

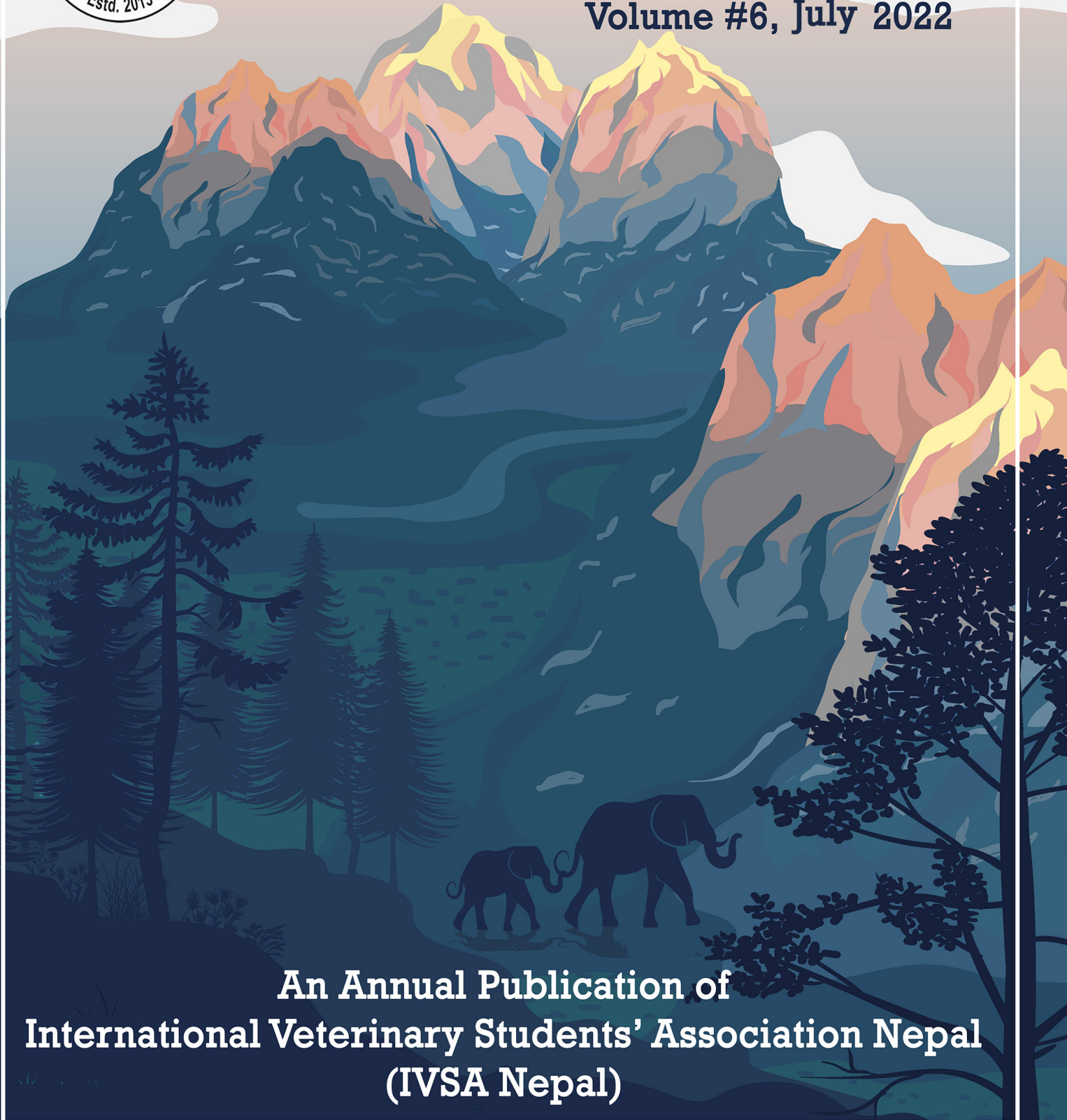


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IVSA MIRROR

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International Veterinary Students' Association Nepal
(IVSA Nepal)

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Editor's Note



I want to express my profound gladness to launch the sixth issue of IVSA Mirror (An annual publication of IVSA Nepal). I also am extremely sorry that I took such a tremendous length of time to publish this issue, which was due to serious technical issues. This online publication couldn't have been possible without the efforts of the IVSA team and countless other helping hands.

We hadn't been able to obtain enough articles due to the covid pandemic. Many enthusiasts hadn't been able to perform research/case studies to prepare an article due to the lockdown. But indeed, there are study writings here that may be appealing and resourceful to the interested ones.

I was honored to be a part of the IVSA Nepal team, both as a member and as Editor-in-Chief. I am filled with ecstasy to have worked alongside my precious and extraordinary team members throughout my tenure in every event and activity of the IVSA Nepal.

As the Editor-in-Chief, I always tried to add every ounce of creativity of the academicians in every program of the IVSA Nepal. Especially for the mirror, I have tried to select the articles whose results focused on resourceful information. It is such a privilege to have worked as the Editor-in-Chief, which got me to learn about scientific writing skills, leadership, managerial attributes, and confidence build up while coordinating with the team and resource persons.

Having said this all, I would like to apologize again to the authors whose articles weren't selected for this issue and surely would like to encourage them all for loving IVSA Nepal with similar valuable contributions in the upcoming days. IVSA Nepal is always glad to accept suggestions for errors and is always positive to take such advice as a step-ladder for our betterment.

Thank You !!!

A handwritten signature in black ink, appearing to read 'Pradip Raj Pant' with a stylized flourish underneath.

Pradip Raj Pant
Editor in Chief
IVSA Nepal 2020/21



Agriculture and Forestry University

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FOREWORD



It is my immense pleasure to write foreword about the sixth publication on scientific journal, IVSA Mirror Number 6, published by the International Veterinary Students Association, (IVSA) Nepal. In continuation with the previous publications, IVSA Nepal has been able to bring forward various research, reviews and case studies as well as findings of various authors and researchers in the field of veterinary education and animal husbandry.

Agriculture and Forestry University (AFU), Rampur, Chitwan, Nepal has been the first technical university dedicated to the production of highly skilled graduates on agriculture, animal and veterinary sciences, fisheries as well as forestry. Among the various students' technical organizations, IVSA Nepal has been able to leave a mark among the students as one of the leading technical organization through various programs in the field of veterinary education. The publication of the scientific journals such as IVSA Mirror has brought the knowledge, ideas and innovations of the individuals into the paper for everyone to learn and understand. In fact, it has united various students, teachers, researchers and innovators into a common ground where information is properly shared among the individuals.

IVSA Mirror has been playing vital role in bringing the knowledge of the few to wider audience. The success of such initiative will help to maintain the standard of the university as a true technical university. The journal will be instrumental in bringing together the national and international delegates to recognize the activities conducted by the veterinary students in our university. The journal will certainly promote the recognition of Agriculture and Forestry University in international community.

I would like to congratulate the team of editorial board and the IVSA Nepal for their efforts in bringing yet another informative and useful scientific journal in IVSA Mirror. I am confident that this publication will be highly beneficial to the students, faculty and researchers of the national as well as international community.

Prof. Punya Prasad Regmi, PhD
Vice Chancellor



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Message From Dean



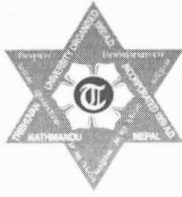
It is my honor to write a few words to congratulate International Veterinary Students' Association Nepal (IVSA Nepal) on the successful publication of the 6th issue of its annual journal; IVSA Mirror. Being on the responsible position at Agriculture and Forestry University (AFU) for the last few years, I have directly witnessed the improvement of this journal both on quantity and quality, issue after issue. The journal has also started gaining its popularity at the international level. The international articles published in this journal signifies its reach to the global community.

The Faculty of Animal Science, Veterinary Science, and Fisheries (FAVF) is grateful to IVSA Nepal for the publication of this scientific journal, which is the collection of articles from national and international Veterinary professionals and students. FAVF is also proud of other various educational activities of the association which are helpful to the students of this faculty. I sincerely praise the editors, the readers, the advisors, and the supporters who contributed to the publication of the journal.

Being in the period of global competition, Veterinary students with good academic knowledge should also possess strong writing skills. Good writing skills ease and enhance scientific communication and also the dissemination of research findings. Therefore, IVSA Mirror is a platform for all Veterinary students to harness their writing skills. I wish the Veterinary students will use this golden platform and hope to see more articles from them in the upcoming issue.

Lastly, I want to appreciate the fact that even during the tough time of the pandemic, IVSA Nepal is successful in publishing such a great journal. I am sure, this journal will be highly beneficial to students, farmers, and foreign delegates. I wish IVSA Nepal an unceasing success.

Prof. Dr. Hom Bahadur Basnet
Dean
Faculty of Animal Science, Veterinary Science and Fisheries



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Message from Dean

It gives me great pleasure to express my deepest gratitude to the International Veterinary Students Association (IVSA) for releasing the 6th issue of "IVSA Mirror," which provides excellent exposure to veterinary and animal science students and professionals. I'd want to applaud all of the students and responsible individuals who went above and beyond to deliver this book in this format.

Hopefully, the events and activities organized by IVSA Nepal and its local chapters are helping to bridge the gap between veterinary professionals in Nepal and those working in other countries. IVSA Nepal's efforts may be beneficial to the development of veterinary academics and professions, as well as worldwide cooperation in battling national and global concerns about animal and human health. IVSA Mirror, an annual scientific publication published by IVSA Nepal, has served as a conduit for ideas and knowledge to be shared and understood by all.

Finally, I'd like to congratulate IVSA Nepal's entire team on reaching such a lofty position in the IVSA world in only 9 years (2013 A.D). IVSA Mirror, I believe, this plays a significant part in propelling IVSA Nepal to new heights of success. I am confident that the IVSA mirror will address and share current veterinary challenges and novel veterinary activities that integrate animal and human welfare and that it will serve as a springboard for future research and extension activities. I would like to extend my best wishes to IVSA Nepal.

.....
Prof. Bhargab Dhital
Dean



HIMALAYAN COLLEGE OF AGRICULTURAL SCIENCES & TECHNOLOGY (HICAST)

Affiliated to Purbanchal University



Message from Principal

I am glad to write some words on the publication of IVSA Mirror which is a scientific journal annually published by the International Veterinary Students' Association Nepal (IVSA Nepal). It publishes veterinary science and animal husbandry related research articles, review articles, case study, and short communications. I would like to appreciate the IVSA Nepal and its editorial board in publishing this journal, which requires hard work and tireless efforts.

I am sure that IVSA Mirror has been a good medium for veterinary students to uplift their writing skills. It has also been a reliable source of veterinary-related information to students, professionals, and farmers. Besides this publication, other activities such as free animal health camps, exchange program, training and workshops, veterinary quiz competitions, international conference and symposium, etc. has been equally admirable.

Being the first private veterinary college of Nepal, Himalayan College of Agricultural Sciences and Technology (HICAST) always supports programs that upgrades the knowledge of veterinary students. HICAST has been supporting the activities of TVSA Nepal, especially the IVSA HICAST from the beginning. I also want to ensure IVSA Nepal that HICAST always encourages and supports such activities that contributes to uplift the skills of veterinary students and veterinary education as a whole.

Finally, I would like to congratulate IVSA Nepal for publishing IVSA Mirror and wish for the success of this publication.

.....
Dr. Shreeram P. Neopane Ph. D. (UK)
Prof. (Animal Breeding and Genetics)
Principal, HICAST, Kritipur, Kathmandu



Affiliated to Purbanchal University & Council for Technical Education and Vocational Training

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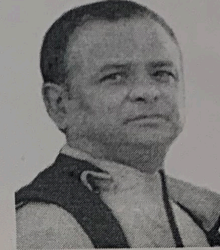
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Message from the Academic Director



It is my pleasure to write a few words in the "IVSA MIRROR, 6th edition ", a scientific journal publication of International Veterinary Students' Association Nepal (IVSA Nepal).

I am sure that such publications will help veterinary students to increase their knowledge as readers and also as contributors. They can increase their creativity by providing research articles, short notes, case reports etc. They get knowledge about how to express their views and ideas on veterinary related matters scientifically.

I know that IVSA NPI has been working continuously for last 3/4 years organizing different functions and activities such as speech program, workshop, quiz contest, rabies vaccination campaign, tiger day celebration, fare well among students etc which ultimately help students increase their creativities and help to make relationship among veterinarians and societies.

I would like to appreciate the editor publication team members of IVSA Nepal for their hard work in order to bring out such a useful journal publication.

Thanks,

Dr, Egendra Kumar Shrestha
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नेपाल भेटेरिनरी एशोसिएसन NEPAL VETERINARY ASSOCIATION



Message from the President

I would like to congratulate the editorial board and the whole team of International Veterinary Students' Association (IVSA) Nepal for their successful publication of 5th edition of IVSA Mirror as an official organ, which is a reflection of IVSA Mirror.

IVSA Mirror has always been a great platform for various researches in the field of veterinary sciences among the students as well as seasoned researchers. It has provided the platform to acknowledge the findings in research of the veterinarian and has helped to broaden the horizon of knowledge of the students.

International Veterinary Students' Association Nepal (IVSA Nepal) has done justice to the ethics of the veterinarians and the field of veterinary as a whole. IVSA Nepal from the beginning of its formation has been extraordinary in various veterinary related activities and achievements. In doing so, IVSA Nepal has also been able to make its presence in various international committee. Its activities have benefitted not only veterinary students but also veterinary professionals and semi-professionals.

I again extend my best wishes to IVSA Nepal for publication of this official organ, IVSA Mirror.

Thank you.
Sincerely,

Dr. Sital Kaji Shrestha

President, Nepal Veterinary Association

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Tel/Fax: 00977-1-5357496, Email: nveta2024@gmail.com, URL: www.nva.org.np



Dear members of IVSA Nepal,

My name is Anna Ciećkiewicz, and I'm the President of IVSA Global. I'm 24 years old, and I have just finished my fifth year of veterinary medicine at Agriculture University, in Kraków Poland.

I'm delighted to see the publication of the 6th issue of IVSA Mirror by IVSA Nepal. I believe that each and everyone of us play an important role in the veterinary community and collectively by adding our smallest project, idea, sharing our view and opinion we can make a big difference. The Journal is a beautiful example of the motivation of veterinary students from Nepal to contribute to the goal of advancing the veterinary profession on a Global and local level.

I'm always amazed about the beautiful diversity of our reasons to be involved in the association, ideas to improve the veterinary profession and our cultural backgrounds. This makes IVSA a global platform which allows us to broaden our horizons and learn from each other, collectively improving our approach to veterinary medicine. Therefore, I can't wait to read the interesting articles in the IVSA Mirror and learn about veterinary medicine in your country, about your perspective and the challenges you face everyday. It will certainly make me and all the readers better future health professionals.

Congratulations! I am delighted to be part of this international family together with you, inspiring veterinary students from Nepal! I hope I will be able to meet you soon during one of our live or online events.

Lots of love,
Anna Ciećkiewicz
President 2021-2022
International Veterinary Students' Association





"Established in 2013 to benefit people and animals of the world"

INTERNATIONAL VETERINARY STUDENTS' ASSOCIATION NEPAL (IVSA NEPAL)

Ref. No.

Date: - 1st July, 2022

Forewords



IVSA Nepal is one of the 194 member organizations (MO) under IVSA Global. In its 8th year of establishment, IVSA Nepal has marked its position promptly among IVSAians and veterinary professionals. IVSA Nepal has worked relentlessly for the betterment of veterinary education and animal welfare through different sorts of programs like awareness, vaccinations, conferences, workshops, etc. IVSA Nepal acts as a mother organization of its 4 local MO that is established in all 4 veterinary institutions in Nepal ie; IVSA Rampur, IVSA Paklihawa, IVSA HICAST, and IVSA NPI. It has gained momentum with the help of enthusiastic volunteer students from these local MOs.

Documentation of the records, situations and scientific writings started in ancient Greek long ago. Nowadays, it has become a culture to shape the mind for innovations. IVSA Nepal realized the importance of documentation of scientific findings and works. Also, veterinary science, a branch of mainstream science with huge potential in Nepal follows the path of documentation of scientific works. So, IVSA Nepal started publishing IVSA Mirror in 2016 AD with a sole motto to encourage veterinary professionals, graduates, and students in scientific works and writing, and help the entire veterinary community. Since its first edition, IVSA Mirror has become a pride of IVSA Nepal. And now I am very happy to announce the publication of the 6th edition of IVSA Mirror.

Finally, I want to express my sincere thanks to the editor and his team for their irresistible efforts. I want to remember all the members of IVSA Nepal and its Local MOs who are the unsung hero behind this success. I would like to thank all seniors who have been guiding us continuously throughout the publication. Last but not the least, I would like to express my sincere gratitude towards our patron Prof. Dr. IP Dhakal, our advisors Prof. Dr. Bhuminanda Devkota, and Assoc. Prof. Dr. Rebanta Kumar Bhattarai for their continuous guidance and support for IVSA Nepal.

.....
Aashish Adhikari
President
IVSA Nepal 2020/2021
Email: asis.adk19@gmail.com

Acknowledgment

IVSA Nepal and IVSA Mirror Editorial Board would like to express sincere gratitude to the Office of the Vice-Chancellor (Agriculture and Forestry University), Office of the Dean (FAVF, AFU), Office of the Dean (IAAS), Himalayan College of Agricultural Sciences and Technology (HICAST), Nepal Polytechnic Institute (NPI), International Veterinary Students' Association (IVSA), IVSA Rampur, IVSA Paklihawa, IVSA HICAST, IVSA NPI, Prof. Dr. Punya Prasad Regmi, Prof. Dr. Ishwari Prasad Dhakal, Dr. Sital Kaji Shrestha, Prof. Dr. Bhuminanda Devkota, Assoc. Prof. Dr. Dipesh Kumar Chhetri, Assoc. Prof. Dr. Rebanta Kumar Bhattarai, Dr. Shyam Bahadur Raut, Asst. Prof. Dr. Ananta Dahal, Asst. Prof. Dr. Shankar Raj Barsila, Assoc. Prof. Dr. Krishna Kaphle, Asst. Prof. Dr. Gokarna Gautam, Asst. Prof. Dr. Shatrugan Sah, Asst. Prof. Dr. Surendra Kanu, Dr. Sulove Koirala, Dr. Binod Pokhrel, Dr. Sachin Upadhyaya, Dr. Dibek Karki, Mr. Aashish Adhikari, Mr. Tejaswee Pokhrel, Mr. Apil Subedi, Mr. Samin Dahal, Mr. Saurabh Gelal, Mr. Somnath Aryal, Mr. Kabit Timilsina, the editorial team and all the hands who helped us directly or indirectly from call to publication.

Great to have your support !!!

IVSA MIRROR

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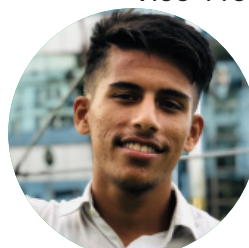
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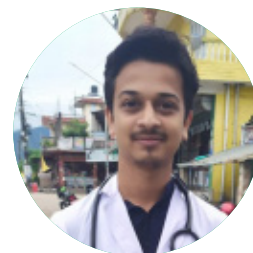
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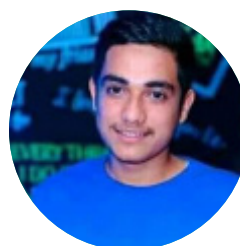
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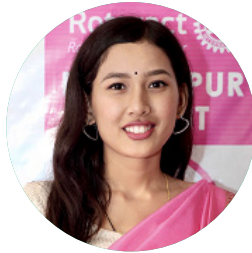
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A CASE OF COINFECTION: COLIBACILLOSIS AND IBD IN BROILERS AT NATIONAL AVIAN DISEASE INVESTIGATION LABORATORY (NADIL), BHARATPUR, CHITWAN, NEPAL



N. Sekh*

Abstract: *E. coli* is a ubiquitous bacteria that can affect poultry health and flock performance. Moreover, it can cause higher mortality in younger birds due to their immature immune system. Immunity suppressing diseases like Infectious Bursal Disease (IBD) can favor the invasion of *E. coli* into the blood circulation causing heavy mortality due to septicemia. Hence, colibacillosis case, which is an infection due to Avian Pathogenic *E. coli* (APEC) should be correlated with immune suppressing disease like IBD while performing the necropsy. In this case, 29-day Cobb500 commercial broilers were presented to the National Avian Disease Investigation Laboratory (NADIL), Bharatpur, Chitwan. Key post-mortem findings included fibrin deposition on the liver and enlarged bursa with viscous mucus inside. Liver samples were thereafter pooled for the bacterial culture and antibiotic sensitivity test. IBD was confirmed by the rapid antigen test kit. Based on zones of inhibition, (reference ATCC 25922 *E. coli*), Gentamicin, Colistin, and Ceftriaxone were found to be sensitive whereas Amikacin and Ciprofloxacin were found to be resistant. Finally, Gentamicin was prescribed and Ciprofloxacin was discontinued as the second line of treatment.

Keywords: Antibiotic sensitivity test, Cobb500, Colibacillosis, Gentamicin, IBD, NADIL

Introduction

Colibacillosis is an infection (Moulin et al., 1999) caused by Avian Pathogenic *Escherichia coli* (APEC). *Escherichia coli* (*E. coli*) cases are observed worldwide in chickens, turkeys, and other poultry species. The disease may take the form of localized or systemic infection. Birds of all ages are susceptible to colibacillosis, but younger birds are more affected (Leitner and Heller et al., 1991). Colibacillosis frequently occurs with other diseases; making it more difficult to diagnose. Morbidity varies and mortality could be 5 to 20% (The Poultry Site). The infectious bacteria is moderately resistant in the environment but is susceptible to many disinfectants and temperatures at 80°C. Route of infection in poultry may be oral, inhalation, and also via shell membranes, yolk, and unhealed navel. Generally, the incubation period is 1-3 days (Linden et al., 2015). Poor hygiene, incomplete navel healing, mucosal damage due to viral infections, and immuno-suppression are some predisposing factors for colibacillosis outbreaks (Linden et al., 2015). The affected flock may show the signs like coughing, sneezing, reduced appetite, reduced water intake, poor growth, and decreased flock performance (Nolan et al., 2013).

