enlarged popliteal and mandibular lymph nodes, as well as peritoneal fluid, revealed marked cellularity with sheets of lymphoblasts exhibiting malignant features, including prominent nucleoli, coarse chromatin, and occasional mitotic figures, along with scattered neutrophils. Based on the hematological, biochemical, imaging, and cytological findings, the case was diagnosed as disseminated lymphoma with secondary lymphocytic leukemic phase of lymphoma in the dog.

Comparative Oncology: A Review Authors:

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Mathematical logic suggests that cancer risk should increase with an animal's maximum body size and lifespan. By that rule, massive animals like the Blue Whale—with quadrillions of cells multiplying for decades—should theoretically not exist. Yet, biological reality contradicts this, presenting a startling disparity known as Peto's Paradox. To bridge the gap between logic and reality, nature did not reinvent the wheel. Instead, through the wonders of convergent evolution, wild species developed unique strategies to combat tumor formation. Elephants duplicated the TP53 gene to enact a scorched-Earth apoptosis policy, whales invested heavily in meticulous DNA repair, and naked mole rats evolved a gelatinous meshwork of hyaluronic acid to halt tumors via hypersensitive contact inhibition. However, human intervention can easily throw into chaos all the carefully laid out plans of nature. The domestic dog perfectly illustrates Simpson's Paradox: when a species undergoes rapid artificial selection for massive size, it lacks the evolutionary time required to develop proper tumor suppression mechanisms. Giant breeds like Rottweilers face staggeringly high odds of aggressive osteosarcoma, while chondrodystrophic dwarf breeds remain remarkably protected. Furthermore, dogs provide an ideal, naturally-occurring preclinical model for human triple-negative mammary carcinoma, where IGF1R over-expression heavily drives tumor survival. Comparative oncology translates these natural defenses into real-world applications, such as using lipid nanoparticles to deliver synthetic elephant TP53 mRNA directly into osteosarcoma cells. Ultimately, this novel research rests on the One Health framework, highlighting that human, animal, and ecosystem health are deeply intertwined. If we fail to conserve global biodiversity amidst the Earth's sixth mass extinction, the invaluable clinical data generated from Mother Nature's multi-billion-year experiment on tumor suppression will be lost forever.

Evaluation of Nutritional Deficiencies and Their Impact on Fish Health

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Nutrition plays a significant role in maintaining the health, growth, immunity and overall productivity of fish in aquaculture. This study evaluates the common deficiencies of macronutrients like protein and lipids and micronutrients including vitamin and minerals and their associated physiological and pathological impacts on cultured fish species. Inadequate protein and lipid intake leads to reduced growth performance, energy imbalance and decrease reproductive performance. Deficiency of fat and water-soluble Vitamins such as A, C, D and E results in skeletal deformities, muscular dystrophy, and increased susceptibility to diseases Mineral imbalances particularly involving calcium, phosphorous and iron, contribute to abnormalities in bone mineralization, hematopoiesis and metabolic regulation. The evaluation includes clinical diagnostics, morphometric assessments and hematological and biochemical profiling and proximate feed composition analysis to establish deficiency indicators. Observes outcomes integrates poor Feed Conversion Ratio (FCR), reduced Specific Growth Rate (SGR), increased mortality rates, and increased disease susceptibility. Regular monitoring, proper feed formulation, and supplementation are essential strategies to prevent deficiencies and ensure sustainable fish production. This study emphasizes the pivotal role of precision nutrition in optimizing fish health, enhancing resilience, and supporting sustainable aquaculture.

Keywords: Fish Nutrition, Fish Health, Growth Performance, Nutritional Deficiencies Sustainable Aquaculture.

Ichthyofaunal Diversity of Swaraj Dweep (Havelock Island): Preliminary Observations from Scuba Diving in the Andaman Sea

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Coral Reef ecosystems support highly diverse fish communities which play an essential role in maintaining marine ecological structure and function. This study documented the reef associated Ichthyofaunal diversity across four diving in three Scuba sites in Havelock Island, namely Nemo Reef, The Wall and The Slope. Surveys were conducted during training dives as a component of an Open Water Scuba Certification Course. The study area comprised fringing reefs characteristic of the Andaman coast, exhibiting clear zonation from shallow reefs to deeper slope regions. Data was collected through qualitative underwater visual surveys with the aid of roving diver observations spanning across four dives in shallow (up to 11 m) and deeper reef zones(up to 18 m). Species were noted and classified as per distribution across depth gradients. A total of 51 species belonging to 11 orders and 18 families were documented, with Acanthuriformes and Bleniiformes representing the most species rich orders. Shallow reef habitats were dominated by Pomacentrids, while deeper zones supported higher occurrence of Labrids and Lutjanids. Several species were observed across various depth ranges, indicative of vertical habitat overlap within the fringing reef system. Notable observations included site-specific macro invertebrates, such as Nudibranch (*Halgerda stricklandii*) and fragile Sea Whips (*Junceela fragilis*) which were recorded at The Slope, where moderate currents were also noted. These observations are consistent with known associations between gorgonian coral and water movement. Video documentation captured feeding behaviour of Moon Wrasse (*Thalassoma lunare*) on coral associated substrates, with observed colour variations suggestive of different sexual stages within the population. The lesser number of dives and restriction in the depth of diving could be considered as the major limitations of this study.

Surgical Management of Concurrent Medial Patellar Luxation and Cranial Cruciate Ligament Rupture in a Chihuahua Crossbreed Dog

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A 4-year-old Chihuahua crossbreed dog was presented with chronic left hind limb lameness acutely exacerbated following a traumatic incident 45 days prior to presentation. Orthopedic examination revealed grade 3 medial patellar luxation with a shallow trochlear groove, tibial internal rotation, and a positive cranial drawer sign indicated concurrent cranial cruciate ligament rupture. Radiographic evaluation confirmed a shallow trochlear groove, internal tibial rotation, a fat pad sign indicating joint effusion, and mild osteoarthritis. Due to financial constraints, the owner declined advanced diagnostic imaging (arthroscopy or MRI) as well as tibial plateau leveling osteotomy. Surgical intervention was performed combining tibial tuberosity transposition with tension band wiring, trochlear wedge recession, and lateral fabellar extracapsular stabilization using 80 lbs nylon suture. Postoperative recovery was uneventful, with marked improvement in lameness and stifle stability at 12-day follow-up. This case demonstrates that combined extracapsular stabilization and patellar realignment can be a viable and cost-effective surgical approach for managing concurrent medial patellar luxation and cranial cruciate ligament rupture in small dog breeds when advanced osteotomy techniques are not feasible.

Nanotechnology Uses in Meat Production: Enhancing Safety, Quality, and Sustainability

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Nanotechnology, operating at the nanoscale (1–100 nm), represents a powerful paradigm shift with the potential to fundamentally transform the meat production and processing industry. Its applications are broadly aimed at addressing critical global challenges, including extending shelf-life, ensuring food safety, and developing novel functional meat products. In the realm of preservation, nanoencapsulation systems effectively protect and deliver highly active antimicrobial and antioxidant agents, such as essential oils and natural extracts, directly into the meat matrix or as edible coatings. This micro-scale precision significantly slows down microbial spoilage and lipid oxidation, thereby minimizing food waste and extending product freshness. A key area of innovation lies in packaging technology. The use of nanocomposite films incorporating materials like nanoclays (e.g., Montmorillonite) or metallic nanoparticles (e.g., silver, zinc oxide) dramatically improves the gas (O_2, CO_2) and moisture barrier properties of packaging materials. This leads to improved quality retention and reduced use of traditional chemical preservatives. Furthermore, the integration of nanosensors in smart packaging allows for real-time monitoring of product quality by detecting volatile organic compounds or pathogens, providing a visual alert to consumers and regulators. In product development, nanoemulsions and other nanocarriers are utilized to enhance the bioavailability and controlled release of health-promoting ingredients, such as vitamins and omega-3 fatty acids, creating healthier functional foods without compromising the meat sensory attributes like texture and flavor. However, despite these remarkable technological benefits, the widespread adoption of nanotechnology in the meat sector faces significant hurdles, primarily centered on potential human health and environmental risks associated with nanoparticle migration and toxicity. Overcoming these challenges will require concerted effort in developing robust regulatory frameworks and comprehensive toxicological studies to ensure long-term consumer trust and safe industrial implementation.

Effect of roof modifications on micro-climate in loose housing system of Buffalo Farm

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The purpose of this study was to assess how well roof modifications more especially, false ceilings composed of glass wool and expanded polyethylene (EPE) sheets painted with reflective white paint—could reduce heat stress and enhance the microclimate in the loose housing system of lactating Murrah buffaloes in subtropical climates. The experiment was conducted at the Buffalo Farm, LUVAS, Hisar, India, for ninety days. An asbestos roof without any modifications (T1, control), an asbestos roof with a glass wool false ceiling and white paint (T2), and an asbestos roof with an EPE sheet false ceiling and white paint (T3) were the three treatments. The temperature of the internal shed, relative humidity (RH), upper roof temperature (URT), false ceiling temperature (FCT), and floor temperature (FT) were recorded on a fortnightly basis for 3 consecutive days, along with macroclimatic parameters. The findings indicated that T2 group had the best thermal insulation and heat reflectance, maintaining significantly ($P<0.05$) the lowest interior, upper roof, false ceiling, and floor temperatures with the most stable relative humidity. T2 considerably moderated thermal load by achieving a temperature reduction of 4–7°C in comparison to the macroclimate. According to the research, dairy buffaloes' thermal comfort is significantly increased by integrated roof insulation and reflective surfaces, which improves their welfare and productivity in hot climates.

Keywords Buffalo, Insulation, Roofing, Microclimate, Heat stress

Integrative assessment of breeding soundness in pre-rut and rut dromedary bulls using infrared thermography, testicular morphometry and molecular markers

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Camel (*Camelus dromedarius*) exhibits distinct seasonal reproductive patterns regulated by photoperiodic cues mediated via melatonin, which modulates the hypothalamic-pituitary-gonadal axis. This endocrine regulation, in interaction with energy balance and environmental factors, leads to seasonal variation in testicular function and libido, ultimately constraining year-round fertility in arid regions. A breeding soundness evaluation of camel bulls (n = 12) was conducted during the pre-rut (early November) and rut (December-January) periods to generate molecular and functional insights for improved reproductive management. Bulls were assessed for testicular morphometry, functional reproductive traits, testicular surface temperature and relative gene expression. Quantitative PCR analysis was performed using custom primers targeting MTNR1A, MTNR1B, GnRHR, AR, FSHR, ESR, LEPR, and PSEN1, representing pathways associated with photoperiodism, reproductive seasonality and energy balance. Morphometric evaluation revealed a decline in scrotal circumference from 15.71 ± 1.20 inches (pre-rut) to 14.95 ± 0.42 inches (rut), accompanied by a shift in scrotal shape (intermediate-pendulous to wedge-intermediate) and testicular consistency (normal-hard to soft-normal). Body condition score decreased significantly ($p<0.05$) from 3.3 ± 0.09 to 3.1 ± 0.06. Behavioural assessment during rut indicated considerable variability, with reaction time (5-30 s), mount latency (10-150 s), and mating time (2-12.5 min). Sexual desire remained high (4.15 ± 0.05), while mating ability (3.2 ± 0.10) and libido (3.6 ± 0.06) indicated moderate to good sexual performance in all bulls. Gene expression analysis demonstrated a consistent downregulation of most target genes during rut compared to pre-rut, except ESR and PSEN1, which remained unaltered. Overall, the integrative morpho-functional and molecular evaluation demonstrates pronounced seasonal modulation of reproductive traits in camel bulls, offering valuable insights for optimizing breeding management under arid conditions and indicating the potential to extend the rut phase through targeted nutritional and managerial interventions.

Consumption of probiotic-fermented camel milk has protective efficacy against experimentally induced acute gastric ulcer in mice

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Gastric ulcers remain a significant global health concern with a prevalence of about 40% in the developed countries. While proton pump inhibitors are effective in treating gastric ulcer, they may be associated with rebound acidity. Fermented dairy products, have emerged as promising dietary interventions for gastrointestinal protection. Both cow and camel milk were fermented with 10^8CFU/ml of combined inoculum of *Lactobacillus plantarum* and *Streptococcus thermophilus*. The proteolysis pattern of fermented milk was evaluated by SDS-PAGE and OPA assay. Further, untargeted metabolomics and proteomics were carried out using Orbitrap mass spectrometer. Different groups (n=6) of mice were orally given with fermented cow milk (FCOM), fermented camel milk (FCM), Ranitidine (positive control), and normal saline (NS; negative control) for 15 days. Followed by, 24 h fasting was observed and the mice were orally gavaged with a solution of 60% ethanol with 150 mM hydrochloric acid @ 100 µl/10 g body weight to induce acute gastric ulcer. Mice were euthanized after 1 h and gastric tissues were subsequently evaluated for gross ulcer index and histopathological alterations. Multi omics profiling revealed the enrichment of histidyl-glutamate dipeptide in FCM, potentially linked to cytoprotective pathways. Pathway enrichment analysis suggested modulation of arginine and lysine associated pathways in FCM linked to polyamine formation. Gastric mucosa of FCM group had relatively lower inflammation in contrast with FCOM group. Accordingly, the gastric mucosal layer of FCOM group has comparatively higher infiltration of immune cells (neutrophils and lymphocytes). Collectively, the probiotic-FCM exerts superior gastroprotective effects, potentially mediated through its unique bioactive composition. Dipeptide and polyamine formation in FCM might be associated with gut epithelial health and host–microbiota interactions. The possibility of gut-brain-axis modulation through neuroprotective polyamines can further be investigated. This study highlights the therapeutic promise of FCM as a dietary strategy for the management of gastric ulcer. Further studies are warranted to validate its translational potential in humans.

Bayesian Analysis of growth rates and Kleiber's Ratio in Jakhrana Goats

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The present study aimed to estimate additive genetic and maternal effects on average daily gain (ADG) and Kleiber's ratio (KR) traits in Jakhrana goats using a Bayesian approach. Data on 428 kids born between 2005 and 2023 were analysed for ADG1 (birth to weaning), ADG2 (weaning to six months), ADG3 (six to twelve months), and the corresponding KR traits. The effects of period of birth, sex, type of birth, and dam's weight at kidding were evaluated using a general linear model, while genetic parameters were estimated using single-trait animal models implemented through GIBBS2F90 and POSTGIBBSF90 programs of the BLUPF90 package. It was revealed from the results that the least squares means were 86.91±1.40 g (ADG1), 67.89±1.86 g (ADG2), and 44.16±2.42 g (ADG3), while the corresponding KR values were 14.76±0.11, 7.97±0.17, and 3.98±0.21, respectively. Period of birth, sex, and type of birth significantly ($P<0.05$) affected most traits. Heritability estimates ranged from 0.17 to 0.24, indicating moderate genetic control, while maternal effects (m^2) varied from 0.05 to 0.17, highlighting their role during early growth. Correlation estimates suggested that improvement in growth traits would result in correlated changes in efficiency traits. The results suggested that selecting animals at an early age based on ADG1 can accelerate genetic progress in Jakhrana goats, offering a more efficient and time-saving alternative to the currently used WT6 criterion, with practical implications for improving selection strategies and overall flock productivity.

Keywords: Jakhrana goats; Daily gain; Kleiber's ratio; Heritability; Genetic correlation.

Genetic Evaluation of Dijkstra Lactation Curve Traits for Genetic Improvement in Murrah Buffaloes

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The objective of the present study was to analyze lactation curve traits employing the Dijkstra mechanistic model and to estimate genetic parameters of these traits using REML in first parity Murrah buffaloes. The data comprised 6,388 test-day milk yield records obtained from 644 first lactation Murrah buffaloes over a period of 24 years (2000-2023). Parameters of the Dijkstra model viz. initial milk yield (M_0), cell proliferation rate (μ), decay parameter (k) and cell death rate (λ) were obtained using non-linear regression in SPSS software. These parameters were further used to derive important lactation traits, namely peak yield (PY), time to peak (PT) and the relative rate of decline following peak production (r_d). The influence of non-genetic factors on the parameters and derived traits was evaluated using a general linear model. Estimation of genetic parameters was performed through four univariate animal models fitted using the REML approach in Wombat software, with comparison of models carried out using -2 Log Likelihood values and AIC criteria. Bivariate animal models were used to estimate genetic and phenotypic correlations among traits. Heritability estimates for Dijkstra model parameters and related traits were low (0.04–0.17), indicating strong environmental influence, whereas peak yield displayed moderate heritability (0.31), suggesting scope for genetic improvement. Maternal genetic effects were observed to influence early lactation performance (M_0), while maternal permanent environmental effects were negligible across traits. Strong positive genetic and phenotypic correlations of peak yield with proliferation rate (μ) (0.92) and 305-day milk yield (0.86) indicated that animals with higher peak yield are likely to produce greater total milk yield. These findings highlighted peak yield as an early and reliable indicator of lactation performance, with potential to replace 305-day milk yield in selection. Its inclusion in breeding programs could accelerate genetic gain through earlier selection and reduced generation interval.

Keywords: Murrah Buffaloes; Lactation curve; Dijkstra model; Peak yield; REML.

Conservation and improvement of Nari cattle breed in Rajasthan

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Indigenous cattle of India are highly adaptable to harsh climatic conditions, and locally available food and fodder of Rajasthan. Nari cattle, Rathi cattle, Tharparker cattle breeds are commonly found in arid zone and southern region of Rajasthan. These breeds are known for disease resistance, their resilience and ability to survive in the region of Rajasthan. The Nari cattle breed is a newly registered breed of cattle which is found near the Sirohi and Pali districts of Rajasthan. Nari cattle can survive in grazing pastures in hilly areas and extreme climatic conditions, but this breed also survives on farms. At farm, Nari cattle maintain with all good management and veterinary practices along with well-known genetic records of parent animals. Nari cattle breed, Conservation can be done by in situ and ex-situ conditions of animals. Genetic improvement of Nari cattle can be done by selection of animals with superior traits, AI (artificial insemination) with good quality semen in their breeding tracts and providing good nutritional and management conditions. These systematic approaches not only enhance the productivity of individual animals but also aids in the conservation and improvement of the Nari cattle breed in Rajasthan.

Organoids in Veterinary Disease Modeling: Bridging In Vitro and In Vivo Interfaces

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Organoids are stem cell-derived three-dimensional (3D) culture systems that recapitulate key structural, functional, and molecular features of native tissues. Cultured within extracellular matrix scaffolds such as Matrigel and supplemented with defined growth factors, these self-organizing systems enable long-term expansion and lineage-specific differentiation. In veterinary biomedical research, organoids represent a robust translational platform for modeling infectious, neoplastic, and hereditary diseases under controlled in vitro conditions. Species-specific organoid systems, particularly intestinal organoids derived from adult stem cells, reproduce complex architectures such as crypt–villus organization, facilitating mechanistic investigation of host–pathogen interactions, epithelial barrier integrity, and inflammatory signaling pathways.Organoids have significant utility in preclinical drug screening and toxicological evaluation, demonstrating physiologically relevant responses including dose-dependent cytotoxicity, oxidative stress, mitochondrial dysfunction, and apoptosis. Their application in precision veterinary medicine enables individualized and breed-specific therapeutic response assessment, thereby improving predictive accuracy and clinical translation. Furthermore, organoid technology aligns with the principles of the 3Rs (Replacement, Reduction, and Refinement) by reducing reliance on in vivo animal experimentation. In conclusion, organoids bridge the critical gap between conventional in vitro models and in vivo systems, providing a scalable, ethically sustainable, and biologically relevant platform for advancing veterinary disease modeling, toxicopathology, and translational research.

Chitosan-Based Nanoparticles as Potent Antibacterial Agents: Mechanisms and Applications in Veterinary Practice

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Antimicrobial resistance (AMR) is a major threat to animal health, food safety, and public health worldwide. Excessive and irrational use of antibiotics in veterinary practice has reduced drug efficacy, promoted resistant bacterial strains, and caused harmful residues in animal products. Therefore, there is an urgent need for safe, sustainable, and effective alternatives to conventional antibiotics. Chitosan, a natural biopolymer obtained from chitin, has gained attention because of its biocompatibility, biodegradability, non-toxic nature, and inherent antimicrobial properties.Chitosan-based nanoparticles (CSNPs) exhibit enhanced antibacterial activity due to their nanoscale size, large surface area, and better interaction with microbial cells. These nanoparticles act through multiple mechanisms, including disruption of bacterial cell membranes, leakage of intracellular contents, inhibition of nutrient uptake, and interference with microbial metabolism. Their broad-spectrum action makes them effective against both Gram-positive and Gram-negative bacteria.In veterinary practice, CSNPs have promising applications in treatment of bacterial infections, mastitis control, wound healing, feed additives, vaccine delivery, and targeted drug delivery systems. Their use can reduce dependence on antibiotics, lower treatment costs, and improve livestock productivity. In addition, reduced antibiotic use can support safer milk, meat, and other animal products for consumers.In conclusion, chitosan-based nanoparticles are potent and eco-friendly antibacterial agents with great potential in veterinary medicine. Their multifunctional properties make them valuable tools for combating AMR and improving animal health management. However, further in vivo studies and clinical trials are necessary to establish their efficacy, safety, and field-level applications.

