8th One Health Bangladesh Conference

Transforming the One Health Agenda to a One Health Movement in Bangladesh

ABSTRACT BOOK

29-31 March, 2015
Dhaka, Bangladesh

ONE health BANGLADESH

EPAB

USAID FROM THE AMERICAN PEOPLE

CDC Centers for Disease Control and Prevention

unicef

icddr,b

Massey University

EcoHealth Alliance
Formerly known as Wildlife Trust

IEDCR

World Health Organization
Country Office for Bangladesh

Food and Agriculture Organization of the United Nations

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার

8th One Health Bangladesh Conference

Transforming the One Health Agenda to a One Health Movement in Bangladesh

ABSTRACT BOOK

29-31 March, 2015
Dhaka, Bangladesh

ONE health BANGLADESH

EPAB

(RAPA)

স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়

USAID FROM THE AMERICAN PEOPLE

CDC Centers for Disease Control and Prevention

unicef

icddr,b

Massey University

EcoHealth Alliance
Formerly known as Wildlife Trust

IEDCR

World Health Organization
Country Office for Bangladesh

Food and Agriculture Organization of the United Nations

Editorial Board

Publisher
Scientific Sub-Committee,
8th One Health Bangladesh Conference

Date of Publishing
March 2015

Secretariat
Institute of Epidemiology, Disease Control and Research (IEDCR)
Mohakhali, Dhaka 1212, Bangladesh
Web: www.iedcr.gov.bd
Tel: 9898796, 9898691
Fax: 9880440
Email: info@iedcr.org

Printer:
Interpress Ltd.
267/1 Commissioner Lane, Fakirapool, Dhaka 1000
Tel: 01715027545
Email: interpress@dhaka.net

Preface

The Eighth One Health Bangladesh Conference 2015 is being held with the theme: "Transforming the One Health Agenda to a One Health Movement in Bangladesh". The overarching purpose of this Conference is to consolidate what we have achieved during last seven years in terms of science, technology, capacity building & networking, and generate a new call to transform agenda to movement. With the backdrop of emergence, reemergence and resurgence of infectious disease, the increasing effect of toxic chemical & hazardous substances, their health implications on all species, and global climate & atmospheric changes, we have organized this Conference.

One Health, as a concept, is now well recognized in Bangladesh - not only by physicians and veterinarians, but also by wildlife specialists, environmentalists and social scientists. This concept has involved a wide range of agencies & institutions, and a large number of professionals, researchers, practitioners, innovators, young activists and students. While the initial focus was to reduce risks of emerging and reemerging infectious diseases at the human-animal interface & their consequences, it has now been adopted within control of food-borne illnesses, food security, nutrition and conservation. Multidisciplinary collaboration in disease control, research and capacity building has been fostered and a series of conferences and seminars were organized during the past seven years.

This Conference particularly emphasizes on transformation of agenda to action. To achieve the theme the scientific sessions will present evidences, innovations, technology and recommendations. The topics of plenaries and scientific deliberations have been divided into: Emerging Infectious Diseases, Neglected Tropical Disease and Zoonoses, Food Safety and Food Security, Eco-Health and Bio-Security, Capacity Building. Moreover, another Open Paper Session has been organized. The concluding session is for synthesis of the scientific sessions and Annual General Meeting of One Health Bangladesh.

This Abstract Book includes the abstracts of oral, poster and key-note presentations. We thank the reviewers, editing panel members, contributors. We also thank all the members of Organizing Committee and other Sub-committees who worked tirelessly to make this Conference a success. We thank the members of Scientific Sub-committee who worked hard to mobilize the presenters and edited, complied and published the abstracts into a book form.

We thank all those who were instrumental for the inception, planning, implementation and success of the Conference. We acknowledge the contribution of IEDCR, FAO, WHO and others which have strengthened the effort of the Ministry of Health & Family Welfare for organizing the Conference.

Nitish C. Debnath
One Health Coordinator, FAO Bangladesh &
Chairperson, Conference
Organizing Committee

Mahmudur Rahman
Director, IEDCR &
Co-Chairperson, Conference
Organizing Committee

Table of Contents

Committees of 8th One Health Bangladesh Conference..... i

A. Organizing Committee..... i

B. Reception & Registration Sub Committee..... i

C. Food & Entertainment Sub-Committee..... i

D. Scientific Sub-Committee..... ii

E. Transport & Communication Sub-Committee..... ii

F. Abstract Reviewers Sub-Committee..... ii

Conference Schedule..... iii

Conference Key Note Speech

The One Health Movement and the Global Health Security Agenda: A Partnership for Making the World Safe from Infectious Diseases; ***Dennis Carroll***..... 01

Day 1: Morning Session

Emerging Infectious Diseases

A Systems Perspective on Avian Influenza; ***Dirk U. Pfeiffer***..... 02

Avian Influenza at the Animal-Human Interface: Investigations among Poultry Workers in Live Bird Markets in Dhaka City, Bangladesh, 2012-13; ***Katharine M. Sturm-Ramirez***..... 03

Survey for Avian Influenza A Viruses in the Live Bird Markets' Environment in Bangladesh, 2013-2014; ***Paritosh K. Biswas***..... 05

Molecular Epidemiology of H5N1 Highly Pathogenic Avian Influenza Virus in Bangladesh and the Challenges in the Control of Avian Influenza; ***M. R. Islam***..... 06

Isolation of Avian Influenza Viruses from Vaccinated Chicken Flocks of Bangladesh; ***M. Giasuddin***..... 07

Backyard Poultry Rearing Practices in Bangladesh: Implications for Risk of Avian Influenza in Humans; ***Ireen Sultana Shanta***..... 08

One Health Approach to Curb Cholera Outbreaks in Urban Bangladesh; ***Farhana Haque***..... 09

Day 1: Afternoon Session

Emerging Infectious Disease (contd.)

Emerging Infectious Diseases (EIDs): One Health Approach to Combat MERS-CoV, Ebola and Nipah in Bangladesh; ***Mahmudur Rahman***..... 10

Ecological Determinants of Nipah Virus Risk in Bangladesh: The Convergence of People, Bats, Trees and a Tasty Drink; ***Emily S. Gurley***..... 12

Circulating Dengue Serotypes In Dhaka City During 2013 – 2014; ***Saif Ullah Munshi***..... 13

Day 2: Morning session

Neglected Tropical Diseases and Zoonoses

Mass Dog Vaccination for Elimination of Rabies in Bangladesh: Piloting and Scaling Up; ***Be-Nazir Ahmed***..... 14

Strategy for Canine Rabies Control and Elimination of Rabies in Bangladesh; ***Md. Sohrab Hossain***..... 15

Risk Factors for Outbreaks of Anthrax in Livestock in Bangladesh; ***Muhammad Belal Hossain***..... 17

Day 2: Noon session

Food Safety and Food Security

Lead Exposure in Bangladesh: A One Health Perspective; ***Stephen P. Luby***..... 18

Arsenic Contamination of Foodstuffs; ***Mir Misbahuddin***..... 19

Pesticide Residue in Food: Bangladesh Perspective; ***Md. Sultan Ahmed***..... 20

Day 2: Afternoon session

Eco-Health and Bio-Security

An Ecological Framework to Understand and Rank the Spillover Potential of Novel Animal Viruses; ***Kevin J. Olival***..... 21

PREDICT Bangladesh: Models for Global Pandemic Prevention; ***Ariful Islam***..... 22

Eco-friendly Management of Different Diseases of Tomato, Carrot, Pea and Potato by Trichoderma Fortified Compost; ***Md. Khurshed Alam Bhuiyan***..... 23

Outbreak of Acute Encephalitis among Children living near Lychee Orchards in Northern Bangladesh; ***M. Saiful Islam***..... 24

Breeding Ecology of Yellow-wattled Lapwing, Hooded Pitta and Slaty-legged Crake in Selected Areas of Bangladesh; ***Abu Nasar Md. Aminoor Rahman***..... 25

Proximity to Pig Populations as a Key Risk Factor for Japanese Encephalitis Disease; Results of a Five-year Surveillance Study from Northwestern Bangladesh; ***Henrik Salje***..... 26

Milk Ring Test and Conventional PCR for Diagnosis and Control of Brucellosis in Cow Milk in Bangladesh; ***Md. Abu Sayeed Sarker***..... 27

Day 3: Morning Session

Open Paper Session

Assessing Dairy Cattle Welfare Using Farm Condition, Animal Based Measurements, and Physiological Indicators; ***Al-Amin***..... 28

Emergence of Multidrug Resistant Zoonotic Salmonella spp. from Poultry of Savar, Bangladesh; ***Md. Showkat Mahmud***..... 29

Epidemiological Investigation of Bovine Tuberculosis in Dairy Cattle in Chittagong, Bangladesh; ***Mohammad Belayet Hossain***..... 30

Detection of Coxiella burnetii, the Causal Agent of Q Fever, in Small Ruminants at Northern Barind Tract, Bangladesh; ***Md. Hemayatul Islam***..... 31

Isolation, Molecular Identification and Age Dependent Antimicrobial Susceptibility Profile of Salmonella Species from Broiler Chickens in Jamalpur District of Bangladesh; ***S. M. Lutful Kabir***..... 32

Elimination of Rabies in Bangladesh: One Health Approach; ***M. Salim Uzzaman***..... 33

Day 3: Noon Session

Capacity Building

A Journey Towards a One Health Movement; ***Nitish C. Debnath***..... 34

One Health Epidemiology Fellowship Program: Building Future One Health Leadership and Capacity in South Asia; ***Sithar Dorjee***..... 35

Fighting Zoonoses in Afghanistan, Bangladesh and Nepal: Concept and Progress of the One Health Initiative in Asia; ***Resham Prasad Acharya***..... 36

One Health Capacity Building: Roles of Chittagong Veterinary and Animal Sciences University; ***Md. Ahasanul Hoque***..... 37

Community Engagement for Sustainable One Health Movement: A Concept; ***Md. Abul Kalam***..... 38

One Health in Action: Controlling Dhaka's Dog Population; ***Sarah Vallentine***..... 40

Day 1: Poster Presentation

Amplification of mitochondrial DNA for barcoding of ducks in Bangladesh; ***Jahangir Alam***..... 42

Avian influenza virus resistant gene (Mx gene) and its diversity in poultry; ***Minakshi Nag***..... 43

Avian influenza A viruses in wild birds and domestic ducks in Bangladesh; ***A Islam***..... 44

Biosecurity practices in small commercial poultry farms, Bangladesh 2011-12; ***Nadia Ali Rimi***..... 45

Live bird market surveillance during 2011-2012 episode of H5N1 highly pathogenic avian influenza detected both Newcastle disease virus and avian influenza virus in dead chickens; ***L.R. Barman***..... 46

Mucosal vaccination of conserved sM2, HA2 and cholera toxin subunit A1 (CTA1) fusion protein with poly gamma-glutamate/chitosan nanoparticles (PC NPs) induces protection against divergent influenza subtypes; ***Mohammed Yousuf Elahi Chowdhury***..... 47

The use of antibiotic growth promoters and alternative strategies in poultry production: Global trends & Bangladesh; ***H. M. Salim***..... 48

Influenza A virus surveillance in live bird markets in Bangladesh; ***Sukanta Chowdhury***..... 49

Isolation of sorbitol non-fermenting including shiga toxin-producing Escherichia coli from Black Bengal goat in Bangladesh; ***Mukta Das Gupta***..... 51

Influenza epidemiology in Bangladesh: a pre- and post-pandemic comparison of the national hospital-based influenza surveillance findings (2007-2013); ***MA Aleem***..... 52

Anti-diabetic potentials of Syzygium cumini and Ficus racemosa: current state and prospects; ***Md. Mahmudul Amin***..... 54

Highly Pathogenic Avian influenza (HPAI) at the domestic-wild birds interface in Bangladesh; ***Mohammad Mahmudul Hassan***..... 55

Prevalence of canine parvo virus and canine influenza virus in dogs of Dhaka and Chittagong division; ***S. M. Lutful Kabir…***..... 56

Knowledge, Attitude and Practices Survey on Avian Influenza in Three Districts of Bangladesh; ***S.K. Sarkar***..... 57

Day 2: Poster Presentation

Detection of Listeria monocytogenes in raw milk; ***MMI Talukdar***..... 58

Isolation and Identification of Bacteria from Four Different Frozen Snacks of Gazipur District of Bangladesh; ***Shuvho Chakra Borty***..... 59

Biosecurity conditions and biosafety practices in the live bird markets of Dhaka city, Bangladesh, 2012; ***N A Rimi***..... 60

Identification and antibiogram study of bacterial agents isolated from the milk samples under different locations of Bangladesh; ***MN Munsi***..... 61

Enhanced pilot surveillance program for anthrax in livestock species in north-west Bangladesh; ***D. Ghosh***..... 62

Evidence for the recent emergence of dengue in Bangladesh: results from a seroprevalence study; ***Henrik Salje***..... 63

Factors associated with repeated outbreak of anthrax in Bangladesh: qualitative and quantitative study; ***J Hassan***..... 64

Antibiotic residues in milk and eggs of commercial and local farms at Chittagong, Bangladesh; ***Suchayan Chowdhury***..... 65

Cystic Echinococcosis, A Neglected Parasitic Zoonoses; Is it Threat for Public Health in Bangladesh?; ***Moizur Rahman***..... 66

Animal Anthrax in Sirajganj District of Bangladesh from 2010 to 2012; ***SK Shaheenur Islam***..... 67

Study on snails acting as intermediate hosts for different parasites of livestock and transboundary animal diseases in Saint Martin's Island; ***MN Munsi***..... 68

Investigation of Heavy Metals in Water and Dairy Milk of Chittagong and Chandpur Districts of Bangladesh; ***Abu Sayeed*** 69

Transmission of Zoonotic diseases and loss of habitat due to human langur conflict at jessore district of Bangladesh; ***Syed Hossain***..... 70

Assessing the Risk of Transmission of Canine Distemper Virus from Village Dogs to the Bengal Tiger Population of Bangladesh Sundarbans: A proposed study; ***Md. Mahbubul Alam***..... 71

Single nucleotide polymorphisms of Toll-like receptors and association with Haemonchus contortus infection in goat; ***M.A. Alim***..... 72

Day 3: Poster Presentation

An overview of animal slaughterhouse, slaughtering system and meat control act in Bangladesh; ***Md. Jalal Uddin Sarder***..... 73

Isolation, identification, molecular characterization and in vitro screening of potential probiotic activities of Lactobacillus species from poultry sources at live bird markets in Mymensingh; ***S. M. Lutful Kabir***..... 74

Evaluation on the Efficacy of BAU Fowl Cholera Vaccine; ***Koly Mustafa***..... 75

Molecular Characterization of Giardia intestinalis Assemblage E from Goat kids in Bangladesh; ***Mohammad Alamgir Hossain***..... 76

Influenza A Surveillance in Animal Health Sector: Identifying viruses and Integrating towards OH approach; ***GM Ahmed***..... 77

Effects of testosterone on hemogram and serum biochemistry of Black Bengal goat; ***M. Royhan Gofur***..... 78

Drug dispensing practices for acute respiratory infections and availability of oseltamivir through pharmacies, in Dhaka, Bangladesh; ***Fahmida Chowdhury***..... 79

Fighting Zoonoses in Bangladesh: Increase Awareness, Prevention and Control; ***Sumon K. Biswas*** 81

Environmentmove.com a dedicated web hub on environment-nature-wildlife; ***Md. Tawhid Hossain***..... 82

The Contemporary Challenges of Emerging Novel Diseases and the Training of the New Health Workforce Generation under One Medicine; ***E. Farag***..... 83

Laboratory-based surveillance for genetic characterization of wild-type viruses, Bangladesh; ***Khondoker Mahbuba Jamil***..... 84

Improving Biosecurity at Live Bird Markets (LBMs): A Journey So Far in Bangladesh; ***S.D.Gupta***..... 85

Identification of Salmonella spp. by Inv A gene Specific PCR with Antimicrobial Resistance Pattern from Stray dog at Chittagong Metropolitan Area, Bangladesh; ***Tofazzal Md. Rakib***..... 86

Committees of 8th One Health Bangladesh Conference:

(Not according to seniority)

A. Organizing Committee:

1.	Nitish C. Debnath , FAO	Chairperson
2.	Mahmudur Rahman, IEDCR	Co- Chairperson
3.	M. Salim uzzaman, IEDCR	Member-Secretary
4.	Shah Monir Hossain, FAO, Food Safety Programme	Member
5.	Md. Kamaruzaman Biswas, WHO	Member
6.	Tarek Hussain, USAID	Member
7.	Isteque Uddin Ahmad, IUSEN	Member
8.	Md Abdul Matin, BAPA	Member
9.	M. Mushtuq Husain, IEDCR	Member
10.	Selina Khatun, IEDCR	Member
11.	Khaleda Islam, IEDCR	Member
12.	Mahbubur Rahman, IEDCR	Member
13.	Tapan Dey, Department of Forestry	Member
14.	Ainul Haque, DLS	Member
15.	Mehedi Hossain, LRI	Member
16.	Ahmad Raihan Sharif, IEDCR	Member
17.	Katharine M. Sturm-Ramirez, icddrb	Member
18.	Farhana Haque, IEDCR	Member

B. Reception & Registration Sub-Committee:

1.	Khaleda Islam, IEDCR	Convener
2.	Kazi Mohammad Hassan Ameen, WHO	Jt. Convener
3.	Sharmin Sultana, IEDCR	Member
4.	Md. Mostafizur Rahman, IEDCR	Member
5.	Monjur Hossain Khan, IEDCR	Member
6.	A. K. M. Muraduzzaman, IEDCR	Member
7.	Sultana Jesmin, IEDCR	Member
8.	Md. Nurul Islam, Massey Fellow	Member
9.	Md. Kamrul Islam, Massey Fellow	Member
10.	Shovon Chakma, Massey Fellow	Member

C. Food & Entertainment Sub-Committee:

1.	M. Salim uzzaman, IEDCR	Convener
2.	Farhana Haque, IEDCR	Jt. Convener
3.	Iqbal Ansary Khan, IEDCR	Member
4.	Md. Sohel Samad, IEDCR	Member
5.	Md. Mostafizur Rahman, IEDCR	Member
6.	Mahbubur Rahman, IEDCR	Member
7.	Nuzhat Nasreen Banu, IEDCR	Member
8.	Shamsi Ara Chowdhury, IEDCR	Member
9.	Md. Nurul Islam, Massey Fellow	Member
10.	Md. Kamrul Islam, Massey Fellow	Member
11.	Shovon Chakma, Massey Fellow	Member

D. Scientific Sub-Committee:

1. James D. Heffelfinger, CDC, USA	Convener
2. M. Mushtuq Husain, IEDCR	Jt. Convener
3. Nitish C Debnath , FAO	Member
4. Mahmudur Rahman, IEDCR	Member
5. Be-Nazir Ahmed, NIPSOM	Member
6. Meerjady Sabrina Flora, NIPSOM	Member
7. Stephen P. Luby, Stanford University, USA	Member
8. John Ryder CTA, FAO Food Safety Programme	Member
9. Jatindra Nath Das, LRI	Member
10. Md. Giasuddin, BLRI	Member
11. Md. Ashraful Alam, IEDCR	Member
12. Selina Khatun, IEDCR	Member
13. Bidhan Chandra Das, CDIL	Member
14. A. S. M. Alamgir, WHO	Member
15. Md. Ahsanul Hoque, CVASU	Member
16. Farhana Haque, IEDCR	Member
17. Mat Yamage, FAO-BD	Member
18. Emily Suzanne Gurley, icddrb	Member
19. Katharine M. Sturm-Ramirez, icddrb	Member
20. Muhammad Waliur Rahman, IEDCR	Member
21. Shua J. Chai, FETP, CDC,USA	Member
22. M. Salim uzzaman IEDCR	Member
23. Mohammad Nizam Uddin Chowdhury Massey Fellow	Member
24. Muhammad Asaduzzaman, Massey Fellow	Member
25. Sultan Mahmood, Massey Fellow	Member

E. Transport & Communication Sub-Committee:

1. Mujaddeed Ahmed, WHO	Convener
2. Iqbal Ansary Khan, IEDCR	Jt. Convener
3. Md. Mostafizur Rahman IEDCR	Member
4. Mohammad Nizam Uddin Chowdhury, Massey Fellow	Member
5. Muhammad Asaduzzaman, Massey Fellow	Member
6. Sultan Mahmood, Massey Fellow	Member
7. Anwarul Karim, A.O, IEDCR	Member

F. Abstract Reviewers:

1. A S M Alamgir, WHO
2. Ashraful Alam, IEDCR
3. Be-Nazir Ahmed, NIPSOM
4. Bidhan Chandra Das, CDIL
5. Farhana Haque, IEDCR
6. James D. Heffelfinger CDC, USA
7. Katharine M. Sturm-Ramirez, icddr,b
8. Mahmudur Rahman, IEDCR
9. Mat Yamage, FAO
10. Md Ahasanul Haque, CVASU
11. Md Giasuddin, BLRI
12. Meerjady Sabrina Flora, NIPSOM
13. Mohammad Mushtuq Husain, IEDCR
14. Muhammad Waliur Rahman, IEDCR
15. Nitish C. Debnath, FAO
16. Shua J Chai, CDC, USA

8th One Health Bangladesh Conference

Programme Schedule

29-31 March 2015, Dhaka

Day 1	**29 March 2015, Sunday**
08:30 - 09:30	Registration for participants
	Morning Session (09:30 – 11:30)
	Emerging Infectious Diseases
Co-Chairs:	**Shah Monir Hossain**, Senior National Advisor, Improving Food Safety in Bangladesh, FAO
	Eric Brum, Team Leader, ECTAD FAO, Bangladesh
Rapporteurs:	**Asif Mojtaba Mahmud**, Principal Scientific Officer, IEDCR
	Muhammad Asaduzzaman, Massey University One Health Fellow, IEDCR
	Nuzhat Nasreen Banu, Scientific Officer, IEDCR
09:30 – 09:50	A Systems Perspective on Avian Influenza
	***Dirk U. Pfeiffer**, Professor of Epidemiology, Royal Veterinary College, University of London, UK*
09:50 – 10:00	Questions & Answers
10:00 – 10:15	Avian Influenza at the Animal-Human Interface: Investigations among Poultry Workers in Live Bird Markets in Dhaka City, Bangladesh, 2012-13
	***Katharine M. Sturm-Ramirez**, CDC Senior Technical Lead for Influenza and Respiratory Diseases, Center for Communicable Diseases, icddr,b*
10:15 – 10:30	Survey for Avian Influenza A Viruses in the Live Bird Markets' Environment in Bangladesh, 2013-2014
	***Paritosh K. Biswas**, Department of Microbiology and Veterinary Public Health, Chittagong Veterinary and Animal Sciences University, Chittagong*
10:30 – 10:45	Molecular Epidemiology of H5N1 Highly Pathogenic Avian Influenza Virus in Bangladesh and the Challenges in the Control of Avian Influenza
	***M. R. Islam**, Department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh*
10:45 – 11:00	Isolation of Avian Influenza Viruses from Vaccinated Chicken Flocks of Bangladesh
	***M. Giasuddin**, National Reference Laboratory for Avian Influenza, Animal Health Research Division, Bangladesh Livestock Research Institute, Savar*

11:00 – 11:15	Backyard Poultry Rearing Practices in Bangladesh: Implications for Risk of Avian Influenza in Humans
	***Ireen Sultana Shanta**, Research Investigator, Center for Communicable Diseases, icddr,b*
11:15 – 11:30	One Health Approach to Curb Cholera Outbreaks in Urban Bangladesh
	***Farhana Haque**, Outbreak Investigation Officer, IEDCR & Assistant Scientist, icddr,b*
11:30 – 12:00	**Morning Tea**

Inauguration Ceremony

12:00 – 13:35

11:55 – 12:00	Arrival of the Guests
12:00 – 12:05	Welcome address by Prof Dr. Nitish C. Debnath, FAO Coordinator One Health Bangladesh
12:05 – 12:25	Key Note Presentation by Dr. Dennis Carroll, Director, Global Health Security and Development, USAID
12:25 – 12:30	Address by Guest of Honour Dr N. Paranietharan, WHO Representative to Bangladesh
12:30 – 12:35	Address by Guest of Honour Mr. Edouard Beigbeder, UNICEF Representative in Bangladesh
12:35 – 12:40	Address by Guest of Honour Mr. Mike Robson, FAO Representative in Bangladesh
12:40 – 12:45	Address by Guest of Honour Mr. Yunus Ali, Chief Conservator of Forest
12:45 – 12:50	Address by Guest of Honour Mr. Ajay Kumar Ray, Director General, Department of Livestock Services
12:50 – 12:55	Address by Guest of Honour Prof. Dr. Deen Mohd Noorul Huq, Director General of Health Services
12:55 – 13:00	Address by Special Guest Dr. Kamal Uddin Ahmed, Secretary, Ministry of Environment and Forests
13:00 – 13:05	Address by Special Guest Dr. Shelina Afroza PhD, Secretary, Ministry of Fisheries & Livestock
13:05 – 13:25	Address by Chief Guest Mr. Mohammed Nasim, MP, Hon'ble Minister, Ministry of Health & Family Welfare
13:25 – 13:30	Address by Chairperson Mr. Syed Monjurullslam, Secretary, Ministry of Health & Family Welfare
13:30 – 13:35	Vote of Thanks by Prof. Dr. Mahmudur Rahman, PhD, Director, IEDCR

