

Volume 1 | Issue 03 | August 2021

IVSA Rampur. Vetzine

The Magazine of Vet Students



Case Book

Explore the different
cases with their photos

Art Gallery

Moments where
creativity meets skill

MO's Ally Wing

Know more about our
IVSA family

Standing Committee Corner

Explore the different aspects
of animal life in Nepal

Acknowledgements

IVSA Rampur and IVSA Rampur VetZine Editorial Board would like to express sincere gratitude to the Office of Dean (FAVF, AFU), International Veterinary Students' Association (IVSA), Standing Committee on Veterinary Education (SCOVE), International Veterinary Students' Association Nepal (IVSA Nepal) Mr. Sudip Regmi, Mr. Aashirbad Pokhrel, Mr. Dibek Karki and to all teachers, professors & other helping hands who directly or indirectly helped us throughout our movement and the publication process.

Big thanks to all !!!!!



IVSA RAMPUR

International Veterinary Students' Association (IVSA) Rampur, Agriculture and Forestry University is a local Chapter of International Veterinary Students' Association (IVSA) Nepal. It is a non-profit and completely technical organization based on the mission of IVSA Global which is to benefit 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 Rampur is formed with the motive to uplift veterinary education and animal health and assisting in maintain proper welfare of animals as well as individuals of Agriculture and Forestry University and its premises.





Mission

Basically, the purpose of instigating this magazine idea is to encompass all animal related issues by the active participation and collaboration of all enthusiastic faces all around the globe. We are not here to just collect and publish the articles, research papers but we are trying to diversify our approach towards some creative areas too. We are hoping for some creativity in our Veterinary field too.

Why not make it engrossing? Why can't we write poems, stories regarding animal issues? Not only that, we also accept photography related to vet drawings, facts, amazing and many more.

So, we have tried to work jointly to include all the vets around the globe to centralize various creative works in one short magazine.

Our main effort will always be to make the works fascinating and engrossing. Vet-Magazine just doesn't focus on our curriculum related articles but also some new experiences encountered in our field, some awareness related posts, some fun works.





Agriculture and Forestry University
Faculty of Animal Science, Veterinary Science & Fisheries
Office of the Dean
Rampur, Chitwan, Nepal

Tel.No. : 056-592131
Fax.No. : 056-526014

Message from Dean

The objective of education is "Performance" not the "Knowledge".

It is an immense pleasure to extend my heartfelt greetings to the International Veterinary Students' Association (IVSA) Rampur for the launch of Veterinary Trimonthly Magazine, "IVSA Rampur Vetazine". This is certainly an exciting online platform provided by IVSA Rampur, which encourages Veterinary Students to share their ideas, knowledge skills and motivate them to explore more.

IVSA Rampur has always been active in such innovative ideas for the betterment of Veterinary Education, and undoubtedly this is adding another stone towards its betterment. The articles here engage the readers while providing various information related to the veterinary field, which is highly commendable. The artworks and the literature provide the more melodic way of expressing knowledge and experiences.

I believe this magazine will be beneficial to all veterinary students allowing them to crave more. I express gratitude to the team of IVSA Rampur and authors for their admirable effort.

At last, I congratulate IVSA Rampur for the publication of the Magazine and my best wishes for the success and continuation of this worthy work.

Prof. Dr. Hom Bahadur Basnet

Dean

Faculty of Animal Science, Veterinary Science and Fisheries
Rampur, Chitwan, Nepal

President's Message

It is a matter of immense pleasure and pride to bring out the second issue of 'IVSA Rampur Vetzone,' an online trimonthly magazine. It was a tedious yet exciting journey to have this first publication available. I want to express my sincere gratitude to all the helping hands supporting and working responsibly throughout this journey.

IVSA Rampur, a local chapter of IVSA Nepal, is a non-profit, technical organization marching ahead with a motive to uplift Veterinary Education and Animal Health. The unfaltering journey of this organization has brought forward significant changes in the understanding regarding the veterinary profession and veterinary services among the stakeholders. This first edition of 'IVSA Rampur Vetzone' comprises Reviews, Poems, Stories, Blogs, Essays, Photos, and Arts related to Veterinary Science and Animal Husbandry.



It is sure to act as a refreshing and insightful guide for the betterment of veterinary education. Finally, I would like to express cordial gratitude to the respected teachers and seniors, colleagues, and endeared juniors without whom this magazine's materialization would have been impossible. IVSA Rampur heartily welcomes suggestions and compliments on this volume of 'IVSA Rampur Vetzone,' which will act to betterment of upcoming magazine in future.

Mr. Samin Dhahal
President
IVSA Rampur 2020/21
Advisor
IVSA Rampur Vetzone

Editor's Message

I am so elated to instigate the third tri-monthly magazine of IVSA entitled "IVSA Rampur Vetzone" on the behalf of whole IVSA family.

With an aim of encompassing several animal related milieu along with publishing up to date research papers, case-studies, and several creative & artistic works of students, IVSA Rampur has stepped forward to launch this exciting magazine.

IVSA has always been working for the betterment of students learning skills either in papers or in the field. This new step has been a great challenge for us and has also expected some switch and diversity to our outreach.

Personally speaking, as far as I am concerned, this kind of magazine is a treat for enthusiastic and emerging professionals like us. Having been not involved in the practical field that much, we could get to grab a lot of things from here, assisting and guiding us in a diversified approach. We could also show our creativity here and attempt something new along with writing our usual articles. Artistic works, photography, poems, blogs, opinions, short stories are some of the options you could choose from.

We have also introduced a MO-Allys Wingsection to include a short introductory article of respective MOs and the activities from all IVSA chapters for all around the globe. From this issue, we are also introduced a section "Case Book" with a aim to increase knowledge of veterinary studetns with photos of different cases.

It goes without saying, personal or collaborative works would be accepted. This is a challenge for us and we expect a lot of enthusiastic faces coming forward. Thank you all of you in advance for contributing to "Vetzone".



Mr. Saurabh Gelal
Editor
IVSA Rampur 2020/21
Editor-in-Chief
IVSA Rampur Vetzone

Creative team

Here we gladly present the third issue of “IVSA Rampur Vetzine”, a tri-monthly magazine of International Veterinary Student’s Association (IVSA) Rampur which is created to provide veterinary students a platform to shape and sharpen their creations. We believe every beautiful mind has skills to do any work in a creative way.

This magazine holds the whole package of deeds and gallery of IVSA Rampur. We have divided the magazine in four different sections. The very first section shows the events and activities of IVSA Rampur elapsed during the first three months of our tenure. The second has surprises with the art and creation of veterinary students. The third section travels to other MOs, which demonstrates a mutual relationship and brotherhood of IVSA Rampur and the last reflects the great works by the Standing Committee Coordinators of IVSA Rampur.

A lot of helping hands were involved spending their toil to extract the great materials. We would like to acknowledge our teachers, mentors and seniors, mates and juniors who have given every bit of effort to craft and improve the magazine.

We hope you find this first issue valuable to you and help gather some memories with IVSA Rampur. We always welcome the feedbacks, suggestions and appreciations to revitalize the magazine on its third issue.

Thank you so much!



Mr. Somnath Aryal
Secretary
IVSA Rampur 2020/21
Content Manager
IVSA Rampur Vetzine

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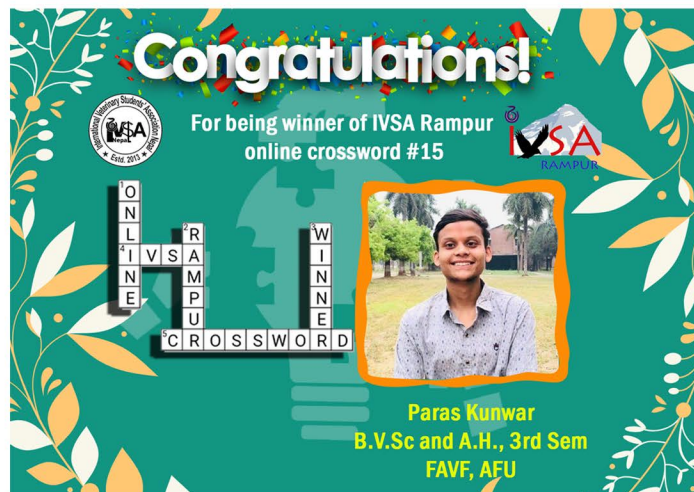
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May 4- Announcement of the Winner of IVSA Crossword Puzzle #15 and launch of IVSA Crossword Puzzle #16

Congratulations to Mr. Paras Kunwar on being drawn as a lucky winner of Online IVSA Crossword #15. All the participants are highly appreciated and encouraged for more gracious participation in the coming days.

IVSA Rampur is back with IVSA Online Crossword Puzzle to provide you a platform to participate and utilize your time efficiently.



IVSA Rampur in collaboration with SAFE Nepal Presents

Talk Show

How many rhinos can Nepal Sustain?

Saturday, May 8 (Baisakh 25)
1:00-2:30pm Nepali Time
Via Zoom

Key Speakers:



Dr. Amir Sadaula
Wildlife Veterinarian
National Trust for
Nature Conservation
(NTNC)



Dr. Bijay K. Shrestha
Senior Veterinarian
Chitwan National Park
(CNP)



Mr. Bishnu Shrestha
Chief Conservation Officer
Bardiya National Park
(BNP)



Mr. Suman Bhattarai
Assistant Professor
Institute of Forestry, TU
Pokhara, Nepal

For more information: ivsarampur@gmail.com / safenepal.iof@gmail.com

8th May- Talk show on the topic “How many Rhinos can Nepal Sustain?”

International Veterinary Students' Association Rampur (IVSA Rampur) in collaboration with Students' Association for Forest and Environment- Nepal (SAFE-Nepal) organized a short online talk show on the topic “How many Rhinos can Nepal Sustain?”, where we discussed mainly about Rhinos' behavior, ecological carrying capacity, Rhino-human interaction, present genetic status and disease status.

We would like to express our gratitude to our respected guests Dr. Amir Sadaula, Dr. Bijay Kumar Shrestha, Mr. Bishnu Shrestha, Mr. Suman Bhattarai for their valuable participation.

We would also like to thank all the participants for their presence in this event.

13th May- Webinar on “Current Ranikhet Outbreaks in Nepal & its Management”



Ranikhet was seen as recent outbreaks in different districts of Nepal since the past few months. As veterinary students, we should be aware of its recent outbreaks and its management. In line with this IVSA RAMPUR organised a webinar on "Current Ranikhet Outbreaks in Nepal and its Management"

This covered introduction, present scenario and epidemiology, symptoms, possible cause of outbreaks, treatment, vaccination, biosecurity measures, risk to human consumption, and role of different stakeholders to control it.