Human Elephant Conflict: Driving Force & Mitigation Strategies

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The Asian elephant (*Elephas maximus*) serves as a vital keystone species and cultural icon in India, playing a critical role as a biological engineer for forest ecosystems. Despite this revered status, the species is currently facing a severe survival crisis, with recent DNA-based census data revealing a 25% population decline from 29,964 in 2017 to an estimated 22,446 by 2021–25. This decline is primarily attributed to escalating human-elephant conflict (HEC), which has emerged as a significant threat to biodiversity conservation and human safety. One of the major causes of this conflict is heat stress which has led to changes in the behavioural patterns of elephants and a continuous competition between man and elephants for resources. The conflict is further driven by extensive habitat fragmentation, where once-contiguous forests are divided into isolated patches by commercial development, such as tea plantations, and linear infrastructure like roads and railways. These changes force elephants into human-dominated areas to meet their physiological needs, a situation exacerbated by climate-induced heat stress and the loss of traditional migration corridors. Specific threats include frequent train-wildlife collisions, which resulted in over 200 elephant deaths between 1987 and 2015.The socio-economic impacts are equally severe, causing approximately 400 human fatalities annually in India and devastating the livelihoods of subsistence farmers through crop raiding and other damage to properties, storages and resources. Effective conflict management requires an integrated approach that balances short-term reactive tactics with long-term structural solutions. Short-term measures include the use of "Hullah" parties, chili-based deterrents, and rapid response teams. Long-term strategies focus on securing elephant corridors, land-use planning, and community-based natural resource management to foster tolerance and to prevent the loss of lives and damage to livelihoods of both humans and elephants. Furthermore, technological innovations like the AI-based Intrusion Detection System (IDS) in Uttarakhand provide a scalable model for preventing railway accidents by using sensors to detect elephant movement near tracks. Ultimately, the article argues for a shift toward the "elephant's perspective," recognizing their cognitive abilities and social dynamics to transition from a relationship of competition to one of peaceful coexistence.

Assessment of Smallholder Livestock and Poultry Management Practices in and around Saralgaon, Taluka – Murbad, District-Thane, Maharashtra

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Smallholder livestock production is significant to the livelihoods of rural communities by providing a means of income, employment, and nutritional security. The present study was conducted in selected villages in and around Saralgaon, Taluka – Murbad, District - Thane, Maharashtra representing a semi-rural production system characterized by mixed crop–livestock farming and the high dependence on conventional methods of production management. A total of 75 livestock farmers were surveyed across five purposively selected villages - Wadavli, Nagaon, Manivali, Dahivali-Partale and Khutal Bangla – based on the livestock population, accessibility and their representation of prevailing production systems. Primary data were collected through structured interviews using a pre-tested questionnaire. The collected data were analyzed using descriptive statistical tools such as percentages and averages. Findings revealed that mixed livestock farming was the dominant production system, with buffaloes, non-descript cattle, and goats forming over 70% of the livestock population. Natural mating was the predominant breeding method due to limited access to artificial insemination. Backyard poultry, mainly dual-purpose birds like Kaveri and Sonali, provided nutritional support and supplemental income to marginal farmers. Housing systems were predominantly semi-intensive, with semi-pucca structures. Feeding practices mainly involved stall feeding combined with open grazing, with a heavy dependence on seasonally available fodder and with low use of balanced concentrate feed. These gaps in scientific feeding, breeding, and healthcare practices were identified as key constraints affecting productivity. The study emphasizes the need for strengthening extension services, improving veterinary outreach, and promoting scientific livestock management practices to enhance productivity and support sustainable rural livelihoods in the study area.

Keywords: Feeding practices, Housing system, Livestock management, Smallholder livestock farmers and Veterinary services

Impact of Gut Microbiota on Reproductive Health of Dairy Animals

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The gut microbiota, comprising trillions of microorganisms residing in the gastrointestinal tract, plays a fundamental role in host metabolism, immunity, and overall health. An emerging concept, the microbiome–gut–reproductive axis (MGRA), highlights how gut microbial populations influence reproductive hormones, ovarian activity, immune function, and overall fertility in dairy animals. Various factors such as nutrition, antibiotic usage, metabolic stress, and the transition period can disrupt the gut microbiota, leading to dysbiosis, a microbial imbalance that adversely affects reproductive function. Dysbiosis may impair estrogen metabolism, modulate immune responses, increase systemic inflammation, and ultimately result in suboptimal reproductive outcomes. Microbial metabolites, including short-chain fatty acids (SCFAs) and endotoxins, impact the hypothalamic-pituitary-gonadal (HPG) axis and regulate key reproductive hormones such as estrogen, progesterone, and luteinizing hormone. Furthermore, the reproductive tract itself harbors its own unique microbiota, influenced by ascending colonization, hematogenous spread, and environmental exposure. Recent studies have demonstrated a strong association between gut dysbiosis and reproductive disorders such as endometritis, disrupted estrous cyclicity, and reduced conception rates. Probiotic and prebiotic interventions, along with targeted dietary strategies, have shown promise in restoring microbial balance and enhancing reproductive performance. Understanding the MGRA offers a novel, sustainable, and non-invasive approach to improving fertility and managing reproductive disorders in dairy animals. These insights have significant implications for optimizing reproductive efficiency and productivity in modern dairy production systems.

Keywords: Dairy animals, dysbiosis, estrogen, fertility, gut microbiota, probiotics,

Seasonal Variations in the Fertility and Reproductive Efficiency of Buffaloes

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Buffaloes (*Bubalus bubalis*) play a pivotal role in global dairy production, contributing nearly 43.62% of India's total milk yield. However, their reproductive efficiency fluctuates seasonally, particularly under tropical and subtropical climates. Although not true seasonal breeders, buffaloes exhibit reproductive peaks during cooler months (autumn–winter) and a pronounced decline during the hot, long-day season (spring–summer). This variation results from complex interactions among environmental, managemental, nutritional, endocrine, and molecular factors. Elevated ambient temperature, prolonged photoperiod, and poor thermoregulatory capacity induce heat stress, oxidative imbalance, and hormonal disruptions especially altered melatonin and prolactin levels that collectively impair ovarian function, estrus expression, and conception rate. Nutritional deficiencies, particularly in energy, minerals, and antioxidants, further escalate delayed puberty, prolonged calving intervals, and reduced oocyte quality. Molecular studies reveal that oocytes and follicular cells during the non-breeding season show downregulated expression of genes such as *IGF2*, *SPP1*, and *HSPA1A*, along with differential expression of miRNAs involved in folliculogenesis, thereby reducing oocyte competence. Field observations confirm lower conception and calving rates during summer, especially when the temperature-humidity index exceeds 75. To counter these effects, integrated management approaches such as microclimate modification (cooling), nutritional supplementation (bypass fat, minerals, antioxidants, capsaicin), and hormonal or melatonin-based synchronization protocols have proven effective. A holistic approach that combine physiological, nutritional, and endocrine management can substantially ameliorate the adverse effects of seasonality and enhance reproductive efficiency in buffaloes.

Keywords: Buffalo, Fertility, Melatonin, Reproductive efficiency, Seasonality

"Coccidiosis management through phytobiotics, current status and Future perspective"

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Coccidiosis is one of the most economically significant protozoan diseases in poultry, caused by intracellular parasites of the genus *Eimeria*. Global losses due to reduced productivity, mortality, and preventive drug costs exceed US $3 billion annually. The continuous use of synthetic anticoccidial agents such as monensin, nicarbazin, and amprolium has led to the emergence of drug resistance, toxicity, and residue concerns, emphasizing the urgent need for safer and sustainable alternatives. Phytobiotics, a diverse group of bioactive plant-derived compounds, have gained attention for their antimicrobial, antioxidant, and immunomodulatory potential in controlling coccidiosis. Phytochemicals such as allicin from *Allium sativum* (garlic), curcumin from *Curcuma longa* (turmeric), carvacrol and thymol from *Origanum vulgare* (oregano), and cinnamaldehyde and eugenol from *Cinnamomum zeylanicum* (cinnamon) have shown significant efficacy in reducing oocyst shedding, lesion scores, and intestinal damage in infected broilers. These compounds enhance gut barrier integrity, modulate immune responses by stimulating $CD4^+$ and $CD8^+$ lymphocytes, and suppress inflammatory cytokines like NF-κB and IL-6. Other phytoagents including betaine, mangiferin, tannins, chlorogenic acid, and arabinoxylans further contribute to osmoregulation, antioxidant defense, and mucosal repair. The integration of novel delivery systems such as herbosomes, liposomes, and microemulsions can improve bioavailability and target efficiency.Harnessing India's rich phytotherapeutic heritage through modern phytoanalytical and nanotechnological advancements can pave the way for phytobiotic-based coccidiosis management strategies. Such approaches promise sustainable poultry health, reduced antimicrobial dependence, and improved productivity under climatic and economic challenges.

Keywords: Phytobiotics, Coccidiosis, Poultry, Immunomodulation, Curcumin, Garlic, Anticoccidial resistance.

Infrared Thermography and Milk Cortisol: A Non-Invasive Tool for Heat Stress Monitoring in Temperamental Dairy Buffaloes

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Infrared thermography (IRT) emerges as an optimal non-invasive technique for health and stress assessment in dairy buffaloes, especially Murrah breeds with high temperament scores. Physical handling induces acute stress, reducing milk yield, while their dark skin, sparse hair, and poor sweating amplify surface temperature rises under heat stress (THI >72). This study evaluated 12 healthy lactating Murrah buffaloes (parity 2–4, 45±10 days in milk) at ICAR-NDRI's Livestock Research Centre. Bi-daily thermal imaging (10:00, 14:00 h) was employed using a Fluke thermal camera (emissivity 0.98, 1.5 m distance) during May–June 2025 (ambient 35–42°C, RH 60–80%, THI 78–85). Regions scanned included inner canthus/cheek (facial), mid-flank, and ergot/limb. Milk cortisol was assayed via ELISA (post-milking, 4% EDTA), with data analyzed by Pearson correlation and ANOVA (SPSS v26). Facial temperatures peaked at 39.2±1.2°C (ΔT=2.8°C vs. baseline, p<0.001), correlating robustly with milk cortisol (r=0.71, p<0.01) and THI (r=0.68). Flank/limbs exhibited milder increases (1.5–2.1°C), and cortisol reached 8.2±1.4 ng/mL (14:00 h). Heat-driven vasodilation enhanced facial IRT sensitivity, aligning with buffaloes' sweating limitations. Our study indicated that IRT can surpass rectal probes by avoiding temperament-related stress. Further, paired with milk cortisol validation, facial IRT enables temperament-friendly, remote heat stress phenotyping. In future, routine integration of IRT and milk cortisol promises to mitigate summer productivity losses in buffaloes thus improving their welfare and milk yields.

Keywords: Infrared thermography, Milk cortisol, Buffaloes, Heat stress.

Surgical Management of Splenic Hemangiosarcoma in a Dog with Emphasis on Diagnostic Imaging: A Case Report

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Splenic hemangiosarcoma is a highly aggressive malignant tumor of vascular endothelial origin, commonly associated with splenic rupture and life-threatening hemoperitoneum. An 8-year-old male Labrador Retriever was presented with anorexia, weight loss, abdominal distension, and dyspnea. Hematological findings revealed anemia and thrombocytopenia, raising suspicion of an underlying hemorrhagic condition.Diagnostic imaging played a pivotal role in the evaluation of the case. Abdominal radiography revealed marked splenomegaly with a soft tissue opaque mass effect and displacement of adjacent abdominal organs. Ultrasonography demonstrated a heterogeneously echogenic splenic mass with multiple cavitated hypoechoic to anechoic regions, suggestive of a vascular neoplasm. Further characterization using contrast-enhanced computed tomography (CT) of the abdomen revealed an irregular, heterogeneously enhancing splenic mass with areas of necrosis and cavitation, which aided in surgical planning and assessment of lesion extent. Based on clinical and imaging findings, exploratory celiotomy followed by total splenectomy was performed after appropriate preoperative stabilization. Histopathological examination confirmed splenic hemangiosarcoma. The dog recovered uneventfully with supportive postoperative care. This case highlights the complementary role of radiography, ultrasonography, and CT in the accurate diagnosis and surgical planning of splenic tumors, facilitating timely intervention and improved clinical outcomes.

Comparative evaluation of pedigree-based, genomic and single-step genomic BLUP models for FLMY and AFC in Karan Fries cattle

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Dairy cattle breeding programs in India have historically emphasized selection for increased milk yield, which, while enhancing production, has often been associated with a decline in reproductive efficiency. Therefore, a balanced genetic evaluation incorporating both production and reproductive traits is essential. In this context, the present study was undertaken to estimate breeding values for first lactation milk yield (FLMY) and age at first calving (AFC) in Karan Fries cattle maintained at ICAR-National Dairy Research Institute, Karnal, using pedigree, phenotypic, and genomic information from a sparsely genotyped animals (n=169). Model performance was evaluated using the Legarra–Reverter forward prediction approach, employing a partial dataset (records up to 2012) and the complete dataset spanning 1965 to 2025. In the univariate analysis, heritability estimates (h^2) obtained using ssGBLUP were [0.21 ± 0.03] for FLMY and [0.38 ± 0.04] for AFC, whereas the corresponding estimates from PBLUP were FLMY [0.19 ± 0.04] and AFC [0.33 ± 0.04] respectively. The predictive ability of ssGBLUP showed 2.26% increase compared to PBLUP in all animals by 2.24% in non-genotyped animals. Results showed that pure GBLUP was frequently over-dispersed and unstable, particularly for FLMY, whereas ssGBLUP provided more balanced predictions across genotyped and non-genotyped animals.

Endometrial and Systemic Biomarkers for Differentiation of CEH-Pyometra and Atrophic Pyometra in Dogs

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Pyometra is the most common uterine disorder in intact, middle-aged to older nulliparous female dogs, presenting in two distinct pathological forms: cystic endometrial hyperplasia-pyometra (CEH-P), driven by progesterone-induced endometrial proliferation with secondary bacterial infection, and atrophic pyometra (AT-P), characterized by endometrial thinning with concurrent myometrial hypertrophy. Given that the degree of uterine inflammation may influence clinical outcomes and reproductive prognosis, accurate differentiation between these two entities holds considerable diagnostic and prognostic significance. This study investigated selected endometrial gene expression profiles and systemic inflammatory mediators as potential tools for distinguishing CEH-P from AT-P in canine patients. Dogs were categorized via trans-abdominal ultrasonography and histopathological examination into CEH-P (n=20), AT-P (n=12), and age-matched healthy controls (n=10). RT-qPCR analysis demonstrated significantly elevated expression of matrix metalloproteinase 1 (MMP1) and S100 calcium-binding protein A8 (S100A8) in CEH-P relative to AT-P dogs, while prostaglandin F synthase (PGFS), interleukin-6 (IL-6), and interleukin-8 (IL-8) transcripts were upregulated in CEH-P compared to controls. Secretory leukocyte protease inhibitor (SLPI) expression remained consistently high across all diseased groups.Serum concentrations of C-reactive protein (CRP), prostaglandin F2α metabolite (PGFM), IL-6, and IL-8 were markedly elevated in both pyometra groups. Receiver operating characteristic (ROC) curve analysis identified serum IL-8 as the strongest discriminatory marker for CEH-P, yielding 91.2% diagnostic accuracy at a threshold of ≥ 2,165 pg/mL, while PGFM and CRP each achieved approximately 80% accuracy in differentiating CEH-P from healthy controls. These findings indicate that endometrial MMP1 and S100A8 expression may facilitate differentiation between CEH-P and AT-P, and that circulating IL-8, CRP, and PGFM levels may serve as clinically informative biomarkers reflecting the systemic inflammatory burden in bitches diagnosed with pyometra.

Application of image processing and deep learning models for breed identification and classification of phenotypically similar looking breeds

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Accurate breed identification in dairy cattle is essential for optimizing herd management and improving genetic standards. A smart method for correctly identifying phenotypically similar breeds can empower farmers to enhance herd productivity. A convolutional neural network (CNN) based model was developed for the identification of Sahiwal and Red Sindhi cows. To increase the classification accuracy, first, cows's pixels were segmented from the background using CNN model. Using this segmented image, a masked image was produced by retaining cows' pixels from the original image while eliminating the background. To improve the classification accuracy, models were trained on four different images of each cow: front view, side view, grayscale front view, and grayscale side view. The masked images of these views were fed to the multi-input CNN model which predicts the class of input images. The segmentation model achieved intersection-over-union (IoU) and F1-score values of 81.75% and 85.26%, respectively with an inference time of 296 ms. For the classification task, multiple variants of MobileNet and EfficientNet models were used as the backbone along with pre-trained weights. The MobileNet model achieved 80.0% accuracy for both breeds, while MobileNetV2 and MobileNetV3 reached 82.0% accuracy. CNN models with EfficientNet as backbones outperformed MobileNet models, with accuracy ranging from 84.0% to 86.0%. The F1-scores for these models were found to be above 83.0%, indicating effective breed classification with fewer false positives and negatives. Thus, the present study demonstrates that deep learning models can be used effectively to identify phenotypically similar-looking cattle breeds. To accurately identify zebu breeds, this study will reduce the dependence of farmers on experts.

Efficiency of Essential Oil on Ndv Induced Pathology in Broilers Birds

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One twenty broiler chicks were divided into six groups (n=30) to study the antiviral (against NDV) effect of essential oils mixture (cinnamaldehyde and citral) at prophalyctic and therapeutic dosage. Various parameter such as the production parameters, clinical symptoms that appeared after challenge with NDV, mortality rate, morbidity rate, postmortem gross lesions scoring, histopathological lesions scoring, determination of humoral immunity by HI test and cytokine gene expression were studied. Result of this study showed there was improved growth performance in terms of body weight and FCR, mild clinical signs and lesion scoring, delayed onset of mild clinical signs, less mortality and morbidity, higher HI titre prophylactic and therapeutic group than that of control infection groups. In conclusion, oral administration of essential oil mixture (cinnamaldehyde and citral) helps in reduction of pathological changes induced by NDV in poultry birds and can be considered as better preventive than therapeutics.

Keywords: NDV, essential oil,

In vitro evaluation of probiotic potential of camel rumen derived lactic acid bacteria

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This study focused on isolating, identifying, and characterizing lactic acid bacteria (LAB) from the camel rumen, with an emphasis on evaluating their functional and safety attributes. A total of four LAB species were successfully identified from the collected isolates: *Streptococcus lutetiensis*, *Enterococcus faecium*, *Streptococcus equinus*, and *Limosilactobacillus mucosae*. These strains were subjected to a series of in vitro assessments to determine their biochemical properties, resilience under stress conditions, adhesion capacity, and safety profile. The isolates exhibited varying levels of tolerance to environmental stresses. Among them, *S. lutetiensis* demonstrated the strongest ability to withstand acidic and bile conditions, suggesting its adaptability to gastrointestinal environments. In contrast, *E. faecium* showed the highest tolerance to elevated salt concentrations. Temperature tolerance assays indicated that *S. lutetiensis*, *E. faecium*, and *S. equinus* maintained good stability across a range of temperatures. Adhesion potential, an important probiotic trait, was most prominent in *S. lutetiensis*, indicating a higher likelihood of colonization within the host gut. Safety evaluation revealed that none of the isolates exhibited hemolytic activity, indicating their non-pathogenic nature under the tested conditions. Additionally, no antimicrobial activity was detected among the strains. Antibiotic susceptibility testing showed that *S. lutetiensis* was the most sensitive to the antibiotics evaluated, which may be advantageous in minimizing the risk of resistance transfer. Overall, the results highlight *S. lutetiensis* as a particularly promising candidate due to its strong stress tolerance, adhesion ability, and favorable safety profile. These characteristics suggest its potential application as a probiotic feed additive in livestock, warranting further detailed investigations and in vivo validation studies.

Seroprevalence of Brucellosis in Dairy Animals Using Serological and Bacteriological Diagnostic Methods

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A seroprevalence study of Brucellosis had been conducted to determine the occurrence of infection among dairy animals under field conditions. The study had been carried out across organized and unorganized dairy farms, where a total of 120 serum samples had been collected from cattle and buffaloes with a history of reproductive disorders. The selection of animals had been based on clinical signs such as abortion in the last trimester, retained placenta, repeat breeding, and infertility. Blood samples had been collected aseptically, and serum had been separated for serological testing. Initial screening had been performed using the Rose Bengal Plate Test (RBPT), followed by confirmation through indirect Enzyme-Linked Immunosorbent Assay (iELISA) to detect antibodies against *Brucella* organisms. For confirmatory diagnosis, bacteriological isolation had been carried out from clinical samples such as aborted fetal materials, uterine discharges, and vaginal swabs. Samples had been cultured on commonly used media including blood agar and nutrient agar and incubated at 37°C for 48–72 hours. The colonies had appeared as small, smooth, glistening, and non-hemolytic. Smears from suspected colonies had been subjected to Gram staining, revealing Gram-negative coccobacilli. Biochemical characterization had been performed, where isolates had shown catalase positive, oxidase positive, urease positive, and indole negative reactions, confirming the identity of *Brucella* species.Out of the total 120 samples screened, 42 samples had been found positive by RBPT, while 38 samples had been confirmed positive by iELISA, indicating an overall seroprevalence of 31.67%. Bacteriological findings had further supported the presence of infection in selected clinical samples. The study had demonstrated that the combination of serological screening with bacteriological isolation and biochemical tests had provided reliable confirmation of Brucellosis in dairy animals.