13:35 – 15:00	**Lunch**
	Afternoon Session (15:00 - 16:00)
	Emerging Infectious Disease (contd.)
Co-Chairs:	**Md. Shah Newaz**, Additional Director General, DGHS
	James D. Heffelfinger, Country Director, US-CDC & Senior Technical Advisor, Center for Communicable Diseases, icddr,b
Rapporteurs:	**Ahmad Raihan Sharif**, Medical Officer, IEDCR
	Kazi Mohammad Hassan Ameen, National Consultant, Training & Risk Communication, WHO
	Mohammad Nizam Uddin Chowdhury, Massey University One Health Fellow, IEDCR
15:00 – 15:20	Emerging Infectious Diseases (EIDs): One Health Approach to Combat MERS-CoV, Ebola and Nipah in Bangladesh
	***Mahmudur Rahman**, Director IEDCR* & Joint Coordinator, One Health Bangladesh
15:20 – 15:30	Questions & Answers
15:30 – 15:45	Ecological Determinants of Nipah Virus Risk in Bangladesh: The Convergence of People, Bats, Trees and a Tasty Drink
	***Emily S. Gurley**, Acting Director, Center for Communicable Diseases, icddr,b*
15:45 – 16:00	Circulating Dengue Serotypes In Dhaka City During 2013 - 2014 ***Saif Ullah Munshi**, Department of Virology, Bangabandhu Sheikh Mujib Medical University, Dhaka.*
16:00 – 16:30	**Afternoon Tea**

Day 2	**30 March 2015, Monday**
	Morning Session (09:00 – 10:30)
	Neglected Tropical Diseases and Zoonoses
Co-Chairs:	**A. K. M. Shamsuzzaman**, Director, Disease Control & Line Director, CDC, DGHS
	Peter Black, ECTAD, Deputy Regional Manager for Asia, FAO RAP, Bangkok
Rapporteurs:	**Sharmin Sultana**, Medical Officer, IEDCR
	Md. Mostafizur Rahman, Medical Officer, IEDCR
	Sultana Jesmin, Medical Officer, IEDCR
	Manjur Hossain Khan, Medical Officer, IEDCR
09:00 – 09:20	Rapid rabies control -- unleashing One Health on humankind's oldest pandemic
	Eric Brum, Team Leader, ECTAD, FAO Bangladesh
09:20 – 09:30	Questions & Answers
09:30 – 09:45	Mass Dog Vaccination for Elimination of Rabies in Bangladesh: Piloting and Scaling Up
	***Be-Nazir Ahmed**, Professor, Department of Microbiology, NIPSOM*
09:45 – 10:00	Strategy for Canine Rabies Control and Elimination of Rabies in Bangladesh
	***Md. Sohrab Hossain**, Veterinary Officer, Gazipur City Corporation*
10:00 – 10: 15	Developing Regional Cooperation on Anthrax Control
	***Sean V. Shadomy**, Bacterial Special Pathogens Branch, Centers for Disease Control and Prevention*
10:15 – 10:30	Risk Factors for Outbreaks of Anthrax in Livestock in Bangladesh
	***Muhammad Belal Hossain**, icddrb*
10:30 – 11:00	**Morning Tea**

Noon Session (11:00 – 13:00)

Food Safety and Food Security

Co-Chairs:	**Stephen P. Luby**, Professor of Medicine, Division of Infectious Diseases and Geographic Medicine; & Deputy Director for Research at the Center for Global Health Innovation; Stanford University, USA
	John Ryder, Chief Technical Adviser, Food Safety Program, FAO, Bangladesh
Rapporteurs:	**Iqbal Ansary Khan**, Senior Scientific Officer, IEDCR
	Farhana Haque, Outbreak investigation Officer, IEDCR & Assistant Scientist, icddr,b
	Sultan Mahmood, Fellow, One Health Epidemiology Fellowship Program, Massey University (Attached to IEDCR)
11:00 – 11:05	Introduction by Co-Chairs
11: 05 – 11:30	Lead Exposure in Bangladesh: A One Health Perspective
	***Stephen P. Luby**, Professor of Medicine, Division of Infectious Diseases and Geographic Medicine; & Deputy Director for Research at the Center for Global Health Innovation; Stanford University, USA*
11:30 – 11:55	Arsenic Contamination of Foodstuffs
	***Mir Misbahuddin,** Division of Arsenic Research, Department of Pharmacology, Faculty of Basic Science and Paraclinical Science, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka*
11:55 – 12:20	Pesticide Residue in Food: Bangladesh Perspective
	***Md. Sultan Ahmed**, Senior Scientific Officer, Entomology Division, Bangladesh Agricultural Research Institute, Joybebpur, Gazipur*
12:20 – 12:45	Overview Paper on Risk Perception
	***Sridhar Dharmapuri**, International Food Analysis Expert, FAO*
12:45 – 13:00	Wrap up and Conclusion
13:00 – 14:00	**Lunch**

Afternoon Session (14:00 – 16:00)

Eco-Health and Bio-Security

Co-Chairs:	**Ishtiaq Uddin Ahmad**, Country Representative for IUCN, Bangladesh
	Md. Abdul Matin, General Secretary, BAPA
Rapporteurs:	**Mujaddeed Ahmed**, Senior National Consultant, WHO
	Mohammad Sohel Samad, Medical Officer, IEDCR
	Md. Nurul Islam, Massey University One Health Fellow, IEDCR
14:00 – 14:20	An Ecological Framework to Understand and Rank the Spillover Potential of Novel Animal Viruses
	***Kevin J. Olival**, EcoHealth Alliance*
14:20 – 14:30	Questions & Answers
14:30 – 14:45	PREDICT Bangladesh: Models for Global Pandemic Prevention
	***Ariful Islam**, EcoHealth Alliance*
14:45 – 15:00	Eco-friendly Management of Different Diseases of Tomato, Carrot, Pea and Potato by *Trichoderma* Fortified Compost
	***Md. Khurshed Alam Bhuiyan**, Professor, Department of Plant Pathology, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur*
15:00 – 15:15	Outbreak of Acute Encephalitis among Children living near Lychee Orchards in Northern Bangladesh
	***M. Saiful Islam**, Assistant Scientist, Center for Communicable Diseases, icddr,b*
15:15 – 15:30	Breeding Ecology of Yellow-wattled Lapwing, Hooded Pitta and Slaty-legged Crake in Selected Areas of Bangladesh
	***Abu Nasar Md. Aminoor Rahman**, Department of Gynecology, Obstetrics & Reproductive Health, Faculty of Veterinary Medicine & Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur*
15:30 – 15:45	Proximity to Pig Populations as a Key Risk Factor for Japanese Encephalitis Disease; Results of a Five-year Surveillance Study from Northwestern Bangladesh
	***Henrik Salje,** Johns Hopkins University, Baltimore, USA*
15:45 – 16:00	Milk Ring Test and Conventional PCR for Diagnosis and Control of *Brucellosis* in Cow Milk in Bangladesh
	***Md. Abu Sayeed Sarker**, Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh*
16:00 – 16:30	**Afternoon Tea**

Day 3	**31 March 2015, Tuesday**
	Morning Session (09:00 – 10:30)
	Open Paper Session
Co-Chairs:	**Md. Rafiqul Islam**, Bangladesh Agricultural University, Mymensingh
	Abbas Bhuiya, Deputy Executive Director, icddr,b
Rapporteurs:	**Khaleda Islam**, Senior Scientific Officer, IEDCR
	Mahbubur Rahman, Medical Officer, IEDCR
	Shovon Chakma, Massey University One Health Fellow, IEDCR
09:00 – 09:15	Assessing Dairy Cattle Welfare Using Farm Condition, Animal Based Measurements, and Physiological Indicators
	***Al-Amin**, Chittagong Veterinary and Animal Sciences Universality, Chittagong*
09:15 – 09:30	Emergence of Multidrug Resistant Zoonotic *Salmonella* spp. from Poultry of Savar, Bangladesh
	***Md. Showkat Mahmud**, Bangladesh Livestock Research Institute, Savar & Department of Microbiology, University of Dhaka, Dhaka-1100, Bangladesh*
09:30 – 09:45	Epidemiological Investigation of Bovine Tuberculosis in Dairy Cattle in Chittagong, Bangladesh
	***Mohammad Belayet Hossain**, Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh*
09:45 – 10:00	Detection of *Coxiella burnetii*, the Causal Agent of Q Fever, in Small Ruminants at Northern Barind Tract, Bangladesh
	***Md. Hemayatul Islam**, Department of Animal Husbandry and Veterinary Science, University of Rajshahi*
10:00 – 10: 15	Isolation, Molecular Identification and Age Dependent Antimicrobial Susceptibility Profile of *Salmonella* Species from Broiler Chickens in Jamalpur District of Bangladesh
	***S.* M. Lutful Kabir**, *Associate Professor, Department of Microbiology and Hygiene, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh*
10:15 – 10:30	Elimination of Rabies in Bangladesh: One Health Approach
	***M. Salim Uzzaman**, Senior Scientific Officer, IEDCR*
10:30 – 11:00	**Morning Tea**

Noon Session (11:00 – 13:00)

Capacity Building

Co-Chairs:	**Abul Kalam Azad**, Additional Director General (Planning & Development) & Director, Management Information System (MIS), DGHS
	A. B. M. Abdul Hannan, Director, Medical Education & Health and Manpower Development, DGHS
Rapporteurs:	**Syed Muhammad Baqui Billah**, Technical Officer, FETP,B
	Muhammad Waliur Rahman, Outbreak Investigation Officer, IEDCR & Research Investigator, icddr,b
	A. K. M. Muraduzzaman, Medical Officer, IEDCR
11:00 – 11:20	A Journey Towards a One Health Movement
	***Nitish C. Debnath**, National consultant, FAO & Coordinator, One Health Bangladesh*
11:20 – 11:30	Questions & Answers
11:30 – 11:45	One Health Epidemiology Fellowship Program: Building Future One Health Leadership and Capacity in South Asia
	***Sithar Dorjee**, Regional Co-ordinator, One Health Epidemiology Fellowship Program, International Development Group, Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand*
11:45 – 12:00	Fighting Zoonoses in Afghanistan, Bangladesh and Nepal: Concept and Progress of the One Health Initiative in Asia
	***Resham Prasad Acharya**, Relief International*
12:00 – 12:15	One Health Capacity Building: Roles of Chittagong Veterinary and Animal Sciences University
	***Md. Ahasanul Hoque**, Professor of Veterinary Epidemiology, Chittagong Veterinary and Animal Sciences University*
12:15 – 12:30	Field Epidemiology Training Program in Bangladesh
	***Shua J. Chai**,* Resident Advisor, Field Epidemiology Training Program, Bangladesh
12:30 – 12:45	Community Engagement for Sustainable One Health Movement: A Concept
	***Md. Abul Kalam**, National Project Coordinator, Food and Agriculture Organization*
12:45 – 13:00	One Health in Action: Controlling Dhaka's Dog Population
	***Sarah Vallentine**, Program Manager, Humane Society International*
13:00 – 14:00	**Lunch**

Afternoon Session (14:00 – 16:00)

Synthesis and Annual General Meeting

Rapporteurs:	**M. Mushtuq Husain**, Principal Scientific Officer, IEDCR
	Garba M. Ahmed, International Consultant – Epidemiologist, ECTAD FAO
	Kamrul Islam, Massey University One Health Fellow, IEDCR
14:00 – 14:30	Synthesis
14:30 – 16:00	Annual General Meeting
16:00 – 16:30	**Afternoon Tea**

Conference Key Note Speech

The One Health Movement and the Global Health Security Agenda: A Partnership for Making the World Safe from Infectious Diseases

Dennis Carroll

Special Representative for Global Health Security; Director, Global Health Security and Development, Bureau for Global Health, U.S. Agency for International Development

In today's globalized world, the speed with which emergent diseases can surface and spread, as illustrated by the ongoing threats posed by the Ebola epidemic in West Africa, the Middle East Respiratory Syndrome (MERS) corona virus, and the avian influenza virus H7N9,raises serious public health, economic , as well as global security and development concerns. We have seen in the our collective response to SARS in 2003, the H1N1 influenza virus in 2009, and the ongoing Ebola epidemic that responding to a new threat only once it has acquired human-to-human transmission leaves the world vulnerable as we struggle to develop and deploy effective biomedical countermeasures. Collectively, these events underscore the urgent need for the global community to adopt One Health strategies that allow the targeting of a package of multisectoral interventions to new disease threats to those places, populations, times and situations where the risk of "spill over" of microbial agents from animals into human populations is greatest.

The ongoing Ebola epidemic in West Africa underscores that when weaknesses in one country's health system are ignored or underestimated the health security of the globe is at risk. In 2005 the International Health Regulations (IHR) were revised to reflect the shared recognition that in an increasingly globalized world to effectively minimize the threat posed by "public health events of international significance" requires every national public health system to meet a minimum of "core competencies" in "event" detection and response. Since the revision of the IHRs the world's experience with zoonotic threats, such as avian influenza, MERS, and now Ebola have highlighted that when we fail to have in place multisectoral core competencies for prevention, early detection and control even a limited "spill over" of a novel pathogen from animals into humans can quickly spread and have global consequences.

The recently launched "Global Health Security Agenda" provides a framework for global partnership to accelerate progress towards keeping the world safe and secure from infectious disease threats. The hallmark of the GHSA is its commitment to a multi-sectoral/One Health approach that unites animal health specialists, medical professionals, and environmentalists in a common effort. This talk will highlight the shared interfaces between the One Health movement and the Global Health Security Agenda and opportunities for shared action.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Thematic Session Keynote Presentation

A Systems Perspective on Avian Influenza

Dirk U Pfeiffer

The Royal Veterinary College, Great Britain

Since the occurrence of the first reported outbreak in Guangdong province in China highly pathogenic avian influenza (HPAI) subtype H5N1 in 1996, the infection has gradually spread across Asia, Europe and Africa, resulting in major epidemics first in China, several south-east Asian countries, and then eventually in Nigeria and more recently in Egypt and Bangladesh. Most other affected countries had relatively sporadic occurrence or small epidemics. Since then enormous financial, scientific and human resources have been invested into the risk management of disease, but it is now accepted that the virus will remain to be a threat to poultry and humans for some time. The transmission dynamics of HPAI H5N1 represent an example of a pathogen that thrives within complex ecosystems. Avian influenza viruses are being maintained in wild bird species, particularly waterbirds, as part of a globally interconnected network facilitated through the movements of migratory wild bird species. This system also generates new subtypes of AI viruses through antigenic drift and shift, as a consequence of the large number of virus multiplication and transmission events. Domestic poultry species are also susceptible to AI, and depending on the species, the production system characteristics and the associated poultry density, they can become local reservoirs of infection. The countries in South-East Asia which have experienced major HPAI H5N1 epidemics all have geographical areas with high densities of small-scale commercial poultry production, and many of these also include relatively high domestic waterbird densities. The characteristics of these production systems allow maintenance of the virus through contact structures involving farmers, traders and live bird markets. These systems have evolved over centuries and are therefore embedded in local and regional culture. This is, for example, reflected in the use of grazing ducks for rice pest management in some of these areas, as well the widespread fighting cock activity. The systems are highly adaptable to changing economic drivers, and can involve cross-boundary formal and informal trade over large distances. Traditional disease control methods involving culling, movement control and vaccination are not effective in such systems, since they do not acknowledge the risk perception of the actors involved and indeed often even appear to threaten their livelihoods. Effective risk management of HPAI H5N1 requires an understanding of the multi-dimensional nature of the problem, and it has now been recognised that this needs to involve the adoption of an interdisciplinary one health approach.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Avian Influenza at the Animal-Human Interface: Investigations among Poultry Workers in Live Bird Markets in Dhaka City, Bangladesh, 2012-13

K.M. Sturm-Ramirez[1,2], *S. Afreen[1], M.Z. Rahman[1],S. Chowdhury[1], S.U. Khan[1], Md. M. Rahman[3], A.R. Sharif[3], M. Rahman[1], T. Azim[1], S. Nasreen[1], L. Berman[2], F. Liu[2], V. Veguilla[2], N. Simpson[2], D. Iuliano[2], A. Balish[2], M-A.Widdowson[2], R. Donis[2], D. Jernigan[2], J. Heffelfinger[1,2], S. Luby[4], C. Davis[2], S. Lindstrom[2] , J. Katz[2], A.S.M. Alamgir[5], T.M. Uyeki[2], M. Rahman[3], E.S. Gurley[1]*

[1]*International Centre for Diarrheal Diseases Research, Bangladesh (icddr,b), Dhaka, Bangladesh;*
[2]*Centers for Disease Control and Prevention, Atlanta, Georgia, United States;*
[3]*Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh;*
[4]*Stanford University, Palo Alto, California, United States;*
[5]*World Health Organization, Dhaka, Bangladesh;*

Since 2007, highly pathogenic avian influenza (HPAI) H5N1 virus has circulated among Bangladesh poultry. Workers in live bird markets (LBMs) have intense occupational exposure to poultry with minimal use of personal protective measures. In February 2012, we started surveillance to identify human cases of infection with avian influenza A viruses (AIVs) among poultry workers in 16 LBMs of Dhaka. Whenever poultry workers with detectable AIV RNA by rRT-PCR were identified, we initiated an outbreak investigation in the affected market to enhance case detection, ascertain clinical history and health status of suspected cases, and explore possible sources of infection. Details regarding index cases that triggered investigations are reported separately; here we report on investigations at markets with suspected cases from February 2012 to February 2013.

We defined suspected AIV cases as influenza-like illness (fever with cough or sore throat) for the first LBM investigation and any respiratory symptoms subsequently. In response to any AIV RNA-positive case, we screened all workers in that market to identify further suspected AIV cases for up to three weeks after detection of the index case. Nasopharyngeal (NP) and oropharyngeal (OP) swabs were collected from suspected cases and tested by rRT-PCR for influenza viral RNA and further subtyped (H1N1pdm09, H3, H5, H7 and H9) if positive for influenza A virus. Acute (<7 days post illness onset) and convalescent serum (>21 days after acute serum collection) were collected from workers with detectable AIV RNA and tested for H5-specific antibodies by microneutralization assay. An H5 seropositive was defined as a ≥4-fold rise in antibody titer in paired sera (seroconversion) or a neutralizing antibody titer of ≥40 in any serum specimen with confirmation by western blot assay and serum adsorptions. Starting with the second investigation, NP and arm swab specimens were collected from asymptomatic workers matched 1:1 to suspected cases by timing and market location.

Nine investigations were launched within eight markets, all during months of peak AIV circulation among poultry (November-March). We screened 3111workers, of which 836(27%) had respiratory symptoms. Respiratory swabs were collected from 778(93%) symptomatic workers. Out of 778, 69(8.9%) had detectable AIV viral RNA but frequently with high Ct values (>37): 25(3.2%) for H5, 35(4.5%) for H9, 9(1.2%) for H5 and H9. A further 59(7.6%) had detectable influenza ARNA but unsubtypeable. Attempts to culture H5N1 virus from 12 positive swabs were unsuccessful. Of 25 paired sera tested to date, no

seroconversions to H5N1 virus were identified, but sera from five workers were H5 seropositive in both specimens. Four suspected AIV cases missed work due to illness, but none were hospitalized and all recovered.

Among 371 asymptomatic workers, 17(4.5%) had detectable AIV RNA in NP swabs and 67/361(18.5%) had detectable AIV RNA in arm swabs; H5 viral RNA was detected in 7 NP and 37arm swabs, and H9 viral RNA was detected in 8 NP and 11 arm swabs. The proportion of H5 viral RNA-positive NP swabs was similar among symptomatic (23/778; 3.0%) and asymptomatic (7/371; 1.9%) workers.

In Dhaka LBMs with suspected AIV cases, we identified 145 poultry workers with detectable AIV or influenza A/unsubtypeable viral RNA by rRT-PCR in respiratory specimens, often with high Ct values, during months of peak AIV circulation among poultry. Five workers were seropositive for HPAI H5N1 virus antibodies, suggesting prior infection. Among symptomatic workers, no severe illness was reported and no H5-specific seroconversion was identified. Frequent detection of AIV RNA among poultry workers and in NP swabs and on arms of asymptomatic workers suggests that detection of AIVs in symptomatic workers without serologic confirmation could represent viral contamination rather than active infection.LBM markets are an ideal setting to perform surveillance for zoonotic influenza A virus transmission but interpretation of rRT-PCR findings is challenging and highlights the need to discriminate between viral contamination of the human respiratory tract and infections with AIVs. Further research should investigate why severe illness is not detected among highly exposed poultry workers.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Survey for Avian Influenza-A Viruses in the Live Bird Markets' Environment in Bangladesh, 2013-2014

***Paritosh K. Biswas*[1]*, *Mohammad Giasuddin*[2], *Probal Chowdhury, Nitish C Debnath*[1, 4], *Mat Yamage*[4]

[1]*Department of Microbiology and Veterinary Public Health, Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh*
[2] *National Reference Laboratories for Avian Influenza, Bangladesh Livestock Research Institute, Savar, Dhaka*
[3] *Department of Livestock Services (DLS), Bangladesh*
[4]*Food and Agriculture Organization of the United Nation, Dhaka, Bangladesh*

A very little is known on the circulation of avian influenza A virus (AIV) subtypes in the live bird markets' environment in Bangladesh. Funded by Food and Agriculture Organization (FAO) of the United Nations (UN), a survey conducted in the second half of the year 2012, demonstrated that ~9% Live Bird Markets (LBMs) in Dhaka and Chittagong Metropolitan city areas could be found positive with highly pathogenic avian influenza (HPAI) H5N1 virus in ≥ 1 of the four environmental samples: Market floor, Poultry stall floor, Poultry holding case and Slaughter area, if sampled once a month. H5N1 was the predominant subtype of AIV circulating in the LBM environments of the study area in 2012. A follow up survey, from September 2013 to January 2014, was conducted on the same 32 LBMs sampled in the first phase to investigate five kinds of environmental samples: Market floor, Poultry stall floor, Poultry holding case, Slaughter area and Water used for meat processing. Hygienic and biosecurity measures in 10 of the selected LBMs were intervened and improved by FAO. Spatially, 16 of the selected LBMs were in the Dhaka city corporations, and the other 16 in the Chittagong City Corporation. Except for water sample, five individual swabs swabbed from five cross-sectional sites of each of the other four kinds of environmental samples were kept together to make a pooled sample, while sampling monthly. A pooled water sample was mixed-water, collected from five slaughter sites/places. The samples were collected once a month, but for a period of 5 months, thus resulting in 160 LBM-month observations with 800 pooled samples that contained 3200 individual swabs and 800 individual water samples. Each of these pooled samples was at first inoculated into 9-12 day old embryonated hen eggs following standard procedures. After the recommended incubation period, harvested allantoc fluids were tested for the haemagglutinating activities with 1% chicken red blood cells. Every allantoic fluid showing haemagglutinating activity was tested for the presence of M gene of AIV, and those that were postitive for M gene, were further tested for the presence H5N1, H7N9 and H9N2, by real-time reverse transcription polymerase chain reaction using standard protocols. The results showed that, in the total LBM-months at risk, 31, 4 and 12 were positive with AIV, H5N1 and H9N2, respectively. Of them 19, 2 and 7 were in the Dhaka city corporations, and 12, 2 and 5 in the Chittagong. All the LBMs observed were negative for H7N9. With FAO assistance, 20 of the M gene positive isolates were sent to the OIE-FAO Reference Laboratory for Avian Influenza based in Padova, Italy for reconfirmation of their sub-typing identities and for having specific gene sequence data. The results confirmed that the HA cleavage site of the isolates belonging to the subtype H5N1 had the amino acid motif RRRKKR*GLF. Additionally, partial sequence analysis of one of the four H5N1 isolates indicated that it belonged to 2.3.2.1a lineage.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Molecular Epidemiology of H5N1 Highly Pathogenic Avian Influenza Virus in Bangladesh and the Challenges in the Control of Avian Influenza

***M. R. Islam*[1]**, *M.E. Haque*[1], *R. Parvin*[1], *E.H. Chowdhury*[1], *M. Giasuddin*[2]

[1]*Department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh;*
[2]*National Reference Laboratory for Avian Influenza, Bangladesh Livestock Research Institute, Savar, Dhaka*

The first outbreak of H5N1 highly pathogenic avian influenza (HPAI) in Bangladesh was reported in 2007 and since then as many as 549 outbreaks have been reported to OIE as of October 2013. Outbreak situation in the country since October 2013 is unclear. Between 2007 and 2012, there have been introduction of at least three separate clades, namely 2.2, 2.3.4 and 2.3.21 of H5N1 HPAI viruses in Bangladesh. The clade 2.3.2.1 has apparently replaced the clades 2.2 and 2.3.4. Point mutations also have accumulated in Bangladeshi isolates over the period with potential modification of receptor binding site and antigenic sites. Low pathogenic avian influenza virus H9N2 had been prevalent in Bangladesh even before the H5N1 HPAI outbreaks were reported. There has been at least one event of re-assortment between H5N1 and H9N2 viruses. “Stamping out” through mass culling of infected and in-contact birds and decontamination of premises has been the national policy for controlling HPAI, however, this approach has apparently failed to eradicate the disease from Bangladesh. In the face unprecedented increased number of HPAI outbreaks in 2011 and 2012, Bangladesh started vaccination in 2013 at selected geographical regions, but the impact of vaccination is yet to be evaluated. The challenges in the control of avian influenza in Bangladesh with regard to surveillance, stamping out, vaccination and biosecurity will be discussed.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Isolation of Avian Influenza Viruses from Vaccinated Chicken Flocks of Bangladesh

***M. Giasuddin**, M.H. Rahman M. Hasan and M.R. Karim*

National Reference Laboratory for Avian Influenza, Animal Health Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka-1341, Bangladesh

Infection of vaccinated chickens with high (H5) and low pathogenic (H9 and other) avian influenza A virus were isolated and identified through a surveillance program by National Reference Laboratory for Avian Influenza (NRL-AI). During the surveillance in December 2014 to February 2015, NRL-AI collected a total of 132 samples (each for both swab and serum) from commercial and breeder chicken farms of Gazipur and Kishorgonj district of Bangladesh. NRL-AI also collected 05 samples (trachea) from dead birds of vaccinated chicken farms of the study areas. The swab and tracheal samples were processed for RNA isolation and directly tested by Real Time Reverse Transcription PCR (RRT-PCR) and serum samples were analyzed by hemagglutination inhibition (HI) assay. Out of 132 swabs samples, 09 samples were positive for detection of influenza type A, in which 08 samples were found positive for hemagglutinin (HA) gene of H9 and 01 was undetermined subtype of AI viruses from two farms of Gazipur district despite the hemagglutination titers were Log27, Log28, Log27, Log28, Log28, Log27, Log28, Log28, Log27 respectively of these 09 serum samples against the vaccine of avian influenza. In addition, another 05 tracheal samples of vaccinated chicken farms were also found positive for influenza type A of which 03 samples found positive for hemagglutinin (HA) gene of H5 and 02 were undetermined subtype of AI viruses which were not H5, H7 or H9. The detected avian influenza viruses were isolated by inoculating pathogen free embryonated chicken eggs and preserved for detail study. This study shows that vaccinated chicken flock can be infected without showing signs of illness and the virus has evolved into multiple genotypes which may be vaccine escape variants.