The common co-infection documented to occur with *E. coli* is CRD (Chronic Respiratory Disease) caused by the *Mycoplasma gallisepticum* (Li et al., 2019). *Mycoplasma gallisepticum* is one of the major pathogens that cause respiratory distress in poultry. Chicken with CRD often shows clinical lesions like tracheitis, sinusitis, air sacculitis, and conjunctivitis (Li et al., 2019).

Case Description

A broiler commercial farm located at Piluwa, Bara district of Nepal suspected to be affected with mixed bacterial diseases based on the farmer's history taken at the National Avian Disease Investigation Laboratory (NADIL); CASE NO 4564. The breed was Cobb500 broiler which is the most popular breed (Sharma et al., 2012) of broiler in Nepal. The age of the flock was 29-days; with a day-1 flock size of

*Corresponding author: drnajimsekh@gmail.com

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1000.

History and Clinical Signs

There was a decrease in overall feed and water intake as compared to the standard performance (Cobb500) after the outbreak of the disease. Also, labored respiration was noted among the birds. As compared to the standard floor space requirement per bird, broilers had been overstocked in the absence of adequate ventilation. The morbidity was 50% and mortality was 10%. The signs of white diarrhoea were observed when vents were grossly examined.

Post-Mortem Findings

There were fibrin deposition on the livers as flake along with congested lungs. Both kidneys were remarkably swollen. Furthermore, the bursas were grossly pale and enlarged; and had copious mucous when got incised.

Rapid Test, Bacterial Culture, and Antibiotic Sensitivity Test

Rapid antigen test kit (Bio-Note) for Infectious Bursal Disease Virus/IBDV was used following a post-mortem examination. The rapid test for IBD (Gumboro disease) was found to be positive. Afterward, liver samples were pooled for the bacterial culture and lastly, an antibiotic sensitivity test was performed for clinical purposes.

The *E. coli* was confirmed by bacterial culture on various growth medias like Nutrient Agar & MacConkey Agar, EMB Agar, and TSA. From TSA, pure colonies of *E. coli* was isolated. For antibiotic sensitivity test, colonies from TSA were added to the test tube containing distilled water and mixed well so as to standardize its turbidity with the McFarland Standards. Then, the suspension was uniformly inoculated on the Muller Hinton Agar (MHA) using a cotton swab. Six different antibiotic discs (one control) were placed over it and incubated at 37 degrees C for 48 hrs.

Media	Observation	Result
Nutrient Agar (NA) and MacConkey Agar (MAC)	Colorless colony in NA and Pinkish colony in MAC	Positive for gram-negative
EMB Agar	Metallic green appearance	Positive for Lactose Fermenter (e.g. <i>E.coli</i>)
TSA	White colony	Pure culture of <i>E.coli</i>

Table 1: Culture media used for the *E. coli* isolation

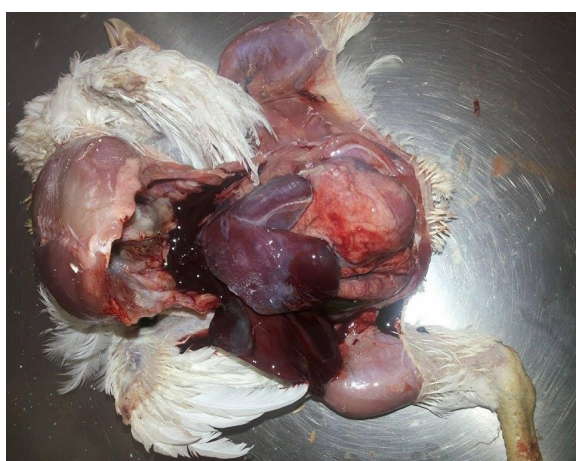


Fig 1: Fibrin deposition on liver



Fig 2: IBD test positive on rapid antigen test

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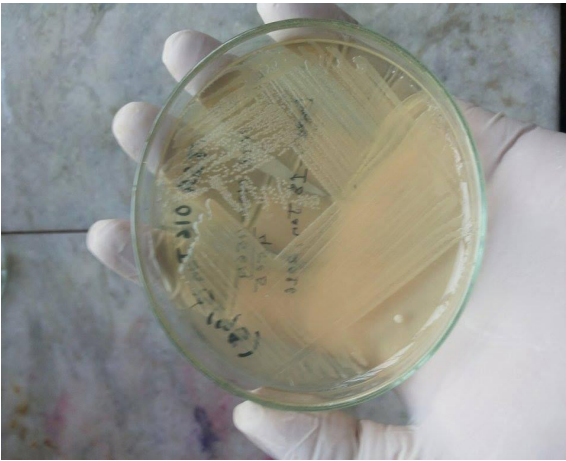


Fig 3: Colorless colony in Nutrient Agar



Fig 4: White pure colony in TSA



Fig 5: Pink colony in MacConkey Agar

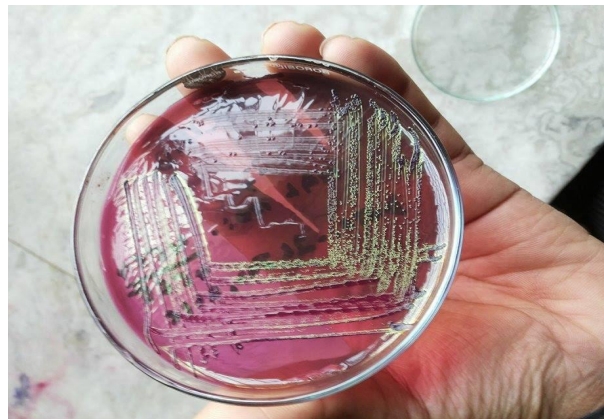


Fig 6: Metallic green color in EMB Agar

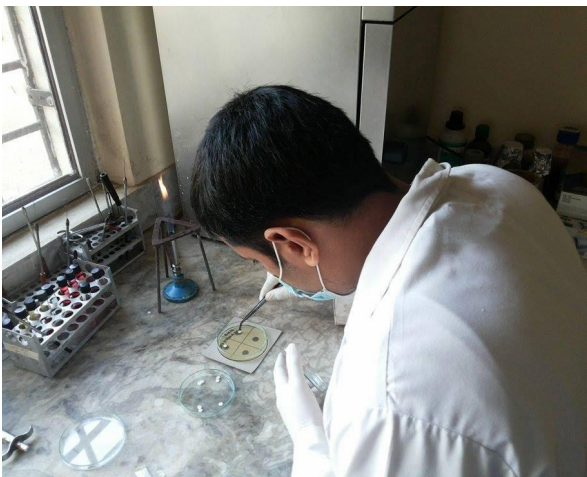


Fig 7: Antibiotic discs dispersion in MHA



Fig 8: Zone of Inhibition at MHA

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Antibiotic Disc	Zone of Inhibition (mm)	Reference Range ATCC 25922 E. Coli	Remarks
Gentamicin	20	19-16	Sensitive
Colistin	13	9-14	Sensitive
Amikacin	13	23-29	Not Sensitive
Ceftriaxone	33	29-35	Sensitive
Ciprofloxacin	14	30-40	Not Sensitive

Table 2: Antibiotic sensitivity test result for *E.coli*

First line of Treatment

As IBD virus causes suppression of immunity (Muller, Islam, and Raue et al., 2003), medication like Vitamin E, Vitamin C, Selenium and phyto-genic additives were provided as per the manufacturer guideline for 5 days to be used for every 2 hours' drinking water early in the morning each day.

To control secondary bacterial infections, Ciprofloxacin 10% were prescribed at the rate of 1 gm per 3 liters of water for 5 days simultaneously throughout the day; without mixing up with the immunity enhancing medications mentioned above.

Follow Up of the Case

The farm owner was advised to make a call after 3 days of the first line of treatment. After the first session, there was an improvement in the morbidity; however, the mortality remained similar. This might have happened as the Ciprofloxacin was resistant on that farm. Consequently, a sensitive drug; Gentamicin was prescribed as the second line of treatment when a culture report became available. The mortality stopped completely after 4-days of using Gentamicin.

Conclusions and Recommendation

Antibiotic resistance problem is growing across the world that can potentially harm both animal and human health via the food-supply chain. Moreover, haphazard use of such drugs is frequent findings in the third world country like Nepal due to a lack of proper legislation, implementation, and monitoring. Therefore, Nepalese poultry farmers should be educated to use sensitive medication like antibiotics only under the prescription and supervision of a registered veterinarian to protect the health of birds and human beings, promoting one health side by side.

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A CASE REPORT ON COMPOUND FRACTURE OF FORELIMB IN A GOAT KID



D. S. Kushwaha^{*1}, A. K. Jha¹, S. Rokaya¹, S. P. Kanu²

Abstract: A 1.5-month-old male goat kid was carried to the Veterinary Teaching Hospital of IAAS Paklihawa campus with the primary complaint of a compound fracture in the metacarpal bone. The fracture was so complicated that amputation of the leg was the only option. Right after the preparation of the patient, Intravenous Regional Anaesthesia was given and radio-carpal disarticulation was done in the goat. The surgery continued for almost 2 hours and after the surgery, the goat kid was discharged under caring of the owner, with monitoring and follow-up under VTH. The condition of the goat kid is well now and healing slowly. This article stresses on the importance of documenting livestock limb amputation for a legit conclusion on prognosis, life expectancy, and expected quality of life of amputated animals.

Keywords: Amputation, Compound Fracture, Goat, Intravenous Regional Anaesthesia (IVRA), Radio-carpal Disarticulation

Introduction:

Amputation is becoming quite popular in veterinary practice to save the life of animals which has become a better option than euthanasia. It is thought that the cost of amputation and post-surgical management could be higher than the cost of the animal, especially in rural areas, so people often think it is rare but for the conservation of animals it's a much more essential job to be done. Amputation is done in various cases like necrosis, gangrene, extensive nerve injury of the limb, malignant neoplasm, frostbite, and some incurable vascular diseases that would not respond to local treatment (Devi et al., 2016).

Limb amputation is thought to be a better option in case of bony tumors, severe trauma, or catastrophic injury if the treatment is presumed to be guarded. In the case of production animals, this is uncommon due to poor prognosis and higher cost of surgery so animals are either slaughtered or euthanized. In the case of dogs, it is common in cases of osteosarcoma or severe trauma. Amputation is done if the injury is catastrophic and has got a poor or guarded prognosis. Some of the conditions that require amputations are catastrophic injury to associated soft tissue structures such as muscles, tendons, ligaments, and nerves, chronic or gangrenous infection, osteomyelitis, loss of blood supply, and open, comminuted long bone fractures (Gabriel A et al., 2017).

Case Description and History

A 1.5-month-old male kid of Terai breed goat was brought to Veterinary Teaching Hospital (VTH), IAAS, Paklihawa Campus with the chief complaint of compound fracture of the front right limb extending below the knee joint to the hoof (**Fig. 1**). The wound had an exposure of the broken metacarpal bone to the phalanges. The patient was brown in colour with a weight of 5 kg, a rectal temperature of 102.2° Fahrenheit, and a heart rate of 120 beats per minute. According to the owner, the wound occurred due to the accident, the patient had to face after getting hit by a vehicle at Ranigaun, Siddharthnagar Municipality-1. The patient was brought without any delay.

Clinical Signs

The patient was unable to stand and suffering from pain. The lacerated wound (6-8 cm) was wide open and the internal part was exposed to the environment. The bone marrow was visible. No sign of pain or discomfort was seen while palpating the rest body parts. The patient had tachycardia, pink mucous membrane, <2 seconds capillary refill time (CRT), 5% dehydration status, and dull but responsive.

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Crepitus was felt while palpating the right forelimb mid metacarpal. The limb extremity was congested at the fracture site.

Diagnosis

The clinical signs, exposure of the broken metacarpal bone with the crepitus sound and blood congestion confirms the compound fracture of the right front limb from the mid metacarpal bone to phalanges.

Treatment

Surgical Treatment:

Since the condition of the patient was severe, fixation was not possible. So, amputation was done from the radio-carpal joint onwards.

a. Pre-operative Care: The patient was restrained properly in the lateral recumbency with the right side upward. The wound was thoroughly cleaned with diluted povidone solution. The patient was given pre-medications i.e., Tramadol (2 mg/kg) – 0.2 ml I/M. The area above the wound was cleaned and shaved. A tourniquet was tied above the Elbow joint. Lignocaine hydrochloride 2% - 1.5 ml was given intravenously in the radial vein as intravenous regional anaesthesia and 5 ml locally around the elbow joint. Since the patient was a ruminant, general anaesthesia was not preferred. The site of the incision and the shaved area was washed with cotton soaked with 90% alcohol and diluted Savlon.

b. Operation Procedure: Below the knee joint (3-4 cm), targeting the joint of radio-ulna and carpal joint, an elliptical or V-shaped incision was made on the medial and lateral aspects of the limb. The skin was cut with a sharp sterile BP – blade. The skin flaps were made enough for suture by undermining the skin. The veins (radial, medial, and ulnar) were ligated for prevention of bleeding by using a Catgut suture (2.0) (**Fig. 2**). The incision further continues till the extensor and flexor muscles are cut. The bones were disarticulated from the joint of the Radio-ulna and the carpal (**Fig. 3**). Meanwhile, Meloxicam (0.2 mg/kg) – 1 ml I/M was administered. After the amputation, Ceftriaxone (5-10 mg/Kg) – 3 ml was sprayed over the wound for further protection against any microbial activities.

The edges of skin flaps were closed by apposition suture; Horizontal mattress with nylon thread (non-absorbable suture) (**Fig. 4**). Nebanol (Neomycin + Bacitracin) powder was spread over the incision line. And the incision line was wrapped with sterile gauze.



Fig. 1: Broken metacarpal of right forelimb of goat kid



Fig. 2: Ligation of blood vessels of the right forelimb



Fig. 3: Disarticulation of radio-ulna and carpal joint



Fig. 4: Closure of skin flaps by horizontal mattress suture technique with a non-absorbable nylon thread

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c. Post-operative Care:

For 5 days, the patient was treated with antibiotics: Ceftriaxone 250 mg (5-10 mg/Kg) – 1.5 ml I/M BID, analgesics: Meloxicam (0.2 mg/Kg) – 1 ml I/M, and Conciplex (Multivitamins). The owner was asked to maintain a clean and hygienic environment for the patient and good food. Dressing with a tincture of Iodine was done on alternate days until complete healing occurred.

Discussion

Fractures of the appendicular bones (forelimbs and hind limbs) are prevalent, especially in calves, as a result of trauma or manipulation during dystocia (Gabriel A et al., 2017). However, fractures affecting goats, particularly in kids, are not uncommon. Fractures of metacarpus and metatarsus, followed by fractures of the tibia, ulna, radius, and the humerus, are the most common, and the femur, pelvis, phalanges, and axial skeleton are considered less common and rare fractures in cattle (Schoiswohl et al., 2020). When deciding on any operations involving fractures in ruminants, consider the animal's prognosis in relation to the severity and nature of the fractured limb, the cost of treatment, the animal's economic and genetic value, the complexity of the procedure, unpredictable post-operative complications, and prolonged post-operative care (Câmara et al., 2014; Kreycik et al., 2005). Splints, casts, external skeletal fixation (ESF), and transfixation pinning and casing (TPC) are all options for treating limb fractures (Schoiswohl et al., 2020). In serious injuries where genetic preservation or environmental value to the client are important, amputation is considered an alternative to euthanasia.

The kid's limb fractured after being hit by a vehicle, resulting in metacarpophalangeal avulsion, corroborating trauma as the primary cause of limb amputation. Amputation of a limb can be done via diaphysis or disarticulation (Desrochers et al., 2014). The most common method of limb amputation in horses is disarticulation with a caudal flap technique that involves suturing the suspensory ligament and flexor tendons to the extensor tendons. Because there are no sharp bone borders, disarticulation gives a broader surface for weight bearing, less haemorrhage, and faster soft tissue healing with a lower chance of dehiscence (Desrochers et al., 2014; Vlahos & Abvp, 2011).

In cattle, amputation through the diaphysis has been successfully reported through the distal third of the tibia, proximal radius-ulna, mid-femur, mid-humerus, distal femur, proximal metatarsi, and distal metacarpus, and in sheep and goats, amputation through the diaphysis has been successfully reported through tibia, proximal radius-ulna, femur, humerus, and metatarsus. Tendon breakdown and laxity of the contralateral limb, persistent intermittent lameness, surgical site infection, and angular limb deformity are the most prevalent post-surgical problems in small ruminants (Gamsjaeger & Chigerwe, 2018).

When considering limb amputation, these complications should be considered because they may affect the animal's welfare and quality of life (Desrochers et al., 2014). In goats and sheep undergoing limb amputation, veterinarians and owners should be aware of the possibility of post-surgical problems such as uncoordinated gait, tendon breakdown and laxity of the contralateral limb, persistent lameness, surgical site infection, and angular limb deformity. We stress the importance of documenting more livestock limb amputations in order to draw conclusions on prognosis, life expectancy, and expected quality of life.

Conclusion

The case of compound fracture in 1.5 months goat kid didn't have any alternative but the amputation of the leg. Intravenous regional anaesthesia was carried out for amputation. Unlike production animals, it is mostly done in dogs. It is only carried out in most severe cases only like necrosis, gangrene, extensive nerve injury of the limb, malignant neoplasm, frostbite, and some incurable vascular diseases that would not respond to local treatment. The patient was prepared for the surgery by disinfecting the operation site and tramadol was given for pain management. Tourniquet was tied just above the site of surgery and Lignocaine 2%- 1.5 ml was given intravenous and 5 ml around the elbow joint. After the amputation was done. Ceftriaxone was sprayed all over the wound. Various drugs were prescribed for post-operative care

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like Ceftriaxone, Meloxicam, Conciplex and dressing was done. Surgery was carried out successfully and the goat is doing fine now.

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A GOLDEN RETRIEVER RECOVERED FROM EHRLICHIOSIS: A CASE STUDY



A. Shrestha*

Abstract: Jenny, a 4yr old female golden retriever dog was brought to NPI hospital with a history of anorexia, lethargy, vomiting, diarrhea, and high fever. The blood test determined the range of Platelets, RBC, and hemoglobin below the normal, and the White Blood Cell count slightly increased. Ehrlichiosis was diagnosed in the dog from Giemsa staining of blood smear and also confirmed by the Antigen Rapid *E.canis* Ab Test Kit. Doxycycline capsule was recommended at the rate of 10 mg/ kg body weight orally for 7 days twice a day after food to solve the problem of *E.canis*, thrombocytopenia, and anemia. Platogrow was given orally b.i.d for 8 days. To solve the problem of severe epistaxis, tranexamic acid tablet was given orally at the dose rate of 10mg/kg body weight. After 10 days the dog was recovered and physically fit. Finally blood examination was done and the complete blood count report was in the normal range.

Keywords: Ehrlichia, doxycycline, thrombocytopenia, epistaxis

Introduction

CME (Canine Monocytic Ehrlichiosis) is a tick-borne disease caused by *Ehrlichia canis* (Syaputra et al., 2020). It is a small, coccus, gram-negative bacteria with a single circular chromosome (Syaputra et al., 2020). *Ehrlichia spp.* manages to survive within the vector ticks by invading and replicating in endothelial cells, white blood cells, midgut cells, and salivary glands of the vector tick (Islam et al., 2017). *Ehrlichia spp.* has developed strategies to subvert host cell processes ranging from host signaling, modulation of vesicular traffic, protection from the oxidative burst, acquisition of nutrients, and control of innate immune activation (Islam et al., 2017). Being an obligate intracellular parasite, it infects monocytes, macrophages, and lymphocytes, forming intracytoplasmic, membrane-bound bacterial aggregates, called morulae (Syaputra et al., 2020). Common clinical signs of *ehrlichiosis* include anemia, epistaxis, petechiae, prolonged bleeding during estrus, hematuria or melena associated with thrombocytopenia, or vasculitis. Ocular signs are also common in CME (Suto et al., 2001). The most common is anterior uveitis, corneal opacity, hyphema, retinal vessel, chorioretinal lesions, and scleral hemorrhage (Sainz et al., 2015). The study conducted, determined the prevalence of *ehrlichiosis* in dogs as 1.8% in Kathmandu (Phuyal et al., 2017).

Materials and methodology

History and clinical finding

A golden retriever of 26 kg with a history of high fever (temperature 104.2° F), thrombocytopenia, anemia, and severe epistaxis for 2 days were found. After physical examination of the dog, signs of anorexia, lethargy, vomiting, and diarrhea was reported. The dog was unable to breathe properly and it was dehydrated. The Rhinarium and philtrum region of the nose was extremely dry. Ixodes ticks were found embedded in the skin of the dog and there was no use of any tick-controlling products for 3 yrs. Finding the pale mucous membrane in gums, mucosa, and eyes, the owner was suggested to have a complete blood count test of the dog. Blood was collected from cephalic vein aseptically using a 5ml syringe.

Complete blood count test

Approximately, one ml of blood was collected in the EDTA tube and four ml was collected in the serum tube. An automatic analyzer was used to know different biochemical parameters. After the complete blood test, the following results were obtained.

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Blood smear preparation and Giemsa staining

A blood smear was prepared from EDTA blood. A clean slide measuring 75X25 mm and approximately 1 mm thick was taken. Tongue shaped smear of uniform thickness was prepared with the help of a spreader on a glass slide. A thin blood smear was fixed with methanol for 2 minutes after air drying. 10% Giemsa stain was prepared and transferred to the couplin jar. A blood smear was dipped in Giemsa for 30 minutes then a microscopic examination under 100x oil immersion was done.

The Antigen Rapid *E. canis* Ab Test Kit is a chromatographic immunoassay for the qualitative detection of *Ehrlichia canis* antibodies in canine whole blood, serum, or plasma (Islam et al., 2017). The Antigen Rapid *E. canis* Ab Test Kit has a letter “T” and “C” as test line and control line on the surface of the device. A purple test line will be visible in the result window if *E. canis* antibodies are present in the specimen. The specially selected *E. canis* antigens are used in the test band as both capture and detector materials. These enable the Antigen Rapid *E. canis* Ab Test Kit to identify *E. canis* antibodies in canine whole blood, serum, or plasma with a very high degree of accuracy (Islam et al., 2017).