We are especially thankful to our resource person Dr. Nabaraj Shrestha. Our gratitude to all participants for their active participation.

17th to 23rd May- IVSA Wellness Week 2021

Physical well-being is what we see in a person but mental health always remains eclipsed. It does not mean mental well-being is not cardinal. Apart from good physical health, humans need a peaceful mind, free from stress and mental illness. To achieve this, one should surpassingly focus on self-actualization and self-awareness so as to step on the path of tranquility. Being mentally fit should not be a choice, it must be a compulsion.

IVSA Rampur celebrated 17th-23rd of May 2021 as "IVSA Rampur Wellness Week" with the theme 'Try shaping your mental well-being to shape your better future' to ensure the mental wellness of veterinary students via different interactive activities. IVSA Rampur conducted the following programs on the occasion of 'IVSA Rampur Wellness Week 2021'.

1. Detective: Ultimate Mystery Solver, a mystery every day throughout the week
2. Short message to your dear one program
3. A webinar on " Mental Health Management and self-care during COVID-19", by Bijaya Bijukachhe, Psychologist EMDR Therapist and Managing Director at Abbal Women Entrepreneur Pvt. Ltd.

(Photo: A Tribute to Frontline Health Care Professionals During the COVID-19 Pandemic)

1. Detective: Ultimate Mystery Solver



IVSA Rampur
Wellness Week



IVSA Rampur
Wellness Week



Detective: Ultimate Mystery Solver

Case 3: Find the difference

Find at least 6 differences in the following 2 pictures.



IVSA Rampur is celebrating this week (17th-23rd) as "IVSA Rampur Wellness Week" with the theme "Try shaping your mental well-being to shape your better future" to ensure the mental wellness of veterinary students via different interactive activities.

✉ ivsarampur@gmail.com



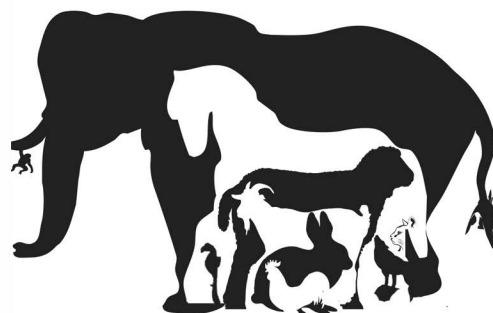
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Detective: Ultimate Mystery Solver

Case 6: How many animals can you find?



IVSA Rampur is celebrating this week (17th-23rd) as "IVSA Rampur Wellness Week" with the theme "Try shaping your mental well-being to shape your better future" to ensure the mental wellness of veterinary students via different interactive activities.

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2. Short message to your dear one program

“Express your care, Stay connected”

People we hold closest are the ones who matter the most in our life. They are our treasure, our support system. Living with them day in & day out, we assume most gestures as ‘understood’ & leave simplest things undone. Busy & self-absorbed pursuing our own goals, furthering our own needs & sorting out our own problems, we have little time (and inclination) to make them feel special. It’s not enough to believe you care for each other. You have to express it. This being the case, IVSA Rampur brought an opportunity to make people express love, care, gratitude & gratefulness to your friends/colleagues/dear ones & whoever is special in their life.



IVSA Rampur
Wellness Week



✉ ivsarampur@gmail.com



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3. Mental Health Management and Self Care during COVID-19



IVSA RAMPUR organized a webinar on "Mental Health Management and Self Care during COVID-19 with our respected guest Bijaya Bijukachhe.

It was such an interactive program, where participants shared their difficulties during this difficult time and our speaker had clarified why we should take care of our mental health as much as we do of physical health.

In the session, the major mental health problems, their management, self care techniques and mental well-being strategies were discussed.

It was a first ever attempt for advocacy of mental health among Veterinary Students in Nepal. We would like to thank our speaker, participants and all helping hands for the successful session.



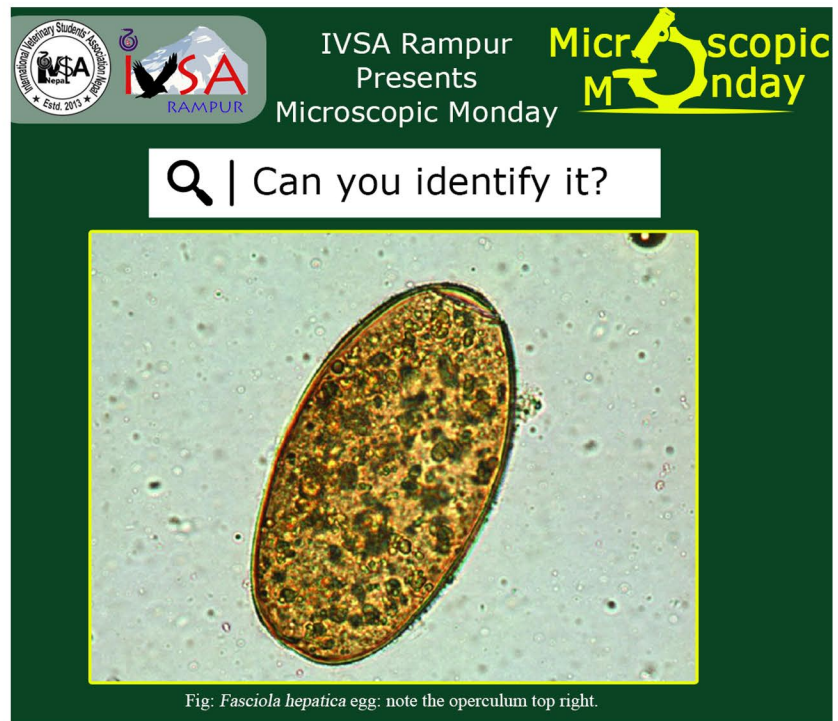
(Photo: A Tribute to Frontline Health Care Professionals During the COVID-19 Pandemic)

24th May- Microscopic Monday series started

With an aim of developing curiosity and sharing knowledge among the Veterinary Students, IVSA Rampur made an initiative to share questions or information related to microscopic organisms every Monday.

Eg. Identify the egg of the parasite given below.

Hint:- It is found in bile ducts of domestic animals.





GOOD FRIDAY SESSION XXXIV



Bubalus arnee: Present Situation, Threats and Conservation Strategies



PARTICIPATE AND LEARN



Presenter:
Mr. Padam Bohora
B.V.Sc & A.H. (3rd Sem)
FAVF, AFU

Date: 28th May 2021
Friday
Time: 4 pm
Zoom id: 228 562 0749
Passcode: Arna

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28th May- Good Friday Session Episode XXXIV

IVSA Rampur successfully conducted its "GOOD FRIDAY SESSION Episode XXXIV" via an online platform, which aims to develop the presentation skills of students and share the knowledge about various important and exciting topics.

Mr Padam Bohora, currently enrolled in B.V.Sc & A.H., 3rd Semester has presented on the topic "Bubalus arnee; Present situation, Threat and Conservation Strategies in Nepal ". We would like to thank him for creating this kind of informative program.

3rd June-Announcement of the Winner of IVSA Crossword Puzzle #16 and launch of IVSA Crossword Puzzle #17



Congratulations to Mr. Prabin Pokhrel on being drawn as a lucky winner of Online IVSA Crossword #16. All the participants are highly appreciated and encouraged for more gracious participation in the coming days. IVSA Rampur is back with IVSA Online Crossword Puzzle to provide you a platform to participate and utilize your time efficiently.

12th June- Webinar on Importance of Chure Range in Agriculture, Livestock Production, and Wildlife Conservation

International Veterinary Students' Association Rampur (IVSA Rampur) in collaboration with Group of Agriculture and Forestry Students (GAVS) conducted a panel discussion on "Importance of Chure Range in Agriculture, Livestock Production, and Wildlife Conservation." The major theme of this program was to assess the importance of Chure in Nepal and point out the necessity of its conservation.

We are thankful to our panelists Dr. Kamal P. Gairhe, Mr. Rishi Ram Kattel and Mr. Roshan Srivastav for their valuable time and information about the topic and our gratitude to all the participants and helping hands for making this program successful.



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
- Dr. Rishi Ram Kattel
Asst. Professor
Department of Agriculture Economics and Agribusiness
AFU, Chitwan
- Mr. Roshan Srivastav
Assistant Forest Officer
Division Forest Office
Marin, Sindhuli

Moderators:

- Mr. Pramod K. Chaudhary
- Miss Ashmita Bhatta

For more information: ivsarampur@gmail.com / gavs.afu@gmail.com

17th June to 28th June: Webinar series on "Day 1 Competencies for Vet Graduates"




International Veterinary Students' Association Rampur (IVSA Rampur) conducted a webinar series on "Day 1 Competencies for Vet Graduates" based on the "OIE Recommendations on the Competencies of graduating veterinarians (Day 1 graduates) to assure "National Veterinary Services of quality" by the World Organisation for Animal Health (OIE).

This webinar series was expected to be helpful for all veterinary students and especially the internship students who are going to be veterinary professionals soon.

In line with this, we organized the following webinars on different dates ;





1. Epidemiology for Day 1 Graduates- by Dr. Krishna Kumar Thakur
2. Transboundary Animals Diseases for Day 1 Graduates- by Dr. Khadak Singh Bist
3. Zoonoses for Day 1 Graduates- by Dr. Tulsi Ram Gombo
4. Emerging and Re-emerging diseases for Day 1 Graduates- by Dr. Surendra Karki


We had altogether 119 responses from in and out of the country and a remarkable number of participation throughout the program.








International Veterinary Students' Association Rampur- IVSA Rampur
Presents
A Webinar Series on
Day 1 Competencies for Vet Graduates

Phase I
4 Eps.

<p>"Epidemiology for Day 1 Graduates"</p>	<p>"Transboundary Animal Diseases (TADs) for Day 1 Graduates"</p>	<p>"Zoonoses for Day 1 Graduates"</p>	<p>"Emerging & Re-emerging Diseases for Day 1 Graduates"</p>
<p>17th June</p> <p>1</p> <p>6 pm</p>  <p>Dr. Krishna K. Thakur Assistant Professor Infectious Disease Epidemiology UPEI, Canada</p>	<p>20th June</p> <p>2</p> <p>2 pm</p>  <p>Dr. Khadak Singh Bisht Animal Disease Specialist for South Asia ECTAD, FAO</p>	<p>24th June</p> <p>3</p> <p>4 pm</p>  <p>Dr. Tulsi Ram Gombo Veterinary officer Central Veterinary Laboratory, Kathmandu, Nepal</p>	<p>28th June</p> <p>4</p> <p>4 pm</p>  <p>Dr. Surendra Karki National Technical Coordinator ECTAD, FAO</p>


Register Now

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

24th June - GOOD FRIDAY SESSION Episode XXXV



IVSA Rampur successfully conducted XXXV Episode of Good Friday session via the Zoom platform. The topic of the presentation was 'Journey From Wildlife Trade to COVID 19' presented by Ms Anamika Shrestha, a 7th-semester veterinary student from NPI.