Day 1: **Morning Session** **Emerging Infectious Diseases**

Backyard Poultry Rearing Practices in Bangladesh: Implications for Risk of Avian Influenza in Humans

***Ireen Sultana Shanta*[1]*, Md. Abul Hasnat*[1]*, Andrea Mikolon*[1, 2]*, Salah Uddin Khan*[1]*, Najmul Haider*[1]*, Abdulla Al- Mamun Bhuyan*[1]*, Md. Afzal Hossain*[3]*, Emily S. Gurley*[1]*, Eduardo Azziz-Baumgartner*[4]*, Stephen P Luby*[5]

[1]*International Centre for Diarrheal Disease Research, Bangladesh;*
[2]*Department of Food and Agriculture, Animal Health and Food Safety Services, Animal Health Branch, California, USA;*
[3]*Influenza Division, Centers for Disease Control and Prevention, Atlanta, GA, USA;*
[4]*Department of Livestock Service, Ministry of Fisheries and Livestock, Bangladesh;*
[5]*Woods Institute of the Environment, Stanford University, USA*

Since 2007, highly pathogenic avian influenza A/H5N1 has been confirmed in poultry in 52 of 64 districts of Bangladesh and 58 outbreaks occurred in backyard poultry. Fifty percent of poultry in Bangladesh is raised in backyards where people have close contact with poultry. We assessed poultry raisers' knowledge about avian influenza and compared current poultry raising practices to the practices recommended by the Government of Bangladesh.

During May 2009 to August 2012, we enrolled a nationally representative sample of 2489 backyard poultry raisers with flocks of one to 55 poultry from 115 rural village clusters selected by probability proportional to population size. Researchers visited households and collected information about poultry raising practices from owners using a structured questionnaire.

Fifty-nine percent of poultry raisers had never heard of avian influenza or "bird flu". The majority of poultry raisers (93%) reported free range poultry roaming into their homes. Against recommendations, 85% of poultry raisers typically handled sick or dead birds, 51% slaughtered sick birds, and 53% kept sick birds inside the house. In 41% of poultry raisers' households, children touched or played with poultry, and in 29% of households, slaughtered poultry. Forty-two percent of poultry raisers reported never washing their hands with soap after handling poultry, while 0.3% covered their nose and mouth with a cloth when handling poultry. Most (93%) reported fully cooking poultry products before consumption. In spite of recommendations, 48% used poultry manure as fertilizer. Only 3% reported poultry illness and deaths to local authorities. When poultry raisers experienced a flu-like illness, 19% reported consulting a medical doctor and reporting was three times higher in the raisers who heeded avian influenza.

The majority of poultry raisers have not heard of avian influenza or "bird flu", and government recommendations are infrequently being followed by backyard poultry producers. Prevention messages should be reevaluated to assess optimal communication channels used for dissemination, the acceptability, feasibility and effectiveness of the proposed behaviors to reduce risk in the target communities.

Day 1: **Morning Session** **Emerging Infectious Diseases**

One health approach to curb cholera outbreaks in urban Bangladesh

***Farhana Haque*[1,2], *M. Mushtuq Husain*[1], *Mahmudur Rahman*[1]**

[1]*Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh*
[2]*International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh*

Between 2011 and 2014, the national rapid response team investigated 10 cholera outbreaks in different urban districts of Bangladesh. We reviewed the investigation reports and aimed to identify the strengths and challenges for responding to cholera outbreaks in Bangladesh. The teams identified 6,828 outbreak associated diarrhoea cases with 10 deaths. The median age of affected cases was 21 years. Vibrio cholerae was isolated from 36% of the rectal swab samples and in 44% of the point-of-use water samples connected to the municipal supply. We did not find Vibrio in the water samples from central pumps or tube wells. No residual chorine was detected in any of the collected water samples. Ground water extracted from deep tube wells was supplied intermittently through interconnected pipes in the outbreak areas. Poverty, lack of care-giver, lack of social cohesion, and lack of awareness about prevention and cure led to the deaths. Severe watery diarrhea in adults and isolation of cholera organisms from their rectal swabs confirmed that these outbreaks were caused by Vibrio cholerae. Vibrio in the tap water samples suggested water contamination in the pipelines. Multi-disciplinary outbreak investigations helped to understand the context in the rapidly urbanizing low-income setting of Bangladesh that makes safe water provision challenging in municipalities where water supply is intermittent, and where pipes commonly leak. Institution of the joint administrative, human, anthropological, environmental, water supply and public health engineering departments through the District Commissioner strengthened the response by utilizing the combined synergy of relevant sectors. Given the limited practical examples to operationalize one health worldwide, multi-sectoral outbreak investigation and initiation of the multi-sectoral response is a useful initial model. A multidisciplinary approach based on prevention, preparedness and response, along with an efficient surveillance system, is key for mitigating cholera outbreaks, controlling cholera in endemic areas and reducing deaths. Multi-sectoral research exploring effectiveness of water purification strategies could help identify appropriate approaches for ensuring safe piped water in resource-poor cities.

Day 1: **Afternoon Session** **Emerging Infectious Diseases**

Thematic Session Keynote Presentation

Emerging Infectious Diseases (EIDs): One Health Approach to Combat MERS-CoV, Ebola Virus Disease and Nipah in Bangladesh

Mahmudur Rahman

Director, Institute of Epidemiology, Disease Control & Research (IEDCR) & National Influenza Centre (NIC), Bangladesh

In addition to the rapidly changing societal, environmental and behavioural patterns observed among the population of Bangladesh in the face of rapid urbanization and ever- increasing global travel and trade, there is also a dramatic rise in the spectrum of infectious diseases. The unprecedented growth of the population sharing a fragile ecology, close interactions of humans and animals, large urban dwellers living in unhygienic conditions, highly vulnerable food security and safety along with the adversities of natural disasters and global warming, make Bangladesh increasingly vulnerable to the public health threats of emerging and re-emerging diseases (EIDs) and antibiotic resistance.

In recent years, lethal diseases such as Nipah virus, Middle East Respiratory Syndrome Corona Virus (MERS-CoV) and most recently Ebola Virus Disease (EVD) have emerged. The ongoing EVD epidemic has resulted in 18,603 cases and 6,915 deaths as of December 17, 2014 heightening global concern for fear of importation. It is extremely likely that the high human and animal population densities, and the frequent interactions between animals and humans, will result in the emergence of other novel, potentially pandemic, diseases in the future. EIDs comprise of a significant proportion of the hundreds of infectious outbreaks responded from the national level in the recent years in the country. Recent examples of important emerging infectious diseases include Nipah, MERS-CoV and EVD. These pathogens having then potential to cause Public Health Emergency of International Concern have been thought to originate from animals. These diseases as well as resurgent diseases (e.g., tuberculosis and cholera) illustrate Bangladeshis' vulnerability to microorganisms at the human-animal and environmental interface.

Recognizing this urgent need to respond to the rising threats of highly infectious EIDs and to comply with the International Health Regulations (2005) by WHO, Bangladesh has already taken several steps to address a number of issues for maintaining a sustainable animal, human and eco-health, including proper waste disposal in laboratories and industries, hygienic animal slaughtering practices in wet markets, and monitoring of antibacterial resistance and residual effect. Given that these challenges have a significant impact on food safety, food security and human resilience especially related to health, Bangladesh has initiated major steps to ensure food safety and security. The government has dedicated a separate programme to address EIDs. Given the multi-faceted determinants of EIDs, collaborative outbreak investigation team have been formed. Multi-sectoral outbreak investigations helped epidemiologists to understand the interrelated processes that led to emerging infectious disease outbreaks in the densely-populated Bangladesh where people have close contact with their animals and environment. Institutionalization of the joint human, animal and environmental health concept could further strengthen the response by utilizing the combined synergy of relevant sectors.

The multi-disciplinary, collaborative outbreak investigation and response capacity of IEDCR and icddr,b, that have been developed through experienced handling of Nipah outbreaks with the collaboration of CDC, WHO and other agencies, which in turn, have increased Bangladesh's capacity to detect, respond to, and prevent emerging epidemics. The EVD preparedness activities have allowed Bangladesh to build on existing strengths of the IHR 2005 core capacities.

The current outbreaks of MERS-CoV in the Arabian Peninsula and Ebola virus disease (EVD) in West Africa and the subsequent spread to other countries demonstrate the risk of extension to other unaffected countries, including Bangladesh. While the chances of introduction of EVD into Bangladesh may be low, the extremely high population density coupled with inadequate healthcare services and limited infection control practices in most hospitals make Bangladesh highly vulnerable to sustained transmission in the event of importation. Similarly, the introduction of MERS-CoV could prove disastrous unless contained adequately. To enhance the country's capacity to detect, respond to, and prevent emerging epidemics of international concern, Bangladesh needs to follow a One Health Approach to develop a comprehensive collaborative, preparedness plan that builds on existing strengths of outbreak response procedures and core capacities of the 2005 International Health Regulations, focus on reducing identified gaps in healthcare delivery.

Day 1: **Afternoon Session** **Emerging Infectious Diseases**

Ecological Determinants of Nipah Virus Risk in Bangladesh: The Convergence of People, Bats, Trees and a Tasty Drink

***Emily S. Gurley*[1]**, *Sonia T. Hegde*[1], *Kamal Hossain*[1], *Hossain M. S. Sazzad*[1], *M. Jahangir Hossain*[1], *Mahmudur Rahman*[2], *M A Yushuf Sharker*[1], *Henrik Salje*[3], *Jonathan H. Epstein*[4], *M. Salah Uddin Khan*[1], *A. Marm Kilpatrick*[5], *Peter Daszak*[4], *Stephen P. Luby*[1,6]

[1]*icddr,b, Dhaka, Bangladesh;*
[2]*Institute for Epidemiology, Disease Control and Research, Ministry of Health and Family Welfare, Bangladesh;*
[3]*Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA;*
[4]*EcoHealth Alliance, New York, NY, USA;*
[5]*University of California, Santa Cruz, CA, USA;*
[6]*Stanford University, Stanford, CA, USA*

Pteropus bats are the host reservoir for Nipah virus; humans become infected through consumption of contaminated date palm sap, a shared food source. Nipah causes yearly, highly case fatality (>75%) outbreaks in Bangladesh. Despite the wide geographic range of *Pteropus* bats within Bangladesh, and throughout Asia, outbreaks in Bangladesh remain spatially-clustered in the north and western part of the country. The objective of our study was to investigate the ecological determinants of bat-to-human transmission of Nipah in Bangladesh.

During December 2011 – February 2013 we visited 60 villages where Nipah cases were identified between 2001 and 2012, 73 randomly selected control villages within 50 km of a Nipah case village ('Nipah belt' controls) and 74 randomly selected villages > 50 km from any Nipah case village ('non-Nipah belt' controls). In each village, we counted the number of *Pteropus* bats roosting, the number of date palm sap trees, and interviewed residents in 25 randomly selected households about date palm sap consumption practices. We compared case villages to both sets of controls in terms of number of bats, population density, date palm sap trees, and human sap consumption behavior using Wilcoxon-Rank Sum tests for medians and t-tests for proportions, after accounting for clustering within villages.

Case villages were similar to 'Nipah belt' controls in terms of number of people per kilometer squared (km sq) (median 291 vs 253, p=.773), number of bats (median 239 vs 303, p=.663), and number of date palm sap trees (median 72 versus 71, p=.472). However case villages had a higher proportion of households where at least one resident commonly drank sap (61% vs 49%, p=.015). Case villages were similar to 'non-Nipah belt' controls in terms of population density (median 291 km sq vs 336 km sq, p=.725), but had significantly more bats (median 239 vs 115, p=.038), more date palm sap trees (median 72 versus 47, p=.005) and a higher proportion of households where at least one resident commonly drank sap (61% vs 31%, p=<.001).

Villages with previous Nipah virus outbreaks were different from non-Nipah areas in terms of host reservoirs, date palm trees, and human behavior. Even within the 'Nipah belt', areas with higher date palm sap consumption appeared at greater risk for a Nipah spillover event. The convergence of these characteristics in specific geographic areas likely explains the spatial clustering of human outbreaks, despite the wide geographic range of *Pteropus* bats.

Day 1: **Afternoon Session** **Emerging Infectious Diseases**

Circulating Dengue Serotypes in Dhaka City during 2013 – 2014

*Tahmina Akter[1], Muraduzzaman[1], Nusrat Fatema[1], **Saif Ullah Munshi**[1], Shahina Tabassum[1], Abdul Mannan Bangal[2], Be-Nazir Ahmed[3]*

[1]Department of Virology, Bangabandhu Sheikh Mujib Medical University, Dhaka;
[2]World Health Organization Regional Office, Dhaka, Bangladesh;
[3]Directorate of Health Services, Dhaka, Bangladesh.

Ecology of Dengue Virus (DENV) is complexed by the presence of 4 serotypes (DEN-1,-2,-3,-4). Some or all of the serotypes may circulate at a time in a particular endemic region. Within any given local population, levels of immunity to each of the 4 serotypes may vary over time. Though DENV infection is currently endemic in Bangladesh, serotyping is performed infrequetly. Presence of all serotypes with predominance of DEN-3 has been reported in some studies. The present study was aimed to determine the co-circulation of different dengue serotypes in Dhaka city.

This study was performed from January'2013 to December'2014 at the Department of Virology, BSMMU, Dhaka. Blood samples were collected from patients of all age groups who were suspected for dengue fever. All the sera were separated and preserved at −70°C and tested for anti-dengue IgM/IgG and dengue NS1 by Immunochromatographic tests. Detection of DENV-RNA and serotyping was performed using Real Time – Polymerase Chain Reaction (PCR) on either NS1 and /or IgM positive serum or serum collected < 5 days of fever.

During the 2-year study period, a total of 537 blood samples were tested and 48.6% (261/537) were positive for IgM or IgG alone or both antibodies or positive for dengue NS1 antigen. Out of 261 dengue cases, 35 (13.4 %) were positive for dengue NS1 antigen, 77 (29.5%) were positive for dengue IgM and 68 (26.0%) were positive for both IgM & IgG antibodies. In addition, dengue-IgG was positive in 29.5% (77/261) of sera. DENV- RNA were detected in 51.4 % (18/35) of NS1 positive, 11.7 % (9/77) of dengue IgM , 2.9 % (2/68) of dengue IgM & IgG and 66.7 % (02/03) of NS1 & IgG positive cases. Out of 89 dengue cases which were either NS1 or IgM positive and/ or serum collected < 5 days of fever, 31 (34.8%) were DENV-RNA positive and 25 (80.6%) of them had DEN-2, 5(16.1%) had DEN-1infection and 1(3.2%) had co-infection with both. Same serotypes were circulating during the whole study period.

This study identified that only two serotypes (DEN-2, DEN-1) were circulating in Dhaka city. DEN-3 was not detected during these 2 years, thus indicating a shift in predominance of DEN-3 to DEN-2 serotype.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Mass Dog Vaccination for Elimination of Rabies in Bangladesh: Piloting and Scaling Up

***Be-Nazir Ahmed*[1]**, *Umme Ruman Siddiqui*[2], *Aung Swi Prue Marma*[3], *Dananjaya Karunaratna*[4], *Md. Sohel Rana*[2], *Md. Kamrul Islam*[2], *Chandan Kumar Sarker*[2], *Sumon Ghosh*[5], *Syed Mohammad Ullah*[2], *Md. Enamul Haque Bhuiyan*[2], *Abdullah Ibne Umar*[2], *Md Rashed Ali Shah*[2], *Aunta Melan*[6], *Md. Sohrab Hossain*[7], *SM Emran Ali*[8], *AKM Shamsuzzaman*[2]

[1]*Microbiology Department, National Institute of Preventive and Social Medicine (NIPSOM), Mohakhali, Dhaka;* [2]*Communicable Disease Control, DGHS, Mohakhali, Dhaka;* [3]*Civil Surgeon, Bandarban;* [4]*World Animal Protection, United Kingdom;* [5]*icddr,b;* [6]*Microbiology Department, Ibrahim Medical College;*[7]*Gazipur City Corporation;* [8]*Infectious Disease Hospital*

Rabies had been a severely neglected zoonotic disease of much public health importance of Bangladesh like other countries of south Asia. The disease used to claim more than two thousands lives annually through over 3 hundred thousand animal exposure principally by dog. More than 80% of around 1.2 million dog population of the country are stray or community own dogs with negligible vaccination coverage against rabies. Bangladesh initiated rabies elimination program targeting the principal transmitter through mass dog vaccination (MDV) as the main strategic objective. The piloting of MDV was done in Cox's Bazaar Municipality in November 2011 by Rabies Elimination Program of Communicable Disease Control (CDC) of Directorate General of Health Services with support and collaboration of World Health Organization, World Society for Animal Protection (WSPA), Department of Livestock DLS), Local Government (LGD) and Ovoyaronno. The MDV was scaled up to cover another municipality and Sadar Upazila of Satkhira District in 2012 with fund of annual development program (ADP) under Operation Plan (OP) of CDC. It was further scaled up in the district municipalities and city corporations of Rangpur, Rajshahi, Dhaka and Sylhet divisions with fund from LGD and support of DLS and WSPA. MDV was further scaled up to cover remaining districts of Chittagong, Barisal and Khulna Division in 2013 and 2014. Other than Dhaka City Corporation all municipalities and city corporations of all the districts were covered. So far, around 100 thousand dogs have been vaccinated with 85% coverage. Snow ball technique was applied for local capacity building. Humane dog catching with ring and net was applied for the first time using cleaners of municipality as dog catcher. International consultant first trained veterinary surgeons and cleaners for vaccinating and catching dogs. They in turn trained cleaners and DLS volunteers in other districts through theoretical and hands on training now creating over thousand expertises in dog catching and vaccinating. Also, CDC recruited and trained 8 veterinary surgeons with financial support of World Animal Protection as MDV Consultant who has the ability to plan and implement MDV nationally and internationally. Bangladesh has now the capability to campaign 3 rounds of MDV of its dog population to achieve elimination of rabies by 2020.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Strategy for Canine Rabies Control and Elimination of Rabies in Bangladesh

Dr. Md. Sohrab Hossain

Veterinary Officer, Gazipur City Corporation,

RABIES SCENARIO IN BANGLADESH: Rabies is one of the most dreadful zoonotic viral infectious disease known to occur from the ancient time and continues to cause the tragic death of human and animal in many countries. Bangladesh is rabies endemic country and for high incidence rate ranks third among rabies prevalent countries of the world. Every year >2000 people and about 25000 animal die of rabies , 200000--300000 people take post exposure prophylaxis and suffer from serious mental trauma Among the rabies victims >50% are children and about 80% are rural people. Now-a-days no other single infectious disease is responsible for so many death like Rabies.

RABIES CONTROL SITUATION IN BANGLADESH: In the past rabies was regarded as a very neglected issue in Bangladesh and very minimum initiatives were taken for its mitigation. But in the recent time rabies control program has gotten new dimension with the change in attitude of the government. Bangladesh Government has started to provide high priority to the problem and has fixed up the goal to eliminate rabies by 2020 adopting modern tools and technologies.

RABIES ELIMINATION STRATEGIES:

1. Public Awareness Building: Public ignorance is one of the main constraints to prevent rabies and the Bangladesh Government has taken steps to improve public awareness through social mobilization program like advocacy meeting, seminar, symposium, press conference and celebration of World rabies day, World veterinary day etc.

2. Dog Bite Management: Rabies is 100% fatal but 100% preventable with timely proper medical care. Government has begun to provide post exposure treatment to all victims exposed to suspected rabid animal at free of charge from district level hospital with cell culture vaccine and Rabies immunoglobulin adopting intra-dermal regimens. From the year 2011 Local government Division (LGD), Ministry of Local Government Rural Development and Co-operatives (MLGRD) has begun to provide financial support to municipalities to procure anti-rabies vaccine for dog bite victims. The initiative has begun to reflect positive impact on incidence of rabies.

3. Canine Rabies Control: Rabies is mainly dog mediated disease and >95% cases of this disease occur from rabid dog. So canine (Dog) rabies control is the key point for elimination of rabies and it can be done by vaccination of dog in programmatic method.

(A) Mass Dog Vaccination: Immunization of 70% dog with anti rabies vaccine develop dog herd immunity that interrupt transmission of rabies among dog and other animal including human and thus helps to eliminate rabies from an area or country. This can be achieved by mass dog vaccination (MDV). Bangladesh Government has decided to develop rabies free dog population conducting MDV.. For elimination of rabies MDV campaign is to be conducted throughout the country in three consecutive years. Conduction of MDV has already been started from the year 2012 and one round program has been completed in all district level municipality and most of the city corporations.

(B) Dog Population Management (DPM): In Bangladesh unvaccinated dog population is very high which causes maximum exposure of rabies and interferes successful conduction of MDV. To reduce dog

population their number is to be minimized and that can be done by dog population management (DPM) adopting (a) Dog birth control, (b) Reduction of food source for stray dog by improvement of solid waste and slaughter house management (c) Humane euthanasia of unexpected dog. Adopting birth control program on 80% dog their population may be brought under selected position. All the City Corporations have taken initiative to conduct MDV & DPM. Gazipur City Corporation is going to start a pilot project on these programs very soon.

Rabies elimination is multifactor issue which cannot be implemented by separate initiative from individual organization and it needs One Health approach from multi-sectoral stakeholder organizations.
.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Risk Factors for Outbreaks of Anthrax in Livestock in Bangladesh

*Najmul Haider[1], Emily S. Gurley[1], Farhana Haque[1], Md. Saiful Islam[1], Sean V. Shadomy[2], Henry Walke[2], **Muhammad Belal Hossain[1]**, Kamal Hossain[1], Ashraful Alam[3], Mahmudur Rahman[3], Nordin S. Zeidner[1]*

[1]International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh:
[2]US Centers for Disease Control and Prevention, Atlanta, GA, United States;
[3]Institute of Epidemiology, Disease Control and Research, Dhaka, Bangladesh

Anthrax is endemic and annually causes outbreaks in Bangladesh. The purpose of this study was to identify risk factors for animal anthrax to guide measures to prevent outbreaks among livestock. Between October 2012 and October 2013, we conducted case-control studies in cattle and goats in four districts of Bangladesh where human cutaneous anthrax outbreaks were identified by government officials. Case-animals were defined as ruminants with an epidemiological link to a human cutaneous anthrax case with evidence of anthrax by either Gram stain and McFadyean reaction and/or characteristic appearance of colonies growing on blood agar medium. We enrolled as controls all ruminants on the 10 farms closest to the case-farm that reported no illness in their animals in the three days before the outbreak at the case-farm. We interviewed owners of all enrolled ruminants using a structured questionnaire to record their feeding, grazing and vaccination histories. We estimated the association between animal exposures and anthrax infection with 95% confidence intervals (CI) using bivariate and multivariate logistic regression, accounting for farm-level clustering. We enrolled 47 case-animals from 33 farms and 403 controls from 180 farms. Compared to controls, infected animals were more likely to be <24 months of age (57% vs. 37%, p=0.02), feed on green grass cut or pulled up from agricultural lands (69% vs.33%, p=0.003), and graze on agricultural lands for a longer period of time in the 24 hours preceding onset of the animal outbreaks (4.3 vs. 1.3 hours, p<0.001). Case-animals were less likely to be vaccinated against anthrax during the past year compared to controls (15% vs. 53%, p<0.001). On multivariate analysis, being fed green grass cut or pulled-up from agricultural lands was independently associated with anthrax infection in ruminants (adjusted odds ratio [AOR]=3.0, 95% CI: 1.1-8.3) and anthrax vaccination in the past year was protective (AOR=0.15, 95% CI: 0.05-0.39). Cut or pulled up grass from agricultural lands can be contaminated with soil containing anthrax spores and this is a potential source of anthrax infection for ruminants. Considering the challenges of avoiding the use of green grass mixed with soil contaminated with spores, we suggest identifying and addressing barriers to increased vaccine coverage.