Field-Based Detection of Listeria monocytogenes in Dairy Farms Using Field and Laboratory Methods: A Survey of Ten Farms

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Detection of Listeria monocytogenes had been investigated through a field-based survey conducted across 10 dairy farms of Raipur district. The study had aimed to determine the occurrence of the pathogen using feasible detection methods under field and basic laboratory conditions. A total of 60 samples had been collected, comprising 15 fecal samples, 15 mastitic milk samples, 10 apparently healthy milk samples, 10 silage samples, 5 water samples, and 5 environmental swabs from farm premises and milking equipment. Sample collection had been guided by the presence of clinical signs suggestive of Listeriosis, including neurological symptoms (circling, head tilt), late-term abortions, and mastitis unresponsive to antibiotic therapy, along with suspected poor-quality silage feeding.

Initial screening had been performed using Loop-mediated Isothermal Amplification (LAMP) for rapid detection of *Listeria monocytogenes* DNA in enriched samples. Further confirmation had been carried out through culture-based methods, where samples had been enriched in selective broth and plated on PALCAM agar. Typical colonies had appeared as gray-green colonies with black halos. Presumptive isolates had been subjected to biochemical tests, including Gram staining (Gram-positive rods), catalase positivity, and motility testing showing characteristic umbrella-shaped growth. Out of the 60 samples analyzed, 36 samples had been found positive, indicating an overall positivity rate of 60% across the surveyed farms. The study had demonstrated that the combination of LAMP screening with conventional culture and biochemical methods had provided a reliable approach for detection under field conditions. The findings had indicated a considerable occurrence of the pathogen in dairy farm environments.

Isolation and Detection of Listeria monocytogenes from Mastitic Milk Samples in Dairy Farms Using LFA, Culture, and Biochemical Methods

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Isolation and detection of Listeria monocytogenes had been carried out from mastitic milk samples collected during a field-based survey of 10 dairy farms. The study had focused specifically on mastitis cases that had been unresponsive to routine antibiotic therapy. A total of 15 mastitic milk samples had been collected aseptically from affected animals showing clinical signs such as udder inflammation, abnormal milk secretion (flakes, clots, watery consistency), and reduced milk yield. All samples had been subjected to an enrichment step in selective enrichment broth to enhance the recovery of *Listeria monocytogenes*. Initial screening had been performed using Lateral Flow Assay (LFA) for rapid detection of bacterial antigen. For bacteriological isolation, enriched samples had been plated on selective media such as PALCAM agar and incubated at 37°C for 24–48 hours. Typical colonies had appeared as gray-green colonies with black halos, suggestive of *Listeria* species. Presumptive colonies had been further processed for identification through Gram staining, which had revealed Gram-positive short rods. Biochemical characterization had been performed, where isolates had shown catalase positive reaction and characteristic motility in semi-solid medium, producing umbrella-shaped growth at room temperature, confirming *Listeria monocytogenes*. Out of the 15 mastitic milk samples analyzed, 8 samples had been found positive, indicating a positivity rate of 53.33%. The study had demonstrated that targeted sampling of mastitic milk along with enrichment, LFA screening, and conventional culture and biochemical methods had provided an effective approach for isolation and detection of Listeria monocytogenes under field conditions.

Canola meal as poultry feed substitute

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Prolong dependence on soybean meal (SBM) for protein supplementation in commercial poultry has led to significant environmental and sustainability issues primarily due to over exploitation of land resources. Rising commodity prices and growing concerns over land use have further intensified the need to identify alternative, cost-competitive protein sources for poultry diets. Canola meal, a by-product of canola oil extraction, has emerged as a nutritionally credible and economically viable substitute for soybean meal in commercial poultry production. Canola meal can act as a vital protein source in poultry diets, offering a crude protein content ranging from 35–40%, along with a well-balanced amino acid profile particularly in methionine, lysine, threonine, cystine and tryptophan. Even though having lower metabolizable energy (ME) than soybean meal, it compensates through superior mineral density including higher calcium, phosphorus, selenium and magnesium levels. These micronutrients play a critical role in skeletal integrity, eggshell quality and overall metabolic function in layer and broiler birds. Studies have demonstrated that canola meal promotes better egg production performance in layer birds when included at optimized dietary levels.However, the broader adoption of canola meal in poultry nutrition is not without challenges. High concentration of fiber and anti-nutritional factors (ANFs) such as glucosinolates, sinapine, tannins and erucic acid limit its inclusion rate and overall digestibility. Glucosinolates in particular, when present beyond 1.4 µmol/g in the diet , adversely affect thyroid function and liver health. Sinapine is known to cause fishy off-flavors in eggs of certain brown-egg laying breeds, which poses a concern for marketability. Despite these limitations, strategic processing techniques such as dehulling, solvent extraction and enzyme supplementation have shown considerable promise in improving the nutritional value and palatability of canola meal. Inclusion of carbohydrase and protease enzymes helps breakdown fiber fractions and improves amino acid digestibility significantly. Economic analysis further supports its adoption, as partial replacement of soybean meal with canola meal at inclusion levels up to 20% can reduce feed cost substantially without compromising bird performance.This review article summarizes the nutritional characteristics, limitations and strategies to enhance the utilization of canola meal in poultry farming, reinforcing its potential as a sustainable long-term alternative to soybean meal.

Keywords: Canola meal, Soyabean meal, Glucosinolates , Anti-nutritional factor

Management of Equine purpura hemorrhagica

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Equine purpura hemorrhagica (PH) is an acute, non-contagious, immune-mediated, aseptic necrotizing vasculitis characterized by extensive subcutaneous edema, particularly affecting the face, muzzle, ventral abdomen, and distal limbs, often accompanied by petechial or ecchymotic hemorrhages. In severe cases, edema may progress to necrosis, and sloughing of the skin, resulting in granulating wounds and systemic complications. The underlying pathogenesis involves the deposition of antigen–antibody immune complexes, primarily consisting of immunoglobulins and streptococcal antigens, within the walls of small blood vessels, leading to complement activation, leukocytoclastic vasculitis, and vascular damage. This condition is widely recognized as a type III hypersensitivity reaction. PH is most commonly associated with prior infection or vaccination against Streptococcus equi, the etiological agent of strangles, typically developing within 2–4 weeks following exposure. However, cases without a clear history of infection have also been reported, suggesting the involvement of other antigenic triggers or idiopathic mechanisms.

In this article, we explore the potential progression of a subacute strangles infection leading to PH, along with successful clinical management and wound healing in an affected horse using unconventional therapeutic approaches.

Bioconversion of Whey into High Protein & High Lipid Animal Feed Supplement Using Food Grade Oleaginous Yeasts

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Whey is produced in large quantities around the world, but only about half of it is used in human consumption and animal feed. The value of employing whey lactose for single cell oil production is obvious, since it would drastically reduce production costs while also tackling an environmental problem without competing with human food production. However, the cost of single cell oil production still remained a high-risk business owing to its limited conversion rate from second generation substrates and downstream processing requirements. We studied two yeast isolates (*Candida zeylanoides* CHV & *Candida metasilopsis* IY) from dairy products that may accumulate cytoplasmic lipid granules using whey as a substrate. The growth rate and lipid production from our two oleaginous yeasts, along with the reference strain *Blastobotrys adeninivorans* MTCC 2516 was observed in whey-based media formulation. The highest lipid content of 77.92 ±7.79% of dry cell mass was harvested from *B. adeninivorans* MTCC 2516 followed by CHV (76.17 ± 8.43%) and IY (75.79 ± 3.06%) isolates in early stationary phase (ES). The relative conversion of whey into % lipid, carbon, nitrogen and ash content were observed. The most efficient conversion of whey media in value added components was done by yoghurt isolate IY that exhibited highest relative 54% lipid content followed by 41% carbon content as well as lowest 1% ash content of its dry cell mass in late stationary phase (LS). However, the relative highest 8 to 7% nitrogen content was recorded in cheese isolate CHV at ES and LS. Hence, the efficient conversion of whey-based feedstock into food grade oleaginous yeasts in our study will provide a more acceptable nutrient rich option for animal, poultry and aqua feed supplements.

Keywords: Oleaginous yeasts, Whey bioprocessing, Whey upscaling, Single cell oil, Single cell protein.

Antibiotic Use and Antimicrobial Resistance: A Study of Knowledge, Attitudes, and Practices among Dairy Farmers

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Antibiotic misuse in dairy farming has emerged as a critical concern due to its contribution to antimicrobial resistance (AMR), posing risks to both animal and public health. The present study employed an ex post facto research design to assess the knowledge, attitudes, and practices (KAP) of dairy farmers regarding antibiotic use and antimicrobial resistance in Western Maharashtra. A total of 200 dairy farmers were randomly selected from the districts of Satara, Sangli, Kolhapur, Ahilyanagar, and Pune. Data were collected through a structured interview schedule and analysed using appropriate statistical methods. The findings revealed that most respondents belonged to the medium category across key socio-economic and communication variables, including age, family size, landholding (48%), herd size (83%), social participation (80%), and extension contacts (53.33%). Regarding KAP dimensions, a majority of farmers exhibited medium levels of knowledge (80.33%), attitude (68.33%), and practices (78.33%). Although farmers commonly used antibiotics for animal treatment, their understanding of appropriate usage, dosage, storage, withdrawal periods, residual effects, and risks of human exposure remained limited to moderate. Notably, awareness of antimicrobial resistance was particularly low. Furthermore, most respondents demonstrated an unfavourable attitude and suboptimal practices concerning antibiotic use and AMR. The study highlights a significant gap in awareness and rational antibiotic usage among dairy farmers. Therefore, targeted educational interventions are essential to promote judicious antibiotic use and mitigate the risks of antimicrobial resistance. Extension strategies such as training programmes, awareness campaigns, workshops, and field demonstrations should be strengthened, considering farmers' socio-economic and communication contexts. These efforts are crucial for fostering behavioural change and safeguarding public health.

Keywords: Antibiotic use, antimicrobial resistance, dairy farmers, knowledge, attitude, practices.

Efficacy of Polyherbal Formulation in Broiler Chickens: Cecal Microbiome Restoration and Cytokine Expression during Experimental Colibacillosis

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In response to the growing threat of antibiotic resistance in poultry production, this study investigated the protective effects of a polyherbal formulation (fermented and non-fermented aqueous extracts) in broiler chickens challenged with *Escherichia coli*. A total of 150 one day old Vencobb 400 broiler chicks were divided into five groups: Environmental control (G1), infection control (G2), non-fermented extract treated (G3), fermented extract treated (G4) and a safety group (G5), receiving only fermented extract. Over a 42-day experimental period, the birds were monitored for growth performance, hematobiochemical, immunological, oxidative stress, gut microbiome status and histopathological parameters. Treatment normalized hematobiochemical parameters, signifying hepatoprotective and nephroprotective effects of polyherbal formulation. Antioxidant status improved, and significant reductions in CRP and TNF-α levels were observed, particularly with fermented extract. Molecular analysis revealed upregulation of anti-inflammatory cytokine IL-10 and downregulation of pro-inflammatory cytokine IL-8 in G4, affirming its immunomodulatory potential. Microbiome profiling demonstrated that treatment with fermented polyherbal extract led to notable shifts in gut microbial diversity and composition. The Shannon diversity index, a measure of microbiome richness and evenness, was highest in G4, indicating a well balanced and diverse microbial ecosystem compared to the infection control and non treated groups. Histopathological analysis confirmed that the extracts preserved tissue integrity in the liver and intestine. In a nut shell, the polyherbal formulation particularly its fermented form demonstrated protective, antimicrobial, antiinflammatory, antioxidant and immunomodulatory effects in *E. coli* infected broiler chickens.

Post Biotics: The Future of Animal Nutrition

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Antibiotics have been used for over seventy years to ensure animal health, growth potential and enhance their productivity. However, this action has led to negative consequences resulting from the inappropriate and excessive use of antibiotics, which has led to the development of antibiotic-resistant bacteria and high levels of antibiotic residues in animal products. Postbiotics, which refer to microbial compounds that are not alive, have emerged as a promising substitute for antibiotics due to their observed beneficial impacts on the health and growth of poultry when incorporated into their diets. Postbiotics are metabolic products produced by lactic acid bacteria. Any substance of bacterial or fungal origin that has a favourable impact on the host but does not fit the criteria for a probiotic and is not primarily of a prebiotic nature is assumed to fall under the postbiotic category. Postbiotics offer several advantages over well-known pre-and probiotics. Prebiotics first need to selectively stimulate the growth of beneficial bacteria, while probiotics need to become active in the digestive tract and start producing active components. In contrast, postbiotics already contain their active components in large amounts, since these are produced in large numbers during the fermentation process. Therefore, they can act immediately on the microbiota and intestinal epithelial cells. Postbiotics can improve the intestinal barrier, reduce inflammation, and inhibit pathogenic bacteria. They can also promote beneficial bacteria in the gut. Postbiotics have antioxidant, immunomodulatory, and anti-inflammatory properties. Postbiotics inhibit the growth and proliferation of various pathogen species in the gut. In general, the beneficial effects of postbiotics on poultry can be attributed to various mechanisms, including promotion of food digestibility and intestinal morphological development, competitive exclusion and antagonism of pathogens, modification of the gut microbiota, generation of antimicrobial compounds, and activation of the immune system. Postbiotics can be considered as a promising part of the future of animal nutrition because they can improve animal health and productivity, and reduce the need for antibiotics.

Influence of Dietary Feed Additives on Body Condition Score of Lactating Sahiwal Cows

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The present investigation was conducted to assess the effect of monensin sodium, yeast metabolites and neem (*Azadirachta indica*) leaf supplementation on body condition score (BCS) of lactating Sahiwal cows. Twenty-four freshly calved cows were randomly selected and allotted to four dietary treatments with six animals in each group at Bull Mother Experimental Farm (BMEF) Anjora, Durg, Chhattisgarh , India. Animals in the control group were maintained on a basal diet, whereas those in the treatment groups (T_1, T_2, and T_3) received the basal diet supplemented with monensin sodium, yeast metabolites and neem leaf, respectively. Body condition score (BCS) of the cows was recorded on days 0, 30, 60, and 90 of the experimental periods using a standardized 5-point scoring system. Analysis of variance indicated that there were no significant differences in BCS among the treatment groups at any stage of the study. The initial BCS values were comparable across all groups, confirming the homogeneity of animals at the commencement of the experiment. Although slight numerical increases in BCS were observed over time, the pattern of change remained similar across all treatment groups. The BCS values were maintained within the optimal physiological range throughout the experimental period, indicating that the basal diet adequately met the animals' energy requirements and that supplementation did not significantly influence body energy reserves. These findings suggest that monensin sodium, yeast metabolites and neem (*Azadirachta indica*) leaf can be incorporated into the diets of lactating Sahiwal cows without significant change in body condition.

Keywords: Body Condition Score, Monensin Sodium, Yeast Metabolites, Neem Leaf, Sahiwal Cow.

Visnagin ameliorates 5-Fluorouracil induced cardiotoxicity through modulation of NF-κB pathway

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Visnagin (Vis) is a flavonoid compound with an anti-oxidant, anti-inflammatory,anti-atherogenic and antifibrotic properties. The present study evaluated the ameliorative effects of Vis against cardiotoxicity induced 5-Fluorouracil (5-FU) in male albino *Wistar* rats. A total of 48 adult rats were divided into 4 groups (12 animals each) where group 1 rats served as normal control, groups 2, 3, and 4 rats were administered with 5-FU (5 mg/kg BW/day) for 1st 5 days, Vis (100mg/kg BW/ day) orally and NG + 5-FU respectively, for 28 days. Six rats from each group were sacrificed on the 14th and 28th day of the experiment, and heart was collected for various analyses. The present study revealed in group 2 rats, a significant ($P<0.05$) increase in cardiac markers (CK-MB, CTn-I, CRP, LDH, and ALP), and lipid profile assay (TG, TC, and LDL-c) except HDL-c. Similarly, a significant ($P<0.05$) increase in inflammatory cytokine levels of TNF-α, IL-1β, and IL-6 and a significant ($P<0.05$) decrease in IL-10 levels in heart tissues. Also, there was a significant ($P<0.05$) increase in TBARS and a significant ($P < 0.05$) decrease in GSH and SOD concentration compared to group 4 rats were observed. Further, the heart weights and ventricular wall thickness were increased significantly in group 2 rats. Also, by light microscopy, group 2 exhibited severe degenerative changes in heart sections along with ultrastructural changes, which showed intermuscular hemorrhages and degenerative cardiac myocytes with mild fibrous tissue proliferation. Furthermore, Immunohistochemically, heart sections revealed strong immunopositivity for NF-κB. A moderate reduction in the intensity of tissue damage was observed in all the parameters studied in group 4 rats compared to group 2 rats. In conclusion, these results suggested that administration of Vis showed ameliorating action against 5-FU-induced cardiotoxicity through modulating NF-κB pathway and restoration of anti-oxidant status. Therefore administration of Vis could use for the management of 5 FU induced cardiotoxicity.

Keywords: 5-Fluorouracil, Cardiotoxicity, Visnagin, NF-Kb, Inflammatory cytokines and Antioxidants.

Evaluation of Clinico-Physiological and Haemodynamic Parameters Following Propofol-Isoflurane Anaesthesia Alongwith Various Premedicants for Balanced Anaesthesia in Dogs

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The present study was conducted at Department of Veterinary Surgery and Radiology, TVCC, Durg (C.G.) to evaluate the alternations on clinico-physiological and haemodynamic parameters following propofol-isoflurane in dogs premedicated with dexmedetomidine, midazolam, butorphanol or buprenorphine or tramadol. Eighteen adult dogs of either sex were randomly divided into three groups with six animals in each. Initially, glycopyrrolate is administered @ 0.01 mg/kg I/M. Then 15 minutes prior to the anaesthetic administration, all the dogs of group A, B and C were premedicated intramuscularly with dexmedetomidine @ 10 µg/kg b.wt., midazolam @ 0.2 mg/kg b.wt. In group A butorphanol @ 0.2 mg kg b.wt., group B buprenorphine @ 10 µg/kg b.wt. and group C tramadol @ 2 mg/kg b.wt. was administered intramuscularly. General anaesthesia was induced with propofol @ 4 mg/ kg b.wt. intravenously and maintenance was done with 1-2% isoflurane. Clinical parameters were recorded following propofol-isoflurane anaesthesia. Physiological and haemodynamic parameters were recorded at different time interval. Duration of anaesthesia and complete recovery were significantly ($p<0.05$) longer in group B as compared to group A and C. The physiological and haemodynamic parameters showed transient changes which remained within normal range during the study. Thus, propofol-isoflurane can be safely and effectively used as balanced anaesthesia in dogs premedicated with either dexmedetomidine or midazolam or butorphanol or buprenorphine or tramadol does not produce any adverse effect on cardiopulmonary system. However, dexmedetomidine-midazolam-buprenorphine-propofol-isoflurane combination provided superior balanced anaesthesia in dogs as compared to other groups.

Ageratum houstanianum poisoning in a Buffalo

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Ageratum poisoning is an under-recognized but significant toxicological condition affecting livestock. Ageratum houstonianum, commonly known as floss flower contains toxic compounds like coumarins and pyrrolizidine alkaloids which exert anticoagulant and hepatotoxic effects. A case of suspected Ageratum poisoning in a buffalo was presented to RVP ICAR-IVRI, Izzatnagar with clinical signs of dyspnea, bloody feces, anorexia following plant ingestion in the grazing field. Despite initiation of Vitamin K and other supportive therapy, the delay of approximately two days post exposure significantly reduced therapeutic effectiveness and the animal succumbed to the condition. Laboratory findings revealed elevated bilirubin and SGPT, indicating severe hepatic damage.This case highlights the rapid progression and poor prognosis associated with delayed intervention in plant toxicities. Farmer awareness regarding identification and removal Ageratum from grazing areas along with timely reporting of clinical signs, is essential to prevent economic losses and improve animal survival outcomes.

Arsenic toxicity in arsenic-prone area of Rajnandgaon district of Chhattisgarh

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Fifty four milch cattle were selected randomly from nine block of Rajnandgaon district of Chhattisgarh. Milk, feces and hair samples were collected to analyze arsenic status in animals. Water and straw samples were also estimated for arsenic. Milk products prepared from milk of cattle rearing in arsenic prone village were also collected to quantify total arsenic and speciation of arsenic in milk and feces samples were also carried out. It was observed that high amount of arsenic was present in milk, feces, hair of cattle and water and straw samples in arsenic prone village. Milk product also contained significant amount of arsenic than that of milk product of control village. Speciation study revealed arsenite fraction was mainly eliminated through milk, whereas organ arsenic species were mainly excreted through feces.