The overall program was interactive and informative. We are grateful to Ms Anamika Shrestha and to all the participants for making this program successful.

July 1- Announcement of the Winner of IVSA Crossword Puzzle #17 and launch of IVSA Crossword Puzzle #18

IVSA Rampur congratulates Mr. Dilip Paudel for being drawn as a lucky winner of Online IVSA Crossword #17. Other participants with 100% accuracy are Sachin Bhattarai, Rashmi Thakur, Priti Gurung, Kripa Giri, Sushmita Sharma, Sachin Upadhyaya, Ashish Chaudhary, Saru Rimal, and Smriti Sharma.

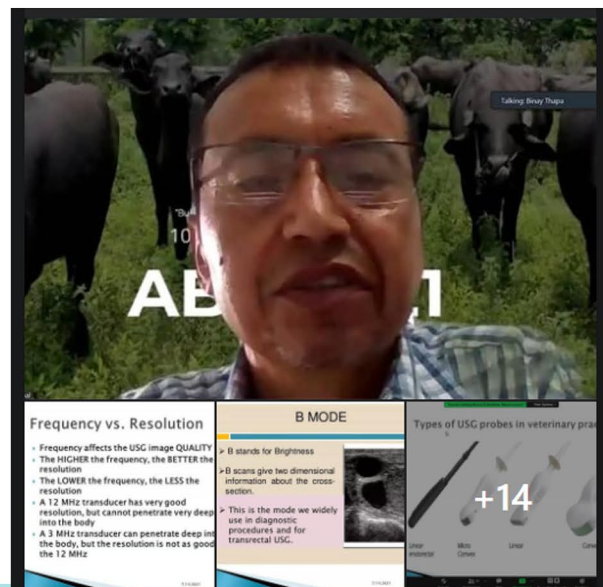
IVSA crossword puzzle 18 was also launched.



July 11- Webinar on **BASICS OF TRANSRECTAL USG IN LARGE ANIMALS**

International Veterinary Students' Association Rampur (IVSA Rampur) conducted webinar on the topic 'BASICS OF TRANSRECTAL USG IN LARGE ANIMALS' presented by Dr Bhumi N Devkota, Professor of Veterinary Theriogenology, Agriculture and Forestry University. He is one of the first Veterinarians who started using USG in large animals in Nepal.

Our gratitude to Dr. Bhumi.N Devkota sir for his wonderful presentation and knowledge he shared with us and would also like to thank all the participants and helping hands for making this program successful.






IVSA Rampur

presents

Webinar on



"Basics of Transrectal USG on Large Animals"

SPEAKER:

Dr. Bhuminand Devkota

Professor
Veterinary Theriogenology
Agriculture and Forestry University
Rampur, Chitwan



Date: 14th July 2021, Wednesday
Time: 5 PM NPT/ 11:15 AM GMT

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 International Veterinary Students' Association - Rampur (IVSA Rampur)

29th July- GOOD FRIDAY SESSION EPISODE XXXVI



**GOOD FRIDAY SESSION
XXXVI**

**A Discussion on:
Demodectic Mange in Dogs**

Date: - 30th July, Friday
Time: - 3 pm Nepali Time
(UTC +5:45)
Venue: - Zoom
ID: - 983 7296 4589
Password: - ivsarampur

Presenter
Ms. Kanchan Thapa
Intern
B.V.Sc & A.H., AFU

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

IVSA Rampur conducted its “GOOD FRIDAY SESSION” via an online platform, which is being conducted on the last Friday every month. It aims to develop the presentation skills of students and share knowledge about various important and exciting topics. Ms Kanchan Thapa, who is currently in an internship program under B.VSc and A.H, FAVF, AFU, presented this Friday on the topic "A discussion on: Demodectic Mange in Dogs". The discussion on clinical cases was done and the queries of the students were thoroughly addressed.

30th July- Webinar on BASICS OF FLUID THERAPY IN CLINICAL PRACTICE

IVSA Rampur successfully conducted a webinar on 'BASICS OF FLUID THERAPY IN CLINICAL PRACTICE' which was presented by Dr. Ranjita Bastola. It was an informative and interesting session with brief insights on the topic by the speaker. Along with this, the queries of the students were graciously addressed. The overall program was interactive and advantageous for the attendees.



**IVSA RAMPUR
PRESENTS**

**Basics of Fluid Therapy in clinical
practice**

31st July, Saturday
3:30-5pm Nepali
Time (UTC +5:45)
zoom

Resource Person
Dr. Ranjita Bastola
Veterinarian

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

Climate Change Impact on One-horned Rhinoceros

The climate of Earth is changing in an unprecedented way. The study of the Intergovernmental Panel on Climate Change (IPCC) suggests that within the time frame of 1880-2012, the global average temperature of Earth had increased by 0.85 °C. And, it is further predicted to increase the temperature by minimum 0.3°C-1.7°C under Representative Concentration Pathways (RCP) 2.6 and maximum by 2.6-4.8°C under RCP 8.5 scenario. Such change in climate has major challenges in biodiversity. Change in climate has widely affected the environment and its impact is seen worldwide, creating global signal of climate-induced range shifts and phenological responses crossing all the ecosystem and taxonomic groups.



Source: World report Zero poaching in Chitwan National Park, Nepal



Sudip Aryal
B.V.Sc & A.H., 3rd Sem
FAVF, AFU



Prabin Pokhrel
B.V.Sc & A.H., 3rd Sem
FAVF, AFU

Glancing at the data of 25 years from 1982-2006, the temperature in the Himalayas has warmed up by around 1.5 °C, which is three times more than the global average temperature. Such changes in climate have placed a threat for the large mammals of the mountainous country like Nepal.

Climate change is an emerging threat for biodiversity conservation. It has already started impacting species assemblages and ecosystem dynamics. The greater one-horned rhinoceros (*Rhinoceros unicornis*) is an iconic and globally threatened megaherbivore. Due to the unique habitat requirement of the Rhinoceros, they like to remain in the alluvial floodplains dominated by the sub-tropical climate vegetations and availability of water and grasses for year-round. However, the likely impacts

of climate change has not been adequately incorporated into conservation plans for the species and may challenge this success. Greater one-horned rhinoceros (*Rhinoceros unicornis*; hereafter referred to as rhinoceros) is a flagship wildlife species. Until the middle of the 19th century, rhinoceros existed abundantly throughout the floodplains of the Ganges, Brahmaputra and Sindhu Rivers between the Indo-Myanmar border in the east and Pakistan in the west. However, its population sharply declined due to rampant hunting and habitat loss to the point where there were fewer than 500 rhinoceros globally during the 1960s, confined to isolated patches of suitable habitats in the southern part of Nepal and northern foothills of India, including Brahmaputra floodplains. Following the both governments' successful conservation strategies, its population has been recovering, and currently, there are more than 3,500 individuals in the wild. But whether or not this recovery can be sustained given projected climate change impact remains uncertain. Currently, *Rhinoceros unicornis* is limited in the small pocket area of South Asia region, especially in lowland national parks of Nepal and India. Rhinoceros unicorns are mostly

found in the lowlands of Nepal particularly in the three protected areas; Chitwan National Park (CNPLimited information exists on how the changing climate is going to impact wildlife and the exact mechanisms of climate change impacts on them, and studies conducted so far have not documented the likely impacts of climate change to rhinoceros. However, a species conservation action plan for rhinoceros in Nepal (DNPWC 2017) has acknowledged that climate change is one of the emerging threats for rhinoceros and has identified this as a knowledge gap (DNPWC 2017). Thus, assessing the vulnerability of rhinoceros to climate change is an important priority.), Bardia National Park (BNP), Parsa National Park and Shuklapantha National Park.

Table 1. Distribution of greater one-horned rhinoceros (*Rhinoceros unicornis*) in protected areas of Nepal (DNPWC 2017).

Protected area	Core area(km ²)	Buffer Zone(km ²)	No.of Rhinos (2015)	Remarks
Chitwan national park	952	729	605	The only source population of rhinoceros in Nepal.
Parsa National Park	627	285	3	Very small population migrating from adjoining CNP.
Bardiya National Park	968	507	29	91 (43 males, 48 females) rhinoceros translocated from CNP between 1986 and 2017. But most of the rhinoceros in Babai floodplain were lost due to poaching during Maoist insurgency.
Shuklaphanta National Park	305	243	8	Nine (Two males and seven females) rhinoceros translocated from CNP in 2000 and 2017.
Total	2852	1764	645	

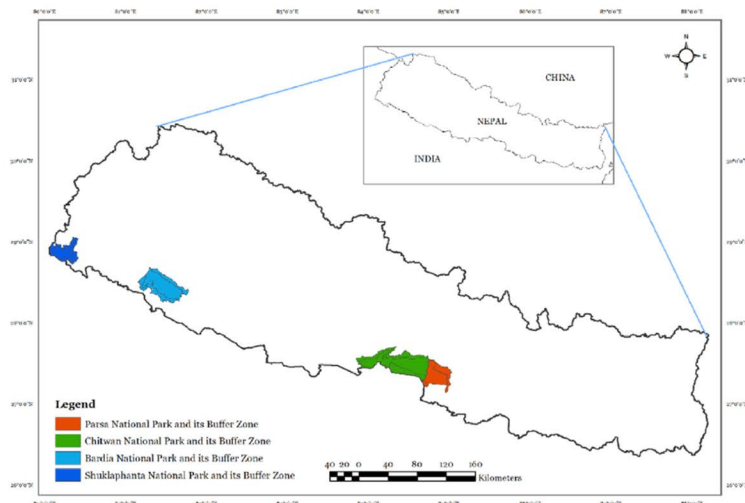


Table 2. Climate change vulnerability indicators for greater one-horned rhinoceros in Nepal and the explanation for their inclusion.

Sensitivity

SN	Indicator	Rationale
1	Habitat component-Food	The changing climate is likely to impact the abundance of food resources that will be available for the species.
2	Habitat component-Water	The spatial and temporal availability of water could be affected due to climate change.
3	Special habitat requirements	Rhinoceros requires mud pools for wallowing to maintain its body temperature and the availability of the wallowing sites could be limited due to the effects of climate change.
4	Distribution Range	Species with restricted distributions are more likely to be vulnerable to climate change.
5	Population Size	Species that can quickly recover from low population numbers may be less vulnerable to climate change.
6	Niche Breadth	Species with a narrow physiological niche are likely to be more vulnerable to climate change.
7	Susceptibility to disease	The increased spread of wildlife diseases is a likely impact of climate change.
8	Invasive Species	The spread of invasive species is likely to increase due to climate change.