Day 2: **Noon Session** **Food Safety and Food Security**

Lead Exposure in Bangladesh: A One Health Perspective

Stephen Luby[1], *Saiful Islam*[2], *Sarker Masud Parvez*[2], *Rubhana Raqib*[2], *Scott Fendorf*[1]

[1]*Stanford University;*
[2]*icddr,b*

Children who are exposed to low levels of lead have impaired cognitive development. There is no safe level of exposure. Previous studies identified unexpectedly high blood lead levels among residents of rural Bangladesh. We conducted this study to assess if pregnant women in rural Bangladesh had elevated blood lead levels and to identify the source of any exposure. We enrolled 430 pregnant women from rural communities in Tangail, Mymensingh, Gazipur and Khishoreganj Districts. We collected blood specimens in lead-free tubes and measured blood lead levels using atomic absorption spectrophotometry. The field team visited the 55 women with blood lead levels > 7 µg/ml and the 55 women with the lowest blood lead levels <2 µg/ml and administered a detailed questionnaire on potential exposures. We tested implicated items by x-ray fluorescence. Among the 430 enrolled pregnant women 31% had blood lead levels greater than 5 µg/ml. Women with the most elevated blood lead levels were more likely to report eating food out of the can, having their rice ground in the previous season, using Brand X pesticide on their agricultural crops, and using Brand Y herbicide on their crops. Brand X pesticide had 32 ppm lead by x-ray fluorescence. Rice samples had a mean of 0.6 µg/g of lead. Lead intoxication is widespread among residents of Bangladesh. Rice, the staple crop is contaminated. Reducing the use of lead containing pesticides in Bangladesh would improve child cognitive development.

Day 2: **Noon Session** **Food Safety and Food Security**

Arsenic Contamination of Foodstuffs

Mir Misbahuddin

Division of Arsenic Research, Department of Pharmacology, Faculty of Basic Science and Paraclinical Science, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka

Awareness is focused on the presence of high concentration of arsenic in drinking water. On the other hand, presence of high concentration of arsenic in foodstuffs including rice is usually ignored. However, they contributed one-third of total arsenic consumption. In addition, arsenic contaminated drinking water only affected the endemic areas whereas arsenic in foodstuffs affected the peoples of both endemic and non-endemic areas. Arsenic is known to cause oxidative stress. On the other hand, rice contains hundreds of antioxidants. Total as well as speciation of arsenic in foodstuffs are also done. Among the vegetables, arum contains high concentration of arsenic whereas amaranth, spinach contain low contamination. There are both internal (due to irrigation of rice field with contaminated water) and external (cooking rice once or twice with contaminated water) contamination of rice. In case of drinking water, there is option to shift from red marked tube well to green marked tube well water whereas it is impossible to apply this concept in case of foodstuffs. Therefore, we need to encourage the people to consume low amount of rice, cooking rice with plenty of water and decant the liquid starch, avoid highly contaminated foodstuffs such as arum and take vegetables and spices (maize, amaranth, spinach, garlic) that reduce body arsenic load.

Day 2: **Noon Session** **Food Safety and Food Security**

Pesticide Residue in Food: Bangladesh Perspective

***M. S. Ahmed*[1]*, M. A. Rahman*[1]*, Afroza Begum*[2] *and S. N. Alam*[3]

[1]*Senior Scientific Officer,* [2]*Scientific Officer,* [3]*Chief Scientific Officer*
Entomology Division, Bangladesh Agricultural Research Institute, Joydebpur, Gazipur

Studies were undertaken to detect and quantify the left over residues on food (vegetables, shrimps and dry fish) in Pesticide Analytical Laboratory, Division of Entomology, Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur during 2011–2014. Out of 362 analyzed samples of bean, brinjal, cabbage, cauliflower, bitter gourd, snake gourd, pointed gourd, cucumber, okra and coriander leaf collected from local market of seven regions like Jessore, Jamalpur, Bogra, Narshindi, Gazipur, Comilla and Rangpur region, 23% were found contaminated with insecticides. Most of the samples contained Chlorpyriphos residue followed by Quinalphos, Dimethoate, Fenitrothion and Malathion residues. Quinalphos and Dimethoate were found as multiple residue products representing 8% of the total contaminated samples and the rest 92% contained single insecticide residue. About 24% of the total samples were found to be contaminated with the insecticides in which 15% samples had residue above MRL. Fenitrothion and Malathion were detected in few samples from different regions. However, the detected residue level of Malathion was below the MRL, which might be due to higher rate of degradation. Among 49 analyzed shrimp's samples collected from Khulna and Chittagong regions, residues were detected in 7 samples, only one of them was above MRL. A total of 43 samples of dry fish (Loitta, Kanchki, Mola, Paysha & Chepa.) were collected from different markets of nine regions viz. Chittagong, Khagrachori, Rangpur, Bogra, Dinajpur, Jamalpur, Jessore, Mymensingh & Lalmonirhat for the quantification of pesticide residues. Among them, 32 samples contained detectable residue. About 74% of the total samples contained pesticide (Aldrin, Dieldrin & DDT) residues irrespective of single or multi product residues of which 51% samples were of above MRL. Sixty per cent samples contained single insecticide residue and 14% samples had multi product residues. Residue of all dry fish collected from Chittagong & Khagrachori were in above MRL (>0.1ppm). Highest residue of pesticide i.e. Aldrin was detected in Chepa dry fish from Rangpur (2.23ppm) region. Hence, dry fish samples contained different concentrations of Aldrin, DDT & Dieldrin residues indicating unrestricted, unplanned and whimsical use of Organochlorin pesticide for controlling infestation during processing and storage. So, the increasing trend of pesticide residues in food with single and multiple residues is very alarming to human food safety.

Day 2: **Afternoon Session** **Eco-Health and Bio-Security**

Thematic Session Keynote Presentation

An Ecological Framework to Understand and Rank the Spillover Potential of Novel Animal Viruses

Kevin J. Olival[1] *and PREDICT Consortium*

[1]*EcoHealth Alliance, New York, NY, USA;*

In addition to integrating human, domestic animal, and wildlife health studies, a complete One Health framework also links together ecological and natural history investigations. The connection between biodiversity and disease emergence is not always clear. In some schools of thought, e.g. the dilution effect, greater levels of biodiversity can buffer against disease emergence. In other theories, increasing biodiversity actually can increase the risk of zoonotic disease emergence due to a larger number of potential pathogens in the 'zoonotic pool'. Our work supports the latter hypothesis, but also shows that the risk of zoonotic emergence is not uniform across mammalian host species. Furthermore, regardless of the number of viruses or bacterial strains that exist in wildlife in a given area, it is largely ecological dynamics (e.g. human-induced ecological change like land-use change, hunting, and markets) that likely drive the emergence of new pathogens. I will present work ongoing at EcoHealth Alliance under the USAID PREDICT project to model and understand the ecological and host (biodiversity) factors that lead to disease emergence. This will include our revised 'Hotspot' models for EIDs, and preliminary data from the 'Deep Forest' project that seeks to define the relationship between biodiversity, land-use change, and human behavioral practices on three continents around the world. Lastly, I will discuss how we move from field surveillance in wildlife, to novel pathogen discovery, to developing a meaningful and generalizable framework for ranking the risk of disease spillover to humans. This risk assessment framework, still under development as part of PREDICT, combines a series of independent emerging infectious disease risk models and other metrics, to quantify spillover risk from newly discovered by not fully characterized viruses.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

PREDICT Bangladesh: Models for Global Pandemic Prevention

Ariful Islam[1] *and the PREDICT Consortium*

[1]*EcoHealth Alliance New York, NY, USA;*

The Emerging Pandemic Threats (EPT): PREDICT program began in 2009 and was designed to create an early warning system for detecting novel zoonotic diseases in parts of the world most vulnerable to disease emergence. PREDICT works with local partners in EID hotspots, including Bangladesh, to characterize viral diversity in key wildlife species; to identify high risk interfaces where viral spillover is most likely to occur; and to identify and assess novel viruses most likely to impact human health. Under PREDICT2 (2014-2019), in collaboration with EPT partners and the Government of Bangladesh, will use a combination of longitudinal biological, ecological, and behavioral surveillance efforts in human-animal interfaces to monitor spillover of viruses within key viral families (paramyxoviruses, coronaviruses, filoviruses, and influenza viruses) from wildlife into livestock and human populations to characterize risk factors for viral evolution, pathogen amplification and spread.

PREDICT1 surveillance in Bangladesh consisted of the non-destructive sampling of wild bats, rodents, and primates (taxonomic groups highly associated with zoonotic viruses). Samples included those collected during the PREDICT1 project as well as archived samples from other projects. Blood, saliva, urine, and feces, were tested using viral family-level PCR assays for previously undescribed ('novel') viruses. Using an epizonal approach, PREDICT 2 will focus on surveillance at transboundary livestock trade routes and in areas where wildlife, people and livestock have frequent contact. Both molecular and serological assays will be used to determine whether spillover has occurred in these contexts.

Samples from a total of 5,796 animals (4,110 bats, 732 rodents and shrews, 543 nonhuman primates and 411 other taxa) were collected. A total of 2,435 bat samples were tested by PCR for 11 viral families, 840 rodent and shrew samples were analyzed by PCR for 10 viral families, and 466 nonhuman primate samples were analyzed by PCR for 34 viral families and genera. We discovered 50 novel and 5 known viruses (based on clade analysis) from bats, 20 novel viruses from rodents and 184 viruses from 14 viral families from Rhesus macaques. We estimated the approximate viral diversity in the Indian flying fox (*Pteropus giganteus*), a native frugivorous bat and the natural reservoir for Nipah virus. We trained 30 individuals in topics including zoonotic diseases, sampling methodology, human and animal safety during wildlife capture, personal protective equipment (PPE), and laboratory methodology and safety.

The PREDICT program uses a collaborative One Health approach to build capacity for detection and characterization of novel wildlife viruses and to improve the understanding of the dynamics of zoonotic virus spillover, evolution, amplification, and spread in order to inform prevention strategies and reduce the risk of disease emergence.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Eco-Friendly Management of Different Diseases of Tomato, Carrot, Pea and Potato by *Trichoderma* Fortified Compost

Md. Khurshed Alam Bhuiyan

Professor, Department of Plant Pathology, Bangabandhu Sheikh Mmujibur Rahman Agricultural University, Gazipur

The effect of Trichoderma fortified compost at different concentrations in reducing different diseases as well as in increasing growth promotion and yield of tomato, carrot, pea and potato was studied in the research field of Bangabandhu Sheikh Mujibur Rahman Agricultural University. The antagonism of the Trichoderma harzianum isolate TH 7 among the tested 100 isolates of T. harzianum was found to be best and most stable in its antagonistic character and observed more than 90 % growth inhibition in dual plate culture against all the tested pathogens including Colletotrichum spp., Fusarium oxysporum, Rhizoctonia solani and Sclerotium rolfsii. Based on the confirmation of the preliminary study the highly antagonist T. harzianum isolate TH 7 was selected to prepare the Trichoderma fortified compost. In the field experiment, post emergence seedling mortality was completely free where wheat grain colonized Trichoderma fortified compost at 300g per 2 x 1.5 m2 per plot was applied. All other doses of Trichoderma fortified compost also reduced the seedling mortality where only compost was used without Trichoderma. Similarly, field diseases at different stages of the crops by various pathogens were also significantly reduced. All the treatments significantly increased the growth parameters including root length, root diameter, fresh root weight, dry root weight, dry shoot weight, plant height, number of leaves and branches, fresh shoot weight and dry shoot weight over the control treatment. Total yield was also increased with the application of Trichoderma fortified compost at different concentrations in all the treatments comparison to the untreated control where soil was not supplemented with Trichoderma fortified compost or only compost and Trichoderma. Application of only compost appeared to be superior in comparison to the application of only wheat grain colonized Trichoderma in reducing the diseases and in increasing the yield of the crops.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Outbreak of Acute Encephalitis among Children Living Near Lychee Orchards in Northern Bangladesh

***M. Saiful Islam*[1]**, *Ahmad Raihan Sharif [2], Hossain M. S. Sazzad[1], A K M Dawlat Khan[1], S M Murshid Hassan[1], Shirina Akhter[1], Golam Dostogir Harun[1], Stephen P. Luby [1,3], James Heffelfinger[1,4], Mahmudur Rahman[2], Emily S Gurley[1]*

[1]*icddr,b;*
[2]*Institute of Epidemiology Disease Control and Research (IEDCR), Dhaka, Bangladesh;*
[3]*Stanford University, Stanford, CA, USA*
[4]*US Centers for Disease Control and Prevention, Atlanta, GA, United States*

In June 2012, a cluster of sudden deaths among children aged 2-10 years was reported from northern Bangladesh. In response, a team from the Government of Bangladesh's Institute of Epidemiology, Disease Control and Research and icddr,b conducted an investigation to describe clinical and exposure histories of cases to generate hypotheses about possible causes of illness; the minimum criterion for classification as a suspected case was presence of convulsion. We reviewed hospital records to identify cases and interviewed family caregivers about the symptoms and exposures the case had. Since many case-households were located adjacent to lychee orchards, the team collected information on the types of pesticides used in the area and case-patient exposures to the orchards and lychees. Fourteen children met the case definition; 13 (93%) died and the median time from illness onset to death was 20 hours. For 64% of cases, the illness started with a sudden outcry in the early morning followed within hours by convulsions and unconsciousness. The most common signs were convulsions (100%), unconsciousness (86%), frothy discharge from the mouth (86%), altered mental status (71%) and fever (70%). Four children had mid-dilated or fixed pupils and six had lung crepitations on auscultation. In the 24 hours before illness onset, all of the cases had either visited lychee orchards (n=11) or consumed lychees (n=7) where multiple pesticides including insecticides, fungicides and other chemicals were used at least three times during the preceding two weeks. Eight case-households bordered lychee orchards, and five case-households were located within approximately 100 meters of a lychee orchard. Caregivers reported that many cases peeled lychee fruits with their teeth and ate unwashed lychees. The clinical manifestations and course of illness of cases suggest that this outbreak was due to poisoning, likely from pesticides used in nearby lychee orchards. Close proximity of the case-households to lychee orchards, heavy use of pesticides in the orchards, and the children's exposure to lychee orchards and fruit increased their exposure to agricultural chemicals. Interventions are needed to limit children's exposures to dangerous agricultural chemicals pesticides. In South Asia, repeated outbreaks of child encephalitis during lychee harvesting season have been reported in with undetermined etiology, which could be similar to what we observed in Bangladesh.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Breeding Ecology of Yellow-Wattled Lapwing, Hooded Pitta and Slaty-Legged Crake in Selected Areas of Bangladesh

Abu Nasar Md. Aminoor Rahman

Department of Gynecology, Obstetrics & Reproductive Health, Faculty of Veterinary Medicine & Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur-1706

Breeding ecology of Yellow-wattled Lapwing and Hooded Pitta (uncommon), and Slaty-legged Crake (rare) birds are not yet studied in Bangladesh. Therefore, the present investigation was aimed to study the egg characteristics, nest size and different biometry of nestlings. Biometric parameters were measured by varnire calipers and measuring scale and weight were taken using a mobile digital balance. Results indicated that the length and width of Yellow-wattled Lapwing eggs were 3.34±0.16 and 2.51±0.13 cm, respectively. Egg weight at laying was 13.70±0.46 g and reduced to 12.74±0.79 g at day 10. Mean egg production per bird, hatching rate and incubation period were 3.50, 42.86% and 28~29 days, respectively. Mean length and depth of nest were 12.6 and 3.25 cm, respectively. Length, height and weight of nestlings were 7.47±0.39 cm, 6.53±0.83 cm and 9.27±0.50 g, respectively. In Hooded Pitta, egg length, width and weight at laying were 2.86±0.57 cm, 1.85±0.29 cm and 5.58±1.07 g, respectively. Weight of nestling at hatching was 4.56±0.83 g and at days 8-9 was 35.50±4.50 g, which increased to 75.70±15.20 g at days 12-14. Mean egg production per bird, hatching rate and incubation period was 5.67, 88.24% and 14 to 19 days, respectively. In Slaty-legged Crake, egg length, width and weight at laying were 3.18±0.28 cm, 2.40±0.27 cm and 13.42±1.95 g, respectively. Mean egg production per bird was 5.50. Weight of nestling at hatching was 4.56±0.83 g. Hatching rate and incubation period were 93.93% and 19 to 21 days, respectively. Weight of nest was 62.4±12.6 g. In conclusion, biometric measurements of eggs, nests and nestlings of one uncommon and two rare birds are figured out. Further study is needed to study breeding biology, pattern and behavior; nesting sites, type and materials and breeding frequency of those birds in detail.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Proximity to Pig Populations as a Key Risk Factor for Japanese Encephalitis Disease; Results of a Five-Year Surveillance Study from Northwestern Bangladesh

***Henrik Salje**, Salah Uddin Khan, Abu Hannan, M. Atiqul Islam, A.A. Mamun Bhuyan, M. Ariful Islam, M. Ziaur Rahman, Nazmun Nahar, M. Jahangir Hossain, Mahmudur Rahman, Stephen P. Luby, Emily S. Gurley*

Japanese encephalitis (JE) is a mosquito-borne virus that causes severe disease in humans with 10-20% case fatality. It is the commonest cause of encephalitis in Bangladesh. Humans are dead-end hosts; the natural reservoirs for JE are wading birds. Pigs are amplifying hosts, so the distribution of pig populations may be particularly important for human disease risk. Previous studies have shown that the highest incidence of human JE infections occurs in northwestern Bangladesh, where JE is also endemic among pigs. The objective of this study was to explore proximity to pigs as a risk factor for human JE disease in Bangladesh. We first geocoded the locations of residence for all JE patients identified through hospital-based surveillance in Naogaon, Chapainawabganj, and Rajshahi districts in northwestern Bangladesh between 2007 and 2011. Next, we used data from a 2009 pig census in these areas to map all pig raising households. To explore the impact of proximity to pigs as a risk factor for JE disease we compared the odds of a human JE case living within a set distance of a pig-raising household to that of a randomly selected control population, generated using random draws from the distribution of all humans in the area. We identified 81 human JE cases from throughout the region, with a mean age of 32 years (range: 0 - 75 years); 11% died. Disease patterns were highly seasonal with 90% of cases occurring between the months of August and November. Humans infected with JE were 2.7 times more likely to live within 500m of a pig-owning household compared to controls (95% confidence interval [CI] 1.3 – 4.6) and 1.7 times more likely to live within 5km (95% CI: 1.0 – 3.7). Results from this analysis suggest that proximity to pig populations is an important risk factor for human JE disease in northwestern Bangladesh. JE vaccination is not currently included in the Bangladesh immunization program; therefore, interventions to reduce infections among pigs could be an important strategy for reducing human risk in these areas and should be explored.

Day 2: **Morning Session** **Neglected Tropical Diseases and Zoonoses**

Milk Ring Test and Conventional PCR for Diagnosis and Control of Brucellosis in Cow Milk in Bangladesh

***Md. Abu Sayeed Sarker*[1]**, *Md. Siddiqur Rahman[1], Md. Taohidul Islam[1], Md.Bahanur Rahman[2], Md. A.K.M Anisur Rahman[1]*

[1]Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh
[2]Department of Microbiology and Hygiene, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh.

Brucellosis is a disease of domestic and wild animals that can be transmitted to human. It is a recognized public health problem with worldwide distribution and one of the major causes of morbidity. Brucellosis is caused by small non motile gram negative and intracellular coccobacilli belonging to the genus Brucella. Prevalence of brucellosis in cattle might constitute a significant hurdle for the development of livestock in Bangladesh. So early and accurate diagnosis is important for under taking an effective control measure against brucellosis .The classical serological test like MRT (Milk Ring Test) and RBT (Rose Bengal Teat) are known to produce cross reaction with other gram negative bacteria having antigenic similarities with Brucella and therefore sometimes produce false positive reaction. In this present study, all collected milk samples from cows were tested by MRT and PCR for diagnosis of brucellosis. A total of 71 milk samples from cows with unknown status of Brucella collected from Central Cattle Breeding and Dairy Farm, Savar, Dhaka between August to October 2013. The objective of the present study was to diagnose brucellosis in cow milk by MRT and PCR. For this research 71 raw cow milk samples were collected from Central Cattle Breeding and Dairy Farm, Savar, Dhaka. Among these samples 7(9.85%) were found positive in Milk Ring Test. Brucella abortus DNA was determined by amplification of alkB gene and only 3 (4.22%) milk samples were found positive in PCR. These results strongly suggest that the use of PCR technique could lead to more reliable diagnosis of brucellosis from cow's milk samples.

Day 3: **Morning Session** **Open Papers**

Assessing Dairy Cattle Welfare Using Farm Condition, Animal Based Measurements and Physiological Indicators

***Al-Amin*[1]**, *Md. Jahirul Islam*[1], *Amir Hossan Shaikat*[1], *Sharmin Chowdhury*[1],*Shohel Al Faruq*[1], *SKM Azizul Islam*[1], *Mahmudul Hassan*[1], *Belayet Hossain*[1], *Joe Mac Regenstein*[2], *Mohammad Rashedul Alam*[1]

[1]*Chittagong Veterinary and Animal Sciences Universality, Chittagong, Bangladesh*
[2]*Cornell University, Ithaca, New York, USA*

A scientific study of dairy welfare in Bangladesh needs to be done. Consistent with the rising quality of life and higher education level of people in Bangladesh, interest in dairy cattle welfare is slowly emerging. Therefore, a cross-sectional study was conducted to assess the present welfare status of high producing dairy cows at the farm level. Thirty six commercial dairy farms in Chittagong Province provided 1110 individual cows for inspection from October 2013 to September 2014. Blood sampling was done for 100 cows to assess their physiological state using blood biochemical profiles. The study showed that most of the farms used an intensive system (75%) and 50% of the farms used the face-in system. A little over 36% of the farms had clean floors for the animals while 47% and 17% of the farms were moderately dirty or dirty, respectively. Drainage systems were not satisfactory on some farms and manure disposal often led to heavy fly infestation (33%).Good indoor ventilation and proper grazing facility were observed on 33 and 25% of the farms, respectively. Hock, claw, and hoof abnormalities were found on 30, 37, and 28% of animals, respectively, whereas injuries were observed for 19% of the cows. Lameness was at 12%; tick infestations and stereotypy behaviors were 15 and 14%, respectively. The study showed that 25% of the injuries occurred in face-out rearing systems, which was 1.80 times more risky than the face-in systems. Moreover, cows on farms with bad drainage systems were 2.37 times more likely to have injuries compared with cows reared on farms with good drainage systems. It was also observed that hock and hoof abnormalities were significantly ($p<0.05$) associated with the quality of such elements such as floor type, floor cleanliness, presence of rubber pads and quality of the drainage systems. Of concern was the observation that 100% of the dairy cows had low calcium and potassium levels outside the accepted range. The electrolytes status in the serum of these animals also was of concern. About 62 and 91% cows, respectively, had high cholesterol and triglycerides values. These results suggest that dairy cow welfare is compromised. Hopefully, the findings of current study will assist farmers as well as government to take proper measures to improve the well-being of dairy cows.

Day 3: **Morning Session** **Open Papers**

Emergence of Multidrug Resistant Zoonotic *Salmonella* Spp. from Poultry of Savar, Bangladesh

***Md. Showkat Mahmud*[1, 2]**, *Munawar Sultana*[2], *Md. Anwar Hossain*[2]

[1]*Bangladesh Livestock Research Institute, Savar, Dhaka*
[2]*Department of Microbiology, University of Dhaka, Dhaka-1100, Bangladesh*

Salmonellosis is one of the major concerns in the poultry industry that hindered its development in Bangladesh. Some serovars of Salmonella spp. are involved in zoonosis. It constitutes a major public health burden and represents a significant cost in many countries. Therefore, a cross-sectional study was conducted to determine the seroprevalence of Salmonella in poultry, drug-resistant patterns, variability in infectivity and mortality rate of birds, predilection of some serovars to cause zoonoses and molecular characterization of poultry Salmonella isolates. The average seroprevalance of Salmonella in three different age groups was found to be 37.9%. A total of 503 samples were examined over a period of one year from five different poultry farms of a semiurban area of Savar, Dhaka, Bangladesh. The prevalence of Salmonella was recorded to be 13.3%. The isolates were identified by conventional cultural and biochemical methods, serotyping and Salmonella specific PCR using, inv A, sef A and fli C primers. Salmonella was found high in dead birds (29.9%) than live birds (9.9%). Salmonella infection was higher (15.6%) in summer than that of rainy (12.9%) and winter (7.1%) seasons. Among the 67 positive (from 503 samples) isolates, 44 belong to serogroup B (66%) and 23 isolates to serogroup D (34%). The highest Salmonella infection was recorded as 47.92% for the 30–35-week-old birds. Drug resistance patterns of the isolates were observed by disc diffusion method using twenty eight antimicrobial agents. Antibiogram of the 67 salmonella isolates revealed different phenotypic expressions acquiring 40 to 100% of most prevalent drug resistance belonging to 10 classes of drugs concurrently. Among the isolates, 44 (66%) harbored different number of plasmids (1– 4) with size variation between >1.63 and >40 kb and rest 23 (34%) isolates were plasmid free. PCR of sixty seven isolates using Salmonella specific primers ascertained 67, 17 and 4 isolates to be invA, sefA and fliC gene positive. Genotyping using Random Amplified Polymorphic DNA (RAPD) and Amplified Ribosomal DNA Restriction Analysis (ARDRA) differentiated three distinct genetic varieties indicating no single source of infection. Sequencing of representatives from each genotype detected close similarity to S. Enteritidis, S. Typhimurium and S. Heidelberg within the poultry samples indicating significant zoonotic hazard. And so, emergence of such multidrug resistant zoonotic Salmonella is indicative of devastating situation of poultry farms in Bangladesh and a potential threat to public health.