Keywords; Arsenic, Milk Products, Soil sample, Straw, faeces

Artificial Intelligence in Veterinary Diagnostics: From Stethoscope to Smart System

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Artificial Intelligence (AI) is rapidly transforming veterinary diagnostics by advancing clinical practice from traditional tools such as the stethoscope to integrated smart systems capable of faster, more accurate, and data-driven decision-making. Conventional diagnosis relies on physical examination, auscultation, imaging, and laboratory interpretation; however, these approaches may be limited by subjectivity and delayed recognition of subtle abnormalities. AI technologies, including machine learning, deep learning, and computer vision, are now enhancing diagnostic precision across companion animal and livestock medicine. Modern applications include automated radiograph interpretation, detection of ear and skin lesions, reproductive ultrasonography in cattle, wearable biosensors for herd health surveillance, AI-based detection of left atrial enlargement on canine thoracic radiographs, and deep learning classification of chronic kidney disease in dogs using ultrasonography (Shen et al., 2020; Yu et al., 2023). AI-assisted diagnostic platforms such as IDEXX Imagyst further demonstrate integration of intelligent systems into routine practice through rapid analysis of fecal samples, blood smears, urine sediment, and cytology slides, thereby improving workflow efficiency and reducing turnaround time (IDEXX Laboratories, 2026). Recent advances in deep learning also support early identification of tumors, musculoskeletal disorders, and metabolic diseases through imaging analytics (Xiao et al., 2025). Despite these benefits, challenges remain regarding algorithm validation, data privacy, clinician trust, and implementation cost. Overall, AI is redefining veterinary diagnostics by combining traditional clinical expertise with intelligent automation, enabling earlier diagnosis, personalized treatment, and improved animal welfare in the era of precision veterinary medicine.

"Unveiling the Prevalence of Shigatoxigenic and Enteropathogenic *E. coli* in Wild Cervid Populations of India: A Public Health Concern"

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In the India, deer are most well-Known and widely dispersed animals. Among diverse pathogens infecting wild animal, *Escherichia coli* is a highly diverse group of Gram-negative bacteria and is also a common member of the intestinal microflora of humans and animals. Generally, infection is asymptomatic; however, some *E. coli* strains have evolved to become pathogenic causing clinical disease in susceptible hosts. Enteropathogenic (EPEC) and Shigatoxigenic *Escherichia coli* (STEC) are among important pathogens that are of major animal and public health concern world-wide. The aim of this study was to determine virulence gene profile of STEC and EPEC isolated from wild Cervidae like Spotted deer, Sambhar, Barking deer, Hog deer, Manipuri deer, Sika deer and Swamp deer. Fresh faecal samples (n=151) collected from various zoological gardens and enclosures in India were processed for the isolation of *E. coli*, followed by pathotyping by multiplex PCR. Total 89 isolates were identified as *E. coli*, and 14 isolates were successfully pathotyped. EPEC was found to be the predominant pathotype with 7.8% isolation rate, followed by STEC (4.49%) and EPEC (3.37%). In seven STEC/AE-STEC isolates stx_1 gene was detected in 6 isolates (42.85%), stx_2 gene in 4 isolates and two AE-STEC isolates harbored both stx_1/stx_2 genes. Further, only *eaeA* (Enteropathogenic) and *hlyA* were detected in 9 and 7 isolates, respectively. Pathotyping revealed that 14 isolates belonged to 13 different serogroups viz O157, O101, O121, O149, O111, O109, O84, O126, O126, O7, O11 and O145. Five isolates were assigned to top six specific serotypes (O157, O121, O111, O118 and 1 were O145). Findings indicate that, wild Cervidae may be carrier of potentially pathogenic STEC and EPEC strains. The presence of STEC in wild Cervidae presents possibility of spread of zoonotic *E. coli* among man and animals exposed to faeces from infected cervids. High incidence of STEC in captive wildlife presents risk to caretakers and visitors at zoos, particularly young children commonly visit zoos and other animal parks and are thus likely to become infected and potentially suffer severe complications such as haemolytic uremic syndrome (HUS). Thus, wild animals are potential STEC transmission vehicles to and from domesticated animals, cattle and humans. Therefore, and following the One Health approach, it is of utmost importance to implement ongoing wildlife surveillance programs to safeguard the human population living close to the forest.

Keywords: Shiga-toxin producing *Escherichia coli*, Enteropathogenic *Escherichia coli* Prevalence, Virulence factors, Wild Cervidae.

SWOT Analysis of Edible Insects as an Alternative Protein Source: Feasibility, Challenges, and Future Prospects

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The increasing global demand for sustainable and nutritionally efficient protein sources has led to growing interest in edible insects as a viable alternative. This study presents a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to evaluate the feasibility and future potential of insect-based protein. The analysis systematically examines internal and external factors influencing their acceptance and large-scale adoption. The findings highlight key strengths such as high feed conversion efficiency, lower resource requirements (land and water), environmental sustainability, and significant market potential in animal feed and pet food sectors. However, several weaknesses were identified, including safety concerns related to microbial hazards and parasitic contamination, limited consumer awareness, and cultural taboos associated with insect consumption. Opportunities were largely driven by increasing global protein demand, potential cost-effectiveness through large-scale production, and expanding research in insect-based food technologies. Conversely, major threats include lack of awareness regarding food safety, social acceptance challenges, and competition from alternative protein sources such as plant-based and cultured meat products. Overall, the study indicates that while edible insects offer substantial environmental and economic advantages, addressing safety concerns, improving consumer awareness, and strengthening regulatory frameworks are essential for their successful integration into mainstream food systems.

Keywords: Edible insects, SWOT analysis, Alternative protein, Food security, Sustainability

Livestock Health Management Practices Followed by Commercial Dairy Farmers in Buldana District of Maharashtra

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Livestock health management is essential for maintaining dairy productivity and reducing economic losses among farmers. However, variations in disease control, preventive healthcare, and biosecurity practices can significantly affect farm efficiency. The present study was conducted to assess disease outbreaks, vaccination, deworming practices, veterinary service utilization, and biosecurity measures followed by commercial dairy farmers in Buldana district of Maharashtra. The research was carried out using an ex-post facto research design, covering 65 dairy farms selected through appropriate sampling methods. Data were collected using a pre-structured interview schedule and analysed using frequencies and percent. These findings revealed that only (4.62%) of farmers experienced disease outbreaks, predominantly Lumpy Skin Disease (4.62%), followed by Foot and Mouth Disease (1.54%), while (95.38%) reported no outbreaks. Vaccination practices showed strong adoption, with (100%) of farmers administering the Foot and Mouth Disease vaccine and (72.31%) adopting Lumpy Skin Disease vaccination. The HS+BQ vaccine was used by (50.77%) of farmers, whereas Brucella vaccination was minimally practiced (3.08%). Deworming practices varied, with (46.15%) of farmers deworming thrice annually, followed by (27.69%) four times, (23.08%) twice, and 3.08% once a year. Regarding veterinary services, (73.84%) of farmers relied on Livestock Supervisors, while (24.62%) used both veterinarians and supervisors, and (1.54%) managed independently. Biosecurity measures were inconsistently adopted, with proper fencing being the most common (86.15%), whereas isolation facilities (12.31%), disinfectant use (6.15%), quarantine facilities (4.62%), and visitor record maintenance (1.54%) were limited. Notably, (10.77%) of farmers did not adopt any biosecurity measures. The study highlights critical gaps in biosecurity and preventive healthcare practices despite good vaccination coverage, emphasizing the need for improved awareness and extension services to enhance sustainable dairy farming.

Role of Essential Oil-Based Teat Dip in Improving Milk Physico-Chemical Characteristics in Dairy Cows

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The present study was conducted to evaluate the effect of an essential oil-based teat dip on milk composition parameters, specifically solids-not-fat (SNF), protein, lactose, and pH, in crossbred cows. A total of 36 lactating crossbred cows were selected from Shri Gorakshan Sanstha, Akola, and randomly divided into three groups: control (T_0), iodine-based teat dip (T_1), and essential oil-based teat dip (T_2). The experiment was carried out over a period of 90 days.The results revealed significant improvement in milk composition parameters in the T_2 group compared to T_0 and T_1. The SNF content increased significantly ($p<0.05$) in T_2 (8.55±0.11%) compared to T_0 (7.76±0.20%). Similarly, milk protein percentage was higher in T_2 (3.22±0.12%) than in T_0 (2.76±0.11%). Lactose content also showed a significant rise in T_2 (4.48±0.09%) compared to the control group (3.73±0.10%). The improvement in these parameters indicates better milk quality and udder health in cows treated with essential oil-based teat dip.Milk pH remained within the normal physiological range in all groups; however, T_2 recorded the lowest pH (6.77±0.08), indicating better milk stability and reduced microbial load, whereas T_0 showed an increased pH (7.20±0.04), suggesting compromised milk quality. The observed improvements in SNF, protein, lactose, and pH in T_2 may be attributed to the antimicrobial and anti-inflammatory properties of essential oils, which help in maintaining udder health and reducing subclinical mastitis.In conclusion, the essential oil-based teat dip proved to be effective in enhancing milk composition and maintaining optimal pH, thereby improving overall milk quality. It can be considered a promising alternative to conventional iodine-based teat dips in dairy management.

Development of one-step multiplex PCR for species-level confirmation of zoonotic Mycobacterium tuberculosis complex (MTBC)

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Mammalian tuberculosis (TB) is one of the most important zoonotic infectious diseases of animals and humans, caused by the members of closely related *Mycobacterium tuberculosis* complex (MTBC). Elimination of tuberculosis in humans is only feasible; only if it is also controlled in animals. Hence, species-level identification of MTBC is urgently required to identify the risk factors in the transmission of these zoonotic pathogens in animal-human interface. Although probe-based real-time PCR is currently available for species-level confirmation of MTBC, this may not be feasible in most laboratories due to the requirement of high-cost instrumentation and expensive reagents. Hence, we set out a goal to develop a low-cost, one-step sensitive multiplex PCR for species-level confirmation of MTBC of animal origin viz, *M. tuberculosis*, *M. orygis*, *M. caprae*, *M. bovis* and *M. bovis* BCG. A total of 40 Mycobacterial isolates including 10 reference strains [3 MTBC species i.e. *M. tuberculosis* H37Rv, *M. bovis* AN5, *M. bovis* BCG and 7 non-tuberculous Mycobacteria (NTM) i.e. *M. fortuitum*, *M. scrofulaceum*, *M. kansasii*, *M. smegmatis*, *M. gordonae*, *M. gastri*, and *M. chelonae*], 22 clinical MTBC isolates of animal origin, characterized by whole genome sequencing [*M. orygis* (n=19), *M. caprae* (n=3)] and eight clinical MTBC isolates characterized by standard real-time PCR were considered for determination of the relative sensitivity and specificity of the assay. The species-specific novel molecular target sequences in various regions of difference (RDs) were identified by whole genome analysis and bioinformatic tools to design primers viz., RD1(Rv3784-Rv3786) for all MTBC except *M. bovis* BCG; RD4(Rv1498c-Rv1499) specific for *M. tuberculosis* and *M. orygis*; RD4(Rv1498cRv1515c) for confirmation of *M. caprae* and RD4(Rv1516c-Rv1517) to identify *M. bovis* and *M. bovis* BCG, whereas the RD9-specific primers published earlier were used for confirmation of *M. tuberculosis*. The multiplex PCR was found 100% sensitive and specific for species-level confirmation of MTBC and could detect up to 1 pg Mycobacterial DNA, compared to 0.5 pg DNA through real-time PCR . Further, all five MTBC species were successfully detected by this assay down to 12 CFU/mg in the spiked lung samples.

Keywords: MTBC, Multiplex PCR, Zoonoses.

Development of Rapid and Accurate Differential Diagnostic PCR for MTBC and NTM infections: A Sensitive Assay for Clinical Practice

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Tuberculosis (TB) is a major global health concern, with *Mycobacterium tuberculosis* complex (MTBC) species being the primary causative agent. However, infections caused by non-tuberculous mycobacteria (NTM) have been increasingly reported worldwide. The inability to differentially diagnose NTM infections from MTBC frequently results in the misdiagnosis of respiratory illness with clinical signs of coughs, fevers, and weight loss as TB. This ultimately leads to ineffective empiric therapy, which is time-consuming, costly, and hazardous, and leads to the emergence of TB drug resistance. Conventional diagnostic methods, such as culture and microscopy, have limitations in terms of sensitivity and specificity. Therefore, highly sensitive molecular diagnostic techniques have appeared more demanding, particularly for rapid confirmation of NTM and MTBC. In this regard a 100% sensitive and specific multiplex PCR assay has been developed to differentiate *Mycobacterium* spp. as MTBC or NTM using highly efficient available primers after thorough in-silico analysis. The Mycobacteria-specific primers targeting 16S rRNA (Wilton and Cousins, 1992) and hsp65 gene (Telenti *et al*., 1993) were used to detect all Mycobacterial species with PCR products of 1030bp and 441bp, respectively and for confirmation of MTBC among all Mycobacteria, the novel insertion sequence IS1081 based primers were selected (Liebana *et al*., 1996) producing 238bp sized amplicon when analysed with a total of 40 reference and clinical isolates. Screening of serially diluted DNA and tissue samples spiked with serially diluted reference cultures indicated that the assay could detect up to 5 pg/µl of mycobacterial DNA and 12-16 CFU/mg in spiked lung tissue. Moreover, screening of limited clinical isolates ensured the application of the assay with 100% fidelity in detecting target DNA sequences in field-level TB diagnosis.

Keywords: Tuberculosis, NTM, MTBC, Molecular diagnostic techniques, Multiplex PCR

Antimicrobial Activity of Green-Synthesized Iron Oxide Nanoparticles against Bovine Wound Pathogens

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Iron oxide nanoparticles (IONPs) have emerged as the most versatile nanoparticle due their unique physicochemical properties such as superparamagnetism, biocompatibility and chemical stability which makes them indispensable application in biomedical sciences. However, the antimicrobial properties Green Synthesized IONPs from *Moringa oleifera* have not been explored. Therefore this study was carried out with objective of evaluating the antimicrobial activity of green synthesized IONPs. In this study, the IONPs were synthesized from Ferrous Sulphate heptahydrate by *Moringa oleifera* leaf extracts and characterized by Transmission electron microscopy, UV-Vis Spectroscopy, Fourier transform infrared spectroscopy and Dynamic light scattering. The size and lambda max of Green IONPs was found 30-40 nm and 370 nm respectively. The zeta potential was found around -37.5 mV and extra Hydroxyl group (-OH) was found over the surface of Green IONPs. The antimicrobial activities of Green Synthesized IONPs against *P. aeruginosa* and *S. aureus* were also evaluated and the minimum inhibitory concentration (MIC_{50} value) was found around 47.10 and 48.93 $\mu g.ml^{-1}$ against *P. aeruginosa* and *S. aureus* respectively. Therefore, green IONPs would be a potential antimicrobial agent in place commercially available antibiotics against aforesaid organisms in nearest future.

Keywords: Iron oxide nanoparticles (IONPs), *Moringa oleifera*, Transmission electron microscopy, UV-Vis Spectroscopy, Fourier transform infrared spectroscopy and Dynamic light scattering.

From Cure to Complication: Renal Dysfunction Following Treatment for Feline Infectious Peritonitis.

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Feline Infectious Peritonitis (FIP) is a severe, historically fatal viral disease of cats; however, recent advancements in antiviral therapy, particularly the use of GS-441524, have markedly improved clinical outcomes. Despite these therapeutic successes, post-treatment complications are increasingly being recognized. This report describes a 2-year-old intact queen presented with dysuria, polydipsia, and intermittent urine spraying following completion of an antiviral treatment course for FIP. Clinical examination revealed lethargy and mild dehydration. Hematobiochemical evaluation demonstrated leukocytosis characterized by neutrophilia, azotemia, hyperglobulinemia with a decreased albumin-to-globulin ratio, and mild elevation of hepatic enzymes, findings consistent with systemic inflammation and renal involvement. The case was managed with antimicrobial therapy, fluid therapy, and implementation of a specialized renal diet, alongside continuous monitoring of renal function parameters. The clinical findings suggest that renal dysfunction likely resulted from a combination of immune-mediated mechanisms associated with FIP and potential treatment-related effects. This case underscores the importance of routine renal monitoring in cats undergoing or recovering from FIP therapy, enabling early detection and timely management of renal complications, thereby improving overall clinical outcomes.

Early pregnancy diagnosis using color Doppler ultrasonographic monitoring of luteal blood flow and growth dynamics in cattle

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Early pregnancy diagnosis is essential for reducing calving intervals by enabling early identification of non-pregnant animals and timely rebreeding. The corpus luteum (CL) is a highly vascularized, transient endocrine gland that produces progesterone (P4), which is necessary for maintenance of pregnancy. Luteal blood flow has been reported to be a more reliable indicator of CL function and serum progesterone levels than CL size, particularly during the regression phase. Therefore, evaluation of luteal blood flow using color Doppler ultrasonography may serve as a dependable method for early pregnancy diagnosis. The present study aimed to evaluate CL growth dynamics and luteal blood flow changes in relation to early pregnancy in Deoni cows. A total of 18 multiparous cows (3–5 parity) were selected. Ultrasonographic examinations and serum progesterone estimations were carried out on days 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 33, 40, and 47 post-estrus, or until the next estrus occurred, with or without insemination. Grayscale (B-mode) ultrasonography was used to assess CL morphometry, including luteal diameter, tissue area, and volume, while color Doppler was employed to evaluate luteal blood flow area. Based on per rectal pregnancy diagnosis on day 47, cows were retrospectively categorized into three groups: pregnant (n = 6), inseminated non-pregnant (n = 6), and non-bred cyclic control cows (n = 6). In pregnant cows, CL morphometry and blood flow area progressively increased from day 5 to day 47, whereas these parameters declined from day 19 in both non- pregnant and cyclic control cows. On day 19, CL diameter, volume, and tissue area were significantly higher ($P< 0.05$) in pregnant cows compared to the other groups. Similarly, luteal blood flow area was significantly higher ($P< 0.05$) in pregnant cows on day 19. Although the vascularity index showed a similar trend, the differences were not statistically significant. Serum progesterone concentrations declined from day 17 in non-pregnant and cyclic control cows, while significantly higher levels ($P< 0.05$) were observed in pregnant cows on day 19. In conclusion, increased CL morphometry and luteal blood flow area on day 19 are indicative of pregnancy and closely reflect serum progesterone levels. These parameters may serve as effective, non-invasive predictors for early pregnancy diagnosis in Deoni cows.

Keywords: Cattle, Color Doppler ultrasonography, Corpus luteal blood flow, Early pregnancy diagnosis, Progesterone.

Caring Beyond Cure- Holistic Practices in Animal Healthcare

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Holistic animal care means looking after an animal's whole well-being which involves the treatment of whole animal, including physical, behavioural, environmental and nutritional factors alongside conventional modern measures. It's like caring for a family member, not just fixing them when they are sick. The idea of holistic animal health care practices aligns closely with WHO concept of one health which recognizes the interconnectedness of animal, human, and environmental health. Holistic animal healthcare approach includes complementary and alternative veterinary medicine which is based on acupuncture, herbal medicine, homeopathy, physiotherapy and ethno-veterinary practices- which involves the use of traditional knowledge using plant based remedies and indigenous practices, which leads to low cost and less use of medicines and more natural, responsible animal farming, particularly essential for livestock healthcare in remote regions. Also animal nutrition, plays a central role in holistic animal health, with the help of balanced diets, use of probiotics and mineral supplementation helps in improving the immunity and reduced disease incidence. Stress reduction, improved housing and hygiene and environmental enrichment, enhances the productivity and animal welfare, especially in dairy and poultry systems. Holistic animal healthcare contribute to sustainability in several ways- which includes reduced antibiotic resistance, by using herbal and natural therapies, environmental protection and by biodiversity conservation. Complementary and alternative veterinary medicine includes therapies such as Chiropractic care, Aromatherapy, Laser therapy, Hydrotherapy .Despite many advantages, several barriers limit the promotion of holistic animal healthcare, which includes lack of scientific validation because many therapies lack strong clinical evidence and standardized testing, also the dose differences. Even the veterinary professionals often lack formal education in holistic approach and the lack of policies. The risk of misuse of relying a lot on alternative therapies may delay essential medical treatment. To promote the holistic animal healthcare practices, clinical trials should be conducted to validate the therapies by integrating traditional knowledge with modern science and by developing standard treatment protocols, promoting interdisciplinary research and including alternative veterinary medicine in veterinary education and training. With the help of these approaches, holistic animal healthcare offer a promising approach to improving animal health, welfare and sustainability.

Keywords: One health, WHO, sustainable livestock production, animal nutrition, antimicrobial resistance, alternative veterinary medicine.