Exposure

SN	Indicator	Rationale
9	Change in temperature	The degree of observed and projected changes in temperature could affect the species and its habitat.
10	Change in Precipitation	The degree of observed and projected changes in precipitation pattern could affect the species and its habitat.
11	Floods	Frequent and severe floods will cause habitat destruction and loss or decline in the species population.
12	Droughts	Prolonged and frequent drought can increase the likelihood of local extinction.
13	Forest Fire	Increased fire frequency could have adverse effects on the species and its habitat.

Adaptive Capacity

SN	Indicator	Rationale
14	Dispersal ability	Species with high dispersal ability are less vulnerable to climate change.
15	Dispersal opportunity	Species distributed in an area with limited dispersal opportunity are more vulnerable to climate change.
16	Genetic Diversity	Species distributed in an area with limited dispersal opportunity are more vulnerable to climate change.
17	Feeding habitat	Generalist species are likely to be less sensitive to climate change than specialists.

Other stressors

SN	Indicator	Rationale
18	Poaching	Poaching is likely to exacerbate vulnerability to climate change.
19	Human-wildlife interaction	The conflict between human and wildlife can worsen if wildlife enters human settlements in search of suitable habitat.
20	Pollution(Water,Waste)	Pollution of water sources in and around rhinoceros habitat can intensify climate change vulnerability.
21	Interspecific interaction	Climate change is likely to intensify interspecific interactions among wildlife species due to limited resources.

Conclusion

The rhinoceros populations in Nepal are likely to be moderately vulnerable to the impacts of climate change. Climate change may not directly impact the physiology of the rhinoceros. However, it is likely to impact them indirectly through extreme events such as floods and droughts, limited availability of resources due to the prevalence of invasive plant species, and continued pressures from existing stressors such as poaching, human-wildlife conflict and pollution. Likewise, it is necessary to identify and create suitable corridors for rhinoceros and remove anthropogenic barriers to facilitate dispersal to higher and safe grounds during flood events. So it is necessary to continue the ongoing best practices such as implementation of zero poaching, pollution control and park-people partnership strategies given that such non-climatic stressors are likely to exacerbate the climate change vulnerability of rhinoceros in future.

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Salmonellosis in Poultry

Salmonellosis is an infectious bacterial disease of both animals and humans characterized by diarrhea and systemic infection. The genus *Salmonella* consists of two species, *S. enterica* and *S. bongori* (Grimont & Weill, 2007), are the etiological agents for the disease. *Salmonella enterica* is a Gram-negative, aerobic or facultative anaerobic, motile and non-sporulating bacillus in the family Enterobacteriaceae. Currently more than 2600 serovars of *Salmonella* are recognized (Issenhuth-Jeanjean et al., 2014) including Enteritidis, Typhimurium, Gallinarum, Pullorum, etc. The *Salmonella enterica* has six subspecies, which consist the most common serovars that cause infection in humans and animals, i.e. Enteritidis and Typhimurium. Animals may become symptomatic or asymptomatic carriers in clinical or subclinical cases, respectively, resulting in the continuous shedding of bacteria within feces in the environment. Consumption of contaminated animal food products like eggs and their products, meat, milk, cheese and contaminated fresh fruits and vegetables, may cause the salmonellosis in humans which is considered one of the major economically important food borne zoonoses. The Centers for Disease Control and



Binay Thapa
B.V.Sc & A.H., 5th Sem
FAVF, AFU

Prevention (CDC, 2013) estimated that salmonellosis causes more than 1.2 million illnesses each year in the US alone. The epidemiological status of disease has shown the worldwide risk and the non-typhoidal *Salmonella* becomes the most prevalent in the intensive farming practices of pig and poultry (Barrow & Methner, 2013). The disease may get transmitted by consuming infected carcasses, contact with contaminating fomites and sewage, faecal-oral route and vertical transmission in commercial poultry. Veterinarians, laboratory, abattoirs workers and animal attendants may also get the disease by the direct contact with infected animals.

Poultry chickens of age less than one week are the most susceptible to the infection which exhibit clinical signs like anorexia, adipsia, depression, ruffled feathers, huddling together, dehydration, white diarrhea, pasted vents, joint swelling, conjunctivitis and death, but even in young poultry, subclinical infection is mostly prevalent (OIE, 2018b). The gross lesions found in

infected birds may be hepatomegaly, perihepatitis, splenomegaly, nephritis, multifocal necrosis on liver, spleen, intestine, proventriculus, crop or oesophagus, epicarditis, pericarditis and muscle necrosis, and differential diagnoses in poultry birds could be trichomoniasis, avian influenza, *Escherichia coli*, *Yersinia* spp., *Pasteurella* spp., coccidiosis, giardiasis and some toxins including lead and zinc (OIE, 2020). Thus, diagnosis is based on the isolation of the organism in a culture medium followed by biochemical tests, and serological tests including serum agglutination test and ELISA. Identification of the agent and the serological tests for *Salmonella* as etiology in various species of animals is described more comprehensively in the chapter 3.9.8 on Salmonellosis of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2018.

Some serovars of *Salmonella* that are host specific to avian species pose minimum zoonotic risks (Shivaprasad, 2000); *Salmonella Gallinarum* cause fowl typhoid and *S. Pullorum* cause the pullorum disease or bacillary white diarrhea that are greatly distributed throughout the world in poultry (Barrow & Neto, 2011). *Salmonella Gallinarum* reported in the European countries in the early 21st century (Ivanics et al., 2008),

Whereas *S. Pullorum* remains as the reservoir in wild and game birds (Shivaprasad et al., 2013). The clinical signs of fowl typhoid are septicemia, reduced hatchability of infected eggs due to trans-ovarian infection, older birds may show anaemia, depression, laboured breathing and diarrhea, pasted vent and increased mortality, but in pullorum disease, younger birds of 2-3 weeks are more susceptible whereas older breeding and laying birds only suffer from reduction in egg production, fertility and hatchability (Shivaprasad, 2000; OIE, 2018a). Post-mortem gross lesions in newly hatched chicks infected with pullorum disease show peritonitis, generalized congestion of tissue and unabsorbed yolk sac. Small white spot lesions are present in the liver and spleen of infected birds which is not present in *Gallinarum* infection. In fowl typhoid, septicemia, hepatomegaly with dark and febrile appearance of liver and dark brown bone marrow can be noticed.

These both diseases of poultry can be differentiated by the clinical signs and gross and microscopic lesions, however the laboratory diagnosis of these diseases is highly recommended. *Salmonella Gallinarum* and *S. Pullorum* can be distinguished in biochemical tests and serological test provided by Shivaprasad (2000). Live attenuated and killed

(inactivated) vaccines are commercially available against fowl typhoid for chickens; killed vaccines contain oil or alhydrogel adjuvants to improve their efficacy. Identification of the agent and the serological tests for fowl typhoid and pullorum diseases caused by *Salmonella* serovars and requirements for vaccines are described more comprehensively in the chapter 3.3.11 on Fowl Typhoid and Pullorum Disease of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals 2018.

Salmonellosis in poultry may become subclinical and these animals contribute as reservoir for the disease dissemination in the flock, whereas in humans, food animal infection lead to the contamination of meat and eggs which eventually enter the food chain thus become human food borne infection (OIE, 2019b). *Salmonella* prevention and control measures are well depicted in chapter 6.6 on Prevention, Detection and Control of *Salmonella* in Poultry of the OIE Terrestrial Animal Health Code 2019 by adopting good husbandry practices and hazard analysis critical control point (HACCP) system. An ounce of prevention is worth a pound of cure, thus in poultry production, biosecurity and prevention is the most effective and economical method to control the spread of infectious pathogens and containment of any infection,

especially in intensive farming practices (OIE, 2019a). Biosecurity procedures in the poultry farms and hatcheries for live meat birds, layers and breeders are given in the chapter 6.5 on Biosecurity Procedures in Poultry Production of the OIE Terrestrial Animal Health Code 2019 with the goal of preventing introduction and diffusion of infectious agents in the poultry production chain.

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One Health and its role in fighting of infectious disease

Human health and animal health are interdependent and bound to the health of ecosystem in which they exist. Human population is rapidly growing and expanding into new geographic areas due to which people are living in close contact with animals (wild and domestic). As the human population continue to grow and our relationships with animal continue to grow and our relationship with animal continues to evolve, understanding the interdependencies of people, animals and the environment becomes even more critical to our collective health and safety. As our relationships with animal continue to evolve it provides sufficient opportunity in passing disease between animals and people. These changes have led to spread of endemic (known) as well as emerging (new) Zoonotic diseases, which are disease that can spread between animals and people. Thus, in order to tackle with this kind of infectious disease the concept of one health was introduced. The term “ One Health “ could be defined as the interdisciplinary approaches and actions involving strong cooperation primarily between physician and veterinarian so that health of people and animals could be ensured including safety of environment . Communication, coordination and collaboration among



human, animal, environment and other relevant partners are regarded as foundation of One Health. The concept of One Health is increasingly growing in today's context and has become more important to fight against emerging and re-emerging infectious disease. Despite of its huge importance and role in fighting of infectious disease, there remain several problems at implementation level of One Health. The major bottleneck in implementation of One Health approach are poor organizational structure , poor coordination between various agencies , insufficient technical expertise , poor communication and data sharing between concerned agencies. For the proper implementation of One Health approach this gap should be filled. If we can effectively work on One Health approach we can tackle health issues at human-animal-environment interface, including zoonotic disease with an ease. Moreover, One Health has also become significant in key issues such as food safety , the control of zoonosis and struggle against antibiotic resistance .



One Health is the collaborative and integrative effort of multiple disciplines which play vital role to attain optimal health for people, animal and environment. Veterinarians have major role to perform in order to implement one Health approach at ground level. Using their expertise, veterinarians play critical role in health of animals, humans and even environment. Also, Veterinary medicine operates at the interface of these three components of One Health. Apart from this, Veterinarians can also work in food safety and Anti –microbial resistance (AMR) issues along with disease surveillance at ground level in animals. Not only veterinarians, Veterinary students (emerging vets)

should also be provided with proper education on One Health approach so that they could understand delicate relationship between animals, humans and environment and then extend their knowledge to ordinary people.