Procedure:

Three drops of whole blood diluents were placed in a test tube. One drop of whole blood of the suspected patient (Jenny) was added and mixed in the test tube.

The mixture was placed into the well of the rapid test kit.

Interpretation

The presence of only one band (“C”) within the result window indicates a negative result (López et al., 2012).

The presence of two color bands (“T” and “C”) within the result window, no matter which band appears first indicates a positive result (López et al., 2012).

Invalid test: If the purple color band (“C”) is not visible within the result window after performing the test, the result is considered invalid (López et al., 2012).

Blood parameter

Blood parameter	Result	Normal range
WBC (10 ⁹ / L)	15.29	6-17
Lymphocyte%	30	12-30
Granulocyte%	67.1	62-87
Hemoglobin(gm/dl)	9	12-18
MCH pg	21.5	19.5-24.5
MCHC g/dl	37.6	31-34
RBC (10 ¹² /L)	4.17	5.5-8.5
HCT %	23.96%	37-55S
PLATELETS(10 ⁹ /L)	184	200-500

Table 1: Complete blood count result

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TEST	RESULT	NORMAL RANGE
ALT (U/L)	27	10-109
AST(U/L)	26	13-15
BILIRUBIN (mg/dl)	0.2	0.3-0.9
SERUM UREA(mg/dl)	21	8-28
CREATININE (mg/dl)	0.9	0.7-1.8

Table 2: Test to determine liver and kidney function test

Results

The complete blood profiling gave the values as given in table 1. Based on the blood test, it was found that the dog was anemic as RBC and Hemoglobin were below the normal, and platelet count was decreased which reveals thrombocytopenia. Thrombocytopenia is the most frequent hematological abnormality in CME, appearing in more than 80% of the cases (Mathios & Konstantina, 2017).

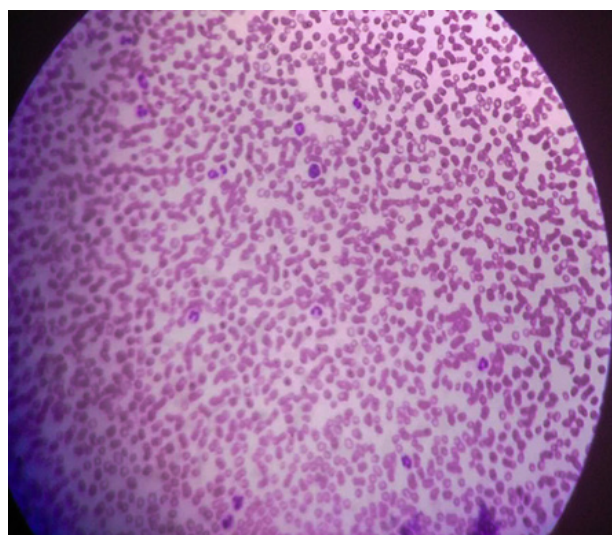


Fig: Giemsa staining of blood smear gives positive *ehrlichiosis canis* test

For further confirmation of Giemsa staining rapid test was done. A rapid test kit enables us to identify *E.canis* antibodies in the blood of the dog (Mathios & Konstantina, 2017). In the case of the golden retriever, two red color band “T” and “C” was seen on the result window a few minutes after the blood mixture was placed into the well of a rapid test kit.

Treatment

The patient was anorectic so kept on IV ringer lactate fluid immediately. Since it was not possible to bring the dog daily to the hospital, doxycycline-100mg tablet, tranexamic acid-500mg tablet, and platogrow suspension was recommended for 10 days. Doxycycline was given at the dose rate of 10mg/kg body weight orally b.i.d for 7 days. Doxycycline enters microorganisms either through passive diffusion, through hydrophilic channels formed by porins, or by energy-dependent active transport processes (Eddlestone et al., 2007). In *E.canis*, they bind to the ribosomal subunit in the 30’s so that it inhibits the binding of aminoacyl-tRNA to the acceptor site of the ribosomal mRNA complex, inhibiting the protein transcription process (Eddlestone et al., 2007).

To solve the problem of thrombocytopenia and epistaxis, platogrow was given 10 ml orally two times a day for 10 days. Because of platogrow blood count magically grew after 10 days. Platogrow stimulates the production of new blood cells, especially thrombocytes. Furthermore, tranexamic acid was given

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to stop the severe bleeding from the nose. Tranexamic acid was administered orally at the dose rate of 10mg/kg bodyweight for 3 days only. Famotidine tablets were given orally since it was anorectic for 4 days. Dehydration was seen in the patient so enough water was given to her. Her owner has given her boiled beetroot, carrot, and pumpkins to increase her blood count. After 10 days dog looks healthier and was actively playing with his owner. The owner has used the tick control products such as those containing pyrethroids (permethrin, deltamethrin, tetramethrin, flumethrin) (Syaputra et al., 2020) and tick-controlling shampoo.

JIBACHHA VETERINARY HOSPITAL R&TC (P.) LTD

EXAMINATION (DOG) Registration No.: 154 Sample Date: 2078/6/1

Owner's Name: Anisha Shrestha Address: Kshetrapur Report Date: 17/9/2021

Species: Canine Pet Name: Jimmy Breed: Golden Retriever

Sex: F Age: 3Year Color: Gray B/W: 26Kg

***E. canis* ANTIGEN RAPID TEST**

Specimen	Blood
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Test Result

Test	Result
<i>E. canis</i>	Positive

INTERPRETATION

Diagram illustrating the test result interpretation:

- Negative: Shows a single line in the test well.
- Positive: Shows two lines, one in the control well and one in the test well.
- Invalid: Shows no lines in either well.

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Fig: Positive result of *E. canis* antigen rapid test

Discussion

The most important clinical sign, thrombocytopenia, anorexia, vomiting, and persistent fever, was observed. The appetite remains well in the early stage and later in the chronic stage becomes anorectic. In this case, the dog was anorectic even in the early stage. Dyspnoea and dry nose were observed. Profound changes in hematological parameters were observed. Platelets, hemoglobin, RBC, and hematocrit were severely decreased and the value was similar to the findings of the study done by Phuyal (Phuyal et al., 2017). Thrombocytopenia is observed due to the combined direct and indirect effect of *E. canis*. Ehrlichia has a direct effect on the life span of platelets and an indirect effect on bone marrow that suppresses erythropoiesis activities. This results in thrombocytopenia in an infected dog. A decrease in the level of platelets in severe cases results in bleeding due to a lack of clotting factors. This type of bleeding was observed in the patient and it was severe. Splenomegaly is a common finding on a radiograph but an X-ray was not taken in this case because the disease was diagnosed based on the rapid test kit. Usually, antibody pathogen-specific IgG is detected (Phuyal et al., 2017). The band seen in the result well was so dark. The cause of this dark band is due to a large number of antibodies. Therapeutic management was

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doxycycline at the dose rate of 10 mg/kg body weight in addition with doxycycline tranexamic acid and platogrow have been beneficial for the treatment of CME in the dog. Jenny recovered successfully after 10 days of post-treatment which suggests that continuous monitoring, specific, and appropriate supportive therapy as well as owner's compliance are key factors in the elimination of the infection from blood in CME-affected dogs.

Conclusion

The presence of *E.canis* in the blood smear of the infected dog and Antigen Rapid *E.canis* Ab Test Kit confirms the ehrlichiosis in the dog. Doxycycline at the dose rate of 10 mg/ kg body weight orally and platogrow at the dose rate of 10ml twice a day for 10 days has been effective in the treatment of acute ehrlichiosis.

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A REVIEW ON ANTHELMINTIC RESISTANCE IN ANIMALS AND ITS SCENARIO



P. Kiju^{*1}, S. B. Magar², C.K. Tiwari³

Abstract :Anthelmintics have been used as a major control method for parasites in livestock, horses, and captive wild ungulates. But the continuous irrational deworming approaches have led to the grave issue of anthelmintic resistance leading to the significant loss of productivity and negative effects on animal health. The fecal egg count reduction test (FECRT) is one of the simplest and most effective methods to detect the resistance of the anthelmintics. Resistance to major groups of anthelmintics drugs has been reported from various parts of the world and recently from Nepal also. A proper view and approach regarding the resistance are seen to be the utmost need in today's scenario. Parasite control scheme should not be based on the sole use of anthelmintics but rather combined recipes of management practices, and nutrition is suggested. Proper nutrition, sanitation and periodic deworming strictly based on advanced scientific strategy aid in combating the serious issue of anthelmintic resistance. This paper aims to view the factors leading to the anthelmintic resistance, their detection on time, and scenarios with approaches to tackle them.

Keywords: anthelmintic, resistance, goat, horse, captive ungulates, fecrt%, management

Introduction

According to Merriam-Webster Dictionary, anthelmintic are substances that is used for expelling or destroying parasitic worms, especially in the intestine. Anthelmintic resistance is defined as the inability of anthelmintic drugs caused due to genetically transmitted loss of sensitivity in the worm populations that was previously sensitive to the same drug (Köhler, 2001). Helminths which are genetically and physiologically resistant to anthelmintic when reproduces progressively spreads and not being detected until it has reached to the high level (Prichard, 1994). Similarly, the author also states that the most widespread resistance problems occur to benzimidazole anthelmintic in nematodes.

The availability and high price of the anthelmintic in combination with low levels of literacy and poor understanding of dose rates means that under-dosing is probably frequent in South Asia (Sani et al., 2004). The majority of the Nepalese population occupies tropical and subtropical climate zones. This makes Nepal vulnerable to a diverse range of parasites of medical and veterinary importance, whose transmission and geographical distribution are closely linked to regional temperature, rainfall, and humidity

Nepal as an agriculturally based nation has 66% of the total population engaged in Agriculture as an occupation(MOAD, 2019). Around 75 % of households in Nepal are rearing goats. The population of goats in 2007/2008 was 8,135,880 which increased by 37.2 percentage increase in 2016/2017, thus indicating the trend and importance of goat farming in Nepal (MOAD, 2019). Throughout developing countries, small ruminants like sheep and goats occupy an important economic and ecological niche in agricultural systems (Devendra, 2005). Gastrointestinal (GI) parasitism has been reported as a major threat and a primary constraint to the small ruminant industry causing production losses and even mortality in severe cases (Tariq *et al.*, 2010). However, indiscriminate and frequent use of the anthelmintic drugs has resulted in the emergence of anthelmintic resistance against major classes of anthelmintic in several countries (Coles *et al.*, 2006; Jabbar *et al.*, 2006 and Saeed *et al.*, 2007).

Similarly, horses are also exposed to a significant amount of gastrointestinal parasites resulting in morbidity and mortality as well (Hodgkinson, 2006; Oli & Subedi, 2018). As per Statistical Information on Nepalese Agriculture (2019/20), Nepal has a total of 59,762 horses/asses population. Horses are very prone to internal and external parasitic infestation. Parasitism is the major hindrance to horse rearing

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(Saeed et al., 2010). The prevalence of anthelmintic-resistant intestinal parasites is a rapidly growing problem in the equine industry (Herd, 1990; Kaplan & Nielsen, 2010). The major classes of anthelmintics used to control nematodes in horses are benzimidazole (fenbendazole, oxbendazole), pyrantel (tetrahydropyrimidines) and macrocyclic lactones (ivermectin, moxidectin) (Fesseha et al., 2020; Kaplan & Nielsen, 2010). Resistance to the commercially available benzimidazole and pyrantel has developed in many countries whereas macrocyclic lactone has been less effective than they were initially (Lyons & Tolliver, 2015; Gasser et al., 2004). Resistance to macrocyclic lactones has not been reported in equines however it has been seen in sheep (Gasser et al., 2004). Ivermectin is considered the drug of choice for nematode and arthropod parasitism in equines as it is effective against luminal and adult strongyles with a wide safety margin (Toguchi & Chinone, 2005).

The captive wild animal scenario of the central zoo in which ungulates cover the major population includes spotted deer, sambar deer, four-horned antelope, Himalayan ghoral, blue bull, barking deer, one-horned rhinoceros, swamp deer, wild Boar, and wild water buffalo. Parasite disease is one of the major causes of morbidity and mortality in captivity caused due to improper diet, the severity of parasitic infection, and poor husbandry practice (Singh et al., 2006; Mir et al., 2016; Kolapo & Jegede, 2017). In the wild, animals generally have a natural resistance to parasites due to their diverse habitat and food but due to the confinement and change in the living condition, the captive wild animals might be more susceptible to many diseases, viz., viral, bacterial, rickettsial and parasites (Goossens et al., 2005; Thawait et al., 2014). The epidemiology of nematodiasis in domestic ruminants is well studied but there are limited studies and reports that directly address the parasite control programs in captive wild ruminants (Isaza et al., 1990; Goossens et al., 2006). The regular parasitic load examination, anthelmintic efficacy, and resistant evaluation are not frequently done in many zoological gardens and parks. In the context of Nepal, there is no published data of anthelmintic resistance in a captive wildlife settings.

Determination of Anthelmintic Resistance

The simplest, least expensive method to determine the parasite load is Fecal egg count (FEC) and fecal egg reduction counts which also determine the efficacy of the anthelmintic class being used (Craven et al., 1999; Fesseha et al., 2020). A number of studies have shown that FECRT is the main method for determining anthelmintic resistance (Rosanowski et al., 2017). It is simple, easy, and applicable for all the anthelmintic classes (Coles et al., 1992; Kaplan & Nielsen, 2010). Although they cannot measure larvae or encysted larvae and parasites that don't shed eggs in manure it is an important test to measure the anthelmintic resistance.

The widely published method for determining FECRT has been recommended by the World Association for the Advancement of Veterinary Parasitology which is based on the fecal samples of before and after treatment.

WAVVP guidelines (Coles et al., 1992)

$FECR\% \text{ (with CTL)} = 100 \times (1 - [T2/C2])$ where T2 and C2 are arithmetic mean FEC of IVM and CTL group at day 14 respectively.

$FECR\% \text{ (no CTL)} = 100 \times (1 - [T2/T1])$ where T2 and T1 are arithmetic mean of FEC of IVM group at day 14 and day 0 respectively.

Status of anthelmintic resistance.

1. Albendazole, Fenbendazole and Ivermectin resistance in goat

Gehlot et al. (2016) studied emergence of multiple resistances against gastrointestinal nematodes of Mehsana-cross goats in a semi-organized farm of semi-arid region of India where in the Fecal egg count reduction test was used to detect the resistance of Albendazole, Levamisole and Ivermectin in goats naturally infected with gastrointestinal nematodes. They reported that the Alben-

dazole, Levamisole and Ivermectin reduced faecal egg counts on 14th day post-treatment varied from 53, 65 and 76 per cent respectively, with less than 95% confidence limit revealing presence of resistance of worms to all these drugs. Aktaruzzaman et al., (2015) conducted experimental studies to test the therapeutic efficacy of Ivermectin, Fenbendazole and Albendazole against naturally occurring gastrointestinal nematodiasis infection and found Ivermectin @0.2mg/kg was the most effective (100%) followed by Fenbendazole @ 7.5mg/kg (95.33%) and Albendazole was the least effective @ 7.5 mg/kg (90.11%).

Similarly, Regassa *et al.* (2013) conducted efficacy trials with albendazole (oral @7.5 mg/kg b.wt), tetramisole (oral @22.5 mg/kg b.wt) and ivermectin (subcutaneously @0.2 mg/kg b.wt) in gastrointestinal nematodes affected sheep and goats and found that ivermectin was 100% effective in goats when compared with sheep (95.7%) on Fecal Egg Count Reduction Test (FECRT).

Tiwari (2021) conducted recent research on efficacy determination of Albendazole, Fenbendazole and Ivermectin on Gastrointestinal nematodes in goats at National Goat Research Program, Bandipur, Nepal. The fecal egg count reduction percentage for Albendazole treated group was 82.3% (CI 69.3-90.5) while Fenbendazole treated group was 78.8% (CI 69.1-85.1) and Ivermectin treated group was 90.6% (CI 90.6-98) at day 14 using Bayesian hierarchical model. Ivermectin was found to be most effective anthelmintic in comparison to Albendazole and Fenbendazole. The data shows the presence of resistance of gastrointestinal nematodes against Albendazole and Fenbendazole at NGRP, Bandipur.

2. Ivermectin resistance on horse

The fecal egg count reduction after 14 days of treatment with ivermectin was found to be 97.25% (Seyoum et al., 2017). Similarly, Rosanowski et al., (2017) conducted efficacy evaluation of ivermectin and found out the range of the antihelminth was from 99.8% to 100% on day 7 to between 98.5% and 100% on day 21 in yearling thoroughbred. The two trials data conducted by Klei et al., (2001) showed that horses had significant >99% reduction in strongyles after ivermectin paste given at 200mcg/kg along with gastrointestinal parasites.

According to a recent study conducted by Budha Magar (2021), the overall prevalence of strongyles was found to be 13.48%. The FECR value for ivermectin is 100% (87.23-99.91%), but the study identifies the suspected resistance due to a lower 95% CI.

3. Different anthelmintic resistance on captive wild ungulates

According to Singh et al.(2006), treatment of animals with appropriate drugs(albendazole, fenbendazole) based on the species of parasites present in the animals (Blackbuck, Laddakhi goat, and Chinkaras) was reported to be 100 percent effective in the majority of cases in Mahendra Choudhary Zoological Park, Punjab.

Ortiz et al. (2001) in research conducted on the oral administration of mebendazole for the reduction of nematode egg shedding in captive African gazelles, no satisfactory significant differences were detected between the treatment and the control group. In a study was done by Nalubamba & Mudenda (2012), on determining the anthelmintic efficacy of fenbendazole in captive wild impala antelope in Zambia, the efficacy was obtained at 90% and this study also represented the first documentation of anthelmintic resistance in the captive wild ungulates in the country.

According to a recent study conducted by Kiju (2021), The efficacy of Zanide L forte (levamisole-0.75 gm and oxclozanide-1.00 gm) was found to be 85.3% (CI 80.4-89) at day 07 and 89.2% (CI 85-92.3) at day 14 by using Hierarchical Modelling of Fecal Egg count based on 'egg counts-2.3 on R version 3.6.1 and 85.47% (CI 61.51-94.48%) at day 07 and 89.67% (CI 74.18-95.61%) at day 14 by WAAVP guidelines. The study represents the first documentation case of ineffectiveness of anthelmintic treatment resulting in anthelmintic resistance in the central zoo.

Recommendation

Rational anthelmintic use means the proper dosage and route of administration, frequency of treatment, and mechanism of action (Fesseha et al., 2020). Effective deworming strategy plays a pivotal role in controlling and treating internal parasites. In addition, nutrition and management should go hand in hand with the chemical method. Prophylaxis, as well as treatment protocol against the internal parasites in any animal, must be done on the basis of parasitic load and parasitic species involved. One of the widely popular strategy is selective therapy where individuals exceeding predetermined cut-off egg count are treated after their fecal samples are taken.

The traditional deworming trend in developing countries like Nepal is highly relied on the use of broad-spectrum anthelmintic in a rotational manner. This need to be replaced by modern scientific deworming strategies such as combination anthelmintic therapy in rotation. Control and preventive treatments with anthelmintic with the integration of good management and awareness about the rational use of anthelmintic can be one of the leading steps in controlling the anthelmintic resistance.

Conclusion

Infection with the nematodes is of major veterinary importance. Frequent, unnecessary, and underdosing of anthelmintics have given rise to a major problem of anthelmintic resistance in animals. The serious problem of anthelmintic resistance is predictable on the fact that levels of resistance can increase rapidly and the development of a new class of drugs is less. As an anthelmintic resistance cannot be reversed the problem is everlasting and there are few anthelmintic currently being developed. It is unlikely that only the development of a new anthelmintic drug will decrease the losses in productivity that results from the failure of controlling multiple drug-resistant worms. Thus, the effective and newly developed drugs should be preserved and used sincerely. The pre-existing anthelmintic therapy in most parts of the country is based on the use of the same class of anthelmintic intensively. This predisposes to the development of drug-resistant parasites due to evolutionary pressure created with continuous exposure of the parasite to the same class of drugs. In other hand, the use of a different classes of anthelmintic without consideration of dose and interval can lead to the development of multi-drug resistant parasites. Hence, it is very necessary to undertake measures before this situation gets out of hand. The analysis of FECRT should be conducted time and again to know the true extent of the resistance and keep the problem in check. The deworming strategy must be planned based on the FECRT analysis of anthelmintic resistance and a combination of various classes of anthelmintic drugs should be used in an alternative manner. Proper nutrition, sanitation, and periodic deworming strictly based on advanced scientific strategy will aid in combating the serious issue of anthelmintic resistance.

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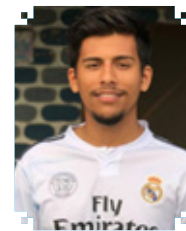
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ANTIMICROBIAL RESISTANCE IN FOODBORNE PATHOGENS: A THREAT TO PUBLIC HEALTH

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Abstract: Antimicrobial resistance, a natural phenomenon of microbes to adapt the harsh conditions of antimicrobials, is rising at an alarming rate throughout the world. Apart from the antimicrobial-resistant nosocomial infections due to ESKAPE [*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter spp.*], antimicrobial-resistant infections through the foodborne pathogen like mobile-colistin-resistant (*mcr*) strains of *E. coli*, Carbapenem-resistant Enterobacteriaceae (CRE), etc. have been major emerging issues in recent times. Increased use of antimicrobial in the animal production sector for therapeutic, metaphylactic, prophylactic, or growth promotion purposes led to the development of antimicrobial resistance in foodborne pathogens via different mechanisms. Contamination of food with antimicrobial-resistant pathogens during the production, processing, transportation, and storage of food leads to the transmission of these pathogens to the human population. Transmission of foodborne pathogens via the food chain possess a severe threat to the general public, especially to children. The increasing risk of AMR in foodborne pathogens emphasizes the need for global initiatives and the establishment of common guidelines and systems controlling resistance in all countries like risk assessment, and whole genomic sequencing guidelines. The development of Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and Good Hygienic Practices (GHP) leads to the production of Generally Recognized as Safe (GRAS) food to break the transmission cycle of antimicrobial-resistant foodborne pathogens.