Day 3: **Morning Session** **Open Papers**

Epidemiological Investigation of Bovine Tuberculosis in Dairy Cattle in Chittagong, Bangladesh

***Mohammad Belayet Hossain**, Md. Masuduzzaman, Mohammad Alamgir Hossain, Mamun Khan, Md. Ahasanul Hoque*

Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh

Bovine tuberculosis (bTB) is a zoonotic bacterial disease. The world-wide prevalence of bTB is quite high. Structured epidemiological studies on bTB have been sacred to estimate true status of bTB in cattle population and assess the potential public health risk in Bangladesh. Hence, a cross sectional study was performed on dairy cattle farms in Chittagong Metropolitan and its adjacent upazillas (sub-districts) during June 2014 with the aim of estimating the prevalence and sero-prevalence of bTB in dairy cattle and the associated risk factors. A total of 37 dairy cattle farms were randomly selected (N=92) of which 22 were from Double Mooring (n=64); 10 were from Shikal Bha (n=19); 5 were from Rawjan (n=10). First tuberculin test was performed on 847 eligible cattle belonging to 37 farms and the second tuberculin test was applied to the cattle reactive to the first tuberculin test. A total of 450 blood samples were obtained (N=847) for estimating seroprevalence of bTB using ELISA. Epidemiological data (Farm and individual animal) were also recorded using structured questionnaire. Data were stored in MS Excel 2007 and exported to STATA 13 for statistical analysis. The overall prevalence of bTB was 81.1% (N=37 farms) and 13.2% (N=847 animals) (according to first tuberculin test) and 35.1% (N=37 farms) and 6.1% (N=777 animals) (according to second tuberculin test). The overall sero-prevalence of bTB was 6% (N=450 animals). Potential risk factors associated with the prevalence of bTB along with their applications will be presented in the One Health Conference 2015.

Day 3: **Morning Session** **Open Papers**

Detection of *Coxiella burnetii*, the Causal Agent of Q Fever, in Small Ruminants at Northern Barind Tract, Bangladesh

***Md. Hemayatul Islam*[1]**, *Md. Jalal Uddin Sarder*[1], *Moizur Rahman*[1], *Md. Shofinur Rahman*[2]

[1]*Department of Animal Husbandry and Veterinary Science, University of Rajshahi*
[2]*Youth Training center, Naogoan*

Q fever is a zoonotic disease which infects human and domesticated animals all over the world. The main clinical manifestations of Q fever in goats and sheep are abortion and stillbirth. The present study was carried out on 327 small ruminants (sheep and goats) to determine the prevalence of Coxielosis in northern barind tract by ELISA test. The study areas were Rajshahi, Natore, Naogaon and Chapai Nawabgonj district. The effect of species, age and sex on prevalence of coxiellosis was also determined. From a survey on disease occurrence of small ruminants, 457 reproductive disorders were identified. The samples of 327 aborted cases were send to the the Friedrich-Loeffler-Institute, Germany for Q fever test. Statistical method chi-squire test was performed with SPSS program by using descriptive crosstab analytical tools. The results showed that 10.1% of small ruminants in northern barind tract, Bangladesh were sero-positive to Coxiellosis. Infection in goat (4%) was lower than in sheep (6.1%). There was no statistically significant (P>0.05) effect of sex and age on Coxiellosis. Female (7.6%) showed high infection rate than male (2.4%). Likewise, older animals (5.5%) were highly susceptible than young (3.4%) and kids (1.2%). The Coxiellosis is the first time report in small ruminants in Bangladesh. It was also found that species, age and sex influence the Coxiellosis in small ruminants.

Day 3: **Morning Session** **Open Papers**

Isolation, Molecular Identification and Age Dependent Antimicrobial Susceptibility Profile of *Salmonella* Species from Broiler Chickens in Jamalpur District of Bangladesh

*Amitav Sarker, **S. M. Lutful Kabir**, M. Tanvir Rahman*

Department of Microbiology and Hygiene, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

The present study was designed to isolate, characterize and determine antibiogram profile of Salmonella spp. from apparently healthy broiler chickens of different age groups (7, 14, 21, and 28 days respectively). A total of 60 cloacal samples (15 from each age group) were collected from commercial broiler chickens randomly during the period from July 2014 to December 2014. Isolation of Salmonella spp. was carried out by cultural, biochemical and PCR based approach. Later antibiogram studies of these isolated Salmonella spp. were carried out by disc diffusion method against 5 commonly used antibiotics. Out of total 60 samples (15 from each age groups) over all 38 (63.33 %) were found positive for Salmonella spp. Highest prevalence (80%) was found at day 21 and lowest (40%) was in day 7. All the isolates (100%) were found to resistant against ampicillin followed by azithromycin 50%, 77.77%, 66.66%, and 72.72% at 7, 14, 21, and 28 days respectively. Furthermore, all the isolates (100%) were found sensitive to cefixime followed by gentamicin 100%, 77.77%, 83.33%, and 72.72% at day 7, 14, 21 and 28 days respectively. To conclude, antibiotics cefixime could be used at any age groups (at 7, 14, 21 or 28 day) and in case of gentamicin, it could be used at 7, 14 and 21 days and in case of norfloxacin it could be used at 14 and 21 days for the treatment of clinical cases of salmonellosis in broiler in the study area.

Day 3: **Morning Session** **Open Papers**

Elimination of Rabies in Bangladesh: One Health Approach

***M. Salim Uzzaman*[1]**, *Be-Nazir Ahmed*[2], *S M Emran*[3], *Md. Sohel Rana*[4]

[1] *IEDCR, DGHS;*
[2] *NIPSOM;*
[3] *IDH, Dhaka;*
[4] *CDC, DGHS*

Rabies is an infectious disease of thousand years, but it remained a neglected viral Zoonotic disease that occurs in >100 countries and territories of the world. Although a number of carnivores and bat species serve as natural reservoirs, rabies in dogs is the source of 99% of human infections and poses a potential threat to >3.3billion people according to WHO. In humans, rabies is almost invariably fatal once clinical symptoms have developed. Worldwide around 60,000-75,000 people die due to rabies every year.

Bangladesh is a small country of 147, 570 sq.km, with total population of 15.1.5 million. Estimated total dog population is 1.2 million with 83% stray, estimated annual Human bite by dog is more than 200,000. It is a neglected tropical disease of high public health importance; the estimated animal bite is 166,590 with 2100 rabies cases death annually (Hossain et al, 2011). Most of the victims are under 15 children hailing from rural poor community. Lack of animal bite care awareness, unavailability and inability to modern bite-management for post-exposure prophylaxis (PEP), large number of stray unvaccinated dog population are the most important causes for huge number of rabies cases. Rabid Dog-bite is the main animal responsible for this disease, followed by rabid mongooses, jackals' cats and monkeys.

Since 2010, Disease Control Unit, of DGHS, MoHFW has given emphasis on the deadly preventable disease. The government has formed National Steering Committee, Joint Coordination committee and Technical working group for effective elimination program. National strategic plan with goal of elimination of Rabies by 2020 has been developed; involvement of multilevel and multisectoral stakeholders (from MoHFW, MOLDGR&C, MoF&L, MoPE, MoInf.) with One-health approach has been ensured. Other working partners included NGOs, Civil society organizations and international organizations. Accordingly Intra-dermal Cell culture rabies vaccination (ID-CCV) has been introduced in all the district at "District Rabies Prevention and Control centers" of Bangladesh free of cost. The Nerve tissue vaccine (NTV) is history, no longer used in Bangladesh. Rabies Elimination national Strategic components includes Social Awareness & Mobilization, Modern Management of dog bite by tissues culture vaccine and RIG if necessary, Mass dog vaccination (MDV) program including pets and Dog population control (DPC) by sterilization of female dogs.

Now Bangladesh is looking way-forward to scaling up of the integrated approach of Rabies elimination throughout the country with multisectoral collaboration and involvement through one Health approach.

Day 3: **Noon Session** **Capacity Building**

Thematic Session Keynote Presentation

A Journey towards a One Health Movement in Bangladesh

***Nitish C Debnath*[1]*, Md Mahmudur Rahman*[2]

[1]*Emergency Centre for Transboundary Diseases (ECTAD), FAO Bangladesh*
[2]*Institute of Epidemiology and Disease Control Research (IEDCR), Directorate General of Health, Bangladesh*

The One Health approach in Bangladesh builds on the work of avian influenza preparedness and response. The scope has then been widened and marked by a change from avian influenza to other emerging diseases with a broader remit to consider the implementation of One Health principles to emerging infectious diseases. The energy and drive came from a group of interested professionals who formed an organization, 'One Health Bangladesh', that provides a forum for discussing the concept of One Health and its relevance for controlling emerging and re-emerging diseases. As the advocacy has been continuing through meetings, seminars and conferences, a second phase towards building effective relationship and ownership of collaborative effort to practice One Health approach has emerged among the stakeholders through undertaking joint disease outbreak investigation and surveillance at human-animal-enviornmental interface including avian influenza, Nipah, rabies and anthrax. Over the last six years, implementation of Bangladesh Laboratory Response Network and application of four-way linking approach, One Health training including Field Epidemiology Training programme, establishing CDC's Global Disease Detection Centre, launching programme for rabies elimination from Bangladesh by 2020 and dog population management, One Health Young Voice and community-based conservation programme, establishment of One Health Institute at Chittagong Veterinary and Animal Sciences University, improvement of live bird market and application of One Health approach in food safety have created a momentum for practicing One Health approach in Bangladesh. Through this progression, a consensus was developed for Bangladesh to benefit from a One Health approach with some degree of institutionalization within the government systems and targeted activities. With this view, relevant Ministries of the government jointly with UN agencies- FAO, WHO and UNICEF developed a Strategic Framework for One Health approach and Action plan. Consensus is being developed to establishing One Health Secretariat with the objective to make continuous and sustained progress of One Health activities. This is how Bangladesh is moving towards a One Health movement for the health and well-being of all species.

Day 3: **Noon Session** **Capacity Building**

One Health Epidemiology Fellowship Program: Building Future One Health Leadership And Capacity In South Asia

***Sithar Dorjee*[1]**; *Peter D Jolly*[1]; *Joanna S McKenzie*[1]; *Mahmudur Rahman*[2]; *Mahbubur Rahman*[2]; *Ahasanul Hoque*[3]

[1]*International Development Group, Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Palmerston North, New Zealand*
[2]*Institute of Epidemiology, Disease Control and Research, Dhaka, Bangladesh*
[3]*Department of Medicine and surgery, Chittagong Veterinary and Animal Sciences University, Chittagong, Bangladesh*

Following the successful completion of a four-year Regional Training Programme in Animal and Human Health Epidemiology for doctors and veterinarians across seven South Asian countries, Massey University of New Zealand is implementing a follow-on One Health Epidemiology Fellowship Program in Afghanistan, Bangladesh, Bhutan and Nepal. The program is funded by the European Union through the EuropeAid One Health Program in Asia. The objectives of the project are: (a) to provide formal postgraduate training in human, animal, and wildlife disease epidemiology and develop local language teaching materials for national implementation in Afghanistan, Bangladesh, Bhutan and Nepal; (b) to undertake pilot investigations of zoonoses to determine national priorities then learn how these approaches can be applied to a wider range of diseases, and; (c) to build and strengthen collaborative relationships within and between countries by integrating project participants into One Health Hubs that have already been implemented in the Region. The 24 participants are studying together through Massey University for Master's degrees in One Health epidemiology and biosecurity. They will then apply the knowledge gained by undertaking collaborative research on four prioritised zoonotic diseases in each of the countries to provide information to support the development of national policy and decision making. Fellows are also working with key national institutions in each country to develop educational programs to sustain the training and capacity building in the region to prevent and manage zoonotic diseases effectively using a One Health approach. Together with the collaborating organisations in each country, this One Health fellowship program is helping train future leaders and is promoting collaborative relationships and networking between the human health, animal health and wildlife health professions within and between countries to develop and implement effective zoonosis detection and control programs. In this presentation we will provide an overview of the program and share the regional, national and fellow's perspectives and experiences to date.

Day 3: **Noon Session** **Capacity Building**

Fighting Zoonoses in Afghanistan, Bangladesh and Nepal: Concept and Progress of the One Health Initiative in Asia

Dr. Resham Prasad Acharya,

Relief International

Relief International's One Health Asia programme works to alleviate the impact of zoonoses on fragile rural populations. The three year project (2014-2016) is funded by the European Union under their One Health Programme in Asia. The project was designed to tackle the spread of infectious diseases at the interface between animals, humans and their various environments. In order to address the problem, three specific objectives were formulated:

1. Create awareness and behavior change,

2. Develop prevention and response capacity of communities, government departments and academia,

3. Integrate Zoonoses surveillance within existing government regulations.

To achieve the specific objectives of the project, the project's main focus are on awareness raising and capacity building activities. This intervention targets on most vulnerable populations including women, girls and youths in rural communities, community health workers, veterinarians and paravets, medical and para medical professionals, environment officials, education officials and University research scholars. To ensure sustainability and to institutionalize the efforts of the project; formation of project support committees, youth clubs and school health clubs are planned at the community level. The project will also create nine district, three provincial/regional/divisional, and three national level Zoonotic Control Associations (ZCAs) as well as an Asia Regional Zoonoses Network. These committees/associations are the forums through which to implement the project and to advocate for zoonotic diseases awareness and action at policy level. The aim of these advocacy efforts is to generate wider support in government circles for the integration of zoonotic diseases into the public health agenda. The associations will also help oversee the integration of grassroots level surveillance with the district and national systems.

This project started on the 1st of January, 2014 with an intensive inception phase. A series of visits, meetings and consultations with key personnel from the relevant Ministries, Departments and Offices at district, regional/divisional/provincial and central levels were organized to educate and ensure buy in for project activities and to explore opportunities for collaboration. Community groups and clubs are being formed, and meetings have been organized among members to initiate the awareness raising campaign in the communities. As an NGO led initiative, the participation of the Afghan, Bangladeshi and Nepalese governments is a priority to ensure ownership and sustainability of the project.

Day 3: **Noon Session** **Capacity Building**

One Health Capacity Building: Roles of Chittagong Veterinary and Animal Sciences University

Md. Ahasanul Hoque[1], *Nitish Chandra Debnath*[2]

[1]*Professor of Veterinary Epidemiology and Dean of Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University;*

[2]*Emergency Centre for Transboundary Diseases (ECTAD), FAO Bangladesh*

Globally sporadic to systematic One Health activities have been occurring. In this region, Bangladesh has been performing better One Health activities by developing the strategic plan, conducting coordinated disease surveillance, research and training programmes, and organizing grand international conferences. Chittagong Veterinary and Animal Sciences University (CVASU) is always being involved with every One Health exercise and activities in this country since 2007. As a part of central One Health movement and the future sustainability of its activities, CVASU has specifically been focusing on those activities that can facilitate One Health educational opportunities and in order to do this CVASU Syndicate has already approved to establish One Health Institute in its campus. In addition CVASU has a running Masters (MS) programme in Epidemiology and is, with the support of OIE and others, planning to open up a Field One Health Epidemiology MS programme. CVASU has also on-going One Health educational and research collaborations with national and international institutes (such as IEDCR, USTC, FAO, Massey University-New Zealand, Deakin University-Australia and The Royal Veterinary College, UK). Besides, CVASU has regularly been organizing one health workshop and training programmes with the collaboration of our national and international partner organizations. With the aforementioned activities it is hoped that One Health skills and capacities will certainly be enhanced in the future.

Day 3: **Noon Session** **Capacity Building**

Community Engagement for Sustainable One Health Movement: A Concept

Md. Abul Kalam

National Project Coordinator, Improving food security of women and children by enhancing backyard and small-scale poultry production in the southern delta region, Food and Agriculture Organization

Principles of one health highlight the need to incorporate the broader interfaces between humans, animals and ecosystems in addressing health issues the world is encountering currently and will encounter in future. One health is essentially a multidisciplinary and multi-sectoral approach and a consensus has already been reached among the partners of world community that one health approach is the sustainable solutions for the effective prevention and control of emerging and reemerging diseases. The Government of Bangladesh has already endorsed the "Strategic framework for one health approach to infectious diseases in Bangladesh." Promotion of multi-sectoral collaboration and communication engaging partners and stakeholders including the communities has been recognized as a key attribute of this strategic framework. Engagement of community based organizations and institutions are essential for the effective translation of one health ideas into actions and for sustainability of one health approach also. Flourish one health approach in the community needs strong advocacy, communication and actions with community leaders and community stakeholders and engagement with community is the only way to reach grass root level. Many community based organizations such as women's group, farmers field school along with traditional local government organizations (union parishad and upazila parishad) are functional in Bangladesh. In addition, schools, madrasas and masjids are important local institutions with significant influence in the community. School committees, madrasa committees, masjid committees play important role in social and behavioral motivation. Individuals like village head, school teachers and religious leader has significant influence in shaping the community capability to prevent and control emerging and reemerging infectious diseases. Joint efforts of local level professionals like veterinarians, physicians, crop scientists and wild life professionals can exert synergistic effect for the prevention, detection and control of infectious diseases. Local level advocacy and training can help to build a culture of working together and the changed culture of working together can make significant contribution to enhance local level capacity to prevent, identify and curb infectious diseases and other health related issues as well. The community at rural level encounters a plethora of health problems requiring multidisciplinary and mutisectoral approach for mitigation. However, important zoonotc diseases may be the entry point for reaching to the community and use one health approach as solutions of multifaceted health problems. Four important zoonotic diseases namely Nipah, Anthrax, Rabies and Avian influenza can be the initial target of community engagement for creating awareness and behavior change through training, meeting and courtyard sessions . A total of seven Upazilas of 7 divisions (one each) may be selected for piloting community engagement process. From each upazila 2 unions may be selected and from each unions 5 villages may be selected as intervention villages as pilot. A baseline and Knowledge, attitude and practice (KAP) study may be carried out at the outset to identify the community level actors (institutions, organizations, individuals) and assess the KAP of the community towards the selected diseases. A Community curriculum may be developed for training and courtyard sessions for the prevention and control of selected zoonosis. Simultaneously, a module for training of local level

professionals and paraprofessionals on disease epidemiology with particular focus on surveillance and joint outbreak investigation may be developed for imparting training to local professionals and para professionals. As FAO and WHO have comparative advantage and experience in dealing with one helath issues, these two organization can take a lead in developing a pilot programme with active engagement of DLS, DG Health and Forest Department. The approach may be expanded to other areas and utilized for the resolutions of other health problems, if the pilot is successful.

Day 3: **Noon Session** **Capacity Building**

One Health In Action: Controlling Dhaka's Dog Population

Sarah Vallentine

Program Manager - Humane Society International

The One Health principle holds that human and animal health is inextricably linked. Consequently, the development of integrated responses to global public health challenges is required. Recent advances in dog population and rabies control in Dhaka City demonstrate the One Health concept in action and provide a framework for sustainable dog and rabies control throughout Bangladesh.

With more than 2000 cases reported annually, Bangladesh has one of the highest per capita incidences of human rabies in the world. In 98% of cases, the virus is transmitted via dogs. Bangladesh has an estimated street dog population of four million, and mass dog culling has been widely used throughout the country, despite the World Health Organisation's assertion that this can be counterproductive to vaccination programmes and should not be part of a rabies control strategy (WHO 2013).

In January 2012, the Dhaka City Corporation halted dog culling (following an order from the Local Government Ministry) and Dhaka became the country's first "no cull" city. Since then, the city's dog population has been managed by Obhoyaronno- Bangladesh Animal Welfare Foundation with the involvement of the Bangladesh Government, international agencies including the United Nations' Food and Agriculture Organization, and Humane Society International. By December 2014 over 8000 dogs had been neutered, vaccinated and returned to the communities, which are reporting significant positive impacts including less nuisance behaviours, less aggression, fewer puppies and healthier dogs. In addition, people are claiming ownership of previously unowned dogs. Humanely controlling the dog population in each ward is revealing benefits for both animal welfare and public health. With fewer puppies there is an increase in the 'value' of dogs and hence more responsible ownership, a reduction in the risk posed by dogs, and a reduction in numbers of unowned dogs which are difficult to access with vaccination. A smaller population turnover means vaccination coverage is maintained for longer, whilst the more stable, vaccinated dog population presents a barrier to the rabies virus. As more dogs are vaccinated, fewer people are bitten by rabid dogs and the strain on human health resources is greatly reduced.

Dog population statistics generated using the "mark-resight" formula (using the ear-notched dogs as the "marked" sample) indicate a further 18,353 dogs need to be neutered and vaccinated in order to reach 80% coverage across Dhaka City. Establishing Dhaka as a successful model of humane, effective dog population management will provide a replicable system and training ground for Bangladesh, with the overall aim of implementing humane dog population management throughout the country by 2020, in line with the Government's aim of rabies elimination by 2020.

To achieve this aim there is a need for greater information exchange and for the various dog and rabies related initiatives to be coordinated under one national roadmap. Municipal authorities must agree to humane dog/rabies control and assume all or part of the operational resources. The Local Government Ministry should issue a clear directive to all local government units to cease dog culling and divert resources to humane dog population management. Dog Population Management should become one of the departmental units within the Department of Livestock Services, which is able to respond to

requests from local government authorities and assist them to implement dog population management according to international standards.

The concept of One Health encourages multiple disciplines to work together to achieve the best possible health for people, animals and the environment (American Veterinary Medical Association, 2014). In applying the One Health principle to rabies control, it is essential to acknowledge that addressing animal health through mass dog vaccination and humane dog population management is key to an effective and sustained rabies response, and there needs to be strong political will and appropriate public health support (such as advocacy, post-exposure prophylaxis, education, diagnostic and surveillance facilities) in place. Global adherence to animal welfare principles will be instrumental in preventing emerging infectious diseases, including zoonotic diseases, from occurring, and thus help stop these diseases inflicting serious resource strains on national and international health services.

Day 1: **Poster Presentation**

Amplification of mitochondrial DNA for barcoding of ducks in Bangladesh

***Jahangir Alam**, Mridha Md. Kamal Hossain, Anjuman Ara Bhuyian and Md. Abdul Alim.*

National Institite of Biotechnology, Ganakbari, Ashulia, Savar, Dhaka

Although central to much biological research, the identification of species is often difficult. DNA sequencing, with key sequences serving as a pattern ‘‘barcode’’, has therefore been proposed as a technology that might expedite species identification. It is an exciting new tool for taxonomic research. The DNA barcode is a very short, standardized DNA sequence in a well-known gene. It provides a way to identify the species to which a plant, animal or fungus belongs. We describe here a PCR-based approach to amplify the portion of mitochondrial genome followed by sequencing of Bangladeshi domestic ducks. For this purpose, a total of 40 duck blood samples were collected from Natore (n=10), Dhaka (n=10), Kishorganj (n=10) and Kurigram (n=10) districts. Of these 50% were from male and 50% from female ducks. DNA was extracted from the samples and tested by polymerase chain reaction using primer (L78 and H774) reported earlier to amplify part of the mitochondrial DNA (mtDNA) control region. Irrespective of sex, only a single 667 base pair long DNA fragment is amplified from all the samples. To identify the variation in each sample sequencing is going on. From this study finding it may be concluded that the primer L78 and H774 may be useful to amplify portion of mitochondrial DNA.

Day 1: **Poster Presentation**

Avian influenza virus resistant gene (Mx gene) and its diversity in poultry

***Minakshi Nag*[1]**, *Md. Mostafizer Rahman*[1], *Mahmudul Hasan*[2], *Shakila Faruque*[2], *Mridha Md. Kamal Uddin*[3], *Anjuman Ara Bhuya*[3], *Abdul Alim*[3], *Saidul Islam*[3], *Jahangir Alam*[3]

[1]*Hajee Mohammad Danesh Science and Technology University, Dinajpur,*
[2]*Bangladesh Livestock Research Institute,*
[3]*National Institute of Biotechnology*

Poultry sector has been facing threat of highly pathogenic avian influenza (HPAI) since 2007 in Bangladesh. The chicken Mx protein has been reported to exhibit antiviral activity against influenza virus. Therefore, targeting Mx gene may be an approach for development of AI resistant poultry. However, there is scarcity of information on Mx gene and its diversity in poultry in Bangladesh. A total of 60 blood samples were collected from six chicken breeds (Rhode Island Red, White Leghorn, White Rock, Barred Plymouth Rock, Necked Neck & Hilly) and 4 duck breeds (Pekin, Rupali, Nageshwari & Common Deshi) and tested by PCR followed by RFLP using RsaI and SspI. The overall Mx gene detection rate was varied from 43.64 to 75.68%. RFLP analysis of 27 samples revealed that tested samples contain homozygous resistant (R/R), homozygous sensitive (S/S) and heterozygous (R/S) Mx allelic gene. In chicken the R/R, S/S and R/S Mx allelic gene was 27.78, 33.33 and 16.67% respectively; while in duck it was 11.11, 66.67 and 22.22%, respectively. Mx gene diversity exists not only among the breeds but also within the breed. To the best of our knowledge this is the first report on Mx gene study in Bangladesh covering both chicken and duck species.