One Health also holds key role in fighting of infectious disease. Infectious disease is also regarded as one of the biggest issues in modern world which are caused by various pathogenic microorganisms to another, from animals to humans and also through various environmental contaminations. Hepatitis, Malaria, Ebola, Tuberculosis etc are considered as some of widely spread infectious disease. There is no any dividing line between human, animal and environment rather they are closely connected with each other. These close interrelations have provide opportunity in spreading diseases from animal to human (zoonosis) or human to animal (Reverse-zoonosis) . The WHO estimates that 61% of all human disease is zoonotic in origin while 75% of emerging (new) disease discovered in last decade is also of zoonotic origin. Therefore it has already been an alarming sign worldwide and there are no other options than mutual sharing in both human and veterinary medicine keeping environmental aspect in mind. In order to prevent infectious disease from spreading there should be

collaborative approach in which veterinarians, physicians and environmentalist will work together to prevent infectious disease from spreading. If we work on One Health approach (multidisciplinary collaboration), we definitely believe that it will be helpful in controlling deadly infectious disease outbreak.

NOTHING FOLLOWS!!!

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- 1) One Health Initiative Task Force: Final report July 15, 2008
- 2) Centre for disease control and prevention (CDC); Journal



Broiler Feed

The Bureau of Indian Standards recognizes only two phases in the broilers from day old to marketable age of 8 weeks that is broiler starter phase (0-5 weeks) and broiler finisher phase (5-8 weeks). So that broiler feed are divided as

1. Broiler starter feed
2. Broiler finisher feed

Requirements of poultry feed:-

S.N.	Characteristics	Broiler starter	Broiler finisher
1.	Moisture percent by mass, Max.	11	11
2.	Crude Protein percent by mass, Min.	23	20
3.	Crude Fiber percent by mass, Max.	6	6
4.	Acid insoluble ash, percent by mass, Max.	3	3
5.	Salt percent by mass, Max.	0.6	0.6
6.	Calcium percent by mass, Min.	1.2	1.2
7.	Metabolizable Energy (Kcal/kg), Min.	2900	3000
8.	Available phosphorus percent by mass, Min.	0.5	0.5

Source: ISI 1974- 1977 (Third Revision)

Inter Relation between nutrients in poultry ration:-

S.N.	Nutrients	Broiler Starter	Broiler Finisher
1.	Calorie : Protein	139 : 1	160 : 1
2.	Calcium : Phosphorus	1.4 : 1	1.4 : 1
3.	Vitamin D3 (ICU/Kg)	200	200
4.	Arginine : lysine	1.12 : 1	1.09 : 1
5.	Methionine : cysteine	1.15 : 1	1.14 : 1
6.	Phenylalanine : tyrosine	1.14 : 1	1.16 : 1
7.	Tryptophan %	0.2	0.2
8.	Niacin (mg/kg)	27	27

Source: ISI 1974- 1977 (Third Revision)

Inclusion rate of common feed ingredients in poultry feed:-

S.N.	Feed Ingredients	Inclusion % in Starter	Inclusion % in Finisher
1.	Maize	60	60
2.	Rice Bran	10	20
3.	Wheat	50	50
4.	DORB	20	20
5.	Sunflower cake	15	20
6.	Soybean Meal	40	40
7.	Fish Meal	15	10
8.	Meat meal	5	10

Source: The Bureau of Indian Standards

The major feed ingredients of poultry feed are detailed below:-



Kabit Timilsina
B.V.Sc & A.H., 5th Sem
FAVF, AFU



Somnath Aryal
B.V.Sc & A.H., 5th Sem
FAVF, AFU

Maize

Maize is the principal energy source used in poultry diets in most of the countries because of its high-energy value, palatability, presence of pigments and essential fatty acids. It contains highest amount of energy (ME 3350 kcal/kg) among cereal grains. It has 8-13% of crude protein. It has high TDN of 85-90%. Maize has low fibre content and is highly palatable. Extremely low in calcium and deficient in vitamin B12 but fair in phosphorus content. Yellow maize provides carotene and xanthophylls pigments for colouration of egg yolk, poultry fat and skin when it is used at 30% and above in the diet. Maize is an excellent source of linoleic acid which contributes for egg size, and maize protein is mainly deficient in tryptophan and lysine. Damaged, immature and

improperly stored maize having higher moisture content is prone to aspergillus flavus infestation and produces aflatoxin. Supplementation of toxin binders in diet containing damaged maize grain is essential to minimize the risk of mycotoxins problem. Organic acids should be added to the maize while storing, if the moisture content in the grain is higher than 16%.

When the maize is used at >30% in pellet diet, supplementation of pellet binders, molasses, rice bran or oil is required for better quality of pellet. Maize can be included upto 70% in poultry ration.

Wheat

Wheat is rich in protein and calcium and but low in fat and energy compared to maize. Wheat is a good source next to maize and sorghum (ME 3100 kcal/kg). Its protein content is highly variable (11-14%). Wheat protein is deficient in methionine and threonine. Wheat contains indigestible non-starch polysaccharides (arabinoxylans) that reduces the performance of poultry. The enzyme, xylanase, may be used when wheat is incorporated in feed at high level. It can be included upto 20% in chick ration and upto 30% in grower and layer rations.

Rice/ Rice broken

The ME content of broken rice ranges from 2400- 3250 kcal/kg. Rice is low in protein (7-8%). Rice which is unsuitable for human consumption can be used for poultry at low level. Rice broken is a byproduct of milling. Its quality is much variable and good quality rice broken can be used in poultry feeds. Replacement of maize with rice broken may increase fat deposition in abdominal area. It can be included upto 10% in chick ration and upto 20% in grower rations.

Soya bean meal

Soya bean meal contains 47-49% protein and is an excellent source of lysine, tryptophan and threonine but it is deficient in methionine. The common adulterant includes castor husk and Mahua oil cake. Like other oil seeds, raw soybeans have number of toxic and inhibitory substances. Soyabean meal contains a number of toxic stimulatory and inhibitory substances including Allergenic, Goiterogenic and anticoagulant factors. Trypsin inhibitor, which reduces the value of protein. Heating or toasting may inactivate the trypsin inhibitor.

These toxic, inhibitory substances and other factors in soya bean like saponins can be inactivated by proper heat treatment during processing. It can be included up to 35% in chick ration and upto 25% in grower ration.

Groundnut oil cake / pea nut meal

Groundnut oilcake has about 40-47% protein which is very rich in arginine and deficient in cystein, tryptophan, methionine and lysine, but good source of Vitamin B12 and calcium. Groundnut oil meal refers to solvent extracted residue and two grades (Grade I & grade II) are available in the market. Groundnut oilcake refers to expeller pressed and two varieties (Grade I & grade II) are available in the market. The common adulterant includes castor husk and Mahua oil cake. Addition of toxin binders and liver tonics is essential in diets containing higher levels of groundnut oil cake. Proper processing of the nuts is essential to deactivate the protease inhibitors present in the nuts. Groundnut cake can be used upto 35% in chick rations and upto 25% in the grower ration.

Fish Meal

It is the major animal protein source of poultry feed. It is a standard ingredient of poultry feed. The inclusion rate is about 5-15% in poultry ration. The protein content is about 40-60%. It contains about 20% of minerals among which Ca 8% & P 4%. It contains the energy about 1300 Kcal ME/ Kg.

Recommended Ration for broilers (per quintal of feed):

Composition	Unit	Broiler Starter	Broiler Finisher
Yellow Maize	kg	45	48
Rice Polish	kg	10.7	17.7
Groundnut Cake	kg	30	22
Fish Meal	kg	11	9
Methionine	gm	40	-
Mineral Mixture	kg	2	2
Vitamin A+B+D3+K	gm	30	30
Vitamin B12	gm	20	20
Potassium Iodide	mg	20	20
Manganese Sulphate	gm	10	8
Zinc Carbonate	gm	10	8
Antibiotic feed supplement	gm	50	50
Zinc Bacitracin	gm	100	100
Coccidiostat	gm	50	50

Source: Department of Agriculture & cooperation, Ministry of Agriculture, Government of India, New Delhi



Ms.Saru Rimal, B.V.Sc. & A.H., 8th sem,
NPI, Bharatput, PU





Ms. Priti Gurung, B.V.Sc. & A.H., 5th sem,
FAVF, AFU, Rampur



IVSA Wrocław, Poland

IVSA Wrocław has been running since 2008 at the Wrocław University of Environmental and Life Sciences (UPWr). It is a form of activity of students expanding their interest in the scientific-didactic and research program of the Faculty of Veterinary Medicine at the University of Life Sciences in Wrocław.



Thanks to this, the activity in IVSA Wrocław enables establishing a network of international contacts in veterinary medicine, as well as getting to know other cultures. Before the pandemic started, there were regular weekly student exchanges between the members of the Wrocław branch and students from, for example, Turkey, Greece, or Macedonia. These contacts have now been moved to the virtual zone, which also creates many great opportunities.



Exchange with IVSA Trinidad & Tobago

We organize weekly lectures as well as annual conferences. The oldest events are the following conferences: the Spring Student Conference "Practitioner's eye" devoted to the medicine of small animals, and the autumn Student Conference "Practitioners for Students", which focuses on farm animals. In recent years, the Ethical-Behaviorist Conference and the Student Conference "Healthy as a Horse? - Clinical Cases in Hypiatrics" have also started.



A large number of members and the committed management board make it possible to devote time to other aspects of veterinary studies as well. IVSA Wrocław is actively involved in the subject of animal welfare, producing educational content and creating a space for student discussion.

Much attention is also paid to the subject of mental health in the environment of students and veterinarians - thanks to the openness to conversation and activities aimed at increasing awareness about the available support, the Association wants to be a safe space for all students.



Gumboro

By Dr. Samiksha Adhikari

Gumboro disease also known as "infectious bursitis" & "infectious bursal disease (IBD)" is an acute, highly contagious infection of young chickens, caused by a birnavirus.



Fig: PM of chicken affected with IBD; Bursa of fabricus cut open and shows inflammation (1); Hemorrhage seen on the surface of kidney (2).