Knowledge of Farmers towards Fodder Production and Its Utilization

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The present study assessed the knowledge of farmers regarding fodder production and its utilization in irrigated (non-kandi) and rainfed (kandi) regions of Jammu district. A total of 154 respondents (66 non-kandi and 88 kandi) were selected) were selected to evaluate their knowledge across various dimensions including crop selection, cultivation practices, advanced techniques, preservation methods, feeding practices, non-conventional feed resources, and market linkages. The findings revealed that farmers in both regions possessed moderate levels of knowledge, with the majority falling under the medium category (non-kandi: 67%; kandi: 72%). The overall mean knowledge scores of non-kandi (25.65±2.86) and kandi (25.82±2.71) farmers did not differ significantly. The overall knowledge gap was found to be 49 per cent in both regions, with the highest gap observed in fodder preservation and quality improvement techniques (71% non-kandi; 75% kandi), followed by non-conventional feed resources and anti-nutritional factors. In contrast, relatively lower gaps were found in livestock feeding practices and market-related knowledge. Regression analysis indicated that fodder farming experience, annual income, landholding size, training, and education significantly influenced knowledge levels. The study highlights the need for targeted capacity-building programs focusing on advanced fodder production technologies, preservation methods, and non-conventional feed resources to bridge existing knowledge gaps and enhance livestock productivity in the region.

Keywords: Fodder production, Knowledge level, Knowledge gap, Fodder utilization, Non-conventional feed resources (NCFR), Livestock feeding practices.

Comparative Efficacy of Betaine, Herbal Choline and Synthetic Choline on Broiler Carcass Traits under Sulfur Amino Acid Deficiency

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An experiment evaluated the effects of betaine, herbal choline chloride (HCC), and synthetic choline chloride (SCC) on carcass parameters in broilers fed a 10% methionine and cysteine (SAA) deficient diet. The research design utilized 240 day-old Vencobb-430Y broiler chicks, randomly allocated into four treatments over 42 days: T0 (control, adequate SAA), T1 (10% SAA-deficient + 0.086% HCC), T2 (deficient + 1 g/kg betaine HCl), and T3 (deficient + 550 mg/kg SCC). Carcass parameters were measured at slaughter, and data were analyzed by one-way ANOVA. Betaine HCl (T_2) significantly improved carcass performance. Final live weight (2554.9 g) was higher than control (2503.8 g; $P = 0.010$), and T_2 had the highest dressed weight (1848.5 g) and yield (72.35%) among groups ($P<0.001$ and $P=0.010$, respectively). Abdominal fat was lowest in T_2 (24.32 g; 0.95%) versus controls (27.03 g; 1.08%), with highly significant reduction ($P<0.001$). Correspondingly, eviscerated meat weight and yield were greatest in T_2 (1742.5 g and 68.20%; both $P<0.01$), indicating leaner carcasses. By contrast, T_1 (herbal choline) showed only moderate improvements and T_3 (synthetic choline) resembled T_0. No significant differences were observed in giblet weight or percentage ($P>0.10$). In summary, under sulfur amino acid deficiency, dietary betaine HCl at 1 g/kg markedly increased carcass yield and reduced fat deposition, whereas giblet proportions remained unchanged. These results support using betaine as an effective methyl donor to enhance carcass traits in broiler diets limited in methionine and cysteine. It is concluded that incorporating 1 g/kg betaine HCl into SAA-deficient formulations confers significant biological advantages to absolute carcass mass, eviscerated meat indices, and abdominal fat mitigation, confirming its superiority over conventional choline supplements.

Comparative Evaluation of Betaine, Herbal and Synthetic Choline Chloride on Blood Biochemical and Immunological Indices of Broilers Fed Methionine and Cysteine Deficient Diets

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This experiment aimed to compare the effectiveness of betaine, herbal choline, and synthetic choline chloride on blood biochemistry and immune function in broilers given diets low in methionine and cysteine. Two hundred and forty day-old Vencobb-430Y broiler chicks were randomly divided into four treatment groups with four replicates of 15 birds each for 42 days. The control group (T_0) received a balanced diet according to BIS 2024 standards. Treatment groups T_1, T_2, and T_3 had diets lacking in methionine and cysteine by 10%, supplemented with herbal choline chloride (0.086%), betaine HCl (1 g/kg), and synthetic choline chloride (550 mg/kg), respectively. At 42 days, blood samples were collected for biochemical analysis, including total cholesterol, HDL, LDL, triglycerides, ALT, AST, total protein, and blood glucose levels. The immune organs (thymus, bursa, and spleen) were weighed, and Newcastle disease antibody levels were measured. The results showed that betaine HCl supplementation (T_2) significantly lowered serum total cholesterol (118.72 mg/dL) compared to the control (123.81 mg/dL) and other treatment groups ($P<0.01$). Total serum protein was significantly highest in group T_2 (3.34 g/dL) compared to T_0 (3.18 g/dL). Thymus and spleen weights were also significantly higher in the T_2 group. However, HDL, triglycerides, liver enzymes, glucose, and Newcastle disease antibody levels did not show significant differences across the treatments. The study concluded that adding betaine HCl at 1 g/kg to diets low in methionine and cysteine improved protein metabolism and lowered cholesterol levels while preserving liver health and immune organ growth in broilers without affecting humoral immunity.

Keywords: Betaine, Blood biochemistry, Broilers, Immune organs, Methionine deficiency, Methyl donors

Development and Standardization of Psychometric Instruments to Assess Farmers' Knowledge and Attitude towards Scientific Wool and Pelt Production

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The study aimed to develop and standardize reliable and valid psychometric instruments to assess farmers' knowledge and attitude towards scientific wool and pelt production in Jammu Division. Recognizing that both knowledge and attitude significantly influence the adoption of scientific practices, two complementary tools, a knowledge test and an attitude scale were constructed using established psychometric procedures. For the knowledge test, an initial pool of 158 items was generated covering key domains including housing, breeding, feeding, health care, government schemes, training and capacity building, marketing, Indigenous Traditional Knowledge (ITKs), and pelt production. Based on standard screening criteria, 91 items were retained, out of which 64 were found relevant through expert evaluation. Item analysis resulted in the selection of 47 items with appropriate difficulty (30–80) and discrimination indices (0.30–0.55). Reliability was established using the split-half method (0.826) and Spearman-Brown prophecy formula (0.903), while internal consistency was confirmed through Cronbach's alpha (0.88). Content validity was ensured. Simultaneously, an attitude scale was developed using Likert's summated rating technique. A comprehensive pool of statements was generated through literature review, expert consultation, and field observations. Following relevancy testing and item analysis using responses from 60 farmers, 40 statements (26 positive and 14 negative) with t-values above 1.75 were retained. The reliability of the scale was confirmed through split-half method (0.871) and Spearman-Brown formula (0.813), with a Cronbach's alpha of 0.88 indicating high internal consistency. Content validity was also established. The developed instruments are scientifically robust and can serve as effective tools for researchers, academicians, and extension professionals to assess farmers' knowledge and attitude, thereby facilitating targeted interventions and policy formulation for enhancing the adoption of scientific wool and pelt production practices.

Infrared Thermography Reveals Distinct Thermal Biomarkers of Dystocia, Premature Calving, and Stillbirths in Dairy Cows and Neonates

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Dystocia and stillbirths inflict heavy economic losses on dairy farms through reduced productivity and high calf mortality. This study harnessed infrared thermography (IRT) to identify thermal biomarkers distinguishing normal, premature, and stillborn calvings in dairy cows. A total of **twenty apparently healthy multiparous pregnant cows** were selected for the study. IRT was used to record body surface temperatures of selected thermal windows (body, facial region, left and right eye, and vulva) and prominent behavioural symptoms were recorded visually continuously from 3 days before the expected day of calving. Dams delivering stillborn calves showed significantly ($p < 0.05$) elevated body surface temperatures, indicative of dystocia-induced hyperthermia and inflammation, while premature calving dams exhibited milder, non-significant ($p > 0.05$) rises. Premature groups uniquely displayed higher facial and vulvar temperatures ($p < 0.05$), signalling localized edema and reproductive stress. Eye temperature asymmetry was evident across groups ($p < 0.05$), with left eye temperatures reaching the highest values in normal calving cows, consistent with autonomic arousal and hemispheric lateralization. Stillborn calves had peak elevations ($p < 0.05$) in body, face, and eyes, reflecting hypoxia or post-mortem retention, contrasting pre-calving hypothermia in viable cases. Left-right eye differences were non-significant ($p > 0.05$) in premature calves, highlighting stress-specific patterns. No prepartum decline in vaginal or vulvar temperature was observed. Restlessness, kicking, vocalization and tail raising were the prominent behavioural symptoms observed as the time of calving approached. Overall, the findings indicate that IRT-derived thermal patterns along with some behavioural changes in dams can effectively differentiate calving outcomes. They may also serve as valuable non-invasive, real-time tool for early identification of premature calving and fetal distress, thereby supporting improved obstetrical management, animal welfare, and dairy herd productivity.

Genomic Characterisation of Kharai Camels: Implications for Conservation and Improvement of Indigenous Dromedary Breeds in India

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The dromedary camel (*Camelus dromedarius*) is an integral component of India's indigenous livestock biodiversity, supporting livelihoods across diverse ecosystems ranging from arid deserts to saline coastal regions. Among these, the Kharai camel is uniquely adapted to a coastal saline habitat, exhibiting exceptional ecological specialisation, including the ability to swim. This study aimed to investigate the genetic distinctiveness of the Kharai camel compared with other Indian camel populations using high-depth whole-genome sequencing (27.7X–31X) across 11 breeds (N = 35). The results revealed high genetic homogeneity among most Indian camel breeds, likely due to historical gene flow and migration. In contrast, the Kharai camel formed a clearly distinct genetic cluster in Principal Component Analysis, with the first two components explaining 24.36% of the total variation. Population differentiation analysis further demonstrated significant divergence between Kharai and other breeds (F_{ST}: 0.076-0.101). Admixture analysis supported the presence of a unique ancestral background in the Kharai population. These findings establish the Kharai camel as a genetically distinct and specialised germplasm adapted to saline coastal ecosystems. The study provides the first comprehensive genome-wide evidence of its uniqueness in India. The results emphasise the urgent need for targeted conservation strategies and highlight the potential of Kharai genetic resources for improving climate resilience and adaptive traits in indigenous livestock populations.

Keywords: Whole Genome Sequencing (WGS), Indian Dromedary Camel, Kharai Camel, Population Structure, Conservation Genomics

Feed and Fodder Resources Available in Rajsamand District of Rajasthan for Goat Farming

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The aim of the present study was to identify and document the various feed and fodder resources commonly used and available in the Rajsamand district of Rajasthan for goat farming. The study surveyed 200 respondents from randomly selected five villages across four tehsils. Data was collected using a pre-tested, well-structured interview schedule. The present study showed that for leguminous green fodder, a majority (66.5%) of respondents preferred Lucerne, Berseem, Groundnut, and Soybean, while 21% opted for Cowpea, Guar, Green gram, Black gram, and Gram. Concerning non-leguminous green fodder, 60.5% of respondents favoured Maize, Bajra, and Sorghum, with 27% choosing Wheat, Barley, and Oat. In terms of Shrubs, 81% of respondents fed their goats Daincha and Jharberi, while only 12.5% chose Kair and Kangi. For grasses, 74.5% preferred Motha, Dhub grass, and Dhaman grass, compared to 19% who offered Pather chatta, Anjan grass, and Baru grass. Regarding tree leaves, 71.5% of respondents utilized Babool, Neem, Ber, Imli, Subabool, and Peepal, while 18% preferred Keeker, Khejri, Sheesham, and Ardu. Dry fodder preferences showed that 69% used Barley straw, Wheat straw, and Grass hay, whereas 7.5% used Legume hay, Maize stover, and Sorghum stover. In terms of concentrate feed, 65% opted for Maize crush, Barley grain, and Wheat grain, 15.5% chose Millets and legumes such as Gram, Urd, and Green gram, and 11% selected Oil cakes like Groundnut, Mustard, Cotton, and Soybean. This comprehensive documentation of feed and fodder resources in Rajsamand provides insights into local feeding practices and can aid in optimizing goat nutrition and productivity in the region.

Keywords: Goat keepers, feed resources, Rajsamand.

Multi-Omics Analysis for Delineating Host Immune Response Genes For Sub-Subclinical Mastitis In Murrah Buffaloes

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Buffaloes (Bubalus bubalis) contribute nearly 45% of India's milk production, yet subclinical mastitis (SCM) remains a silent but major challenge, reducing yield, causing economic losses, and with its milk microbiota-immune response interactions still poorly understood. In this study, we conducted an integrated analysis of the milk microbiome and host mammary epithelial cell transcriptome to elucidate host-microbe interactions in Murrah buffaloes. Comparative transcriptome profiling revealed 4,046 significantly downregulated and 103 upregulated genes in SCM compared to healthy controls. Metagenomic analysis of milk samples identified 35 differentially abundant genera, highlighting microbial shifts associated with disease progression. Using Weighted Gene Co-Expression Network Analysis (WGCNA), we identified five gene modules, two of which were significantly correlated with the microbial taxa linked to mastitis. One module was enriched for immune-related pathways, reflecting immune dysregulation during SCM. From these modules, the top 10 hub genes were identified, with JPH4 selected as a key hub gene. Functional annotation suggested that JPH4 is involved in calcium ion transport, cell-cell signaling, and regulation of cytokine production, all of which are critical processes in mammary gland immunity. qPCR validation further confirmed that *JPH4* (Junctophilin-4) was significantly downregulated in SCM samples, supporting its potential role as a candidate gene for disease susceptibility. Overall, this study provides novel insights into the host-microbiome interplay in Murrah buffalo subclinical mastitis, identifying immune-related pathways and hub genes associated with microbial taxa. Importantly, *JPH4* emerges as a potential candidate gene for further investigation, with implications for developing molecular markers for disease resistance and selective breeding strategies in buffaloes. Using such marker-assisted selection (MAS) in breeding programs would reduce the need for antibiotics, lower treatment costs, and minimize milk loss due to disease.

Keyword: Subclinical Mastitis, Murrah Buffalo, Host-Microbiome Interaction, WGCNA, *JPH4*, Transcriptomic, Metagenomic, Gene expression validation, multi-omics analysis

Genetic prediction and evaluation of Sahiwal breeding bull for fertility traits

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Despite substantial advances in dairy cattle genetics, reproductive efficiency remains sub-optimal, largely due to the under-representation of bull fertility in conventional breeding strategies. Although modest improvements in conception rates have been achieved, optimal fertility levels remain elusive. Sire selection has traditionally relied on phenotypic predictors such as semen quality parameters and the milk yield performance of daughters; however, these indicators often show a weak and inconsistent relationship with actual field fertility. Consequently, sub-fertility in bulls frequently remains undetected and is misattributed to female infertility, leading to unnecessary culling and economic losses. The present study aimed to genetically evaluate bull fertility using long-term reproductive records of Sahiwal breeding bull from the herd established at ICAR-NDRI, spanning **1955 to 2026**. Bull conception rate was computed from field insemination data after rigorous data cleaning and outlier standardization. Genetic evaluation was performed using both **pedigree-based BLUP** and **threshold BLUP models**. The linear animal model (Y=Xb+Zu+e) included fixed effects of **season of service,** parity, age of dam at insemination, and age of sire at service**,** with additive genetic effect as a random component. For the **threshold model**, suitable for binary outcomes (pregnant/non-pregnant), an additional permanent environmental effect of the dam was incorporated, and the trait was analyzed on an underlying liability scale. Variance and covariance components were estimated using REML and heritability of bull conception rate was derived to quantify the genetic contribution to the trait. The results revealed substantial variation in estimated breeding values (EBVs), enabling effective ranking of bulls for fertility. The linear BLUP model produced solutions on the observed scale, with very low heritability 0.01-0.03 due to the binary nature of the trait. In contrast, the threshold model, operating on the liability scale, yielded higher and more realistic heritability estimates 0.08-0.2. Overall, heritability was low to moderate, indicating strong environmental influence but presence of exploitable genetic variation. The threshold model also better captured non-linear effects, providing a more robust evaluation framework. Overall, the study highlights the importance of incorporating **bull fertility** for improving the conception of cattle and supports the transition from conventional phenotypic predictors toward more reliable statistical and genetic approaches for improving reproductive efficiency in dairy cattle.

Population Dynamic Parameters and Genetic Modeling of Growth Traits in Landlly Pigs

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Maintaining genetic diversity is crucial for long-term adaptability to overcome adverse effect of environment, and genetically improve production traits. This study revealed parameters of population dynamics in Landlly pigs at ICAR-IVRI across various generations by using ENDOG program, optiSel, and purgeR for population dynamics parameters. Thereafter, modelling different growth traits using REML at birth, 3, 6, and 8 weeks of age, and the best model was determined by using the Log-likelihood value. Six different models were constructed by including or excluding additive genetic effects, maternal genetic effects, maternal permanent environmental effects, as well as the covariance between direct additive and maternal genetic effects. Analysis revealed that 99.00% of Landlly pigs had known pedigree information. The completeness level ranges from 94.74% to 0.0107% from 1st to 9th generation, respectively, indicating a high degree of pedigree completeness.The F% and AR were 2.83% and 7.57% respectively. The effective population size was 92.41, considered a reasonable size. The number of ancestors explaining 50% of the genetic diversity was 7. The f_e and f_a were 17, and hence the ratio f_e/f_a came to be one, indicating absence of bottleneck effect. The average generation interval was 1.515 years. Log−likelihood value indicated that Model 6 was most appropriate to explain variation in W_0, W_3, W_6, and W_8, which included direct additive, maternal permanent environment effects with covariance between direct and maternal genetic effects. Additionally, the genetic trend for growth performance was evaluated across years to check the effect of inbreeding on body weight of Landlly pigs.

Decoding seasonal proteomic signatures in bovine seminal plasma

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The fertility of cattle is being threatened by climate change, especially buffaloes, who are extremely vulnerable to heat stress. Aware of this danger, the current study sought to understand how heat stress affects seminal quality and to pinpoint important proteins that give Murrah buffalo bulls their inherent resilience. This knowledge is essential for maintaining reproductive efficiency as well as for guaranteeing animal welfare and food security. Fifteen breeding bulls were observed under various thermal settings and divided into three groups: comfort (winter/spring), unaffected, and affected by heat stress. Evaluations of the semen showed a distinct seasonal pattern: in the heat-stressed bulls, acrosome integrity and motility considerably decreased, indicating impaired sperm function under thermal strain. Seminal plasma proteins were profiled using LC-MS/MS to investigate the molecular underpinnings, producing a high-resolution proteome map. Among the 1222 proteins that were found, a clear pattern emerged: a unique proteomic signature of heat stress, marked by the overexpression of proteins related to immunological modulation, membrane stabilisation, and fertilisation competence. Notably, NAGA exhibited the greatest induction, indicating increased lysosomal turnover in reaction to cellular injury. The enrichment of fertility-linked proteins including SPADH1 and IZUMO4 suggests compensatory mechanisms to maintain oocyte-binding and fusion capacity under heat stress. Furthermore, ANXA1, a crucial mediator of anti-inflammatory regulation and membrane repair, was markedly increased, indicating the activation of defence mechanisms to prevent heat-induced membrane instability. More significantly, they discover possible biomarkers for choosing thermotolerant bulls, a breakthrough that has the potential to completely transform buffalo breeding initiatives. The dairy industry can improve fertility, lower insemination failures, and lessen productivity losses brought on by climate change by incorporating proteomic insights into genetic selection. In order to ensure sustainable dairy production and food security in a warming world, the found protein markers open the door to breeding climate-smart cattle.

Keywords: Heat stress, proteomics, Murrah Buffalo, Semen

Electroacupuncture assisted rehabilitation of crippled companion animals

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The present study was undertaken to evaluate the clinical cases of companion animals that exhibited varying degrees of hindquarter weakness and were presented to Teaching Veterinary Clinical Complex, Padmanabhpur, Durg. These animals were brought to the hospital after the attending veterinarians, despite employing routine therapeutic modalities, failed to achieve satisfactory clinical improvement. In most instances, the animals had been suffering for variable durations prior to being referred, reflecting the chronic and often progressive nature of the underlying condition. Upon presentation, each animal underwent a thorough diagnostic workup that included clinical examination, radiological assessment, and detailed neurological evaluation in order to accurately determine the location and extent of spinal involvement. The diagnostic findings revealed a range of spinal disorders. The major affections recorded were vertebral fractures, both with displacement and without displacement, degenerative conditions such as spondylosis, as well as cases of spinal cord compression. Interestingly, a small subset of the affected animals did not show any appreciable abnormalities in the spinal cord upon diagnostic examination, despite manifesting pronounced clinical signs of hindquarter weakness. The treatment regimen comprised administration of methyl prednisolone sodium acetate to reduce inflammation, non-steroidal anti-inflammatory drugs (NSAIDs) to provide analgesia and control pain-associated inflammation, and nervine tonics to promote neuronal health and regeneration. In addition to these pharmacological agents, electroacupuncture therapy was integrated into the management protocol as a rehabilitative adjunct. The response to therapy was carefully monitored and improvement was primarily assessed on the basis of observable clinical signs such as restoration of motor function, reduction in hindquarter weakness, and enhanced mobility of the animals. From the findings of this clinical study, it can be inferred that electroacupuncture holds promise as a valuable adjunct to conventional therapeutic protocols in the management of spinal disorders resulting in hindquarter weakness. Therefore, electroacupuncture may be considered an effective complementary therapeutic modality for improving the quality of life and functional outcome in crippled companion animals suffering from spinal affections.