Day 1: **Poster Presentation**

Avian influenza A viruses in wild birds and domestic ducks in Bangladesh

***A Islam*[1]**, *NJ Hill*[2], *A Mikolon*[1,3], *K Sturm-Ramirez*[1,3], *MA Rahman*[1], *SK Paul*[1], *A Islam*[4], *K Hossain*[1], *MZ Rahman*[1], *SU Khan*[1], *K Vandegrift*[4,6], *J Desmond*[4], *PR Hosseini*[4], *P Daszak*[4], *M Yamage*[5], *SH Newman*[5], *JY Takekawa*[2], *N Gerloff*[3], *N Simpson*[3], *A Balish*[3], *T Davis*[3], *R Donis*[3], *SP Luby*[1,3], *N Zeidner*[1,3]

[1]*International Centre for Diarrheal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh;* [2]*US Geological Survey, Western Ecological Research Center, USA;* [3]*Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA;* [4]*EcoHealth Alliance, New York, NY USA;* [5]Food and Agriculture Organization *of the United Nations, Rome, Italy;* [6]*Center for Infectious Disease Dynamics (CIDD), The Penn State University, University Park, PA.*

Wild waterfowl are the ancestral reservoirs for avian influenza A viruses and support the persistence of these viruses in nature. Domestic ducks, resident and migratory wild birds inhabit the freshwater wetlands in northern Bangladesh during the winter months. The coastal areas are also wintering grounds for a number of migratory waders and shorebirds. We conducted a study of wild birds and domestic ducks in these areas to assess the prevalence of avian influenza A viruses and used satellite telemetry to quantify flight distances and trace migratory routes of influenza virus-infected waterfowl in these areas. We sampled wild birds from the Hakaluki and Tanguar haors of northern Bangladesh and two coastal sandbars in southeastern Bangladesh. We used mist nets and noose traps to catch the wild birds. We collected cloacal swabs from domestic ducks from Hakaluki haor and oropharyngeal and cloacal swabs from wild birds. All swab samples were tested by real-time RT-PCR for influenza A virus at icddr,b laboratory prior to confirmation at the Centers for Disease Control and Prevention. Argos (9-12g) and GPS (22g) satellite transmitters were utilized to provide flight data from March 2010 through April 2012. 1172 wild birds of 95 species and 23 families were sampled from March 2010 to April 2012, of which 285 were resident and 887 were migratory birds. Nine birds (0.76%, CI 0.35 - 1.45%) tested positive for avian influenza A virus, including eight migratory waterfowl from Hakaluki haor and one migratory wader from coastal area. Of the four influenza A-positive northern pintail, one was positive for both H5 and H9 subtypes and another for H5 only. Among the 800 domestic ducks sampled, 16 tested positive for influenza A (1.86%, CI 1.05 - 3.07%). We affixed satellite transmitters on 43 migratory waterfowl (seventeen ruddy shelduck, eleven northern pintail, eight garganey, six northern shoveler and one gadwall). Among the marked birds, 38 were negative and five were positive for influenza A virus. The median distance covered by influenza A positive birds did not differ significantly with that of influenza A negative birds (2738km vs 2387km, p= 0.95).The migratory waterfowl routes connect Bangladesh to other regions in south and central Asia. Continuous survey of migratory wild birds to identify and characterize avian influenza viruses would allow us to better understand if they play any role in the dissemination of influenza A viruses into the domestic ducks of Bangladesh and throughout their migratory flight ranges.

Day 1: **Poster Presentation**

Biosecurity practices in small commercial poultry farms, Bangladesh 2011-12

***Nadia Ali Rimi**; Rebeca Sultana; Mushtari Muhsina; Baktiar Uddin; Najmul Haider; Nazmun Nahar; Katharine Sturm-Ramirez; Stephen P. Luby*

icddr,b, Bangladesh

In Bangladesh, highly pathogenic avian influenza is endemic. Small scale poultry farms account for 262/543 confirmed outbreaks among commercial farms. Biosecurity measures may reduce the spread of avian influenza. This study aimed to understand the biosecurity practices of small commercial poultry farmers.

During 2011-12, the research team conducted 57 hours of observations, 16 in-depth interviews and two group discussions with poultry farmers in 16 small commercial farms from two districts to understand the practices for three principle elements of biosecurity— segregation, cleaning and disinfection. We reviewed and summarized emerging themes.

None of the farms were segregated from the environment, people and animals. None maintained recommended distances from the nearest households (median 6.7m, [IQR 1.65m-25.9m]; recommended: 500m), other poultry farms (median 30.5m, [IQR 7m- 91.95m]; recommended: 200m), large trees (median 0m; recommended: 100m) or roads (median 14.5m, [IQR 9m-41.35m]; recommended: 500m). Only one farm had intact fencing around all sides of the poultry shed. People (other than the farmers), backyard poultry, and other birds were observed frequently entering sheds. Farmers, however, did not allow the buyer's to bring egg trays inside their sheds. Farmers used several locally available disinfectants to protect chickens from disease. All the farmers reported cleaning and disinfecting sheds by spreading lime on the floor before buying chicks. Six farmers reported spraying disinfectant inside and/or outside the shed daily. Four farmers reported sweeping away feces daily but none was observed using any disinfectant on the floor after feces removal. All farmers sold or used the feces as fish-feed without first treating it. Nine farmers used designated footwear for the shed. Two farms had footbaths which were not used during our observation. Of the 94 times farmers entered sheds, the team observed handwashing with soap by one farmer before entering and by two farmers after touching feces, and three farmers disinfecting their feet before entering. Farmers were never observed using masks or gloves and changing clothes before entering the shed. The farmers mentioned financial constraints and inconvenience as reasons for not complying with certain biosecurity measures.

While we seldom observed flock segregation or farmers' handwashing, some workers used measures that involved additional cost or effort, such as using disinfectants and restricting buyer's egg trays, to protect their flock. This suggests that farmers could be motivated by interventions that protect their investment. Future interventions could explore the feasibility and effectiveness of low-cost alternatives.

Day 1: **Poster Presentation**

Live bird market surveillance during 2011-2012 episode of H5N1 highly pathogenic avian influenza detected both Newcastle disease virus and avian influenza virus in dead chickens

***L.R. Barman*[1]**, *R.D. Sarker*[1], *B.C. Das*[2], *E.H. Chowdhury*[1], *P.M. Das*[1], *M.R. Islam*[1]

[1]*Department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh;* [2]*Central Disease Investigation Laboratory, Department of Livestock Services, 48 Kazi Alauddin Road, Dhaka*

Newcastle disease (ND) is endemic in poultry of Bangladesh. On the other hand, highly pathogenic avian influenza (HPAI) has been occurring in poultry of Bangladesh since 2007, with an unprecedented increase in outbreaks in 2011. A live-bird-market surveillance was conducted in two large wholesale poultry markets (Karwan bazar and Kaptan bazar) of Dhaka city during the period from August 2011 to July 2012 to identify the circulating viruses. Around 10-15 freshly dead chickens were collected from the markets at 15 days interval. All carcasses were first tested for type A avian influenza virus (AIV) using an immunochromatographic test kit. AI negative birds were subjected to detailed necropsy. Carcasses having gross lesions suggestive of ND were further tested for ND virus (NDV) by F gene-specific RT-PCR and for AIV by M gene-specific real time RT-PCR. A total of 513 carcasses were examined; 93 tested positive for AIV by immunochromatographic test. Among the remaining 420 carcasses 85 had lesions suggestive of ND. Among these 85 ND suspected samples, 59 were positive for NDV and 24 were positive for AIV by conventional and real time RT-PCR, respectively; 18 samples were positive for both NDV and AIV. This study reveals not only co-circulation of AIV and NDV in chickens but also concurrent infection with AIV and NDV, during 2011-2012 episode of HPAI in Bangladesh.

Day 1: **Poster Presentation**

Mucosal vaccination of conserved sM2, HA2 and cholera toxin subunit A1 (CTA1) fusion protein with poly gamma-glutamate/chitosan nanoparticles (PC NPs) induces protection against divergent influenza subtypes

Mohammed Yousuf Elahi Chowdhury,

Department of Medicine and Surgery, Chittagong Veterinary and Animal Sciences University

To develop a safe and effective mucosal vaccine against influenza A viruses, gene construct of the highly conserved matrix protein-2 (sM2) and fusion peptide of hemagglutinin (HA2) were successfully joined to the well-known mucosal adjuvant cholera toxin subunit A1 (CTA1). It is possible that the intranasal administration of the recombinant fusion protein sM2HA2 or the recombinant fusion protein resulting from joining gene constructs encoding sM2HA2 and CTA1-conjugated sM2HA2 (sM2HA2CTA1) using poly-□-glutamic acid (□-PGA)-chitosan nanoparticles (PC NPs), which are safe, natural materials that are able to target the mucosal membrane as a mucosal adjuvant, could induce a high degree of systemic immunity (IgG and IgA) at the site of inoculation as well as at remote locations. The mucosal administration of sM2HA2CTA1/PC NPs may also significantly increase the levels of sM2- or HA2-specific cell-mediated immunity because increased release of both IFN-□□and IL-4 was observed. In challenge tests in BALB/c mice with 10 MLD50 of A/EM/Korea/W149/06(H5N1), A/Puerto Rico/8/34(H1N1), A/Aquatic bird /Korea/W81/

2005(H5N2), A/Aquatic bird/Korea/W44/2005(H7N3) or A/Chicken/Korea/116/2004(H9N2) viruses, the recombinant sM2HA2CTA1/PC NPs provided better protection against lethal challenges compared with sM2HA2 and sM2HA2CTA1 without PC NPs. Thus, sM2HA2CTA1/PC NPs may be a promising mucosal vaccine candidate against pandemic influenza.

Day 1: **Poster Presentation**

The use of antibiotic growth promoters and alternative strategies in poultry production: Global trends & Bangladesh

***H. M. Salim*[1]**, *M. R. Amin*[1]

[1]*Livestock Economics Section, Department of Livestock Services, Krishi Khamar Sarak, Farmgate, Dhaka-1215, Bangladesh;*

The use of antibiotics in food animals for growth promotion and disease prevention may cause antibiotic resistance in animals and humans, resulting in treatment failure when needed. These problems are also increasing due to the misuse of antibiotics as growth promoters in animal feeds as well as the treatment of humans and animals. The emergence of antibiotic resistance is closely related to the amount of antibiotic residues in food chain and in the environment. The antibiotic resistance bacteria can spread directly by contact, and indirectly through the food chain, air, water, and soil. As a consequence, several countries including European Union have restricted the use of antibiotic in livestock feeds to avoid the harmful impact on public health. In October 2010, Government of Bangladesh (GOB) imposed a complete ban of AGPs in animal feed through "The Fish and Animal Feed Act-2010." Later GOB also formulated "The Animal Feed Rules-2013" to ensure the quality of animal feeds and to produce safe animal originated foods for consumers.

Therefore, the use of antibiotic growth promoters (AGPs) in food animal production has become a crucial concern due to their potential adverse effects on animals and human health, food safety and the environment. As a result, the inclusion of AGPs in the diets of animal has been leading to complete ban in the globe and, at the same time, widening options for the use of their alternative strategies. Several nutritional supplements have been used all over the world as effective alternatives to AGPs in poultry diets. However, multiple, rather than a single additive may replace AGPs in poultry, but blending of feeding & hygienic farm management and strict biosecurity may help achieving good intestinal health, stable enteric ecosystem and sustainable & cost effective production performance of birds. Moreover, controlling unsolicited ingredients at production levels must have support of different market desks under surveillance to provide safe and quality poultry products for the consumers. This requires further up gradation and diversification of value added poultry products and expansion of their markets through strategic planning and gradual limitation of live bird markets in the country. Further research is needed on exploring suitable, reliable and cost effective alternatives to AGPs for commercial use, and strategic poultry market development in Bangladesh.

Day 1: **Poster Presentation**

Influenza A virus surveillance in live bird markets in Bangladesh

***S Chowdhury*[1], *S U Khan*[2], *K Sturm-Ramirez*[1,3], *E S Gurley*[1], *M Z Rahman*[1], *J D Heffelfinger*[1,3], *S P Luby*[4], *N Zeidner*[1,3]**

[1]*International Centre for Diarrheal Diseases Research, Bangladesh (icddr,b), Dhaka, Bangladesh*
[2]*Department of Environmental and Global Health, University of Florida, USA*
[3]*Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA*
[4] *Stanford University, Stanford, California, USA*

Highly pathogenic avian influenza A (H5N1) virus poses a threat to the health of poultry and humans. In Bangladesh, between 2007 and 2012, more than 540 HPAI outbreaks in poultry and seven HPAI human cases, including one death, have been reported. Since August 2007, icddr,b has been conducting surveillance in live bird markets (LBMs) to identify avian influenza virus circulation among poultry in Bangladesh. Poultry raisers and local vendors sell chickens, quail, and pigeons alongside waterfowl such as ducks and geese at LBMs. From August 2007 to December 2010, we identified avian influenza virus A (H5) in 0.6% of waterfowl and 37% of pooled environmental specimens collected at LBMs. This report summarizes LBM-based surveillance conducted in Bangladesh from January 2010 to December 2012 to identify avian influenza virus A (H5) circulation in waterfowl and LBM environmental contamination.

We conducted surveillance in one peri-urban LBM in each of four districts in Bangladesh (Chittagong, Rajshahi, Netrokona and Dinajpur) and 16 urban LBMs in Dhaka city. Surveillance teams visited each selected LBM on a monthly basis to collect samples from waterfowl and the environment. Each month veterinarians selected 20 ducks and/or geese by convenience from each of the four peri-urban LBMs to collect either cloacal or tracheal swabs, or freshly laid feces. We also collected swab specimens from seven environmental sources including poultry droppings, cages, feed, water, slaughtering sites, market floors and drains to prepare one pooled environmental sample monthly from each of the 20 LBMs. The icddr,b virology laboratory tested these samples using real-time reverse transcription polymerase chain reaction (rRT-PCR) assay to detect RNA for influenza A virus and subtype for H5. We interviewed poultry raisers of sampled waterfowl about the demographics, husbandry practices, flock sizes and health status of all poultry. We used chi-square test, bivariate and multivariate logistic regression to identify demographics and exposure variables associated with rtRT-PCR results.

We collected swab samples from 2,347 ducks and 293 geese. Of the sampled waterfowl, 2,459 (93%) were aged more than six months and 2,627 (99%) appeared healthy during sample collection. Most of the sampled waterfowl (94%) were raised in backyard farms. The mean size of backyard poultry flocks was 18 (range: 1-99). Out of 2,640 waterfowl samples, 173 (7%) had detectable RNA for influenza A virus and 80 (3%) had H5 subtype-specific RNA. The prevalence of laboratory confirmed influenza A /H5 was higher in ducks than geese (3% vs.1%, P=0.01). All influenza A/H5 confirmed waterfowl were reared in a backyard facility. Of the 580 pooled environmental samples, 130 (22%) demonstrated detectable H5 subtype-specific RNA and specimens from urban LBMs were five times more likely to have evidence of avian influenza A/H5 contamination than peri-urban LBM specimens (95% CI: 2.5-11.6). Avian influenza virus A/H5 has been detected in both individual waterfowl and the LBM environment almost every month, but the highest proportion (13%) of samples with influenza A/H5 has been detected in March.

Surveillance findings from 2010-2012 suggest that avian influenza A viruses, including H5, circulate year-round in domestic ducks and geese in Bangladesh. LBM environment contaminated with H5N1 may act as a potential source of infection in poultry that may increase the risk of avian-to-human transmission. LBM should be targeted to provide intervention through improved biosecurity and disinfection for reducing avian influenza viruses transmission. LBM-based surveillance should be continued for better understanding on influenza viruses circulation in domestic poultry and may provide sentinel detection of novel avian influenza viruses of public health importance.

Day 1: **Poster Presentation**

Isolation of sorbitol non-fermenting including shiga toxin-producing Escherichia coli from Black Bengal goat in Bangladesh

Mukta Das Gupta[1], Ashutosh Das[2], Md. Zohorol Islam[1], Paritosh Kumar Biswas[1]

[1]Department of Microbiology and Veterinary Public Health, Chittagong Veterinary and Animal Sciences University(CVASU), Khulshi, Chittagong-4225, Bangladesh
[2] Department Genetics and Animal Breeding, Chittagong Veterinary and Animal Sciences University(CVASU), Khulshi, Chittagong-4225, Bangladesh

Shigatoxin producing Escherichia coli (STEC) is an important group of emerging pathogens, with ruminants recognized as their main natural reservoir. Some reports suggested that goats could also be their reservoir. A cross-sectional survey was carried out in the Chittagong region with sampling 514 Black Bengal goats. From a selected goat swab was collected from the recto anal junction (RAJ) which was eventually plated onto cefixime and potassium tellurite added sorbitol MacConkey (CT-SMAC) agar, a selective medium for STEC O157 serogroup where this serogroup and other sorbitol non-fermenting STEC produce colorless colonies. The diversities among the colorless-colony producing E coli isolates on CT-SMAC, referred to as sorbitol non- fermenting Shigatoxin producing E. coli (SNF-STEC) in this study, were genetically verified by polymerase chain reactions (PCRs) with exploring the presence of rfb gene that codes a somatic antigen of the O157 serogroup and four virulent genes namely, stx1 and stx2 – code for the shiga toxin 1 and 2, respectively, eae that codes for intimin and hlyA that codes for enterohemolysin. The clonal relationships of the isolates lacking any virulent genes were verified by pulsed field gel electrophoresis (PFGE). Antimicrobial resistance patterns of the isolates were performed by disk-diffusion method against 10 antimicrobials. The results reveal that the proportion of goat carrying SNF E. coli isotates was 6.2% (32/514) (95% CI 4.4% to 8.7%). Twenty one (4.1%) of this 32 isolates were found positive with at least one of the virulent gene tested in this study. The proportion of samples positive for SNF-Shigatoxin 1- and Shigatoxin 2- E coli was 1.2 % (95% CI 0.5-2.6) and 1.2 % (95% CI 0.5 -2.6), respectively; hence a total of 2.3% goats were positive for SNF-STEC. In addition, hlyA and eae genes were found in 1.4% (95% CI 0.6 -2.8) and 0.4 % (95% CI 0.01 -1.5) of the isolates, respectively. Based on the differences in the possession of the virulent genes SNF- STEC isolates were genetically diverse. Isolates lacking any virulent genes belonged to a heterogeneous population. A good number of SN-F including STEC isolates showed resistance against ≥2 antimicrobials. The circulation of strains harboring the most potential combination of three virulent genes – stx1, stx2 and eae was not detected in the study population, however the role of Bengal Bengal goat as of reservoir of SN-F E coli could not be ruled out.

Day 1: **Poster Presentation**

Influenza epidemiology in Bangladesh: a pre- and post-pandemic comparison of the national hospital-based influenza surveillance findings (2007-2013)

***MA Aleem*[1]**, *AA Mamun[1], MZ Rahman[1], M Rahman[1], MA Islam[1], T Azim[1], ASM Alamgir[4], MS Haider[3], J Heffelfinger[1,2], SP Luby[1,2], M Rahman[3], ES Gurley[1], K Sturm-Ramirez[1,2]*

[1]International Centre for Diarrhoeal Disease and Research, Bangladesh (icddr,b), Dhaka, Bangladesh;
[2]Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA;
[3]Institute of Epidemiology Disease Control and Research, (IEDCR), Dhaka, Bangladesh;
[4]World Health Organization, Dhaka, Bangladesh.

In 2007, Institute of Epidemiology, Disease Control and Research (IEDCR) and International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), supported by the Centers for Disease Control and Prevention (CDC), established national hospital-based influenza surveillance in 12 hospitals in Bangladesh to characterize circulating influenza strains and the seasonal distribution of influenza infections. Here we present surveillance data focusing on how the introduction of the 2009 pandemic strain impacted the seasonality, strain dominance and age distribution of influenza infections in the country.

In each surveillance hospital, physicians systematically identified patients aged ≥5 years with severe acute respiratory illness (SARI;, hospitalized with history of measured/subjective fever and cough/sore throat in the previous 7 days), or patients aged <5 years with severe pneumonia (SP; hospitalized with cough/difficulty breathing with ≥1 of six danger signs),or presenting as outpatients with influenza like illness (ILI; history of subjective/measured fever and cough/sore throat within7 days of onset). Staff collected demographics and clinical history data using a structured questionnaire, and obtained nasopharyngeal and throat swabs for real time reverse transcription polymerase chain reaction (rRT-PCR) influenza typing (A and B) and sub-typing of positives (A/H1, A/H3, A/H5 and A/H1N1pdm09).We defined influenza epidemiological periods as pre-pandemic (May 2007-May 2009), pandemic (June 2009-July 2010)and post-pandemic (August 2010-February 2013) for comparisons. We defined months of influenza peak activity as months with >20% influenza positivity among samples tested.

A total of 18,311 case-patients' samples were tested for influenza virus; 4902 were during pre-pandemic, 4388 during pandemic and 9021 during post-pandemic periods. Overall, 2486 (14%) samples (among SARI 1002/17%, SP 145/5% and ILI 1339/17%) were influenza positive, with influenza A being the dominant type (9%). Among all the hospitalized inpatients A/H1N1pdm09 was the dominant strain (466/5%). Influenza infection among all case-patients was higher during two post-pandemic as opposed to two pre-pandemic years (15% during 2011-2012 vs. 10% during2007-2008; $p<0.001$). During the pre-pandemic period, there was a single annual peak of influenza activity followed by 3-6 months periods with no influenza circulation detected. In contrast, influenza circulation was detected every month from March 2011 to February 2013 in the post-pandemic period. In 2012, there were two discrete peaks of influenza activity, the first one during March-May, almost exclusively due to A/H1N1pdm09, and the second one during August-October, pre-dominantly due to influenza B. We observed an increase in influenza B infection (1.4% to 36%) among influenza-positive SARI case-patients in the post-pandemic compared to the pre-pandemic period. Among influenza A positive SARI case-patients the pandemic

virus A(H1N1)pdm09 was detected by this surveillance platform in August 2009, and has become the dominant influenza strain detected since January 2012, displacing seasonal influenza A/H1 strain completely. Influenza affected all age groups, but the proportion of laboratory-confirmed influenza infections was highest among patients aged 5-19 (21%) years old during the study period. The median age of all influenza positive cases was higher during the pandemic and post-pandemic compared to the pre-pandemic period (19 and 20 years vs. 13 years; $p<0.001$). The median age of A/H1N1pdm09-positive case-patients was significantly higher than that of case-patients affected by non-pandemic strains (20 years vs. 17 years; $p<0.001$).

The introduction of pandemic virus A(H1N1)pdm09 affected the age distribution of influenza infections and influenza seasonality in Bangladesh, with year-round detection of influenza since March 2011, increased frequency of peak influenza activity in the post- as compared to the pre-pandemic period. The irregular seasonality patterns may hinder the deployment of effective public health interventions, in particular scheduling an immunization campaign so as to optimize protection before vaccine-induced immunity wanes. Additionally, this increases the amount of time that avian and human influenza are co-circulating in Bangladesh and so increases the risk for re-assortment and emergence of new strains. Support for influenza surveillance should be continued.

Day 1: **Poster Presentation**

Anti-diabetic potentials of Syzygium cumini and Ficus racemosa: current state and prospects

***Md. Mahmudul Amin*[2]**, *Sonali Bhakta[2], Md. Abdullah-Al-Mahmud[1], Md. Abdul Awal[3], Shonkor Kumar Das[2]*

[1]Dept. of Anatomy and Histology, Faculty of Veterinary Medicine & Animal Science, Bangabandhu Sheikh Mujibur Rahman Agricultural University, Salna, Gazipur-1706;
[2]Bioresearch Laboratory (Cancer and Herbal Research Center),
*[3]Dept. of Anatomy and Histology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh; *E-mail: skdas76@yahoo.com*

The prevalence of diabetes is on a steady increase worldwide and it is now identified as one of the main threats to human health in the 21st century. In Bangladesh, the reported prevalence of diabetes in adults between the ages of 20 and 79 is 9.85%. Out of a large number of herbs, the barks, fruits, seeds or leaves of Syzygium cumini and Ficus racemosa are being widely used to treat diabetes over many centuries. Many photochemical have been isolated and identified to date including β-sitosterol, stigmasterol, lupeol, flavanoides, tannins, saponins, quercetin, glycosides (jamboline and ellagic acid) and alkaloids (jambosine) which have potent anti-diabetic activity. The present review summarizes the pharmacological investigation undertaken by the scientists to explore the desired anti-diabetic results from S. cumini and F. racemosa in different pharmaceutical preparations (alcoholic or aqueous extracts). A number of plant extraction methods have been noticed, for example, rotary evaporation, soxhelet apparatus, lyophilization or percolation method. Variety of artificial diabetes induction dose was applied using the single intra-peritoneal or intravenous injection of the chemical “streptozotocin or alloxan monohydrate”. In the present investigation, statistical analysis revealed that treatment with S. cumini and F. racemosa extracts showed significant decrease in glucose, cholesterol, triglycerides, LDL, VLDL, liver enzymes (SGOT, SGPT and SALP) level and increase in body weight, liver glycogen and HDL level, thereby exhibited significant anti-diabetic activity. Moreover, histopathological studies of the pancreas and liver of the experimented animals showed a valid comparable regeneration. In developing countries, diabetes-specific barriers include lack of patient education about diabetes and diabetes management, stigmatization, too little/weak diagnosis and treatment facilities, negligence, poor training of healthcare professionals (HCPs) and the cost of the anti-diabetic products. Changing diabetes situation in Bangladesh requires partnerships with public and private sectors to strengthen healthcare system, patient empowerment, access to treatment and advocacy combined with patient-focused investments in the quality of healthcare delivery. This review, therefore, provides useful resources to enable a thorough assessment of the profile of S. cumini and F. racemosa plants used in diabetes management so as to ensure a more rational use, also aiming to draw attention of the researchers to expand the use of these plants in ethno-pharmacotherapy and the development of new drugs; as the technology is now extremely more powerful than before.