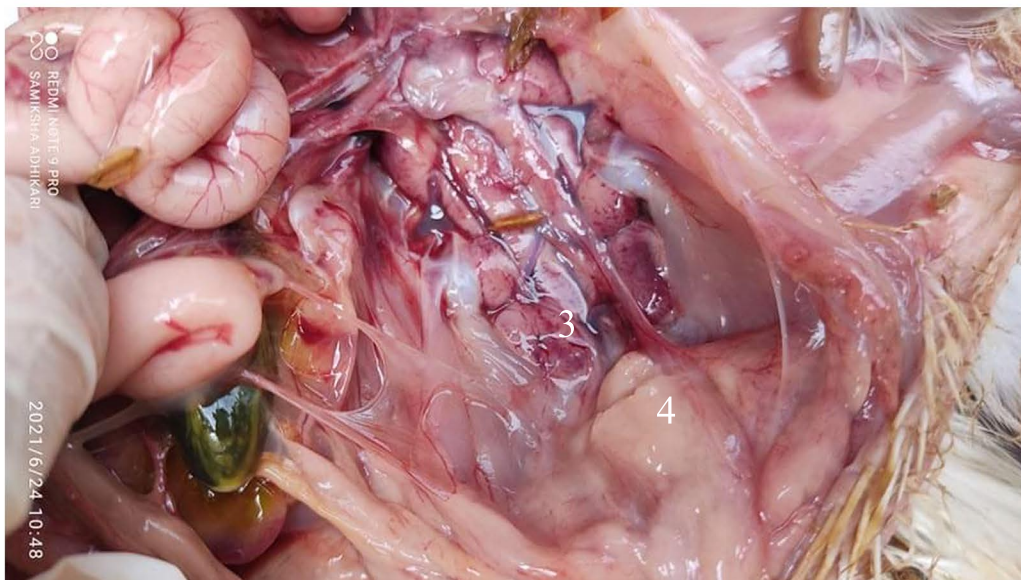


Fig: PM of chicken affected with IBD; Hemorrhage seen on the surface of kidney (3); Bursa of fabricus is enlarged, inflamed, oedematous and cream coloured (4).

Crop Mycosis

By Dr. Samiksha Adhikari

Crop mycosis also known as Thrush, Candidiasis, moniliasis, oidiomycosis, sour crop, and mycosis of the digestive tract. Oral, oesophageal or crop candidiasis occurs quite common, but only rarely causes clinical signs.



Fig: Lumen of crop (1); Pseudomembrane or diphtheritic membrane formation grossly as white cheesy material in the crop (2).



Fig: Multifocal white cheesy material on the crop (3).

Newcastle Disease

By Dr. Shiva Prasad Bhusal

Technical and sales executive Dolphin Group Nepal

Newcastle Disease which is also known as "avian pneumo-encephalitis" and "Ranikhet disease", Newcastle disease is an acute, rapidly spreading disease of domestic poultry and other birds, caused by paramyxovirus type 1 (PMV - 1).

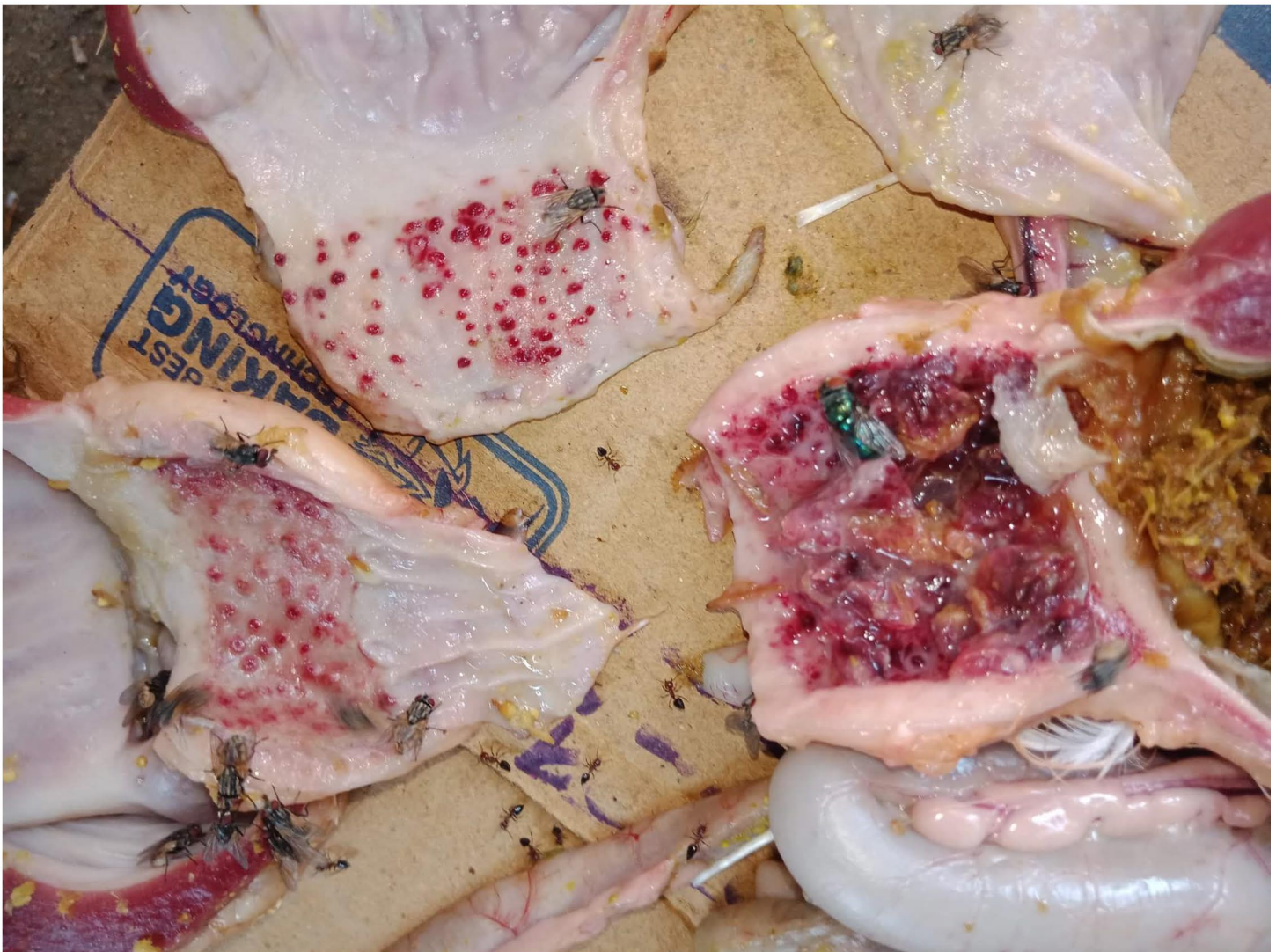


Fig: Typical lesion of Nd where pin point hemorrhage can be observed at the tip of proventricular gland

Bovine Mastitis

Bovine mastitis is an inflammatory response of the udder tissue in the mammary gland caused due to physical trauma or microorganism infections. It is considered the most common disease leading to economic loss in dairy industries due to reduced yield and poor milk quality.



Fig: Mastitis seen in the buffalo characterized by swelling of the udder.

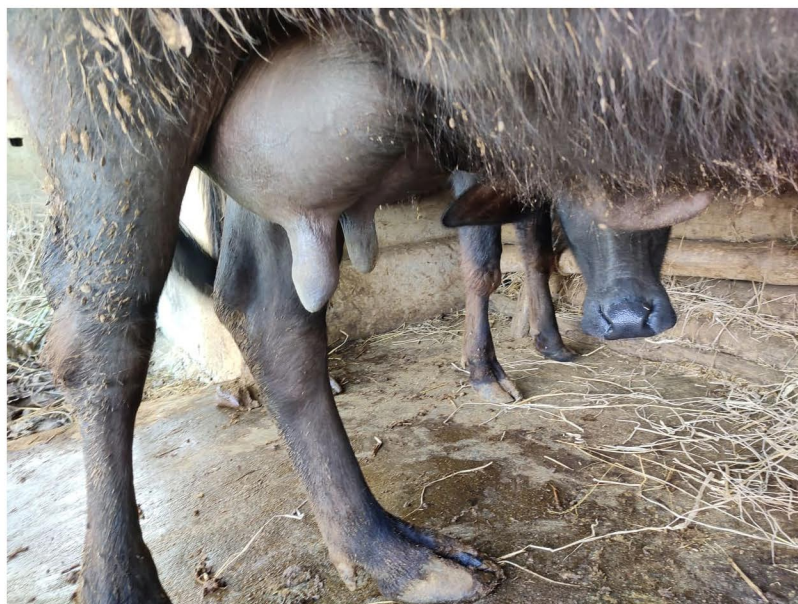


Fig: Swelling of udder & sign of inflammation in udder, a clear sign of mastitis

Canine Ehrlichiosis

Canine Ehrlichiosis also known as Canine Rickettsiosis which is caused by Ehrlichia canis. The disease is transmitted by the tick Rhipicephalus sanguineus. In Asia, the disease has been called, "canine tropical pancytopenia". Most infections in dogs are subclinical



Fig: The dog has fever, serous nasal discharge, vomiting, weight loss, anaemia, and dehydration. The fluid therapy was given in order to preserve its hydration state.

Dystocia in Sheep

Dystocia is defined as the difficulty during parturition. Different nutritional & non-nutritional factors affect the dystocia in sheep. Dystocia is commonly associated with fetopelvic disproportion, uterine inertia, failure of cervix to fully dilate, malpresentation and disease or congenital defects in lambs.



Fig: Ewe observed in the dystocia.



Fig: fetal death during birth due to the dystocia in sheep

Pyometra

Pyometra is a hormonally mediated diestral disorder characterized by cystic endometrial hyperplasia with secondary bacterial infection. Pyometra is primarily in older bitches (>5 yr old), 4-6 week after estrus.