Keywords: Antimicrobial resistance, Foodborne pathogen, Antimicrobial stewardship, Food safety, Food security

Introduction

Antimicrobial resistance (AMR) is a major public health threat of the 21st century. It is a natural phenomenon in microbes, which is due to the attempt of microbes to adapt to the harsh condition created by antimicrobials. The use of antimicrobials in humans, animals, & plants causes the development of AMR in microbes naturally or transmission among the population (Aarestrup, 2005). The rate of development of antibiotic-resistant in susceptible pathogens is currently rising at an alarming rate throughout the world. With the new mechanisms of resistance emerging among the bacterial population, resistance is developing among the bacterial population to new antibiotics (WHO, 2020). This resistance of the bacteria causes difficulty in the treatment of the common infections in the human and animal populations. Several diseases like pneumonia, enterotoxemia, foodborne diseases, etc. are now very difficult to treat despite in past they were easily treatable via antimicrobials. According to the Center of Disease Control (CDC) report, there are about 2.8 million antibiotic-resistant infection cases in the USA each year among which about 35000 people die each year due to these infections. An estimate of 700,000 deaths occurs due to AMR every year in the world. Without any control measures, these deaths are predicted to increase up to 10 million per year (O'Neill, J., 2014). These statistics are only the tip of the iceberg to assess the impact of antibiotic resistance on human health, animal health, and the economy.

Presently, in both humans & animals, the major sources of antimicrobial-resistant infections are attributed to the nosocomial infections due to ESKAPE [*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter spp.*] (Santajit & Indrawattana, 2016). Along with this challenge, antibiotic-resistant bacterial infections via foodborne pathogens come to light in recent times. Several resistant bacteria like mobile-colistin-resistant (*mcr*)

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strains of *E. coli*, New Delhi metallo- β -lactamase-1 (NDM-1)-producing strains of *Klebisella pneumoniae*, Carbapenem-resistant Enterobacteriaceae (CRE), Extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae possess a threat to failure of antimicrobial treatment of even last-resort antimicrobials (CDC, 2019; Pérez-Rodríguez & Mercanoglu Taban, 2019; Al-Tawfiq et al., 2017; Khan et al., 2017). Over the last few years, the antimicrobial-resistant pathogen present in foods especially animal-origin foods like milk, meat, and poultry products has increased significantly. Pathogens which were previously unknown to food industries are now able to infect humans with the advent of resistance in food animals and spread via the food chain (Muloj et al., 2018).

Mechanisms of Antimicrobial resistance

Antimicrobial resistance refers to the unresponsiveness i.e. ability to resist the killing effect or ability of a microorganism to grow on an antimicrobial drug even at the maximal level that is tolerated by the host. It can be divided into the following types: Natural and Acquired resistance. Natural resistance refers to the inherent or genetic resistance of microorganisms to an antimicrobial agent. Acquired resistance is defined as the development of resistance to an antimicrobial agent to which it was previously sensitive. Unlike natural resistance, acquired resistance can happen with any microbes and possess a great threat to antimicrobial therapy. The biochemical mechanism by which acquired resistance develops can be demonstrated via illustrations given in fig 1.

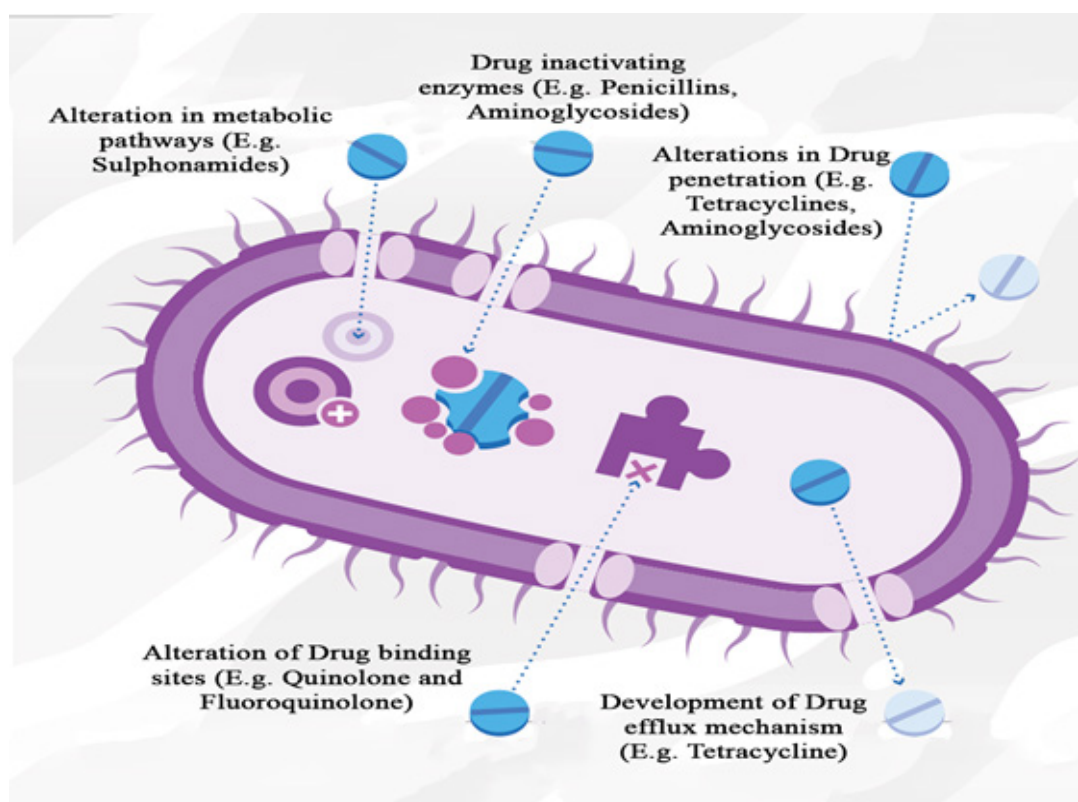


Fig 1: Biochemical mechanisms of AMR (Source: CDC 2019)

Antimicrobial use in food animals & origin of antibiotic-resistant foodborne pathogens

The animal production sector including aquaculture are major sectors where the antimicrobials are used more than in human medicine (Verraes et al., 2013). Data from a global study of antimicrobial use in chicken, cattle, & pigs (which are 93.75% of all food animals worldwide) shows 3,309 tonnes of an-

antimicrobial used in 2017. This antimicrobial use is projected to increase by 11.5% by 2030 to 104,079 tonnes with respect to an increase in food animals & their demand (Tiseo et al., 2020). In contrast to human medicine, the antimicrobial in animal production is mainly used in one of the following ways: a) Therapy: - to treat sick animals; b) Metaphylactics: - to control disease in healthy animals of a flock where clinical signs are seen in few; c) Prophylactics: - to prevent the diseases in healthy animals during unfavorable conditions; and d) Growth Promotion: - to stimulate growth with sub-lethal dose (Aarestrup, 2005). Most of the time, these usages of antimicrobial in animals become indiscriminate and lead to the advent of different antimicrobial-resistant foodborne pathogens. These pathogens are the ones that escape the antimicrobial property of the antimicrobial agents. Since, these pathogens are resistant to commonly used antimicrobial agents, the treatment of these ones is often difficult or impossible. Hence, every indiscriminate use of the antimicrobial agent in animals creates the risk of the development of resistant pathogens which may pose a severe threat to human health in the future (Callens et al., 2018). The occurrence of antimicrobial-resistant pathogens in food is not only limited to the advent of resistance in food animals. There is a high possibility of the presence of antimicrobial-resistant genes in the microorganisms that are intentionally added during food processing. Microorganisms like starter cultures, probiotics, bio-conserving microorganisms, and bacteriophages may act as the carrier of antimicrobial agents to foodborne pathogens (Verraes et al., 2013). Apart from this, there is always the chance of contamination of food in the food chain. The several foodborne pathogens which may contain antimicrobial resistance may be contaminated during food processing, storage, and transport either via the humans or from the external environment. The contamination is mainly attributed to direct or indirect contact with animal feces, human feces, contaminated water, soil, pests, and anthropogenic activities.

Transmission of AMR pathogens via Food chain

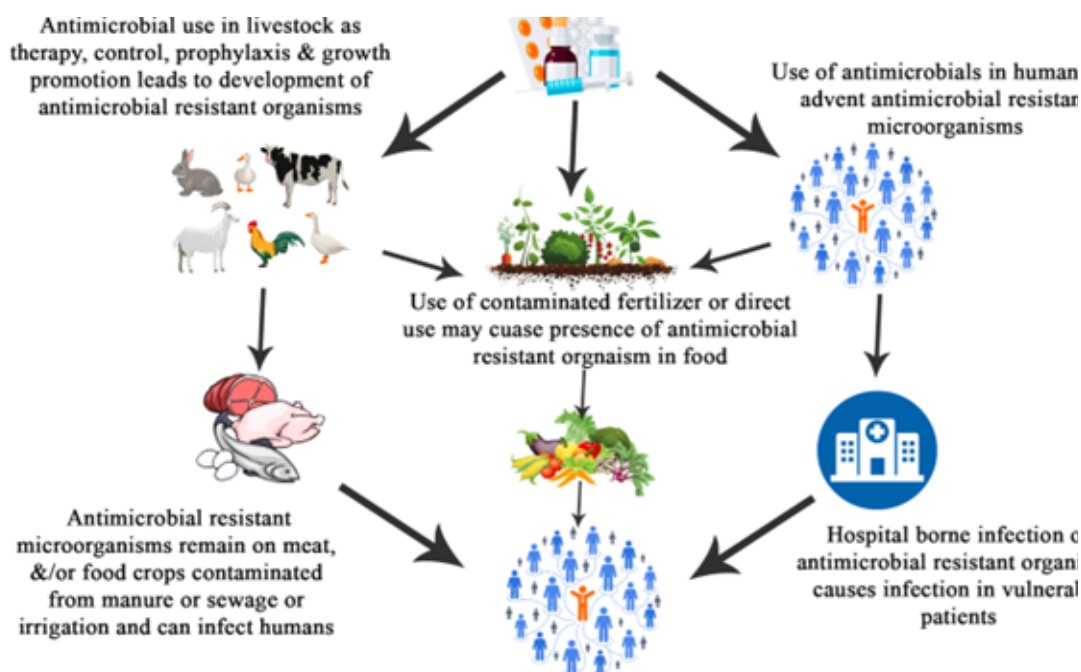


Figure 2: Development of antimicrobial resistance in microorganisms (Adapted from Pérez-Rodríguez & Mercanoglu Taban, 2019)

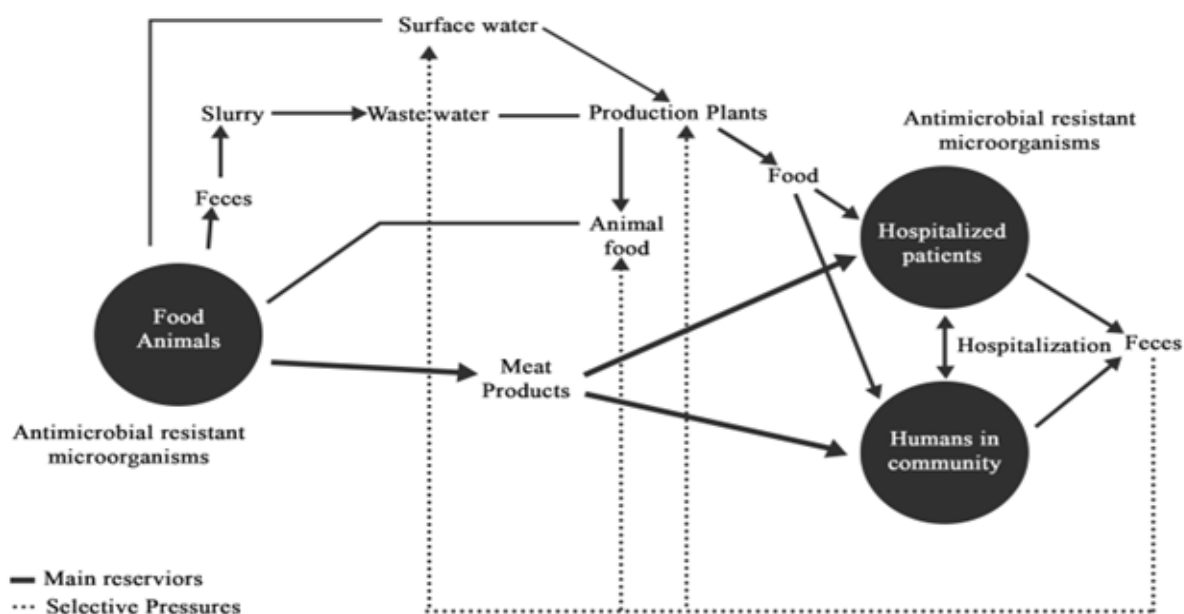


Figure 3: Transmission of antimicrobial-resistant foodborne pathogens (Adapted from Barber et al., 2003)

The food chain has been a major source of infection in humans for a long time. According to WHO, about 600 million (1 in 10 people) fall ill due to foodborne diseases. According to the World Bank, Foodborne diseases cause the loss of an estimated 110 billion US\$ each year. With the increase in AMR in foodborne pathogens, the food chain becomes one of the important ways of transmission of antimicrobial-resistant bacteria to humans. In addition, there is a possibility that plant-based food may also carry these pathogens due to contamination during food production, processing, transport, or storage. The consumption of plant or animal food contaminated with antimicrobial-resistant pathogens is the major route of the transmission of foodborne pathogens to humans as shown in fig 3. E.g. Transmission of antimicrobial-resistant *Salmonella typhimurium* strains from pork and poultry meat; and cephalosporin-resistant *Escherichia coli* (CREC) from chicken meat (Depoorter et al., 2012). In addition to infection due to foodborne pathogens, the antimicrobial-resistant gene can be transmitted to human micro-biota or pathogens via horizontal gene transfer mechanism (i.e. transformation, transduction, and conjugation). In different studies, the transfer of resistance genes via horizontal transmission has been demonstrated in food in experimental conditions e.g. Transfer of plasmid-borne ampicillin resistance genes from *Salmonella typhimurium* to *E. coli* k12 in milk & beef (Walsh et al., 2008); transfer of antimicrobial resistance genes from lactic acid bacteria (LAB) (*Enterococcus faecalis*, *Lactococcus lactis*) to potential pathogenic strains like (*Listeria* spp., *Salmonella* spp., *Staphylococcus aureus* and *E. coli* in fermented whole milk (Toomey et al., 2009). On the other hand, the horizontal transfer of antimicrobial-resistant genes from stressed or partially inactivated cells in food to the human microbiota may act as a possible way of transmission (Verraes et al., 2013).

Risk associated with AMR in foodborne pathogens

According to the WHO, about 420,000 people die every year due to foodborne diseases among which 40% (125,000) are children below 5 years. At present condition, the highly antimicrobial-resistant infections are no longer confined to hospital settings, but it is posing a great threat to the consumers via foodborne pathogens. The hospital-borne antimicrobial-resistant infections mainly affect the vulnerable

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patients in hospital settings, but the food-borne pathogens can cause a high number of infections in the general public. The antimicrobial resistance in foodborne pathogens will have a more severe effect on the most vulnerable age group i.e. children. Hence, with the increase in the development of antimicrobial resistance to foodborne pathogens, these casualties are going to escalate in the near future without proper control measures. The worldwide trade of foods also predisposes the higher incidence of antimicrobial-resistant foodborne pathogens around the world.

Risk assessment of AMR in foodborne pathogens

The increasing risk of AMR in foodborne pathogens emphasizes the need for global initiatives and the establishment of common guidelines and systems controlling resistance in all countries. Currently, the risk linked with antimicrobial resistance in foodborne diseases are defined by Codex Alimentarius using its risk assessment framework. Codex Alimentarius is defined as the international standards program intended to ensure food safety in the food chain and global trade which is developed by FAO and WHO. The risk assessment is a science-based program that incorporated risk analysis, risk management, and risk communication. A risk assessment can provide a transparent, systematic evaluation of relevant scientific knowledge to inform decisions regarding risk management activities (Codex Alimentarius, 2015). The Codex explained four components of a foodborne AMR risk assessment:

1. Hazard identification: - Major purpose of hazard identification is to describe the foodborne AMR hazard of concern via literature reviews and surveillance programs. This helps to identify the strains, genotypes, or particular genes of foodborne microorganisms that possess the threat of transmission to humans. Also, it describes the interaction of AMR microorganisms to different environments/niches via science-based opinions or findings.

2. Exposure assessment: - Purpose of exposure assessment is to portray and elaborate the exposure pathway via detailing & summarizing necessary data. This step should assess the transmission of AMR foodborne pathogens through different stages like animal/plant production, food processing, food storage, and food transport..

3. Hazard characterization: - This step defines the probability of foodborne AMR in humans following the exposure to the hazard. It describes the characteristics of the hazard, food matrix, and host to outline the chances of infections and adverse health effects in humans. The outcome of this step is the dose-response relationship between the levels of exposure to the disease attributed to the resistant organisms.

4. Risk characterization: - The findings from hazard identification, exposure assessment, and hazard characterization steps help in the risk characterization. The risk characterization should describe the individual risk, population risk, etc. of a particular hazard. This step should describe the key scientific assumption, validity, variability, uncertainty, and degree of confidence of the estimation of the risk. This should outline the vulnerable populations and their strengths, weakness, and limitations.

For the risk assessment and surveillance of AMR, the use of Whole Genome Sequencing (WGS) is increasing in foodborne diseases by concerned authorities and laboratories (Oniciuc et al., 2018). With the increasing rapidity, reliability, cost-effectiveness, & accuracy of the WGS technique, it will improve the surveillance of foodborne AMR significantly. A detailed molecular basis of AMR genes and their transmission is the major benefit of WGS over traditional methods (Collineau et al., 2019). WGS protocols involve extraction and sequencing of the different DNA fragments and preparation of whole genome via several parallel sequencing reactions. The complete genome can be used for further analysis, including gene prediction, identification of genes, identification of genome variability, and evolutionary relationship (Ronholm et al., 2016).

Mitigation Strategies of AMR in foodborne pathogens

The control of the advent of AMR in its major source should be prioritized as the mitigation strategy of

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AMR in foodborne. Adoption of Antimicrobial stewardship and prudent use of antimicrobials in animal/plant production should be the primary objective of the mitigation strategy. Proper monitoring and record-keeping of antimicrobial use in animal/plant production should be implemented so that the proper record of antimicrobial use in each country can be accessed whenever needed. This will allow for the development of antimicrobial use policies according to the local situations. The development of Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and Good Hygienic Practices (GHP) increase food safety by decreasing the risk of transmission of foodborne pathogens (Pérez-Rodríguez & Mercanoglu Taban, 2019). Only Generally Recognized as Safe (GRAS) labeled microorganisms like starter cultures, probiotics, bioconserving microorganisms, and bacteriophages should be used in food processing and preservation to eliminate the chance of transmission of resistant genes. Following the major food safety measures is really important to avoid foodborne illnesses including AMR in foodborne pathogens. The major concern of responsible authorities should be positioned in ensuring food safety from farm to fork. This includes growing & harvesting of food safely; maintaining proper safety protocol during processing & transporting food; following protocols of biosecurity during food storage; routine evaluation & investigation of the food chain; and maintaining hygiene at the consumer level. Ensuring the use of safety protocol in consumers i.e. general public can reduce foodborne diseases significantly. For this purpose, WHO has defined the following 5 keys to safer food which are: -

- 1. Keep clean:** Maintaining personal & kitchen hygiene reduces the microbial load and decreases the contamination of the food.
- 2. Separate food:** Separating raw meat, poultry, seafood, etc. from vegetables or fruits helps to decrease the cross-contamination.
- 3. Cook Thoroughly:** Cooking food up to 70°C kills most of the microorganisms.
- 4. Keep food at a safe temperature:** Keep food at $>65^{\circ}\text{C}$ or $<5^{\circ}\text{C}$ to avoid contamination
- 5. Use safe water and raw materials:** Using safe water or sterilization of water & raw materials ensures food safety.

These interventions have greater importance in breaking the transmission cycle of foodborne diseases which are often ignored by consumers. Hence, awareness of the general public about these safety measures is still an important step to decrease transmission.

Conclusion

Though antimicrobials are a powerful and effective way of treatment in the animal, plant, and human health, the indiscriminate use of these agents has led to the development of antimicrobial resistance in the microorganism. These resistant microorganisms pose a severe threat to public health. This is due to the fact that the treatment options for the adverse effect of these resistant microorganisms are very limited and sometimes impossible. The antimicrobial resistance in foodborne pathogens is now an alarming issue for public health due to its high potency of transmission via the food chain to a large population. The threat of antimicrobial-resistant foodborne pathogens like mcr strains of *E. coli*, ESBL producing enterobacteriaceae, etc. is increasing rapidly. The use of antimicrobial in food animals should be properly monitored to control the advent & spread of resistant pathogens. The risk assessment strategies should be reinforced with the help of proper epidemiological studies focused on AMR in foodborne pathogens. Further research should be conducted in understanding the development & transmission of AMR in foodborne pathogens. The concerned authorities should initiate multisectoral collaboration in the fight against these threats. The multisectoral communication, collaboration & cooperation between professionals, different organizations, governments, farmers, and the general public is important more than ever to fight these threats of AMR in foodborne pathogens. With proper use of antimicrobial, AMR surveillance, epidemiological studies in the food chain, awareness programs, development of proper mitigation strategies, and multisectoral collaboration should be guaranteed if we are going to create a safer future for all.

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BILATERAL CHERRY EYE CONDITION IN DOG: A CASE STUDY



S. Phuyal*, P. Kiju

Abstract: A canine cross breed was presented to Central Referral Veterinary Hospital (CRVH), Tripureshwar, Kathmandu with protruding pink mass from the medial canthus of both eyes along with congestion, ocular discharge, and epiphora. All the physical parameters were found to be normal. Based on history and clinical examinations, it was diagnosed as prolapse of the nictitans gland (Cherry Eye Disease) and was corrected surgically i.e., by performing the excision of the gland because of its chronic nature. However, nowadays, the replacement of the gland using Morgan's pocket technique is preferred for the treatment of this disease. It is less risky, easy to perform, and has a high success rate. Also, it also does not alter the morphology of the third eyelid gland ducts, and it does not reduce the amount of tear production. Hence, avoid the development of Kerato-Conjunctivitis Sicca (KCS).