Linking Pastoral Land Access with Livestock Productivity: A Veterinary Perspective on Raika Pastoralists

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Pastoral land access plays a critical role in determining livestock health, productivity, and overall livelihood sustainability among traditional pastoral communities in India. This paper examines the interrelationship between pastoral land availability and livestock productivity from a veterinary and production-oriented perspective, with specific reference to the Raika pastoralists of Rajasthan and Gujarat. The Raika community, historically dependent on extensive grazing systems, has developed adaptive livestock management practices suited to arid and semi-arid ecosystems. However, shrinking grazing lands, fragmentation of common property resources, and increasing restrictions on mobility have significantly altered traditional production systems.Drawing upon secondary literature, field-based observations, and veterinary insights, this study highlights how reduced access to quality grazing directly impacts animal nutrition, leading to decreased milk yield, poor body condition, increased disease susceptibility, and reduced reproductive efficiency. The paper emphasizes the role of veterinary science in understanding these productivity constraints, particularly in relation to nutritional deficiencies, parasitic burdens, and stress-related disorders arising from inadequate pasture resources. Furthermore, the study explores how traditional Ethnoveterinary knowledge of the Raika pastoralists interacts with modern veterinary interventions in maintaining herd health under resource-constrained conditions. It also evaluates the implications of policy frameworks affecting grazing rights, including the decline of commons and the limited integration of pastoral systems into formal livestock development programs. The findings suggest that enhancing pastoral land access is not only a socio-economic necessity but also a veterinary imperative for improving livestock productivity. Strengthening community grazing systems, promoting sustainable rangeland management, and integrating mobile veterinary services can significantly improve animal health outcomes. The paper concludes that a holistic approach combining land rights, veterinary support, and policy recognition of pastoral mobility is essential to sustain the productivity and resilience of Raika pastoral systems in a changing environmental and socio-political landscape.

Ethnoveterinary Pharmacology in Ancient India and Western Rajasthan: A Diachronic Analysis of Textual and Oral Traditions.

Puneet Sharma

The history of veterinary medicine in the Indian subcontinent is characterized by a remarkable continuity between the codified knowledge of ancient Sanskrit texts and the living oral traditions of pastoral communities. This report provides an exhaustive examination of ethnoveterinary pharmacology (EVP) as it evolved from the Vedic period through the classical era of the Samhitas, culminating in a detailed pharmacological analysis of contemporary practices in the arid zones of Western Rajasthan. It synthesizes insights from sacred scriptures like the Rigveda and Atharvaveda, technical treatises such as Shalihotra Samhita and Hastyayurveda, and the empirical wisdom of the Raika pastoralists of the Thar Desert. The analysis reveals a sophisticated understanding of epidemiology, surgery, and pharmacognosy that predates modern veterinary science by millennia, governed by a holistic "One Health" philosophy that integrated animal welfare into the socio-religious and economic fabric of ancient Indian society.

Comparative Analysis of Biochemical Constituents and Ovarian Steroids in Follicular fluid versus Serum in Marwari Goats

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With an objective to evaluate and compare the biochemical constituents and ovarian steroid concentrations in the follicular fluid and serum of Marwari goats, a total forty healthy Marwari goats (2–5 years old), slaughtered at the Municipal abattoir in Bikaner were included in the study. Blood was collected before slaughter and ovaries were retrieved from genital organs post-slaughter. Ovarian follicles were measured by using vernier caliper, and classified as small (1–2.9 mm) or large (3-6 mm). Follicular fluid was collected from both categories of follicles and pooled separately. Serum and FF were analysed for level of various biochemical parameters such as glucose, cholesterol, total protein, albumin, globulin, acid phosphatase, alanine aminotransferase (ALT) and aspartate amino transferase (AST) as well as ovarian steroids level namely oestradiol and progesterone. Serum showed significantly higher ($P<0.05$) glucose, total protein, cholesterol and AST than follicular fluid, while acid phosphatase was significantly higher ($P<0.05$) in follicular fluid. Moreover, albumin and ALT of serum were significantly higher ($P<0.05$) than in large follicles, while globulin of serum was significantly higher ($P<0.05$) than in small follicles. Small follicles showed significantly higher ($P<0.05$) acid phosphatase and ALT activities, along with non-significantly higher albumin and AST compared to large follicles. Most of other biochemical parameters showed non-significant rise over increase in size of follicles. Concentrations of ovarian steroids (estradiol and progesterone) were significantly higher ($P<0.05$) in follicular fluid than in serum and estradiol levels increased significantly ($P<0.05$) with follicle size, whereas progesterone showed a non-significant decline. Overall, follicular fluid composition varied between different follicle size and serum. It was concluded the present study findings highlight the biochemical rhythmic changes and ovarian steroid hormone pattern which will be helpful in understanding the reproductive physiology in Marwari goats.

Zoonotic Implications of Avian Cutaneous Candidiasis: A One Health Perspective

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Candidiasis is an opportunistic fungal infection caused mainly by *Candida albicans*, affecting the skin, mucosa and gastrointestinal tract of birds and other species. Its zoonotic potential warrants careful attention, particularly in pet birds that share close contact with humans. A four-year old parrot was presented with a history of anorexia, feather loss and weight loss for the past eight days. Clinical samples were collected and analysed using Giemsa staining, which revealed the presence of *Candida* species along with bacterial growth. Further examination with lactophenol cotton blue staining confirmed the presence of the fungus. Examination of the owner's hand showed lesions resembling fungal infection, which were confirmed to be caused by *Candida* species. The parrot was treated with fluconazole at a dose of 5 mg/kg body weight, orally, twice daily for seven days, along with health tonics and the owner was counselled on the importance of treatment compliance and zoonotic transmission risks. However, poor compliance was observed, highlighting the challenges in effectively managing avian candidiasis cases. This case report emphasizes the importance of early laboratory diagnosis, timely antifungal intervention and client education in managing avian candidiasis. It also underlines the relevance of a One Health framework in addressing zoonotic fungal diseases at the human-animal interface, thereby improving companion bird health and public health safety.

Keywords: Avian candidiasis, Pet parrot, Zoonosis, One Health, Companion bird health

Evaluation of Thermosensitive Hydrogel Based Vaccine Delivery System for *Staphylococcus aureus* causing Mastitis in Murine Model

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Mastitis, a multi-etiological disease is considered as one of the most economically significant diseases affecting the dairy industry. It is characterized by inflammation of the mammary parenchyma with physical and biochemical changes in milk. Contagious pathogens such as *Staphylococcus aureus* are transmitted through milker's hands causing chronic, biofilm-associated infections that provides resistance to antimicrobials. A study was constructed to evaluate the efficacy of a thermosensitive hydrogel based vaccine delivery system against *S. aureus* mastitis serving as an alternative to the therapeutic antimicrobial treatment. In this study, *Staphylococcus aureus* was isolated from chronic clinical mastitis case and was further characterized using biochemical and molecular methods. A thermosensitive hydrogel was formulated and characterized by physicochemical and rheological analyses to confirm its ability to act as an antigen depot, forming an *in-situ* gel upon injection for sustained antigen release. Twenty-four lactating mice were divided into two groups A and B. Group A was administered with 100 µl of the hydrogel based *S. aureus* vaccine with booster administered on day 14. Group B was denoted as the unvaccinated control group. Following parturition, lactating mice of group A and B were challenged intramammarily on 7-10th day postpartum with 50 µl of *S. aureus* inoculum (1×10^5 CFU/gland). Pre-challenge serum samples were collected to evaluate vaccine-induced immunity. Post-challenge, mammary glands were collected for histopathological examination. Indirect ELISA demonstrated detectable pre-challenge antibody responses in all vaccinated animals. Pre-challenge endpoint antibody titres in these animals ranged from 1:800 to ≥1:12,800, as determined using the predetermined negative cutoff. Following intramammary challenge, histopathological examination revealed vaccinated animals showing reduced neutrophil infiltration and preserved alveolar architecture whereas controls showed severe inflammatory changes. The thermosensitive hydrogel delivery system induced significant antibody responses and reduced histopathological damage following *S. aureus* challenge in murine mastitis model. This platform demonstrated futuristic potential of hydrogel as a novel vaccine delivery system for sustained antigen release and optimal efficacy against chronic mastitis, offering a promising alternative to conventional antibiotic therapy. Further studies involve assessing the duration of immunity and its efficacy in target dairy species.

Keywords: Mastitis, *Staphylococcus aureus*, thermosensitive hydrogel, vaccine delivery system, mice mastitis model.

Effect of starch-extruded slow-release urea supplementation on Serum proteins in lactating dairy cows

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The present study was conducted to evaluate the effect of dietary supplementation on serum biochemical parameters in experimental animals. The study focused on assessing total serum protein, albumin, globulin concentration, and albumin: globulin (A: G) ratio under different dietary treatment groups across various experimental periods. The results revealed that total serum protein concentration differed significantly among dietary treatments ($P<0.01$), whereas the effects of period, group, and period interaction were found to be non-significant. Higher total serum protein values were observed in NC and EC groups, while comparatively lower values were recorded in T_1 and T_2 groups. Serum albumin concentration was significantly influenced by dietary treatments, periods, and their interaction ($P<0.01$). The highest albumin concentration was observed in PC and NC groups, whereas T_1 and T_2 groups exhibited significantly lower values.Globulin concentration also differed significantly among treatments, periods, and their interaction ($P<0.01$). SFSRU-supplemented groups, particularly T_3, recorded significantly higher globulin concentration followed by T_2 and NC groups, while the PC group showed the lowest globulin level. Globulin concentration gradually increased with advancement of experimental periods. The A: G ratio was significantly affected by dietary treatments, periods, and their interaction ($P<0.01$). The highest A: G ratio was observed in NC and PC groups, while SFSRU-supplemented groups showed comparatively lower values, with the lowest ratio recorded in T_3.The findings indicate that dietary supplementation significantly influences serum protein profile and immune-related biochemical parameters, suggesting the beneficial role of SFSRU supplementation in improving physiological and metabolic responses.

Keywords: Serum biochemical parameters, SFSRU supplementation, Total protein, Albumin, Globulin, A: G ratio, Dietary treatments, Experimental animals, Animal nutrition, Metabolic response .

"Jeeva Sruthi" or "Life's Rhythm": An AI-Based Bioacoustics Framework for Potential Early Warning of Zoonotic Disease Outbreaks

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The following conceptual article introduces the creation of a new framework called "Jeeva Sruthi" ("Life's Rhythm"). This framework uses artificial intelligence bioacoustics to potentially detect zoonotic diseases early. Environmental pollution and increasing contact between humans and animals have led to a rise in disease transmission. However, the current system for monitoring and preventing diseases only reacts to threats after they occur; it lacks proactive measures. The goal of this research is to create a new approach using passive acoustic monitoring (PAM), deep learning algorithms, and ecological risk modeling to tackle this problem. For technical implementation, the proposed framework uses a hybrid CNN-Transformer method to analyze soundscapes. The Short-Time Fourier Transform (STFT) converts audio into spectrograms. Then, the CNN extracts spectral features, and the Transformer finds connections between the elements of the spectrogram. Anomalies are detected using autoencoders and Isolation Forests. Acoustic anomaly scores, along with other environmental factors, serve as inputs for the zoonotic risk assessment model. The framework includes six steps: acoustic sensing, artificial intelligence, feature extraction, anomaly detection, risk assessment, and decision making. This design supports bioacoustic monitoring that goes beyond what current systems and artificial intelligence in epidemiology offer. The study also discusses how to implement this framework by using edge computing techniques.

Valorization of Sericulture Byproducts for Functional Livestock Feed

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Sericulture generates a wide range of underutilized byproducts, including silkworm pupae, rearing waste, and mulberry residues, which possess significant potential as functional livestock feed resources. Silkworm pupae are particularly rich in high-quality protein (≈49–55% dry matter) and lipids (≈25–30%), along with essential amino acids and polyunsaturated fatty acids, while mulberry-based residues contain bioactive compounds such as flavonoids and phenolics with antioxidant and immunomodulatory properties. This chapter highlights recent scientific evidence on the incorporation of these byproducts into ruminant, poultry, and aquaculture diets, demonstrating improvements in growth performance, feed efficiency, gut health, and product quality. Overall, the valorization of sericulture byproducts offers a sustainable, cost-effective approach aligned with circular bioeconomy principles, contributing to waste reduction, resource efficiency, and enhanced livestock productivity.

Enhancing Y-Sperm proportion through TLR7/8 agonist R848 in Sahiwal

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This study aimed to develop a simple and efficient method for producing Y-enriched semen using Resiquimod, a Toll-Like Receptor 7/8 agonist. Semen samples were collected from three healthy *Sahiwal* bulls, and a total of 24 ejaculates that met standard quality criteria were selected. These samples were divided into two groups: Group I (control), which underwent conventional cryopreservation, and Group II, which was subjected to a Resiquimod-based sex-sorting protocol prior to cryopreservation. Immunofluorescence assays confirmed the presence of TLR7/8 receptors in bovine sperm. A lower proportion of sorted sperm exhibited TLR7/8 localization on the tail compared to unsorted samples. Post-thaw sperm quality parameters were evaluated, and real-time PCR analysis was conducted to detect the PLP gene and SRY gene in both unsorted (Group I) and Y-sorted (Group II) samples. The findings indicated that treatment with Resiquimod at a concentration of 0.6 µM effectively maintained sperm viability and motility in freshly sorted samples. Moreover, no significant ($p>0.05$) differences were observed between control and treated groups in terms of acrosome integrity, plasma membrane stability, or DNA integrity in both fresh and post-thaw conditions. The method demonstrated a high degree of sorting efficiency, achieving over 78% enrichment of Y-bearing sperm. Quantitative PCR was employed to estimate sperm sex ratios using PLP and SRY as molecular markers. Standard curve analysis confirmed an expected 1:1 ratio of X- and Y-bearing sperm in unsorted semen, while Y-enriched samples showed 78.18% Y-bearing sperm. Overall, the Resiquimod-based approach proved effective in selecting motile and viable sperm, offering potential applications in livestock breeding for the production of elite male offspring.

Climate Change and Animal Reproduction: Impact on Fertility and Adaptive Strategies

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Climate refers to the long-term pattern of weather in a region, including both large-scale (macroclimate) and localized (microclimate) conditions. Climate change involves persistent shifts in temperature, precipitation, and wind patterns over decades, largely driven by human activities such as fossil fuel use, deforestation, industry, agriculture, and waste generation. These changes have led to global warming, irregular rainfall, and more frequent extreme events like floods, droughts, and heat waves. Such environmental changes adversely affect animal health, productivity, and reproduction, supporting the One Health concept that links human, animal, and environmental well-being.Climate change impacts animal health through both direct and indirect pathways. Direct effects include heat stress, altered humidity, and extreme weather events, while indirect effects involve shifts in pathogen dynamics, vector distribution, and resource availability. These stressors lead to reduced feed intake, poor growth, decreased production of meat and milk, increased disease incidence, and higher mortality rates. Reproductive functions are particularly vulnerable, as heat stress disrupts hormonal balance, impairs gamete quality, and reduces fertility in both males and females. In females, elevated temperatures negatively influence oocyte maturation, follicular development, estrus expression, and pregnancy maintenance, while in males heat stress reduces libido, sperm quality, and endocrine function. Additionally, climate change contributes to persistence of infectious diseases by enhancing pathogen development, suppressing host immunity, and facilitating vector survival. Environmental pollutants such as heavy metals and microplastics further exacerbate reproductive toxicity, affecting endocrine regulation and cellular integrity in animals. These combined effects threaten livestock productivity and sustainability. Mitigation and adaptation strategies are vital to address climate change impacts. Key approaches include genetic selection for heat tolerance, environmental modifications like shading and cooling, and nutritional measures to reduce heat stress. Reproductive technologies and antioxidant supplementation help maintain fertility under stress. Strengthened disease surveillance, predictive modeling, and improved animal health services are also essential. Additionally, innovative techniques such as bioremediation, phytoremediation, and advanced genetic tools can reduce environmental pollution. Overall, integrated and multidisciplinary strategies are needed to enhance resilience in animal production systems and ensure sustainable health outcomes.

Assessment of Anticarcinogenic Effect of *Annona Squamosa* (Custard Apple) Seed Extract and *Cleome Gynandra* (Stinkweed) Plant Extract in the Experimentally Induced Mammary Tumor of Sprague-Dawley Rats

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Cancer remains a leading cause of mortality in both humans and animals, despite significant advances in diagnosis and treatment. Plant-based products are also being investigated for their potential anti-neoplastic properties. The present study was conducted to find out the anticarcinogenic potential of *Annona squamosa* seed and *Cleome gynandra* plant extract and their combination against DMBA-induced mammary tumors in Sprague-Dawley rats. Eighteen rats each were randomly distributed to the Control, DMBA, DMBA + Tamoxifen, DMBA + CAS, DMBA + CG and DMBA + COMB and the study was conducted for a period of 150 days. Methanolic extracts of both prepared through maceration method and qualitative as well as quantitative phytochemical analysis of both extracts were performed. *In-silico*, *in-vitro* and *in-vivo* study were also conducted. Significant changes of both haematological and serum biochemical parameters were observed in DMBA group, other treatment groups and control groups. Lipid peroxidation and both enzymatic and non-enzymatic antioxidant parameters were also evaluated and revealed noticeable changes in values among different groups. Highly significant increase ($p< 0.01$) in the heart, lungs, liver, kidney and uterus weight in the DMBA group as compared to control group .However, extract treatment group showed better reversal effect as compared to tamoxifen treatment. Survival rate, Incidence, latency period was also evaluated among different groups. Both nature and grading of mammary tumor were also observed across the groups. Immunohistochemical localization of various markers associated with mammary cancer revealed differential expression across the groups. Additionally, qRT-PCR analysis of genes related to mammary cancer was conducted, showing both upregulation and downregulation of certain genes in the DMBA group, as well as in the treatment and control groups.

Keywords: Anticarcinogenic effect, *Annona squamosa* seed, *Cleome gynandra* plant, DMBA-Mammary tumors, Sprague-Dawley Rat, Tamoxifen

Pathological studies on specimens collected from slaughtered bovines in Aizawl district of Mizoram

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The effective development of any livestock industry depends upon the prevention and control of diseases among the animals. Diseases in these animals cause heavy economic losses in milk, meat and wool industry. This study was conducted to know the incidence of different gross and histopathological lesions in major visceral organs, prevalence of different hemoparasitic infections with their molecular detection and also prevalence of GI helminthes infections in bovines which were slaughtered in Govt. Slaughter house, Aizawl, Mizoram. A total of 90 samples of liver, lungs, kidneys, heart, spleen and 35 samples of intestine were collected. Also 114 blood samples, 104 fecal samples, 12 liver samples with chronic Fasciolosis, 2 tumor samples and 30 swabs from lungs were collected. Among all the organs studied, liver (65.55%) showed the highest prevalence of pathological lesions followed by intestine (42.86%), lungs (38.88), kidneys (35.55%), heart (31.11%) and spleen (20%). Circulatory disturbances were the most common pathological lesion encountered in all the organs. The major pathological condition found in liver was hepatitis followed by fibrosis. Fasciolosis in liver was also found to be commonly prevalent during the current study. In lungs, bronchopneumonia was more common followed by interstitial pneumonia. Tubulo-interstitial nephritis was more in kidneys followed by glomerulonephritis. Sarcocysts were more common in heart followed by myocarditis. Papillary adenocarcinoma was observed as neoplastic condition. Studies for the presence of haemoprotozoan infections showed the presence of *Babesia sp.*, *Theileria sp.* and *Anaplasma sp.* Most of haemoparasitic infections were seen as subclinical infection except for some clinical cases of Anaplasmosis. Molecular detection using PCR confirmed the prevalence of these hemoprotozoan infections. Among the gastrointestinal parasites *Strongyl sp.* (16.35%) was found to be more common followed by *Fasciola sp.* (7.69%), *Paramphistomum sp.* (5.77%), *Trichuris sp*. (3.85%), *Eurytrema sp.* (1.92%), *and Toxocara vitulorum* (1.92%).

Keywords: Bovines, Slaughter house, Aizawl, Pathology, Hemoparasites, GI parasites.

Genetic Variation in the Genomic Region of the *KISSI* Gene and its Association with Fertility Traits in Sahiwal Cattle

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The present investigation was undertaken to assess the genetic variability in *KISS1* gene and its association with fertility traits in Sahiwal cattle, an important indigenous dairy breed. A total of 100 animals blood samples were collected for present study. Genotyping was performed using PCR-RFLP, and representative samples were validated through Sanger sequencing to confirm single nucleotide polymorphisms (SNPs). Amplification of the 5′ UTR and Exon 1 region yielded a 334 bp fragment, which upon digestion with *AciI* enzyme revealed three genotypes (AA, AG, GG), indicating substantial polymorphism. Genotype frequencies were 0.26 (AA), 0.25 (AG), and 0.49 (GG), with allele frequencies of 0.39 (A) and 0.61 (G). The population deviated significantly from Hardy–Weinberg equilibrium. Although statistical analysis showed non-significant genotype effects on fertility traits, animals with AA and AG genotypes exhibited comparatively better reproductive performance. Similarly, the Exon 2 region (308 bp) showed two genotypes (CC and CT) following *HaeIII* digestion, with genotype frequencies of 0.64 and 0.36, respectively. The absence of TT genotype and a higher frequency of the C allele (0.82) were observed. This locus was in Hardy–Weinberg equilibrium. Notably, Exon 2 polymorphism showed a significant association with age at first calving (AFC), where CC genotype animals exhibited superior performance compared to CT genotype. The overall least-squares means for AFC, number of services per conception, calving to first insemination, service period, calving interval, and dry period were estimated as 1460.69±24.67 days, 1.69±0.11, 148.67±16.33 days, 166.33±11.12 days, 432.89±9.87 days, and 203.27±11.02 days, respectively. The study highlighted the functional relevance of *KISS1* gene polymorphism, particularly in Exon 2, as a potential genetic marker for fertility improvement. Incorporation of such potential markers in superior animal selection strategies may enhance reproductive efficiency and accelerate genetic gain in Sahiwal cattle.