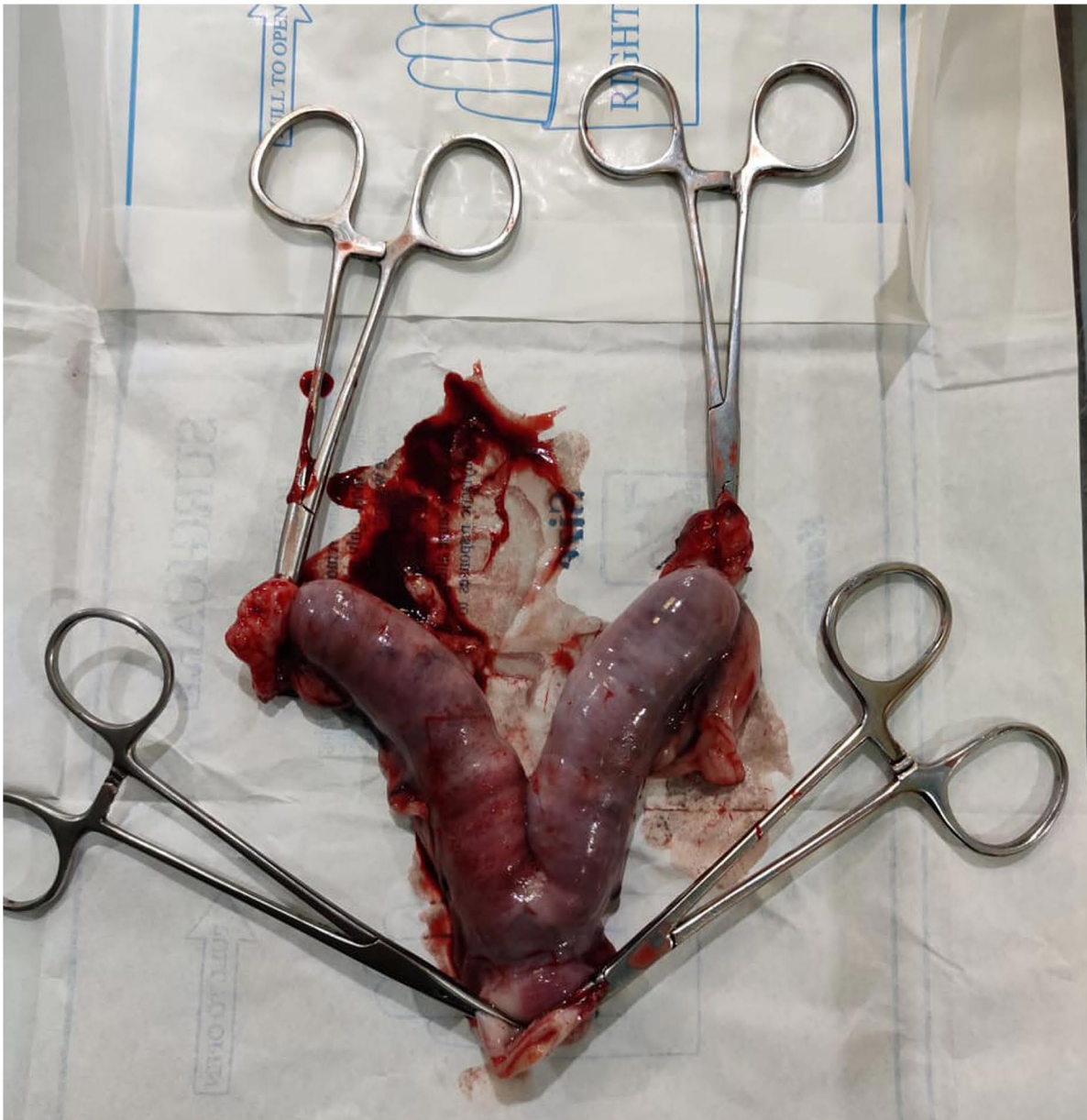


Fig: Ovariohysterectomy is the treatment of choice for pyometra. Here, is the uterus of bitch filled with pus which is surgically removed.

Paramphistomiasis

Paramphistomiasis which is also known as "stomach fluke disease". the intestinal phase of amphistomiasis is a common parasitic disease of cattle, and to a lesser extent, sheep & goat. It is caused by paramphistome flukes, a nd characterized by severe enteritis. The mortality rate in sheep & goat has been as high as 90%. Cattle, sheep, and goats of all ages may be affected, but young cattle are the usual subjects.



Fig: There was a subcutaneous edema, and accumulation of fluid in the body cavities.

In the left picture, the gravid goat was succumbed to death due to high paramphistomiasis. The two dead fetus can be seen. In the right picture, a large number of small, flesh-coloured flukes are present in rumen of goat.

Approaching through One Health for Greater Good; Antimicrobial Resistance and Antimicrobial Use in the standpoint of Veterinary Education

Abstract :

Antimicrobial stewardship in animals, regulated by legislation, qualified practitioners and a structured veterinary profession can be attained by the enforcement of proper veterinary education. The fight against AMR is successful only with the collaborative efforts between public health, veterinary sector and environmental authorities. The education and awareness with proper designed communications and advocacy materials about AMU and AMR must include local people, farmers and animal practitioners. Every nation with support of OIE must develop and execute surveillance systems to detect, analyze and report AMU and outbreak of any AMR microorganisms inside their territory. Veterinarians and veterinary paraprofessionals are at the forefront of national and regional efforts to improve animal health and welfare, preserving the human health and promoting food safety and security.

Introduction:

One health means the mutually dependent association between health of human and



Mr. Binay Thapa
SCOH Coordinator
IVSA Rampur 2020/21

animal; both sharing the same consequences of the health of environment and the responsibility to sustain the equilibrium of the association. It is a collaborative, multi-sectoral and multidisciplinary approach at the level of each respective authority for achieving optimal health outcomes. In other words, the human health and animal health (both domestic and wildlife) are interdependent and bound to the health of the ecosystems in which they subsist. On the other hand, veterinary education is not only for the treatment of animals, but additionally the improvement of animal welfare and public health by preventing the infectious and zoonotic diseases, and promotion of food safety and food security in the world. Veterinarians are those who treat all the living species except *Homo sapiens*. Veterinary education and services, in both their governmental and private sectors inside a nation, play an indispensable role in the development and implementation of policies to manage animal health risks

by communicating and collaborating with a wide range of stakeholders in protecting animal health and welfare; they significantly contribute towards improving human health, as well as food safety and security [1].

About 60% of the existing human infectious diseases and at least 75% of emerging infectious diseases of humans have an animal origin, that is, they are zoonotic [2]. Animal diseases that are transmissible to humans, such as avian influenza, rabies, brucellosis and bovine spongiform encephalopathy, and that transmit between people but have an animal reservoir (eg. Ebola, Nipha) pose a worldwide threat to mankind and must be controlled or eliminated globally. The risk of disease outbreak increases exponentially with population growth, global warming, pollution, climate change, intensive indiscriminate livestock and poultry farming, deforestation, human behavior, uncontrolled urbanization and industrialization. These are the pre-requisites for health hazard in both animal and human population, giving pathogens numerous opportunities to colonize new host ranges and mutate into new forms. Hence an emerging and re-emerging infectious pathogen could evolve.

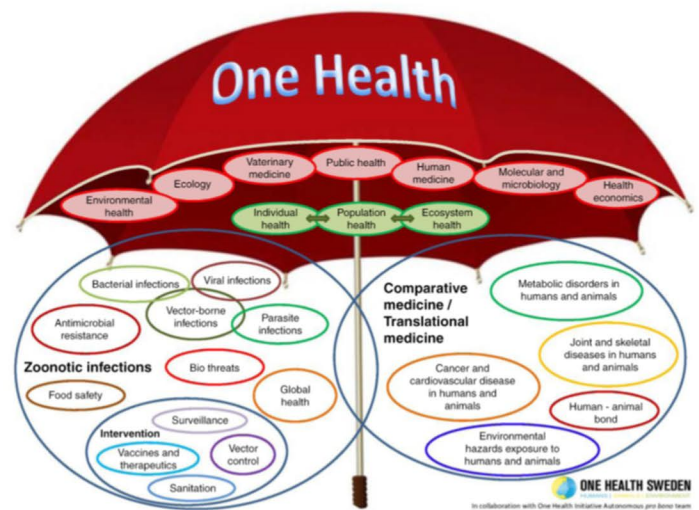


Fig. 1: The ‘One Health Umbrella’ developed by the networks ‘One Health Sweden’ and ‘One Health Initiative’ to illustrate the scope of the ‘One Health concept’. Available on www.onehealthinitiative.com and also published in Ref. 3.

One health is a broad term to explain; it includes all the contexts of infectious and contagious diseases, zoonoses, public and animal health medicine and many more which can be depicted from the one health umbrella developed jointly by One Health Sweden and One Health Initiatives [3]. The “One Health” concept is more of awareness for the well-being of people by some new innovative strategies of controlling and containment of the pathogens at the level of animal population, before they spillover in human population and not let them to make a drastic outbreak – is the most effective and economic way of protecting

people [1]. For this, a formal alliance on One Health was formed in April 2010 between the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE, formerly International Office of Epizootics) and the World Health Organization (WHO), also known as FAO-OIE-WHO Tripartite, for sharing responsibilities and coordinating global activities to address health risk at the animal-human-ecosystem interface. The non zoonotic diseases of animals are also equally important to address in developing countries for maintaining both quantity and quality of animal derived food, which then can significantly alleviate the malnutrition problems and poverty.

One Health Approach in Nepal:

The one health approach in many developing countries is still in its infancy. Like in Nepal, there are several challenges for executing one health, which include lack of multisectoral approach, low economic status, political instability, backward in technical infrastructures and expertise, lack of legal policies and poor knowledge at governmental bodies [4]. Furthermore, the same study [4] provides that the Fleming Fund Country Grant from UK

government has been implemented to strengthen the antimicrobial resistance (AMR) and antimicrobial use (AMU) surveillance in Nepal. This clearly states that there is a need of budget and technical support for establishing one health in the developing countries in term of burning issues like AMR, zoonoses, disease surveillance, animal welfare, food safety and security as well as bioterrorism. Relief International (RI) in association with Asia Network for Sustainable Agriculture and Bio-resources (ANSAB), the “One Health and Zoonoses” course was added in partnership with Agriculture and Forestry University (AFU), Nepal under the faculty of Animal Science, Veterinary Science and Fisheries [5]. This high-lightens the significance of one health in veterinary education for restoring the public health. One World, One Health concept is being more fascinating because of all the health issues AMR, extreme mutation in RNA viruses, association of domestic and wild birds and animals in disease spillover that make the zoonotic diseases more complicated for our understanding and our immune system than ever before [6].

Antimicrobial Resistance:

AMR refers to microorganisms, such as bacteria, viruses, fungi and parasites,

which have acquired resistance to antimicrobial treatment. Sub-therapeutic dose for growth promotion, inappropriate, indiscriminate and excessive use of antimicrobials can lead to the resistance in bacteria that do not respond to antibiotic treatment [7], which are known previously as susceptible but now there is an emergence for a novel group of antibiotic which is quite time consuming and certainly not an economical strategy. This poses a great threat for disease control for both animal and human health. Antimicrobial resistance is a complex mechanism, and these antimicrobial resistant bacteria and determinants existed in the environment long before the discovery and use of antimicrobials by human [8]. This mechanism agrees the Darwinian Theory, Survival of the Fittest, to evolve, develop and adapt the existing antimicrobial environment. Resistant genes can be transferred between bacteria by horizontal transfer involving any three mechanisms: conjugation, transduction and transformation.