Keywords: dog, cherry eyes, nictitans gland, prolapse

Case Identification:

- Dog's Name: Puntey
- Species: Canine
- Breed: Cross bred (Japanese Spitz Cross)
- Age: 4 years
- Sex: Male
- Weight: 12 kg

History:

A four-year-old cross breed was brought to the Central Referral Veterinary Hospital (CRVH), Tripureshwar, Kathmandu with a history of protrusion of pink mass from both eyes for the last 6 months (Fig 1). Also, owners complained that the protruded mass was increasing in size with time, and it was previously treated with eye drops and systemic antibiotics (Gentamicin).



Fig 1: Bilateral Cherry Eye Condition in Dog

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Physical Observation:

All the physical parameters were found to be normal, i.e., heart rate of 90/min, respiration rate of 20/min, rectal temperature of 101°F, and a capillary refill time of < 2 seconds.

Clinical Signs:

1. Protruding pink mass from the medial canthus of both eyes.
2. The prolapsed mass was congested with ocular discharge and epiphora.
3. The dog was displaying irritation and exasperating at being mutilated.
4. Feed intake decreased.

Diagnosis:

Based on history and clinical examination by Dr. Arjun Aryal, the condition was diagnosed as prolapse of the nictitans gland (Cherry Eye Disease). As the condition was chronic in nature, it was opted to remove the prolapsed part using surgical procedure.

Treatment:

Preoperative:

The dog was sedated with xylazine hydrochloride @ 1 mg/kg followed by atropine sulphate @ 0.04 mg/kg intramuscularly. Aseptic preparation of the peri-orbital area was performed, and both eyes were flushed with normal saline.

Operative:

After placing the dog in lateral recumbency on the surgical table, induction anesthesia was given using ketamine hydrochloride @ 5 mg/kg body weight intravenously. The antibiotic ceftriaxone @ 20 mg/kg and analgesic drug meloxicam @ 0.2 mg/kg body weight was administered intravenously and subcutaneously respectively.

The area around the eye was covered with a sterile surgical drape, and the third eyelid was pulled out to provide better surgical access to the nictitans gland (Fig 2). A small incision was made on the palpebral surface of the conjunctiva that encircled the gland. Through the incision, the gland was exteriorized, and hemostatic sutures were placed at its base using catgut no. 2/0 and the gland was excised just above the suture line (Fig 3). The conjunctival incision was sutured over nictitating membrane using simple continuous suture pattern and suture material poliglecaprone number 5/0 (Fig 4). The same procedure was repeated in the next eye to excise the protruding gland.



Fig 2: Exteriorizing third eyelid gland



Fig 3: Excision of third eyelid gland

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Fig 4: Suturing conjunctival incision over nictitating membrane using simple continuous suture pattern

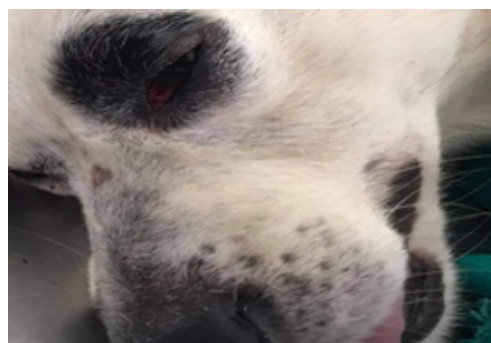


Fig 5: Eyes of dog after surgery

Postoperative:

Ophthalmic antibiotic preparations (Trade name: Occupol D) was instilled and was prescribed to instill the drops three times daily to avoid the dryness of the eyes. Also, an Elizabethan collar was placed around the neck of the dog to prevent self-mutilation.

Case Discussion:

The protrusion of the third eyelid gland from the medial canthus of the eye is called Nictitans Gland Prolapse (NGP). Also, known as hypertrophy, hyperplasia, or adenoma (V & GV, 2020) but commonly termed as third eyelid gland prolapse or cherry eye disease, which is characterized by glandular expression, hyperemia, and increased gland volume (Yurtal, 2020). It is the most common condition encountered in canine species, mainly in dogs (Sivamurthy & Veterinary, 2018). This disease may occur at any age but is mostly seen in young dogs including puppies. It may be unilateral or bilateral and the occurrence in one eye follows the occurrence in another (Prasetyo, 2019). Breeds that are more prone to this disease include Pekingese, Neapolitan Mastiff, Cocker Spaniel, Beagle, Bulldog and Basset (Raza et al., 2013). Brachycephalic breeds often suffer because of their own anatomical conformation of the head and orbit (Yayinggul et al., 2019).

Etiology:

The major reason behind the third eyelid prolapse is the weakening of connective tissues that fix the gland between the ventral membrane and peri-orbital tissue (Lone et al., 2020). There is an increase in glandular size due to secondary inflammation as well as abrasion and drying of the exposed gland (Raza et al., 2013). Thus, it impresses prominent like a cherry, so-called cherry eye disease. Genetic predisposition is also a cause in the case of brachycephalic breeds but may happen in any breed (Yurtal, 2020). Physical trauma to the eye and excessive scratching or pawing of the eye may also lead to this pathological condition. Also, antigenic stimulation and growth of gland have remarkable pathophysiology (Maggs, n.d.).

Clinical Signs:

The most obvious sign of cherry eye in dogs is the presence of a swollen, pinkish-red membrane in the corner of one or both eyes. Dry eyes due to the lack of tear production, excessive blinking of the eyes, and ocular discharge around the eyes are observed. Scratching or pawing at the eyes as the inflamed prolapsed gland affects the conjunctiva and creates discomfort in affected animals (Yayinggul et al., 2019).

Diagnosis:

Diagnosis is done based on history, clinical examination, and various tests like Schirmer tear test (which measures the amount of tear production), fluorescein strip test, etc. (Prasetyo, 2019).

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Differential diagnosis:

Keratoconjunctivitis, glaucoma, corneal ulcer, and keratitis should have to be differentiated from this pathological condition. But the presence of a small protruding pinkish-red mass due to the prolapsed third eyelid gland is the vital sign used to differentiate cherry eye disease from other conditions (Prasetyo, 2019). The appearance of the prolapsed gland as a dark pinkish-red mass will sometime be misdiagnosed as a tumor (Raza et al., 2013).

Treatment:

Surgical and non-surgical treatment options are available.

i. Non-Surgical Treatment:

In the early stages of cherry eye and in case of very small prolapse, non-surgical treatment using antibiotics, anti-inflammatory drugs, and multivitamins can be performed and has a good result (Prasetyo, 2019). The massage method is also the best and safest method to replace the prolapsed gland back to its original position where the protruded mass is massaged in a clockwise and anti-clockwise direction by closing the eyelid and applying lignocaine gel to the affected eye (Raza et al., 2013).

ii. Surgical Treatment:

Surgical treatment for cherry eye can be performed either by excision of the gland or by replacement of the gland.

Excision of the gland:

The third eyelid covers the medial canthus of the eye and consists of a T-shaped flap-like cartilage and tear gland, both of which are important in the protection of the eyes (Raza et al., 2013). Also, the gland of the third eyelid produces 30% of the total tears, and it is important for the intactness of the eyelid, eyeball surface, and conjunctiva (Das & Sciences, 2020; Yaygingul et al., 2019). The beneficial contribution of the gland to tear production significantly accounts for the amount of total tears needed by the eyes and avoids the condition of “dry eyes”. If the gland is excised out, there will be a high risk for the development of keratoconjunctivitis sicca (KCS) (Raza et al., 2013). Thus, excision of the gland is not recommended. However, the worry of owner dissatisfaction because of possible recurrence, sometimes drives some clinicians to remove the gland (Yaygingul et al., 2019). Also, in a chronic state of disease, excision of the gland is performed.

Replacement of the gland:

To avoid the development of KCS, replacement of the gland with Morgan’s pocket technique rather than excision is preferred (Singh et al., 2017). Morgan’s pocket technique for the replacement of the gland is easy to perform, less risky, and has a high success rate (Yurtal, 2020). Also, it does not reduce the amount of tear production and does not alter the morphology of the third eyelid gland ducts. As in this method, the gland is gently sewn back into the place where it can resume tear production (Lone et al., 2020). Due to the low recurrence and complications, its reliability is high, and it is a highly preferred technique. Also, in the study of Yurtal (2020), the success of surgical treatment using Morgan’s pocket technique was found to be 94.12%. But the only side effect which had been encountered with the pocket technique in a few cases is the reduced mobility of the third eyelid (Plummer et al., 2008).

Prognosis:

In most cases, the prolapsed gland returns to normal function within a few weeks after the surgery. In some cases, re-prolapse may occur and require additional surgery. Many dogs that prolapse in one eye will eventually experience a prolapse in the opposite eye. If the prolapsed gland is left untreated, it will result in damage to the tear duct and cause chronic dry eye. The development of KCS is higher if the gland is left exposed (Gelatt & Plummer, 2017). The gland may also become more swollen over time

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and restrict blood flow. Swelling leads to irritation in the eyes and the dog will attempt to scratch or paw at the eye, increasing the likelihood of damage and infection. In severe or chronic cases where gland function is severely diminished or absent, there may be no option other than the removal of the gland.

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DIAGNOSIS AND TREATMENT OF SPLENIC TORSION IN A GERMAN SHEPHERD DOG: A CASE STUDY



U. Karkare¹, S. Lal^{*2}, N. Nadkarni³, H. Karkare⁴

Abstract: Splenic torsion, commonly seen in large breed, deep chested dogs, occurs when the blood supply to the spleen twists on itself. A 3.5 years German Shepherd dog was presented with lethargy, inappetence, vomiting, and abdomen remarkably distended on left side. Abdominal ultrasound was done for Maximus, which revealed hepatomegaly with a small amount of free fluid. Splenomegaly with no blood flow on doppler on MSA was observed, which was of significant concern. An emergency splenectomy with an incisional gastropexy was performed.

Introduction

Splenic torsion occurs when the blood supply to the spleen twists on itself. Most commonly seen in large breeds, deep chested dogs, it often occurs along with a Gastric Dilatation and Volvulus (GDV), but can also occur independently. Imaging diagnostics are shown to be effective in confirming the condition. CT characteristics include enlarged, rounded and/or C shaped folded spleen (DeGroot et al., 2016). On ultrasonography, splenic parenchyma may appear normal, hypoechoic or anechoic with interspersed linear echoes (coarse/lacy appearance). Spectral Doppler and color doppler imaging of the splenic veins usually shows no measurable flow velocities (Hughes et al., 2020). Hilar splenic vessels may appear enlarged (Konde et al., 1989).

History

Maximus, a 3 years 6 months old German Shepherd dog presented with lethargy, inappetence and vomiting 2 days prior to presentation. Upon physical examination, Maximus exhibited classical clinical signs of an acute abdomen. His abdomen appeared remarkably distended on the left side which was non pliable and painful on palpation.

Diagnostics

Basic bloodwork to check CBC, serum biochemistry, blood glucose and clotting time was done which showed low normal albumin, mild hemoglobinemia, mild anemia, significant leukocytosis predominantly neutrophilia and significant thrombocytopenia. The neutrophilia suggested an inflammatory process underway. Manual clotting time was 7 minutes.

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Analytes	Result	Range	Units
Haemoglobin (Hb)	11.1	12 - 18	g % (g/dL)
Packed Cell Volume (PCV)/ Haematocrit (HCT)	32.4	37 - 55	%
Erythrocytes (RBC)	4.53	5.5 - 8.5	10 ⁶ / cu. mm.
Mean Corpuscular Volume (MCV)	71.6	66 - 77	Femtolitre
Mean Corpuscular Haemoglobin (MCH)	24.5	19.9 - 24.5	Picograms
Mean Corpuscular Haemoglobin Concentration (MCHC)	34.2	32 - 36	g / dL
Leucocytes (WBC)	26.4	6 - 17	10 ³ / cu. mm.
Neutrophils	86.3	60 - 77	%
Eosinophils	2.5	2 - 10	%
Basophils	00	Rare	%
Lymphocytes	9.3	12 - 30	%
Monocytes	1.9	3 - 10	%
RBC Morphology	Normochromic	-	-

Fig 1: Pre-operative bloodwork

Abdominal ultrasound was done for Maximus which revealed hepatomegaly with a small amount of free fluid. Splenomegaly with no blood flow on doppler on MSA was observed which was of significant concern. Vena cava appeared tortuous.

Interpretations of the diagnostics suggested a splenic torsion with possible pancreatic involvement.

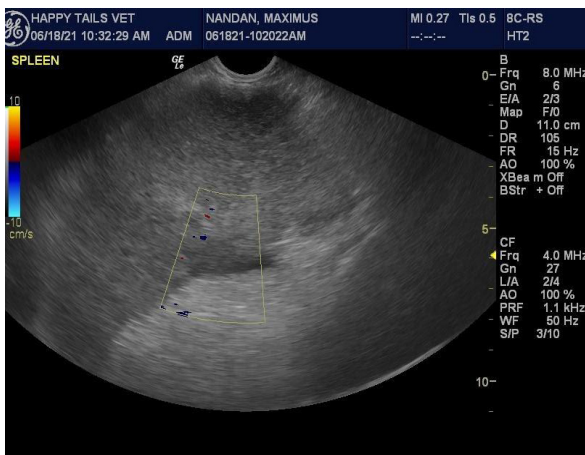


Fig 2: Diagnostic ultrasound images showing remarkable lack of blood flow in the spleen

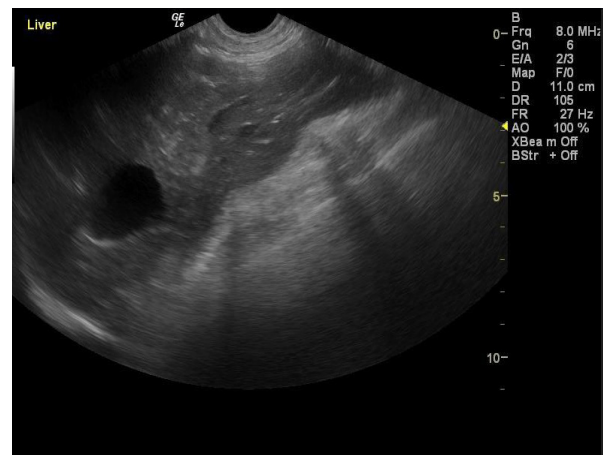


Fig 3: Enlarged liver



Fig 4: Hypochoic splenic parenchyma

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Procedure

An emergency splenectomy with an incisional gastropexy was performed. Following the standard operative procedure, a ventral midline incision was made extending from the xiphoid to the pubis.

Splenic torsion with severe sequestration and congestion was observed. Hilar splenic blood vessels were coiled around their own axis which appeared necrotic. The presence of hemoabdomen was also noted.

The gastrosplenic supply was severed but gastroepiploic blood vessels were intact. Omentum was seen to be hypoperfused and necrosed. Mesenteric vasculature and pancreas were normal. Hemostasis of splenic vasculature was achieved using vessel seal and ligatures with vicryl 2-0. Tranexamic acid was also administered intraoperatively for hemostasis.

JP drain was inserted because peritonitis was expected. Incisional gastropexy was also done using the standard operative procedure.

The removed spleen weighed 1.4 kgs.



Fig 5: Torsed hilar splenic blood vessels



Fig 6: Splenectomy (in process)



Fig 7: Removed spleen



Fig 8: Removed spleen

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Post operative

On day one of post-op, Maximus was non-pyrexia and retained food. He was tachycardic and tachypnoeic with a colorado pain score of 2. Buprenorphine @0.02mg/kg was administered as analgesia and Vitamin C was added as a protectant against oxidative stress-induced cellular damage. Clotting time was down to 3-4 minutes when done manually. 10ml of serosanguineous fluid was removed from the JP drain on day 1 of post-op. All other vitals were within normal limits.

On day 2 post-op, Maximus had a good appetite. Ultrasound showed no effusion and very little amount of fluid was drained from the drain.

On post-op day 3, all blood parameters showed improvements, and the JP drain was removed. Postoperatively, for 3 days Maximus was on injectable ondansetron @0.2mg/kg, pantoprazole @1mg/kg, metoclopramide @0.2mg/kg, metronidazole @15mg/kg, ceftriaxone tazo @20mg/kg, meloxicam @0.2mg/kg, and buprenorphine @0.02 mg/kg. It was followed by an oral prescription for tablet Trypsin-chymotrypsin, Buprenorphine, Metronidazole, and Cefixime.

10 days after the surgery, the sutures were removed.

Discussion

Diagnosis of splenic torsion can be made quite accurately based on clinical examination and ultrasonography. Various post-op complications like peritonitis, sepsis, suture seroma, suture dehiscence, and pancreatitis exist but the prognosis for dogs undergoing splenectomy because of a primary splenic torsion is favourable (Saunders et al., 1998).

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EFFECTS OF CORONAVIRUS PANDEMIC ON POULTRY PRODUCTION



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Abstract: *The poultry industry is responsible for satisfying the nutrient requirements of billions of people on the planet earth. In addition to being a strong pillar of food security, the poultry sector has provided millions of people an opportunity of earning their livings. From the production of seed stock to the supply of finished poultry products, from feed manufacturing units to medicine and vaccine synthesizing companies, all included in the vast circle of poultry production. The coronavirus pandemic has affected this sector in many aspects like any other corporate or non-corporate sector in this world. Major concerns imposed by the covid-19 pandemic on poultry production include the zoonotic concerns, health, and safety of workers, threat to food security, supply chain disruptions, shortage of farm supplies and services, and poultry products marketing and distribution, etc. This review will depict a picture of the adverse effects imposed by the coronavirus pandemic on poultry production.*

Keywords: Poultry production, Coronavirus, pandemic.

Introduction:

A major percentage of micro and macronutrients, protein, and energy for a whole lot of people is provided by the poultry sector in the form of meat, eggs, and other products (Yunita & Hasibuan, 2021). Poultry production has contributed to food security worldwide (S, 2019) (Al-Khalaifa et al., 2019) (Al-Nasser et al., 2020). The livelihood of hundreds of thousands of people is directly or indirectly attached to the poultry industry. A complete socio-economic, as well as so-called supply chain, is followed in the poultry domain as it touches various aspects of the economy. This sector is gaining enormous popularity and emerging as a giant sector in various developing countries (Mottet & Tempio, 2017). It was reported by the organization of economic cooperation and development in 2017 in an outlook report that meat production will be increased because of growth in the poultry sector in the coming decade (Mottet & Tempio, 2017). The upstream segments of the chain include seeds, a variety of strains, feed, vaccines, and medicine and these are being controlled by large companies around the world. On the other side, the processed products and their import-export come under Agro-industry based markets. Technical production includes the farmers who raise live chickens for sale (Mottet et al., 2018). The point of mentioning all the above aspects is how big this sector is. It will help us to understand the effect of coronavirus on poultry production. The coronavirus case in humans that was first reported in December 2019 in Wuhan, China, has spread to every country on the earth. There is not a single sector related to human life that has not been affected by this pandemic. Several issues have emerged for poultry production during this pandemic. Strict lockdowns have disturbed human lives severely. Due to covid-19, the issues raised for the poultry industry are of zoonotic nature, health and safety of workers, production performance, food insecurity, supply chain disruptions, shortage of farm supplies and services, disturbance in poultry products marketing and distribution, and problems of farm's security, etc (Uyanga et al., 2021). So, covid-19 has a devastating impact on the poultry value chain of both eggs and broiler meat (McLeod et al., 2009; Weersink et al., 2020).

Effects of Corona Virus on Poultry Production:

An uncertain environment has been created due to the current pandemic. This uncertainty has many short and long term effects on various sectors including poultry production. The nature of the effect depends upon the segment of the chain in poultry production, contact with the general public, and the implementation of protocols and SOPs. So, the severity of these impacts can vary from area to area depending upon the prevalence as well as control of the disease. In this article, we will present an overview of the

issues and concerns that have been raised because of the global pandemic for poultry production.

1. Zoonotic concerns:

Although the investigations are still on the way, it is a common belief that SARS-CoV-2 originated from a wildlife source (OIE, 2020). The Covid-19 viral strain possesses a lot of similarities with the clade 2b β -CoV from bats (Chow, 2020; WHO, 2020). Some strains of coronavirus also affect poultry birds. However, the research conducted on the poultry products suggests that there is no such zoonotic virus present in the products of the poultry sector. But still, there is a lot to study especially on the transmission of SARS-CoV-2 and it can reveal new secrets. Much propaganda was circulating in the society in the last months that coronavirus is transmissible from poultry to humans but the researchers have strictly denied this myth with facts and proved that poultry products are safe to use.

2. Health and safety of workers:

As coronavirus imposes a serious threat to public health, so it is necessary to update the health literacy of all the potential targets of this virus including a major portion of workers. Proper implementation of Standard operating procedures is lacking at the farms and among workers working in the supply chain domain. This poses a potential threat to the health and safety of the workers and ultimately poultry production. According to the guidelines issued by WHO, it is mandatory to check the temperature of the employees regularly, practice social distance and avoid physical contact, availability of hand sanitizers at every place, properly disinfect areas at regular intervals, production plants, farms, and workplace hygiene and availability of Personal protective equipment such as face mask and hand sanitizers, etc. Also, the Animal Feed Manufacturing Association suggests particular responses in case any personnel in the industry becomes infected. These include quarantining the infected people plus proper sterilization of workplaces (AFM, 2020). The Health and safety of workers are of crucial importance. Covid-19 has seriously disturbed this system and imposed serious effects to poultry production as well.

3. Effect on Production performance

Poultry production is highly dependent on manpower in order to carry out routine tasks effectively. These routine tasks include essential management works like feeding, watering, cleaning, hygiene, biosecurity, supplying, waste disposals, and daily care of the birds. The ongoing situation because of covid-19 has made it very difficult to perform routine activities. This imposes a threat to the welfare and health of the birds too. If the employees and workers are sick or quarantined, then they are unable to perform their duties which are crucial to handling farm operations. Ultimately the focus is to keep diverting from the targets of achieving maximum production from broilers or layers etc. Distractions cause a decrease in body weight, reduced feed, and water intake, and health issues for the poultry which leads to less production, fewer poultry products available in the society, and ultimately the fate is economic loss (Butterworth, 2018). Hatcheries also suffer losses because of interruption in the hatching egg supply and poor sales of day-old chicks. Delayed transportation and shortage of feed also affect the performance of a farm. Still, there are many facts related to demand and supply that are yet to be ascertained (Roembke, 2020).