Day 1: **Poster Presentation**

Highly Pathogenic Avian influenza (HPAI) at the domestic-wild birds interface in Bangladesh

***Mohammad Mahmudul Hassan*[1, 2]**, *Marcel Klaassen*[1], *Nitish Chandra Debnath*[2, 3], *Mat Yamage*[3], *Ariful Islam*[4] *and Md. Ahasanul Hoque*[1, 2]

[1]*Science, Engineering and Built Environment, Deakin University, Australia;*
[2]*Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong-4225, Bangladesh;*
[3]*Food and Agricultural Organization, Bangladesh;*
[4]*EcoHealth Alliance, USA*

Avian influenza is of great concern for global human, wildlife and poultry health. Like many South East Asian countries, Bangladesh has frequently experienced highly pathogenic avian influenza (HPAI) H5N1 outbreaks and HPAI is a serious on-going animal and public health threat in Bangladesh. Chittagong Veterinary and Animal Sciences University has therefore been surveying domestic and wild birds since April 2012. The estimated avian influenza (AI) sero-prevalence was 16% (N=899) in the samples from resident wild birds, 18% (N=155) in migratory birds, 71% (N=160) in household ducks and 85% (N=68) in free ranging ducks. Among the samples from resident wild birds the sero-prevalence was significantly ($p<0.001$) higher in samples from crows (37%; N=282) than that of Asian pied starlings (8%; N=282), sparrows (2%; N=143) and others. The sero-prevalence is also high in other but typical reservoir species (i.e. Charadriiformes and Anseriformes) is great concern. The sero-prevalence was significantly higher in samples obtained from crow during summer than that of winter seasons. Similar seasonal trends were observed for Asian pied starlings and house sparrows. Among the samples from migratory birds tufted ducks (30%; N=40) and northern pintail (15%; N=33) were commonly affected. Among the samples from domestic ducks the sero-prevalence was significantly ($p<0.001$) higher in the summer than winter seasons. The preliminary HI results suggested the H5 serotype was present in crows and domestic ducks. On molecular evaluation the subtypes H5, H7 and H9 were also determined from the samples of Lesser Whistling, Tufted ducks and domestic poultry. These results suggest HPAI viruses may be introduced to Bangladesh through migratory birds.

Day 1: **Poster Presentation**

Prevalence of canine parvo virus and canine influenza virus in dogs of Dhaka and Chittagong division

*Soumitra Sen[1], **S. M. Lutful Kabir[1]**, M. Siddiqur Rahman[2]*

[1]Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh
[2]Department of Medicine, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

The research work was carried out to determine the prevalence of CPV and CIV in Dhaka and Chittagong Division (stray and pet dog) by using Rapigen CIV Ag kit test at Central Veterinary Hospital, Dhaka, BAU, Mymensingh Campus, Chittagong S.A Quaderi Teaching Veterinary Hospital, CVASU, Chittagong and Feni Girls Cadet College Campus. Fecal sample were collected from 50 dogs of different age and sex from different spot of Dhaka and Chittagong Division and the samples were tested with Rapigen canine Parvovirus Ag kit test (CIV).The prevalence of canine parvovirus in related to age was relatively higher in 1-6 months age (28%) , 7-12 months age group (16.66) and Over 18 months age group is (11.11%) quite similar and in related to sex was significantly higher in male (24.13%) than that in female (19.04%). Overall prevalence of CPV in pet dogs was 22% and in stray dogs was 30%. Nasal fluid samples were collected from 50 dogs of different age and sex from different spot of Dhaka and Chittagong Division and the samples were tested with Rapigen canine influenza Ag kit test (CIV). Prevalence of canine influenza virus infection by Rapigen canine influenza virus Ag kit test were 00.00% in all age groups and sex. Overall prevalence of CIV in all pet and stray dogs were 00.00%.

Day 1: **Poster Presentation**

Knowledge, Attitude and Practices Survey on Avian Influenza in Three Districts of Bangladesh

S.K. Sarkar[1], S.M.M.R. Sumon[1], M.S. Parvin[1], M.A.H.N.A khan[2], ***M.T. Islam[1]***

[1]Department of Medicine, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202
[2]Department of Pathology, Faculty of Veterinary Science, Bangladesh Agricultural University, Mymensingh-2202

Avian influenza (AI) is a potential public health threat worldwide. The present study is aimed to acquire the information on knowledge, attitude and practices (KAP) and identify risk factors related to KAP on poultry rearing and other practices pertaining to AI among respondents (backyard and commercial poultry farmers, farm workers, live bird seller, live bird market workers and transporters) in three districts, namely Gazipur and Mymensingh (AI reported districts) and Habiganj (AI non-infected district). A total number of 600 respondents were interviewed in their working place using a simple, well-structured questionnaire to collect data. About 55.7% respondents had heard about AI and mass media was the predominant source of information (46.7%). A total of 60.2% of the respondents agreed that AI is a serious disease and 65.7% respondents agreed that AI is a preventable disease. Regarding to hygienic practices, 32% respondents reported that they use disinfectant regularly and 73.2% respondents wash their hands after handling of birds. Protective measures such as the use of gloves and mask which minimize the risk of transmission of AI from poultry to humans were not used by 93% respondents. The knowledge, attitude and practices (KAP) scores were significantly higher among the respondents of AI infected areas than those of non-infected areas. However, the KAP scores were not satisfactory among a substantial proportion of respondents in both AI affected and non-affected areas. Therefore, health education campaigns pertaining to AI are needed to contain the transmission of AI virus among poultry and human population.

Day 2: **Poster Presentation**

Detection of *Listeria monocytogenes* in raw milk

MMI Talukdar, S Islam, MM Khatun, ***MA Islam***

Department of Microbiology & Hygiene, Bangladesh Agricultural University, Mymensingh-2202

The aim of the present study was to isolate and identify *Listeria monocytogenes* in raw cattle milk collected from the dairy farms and individually reared cattle around fBangladesh Agricultural University (BAU), Mymensingh. A total of 37 raw milk samples were collected from individually (n=10) and farm raised dairy cattle (n=27). Milk samples were cultured onto Oxford agar to isolate *Listeria* spp. Gram's staining, motility test, CAMP test, heamolysis, biochemical test (Catalase, Voges-Proskauer, Methyl red and indole) and sugar fermentation test (dextrose, sucrose, mannitol, lactose, maltose and D-xylose) were conducted to confirm *Listeria* both at genus and species levels. Antibiotic susceptibility tests were performed against five antibiotics (ampicillin, penicillin, ciprofloxacin, vancomycin and gentamicin) by using the disc diffusion method. 4 of 10 milk samples obtained from individually raised cow were found culture positive. On the contrary, 12 of 27 milk samples collected from farm raised cattle were culture positive. Only one isolate of milk of farm raised cattle was confirmed as L. monocytogenes. The *L. monocytogenes* isolate was resistant to ampicillin and penicillin; sensitive to the ciprofloxacin, vancomycin and gentamicin. Data of this study indicate the presence of multi-drug *resistant L. monocytogenes* in raw milk. This is the first report on isolation and identification of *L. monocytogenes* from raw milk in Bangladesh.

Day 2: **Poster Presentation**

Isolation and Identification of Bacteria from Four Different Frozen Snacks of Gazipur District of Bangladesh

***Shuvho Chakra Borty*[1]**, *Mohammad Nizam Uddin Chowdhury,* [2]*Md. Hiron Khan*[3], *Md. Shirajum Monir*[4], *Md. Alimul Islam*[1]

[1]*Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh- 2202, Bangladesh*
[2]*Bangladesh Forest Department, Bangladesh*
[3]*Department of Quality Assurance, Golden Harvest Agro Food industries Limited, Bangladesh*
[4]*Bangladesh Fisheries Research Institute, Freshwater Station, Mymensingh-2201, Bangladesh*

The study was designed to isolate and identify microorganisms from frozen snacks from local market of Gazipur district. For this, four different kinds of snacks (French fry 10, deshi porotha 9, dal-puri 8 and alo-puri 8) were tested for the isolation of microorganisms. For the isolation of bacterial species each food sample was inoculated onto EMB agar, Nutrient agar and MacConkey agar media. The isolated bacteria of each sample were identified by cultural, biochemical (Oxidase, Catalase, Indole, MR, VP, Citrate, TSI, Nitrogen Reduction, Gelatin, Lactose, Sucrose, Glucose, Fructose, Maltose, Mannitol, Arabinose, Sorbitol) and staining characteristics. The results obtained from the microorganisms associated with the spoilage of frozen snacks showed that the total aerobic counts for French Fry ranged from 1.10 x 106 to 2.20 x 106 cfu/g where Deshi Porotha ranged from 1.56 x 106 to 2.58 x 106 cfu/g, Aloo Puri ranged from 1.68 x 106 to 2.36 x 106 cfu/g, Dal Puri ranged from 1.88 x 106 to 2.56 x 106 cfu/g. Out of the total 35 samples the prevalence of *Staphylococcus aureus* was found highest following *Bacillus cereus*, *Klebsiella* aerogenes and *Proteus mirabilis* in all the four kinds of frozen food tested in this study. Where *S. aureus* were found 35%, *B. cereus* 31%, *K. aerogenes* 20%, *P. mirabilis* 14%. In this study *S. aureus* was found frequently from all food samples but *K. aerogenes* and *P. mirabilis* were mostly isolated from Dal Puri and Alu Puri. Frozen snacks has to be stable in the local market for a certain period of time, it is considered to be free from spoilage causing and pathogenic microorganisms and during consumption should not cause any discomfort to taste and health. Results of this study clearly indicates that all the four different isolates of bacterial species are responsible for potential cause of spoilage in frozen foods if there is any variation in storage temperature. Furthermore, the presence of the potential spoilage causing bacteria in the selected frozen foods also indicate that the food got contamination during processing, manipulation, packaging and storing.

Day 2: **Poster Presentation**

Biosecurity conditions and biosafety practices in the live bird markets of Dhaka city, Bangladesh, 2012

***N A Rimi*[1]**, *R Sultana[1], S Khan[1], S Nasreen[1], A Puri[2], A S M Alamgir[3], M Rahman[4], K Sturm-Ramirez[1,5]*

[1]icddr,b, Dhaka, Bangladesh;
[2]UNICEF, Dhaka, Bangladesh;
[3]World Health Organization (WHO), Dhaka, Bangladesh;
[4]Institute of Epidemiology, Disease Control and Research (IEDCR), Dhaka, Bangladesh;
[5]Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, United States.

Poultry surveillance in live bird markets (LBMs) of Dhaka has detected circulation of H5N1 almost year-round. Three of the seven human H5N1 cases reported in Bangladesh have been poultry workers. Biosecurity and biosafety measures may help control the spread of avian influenza viruses in LBMs and prevent transmission to poultry workers. This study explored the biosecurity conditions of LBMs and biosafety practices of the poultry workers.

In August and October 2012, a qualitative research team conducted spot observations in 10 LBMs within Dhaka to record the location and condition of poultry keeping, selling and processing places, 38 hours of observations in four markets to explore hygiene practices during bird handling and waste disposal, and 16 in-depth interviews with poultry workers to explore their practices of slaughtering, cleaning, waste disposal and personal hygiene.

Birds of different breeds and species were usually housed separately in stacked or adjacent cages or baskets without any divider. Metal cage and bamboo baskets were observed only to be dusted off four times. Processing birds on the floor and dry sweeping of the processing floor were commonly observed. Floors of shops and slaughtering places were mainly cemented and many shops had damaged flooring. Informants reported washing processing places and equipment with water at least once daily before closing at night. Use of detergent was never observed during 49 observed occasions of cleaning housing, floor and equipment. Processing places did not usually have running water or proper waste water drainage systems. Workers stored offal in a container and skin and wings on the floor to sell later. Workers were observed to smoke, eat or drink, or touch their face and body without first washing their hands during or after processing birds, and used soap in one of 48 occasions of handwashing. Use of personal protective equipment (PPE), such as gloves, masks, aprons or gumboots, was rarely observed or reported. Unavailability of water and soap or detergent was a major barrier for cleaning and handwashing. The most frequently reported constraint of using PPE was inconvenience while performing their tasks.

Overall biosecurity conditions and biosafety practices among LBM poultry workers can facilitate transmission of avian influenza viruses to humans. Future interventions to improve biosecurity conditions and biosafety practices in these markets should consider improving the resource-poor infrastructures and taking into account the poultry workers' financial constraints and the nature and volume of work when designing intervention.

Day 2: **Poster Presentation**

Identification and antibiogram study of bacterial agents isolated from the milk samples under different locations of Bangladesh

***MN Munsi*[1], *NR Sarker*[2], *R Khatun*[3], *MK Alam*[2]**

[1] *Goat and Sheep Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka 1341*
[2] *Animal Production Research Division, Bangladesh Livestock Research Institute, Savar, Dhaka 1341.*
[3]*Training, Palnning and Technology Testing Division, Bangladesh Livestock Research Institute, Savar, Dhaka 1341.*

From the public health point of view, cow's milk containing pathogenic bacteria is an important threat to the consumers. So, the objective of the present study was to identify the bacterial agents of public health importance from the milk samples (n=35) and to observe their sensitivity to different antibiotics. The milk samples were collected and transported aseptically and subsequently allowed for laboratory tests for the identification of bacterial species. The bacteria identified were Staphylococcus aureus, Escherichia coli and Salmonella sp., whereas the prevalences, in case of vendor milk specimens (n=28), were 96.43 %, 53.57% and 35.71% respectively, those in case of brand milk specimens (n=7), were 42.86 %, 28.57% and 0% respectively, which suggest that cautionary measures should be taken for quality milk production and consumption. The antibiotic sensitivity test was done by following the disc diffusion method and the average inhibition zones, in case of Staphylococcus aureus, were 32 mm for oxytetracycline, 26 mm for amoxicillin, 35 mm for ciprofloxacin, 27 mm for cefotaxime, 30 mm for ceftriaxone, 30 mm for azithromycin, and 26 mm for erythromycin; in case of Escherichia coli, were 5 mm for oxytetracycline, 9 mm for amoxicillin, 22 mm for ciprofloxacin, 30 mm for cefotaxime, 31 mm for ceftriaxone, 15 mm for azithromycin, and 0 mm for erythromycin; in case of Salmonella sp., were 25 mm for oxytetracycline, 24 mm for amoxicillin, 38 mm for ciprofloxacin, 31 mm for cefotaxime, 34 mm for ceftriaxone, 24 mm for azithromycin, and 0 mm for erythromycin.

Day 2: **Poster Presentation**

Enhanced pilot surveillance program for anthrax in livestock species in north-west Bangladesh

***D. Ghosh*[1]**, *A.S.M.A.Hannan*[1], *Md. Mehedi Hossain*[1], *Shahid Atahar Hossain*[1], *Md. Ahasanul Hoque*[2]

[1]*Department of Livestock Services, Bangladesh,*
[2]*Chittagong Veterinary & Animal Science University.*

Control of the badly emerging zoonotic disease –anthrax is undoubtedly essential for the safety of human health and to sustain livestock economy, where an enhanced surveillance could play a major role in Bangladesh. This study was conducted for the evaluation of the enhanced reporting system of animal anthrax cases in comparison to existing surveillance programme. This was adopted to find out the true incidence by the help of the village volunteers with the joint collaboration of animal and human health services in the rural risk areas where repeated cases were reported in the past few years. It was done with a view to measure the effectiveness of the volunteers and implementation of one health approach. In this study 465 villages were selected from 20 unions under five upazilas of five districts in North West Bangladesh for the enhanced surveillance programme where village volunteers were chosen from selected villages. This programme was done from May to September 2013. This study was launched with the training of village volunteers on anthrax surveillance and exchange of ideas with the union chairmans and concerned local officers from both department of Livestock and Human health services. The village volunteers frequently visited the households, collected data and reported to the upazila livestock officers. Within each upazilla, up to eight unions were randomly selected. The enhanced surveillance program was introduced into half of the selected unions per upazilla, and the other four unions maintained the pre-existing surveillance arrangements. At the end of the 5-months study period, a cross-sectional evaluation survey was conducted using 200 randomly selected households: 100 were from villages where the enhanced surveillance had been conducted and 100 from villages were the existing surveillance program was continued by University students. A total of 310 suspected anthrax cases were recorded of which only 22 cases were confirmed by either the laboratory testing or tracing epidemiological link of human anthrax cases. Most of the cases occurred during July-August. Among confirmed cases, 18 were acute and four were per-acute. Young animals and goats were mainly affected. The rate of reporting of suspected anthrax cases significantly increased with the intervention of village volunteers in adopted surveillance programme in 2013 as compared with the earlier years (example in Table 2). Vaccinator and animal village doctors appeared to be performed better than any other types of volunteers.

Day 2: **Poster Presentation**

Evidence for the recent emergence of dengue in Bangladesh: results from a seroprevalence study

***Henrik Salje**, Abu Mohd Naser, Mahmudur Rahman, Ziaur Rahman, James Heffelfinger, Justin Lessler, Derek Cummings, Steve Luby, Emily S. Gurley*

Dengue disease is endemic throughout Southeast Asia and has been reported throughout India. Global models of dengue incidence suggest the disease is widespread across Bangladesh; however, while dengue infections have been reported in Dhaka and other cities, it is unknown if the pathogen has spread to rural communities that make up the majority of the country. To address this gap we conducted a seroprevalence study of dengue in a rural district that borders India in the northwest of the country. We randomly selected 40 communities and visited randomly selected households within each community. All household residents were asked to provide a blood sample and information about socio-demographics. Indirect PanBio IgG ELISAs were used to identify past dengue infections. We used a multilevel model to identify risk factors associated with historic dengue infection. In total, 1497 individuals participated in the study with a median age of 26 (range 0 - 90) years. ELISA optical densities separated individuals into two clear groups supporting appropriate discrimination between those with and without past dengue exposure. Overall, 18% of the study population had serological evidence of past infection. There was significant spatial heterogeneity with virtually no past exposure detected in the north of the district, whereas communities in the south near the district capital had over 60% seropositivity. We found no difference in seropositivity by age (p-value 0.17), suggesting that all individuals had experienced a similar cumulative risk of infection characteristic of recently emergent pathogens. Males were 1.4 (95% confidence interval [CI] 1.0–1.9) times more likely to have been infected than females. Having other infected individuals in the household increased the probability of being seropositive by 1.3 (95% CI 1.1–1.5) times. The presence of seropositive individuals in the community (but outside the household) further increased the risk of having been infected by 1.2 (95% CI 1.1–1.3) times. These findings suggest that dengue has only recently emerged in this area and that the majority of the population remains susceptible. Household and community-specific factors appear key to determining individual risk. Further work exploring differences in the ecological suitability for the vector in this region and the flow of people from dengue endemic communities will help us further understand the observed patterns of exposure.

Day 2: **Poster Presentation**

Factors associated with repeated outbreak of anthrax in Bangladesh: qualitative and quantitative study

J Hassan[1], MM Ahsan[2], MB Rahman[1], SMZH Chowdhury[3], S Ahamed[1], Y Arafat[1], MS Parvej[1], ***KHMNH Nazir[1]***

[1]Department of Microbiology and Hygiene, Faculty of Veterinary Science, Bangladesh Agricultural University (BAU), Mymensingh-2202, Bangladesh;
[2]School of Biotechnology, Yeungnam University, Gyeongsan 712-749, Republic of Korea;
[3]Bangladesh Agricultural Research Council (BARC), Dhaka, Bangladesh.

Anthrax, caused by *B. anthracis* is an acute, febrile disease of warm blooded animals including humans. Social norms and poverty in addition to climatic factors such as soil conditions, seasons of year, ambient temperature and rainfall influence the persistence of the *B. anthracis* and anthrax outbreaks. The present study was designed to reveal the factors influencing the repeated outbreak of anthrax in Bangladesh. Considering the previous outbreaks of anthrax, Sirajganj, Bogra, Khustia, Tangail and Mymensingh districts of Bangladesh were selected for this study. To elucidate the factors, qualitative data relating to the animal management, knowledge and behavior of the people; and quantitative data relating to soil conditions, ambient temperature and rainfall were acquired and analyzed critically. Based on the outbreak histories, a year was divided into two seasons, anthrax prone season (May-November) and anthrax dry season (December-April). Anthrax spores could be isolated from 11.67% (n=14/120) of the soil samples collected from the study areas. The present study revealed that poor knowledge, lack of awareness, improper carcass disposal, inadequate vaccination, high Ca content and moisture in the soil along with high ambient temperature and rainfall during the anthrax prone season were the possible influencing factors of repeated outbreaks of anthrax in the study areas. Intensive propaganda to create public awareness of anthrax together with proper vaccination may reduce anthrax outbreaks in Bangladesh.

Day 2: **Poster Presentation**

Antibiotic residues in milk and eggs of commercial and local farms at Chittagong, Bangladesh

***Suchayan Chowdhury*[1, 2], *Mohammad Mahmudul Hassan*[2], *Md. Ahasanul Hoque*[2]**

[1]*Veterinary Surgeon, Upazilla Livestock Office, Rangamati Sadar, Rangamati Hill Tracts, Bangladesh.*

[2]*Department of Physiology, Biochemistry and Pharmacology, Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong-4225, Bangladesh*

The study was conducted to detection and determination of concentration or level of antibiotic residues in milk and egg of local and commercial farms at Chittagong during December 2011 to June 2012. A total of 400 (200 milk and 200 egg) samples were collected from local and commercial dairy cows and local scavenging and commercial poultry farms, respectively. Microbial Inhibition Test and Thin Layer Chromatography were used for screening and Ultra High Performance Liquid Chromatography was used to estimate the concentrations of antibiotic residues in samples. Tetracycline, amoxicillin and ciprofloxacin residues were significantly ($p \leq 0.05$) higher in commercial farms than local. The boiling insignificantly ($p > 0.05$) reduced residues level in milk and egg. The average concentrations of amoxicillin residue in local milk, commercial milk, local egg and commercial egg were 9.84µg/ml, 56.16µg/ml, 10.46µg/gm and 48.82µg/gm respectively in raw samples and were reduced to 9.81µg/ml, 55.54µg/ml, 10.29µg/gm, and 48.38µg/gm, respectively after boiling. Proper maintaining of withdrawal period and development of active surveillance system are highly recommended for public health security.

Day 2: **Poster Presentation**

Cystic Echinococcosis, A Neglected Parasitic Zoonoses; Is it Threat for Public Health in Bangladesh?

***Moizur Rahman**, Md. Wajed Ali, Md. Alauddin, KM Mozaffor Hossain*

Department of Animal Husbandry and Veterinary Science, Faculty of Agriculture, University of Rajshahi, Rajshahi-6205, Bangladesh

Cystic Echinococcosis (CE) or Hydatidosis, caused by the larval stage of the cestode Echinococcus granulosus, is a widespread parasitic zoonoses. The magnitude of CE principally dependent on a dog–sheep/other ruminants–dog cycle. Dogs act as a definitive host and sheep/other ruminants are intermediate hosts. Humans are often infected accidentally from close contact with infected dogs. CE causes serious morbidity and death if untreated. Mortality ranges between 2% and 4% but it may increase if treatment and care are inadequate. CE is a chronic disease with an asymptomatic period of several years and is difficult to diagnose without imaging tools. According to WHO, CE is endemic in Bangladesh. But human cases are not well reported. A recent retrospective study showed that active transmission of Echinococcus granulosus may occur in Bangladesh as the high number (130 patients) of CE1 hepatic cysts seen at tertiary care hospitals. A number of studies have revealed CE to be a problem in ruminants of Bangladesh. An overall CE was recorded in sheep (23.39%), buffaloes (43.43%), cattle (22.34%) and goats (08.61%). A study on E. granulosus infection in stray dogs showed an average prevalence of 62.5%, with prevalences up to 75.8% recorded in dogs in and around slaughterhouses. Thus, rearing of livestock in scavenging condition and slaughtering of food animals along the home/roadsides and/or open market increases the extent of CE in Bangladesh. The lack of public awareness about CE, contact with dogs, dogs fed with infected offal, allowing dogs to roam free, irregular and inappropiate administration of anthelmintics to dogs, use of contaminated vegetables/drinking water and interdependence with animals are the possible risk factors for E. granulosus transmission. Therefore, a detail community-based screening studies are warranted to better define the prevalence and distribution of cases and risk factors for transmission of the parasite. A precise planning for control, development of an effective control tools for CE and its implementation should be considered by the policymakers to overcome the threat of this neglected public health problem.

Day 2: **Poster Presentation**

Animal Anthrax in Sirajganj District of Bangladesh from 2010 to 2012

***SK Shaheenur Islam*[1]*, David M. Castellan*[2]*, Md. Mehedi Hossain*[3]*, A H M Taslima Akhter*[4]**

[1]Epidemiology Unit, Department of Livestock Services;
[2]Senior Veterinary Epidemiologist, Emergency Centre for Transboundary Animal Disease, Regional Office for Asia Pacific, Thailand;
[3]Head, Epidemiology Unit, Department of Livestock Services;
[4]National Participatory Training specialists, FAO, Bangladesh.

Anthrax outbreaks in humans were first reported in August 2010 in four Upazilas (sub-districts) of Sirajganj District in the North-west part of Bangladesh. As of 2014, a total of 394 human cases were identified in five Upazilas as the disease became endemic in cattle, creating an avenue for spill over in humans. The objectives of this study are to describe the pattern of animal anthrax in Sirajgong District of Bangladesh from 2010 to 2012 and to assess the current use of anthrax vaccine (Vaccine Coverage) in the district based on animal, time and place. A descriptive study has been conducted using secondary surveillance data of animal anthrax from the Epidemiology Unit of Department of Livestock Services for the years 2010, 2011 and 2012.The disease was more prevalent in this district at the beginning of the early monsoon (Month of May, June when flood water enters) and the late monsoon (Month of September, October, when flood water recedes). The study found that the modality of anthrax outbreaks in cattle were continuous declining each year with 111 in 2010, 32 in 2011 and 20 in 2012 with an average mortality of 30.19%. The annual average vaccination coverage during those years was 44.29%, 46.23% and 37.88% respectively. To reduce the number of outbreaks in animals and humans in Sirajganj district the annual vaccination coverage requires improvement. Other activities to motivate, change behavior and build greater awareness of anthrax is also needed at the farmer level.

Day 2: **Poster Presentation**

Study on snails acting as intermediate hosts for different parasites of livestock and transboundary animal diseases in Saint Martin's Island

MN Munsi[1], EH Chowdhury[2], MR Islam[1], MAI Talukder[1]

[1]Goat and Sheep Production Research Division, BLRI, Savar, Dhaka;
[2]Department of Pathology, BAU, Mymensingh.