Foodborne Zoonotic Diseases in Kerala and Tamil Nadu

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Foodborne zoonotic diseases pose a significant public health challenge in the South Indian states of Kerala and Tamil Nadu, driven by dense human-animal interfaces, extensive livestock populations, and environmental vulnerabilities exacerbated by climatic factors. Tamil Nadu is India's second-largest poultry producer (over 120 million birds in the 2019 Livestock Census), with substantial cattle and goat populations, while Kerala has 29.8 million poultry and faces recurrent spillover events linked to its coastal and inland water ecosystems and proximity to the Western Ghats. The major foodborne zoonotic pathogens affecting Kerala and Tamil Nadu can be classified into bacterial, viral, and parasitic groups. Bacterial pathogens are highly prevalent: *Brucella abortus* and *B. melitensis* show seroprevalence of approximately 15% in cattle and buffalo, indicating endemicity in dairy systems, and non-typhoidal *Salmonella* and *Campylobacter* contamination rates in retail poultry meat exceeds 18%. *Mycobacterium bovis* remains an under-recognised contributor to bovine tuberculosis and dairy-associated human tuberculosis. Among viral zoonoses, Kerala has experienced six confirmed Nipah virus outbreaks since 2018, characterised by high case-fatality rates and a bat-reservoir linkage, as well as recurrent HPAI H5N1 outbreaks in paddy-duck systems. Tamil Nadu bears a significant burden of Japanese encephalitis through a pig-mosquito-bird cycle, characterised by high swine seroprevalence, alongside scrub typhus linked to agricultural labourers and the expanding footprint of Kyasanur Forest Disease virus. Parasitic zoonoses, notably *Taenia solium*, which drives porcine cysticercosis and human neurocysticercosis, contribute to the neurological disease burden in pig-rearing areas of Tamil Nadu. Surveillance capacity has improved under the Integrated Disease Surveillance Programme and the National One Health Mission, but intersectoral data sharing, rural laboratory access, and follow-up reporting remain limited. Climate-driven flooding, deforestation, and antimicrobial resistance further compound foodborne zoonotic risk in Kerala and Tamil Nadu. Coordinated livestock vaccination, mandatory pasteurisation across the informal dairy chain, strengthened slaughterhouse inspection, vector control, and integrated human-animal-environment surveillance under the National One Health Mission are identified as cost-effective levers for reducing the zoonotic burden.

Keywords: Foodborne zoonoses; brucellosis; avian influenza; Japanese encephalitis; One Health; Kerala; Tamil Nadu; pasteurization; vector control; integrated surveillance.

Development and Characterization of Chrome-Free Leather from Mahi mahi fish Skin Using Chrome-free Tanning Method

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The conversion of fish skin waste into chrome-free leather represents an environmentally sustainable alternative to conventional leather production that relies on hazardous chemicals such as chromium. This study focused on the standardization of leather production from the skin of Mahi mahi fish (*Coryphaena hippurus*) using chrome-free tanning methods. Different ratios of isopropyl alcohol (IPA) and glycerol (1:1, 1:0.5, and 0.5:1) were employed for treatment durations of 4, 7, 14, and 30 days to optimize leather quality. The proximate composition of the fish skin was found to contain 65.04% moisture, 27.66% protein, 1.40% fat, and 1.28% ash, while the acid-soluble collagen (ASC) yield was 43.47%. FT-IR (Fourier Transform Infrared Spectroscopy) analysis confirmed the presence of Type I collagen, whereas XRD (X-ray Diffraction) analysis indicated the crystalline structure of ASC. SEM (Scanning Electron Microscopy) observations revealed a fibrous and porous collagen matrix. Among the different treatments, the 14-day treatment with a 1:1 ratio of IPA and glycerol was identified as the best treatment group, producing leather with desirable texture, flexibility, and overall appearance. Histological analysis demonstrated effective preservation of collagen fiber arrangement during tanning. Sensory evaluation of the dyed leather indicated good acceptability and aesthetic quality. The study highlights the potential utilization of Mahi mahi fish skin waste for the development of sustainable and eco-friendly leather products.

Keywords: Mahi mahi fish, Chrome-free tanning, Fish collagen, Fish Leather, FTIR, XRD

Cardiolipin Biology in Apicomplexan Parasites: Structure, Function and Its Therapeutic Potential

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Apicomplexan parasites such as *Plasmodium falciparum*, *Toxoplasma gondii*, *Babesia*, and *Theileria* are responsible for several major diseases affecting both humans and animals globally. The growing challenge of resistance to existing antiparasitic therapies has increased the need to investigate alternative cellular pathways that could serve as a new therapeutic target. In this context, mitochondrial phospholipid metabolism has emerged as an imperative but rather understudied area in parasite biology. Cardiolipin is a distinctive phospholipid mainly located in the inner mitochondrial membrane, where it plays a crucial role in maintaining membrane structure, cristae organization, electron transport chain stability, ATP production, mitochondrial function, and adaptation to oxidative stress. Recent findings have suggested that apicomplexan parasites have typical cardiolipin biosynthetic pathways which features similar to bacterial type cardiolipin synthase. In *Plasmodium falciparum*, cardiolipin has been associated with maintaining mitochondrial membrane integrity, stabilizing respiratory complexes, and supporting parasite survival during intraerythrocytic development. Comparative observations in other apicomplexan parasites further emphasize the conserved importance of mitochondrial lipid homeostasis. In *Toxoplasma gondii*, mitochondrial membrane alterations are closely linked to parasite replication and its pathogenicity, while studies in *Babesia* and *Theileria* suggest that mitochondrial metabolism is critical for intracellular adaptation and survival. Research on such related protozoan parasites like *Trypanosoma brucei* has further confirmed that disruption of cardiolipin synthase can destabilize respiratory complexes and severely impair mitochondrial function. Collectively, these findings suggest that parasite specific cardiolipin metabolism may represent an effective target for development of selective antiparasitic drugs which aim to disrupt mitochondrial membrane homeostasis.

Combating Ovine Botulism: Advanced Diagnostics and Therapeutic Interventions

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A two year old female Pattanam sheep was presented to the Small ruminant referral unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with the history of obtunded and severe respiratory distress, blurred vision with difficulty in swallowing for past two days. History provided by the owner indicated that the condition was suspected after sheep in a close extensive system ingested water from a local pond contaminated with dead fish. On clinical examination, animal was found with dysphagia, mild flaccid paralysis of voluntary muscles of limbs, absence of deep tendon reflex and panniculus reflex with the reduced pupillary light reflex. Based on the clinical signs, the case was tentatively diagnosed as Ovine Botulism. Whole blood, Serum, Rumen fluid and heparinized samples were collected for further analysis. Ruminal contents were collected and a suspected pond water with dead fish sample were also obtained and proceeded with culture technique. Cerebrospinal fluid (CSF) was collected at Lumbosacral space and screened for electrolytes, lactate and mineral estimation. Further, ruminal contents, dead fish and water suspected for botulinum neurotoxin- BoNT was subjected to the multiplex RT PCR as per the standard protocol. The animal was treated with Inj. Ringers Lactate solution intravenously, Inj. Ceftiofur Sodium @ 2.2 mg/kg, Inj. Hydroxyprogesterone 5mg/kg Body weight along with supportives. The parentral therapy was continued for 7 days and again blood samples were collected for the further monitoring. The animal was uneventfully recovered after 18 days of supportive treatments.

Keywords: *Clostridium botulinm*, Hydroxyprogesterone, Ovine

Chylothorax in Domestic Short Haired Cat

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A three years old male domestic short haired cat was presented to the Small Animal Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu with a history of open mouth breathing and episodes of retching following feeding, for the past two days. On physical examination, wheezing was observed on thoracic auscultation and pain was evidenced on abdominal palpation. Hematological examination revealed leucocytosis ($55\times10^3/\mu L$) with neutrophilia (94%). Serum biochemistry analysis showed elevated blood urea nitrogen (102mg/dL) and creatinine levels (2.07 mg/dL). On ultrasonography of the thorax, pleural effusion with echogenic exudate were noticed. Thoracic radiograph was performed for further evaluation, a right lateral view was obtained, which revealed evidence of pleural infiltration. Thoracocentesis was performed and milky white colour fluid was aspirated, indicative of chylous effusion. Following thoracocentesis, the collected exudate was treated with ethanol which resulted in sedimentation, due to precipitation of lipid and protein components, along with the development of a purulent odor. Based on the clinical signs, radiographic findings and the nature of the aspirated chylous effusion, the case was confirmed as "Chylothorax". The cat was managed supportive care including oxygen therapy and intravenous fluid. Additionally oral administration of Rutin @ 50 mg/kg was initiated. Considering the chronicity and recurrence of the effusion, surgical intervention in the form of thoracic duct ligation was considered to be the definitive treatment option and surgical correction was scheduled.

Keywords: Chylothorax, thoracocentesis, thoracic radiographs

Deciphering Food Web Dynamics and Maturity of the Gosikhurd Dam Ecosystem: An Ecopath with Ecosim Approach

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This study provides a detailed assessment of the Gosikhurd Dam Ecosystem (GDE) in India through the development of a mass-balanced trophic model using Ecopath with Ecosim software (version 6.6.5). The model incorporates 16 functional groups representing different organisms, enabling a thorough investigation of their feeding relationships, energy flows, and trophic interactions within the aquatic food web. Field data were collected through systematic monthly sampling of fish populations from June 2022 to May 2023. Several important ecological indicators were then computed to evaluate the system's overall maturity, stability, and complexity. These included the Connectance Index, System Omnivory Index, Finn's Cycling Index (FCI), Finn's Mean Path Length (FML), ascendency, overhead, and the Shannon diversity index. Results revealed an FCI of 1.81 and an FML of 2.20, suggesting moderate nutrient cycling and a relatively short food chain that allows the ecosystem to respond effectively to environmental fluctuations while maintaining basic stability. Ascendency accounted for 41.58% of total system capacity, indicating that the ecosystem operates well below its maximum potential. In contrast, the overhead value of 58.42% points to substantial reserves that enhance resilience against external disturbances. However, the Shannon diversity index of 1.67 reflects relatively low species diversity, confirming the ecosystem's immature status and limited structural complexity compared to fully developed aquatic systems. The analysis further highlights zooplankton, zoobenthos, and tilapia as keystone species that play pivotal roles in maintaining ecosystem dynamics and supporting overall functioning .Collectively, these findings indicate that the Gosikhurd Dam Ecosystem remains in a developmental phase. The study offers important baseline information that can inform targeted management strategies, conservation initiatives, and sustainable utilization of this vital freshwater resource in the Wainganga River basin.

Keywords: Ecopath with Ecosim, Trophic modelling, Keystone species, Ecosystem maturity, Gosikhurd Dam.

Zoonotic Neurocysticercosis Risk: A One Health Molecular Analysis of *Coenurus Cerebralis* and *Coenurus Gaigeri* in a Thanjavur Black Goat

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A four months old Thanjavur black kid was presented to Large Animal Medicine Unit, Veterinary Clinical Complex, VCRI, Orathanadu with the history of weakness, multiple swellings all over the body for past two weeks and followed by recumbency. Physical examination revealed multiple, discrete soft fluctuating swellings under the tongue and all over the body. Primary neurological examination showed altered mentation, paresis of all limbs and no response to external stimuli. Haematology and Serum biochemistry analysis revealed anaemia, eosinophilia, hypoproteinaemia, hypocalcaemia and CSF showed the presence of eosinophils in cytology. Ultrasonographical examination revealed the presence of cysts in various body cavities. The animal succumbed to death on the same day of presentation and sent for post-mortem examination. On postmortem examination showed the presence of multiple cysts in the subcutis, between muscles and near visceral organs (*Coenurus gaigeri*), in spinal cord and brain (*Coenurus cerebralis*). Cysts were collected for light microscopic examination and further subjected for molecular analysis. This case raises awareness among practicing veterinarians about the presence of cerebral cysts in this region, highlighting a significant public health concern. The present study provides insight into the cerebral form of the zoonotic *Taenia multiceps* cyst, which may aid in its control and prevention.

Keywords: Coenurosis, *Coenurus cerebralis*, *Coenurus gaigeri*, Kid

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A Case Study of Concurrent Sarcoptic Mange, Dermatophytosis and Zinc-Responsive Dermatosis in a Nomadic Camel

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A 2 year-old male dromedary camel presented with a history of pruritus and alopecia for a period of 15-days to Large Animal Out Patient Unit, Veterinary Clinical Complex, Veterinary College And Research Institute, Orathanadu.Clinical examination revealed odourless, greyish-white alopecic patches ranging from circular to irregular on the hump, flank, and perineal regions. Skin scrapings were collected and KOH-treated skin scrapings showed fungal spores consistent with dermatophytes. On culture using Dermatophyte Test Medium grew *Trichophyton* spp., confirmed by lactophenol cotton blue staining. Additionally, Sarcoptes spp. mites were detected, confirming sarcoptic mange. Hemato-biochemical analysis revealed decreased serum zinc, indicating zinc-responsive dermatosis. The camel was treated with ivermectin @ 0.2 mg/kg subcutaneously weekly for three weeks, sulphur dips (25 ml sulphur per litter of water) applied weekly and topical miconazole and zinc oxide cream. A daily multivitamin-mineral supplement containing zinc was also administered. The camel achieved complete clinical resolution after five weeks. This case highlights the necessity of diagnosing and treating multiple concurrent dermatological conditions in camels using a combined parasitic, fungal, and nutritional therapeutic strategy.

Keywords: Camel, Zinc, Dermatophyte, Sarcoptic manage.

Relationship between udder and teat biometric traits with milk somatic cell count in Indigenous dairy cattle

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Mastitis is the best example of disease for which selective breeding could improve resistance. The present investigation was carried out to investigate the possible association between teat morphometric traits and subclinical mastitis (SCM) in 150 indigenous lactating cattle viz. Kankrej, Sahiwal and Rathi cattle under similar management conditions at university cattle farms located in Bikaner city of Rajasthan, India.. Udder and Teat morphometric parameters, i.e. udder shape (regular and pendulous), udder depth, teat end shape (flat, round, and pointed) and teat length were performed in the beginning of the study. Subclinical mastitis was defined on the basis of somatic cell count (SCC) of pooled quarter milk samples. Positive association between milk SCC and udder morphometry was found in present study. Pendulous Udder, inverted teat end shape, large teat and long udder depth were more associated with SCM. The analysis of variance revealed that the effect of udder shape on Log_{10}SCC was highly significant ($p<0.01$) in Kankrej and significant ($p<0.05$) effect in Rathi and Sahiwal; effect of udder depth was highly significant ($P<0.01$) in Kankrej and Rathi, and significant ($P<0.05$) in Sahiwal; effect of teat end shape was significant ($P<0.05$) in Kankrej, Rathi and Sahiwal and effect of teat length was highly significant ($P<0.01$) on SCC in Kankrej and significant effect in Rathi and Sahiwal breeds of cattle. Results of present study concluded that udder and teat morphometric parameters of indigenous cattle breeds affect milk quality and varies.The study identified possible udder and teat risk factors viz. udder shape, udder depth, teat end shape and teat length which are facilitate the incidence of mastitis in dairy cattle.

Keywords: Indigenous dairy cattle, teat morphometry, SCC, subclinical mastitis, udder health.

Animal Feed Safety and Climate-Resilient Feeding Practices: Recent Developments in India

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Animal feed safety has emerged as an important area in livestock production due to its direct influence on animal health, productivity, food quality, and public health. In recent years, India has introduced several regulatory measures to strengthen the quality and safety standards of animal feeds. The Food Safety and Standards Authority of India (FSSAI) and Bureau of Indian Standards (BIS) have implemented guidelines regarding certification, contaminant limits, residue monitoring, and restrictions on the use of certain feed ingredients and antibiotics in food-producing animals. The revised BIS standard for compounded cattle feed (IS 2052:2023) has prescribed stricter permissible levels for aflatoxins, heavy metals, and other harmful contaminants, while recent amendments by FSSAI have focused on reducing antimicrobial residues and banning specific antibiotics in livestock production systems. The National Action Plan on Antimicrobial Resistance (NAP-AMR) Phase-II further supports a coordinated One Health approach for improving feed and food safety in the country. Along with regulatory advancements, considerable progress has been made in the development of functional and climate-resilient feeding strategies. Novel feed additives such as microalgae, postbiotics, paraprobiotics, and nano-minerals are being explored for their role in improving gut health, immunity, antioxidant status, and production performance in livestock. Precision feeding approaches based on microbiome studies, metabolomics, and artificial intelligence are also gaining importance for designing balanced and efficient feeding systems. In addition, maternal nutritional programming and early-life dietary interventions are being utilized to improve neonatal immunity and long-term animal performance. Environmental sustainability has become another major focus area, with feed additives such as 3-nitrooxypropanol (3-NOP), seaweed-based supplements, and biochar products showing promising results in reducing enteric methane emissions from ruminants. These recent developments indicate a progressive shift towards safer, sustainable, and scientifically advanced animal feeding systems in India.

Keywords: Animal feed safety, FSSAI regulations, BIS standards, Antimicrobial resistance, Functional feed additives.

Innovations in Feed Formulation and Processing Technologies for Enhanced Animal Productivity

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Advancements in feed formulation and processing technologies have emerged as critical drivers for improving animal health, productivity, and sustainability in modern livestock systems. With the growing demand for animal-derived products, there is an increasing need to develop nutritionally balanced, cost-effective, and environmentally sustainable feed solutions. Recent innovations focus on precision nutrition, where feed formulations are tailored based on species, age, physiological status, and production goals, ensuring optimal nutrient utilization and minimal wastage.Modern feed processing technologies such as extrusion, pelleting, and micronization have significantly enhanced feed digestibility, palatability, and shelf life. These methods help in reducing anti-nutritional factors, improving nutrient availability, and ensuring uniform feed quality. Additionally, the incorporation of feed additives such as enzymes, probiotics, prebiotics, and phytogenics has gained prominence. These additives enhance gut health, improve feed conversion efficiency, and reduce dependence on antibiotics, aligning with global trends toward antibiotic-free animal production.Emerging technologies like nanotechnology and precision fermentation are also revolutionizing the feed industry by enabling targeted nutrient delivery and the production of novel feed ingredients. Furthermore, the use of alternative feed resources such as insect meal, algae, and agro-industrial by-products contributes to sustainability by reducing reliance on conventional feed ingredients like soybean and fishmeal.Digital tools and artificial intelligence are increasingly being integrated into feed formulation processes, allowing real-time monitoring, predictive modeling, and optimization of feed efficiency. These innovations not only improve productivity but also minimize environmental impacts, such as greenhouse gas emissions and nutrient excretion.In conclusion, advancements in feed formulation and processing technologies play a pivotal role in achieving efficient, sustainable, and profitable livestock production systems. Continued research and adoption of innovative practices are essential to meet future food security challenges.

Keywords: Feed formulation, Feed processing technologies, Animal nutrition, Sustainable livestock production.

Palatability assessment of compounded feeds incorporated with dried tree leaves in goats

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Palatability refers to the sensory attributes of a feed that stimulate an animal's desire to eat and can be assessed through eating rate or preference tests (Baumont, 1996). Ruminants typically develop preferences for feeds that produce a rapid sense of satiety. Moreover, feeds that can be consumed quickly are highly digestible tend to be more palatable, provided they are free from toxic or anti-nutritional factors. However, goats have unique ability among ruminants to tolerate higher levels of plant secondary metabolites, such as tannins. In contrast excessive level of tannins reduces the voluntary intake (Makkar, 2003a). An assessment of palatability was undertaken to compare the voluntary acceptance of compounded feeds formulated with dried tree leaves. The preference of animals was assessed using dry matter intake, relative preference index (RPI) and preference ranking as indicators of feed acceptability. Dry matter intake differed significantly ($P<0.001$) among the compounded feeds formulated with dried tree leaves. The highest DM (g/d) intake was recorded for compounded feeds formulated with dried tree leaves of containing Moringa (394.00), which remained statistically comparable with Murikku (392.00) and Karana (384.00), while those containing Jack (379.50) and Agathi (372.50) showed relatively lower intake. The lowest dry matter intake was observed in Gliricidia leaf based compound feed (261.00 g/d), which differed significantly from all other treatments. A similar trend was noted for relative preference index, which ranged from 66.24 to 100.00 per cent and varied significantly among treatments ($P<0.001$). Based on preference ranking, compounded feeds formulated with dried tree leaves with Moringa was ranked first, followed by those containing Murikku, Karana, Jack and Agathi, while compounded feeds formulated with dried tree leaves with Gliricidia ranked last, indicating poor palatability compared to other treatments.