4. Food Insecurity

In uncertain circumstances like the present age, livelihood, nutritional status, and food system are greatly affected (CFS, 2015). Food insecurity is a common manifestation in times of crisis as all the components of the food production and food supply chain are disrupted. The sickness of agricultural workers, food chain personnel, and limitation of food products import and export due to zoonotic and health care concerns are considerable liabilities, especially for perishable food products (Dongyu et al., 2020). This situation has created a potential food crisis in many areas of the world as a major part of the world's population is dependent upon the livestock sector for nutritional needs. The food crisis is not only for humanity but for the poultry also because of limitations

in feed manufacturing and disruption in its supply to farms.

5. Supply chain disruptions

The shortage of labor and logistics challenges due to strictly imposed lockdowns has limited the access of farms to essential supplies and also disrupted the supply of finished poultry products like meat and eggs hence pushing poultry farms into financial crisis. Because of the isolation needs and containment measures for controlling the spread of coronavirus, the global export of poultry meat has started decreasing since April 2020 (FAO, 2020). The production and supply of ingredients necessary for feed manufacturing, supply of breeding material, grandparents, and parent stock are severely affected due to movement restrictions across the national and international borders. The reduction of airline traffic on an international level has rendered farms a deficit of breeding stock and hatching eggs. Hence supply chain disruptions have played an important role in decreasing poultry production globally (Vorotkniov, 2020).

6. Shortage of farm supplies and services

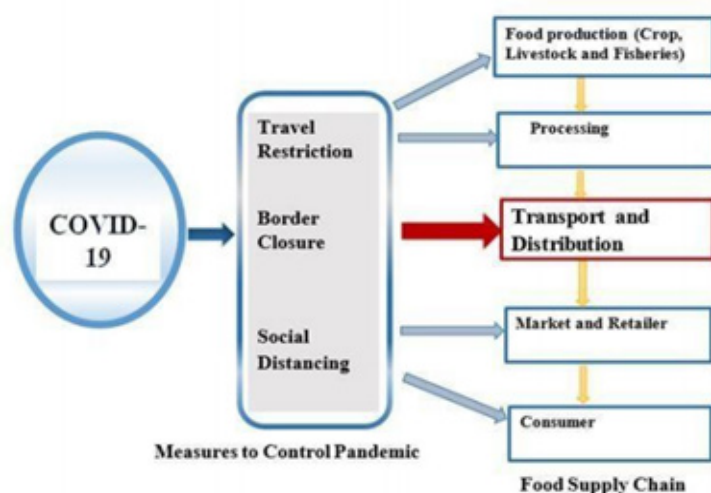
Due to containment measures in order to decrease the spread of covid-19, the closure of markets and manufacturing units, restrictions at international borders and trade, restrictions in air traffic, and international level lockdowns have impacted both producer and consumer supply chains. This disturbance in supply chains has reduced the feed raw material supplies, farm supplies and services, veterinary medicine, and other farm inputs. The cessation of factories and trading centers has also decreased the supply of supplements like micro and macro minerals and vitamins (Roembke, 2020). This poses a challenging situation for poultry farmers.

7. Disturbance in poultry products marketing and distribution:

Whole country lockdowns and citywide lockdowns in different areas of the world have obvious and severe effects on the marketing and distribution of any product. Production and supply lines are cut off due to the closure of international borders and the cessation of air traffic. Because of this, the earning statistics of owners, as well as workers, brokers, and suppliers have shown a clear downfall of up to 20% (Massoi, 2020). Because of the problems faced during the distribution and marketing of the poultry products, scarcity of these products like meat and eggs is produced in many areas especially the remote and rural areas of the countries. Inflation has spiked due to these circumstances which may be a major reason for food insecurity. An increase in the prices of all poultry products has been reported in many countries which has a negative impact on the sales. Failure of delivering farm supplies and goods can result in the termination of small-scale poultry farms.

8. Farm security

Due to strict containment measures and movement restriction orders, the employees are unable to work to the best of their ability. This situation creates a liability and puts a question mark on the future of farm establishment (Oguntuase & Alade, 2020). As the farms are not able to operate to the full of their capacity, the production of the farm has decreased and hence the farmer is not achieving its daily or weekly or monthly production aims (Upton, 2007).



The figure shows COVID-19 affecting every stage of food supply chain with major impact on food transport and distribution.

Note. The image was taken from Poudel, P. B., Poudel, M. R., Gautam, A., Phuyal, S., Tiwari, C. K., Bashyal, N., & Bashyal, S. (2020). COVID-19 and its global impact on food and agriculture. *Journal of Biology and Today's World*, 9(5), 221-225.

Conclusion

No field is safe from the harms of strict lockdowns and control measures implemented by the governments in order to control the spread of coronavirus. Poultry production is one of them too. Most of the issues are raised because of disruption in the supply chain or stock or different services. The sector is struggling to cope with the potential hazards and harms. Still, it'll take a long while to regain the peak stage if the pandemic is contained in near future.

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FETAL MUMMIFICATION IN A COW: A CASE REPORT

G. Gautam*



Abstract: *Fetal mummification is characterized by the death of a fetus, but there is no abortion within a few days; instead, corpus luteum (CL) persists, resorption of placental fluids, dehydration of fetus and fetal membranes lead to a uterus being tightly wrapped around the fetus. A case of successful per-vaginal delivery of a mummified fetus in a Holstein cross cow using cloprostenol (PGF2 alpha analogue) injection has been reported.*

Keywords: Mummification, Holstein cow, Cloprostenol

Introduction

The exact outcome of early fetal mortality is unpredictable and influenced by several factors, such as the cause of fetal mortality, species differences, stage of gestation at fetal death, and the number of fetuses (Lefebvre, 2015). One possible outcome of fetal death is mummification in which there is the death of a fetus, but there is no abortion within a few days; instead, corpus luteum (CL) persists, resorption of placental fluids, dehydration of fetus and fetal membranes lead to a uterus being tightly wrapped around the fetus. Fetal mummification is occasionally diagnosed in many domestic species, including the cow (Barth, 1986), sheep (Hailat et al., 1997), goat (Tutt, 1997), horse (Meyers and Varner, 1991), swine (Christianson, 1992), dog, and cat (Johnston and Raksil, 1987) with the highest prevalence occurring in the swine (Kennedy and Miller, 1993). The present case report puts on a case of fetal mummification in a Holstein cross cow and its successful per-vaginal delivery using cloprostenol injection.

Case History and Observation

A client from Bharatpur-15, Chitwan called the author to handle a case of a three-year-old Holstein cross cow in its second parity that had crossed two weeks the 'due date of parturition'. The cow was artificially inseminated (AI) 295 days ago using Holstein bull semen. The cow was confirmed to be pregnant at around 3.5 months post-AI. According to the owner, there was a gradual decrease in the size of the abdomen and perineal region after around six months of gestation. Even at full term of gestation, there were no signs of approaching parturition, there was no increase in the size of the udder and vulva. The cow had a normal appetite and no signs of any illness. It had a normal rectal temperature (101.8°F) at the examination. On transrectal palpation, there was a hard mass without any fluid in the uterus. Fremitus and placentomes were absent. Per-vaginal examination revealed that the cervix was completely closed. Based on history and clinical findings, the case was diagnosed as 'fetal mummification'.

Treatment and Prognosis

A PGF2 alpha analogue cloprostenol 500 µg (Clostenol-2ml, Zydus Animal Health, India) was injected intramuscularly. After around 90 hours of injection, the cow had mild and infrequent straining but there was no discharge from the vulva. The cow was examined per-vaginally at 110 hours after injection. There was the lodging of dried mummified mass (Figure 1) into the cranial vagina and cervix. It was removed by manual traction by applying glycerin as a lubricant. The mummified fetus was surrounded by dried fetal membranes (Figure 2). After exposing the fetus from the fetal membranes, the head-to-tail base length was 30 cm (Figure 3). After removal of the mummified mass, the uterus was flushed with 1 lit of normal saline using a douche cane set. Then, 60 ml of intrauterine preparation (Voidine IU, Vetoquinol, India) containing 1200 mg levofloxacin, 1500 mg ornidazole, and 30 mg alpha tocopherol was infused into the uterus. There was a good prognosis. The cow came into estrus 18 days after the removal of the mummified fetus, and it was naturally bred with a bull. It was found pregnant at two months

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post-breeding.



Fig. 1. Affected cow and its mummified mass after removal

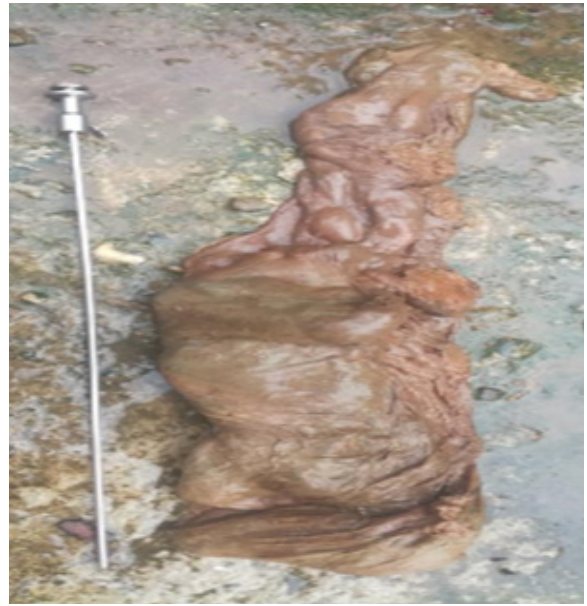


Fig. 2. Mummified fetus wrapped by the dried fetal membranes



Fig. 3. Mummified fetus exposed after removal of wrapped fetal membranes

Discussion

The incidence of fetal mummification in cattle is low and sporadic usually less than 2% (Barth, 1986). It affects cattle of all ages. Breed and previous occurrence are risk factors, with a higher incidence of fetal mummification in Guernsey and Jersey cattle. A higher risk of recurrence (30%) in cows that have experienced a similar event in a previous gestation has been reported (Roberts, 1986). It usually occurs at 3–8th month of gestation but is most common in 4, 5, and 6th months. There is the death of the fetus but there is no lysis of the corpus luteum (CL) or opening of the cervix. The long, hard cervix has three or four complex circular folds and is less responsive to endocrine changes. After fetal death, the amniotic and allantoic fluids are resorbed, dehydrating the fetal tissues and fetal membranes. Eventually, the caruncles disappear during the dehydration process. The longer the mummified fetus is retained, the dryer, firmer, and more leathery the tissues of the fetus become (Lefebvre, 2015).

It is difficult to ascertain the cause of mummification. Several potential causes for this condition have been proposed: bovine viral diarrhoea (BVD), leptospirosis and mold, *Neospora caninum* (Roberts, 1962; Ghanem et al., 2009), mechanical factors such as compression and/or torsion of the umbilical cord (Mahajan and Sharma, 2002), uterine torsion (Moore and Richardson, 1995), defective placentation (Irons, 1999), genetic anomalies (Roberts, 1962; Stevens and King, 1968), abnormal hormonal profiles; and chromosomal abnormalities (Roberts, 1986). However, a definitive etiology is rarely established, because of tissue degeneration. Deoxyribonucleic acid (DNA) extracted from mummified fetuses revealed that two of ten were carriers (heterozygous) of the autosomal-recessive gene for deficiency of uridine monophosphate synthase (DUMPS) (Ghanem et al., 2009), which is known to contribute to embryonic and fetal mortality in cattle (Shanks et al., 1984).

The case of fetal mummification is not suspected until late in gestation when normal development of the fetus, body changes related to parturition and calving fail to occur (Lefebvre et al., 2009). Mummy remains in the semi-moist state without odor or pus until spontaneous abortion in 1-2 months to 1-2 years, or until diagnosed, treated or corrected, or slaughtered. Vaginal examination reveals a closed cervix with a mucous seal of pregnancy. No significant systemic or another type of illness is observed in cows except for spontaneous abortion, which may or may not occur.

The diagnosis of fetal mummification is generally uncomplicated. Transrectal palpation and ultrasonographic examination show the mummified fetus as a compact, firm, and immobile mass without placental fluid or placentomes. The ultrasound examination reveals the absence of a heartbeat. The general physical examination of the dam appears normal, although decreased milk production and weight loss have been observed in rare cases (but may have been attributable to other factors) (Frazer, 2004).

Two treatment options are available for fetal mummification. A more rational and cost-effective approach is to induce parturition by using hormones. Since mummification is characterized by a persistent CL, it can be treated with prostaglandin F₂ alpha preparations (25 mg dinoprost tromethamine or 500 µg cloprostenol) for luteolysis of CL. Estrogen or stilboestrol can also be used (less reliable and less precise than PGF₂ alpha). Following luteolysis, the cervix dilates and secretes mucus. The uterus contracts and forces the fetus outwards, and at the same time the cow usually shows estrus. In most cases, the mummified fetus will be expelled from the uterus. All treated cows should be assessed via transrectal and vaginal examination about five days after the first injection of PGF₂ alpha, in order to check for the presence of CL, cervical dilation, and the fetus in the vagina. After the expulsion of the fetus, a uterine lavage should be performed to remove fetal and placental debris, and intrauterine antibiotics can be infused. In the absence of treatment response, the most cost-effective option is then to proceed with the second injection of PGF₂α. If the cow does not respond to the second injection of PGF₂α after 5 days, proceed with a hysterotomy (laparotomy or colpotomy) or continue medical treatment with a combination of PGF₂α and PGE₂ (Lefebvre, 2015). In one study, a low parturition rate was reported with a single dose of PGF₂α, even though relaxation of the birth canal was satisfactory, suggesting a uterine contractility defect (Vandeplassche et al., 1974). For cows in good condition, the combined administration of PGF₂α and PGE₂ resulted in more effective uterine contractions than the injection of PGF₂α alone (Hirsbrunner

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et al., 2003). In addition to their luteolytic properties (Seguin, 1980), PGF₂ α and PGE₂ have a direct effect on myometrial contractility (Stolla and Schmid, 1980; Hirsbrunner et al., 1999; Hirsbrunner et al., 2000). Thus, the synergistic effect of both PGs may explain the increased success rate relative to the use of PGF₂ α alone. In the situation where combined treatment with PGs (PGF₂ α and PGE₂) is not effective or possible, the veterinarian must proceed with a hysterotomy (Lefebvre, 2015). Both the medical and surgical approaches result in a normal pregnancy rate (Lefebvre et al., 2009). In cows with a history of fetal mummification, histological assessment has shown an intact epithelium and preserved uterine glands with no sign of inflammation (Frazer, 2004). Thus, the prognosis of fetal mummification is usually good.

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FLOPPY KID SYNDROME IN NEONATAL GOAT KIDS



D. Khanal*

Abstract: Floppy Kid Syndrome is a condition of metabolic acidosis in very young kids possibly caused due to overfeeding of milk. It is characterized by weakness, ataxia, and anorexia, without diarrhoea, and may even lead to death if not cured. Since the symptoms of this disease seem similar to kids lacking energy, most farmers try to force-feed milk to the kids which further worsens the condition. Metabolic acidosis without diarrhoea and increased anion gap on blood-gas analysis along with the raised level of D-lactate serve as important diagnostic criteria for this disease. The treatment relies on the correction of metabolic acidosis. Limiting milk consumption and maintaining hygiene in the kids-raising area are considered to be the best way to prevent this disease.

Keywords: anorexia, ataxia, d- lactate, metabolic acidosis, milk

Introduction

A metabolic disorder of young goat kids characterized by weakness, ataxia, flaccid paralysis, metabolic acidosis without dehydration, and finally death if untreated (Riet-Correa et al., 2004). It was first recognized in North America in the late 1980s and the first detailed report was published in Canada (Tremblay et al., 1991). The disease is named after the distinctive decreased muscular tone in affected goat kids: “Floppy Kid Syndrome” used in English publications (Riet-Correa et al., 2004).

The highest risk of acquiring Floppy Kid Syndrome is between the 3rd and 6th days of birth, and negligible after day 11. During the kidding season, mortality rates may rise steadily and reach as high as 60% (Gufler, 2012; Klein et al., 2010).

Most farmers attempt to fix the problem by force-feeding weak kids because the clinical symptom is similar to weak animals devoid of energy. This exacerbates the situation, as this disease appears to result from excessive milk consumption.

Etiology and pathogenesis

This disease has not been found to be associated with specific viral or bacterial pathogens of the neonatal kid. Affected goat kids usually do not have a history of diarrhea or septicemia (Bleul et al., 2006).

Since mammals produce only minimal amounts of D-lactate via the methyl-glyoxal pathway, bacterial fermentation of carbohydrates in the gastrointestinal tract is the most probable source (Uribarri et al., 1998). A possible etiology suggested is the overconsumption of milk (Riet-Correa et al., 2004). The large amounts of milk in the digestive tract allow overgrowth of bacteria, especially several D-lactate-producing species such as *Clostridium perfringens type A*, *Cryptosporidia* which can be observed in more significant number in the feces of affected kids (Bleul et al., 2013). It causes a huge amount of D-lactate to be produced in the gastrointestinal tract, which is then reabsorbed into the blood (Gufler, 2012). The enzyme D- lactate dehydrogenase, which metabolizes D- Lactate, is deficient in mammalian cells causing its elimination to be much slower. On the contrary, L- lactate is eliminated considerably faster after the metabolization by L- Lactate dehydrogenase in the liver. This causes a preferential accumulation of D-lactate in the affected kid’s blood (Bleul et al., 2006; Klein et al., 2010).

A reduction in intestinal pH further enhances bacterial D-lactate production and intestinal absorption, and the acid produced is neutralized by serum bicarbonate, resulting in an elevated anion gap (Uribarri et al., 1998).

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Clinical Signs

At birth, kids that are affected remain unaffected. The clinical signs include weakness, anorexia, reluctance to suckle, apathy, decreased muscle tone, wobbly gait, knuckling in the forelimbs with progressive listlessness (Bleul et al., 2006; Klein et al., 2010; Temizel et al., 2017). Distension of the abdomen is another common clinical symptom. Depression and paralysis may be observed in the animals; at some point, the kids may look so bad that they appear dead (De La Concha & Juste, n.d.).

Body temperature is usually normal with no diarrhea or dehydration. As the symptoms worsen, the extremities become colder as the body temperature drops. If not treated, the animal may become comatose or die within 24 to 36 hours.

Diagnosis

Metabolic acidosis without diarrhea is one of the diagnostic criteria for FKD. Blood gas analysis reveals a drop in blood pH, blood pCO₂, and blood base excess. Anion gap is elevated. Although blood glucose and L-lactate are within normal limits, D-lactate level is significantly increased (Klein et al., 2010; Mathew et al., 2014). In a study, the d-lactate averaged 7.43 mmol/L in affected kids but only 0.26 mmol/L in control kids (Bleul et al., 2006).

A swollen abomasum with milk clots may be discovered during a postmortem examination. When opening the abomasum, a sharp acidic odor may be detected, indicating an elevated amount of lactic acid, and hemorrhagic streaks may be observed attributing to its corrosive impact (Klein et al., 2010; Riet-Correa et al., 2004).

As a differential diagnosis, White muscle disease (Vitamin E and selenium insufficiency), hypothermia-hypoglycemia-complex, congenital copper deficiency (“sway back”), and septicemia owing to bacterial infections should all be checked out when the diagnosis “floppy child syndrome” is carried out. The condition does not seem to respond to antibiotics or vitamin E and Selenium treatments.

Treatment and Prevention

The most crucial step in the treatment is to correct acidosis. Treatment with a proper amount of sodium bicarbonate, whatever the etiology of D-lactic acidosis in calves, goat kids, and lambs, is typically beneficial (Bleul et al., 2006; Schelcher et al., 1998).

The kid can be treated with 1.3 percent sodium bicarbonate intravenously 125 to 200 ml over one to three hours or based on the formula :

(Body weight in kg x 0.5 x (-base excess)) = milli equivalent (mEq) sodium bicarbonate) for three days.

Oral bicarbonate of soda can also be given by mixing 2.5 to 3 grams (a little more than a half teaspoon) with lukewarm water. If the condition is not compounded by another problem, the kid may respond dramatically to one treatment. Otherwise, a second treatment may be required twelve hours later (Bleul et al., 2006).

Another significant aspect of treatment is restricting milk intake for twenty-four hours and replacing it with oral electrolytes. It was shown that goat youngsters who drank their dam’s milk suffered from recurrent metabolic acidosis and recovered more slowly than kids who were weaned and raised with milk replacer. It is thus recommended that affected goat kids be hand-reared with milk replacer or fed pasteurized milk that has been heated at 60 °C for 30 minutes (Klein et al., 2010).

A broad-spectrum antibiotic can also be used to treat or prevent septicemia in kids with impaired immune systems (Riet-Correa et al., 2004; Tremblay et al., 1991).

For the prevention of this disease, the amount of milk consumption by the kids should be limited. In addition to this, the hygiene of the farm should be adequately maintained to reduce the spread of potential

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pathogens in the kid-raising area.

Another important measure can be the separation of newborn kids from adults thus preventing exposure of kids via sucking/licking to the bacterial agent causing d-lactic acidosis, originating from the adult goats or their immediate environment (Gufler, 2012).