Antibacterial resistant strains of bacteria are now proved to be global threat, additionally antifungal, antiviral drug resistance are clinically important and emerging issues, anthelmintic resistance is also neglected one and resistance in protozoal infections pose great risk for

both human and animal, which are associated with poor surveillance and management system [9]. Inappropriate use of chemical disinfectants and antiseptics could also possibly contribute in antimicrobial resistance in a farm environment for a livestock herd. Antimicrobial stewardship is an interdisciplinary and rationale use of antimicrobials, currently emphasizing in veterinary practices, which clearly states the sensible and prudent use of these drugs, such as based on proper diagnosis, proper dosage regimen, choose for narrow spectrum as possible, follow standard guidelines and proper withdrawal time in food animals, which could be a great effort to reduce the antimicrobial resistance [10]. An ounce of prevention is worth a pound of cure, hence the OIE supports new research into alternatives to antibiotics; particularly vaccines. Likewise, rabies is known as both 100% fatal and vaccine preventable disease, which kills around 50,000 people annually worldwide, where Sri Lanka showed that the mass dog vaccination, awareness campaign, responsible dog ownership and surveillance for animals could possibly eliminate the dog mediated rabies death by 2030 [11], which is a perfect example of One Health Approach for controlling the disease in animal population. Not only for viral

diseases, but coccidiosis (protozoal) and salmonellosis (bacterial) in poultry, hemorrhagic septicemia and black quarter (bacterial) in ruminants and ongoing research about helminth vaccines in ruminants are the good example for the prevention approach rather than any use of antimicrobials. Less use of antimicrobials and antibiotics as possible is the great way to prolong the development of resistance against them. From veterinary perspective, veterinarians are the part of solution; but they must be well trained, well supervised and their ethics should be ensured by the statutory veterinary bodies reinforced by law.

Some Scenarios of AMR:

AMR rates are increasing not only in the pathogenic organisms but also in the gut commensals (*E. coli*, *Staphylococcus* spp.) in people and these infections do not respond well with prevalent antibiotics which add more complications, worse outcomes, super-infection by yeast, fungi and resistant bacteria, additional expenditures and even death in healthcare facilities [12]. Evolution of antimicrobial resistance has already narrowed down our antimicrobial choice in both field and hospital basis, which brings the severe consequences in the health and welfare of

animals as well as general people who depend on their farming, besides, outbreak of zoonotic infection is the major threat [13]. In this regard, veterinarians, animal workers, the OIE, the joint collaboration should utilize veterinary knowledge and expertise in sensible and transparent AMU, and continuous monitoring and surveillance of the occurrence of resistance, which help to reduce the growing trend of AMR and to safeguard the efficacy of these medications for future use.

A recent study in commercial poultry farm in Qatar showed 96% of total *E. coli* isolates were resistant against at least one of the 18 prevalent antibiotics including ampicillin, cephalothin, ciprofloxacin, tetracycline and fosfomycin indicating the occurrence of resistance in both healthy and ill bird carcasses pose great risk for human health [14]. Another study which contained 361 isolates of *E. coli* O157 retrieved from humans, cattle, swine, and food during 1985 to 2000, showed that about 27% of the isolates were resistant to tetracycline, 26% were resistant to sulfamethoxazole, 17% were resistant to cephalothin and 13% were resistant to ampicillin [15], the use of these drugs therapeutically in human and veterinary medicine and as prophylaxis in animal farm provide the selection pressure to those bacterial isolates to

develop resistance. Due to the current intensive and semi-intensive farming practices in aquaculture bring stress and frequent disease outbreaks in fish which need to be solved by the use of antimicrobials, but the inappropriate sub-therapeutic dosages for a long period in water provides the selection of resistant determinants of pathogens and enhances horizontal gene transfer, which then surpass from aquatic habitation to terrestrial animal husbandry, and to the human environment, can have adverse effects on human-animal-environment interface as well as aquatic ecosystem [16]. A cross sectional study in Chitwan, Nepal participated by 150 commercial poultry producers showed that 67% of them were unaware about AMR, 13% use antimicrobials for growth promotion in which 35% of them identified to use colistin (a last resort of antibiotic in human medicine) and 27% have lower understanding for withdrawal periods in animal products after using antimicrobials [17], demonstrates that many poultry producers lack proper knowledge regarding AMU and AMR in Nepal, thus improved communication and education associated with veterinary resources and guidelines, and effective surveillance outreach in execution and animal products, may enforce AMR/AMU awareness.

Prudent Use of Antimicrobials:

The FAO-OIE-WHO tripartite alliance set the goals against AMR: i. ensure that antimicrobial agents maintain their efficacy, ii. promote prudent and responsible use of these agents and iii. facilitate access to quality drugs [18]. More recently, on 21 September 2016, the United Nations General Assembly adopted a political declaration aimed at combating the global threat posed by AMR and confirmed the “One Health” approach in line with the Global Action Plan. The OIE made a strong contribution to the WHO’s global action plan on antimicrobial resistance, adopted in 2015, which seeks to ensure the treatment of infectious diseases with effective and quality antimicrobial agents in terrestrial and aquatic animals following OIE’s Intergovernmental Standards. The OIE’s international standards for the prudent antimicrobial use can be obtained in “OIE Standards, Guidelines and Resolution on antimicrobial resistance and the use of antimicrobial agents”, 2nd edition of 2020 in the Ref. 19.

To date, there is no harmonized system of surveillance on the worldwide use and circulation of antimicrobial agents. That information is necessary to monitor and control the origin of medicines, obtain reliable data on imports, trace their circulation, and evaluate the quality of the

products in circulation. In veterinary field, only few countries became succeed to provide the information and database regarding antimicrobial consumption and surveillance of AMR in animal routine, however the reported data are not even, which shows the great need of One Health approach to improve coordination and harmonization between responsible authorities [20]. The veterinary profession has a crucial role to play in fighting against AMR, particularly in controlling the prescription and delivery of these products in animal therapeutics, and their responsible and prudent use.

Animal health and welfare depend on the availability, effectiveness and appropriate use of quality veterinary medicines, including antimicrobials. To continue the progress in disease control management and in improving animal welfare, all the international, regional, national and local animal sector leaders, need to encourage and achieve a sustainable change in behavior so that antimicrobial use in animals closely respects the OIE International Standards on their responsible and prudent use. Preserving the efficacy of these life-saving medications, as well as their availability for both human and veterinary use, is therefore essential to preserve our future. In particular, veterinary services including veterinarians and veterinary

paraprofessionals have a key part to play in this, through their role in regulating and supervising use of antimicrobials and offering professional advice on their use to farmers and animal owners. The adoption of OIE standards and their implementation enables member countries to improve biosecurity, to support animal health and welfare, to sustain public health and furthermore, to participate in safe international trade for economic and food security benefits [21]. To combat AMR and promote the prudent use of antimicrobials in animals, for risk analysis, surveillance and monitoring, and for reporting, the OIE set these four basic objectives:

- Improve awareness and understanding
- Strengthen knowledge through surveillance and research
- Support good governance and capacity building
- Encourage implementation of International Standards

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Gharial, The Beauty of Rapati-Narayani River in NEPAL

Gharials are the unique crocodilian species characterized by the presence of the long snout with interlocked sharp razor-like teeth, which is adapted to catch the fish. There are different families representing different crocodilian species like true crocodile, caimans, alligators and gharials where gharial is the only living member of Family Gavialiadeae.

Taxonomically, gharial is called as *Gavialis gangeticus*, where the word *Gavialis* comes from family Gavialidae and the word *gangeticus* represents the Ganges River of India as the Ganga River is the native habitat of gharials. The name GHARIAL originated from the Hindi word GHARA which is a clay pot used in India. As gharial has the GHARA like bulbous swelling at the end of their snout, they were named so.

Earlier before 1940, there was a massive population of gharials which was more than 5000 but at the mid- 1970, they were almost hunted to extinction. Then after, strict laws were put into action for the conservation of Gharial. Although, the Gharials used to occupy some space in South Asian countries like India, Nepal, Bangladesh, Bhutan but now the populations of Gharials are confined only to the tributaries of Ganges river which



Mr. Prashant Ghimire
SCAW Coordinator
IVSA Rampur 2020/21

includes the Chambal and Giruwa rivers in India and the Rapati-Narayani river of Nepal.

Rapati-Narayani river situated in Chitwan district of Nepal offers deep, clear and fast moving water with sandy banks which makes it the suitable habitat to the existing native population of Gharial in Nepal. The sandy banks of the river are very much important in the day-to day life of Gharial. Firstly, Gharials use the sandy banks for basking. We can see a group of Gharials lying in the sandy banks of the river to get the warmth of the sun. During winter months, the basking activity is done from about 9 am to 4pm but during hot summers, they are only limited to the early morning and late evenings. Moreover, while basking Gharials raise their head up, open their snout and remain in this position for about 20 minutes, which is called Gaping behaviour. As Gharial is a cold blooded animal, basking and gaping helps in the thermoregulation.

The sandy banks also play a significant role in reproduction and development of Gharials. During the month of January to June, the water level in the river falls down due to which sandy banks are exposed much where the Gharials lay their eggs and keep for incubation. After successful mating in the months of January to February, female Gharials move out of the water to sandy banks and dig pitcher shaped holes where eggs are laid and kept buried for incubation. The female guards their nests from mongoose and birds during the incubation period of eggs which ranges from 56 to 70 days. When ready to hatch, youngs make small grunting sounds which alerts the mother to start digging them out. As in other reptiles, the sex of the hatchling is determined by the temperature of incubation, higher temperature results in higher percentage of males.

One behavior peculiar to Gharial among the different crocodilian species is that like other crocodiles, they do not carry their young ones in mouth for translocation of young from nesting site to water sources. The snout with razor-like interlocking teeth does not permit the harmless translocation of Gharials. Instead they are carried in the back of mother. Gharial shows responsible parental behavior to their offsprings and are cared for and

nourished well until the young one become independent and can tolerate the flood in upcoming monsoon season. The reproduction and development of gharials are completed prior to the beginning of monsoon season.

Another peculiar feature of Gharial is the cartilaginous knob present at the tip of snout of male gharials which are developed only in males when they attain 10 years of age. Males mature at about 15 years of age whereas females mature earlier at about 8 years of age. The cartilaginous knob called Ghara converts hissing sound produced by males into buzzing sounds which helps males to communicate with females. Moreover, the Ghara of males helps females to get attracted towards them for mating.

The presence of Gharial, a critically endangered species, in the Rapati-Narayani River is truly an asset to our ecology and natural beauty. The Gharials of Rapati-Narayani River are the only Gharials present in natural habitat in Nepal. Moreover, the Gharial Breeding Centre near the Rapati-Narayani River is contributing a lot to conserve and increase the population where the eggs from captive breeding males and females are collected and incubated in artificial medium. This helps to prevent the loss of fertile eggs from natural predators and

also minimize the hatching failures due to inappropriate environmental conditions. After successful hatching, the young ones are raised in captivity for about 4 years and are released into their natural habitat.

Gharials are the unique assets among the crocodilian family, which is contributing by keeping the ecological balance and promoting the tourism sector in the Rapati-Narayani River of Nepal.



Photo: Gharial in Chitwan National Park, Nepal; Source: Kathmandu Post

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