Keywords – Palatability, Tree leaves, Relative preference index

Animal Health Management and Zoonotic Disease Control under One Health Framework

CRISPR-CAS9 mediated Enhancement of Disease Resistance in Indigenous Livestock : A One Health Approach

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The Indian livestock sector continues to face significant challenges due to recurrent outbreaks of diseases such as Foot and Mouth Disease (FMD), Brucellosis and Lumpy Skin Disease (LSD) leading to substantial economic losses and affecting farmer livelihoods. In regions like Gujarat, where dairy farming plays a vital role in rural income, these challenges have a direct impact on productivity and sustainability. Additionally, the increasing risk of zoonotic diseases transmission and antimicrobial resistance (AMR) driven by excessive use of antibiotics, poses a serious concern for both animal and public health. This study explores the potential of CRISPR-Cas9-based gene editing as a promising approach to enhance disease resistance in indigenous livestock. By precisely targeting genes associated with disease susceptibility, CRISPR technology enables the development of animals with improved natural immunity. Compared to conventional breeding methods, this approach offers greater specificity and faster outcomes. Such genetic interventions can act as an effective preventive biological barrier, reducing infection rates and limiting the transmission of pathogens between animals and humans. Furthermore by gradually decreasing the reliance on antibiotics, this strategy contributes to controlling the emergence of multi-drug resistant pathogens. Overall, integrating advanced genetic technologies with the One Health approach can strengthen rural resilience, improve livestock productivity, and support sustainable livestock farming systems in India.

Keywords : CRISPR-CAS9, Disease Resistance, One Health, AMR, Livestock Sustainability

Effect of Dietary Incorporation of *Moringa oleifera* Leaf Meal on Carcass Characteristics, Cut-up parts, and Weights of Organs Parameters of Broiler Japanese Quail

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A feeding trial was conducted to discern the influence of dietary incorporation of *Moringa oleifera* leaf meal on carcass characteristics, cut-up parts, and weights of organs parameters of broiler Japanese quail. A total 288 day-old Japanese quail chicks were randomly distributed into eight treatments of 36 Japanese quail chicks per treatment with three replicates of 12 quail in each. Japanese quail of treatment T_1 (control group) were fed a basal diet (starter and finisher), whereas in treatment group T_2 basal diet was incorporated with Vitamin C @200 mg/kg, T_3 basal diet was incorporated with Vitamin E @10 IU/kg, and in diets T_4, T_5, T_6, T_7, and T_8, the basal diet was incorporated with 1.0%, 3.0%, 5.0%, 7.0% and 9.0% *Moringa oleifera* leaf meal, respectively. Results showed that non-significant ($P \geq 0.05$) difference were noticed in the dressing percentage without giblet, with giblet, cut-up parts *viz*., neck, back, wing, breast, thigh and drumstick, weights of organs in broiler Japanese quail when Japanese quail was fed diet with different levels of *Moringa oleifera* leaf meal. But significantly ($P \leq 0.05$) higher meat-bone ratio was seen in T_5 group while lower was seen in T_8 treatment group as compared to control. It can be concluded that 3.0 % *Moringa oleifera* leaf meal can be incorporated in feed for improvement of carcass characteristics of the broiler Japanese quail.

Keywords: Carcass characteristics, dressing percentage, Japanese quail, *Moringa oleifera* leaf meal

A Unique presentation of Disseminated Lymphoma with Lymphocytic Leukemia Manifestations in a dog

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Lymphomas are a diverse group of tumors that arise from lymphoreticular cells and can arise in almost any tissue of the body, although they most commonly involve lymphoid tissues such as the lymph nodes, bone marrow, and spleen. Leukemia, in contrast, is a malignant disorder of the hematopoietic system characterized by uncontrolled proliferation of abnormal leukocytes in the bone marrow and peripheral blood, often leading to infiltration of multiple organs. In dogs, leukemic manifestations may occur as a primary condition or develop secondary to lymphoma during its leukemic phase, necessitating careful clinicopathological differentiation. A 10-year-old dog was presented with a history of anorexia, diarrhea, hematochezia, and respiratory distress for 10 days. Clinical examination revealed dullness, a poor body condition score (2.5/5), and generalized lymphadenopathy. Hematological evaluation showed a marked increase in total leukocyte count (TLC: 186,030/cu mm), along with anemia (Hb: 7.1 g/dL; PCV: 18.8%; TEC: 2.41 × 10^6/cu mm) and thrombocytopenia. Peripheral blood smear examination revealed a predominance of intermediate to large population of lymphocytes with evident mitotic figures, suggestive of lymphocytic leukemia, a highly proliferative and aggressive disease. Serum biochemical analysis demonstrated markedly elevated alkaline phosphatase (572 U/L), with mild increases in alanine aminotransferase (84 U/L) and aspartate aminotransferase (52 U/L). Total bilirubin was at the upper limit of the reference range (0.8 mg/dL) with hypoproteinemia (total protein: 3.9 g/dL) with hypoalbuminemia (1.8 g/dL). These findings suggest hepatobiliary involvement along with possible protein loss, likely associated with gastrointestinal pathology. Renal parameters (BUN: 29 mg/dL; creatinine: 1 mg/dL) and electrolyte levels (sodium: 147 mEq/L, potassium: 4.6 mEq/L, chloride: 107 mEq/L) were within normal limits. Ultrasonographic examination revealed enlargement of mesenteric and jejunal lymph nodes, along with loss of normal duodenal wall layering, suggestive of infiltrative gastrointestinal lymphoma. Splenomegaly was also observed. Thoracic radiography showed a broncho-interstitial pattern in the caudal lung lobes, indicating pulmonary involvement. Fine needle aspiration cytology (FNAC) of enlarged popliteal and mandibular lymph nodes, as well as peritoneal fluid, revealed marked cellularity with sheets of lymphoblasts exhibiting malignant features, including prominent nucleoli, coarse chromatin, and occasional mitotic figures, along with scattered neutrophils. Based on the hematological, biochemical, imaging, and cytological findings, the case was diagnosed as disseminated lymphoma with secondary lymphocytic leukemic phase of lymphoma in the dog.

Effect of Aflatoxin B1 Contaminated Feed and Mannan Oligosaccharide Supplementation on Blood Biochemical Profile of Early Lactating Karan Fries Cows

Kuldeep Dudi, Chander Datt, Indu Devi, Harinder Rajoria

A study was conducted to evaluate the effect of dietary aflatoxin B1 (AFB1) contamination and its amelioration through mannan oligosaccharide (MOS) supplementation on blood biochemical parameters of early lactating Karan Fries cows. Twenty-five early lactating Karan Fries cows (30–50 days in milk) were selected from Livestock Research Centre, ICAR-NDRI, Karnal and divided into five groups (T1 to T5) comprising five animals each T1 (control), T2 (35 ppb dietary AFB1), T3 (55 ppb dietary AFB1), T4 (T2 + MOS @ 2% of concentrate mixture), and T5 (T3 + MOS @ 2% of concentrate mixture). The feeding trial was conducted for 150 days and all experimental animals were fed according to nutrient requirements as per ICAR (2013). Aflatoxin B1 was produced using *Aspergillus parasiticus* (MTCC 41 strain, IMTECH, Chandigarh) cultured on ground maize, which was subsequently used as AFB1 inoculum. Blood biochemical parameters including blood glucose, total protein, albumin and globulin were studied at monthly intervals. Data were analyzed using Statistical Package for Social Sciences (SPSS, 2020). The results showed significant ($p<0.05$) effects of dietary AFB1 and MOS supplementation on biochemical parameters. Blood glucose concentration was higher in AFB1 treated groups. T2 (60.98±2.39 mg/dL), T3 (62.18±2.50 mg/dL) and T4 (59.01±3.05 mg/dL) compared to control T1 (59.94±3.56 mg/dL), whereas T5 showed comparatively lower values (59.14±2.74 mg/dL). Total protein concentration decreased significantly ($P<0.05$) in toxin-fed groups T2 (6.50±0.13 g/dL) and T3 (6.51±0.15 g/dL) compared to T1 (7.05±0.26 g/dL), while MOS supplementation improved total protein levels in T4 (7.23±0.14 g/dL) and T5 (7.31±0.24 g/dL). Albumin concentration was significantly lower ($P<0.05$) in T3 (3.31±0.19 g/dL) than control T1 (3.64±0.35 g/dL), whereas MOS supplemented groups T4 (3.75±0.11 g/dL) and T5 (3.63±0.08 g/dL) showed improvement. Similarly, globulin concentration was significantly higher ($P<0.05$) in MOS supplemented groups T4 (3.48±0.55 g/dL) and T5 (3.69±0.39 g/dL) compared to only toxin-fed groups.

Keywords: Aflatoxicosis, Aflatoxin B1, Blood biochemical parameters, Mannan oligosaccharide, MOS amelioration.

Impact of berberine and selenium yeast supplementation on growth performance of jamunapari kids

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This study was conducted to evaluate the effects of dietary berberine and selenium yeast, individually and in combination, on growth performance of Jamunapari goat kids. Twenty-eight Jamunapari kids (mean body weight 10.65 kg; age 3–9 months) were randomly allotted to four groups (n = 7) under a completely randomized design and fed a total mixed ration for 120 days. The control group received the basal diet while T1 was supplemented with berberine (500 mg/kg dry matter, DM), T2 with selenium yeast (3 mg Se/kg DM), and T3 with both berberine (500 mg/kg DM) and selenium yeast (3 mg Se/kg DM). Body weight, body weight gain (BWG), dry matter intake (DMI), and feed conversion ratio (FCR) were recorded at fortnightly intervals. Over the 120-day period, mean body weight and BWG were significantly higher ($P < 0.01$) in the T3 group compared with the control, T1, and T2 groups, with the lowest FCR observed in T3, indicating superior feed utilization efficiency. Although DMI was numerically lower in T3 than in the other groups, overall growth performance remained superior, suggesting improved nutrient utilization. The results demonstrate that combined supplementation of berberine and selenium yeast significantly enhances growth performance and feed efficiency in Jamunapari kids, with synergistic effects that were greater than those achieved by either additive alone. These findings support the use of berberine-selenium yeast co-supplementation as a promising nutritional strategy to improve productivity and efficiency in small ruminant systems.

Keywords: Berberine, growth performance, feed conversion ratio, nutritional additive. Selenium yeast

Histopathological Characterization of Surgically Excised Canine Tumours

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The present study was conducted at the Department of Veterinary Surgery & Radiology, College of Veterinary Science & A.H., Junagadh, Gujarat. During the 14-month study period (April 2024 to May 2025), a total of 40 animals underwent a comprehensive clinico-physiological evaluation, including anamnesis, physical examination, and ultrasonographic imaging to assess tumour size, shape, extent, and its relationship with surrounding soft tissues. Out of 40 cases, 16 cases were of mammary gland tumours, 14 cases of cutaneous tumours, 5 cases of abdominal tumours, 3 cases of perineal tumours, 1 case of epulis and 1 case of wart. In 40 cases, surgical removal of tumours was performed and later subjected to histopathology. Surgical management was carried out in 40 various types of tumours. In which lumpectomy, mastectomy, chain mastectomy and bilateral mastectomy like standard surgical procedures, were carried out in the cases of mammary gland tumours and cutaneous tumours underwent total mass resection, while abdominal tumours were removed by laparotomy procedure. After surgery, tumour samples were collected for histopathology. Out of them, 24 cases were confirmed as benign (60 %) and 16 cases were found malignant (40 %). Histologically, found 24 benign tumours were fibroma (6 cases), fibroadenoma (3), adenoma (2), adenochondroma (2), hepatoid gland adenoma (2), hemangioma (2 cases), trichoblastoma (1), myxoma (1), lymphoma (1), plasmacytoma (1 case), histocytoma (1 case) & adeno-osteoma (1). After histopathology, malignant tumours were found such as tubular carcinoma (4), fibrosarcoma (3), ductal carcinoma (2), adenocarcinoma (2), squamous cell carcinoma (2), myxosarcoma (1), mast cell tumour (1) & basal cell carcinoma (1). Appropriate surgical excision combined with histopathological evaluation is effective for diagnosing and managing canine tumours, enabling clear differentiation between benign and malignant cases.

The Emergence of Devil Facial Tumor Disease

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The field of veterinary oncology is familiar with Transmissible Venereal Tumours (TVTs) in canines, as it has been a constant presence for the past 11,000 years. Contagious cancers are exceedingly rare in the animal kingdom, with TVT being the archetype. However, two are emerging rapidly in the carnivorous Australian marsupial, the Tasmanian Devil; it is the only known mammal species afflicted with two independent transmissible cancers. The first reported case of Devil Facial Tumor Disease was in 1996. The pathogenesis involved Schwann cells, emerging from a single female. The etiology of DFT1 is bite wounds during aggressive communal feeding; the devil has a very powerful bite and can open its jaws up to 80°. The clinical signs are ulcerating and infected lesions localized around the mouth, mandible, maxilla and head. If the tumors spread to the ocular region, vision is affected. Mortality is due to starvation, secondary bacterial infections from the ulcerated tumors, or organ failure. The tumor cells evade immune detection by downregulating their MHC expression. Most unusual of all was the discovery of a second disease termed DFT2, which originated from a different geographical location, completely independently from a male devil in 2011. Both diseases have similar facial symptoms. DFT2 is more insidious in nature; DFT2 has a mutation rate 3 times higher than DFT1. The case fatality rate is nearly 100%, with 95% loss of population in some regions.The unique susceptibility of the devil to the diseases was initially ascribed to its supposedly low genetic diversity, although this was later disproven. The immune system of the marsupials is adapting to the diseases, as seen in cases of spontaneous tumor regression. Affected individuals are surviving for 12 months or more. Researchers have identified alleles near the gene Pax 3 that disrupt angiogenesis (the formation of new blood vessels), which starves the tumors and prevents metastasis. Early vaccine trials are promising, with one in five vaccinated devils demonstrating some immune response to the disease. Nearly 98% of the devil's genetic diversity has been preserved by means of "insurance populations" in ex situ conservation sites like zoos and enclosures.

Next-Generation Bovine Breeding: Targeted Genomic Integration via RNA-Guided Recombinases

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The RNA-guided recombinase (RGR) platform has emerged as a powerful tool for high-precision genome engineering and functional genomics. This system relies on a canonical recognition architecture consisting of a degenerate recombinase core flanked by a 5–7 base pair (bp) spacer region, with the central domain bounded by two RNA-specified DNA target sites corresponding to Cas9-binding loci and their associated protospacer adjacent motifs (PAMs). In this study, we performed a genome-wide *in silico* analysis to map potential RGR target sites across the bovine (*Bos taurus*) genome. Using chromosome-wise sequences retrieved from the Ensembl database, we systematically screened for targets using the dreg program (EMBOSS suite), applying a custom-designed motif modeled on a hyperactivated beta-recombinase variant with a fixed 7-bp spacer.Our genome-wide screening revealed that RGR target sites are distributed across several functionally significant bovine genes involved in vital metabolic, immunological, and production pathways. Notable genic targets included those encoding kinesin-like protein (*KIF23*), thyroglobulin precursor (*TG*), uridine–cytidine kinase 2 (*UCK2*), phospholipid-transporting ATPases, phospholipase C-like proteins, DOK family proteins, calpain-associated proteins, interleukin receptor subunits, furin homolog-like proteins, and natural cytotoxicity receptors. Among these, a prominent RGR site was identified within the coding region of the *TG* gene on chromosome 21, a crucial regulator of thyroid hormone synthesis and fat deposition; given that *TG* polymorphisms are strongly associated with marbling, this site holds high utility for marker-assisted selection and meat quality improvement. Additionally, viable RGR sites were mapped to the *KIF23* gene on chromosome 24 (essential for spindle formation and chromosome segregation) and the *UCK2* gene on chromosome 3 (critical for the pyrimidine nucleotide salvage pathway), underscoring the functional diversity of the accessible loci. Taken together, these findings demonstrate the broad applicability of the RGR platform for precise, site-specific genome engineering in bovines, offering actionable targets to advance precision livestock breeding and functional genomics.

Keywords: Site-specific recombination; In silico genome analysis; *Bos taurus*; Functional genomics; Precision breeding.

Disseminated granulomatous pneumonia consistent with mycobacterial infection in a captive adult female swamp deer (*Rucervus duvaucelii*) from a zoological park in Kerala, India: a case report

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Tuberculosis (TB) caused by members of the *Mycobacterium tuberculosis* complex (MTBC) is an increasingly recognised cause of mortality in captive and free-ranging wildlife in India, with spillover from livestock and humans representing a significant One Health concern. Swamp deer (*Rucervus duvaucelii*), an IUCN Vulnerable cervid endemic to the Indian subcontinent, is maintained in several Indian zoological parks under conservation-breeding programmes; however, published accounts of spontaneous mycobacterial disease in this species are limited.

Case Presentation: An adult female captive swamp deer (*R. duvaucelii*) (> 5 years) of the Thiruvananthapuram Zoological Park, Kerala, India, was found dead on 17 October 2025 with no preceding overt clinical signs documented. A systematic post mortem examination performed at the zoo revealed multifocal to coalescing, firm, pale-white to cream-coloured nodules measuring approximately 2–8 mm scattered across the pleural and parenchymal surfaces of both lungs, without obvious involvement of the extra thoracic viscera on gross examination. Histopathological examination of pulmonary tissue was consistent with chronic granulomatous inflammation, supporting a presumptive diagnosis of disseminated mycobacterial (tuberculous) pneumonia. Confirmatory Ziehl–Neelsen staining, mycobacterial culture and species-specific polymerase chain reaction (PCR) are pending and are essential to establish the causative *Mycobacterium* species.

Conclusion: This report documents presumptive disseminated mycobacterial pneumonia in a captive swamp deer from south India and highlights the urgent need for systematic ante-mortem TB screening, molecular characterisation of mycobacterial isolates, and strengthened biosecurity at the livestock–wildlife– human interface in Indian zoological parks.

Keywords *Rucervus duvaucelii*; Swamp deer; Tuberculosis; *Mycobacterium tuberculosis* complex; Granulomatous pneumonia; Zoo animals; One Health; India

Estrous synchronisation and conception rate in progesterone impregnated intravaginal sponge and PGF-2 alpha administered Deccani sheep

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The objective of the present study was to evaluate the efficacy of intravaginal sponge and double dose PGF-2 alpha inj for oestrous synchronization and conception rate in Deccani sheep under field condition. Eighteen non-pregnant ewes were randomly assigned to three experimental groups (n=6 per group). Group I (Control) received no hormonal intervention and were managed under natural herd mating conditions. Group II underwent an oestrus synchronization protocol consisting of two intramuscular injections of PGF-2α (120 µg cloprostenol) administered at an 11-day interval; ewes exhibiting oestrus signs 48 hours post-treatment were mated with a selected ram. Group III were treated with intravaginal sponges containing 300 mg of progesterone for 11 days, supplemented with 200 IU of eCG on day 10 and mating was performed 48 hours after the onset of oestrus. The results of this study demonstrated a significant variation in reproductive performance across the three experimental groups. The oestrus induction rate was notably lower in the Group I (Control) ewes at 33.3%, whereas Groups II and III exhibited substantially higher and identical synchronization success, reaching 83.33% and 83.3%, respectively. A similar trend was observed regarding the conception rates. The Control group achieved a modest conception rate of 16.6%, while both the double-dose PGF-2α (Group II) and the progesterone-impregnated sponge (Group III) protocols yielded significantly improved outcomes, recorded at 66.6% and 66.66%, respectively. These findings suggest that both hormonal intervention strategies are highly effective for managing sheep reproduction. The data indicates that both the luteolytic effect of the double-dose PGF-2α and the exogenous progesterone priming via intravaginal sponges provide a satisfactory and reliable method for achieving oestrus synchronization and enhancing overall fertility within the flock.

Key Words: oestrous synchronization, conception rate, Intra-vaginal progesterone sponge, eCG, PGF-2α

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Impact of demonstration on improved varieties of fodder crops

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The livestock farming is a cornerstone of rural economic development, offering affordable and high-quality nutrition through milk and various animal products. However, this industry faces a growing challenge as the shortage of available green fodder has steadily intensified over the years. Hence KVK Haveri designed a Front line demonstration to promote intensive cultivation green fodder for sustainable dairy farming. Four villages of Haveri district selected for demonstration. Ten farmers were selected for demonstration of Fodder Sorghum COFS-31, Fodder Cow pea, Hedge Lucerne and African Tall Maize (ATM). Demonstrations were conducted to demonstrate the effect of supplementation of green fodder on milk yield. In this demonstrated mixed fodder unit the average yield was 236.6qtl/acre when compared with conventional method 178.4qtl/acre. The benefit cost ratio of demonstration was 2.14 and conventional method it is 1.88. Results of this technology revealed that milk yield increased up to 18 percent that indicates animals getting balanced green fodder availability throughout the year. KVK promotes mixed fodder as one of the component of integrated farming system promoted in the district. Totally around 50 farmers successfully adopted this technology and 4 farmers started producing fodder seeds and planting materials through KVK extension activities.

Key words: livestock farming, Green fodder, Front line demonstration, milk yield

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