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HEAT STRESS-INDUCED SUMMER INFERTILITY IN BUFFALO



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Abstract: *Global warming is an established fact now and it comes with multidimensional complications including animal husbandry. With the rise in temperature of about 1.2 °C since the industrial era began, it is rising. It is serious unless governments around the world make steep cuts to emissions, promote reforestation and mitigate anthropogenic misadventures. Nothing is more torturing than heat stress in commercial intensive livestock farming. Heat stress can have a negative effect on many production factors in all species of animals. Reducing feed intake as a way to reduce metabolic heat results in reduced milk production in dairy bovine and reduced growth rates in small ruminants, swine, and poultry. Livestock animals that are dark-hided or dark-pelted are more susceptible to heat stress than their light hided/pelted counterparts. Buffaloes are important bovine species in Nepalese conditions and with 52,57591 heads counted, commercial farming is also picking up. Like elsewhere, Nepal is also one of the most affected nations due to climate change resulting from global warming, and buffaloes are found to have seasonal hiatus in breeding activity during summer. This review article discusses the heat stress resulting in seasonal anestrus in buffalo.*

Keywords: seasonal, breeding failure, buffaloes, heat stress

Introduction

Scientists have condemned politicians for failing to protect their citizens from extreme weather events such as the floods in northern Europe and the US heat dome. Nepal has also been reeling under tragedies of cloud bursts resulting in flooding, landslides, and erratic weather. Seasonal patterns are shifting disrupting the annual farming activities in predominantly rain-fed agriculture as the principal source of food production. Altitude-wise, topography, and climate, Nepal is generally divided into Terai (59–200 m), Siwaliks (200–1500 m), middle mountains (1000–2500 m), and high mountains (2200–4000 m), and high Himalayas (>4000 masl). Based on the Global Climate Risk Index 2016, Nepal ranked 17th in the list of countries most affected by weather-related loss events (e.g, floods, storms, heat waves) from 1995 to 2014, and was the 7th most affected country in 2014 (Kreft, Eckstein, Dorsch, & Fischer, 2015). Warming in Nepal is projected to be higher than the global average. By the 2080s, Nepal is projected to warm by 1.2°C–4.2°C, under the highest emission scenario, as compared to the baseline period 1986–2005. The range in possible temperature rises highlights the significantly lower rates of warming expected on lower 21st-century emissions pathways. Due to a combination of political, geographic, and social factors, Nepal is recognized as vulnerable to climate change impacts, ranked 128th out of 181 countries in the 2019 Index (Mendes, 2020). Optimal climatic conditions for cattle, buffaloes, sheep goats, rabbits, and poultry would be something like an air temperature of 13 to 20 C, a wind velocity of 5 to 18 km/hr, relative humidity of 55 to 65% and a moderate level of sunshine and these factors are interrelated. In tropical and subtropical countries, the climatic characteristic is the major constraint on animal productivity. Growth, milk production, and reproduction are impaired as a result of the drastic changes in biological functions caused by heat stress (Habeeh et al., 2018).

Impacts of climate change on buffaloes

Climate change impacts all aspects of the health, productive and reproductive performance of buffaloes. Global warming is diminishing reproductive functions in animals (Lopez and Hunter 2020). Different mechanisms: (1) Direct impacts of more severe physiological challenges: for example, the current trend of increases in ambient temperature would cross the thermo-neutral comfort zone of the animals and would cause heat stress; (2) Nutritional impacts through changes in, and availability of grasses and fod-

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der; (3) Increasing incidence of powerfully evolving vectors and pests; (4) Disturbed circadian rhythm and the short circuits in the Hypothalamus-Pituitary-Gonadal axis. Strictly herbivores and avid foragers, buffaloes are sensitive to climatic factors. Increasing ambient temperature due to climate change influences the distribution of buffalo's favorite plant species and increases the toxicities of invasive alien species of poisonous plants. Rising temperatures with increased atmospheric CO₂ concentration and the long periods of drought predicted under climate change scenarios are likely to substantially enhance the growth and reproductive output, of toxic invasive plants. In a research two types of famine weed, (*Parthenium hysterophorus*), one invasive and the other non-invasive were exposed to the atmospheric levels of carbon dioxide recorded in 1950 and 2020. In the invasive variety, parthenin concentrations peaked at the highest carbon levels suggesting that modern levels of carbon dioxide have contributed to the noxious weed's toxicity (Rice et al., 2021). Changes in climatic factor alter the distribution of plant species thus altering buffalo's feeding habits and energy expenditure that results in a search for greener pasture and wallowing habits lengthens. Thus, animal prefers the place that better fits their thermoregulatory response, decreasing access to wallowing areas concentrates the herd, risking aggression and disease, and pest transfer. Hence, mammals including livestock animals have adapted to variable environments all over the world which typically include high ambient temperatures. In these environments, mammals have acquired genetic variation and improved mechanisms for controlling body temperature and managing heat stress. On the other hand, the genetic selection of livestock by humans has made them more susceptible to heat stress. This is especially the case with dairy animals which generate large amounts of metabolic heat for milk production. In dairy cows selected for high milk production, the conception rate decreases dramatically in summer than in winter (Lopez, 2003).

Physiological impacts of heat stress in buffaloes

Thermoregulation ultimately involves alteration in energy balance and metabolism. Animals have evolved to acclimatize to their environment which includes short-term and long-term strategies. Figure 1, explains the general impact of heat stress in animal's physiology. Buffalo being a ruminant, is designed to withstand heat though it is susceptible to heat stress due to its characteristics such as rumen fermentation, sweating impairment, and skin insulation. It is also noteworthy that buffalo bodies absorb a great deal of solar radiation because of their dark skin and sparse coat or hair, and in addition to that, they possess a less efficient evaporative cooling system due to their rather poor sweating ability (Marai and Haebe, 2010).

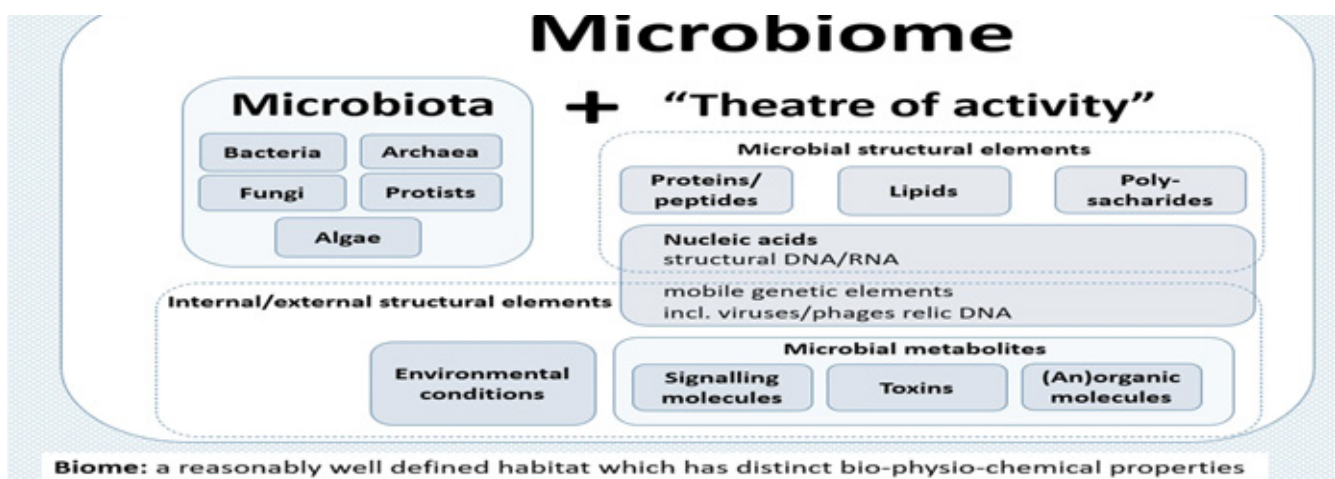


Figure 1: The physiological impact of heat stress on an individual and its coping mechanism.

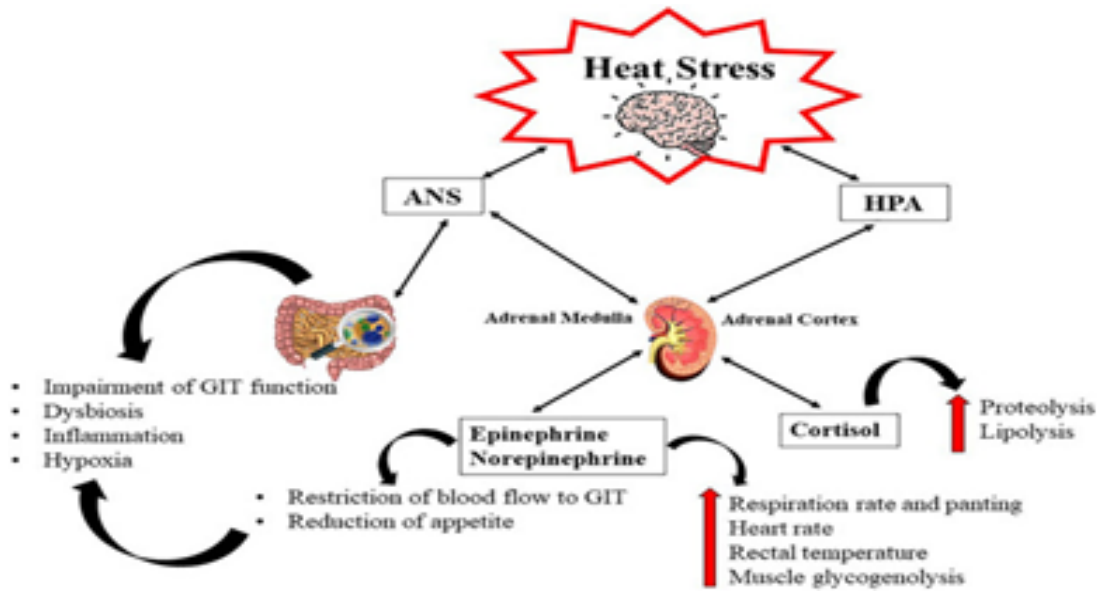


Figure 2. The microbiome disturbance of an individual is one of the major impact of heat stress that have multidimensional impacts and thus the mitigation solution also lies in maintaining its harmony.

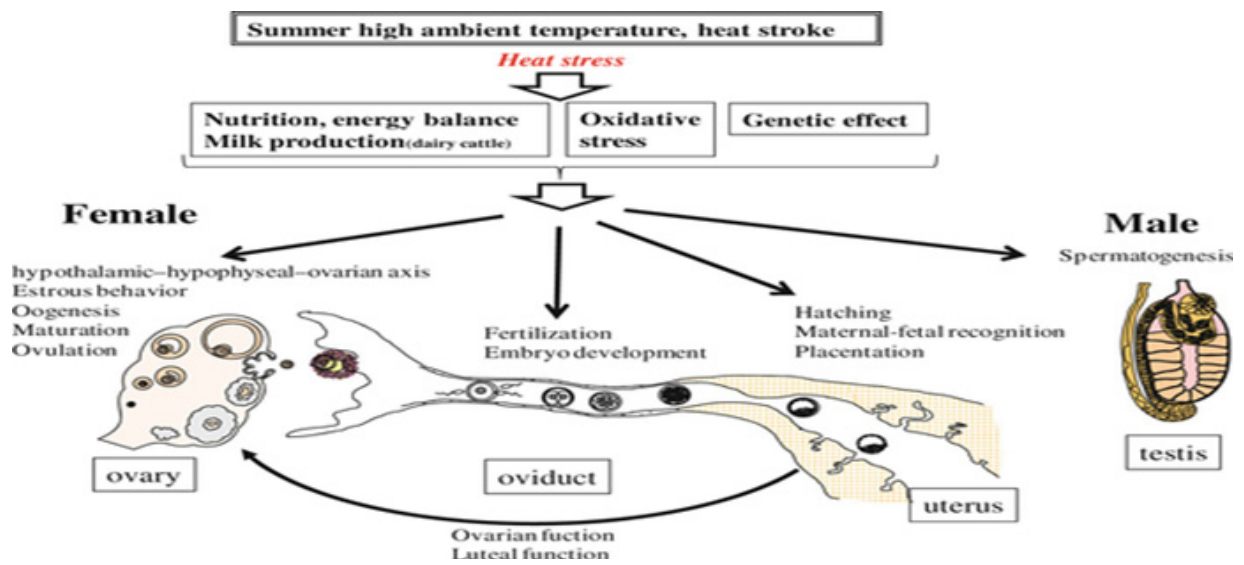


Figure 3. Global temperatures have risen about 0.7°C since the beginning of the industrial revolution in the 18th century, causing climate change all over the world by possible greenhouse gasses. Recent weather reports show that the incidences of summer heat waves, heavy rains or drought have been increasing with rising temperature. It is likely that global warming will have severe impacts on the physiology and reproduction of mammals of both sexes (Takahashi, 2012).

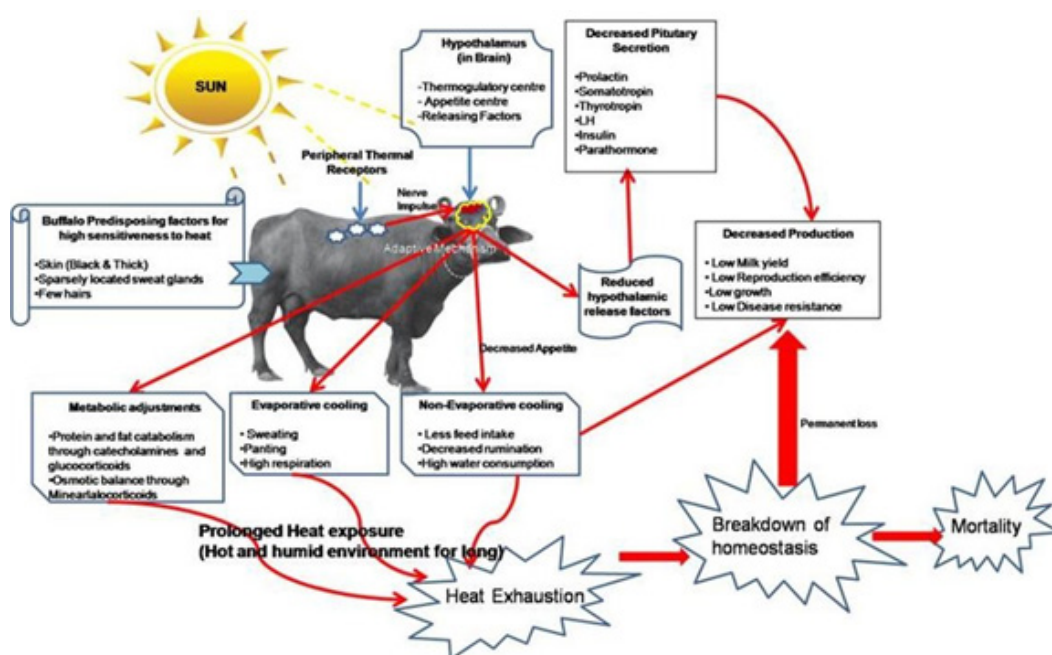


Figure 4. It explains the physiological mechanism during heat stress in buffalo (Source: <http://www.buffalopedia.cirb.res.in>).

It is not that, buffaloes have not adapted to dry and desert-like conditions, but direct exposure to heat radiation is stressful. However, given the shade they cool off quickly as their skin has a highly vascular system for conduction and convection of heat. Particularly, exposure of buffaloes to chronic heat stress conditions evokes a series of drastic changes in biological functions that include depression in feed intake, efficiency, and utilization, disturbances in the metabolism of water, protein, energy and mineral balances, enzymatic reactions, hormonal secretions, and blood metabolites. Thus, buffaloes are affected and such changes result in impairment of growth, production, and reproduction performance. In buffaloes, increased oxidative stress drains vital resources, weakens the immune system, and predisposes vulnerability to attack by pathogenic and opportunistic microbes. Heat stress resulted from dysbiosis plays a crucial role in gut physiological disturbances that have multitude of impacts on the mood, digestion, temperament, and well-being of the individual. Thus, a settled microbiome as shown in Figure 2 is key to manage physiology of any mammal including buffalo under heat stress conditions.

Heat stress and impaired reproduction in buffaloes

Reproduction is an option in an individual when everything else is optimal, hence stress of any kind impairs this natural physiologic function. Heat stress is known to alter follicular dynamics and granulosa cell function and may contribute to the diminished reproductive efficiency commonly observed in mammals during the summer (Li et al., 2016). Starting from the selection and fusion of an ova and sperm to the making of a reproduction-capable individual so much lies in between that can be affected by any form of stress thus compromising fertility.

The impact of heat stress on ovarian function is more than that in the testes as the latter is evolved with the thermoregulatory mechanism. The mechanism involved in this ovarian function failure is not clearly understood. One mechanism may be a decrease in the production of estradiol. Granulosa cell apoptosis results from the lack of survival factors such as estradiol. Estrogens inhibit ovarian granulosa cell apop-

IVSA MIRROR VI

tosis in early antral and pre-antral follicles and estradiol inhibits the activation of endogenous endonucleases and promotes the division and growth of granulosa cells. Therefore, the increase in granulosa cell apoptosis after heat stress may be induced by a decrease in estradiol production. On the other hand, estrogen is essential for folliculogenesis beyond the antral stage of development, as studies with estrogen receptor knockout and estrogen-depleted mice have shown. Thus, the whole follicle growth, its steroids production, and the set up of receptors for luteinization gets disrupted. Heat stress also reduces the level of progesterone and causes a loss of LH surge thus changing the luteal phase and ovulation and reducing the levels of estradiol and follicular estradiol concentration, and aromatase activity, and level of LH receptor associated with delayed ovulation. Heat stress also lowers the levels of gonadotropin receptors and aromatase activity of granulosa cells and the follicular fluid concentrations of estradiol collected from follicles. Short-term exposure to heat stress caused a significant reduction in mRNA expression of cytochrome P450 17- α hydroxylase. In chronic heat stress, significant reduction in expression of mRNA of both steroidogenic enzymes is documented. Khan et al., 2020 explained the hypothalamic-pituitary-ovarian axis interaction as affected by heat stress. It needs to be understood that in females heat stress adversely impacts oogenesis, oocyte maturation, fertilization development, and implantation rate. Detection and evaluation of the deteriorating effects of heat stress on reproductive organs and cells can help to design measures to prevent them and improve reproductive functions (Takahashi, 2012). The effect on the libido of the buffalo bull is even more clear as sperm cells can only retain their viability and fertility at a high level for 24 hours or less in the female genital tract (Roberts, 1971). Heat stress rapidly decreases the fertilizing capacity by deforming them or hastening aging of spermatozoa in the female genital tract. Any injury or alterations in the spermatozoon membrane integrity, enzymatic dynamism, acrosomal cap, or leakage of vital intracellular constituents may prevent defective spermatozoa from fertilizing the egg. Figure 3 explains some key areas and steps inside the female reproductive tract during the crucial periods of establishing the fertility in buffalo that can be affected due to heat stress. Repeat breeding can originate because of factors related to the bull and semen (Perez-Marin et al., 2012). The age of the bull, its housing condition, and nutritional and health status affect the semen volume and the proportion of abnormal spermatozoa; with adult bulls producing the highest volume and lowest abnormal sperms (Khawaskar et al., 2012). Thus, heat stress affects both the bull and cow in many ways as explained in Figure 4.

In conclusion heat stress reduces the duration and intensity of estrus in buffaloes, increasing anestrus and incidence of silent ovulation. Most of it is caused by strategies adopted by the individual animal to reduce metabolism and activation, conserve valuable micronutrients, and compromised enzymatic reaction through the neuroendocrine mechanisms. Developing embryos during the short period (4–8 days) between fertilization and implantation undergo dynamic growth, cell proliferation, cell differentiation, and many changes in gene expression. Therefore, if the maternal body is exposed to heat stress during this period, it is likely that the preimplantation development is severely affected directly by heat stress itself or indirectly by the deleterious change of reproductive tracts. The stage at which embryos become susceptible to heat stress has been studied (Takahashi, 2012).

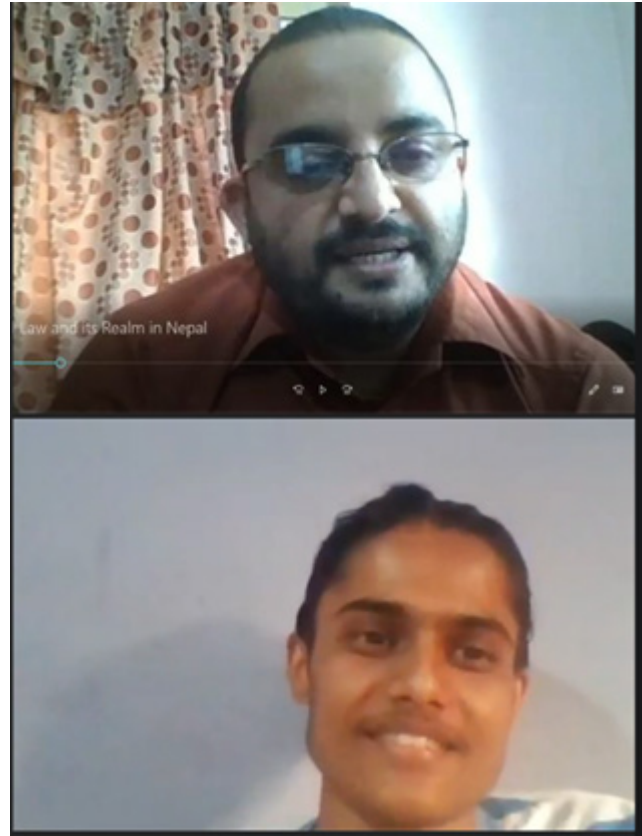
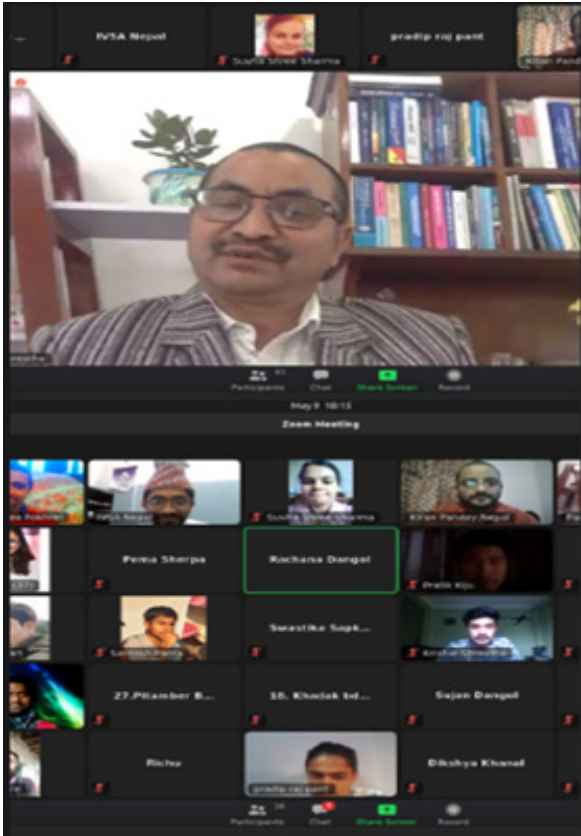
The management strategies in the promotion of indigenous breeds, selecting comfortable housing, managing palatable and nutritious ration, enriching the environment with natural and artificial temperature, humidity, radiation control mechanism, and timed assisted reproduction approaches.

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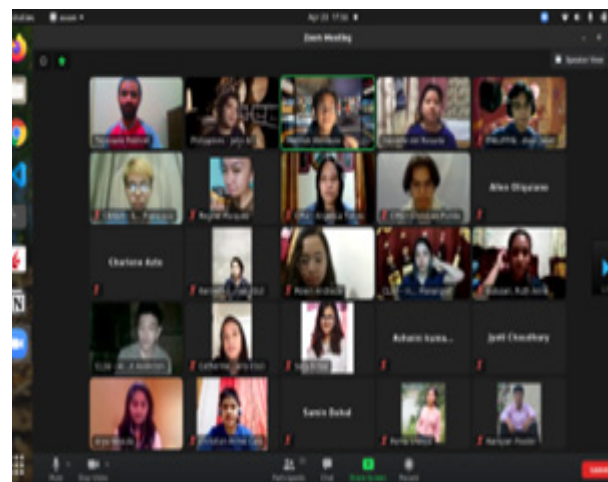
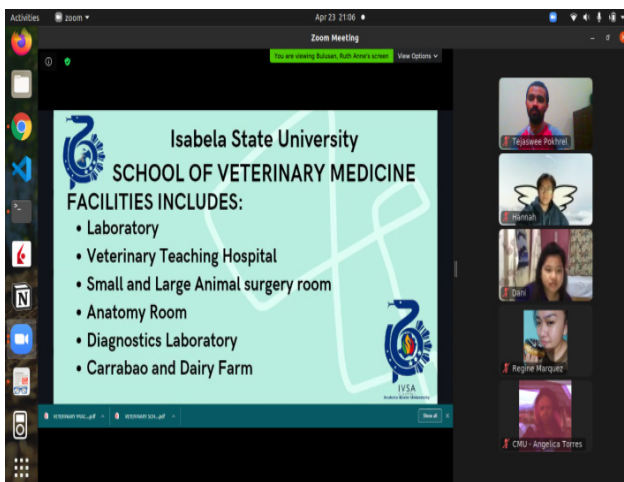
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Events and Activities IVSA Nepal

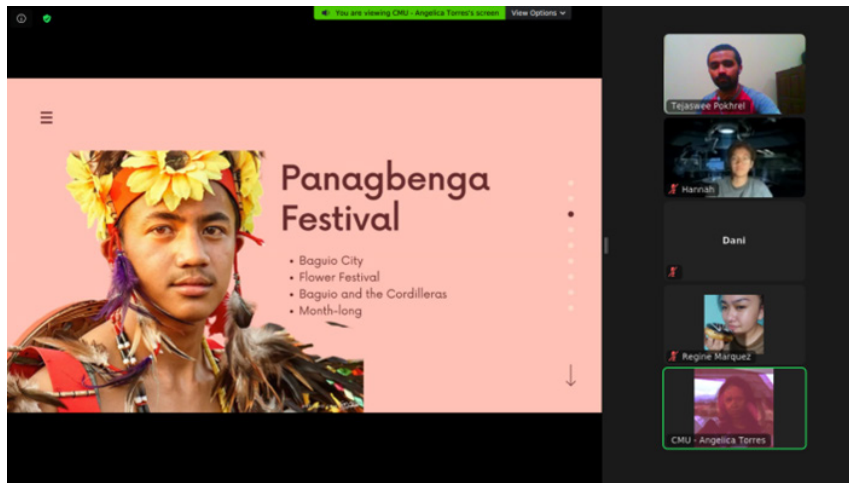
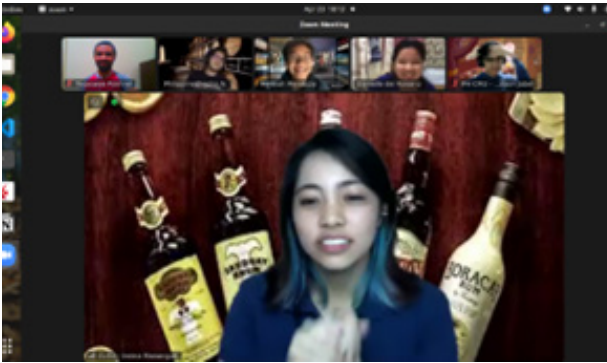


IVSA Nepal Conducted an Interactive Session on the Topic “Animal Law: Its Realm in Nepal” on the Occasion of National Law Day

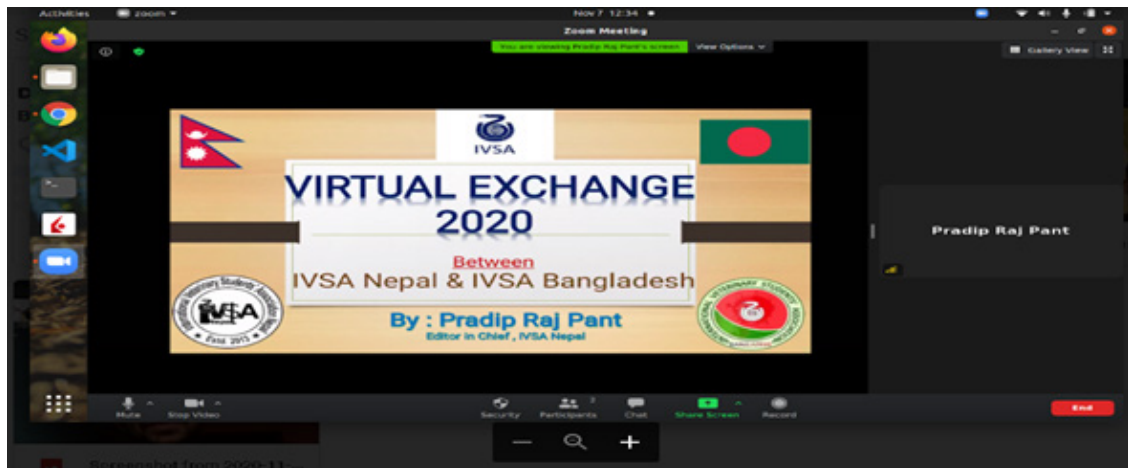
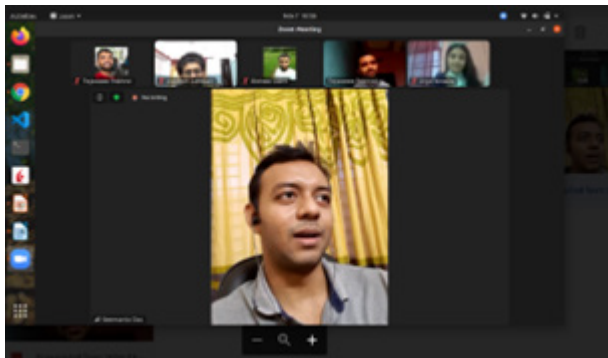


Online Exchange with IVSA Philippines

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Online Exchange with IVSA Philippines

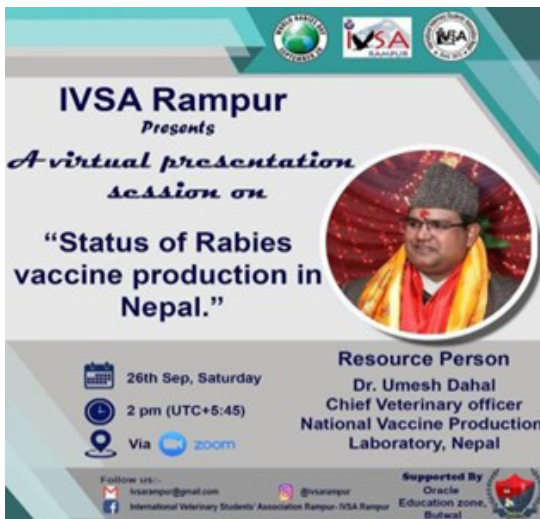


Online Exchange with IVSA Bangladesh

Events and Activities
IVSA Rampur



Radio Talk for Rabies Week 2020



Webinars for Rabies Week 2020



World Egg Day Celebration



World Food Day Celebration

IVSA MIRROR VI



On the occasion of International Snow Leopard Day 2020

IVSA Rampur Presents A Webinar On

Snow Leopard Conservation in Nepal: Status and Overview

Via  **4 pm NST (10:15 GMT)**
23rd October, Friday

Link for the program will be shared through Social media.

Resource Person
Gopal Khanal
 Assistant Conservation officer at Shey Phoksundo National Park
 M.Sc in Wildlife Biology and Conservation

Follow us:  International Veterinary Students' Association (IVSA)- Rampur
 ivsarampur@gmail.com  IVSARampur  IVSARampur



International Conference on One Health
 3rd & 4th November 2020
 Starting Time: 2:00 PM GMT

DAY 1

 Prof. Dr. Aneela Durrani Patron IVSA Pakistan	 Engr. Tehreem Awan Assistant Professor NFC Institute Of Engineering & Technology MULTAN Head of Engineering in Diagnostics 3:30 PM GMT	 Prof. Patricia Poeta Associate Professor UIAQ, Portugal Presentation: Antibiotic resistance - a One Health Perspective 2:50 PM GMT
 Mrs. Sramika Rijal Asst. Professor Agriculture and Forestry University, Nepal Presentation: One Health Trial, in The Face of Climate Change 3:30 PM GMT	 Dr. Muhammad Bilal M.Sc (Epidemiology) University of Glasgow, UK Presentation: Future Opportunities for Undergraduate Students in One Health 4:10 PM GMT	 LIVE  FV & AS, IUB, Pakistan For Registration: http://bit.ly/ICOH2020



IVSA Pakistan, Bahawalpur
 ivsa_pakistan_bahawalpur +92 312 7182177
 ivsapakistan.bahawalpur@ivsa.org

Webinar on Role of Veterinarians in Food Security and Food Safety



Celebration of Animal Welfare Week

On the auspicious occasion of World Veterinary Day 2021, IVSA Rampur Presents

Talk Show

Career in Veterinary Field Opportunities & Challenges

Dr. Ajit Kumar Karna
Senior Technical Advisor, USAID strengthening Systems for Better Health Activity

Dr. Ekata Pandey
Surgeon and Small animal Clinician
Vet for your pet small animal Pvt. Ltd. Chandol

Dr. Sharmila Kumal
Livestock Development Officer
Veterinary Hospital & Livestock Service Expert Center, Nawalparasi (Bardghat susta purba)

Dr. Rockson Karmacharya
Veterinary Diagnostic and Research Laboratory, Tripureshwor, Kathmandu

Via Zoom
8 am Nepali time (UTC+5:45)
24th April Saturday

International Veterinary Students' Association (IVSA)-Rampur
ivsarampur@gmail.com
IVSARampur

Talk Show on the Occasion of World Veterinary Day

International Veterinary Students' Association Rampur (IVSA Rampur) in collaboration with Group of Agriculture and Veterinary Students (GAVS) Presents

Panel Discussion

Importance of Chure Range in Agriculture, Livestock production & Wildlife Conservation

Saturday, June 12
5:00-6:30pm Nepali Time
Via Zoom

Panelists:

Dr. Kamal P. Gairhe
Retired Senior Veterinarian
Chitwan National Park, Chitwan

Mr. Rishi Ram Kattel
Asst. Professor
Department of Agriculture Economics and Agribusiness
AFU, Chitwan

Mr. Roshan Shrivastab
Assistant Forest Officer
Division Forest Office
Marin, Sindhuli

Panel Discussion on Importance of Chure Range

Frequency vs. Resolution

- Frequency affects the USG image QUALITY
- The HIGHER the frequency, the BETTER the resolution
- The LOWER the frequency, the LESS the resolution
- A 12 MHz transducer has very good resolution, but cannot penetrate very deep into the body
- A 3 MHz transducer can penetrate deep in the body, but the resolution is not as good as the 12 MHz

B MODE

- B stands for brightness
- B scans give two dimensional information about the cross section
- This is the mode we widely use in diagnostic procedures and for transrectal USG.

Types of USG probes in veterinary practice

+14

Webinar on Basics of Transrectal USG in Large Animal

Volume 1 | Issue 02 | April 2021

IVSA Rampur Vetzine

The Magazine of Vet Students

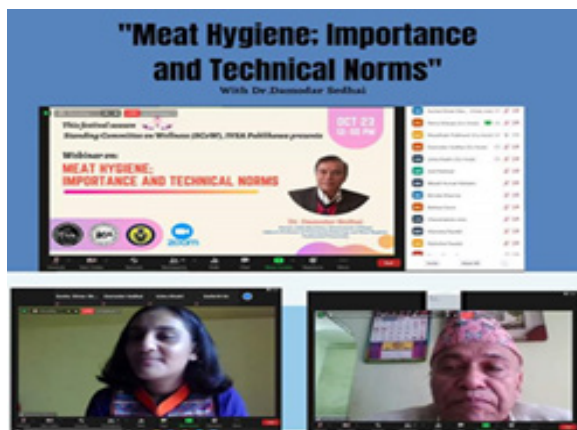
Art Gallery: Moments when creativity meets skill

MD's Ally: Bring things about our IVSA family

Standing Corner: Explore the different life of animal life in Nepal

Publication of Vetzine

Events and Activities IVSA Paklihawa



“An Approach Towards Humane And Hygienic Festival” Webinar and Online Story Telling



Webinar on "Canine Companionship: Behaviour Management and Clinical Care"



Free Animal Health Camp - 2077

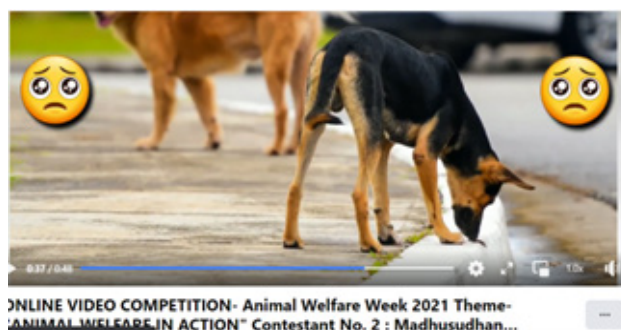


Village Animal Welfare Program on Pig Farming Training and Deworming on the Remote Areas of Nepal, Rukum

3 Days Goat Farming Training

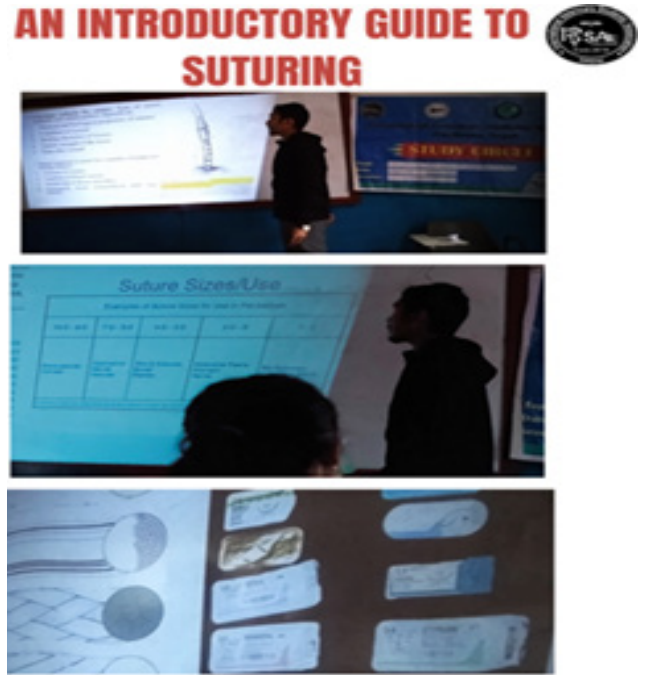
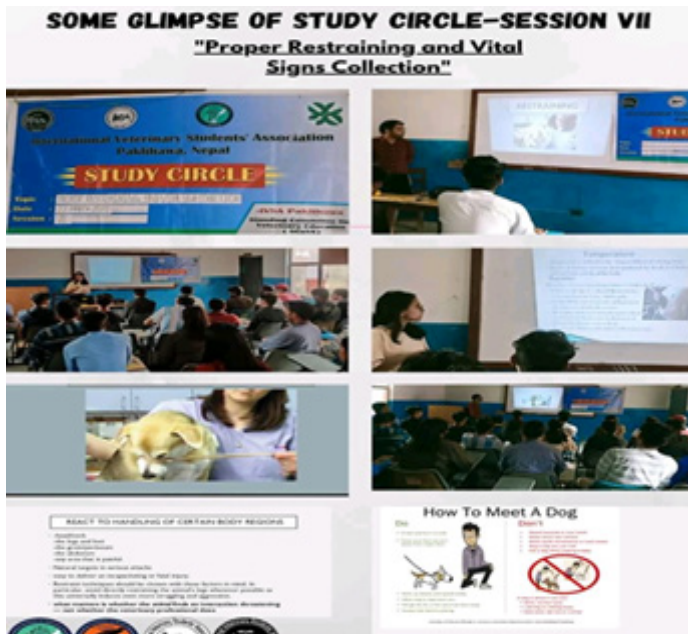


Celebration of World Rabies Day 2021



Celebration of Animal Welfare Week 2021

IVSA MIRROR VI



Study Circle Session VI, VII, VIII, IX



Week long Antimicrobial Resistance (AMR) Events themed as “United to Preserve Antimicrobials”

Events and Activities IVSA HICAST



Anti-Rabies Vaccination Program

Ivsa Hicast presents,



One Day Online Quiz Competition

Date: 23rd October

Guidelines

- ✓ Quiz will be held from 10am to 4pm on 23rd October.
- ✓ There will be total 21 questions.
- ✓ Every hour 3 questions will be posted on official Instagram account of IVSA HICAST.
- ✓ Comment will be valid till 11:59 pm of particular day.

Exciting prizes for winner!!



One Day Online Quiz Competition

SLOGAN WRITING COMPETITION

THEME: SAY NO TO ANIMAL ABUSE

WHO CAN PARTICIPATE: OPEN TO ALL LANGUAGE OF SLOGAN: ENGLISH OR NEPALI

LAST DATE TO SUBMIT: NOVEMBER 4, 2020

HOW TO SUBMIT ENTRIES?

- TEXT ON OFFICIAL FACEBOOK PAGE OF IVSA HICAST
- PLACE THE DIRECT MESSAGE ON OFFICIAL INSTAGRAM ACCOUNT OF IVSA HICAST
- SEND THE MAIL ON OFFICIAL EMAIL ADDRESS OF IVSA HICAST.

WINNER WILL BE REWARDED WITH EXCITING GIFT HAMPER. Certificate will be provided to each participant.

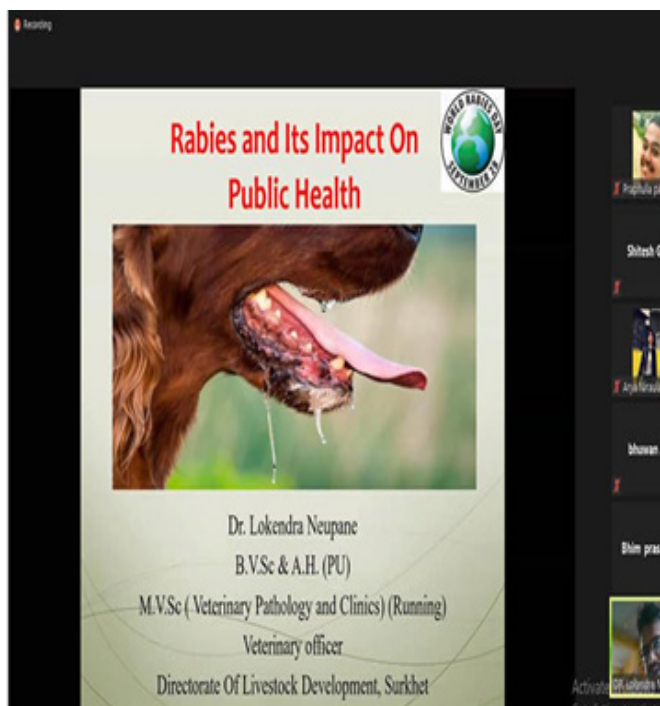


IVSA HICAST | IVSA_HICAST | Visit: ivsa.org.np

Slogan Writing Competition



Webinar on Animal Welfare ‘Speak Up for Those Who can’t Speak for Themselves’



Webinar on “Rabies and its Impact on Public Health”

Events and Activities IVSA NPI



IVSA NPI Free Animal Health Camp 2020



Glimpse of Rabies Week Programs



Care the Dogs Program:
Vaccination and Collar Installation Program



Care The Dogs Program
Vaccination and Collar Installation Program



International Veterinary Students' Association Nepal (IVSA Nepal) is a National branch of a global organization, the International Veterinary Students' Association (IVSA), established in 1953. The organization was solely established for benefiting the animals and people of the world by harnessing the potential and dedication of veterinary students to promote the international application of veterinary skills, education, and knowledge. IVSA Nepal being the National member organization of the global committee works for the same purpose and was established in 2013. During its growth, this organization worked in several dimensions regarding veterinary education, the veterinary Profession, and issues related to the health of animals and people. The organization with its devouring success efficiently established itself as a potent group of skillful and enthusiastic veterinary students. It reached the culmination of eminence for its creative and productive works. In 2016 IVSA Nepal was acknowledged as the national member organization of the IVSA Global committee with four local chapters working under the guideline of the National executive committee. This expansion led the organization to the next level increasing its areas of activism as well as its efficiency by establishing a solid nexus between the veterinary students of different institutes running the veterinary program in Nepal. Currently, this organization focuses on eclectic programs regarding Animal welfare and is involved in different work areas that comprise specific programs for promoting veterinary education in Nepal. It has regularly been an important hand in conducting different programs responsible for raising knowledge as well as awareness at both student and farmers' level.

National MO



Local Chapters