The present study was conducted to find out the existence of snails playing their role as intermediate hosts for different parasites of livestock, and to investigate and traceback the outbreak of transboundary animal diseases (TADs) in Saint Martin's Island. The freshwater sources (small ponds in the island, n=20) were checked carefully to ensure the presence or absence of intermediate snail hosts of parasites. The faecal samples (n=120) of cattle, buffalo and goats were examined by different methods for the presence of parasites and/or their ova. Serum samples (n=30) from the previously infected cattle were collected for doing LPB ELISA in order to determine Ab developed against different serotypes of FMD virus. Eighty serum samples of goats were tested by cELISA to study the sero-prevalence of PPR. On the other hand, sixty serum samples of cattle were tested by rapid bovine TB Ab test kit and brucella Ab test kit to study the sero-prevalence of bovine TB and brucellosis respectively.The snails were identified as Indoplanorbis exustus in 60% ponds, Thiara sp. in 30% ponds and both in 10% ponds. The parasitic eggs found were Amphistomes (in 45.83 % specimens), Fasciola gigantica (in 3.33 % specimens), Schistosoma spp. (in 25 % specimens), stomach worms (in 26.67 % specimens), coccidia (in 4.17 % specimens) and Balantidium coli (in 23.33 % specimens). The distribution of antibody developed against different serotypes of the FMD virus among the affected cattle were 46.67 % for O, 6.67 % for Asia1, 20 % for O+Asia1 and 26.67 % for O+A+Asia1. About 38% serum samples of goats were found positive for PPR but no serum sample of cattle was found positive in case of bovine TB and brucellosis. The outbreak of FMD occurred once and that of ND took place twice during study period. The mortality of chicken was 80% and that of cattle was 0% in the area of outbreak.

Day 2: **Poster Presentation**

Investigation of Heavy Metals in Water and Dairy Milk of Chittagong and Chandpur Districts of Bangladesh

Abu Sayeed

Chittagong Veterinary and Animal Science University, Chittagong

The presence of heavy metals (Arsenic, lead, nickel etc) in water as well as dairy milk is a common problem in Bangladesh. A cross sectional study was conducted on different water sources and dairy milk of greater Chittagong in Bangladesh. A total of 108 water samples (72 tube well and 36 tap water) and 96 dairy milk samples, along with epidemiological and ecological data were obtained from selected study sites and evaluated the samples by using Atomic Absorption Spectrometry. The overall prevalence of lead was higher in tube well water (37.5%) than milk (6.3%). The prevalence of lead in tube well water was significantly higher (61.1%) in Chittagong than in Chandpur (13.9%) but lower in dairy milk of Chittagong (4.2%) than in Chandpur (8.3%). The prevalence of nickel was detected both in tube well water and dairy milk at high prevalence (30.6-37.5%) in Chandpur. Contrarily, nickel was detected only in dairy milk at high rate of prevalence (27.1%) in Chittagong. Around 45% of lead positive water samples (N=56) and 26% of lead positive dairy milk samples (N=51) crossed the reference values (reference values: 0.05 mg/L and 0.49 mg/L for water and dairy milk, respectively). Milk samples obtained from Chittagong crossed the reference value of lead had high frequency (44.8%). Area and presence of industry were determined risk factors for nickel in dairy milk (OR=5.4: semi-urban versus rural; OR=2.0: industry versus non-industry). Thirty one percent of nickel positive tube well water (N=18) also crossed the reference value in this study. Tube well water samples obtained from Chittagong crossed the reference value of lead had higher frequency (95.5%) than in Chandpur (13.9%).

Day 2: **Poster Presentation**

Transmission of Zoonotic diseases and loss of habitat due to human langur conflict at jessore district of Bangladesh.

Syed Hossain

Veterinary Surgeon, Wildlife Crime Control Unit, Mohakhali, Bangladesh Forest Department

Common Langur (Semnopithecus entellus) is the prehistoric mammals of Bangladesh which is located very specific places of Jessore district especially at Keshobpur and Moniram pur. Where as langurs depend primarily on foods cultivated in home gardens and orchards. So sometimes conflict may happen between human and langur when langur feeds on homestead gardens and personal assets of people. Some peoples are afraid of being attacked or bitten by langur even sometimes a troop attacked to the people shop and any other food items shop and sometimes bite the people. So there is a chance of transmitting zoonotic deseases from human to langur and vise versa. The probable outcomes of conflict are death of langur, injury of langur and injury of people. So the habitats of langur are shrinkage day by day which ultimately creates effect on langur health, production and reproduction. Since the conflict increases hence the population of langur decreses. Though the Forest Department has taken initiatives for conservation of langur by plantation of food bearing trees and making awareness to the general people by a project funded by World Bank but it is not enough to increase the population of langur. Some specific research should conduct for better conservation of langur; such as - what are the diseases are normally found in langur, what are the chances of transmission of those diseases to the human being whose are bited by langur, have there any genetic changes happen or not etc.

Day 2: **Poster Presentation**

Assessing the Risk of Transmission of Canine Distemper Virus from Village Dogs to the Bengal Tiger Population of Bangladesh Sundarbans: A proposed study

Dr. Md. Mahbubul Alam

Coordinator, USAID's Bagh Activity, WildTeam

Canine distemper is a highly contagious viral disease occurring in canine and feline species. It is caused by the Canine Distemper Virus (CDV) an enveloped negative stranded RNA virus of the paramyxoviridae family. CDV results in high morbidity and mortality in large felids, particularly in neonates and juveniles. In Russia, this virus has been reported in wild Amur tigers (Panthera tigris altaica) with high mortality rates. However, the prevalence in wild Bengal tiger (Panthera tigris tigris) is unknown despite anecdotal reports of occurrence.

Unvaccinated dogs are the main reservoir of CDV for infection in tiger populations. In Russia exposure of tigers to the virus is thought to be associated with hunting domestic dog populations. In Russia it was found that CDV infection in tigers is an important factor for increasing Tiger Human Conflict (THC) as CDV infection leads tigers to search for easy prey like dog. It found that the prevalence of canine distemper is twice high in conflict tigers in Russia.

While about 50-70% of infected domestic dogs remain asymptomatic carriers, infection in tigers results in much higher morbidities and mortalities, particularly in neonates and juveniles. Anorexia, respiratory distress, ocular and nasal discharge, diarrhoea are common signs for tigers. Infection can also result in neurological signs such as ataxia, staggering gait, head pressing, and seizures usually leading to death. Disease in isolated populations can affected vital role in the survival and reproduction of isolated population of slowly reproducing species like tiger and the increase the risk of extinction. In Russia, CDV is thought to have leaded massive declines in wild carnivore populations.

Sundarbans has one of the highest tiger densities among the Tiger Conservation Landscapes. It is also characterized by a height level of Tiger Human Conflict, resulting in high losses of human, domestic animal and tiger. On average about 80 domestic animals are reported to have been killed annually by tigers either inside the villages during straying incidents or near forest areas. Although the majority of incidents involve livestock, approximately 13% are dogs. Tiger incursions in villages thus offer the potential of CDV transmission from domestic animals into the Sundarbans tiger population.

This proposed study aims to assess the risk of CDV transmission from the villages' dog populations into the Sundarbans tiger population by determining prevalence of CDV infection in village dogs in localities in close proximity to the Bangladesh Sundarbans and identifying the risk factors involved which will ultimately help to reduce the risk of transmission of CDV from domestic dog to wild tiger populations.

Day 2: **Poster Presentation**

Single nucleotide polymorphisms of Toll-like receptors and association with Haemonchus contortus infection in goat

***M.A. Alim*[1, 2]*, Yuhua Fu*[2]*, Zhenyang Wu*[2]*, Shu-hong Zhao*[2]*, Jianhua Cao*[2]

[1]*Animal Biotechnology Division, National Institute of Biotechnology, Ganakbari, Ashulia, Savar, Dhaka-1349, Bangladesh*

[2]*College of Animal Science and Technology, Key Laboratory of Agricultural Animal Genetics, Breeding and Reproduction of Ministry of Education, Huazhong Agricultural University, Wuhan 430070, P. R. China*

Haemonchus contortus is blood sucking gastrointestinal nematode and causal pathogen of intestinal infection. Such type of infection causes serious constraint to goat production. Toll-like receptors (TLRs) are known to induce immune response predominantly through activate different signaling pathways that produce natural resistance against pathogens. TLRs are thought to be a critical ''bridge'' between innate and adaptive immunity to diverse pathogens. The current study was performed to investigate the association between polymorphisms of the TLRs gene and susceptibility to *Haemonchus contortus* infection in goat. Preliminary, 31 single nucleotide polymorphisms were identified in the TRLs gene using both pooled DNA and randomly selected DNA sequencing. The identified SNPs were genotyped by MALDI-TOF MS (Matrix-assisted laser desorption/ ionization time of flight mass spectrometry) methods from 245 individuals. Out of 31, nine SNPs individualy showed statistical significance association with *Haemonchus contortus* infection, of which, three were non synonymous resulted to amino acid replacement. Seven haplotype blocks were observed in this study and of those, four blocks are found to be significtly associted with H*aemonchus contortus* infection. Among the blocks, block6 containg haplotypes GAGCATC, GAACATC, TGGGGGT, GGGGGGC and GGGGGTC were associated ($p<0.002$) with a higher risk of *Haemonchus contortus* infection in goat. Our results indicate polymorphisms detected in TLRs might have an impact on the structure and/or function of TLRs; goat TLRs are predicted to be associated with responses to gastrointestinal nematode infection including *Haemonchus contortus* and hence affect the immune response to pathogens.

Day 3: **Poster Presentation**

An overview of animal slaughterhouse, slaughtering system and meat control act in Bangladesh

Md. Jalal Uddin Sarder

Department of Animal Husbandry and Veterinary Science, University of Rajshahi, Rajshahi-6203, Bangladesh

Worldwide, now a day the food safety is a very importance issue. Safe food plays an important role on human health. Ensuring safe food is paramount for the protection of human health and for enhancement of the quality of life. The demand of safe and hygienic food of animal origin (beef, chevon, mutton, chicken, ducks, eggs, milk and milk products) is increased. Around 3.5 million cattle and 15 million goats are slaughtered annually in our country. In rural areas of developing in Bangladesh the slaughtering of animals for meat is often carried out under less than ideal conditions and where there are limited facilities, slaughtering is likely under a tree where an animal can be hoisted for skinning and evisceration. The supply of meat in Bangladesh in term of handling, slaughtering, and dressing of food animals take place in a very disorganized way. The animals are slaughtered randomly and indiscriminately. There are few slaughterhouses confined to the big cities. Since there is no lairage, animals generally do not receive ante-mortem care. There are many self-made field abattoirs in rural and urban areas, small towns and even in cities where slaughtering of cattle, sheep and goat by unauthorized butchers in fields, bushes, backyards or at some street corners. There is very limited enforcement of slaughtering Act, 1983 and Act relating to the hygienic production of meat, as a result this type of highly nutritious food is handled, produced and distributed in a very unsanitary condition. Most of the public slaughterhouses are governed by the municipal authorities. In a few slaughterhouses, either a veterinarian or a sanitary inspector is deputed to make supervision of the eviscerated carcass. There is no practice of humane slaughtering method in Bangladesh. Aged and sick animals and on the contrary very immature and some healthy animals are also slaughtered. In Bangladesh the largest proportion of cattle destined for the meat stalls are slaughtered by butchers at location of their convenience. An accepted religious person is employed to perform the Halal ritual slaughter and the butcher employees perform the tasks of flaying, dressing the carcass and offal preparation. The public due to unawareness and non-enforcement of laws many a times buy meat, which can not ensure protection to consumers from the potential danger of inferior quality meat. The finished products are transported to meat shops by rickshaw, cart, vans and shoulder carriage, often lying on unclean surfaces and exposed to health hazardous agents. Blood, ruminal and intestinal contents are either left where the slaughter has taken place or washed down a drain to eventually end up in a pond or a watercourse. In this viewpoint many experts suggest that the slaughterhouse management followed in this country need to be improved to ensure production of good quality carcasses and safe hygienic meat. The present study was emphasis on present situation and future prospect of animal slaughter houses position, animal transportation, killing method, anti-mortem and post mortem inspection system, handling and selling of meat to control the zoonotic diseases in Bangladesh.

Day 3: **Poster Presentation**

Isolation, identification, molecular characterization and in vitro screening of potential probiotic activities **of Lactobacillus species from poultry sources at live bird markets in Mymensingh**

***S. M. Lutful Kabir*[1]**, *S. M. Mushfiqur Rahman*[1], *Sucharit Basu Neogi*[2], *M. Shahidur Rahman Khan*[1]

[1]*Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh, Bangladesh*
[2]*Centre for Food and Waterborne Diseases, International Centre for Diarrheal Disease Research, Mohakhali, Dhaka, Bangladesh*

A study was conducted to isolate and characterize Lactobacilli from the gastrointestinal (GI) tract of broiler chickens in different markets along with evaluation of probiotic ability and antibiotic sensitivity of Lactobacillus isolates during the period of July, 2014 to December, 2014. The ceacum and cloacal contents of 100 broiler chickens from different markets were collected and cultured on Man Rogosa and Sharp (MRS) broth and agar. Lactobacilli were isolated and characterized by using phenotypic (cell morphology, Gram's staining, physiological and biochemical tests which are specific for Lactobacillus genus) and genotypic methods (PCR and RAPD). The identified Lactobacilli species were screened for probiotic properties by in vitro tests like acid tolerance and bile tolerance. Total eighty two isolates were identified as Lactobacillus based on morphological, physiological and biochemical tests which are specific for Lactobacillus genus. All of the Lactobacillus isolates were further identified at species level as Lactobacillus acidophilus, Lactobacillus crispatus, Lactobacillus galinarum and other unclassified Lactobacillus species based on sugar fermentation tests. The prevalence of Lactobacillus crispatus, Lactobacillus acidophilus and Lactobacillus gallinarum species found in the chickens were 21.95%, 18.29% and 17.07% respectively. A total of 10 Lactobacillus isolates were amplified by using 16S rRNA gene-based universal primers. Furthermore, out of 10 Lactobacillus isolates 4 molecular patterns were detected and 6 Lactobacillus isolates were clonal by randomly amplified ploymorphic DNA (RAPD) method in this study. Out of 15 Lactobacillus isolates, 10 isolates demonstrated probiotic ability as determined by bile tolerance test and acid tolerance test. Moreover, the results of antibiotic sensitivity showed that all of the isolates tested were sensitive to tetracycline and gentamicin. However, most of the isolates tested were resistant to ampicillin and cefradine. Potential probiotic bacterial strains from poultry sources were identified as well as characterized in this study.

Day 3: **Poster Presentation**

Evaluation on the Efficacy of BAU Fowl Cholera Vaccine

***Koly Mustafa*[1]**, *Md. Haydar Ali[2], Md. Zillur Rahman[3], Jashim Uddin[4], Md. Abdullah Al Noman[5]*

[1] MS Student, Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh-2202
[2] Md. Haydar Ali, Department of Pathology and Parasitology, Faculty of Veterinary and Animal Science, Hajee Mohammad Danesh Science and Technology University, Dinajpur-5200
[3]Md. Zillur Rahman, Veterinary Surgeon, Upazila Livestock Office, Sadar, Satkhira
[4]Jashim Uddin, Department of Animal Husbandry and Veterinary Science, University of Rajshahi
[5]Chittagong Veterinary and Animal Sciences University, Khulshi, Chittagong.

The study was conducted to assess the efficacy of formalin killed oil adjuvanated Fowl Cholera vaccine prepared in Livestock and Poultry Vaccine Research and Production Centre (LPVRPC), Department of Microbiology and Hygiene, Bangladesh Agricultural University, Mymensingh, Bangladesh. The vaccine efficacy was determined based on Antibody titre of the sera of chichen and mice, the protective capability against challenge infection, differential Leukocyte count and the ability of antisera to give Passive protection. Both the chicken and mice were immunized with fowl cholera vaccine with a dose of 0.5 ml through I/M route and 100 µl through I/P respectively and same booster dose was given after 4 weeks. The serum antibody titer was monitored at regular intervals by Passive Hemagglutination Test and the serum antibody titer was picked after 2 weeks of both primary and booster vaccination (**p≤0.01) and started to decline after 4 weeks of both primary and secondary vaccination and the sera induced by vaccination specifically reacted with the field isolates of fowl cholera. Both the chicken and mice of vaccinated group showed maximal resistance following challenge exposure with virulent field isolate of fowl cholera organism. An increased number of lymphocyte was also observed in mice after primary vaccination (**p≤0.01). These result indicate that the fowl cholera vaccine produced by Livestock and Poultry Vaccine Research and production Center induced a high level of protective immunity against field isolates of P. multocida.

Day 3: **Poster Presentation**

Molecular Characterization of *Giardia intestinalis* Assemblage E from Goat kids in Bangladesh

***Mohammad Alamgir Hossain*[1]**, *Sohana Akter Mina*[2], *Lolo Wal Marzan*[2], *Mohammad Asif Emran Khan Emon*[2], *Rasel Das*[3], *Shubhagata Das*[1], *AMAM Zonaed Siddki*[1]

[1]*Deptartment of Pathology and Parasitology, Chittagong Veterinary and Animal Sciences University (CVASU), Chittagong-4202, Bangladesh*
[2]*Department of Genetic Engineering and Biotechnology, University of Chittagong, Chittagong – 4331, Bangladesh*
[3]*Nanotechnology and Catalysis Research Center (NANOCEN), University of Malaya, 50603 Kuala Lumpur, Malaysia.*

Giardiasis is an important protozoan disease caused by Giardia and manifested as life-threatening diarrhea in animals and humans worldwide. In Bangladesh, human infection with Giardia has been reported earlier. However, no study is available in animals that could be an important source of infections for human. Hence, there is a room to characterize Giardia protozoan parasite with the development of various sensitive tools. In the present study, we have observed and analyzed Giardia in 100 goat kids in Chittagong, Bangladesh by using highly sensitive nested PCR amplification of β-giardin gene fragment followed by sequencing and analysis. The nested PCR analyses revealed that only 3 samples out of 100 cases were positive for Giardia infection. Further analysis of β-giardin gene locus has shown and clustered the Giardia in Assemblage E rather than Assemblages A and B. It suggests the low zoonotic transmission frequency from the goat kids and has least epidemiological significance. However, to our knowledge this is the first scale survey has taken in order to characterize Giardia from goat kids in Chittagong, Bangladesh. Further study on this field is prerequisite in terms of more sample numbers, broad geographical areas, age groups, sex and evaluates zoonotic significance along with genetic diversity in other host species as well.

Day 3: **Poster Presentation**

Influenza A Surveillance in Animal Health Sector: Identifying viruses and Integrating towards OH approach

***GM Ahmed**, SD Gupta, NC Debnath, M Yamage*

Emergency Center for Transboundary Animal Diseases (ECTAD), Food and Agriculture Organization of the United Nations, Dhaka, Bangladesh

Introduction: Surveillance to detect, characterize and monitor the evolution and spread of Highly Pathogenic Avian Influenza (HPAI) H5N1 virus has been at the forefront of response to the disease incursion into Bangladesh. Over the last seven years (2007 to 2014), the Department of Livestock Services (DLS) reported 557 outbreaks of HPAI resulting in the culling of over 2.7 million poultry while human health sector recorded one fatal case out of seven reported cases of human infection. The Food and Agriculture Organization (FAO) Emergency Center for Transboundary Animal Diseases (ECTAD) collaborated with the Department of Livestock Services (DLS) to implement seven (7) surveillance focused projects financed by the United States Agency for International Development (USAID). ECTAD also provided technical assistance in implementing the World Bank funded Avian Influenza project – the AIPRP (Avian Influenza Preparedness and Response Project). The intervention projects provided platforms for effective surveillance to detect influenza A viruses at farms, LBMs, wild-domestic bird interface and backyard holdings for poultry and in swine production systems. In 2007/8, surveillance systems were random, nationwide and standalone but gradually evolved to targeted risk-based integrated systems in 2014 involving multiple stakeholders in line with One Health (OH) approach.

Method: Veterinary services capacity for surveillance (field and laboratory levels) and disease reporting were assessed and plan to address the lapses developed. During the process, various stakeholders and partners were involved to ensure multi-sectoral approach.

Result: Active and passive electronic reporting systems (SMS Gateway, LDIS) and Data management system (MIS for poultry, LBMs & Check posts) were developed and DLS staff trained. HPAI H5N1 outbreaks were detected early through active surveillance (86% were through SMS Gateway in 2011) ahead of passive surveillance and responses were taken early to prevent spread (turnaround time from 4.8 days to 1.4 days). From 2007 to 2014, influenza A surveillance platforms isolated several influenza A virus subtypes (H5N1, H7N5, H9N2) from poultry, detected antibodies in wild birds (H1, H2, H4, H5, H7-11 & H13) and identified , evolving clades (2,2, 2.3.4, 2.3.2.1, 2.3.2.1a). No viruses were identified in swine but ELISA results indicated high antibody response. During the same period, virus genome sequences (301 sequences from 197 AI viruses) were archived in the GeneBank for public use and further research. Training was provided to over 2000 field and laboratory personnel including Community Animal Health Workers (CAHWs) and Additional Veterinary Surgeons (AVSs) to support DLS field surveillance capacity. Bangladesh Laboratory Response Networking (BLRN) was established providing platform for information sharing among multi-sectoral partners.

Conclusions: Use of electronic web-based reporting systems and strengthening multi-sectoral collaboration through integrating surveillance systems is needed efficient influenza A surveillance and operationalising OH in Bangladesh.

Day 3: **Poster Presentation**

Effects of testosterone on hemogram and serum biochemistry of Black Bengal goat

***M. Royhan Gofur**, K. M. Mozaffor Hossain*

Department of Animal Husbandry and Veterinary Science, University of Rajshahi, Rajshahi-6205, Bangladesh

Testosterone involves in regulating the oxidative phase of carbohydrate metabolism and also improves the lipid metabolism along with its androgenic effects. This study was conducted to reveal the effects of testosterone on hemogram and serum biochemistry of Black Bengal goat. A total of fifteen goats (n=15) were divided into three groups (five goat in each group). Group-A: goats with deficient testosterone, Group-B: control, and Group-C: goats with excess testosterone. Goats of group-A were castrated after 15 days of purchase and goats of group-C were administered exogenous testosterone enanthate (TE) intramuscularly at the rate of 125 mg per goat weekly for 2 months. The hemogram and serum biochemistry were analyzed by using auto analyzers (Automated Mythic-22 Hematology Analyzer, Switzerland and HUMALYZER-2000, Germany, respectively). Castration of goat caused a significant decrease in the red blood corpuscles (RBC), packed cell volume (PCV), and lymphocytes accompanied with a significant increase in mean corpuscular volume, mean corpuscular hemoglobin, neutrophils, total cholesterol, triglycerides (TG), and low density lipoprotein (LDL). Administration of testosterone enanthate significantly increased red blood corpuscles (RBC), packed cell volume (PCV) but decreased total leucocytes, neutrophils, triglycerides (TG), and low density lipoprotein (LDL). Total protein, albumin, and glucose level also significantly decreased along with lowered level of testosterone. Serum enzymes (SGOT and SGPT) were not affected much by testosterone. From the present study, it is concluded that testosterone significantly affects in certain blood constituents, lipid, and protein profile in Black Bengal goats.

Day 3: **Poster Presentation**

Drug dispensing practices for acute respiratory infections and availability of oseltamivir through pharmacies, in Dhaka, Bangladesh

***F Chowdhury*[1]**, *A A Mamun*[1], *E Azziz-Baumgartner*[2], *M J Chisti*[1], *D Iuliano*[2], *M Ahmed*[1], *M U Bhuiyan*[1], *S Haider*[3], *M Rahman*[3], *K Sturm-Ramirez*[1,2]

[1]*International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh;*
[2]*Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, USA;*
[3]*Institute of Epidemiology, Disease Control and Research, Dhaka, Bangladesh.*

Drug sellers comprise 16% of primary healthcare providers in Bangladesh and often serve as first point of care for the poor and less educated. During the 2009 influenza pandemic, a survey in Dhaka reported that 48% of respondents who had influenza-like illnesses (ILI) used pharmacies as the first point of care. Therefore, drug sellers have an important influence on public health through their health advice and treatment recommendations. No published data are available in Bangladesh on drug dispensing practices for acute respiratory infection (ARI) or on the availability of oseltamivir in pharmacies, an anti-viral drug used to treat and prevent influenza virus infection. We investigated drug sellers dispensing practices for ARI and the availability of oseltamivir in pharmacies throughout Dhaka city, Bangladesh.

During May to October 2012, we conducted a cross-sectional study among 100 pharmacies: 10 pharmacies from each of the 10 zones of Dhaka city which were selected using random points on GPS and identifying the closest pharmacy to that point. Using a structured questionnaire researchers collected data on demographics, availability of oseltamivir and knowledge of oseltamivir from the drug seller who spent the most time in the pharmacy. Additionally, six field research assistants (FRAs) visited all the selected pharmacies and acted as relatives of patients with ARI. FRAs sought drug sellers' advice about clinical management and did not carry a prescription from a physician. FRAs described to drug sellers one of three clinical symptoms for either children or adults: acute onset of cough with runny nose, cough with fever, or respiratory distress. FRAs recorded health advice provided and drugs dispensed by the drug sellers for each visit. We compared dispensed drugs with ARI management guidelines (Government of Bangladesh, Unicef and WHO) to assess the appropriateness of drug seller recommendations. According to the guidelines acetaminophen was considered the only appropriate choice of drug for patients with common cold and fever; antibiotics (erythromycin, azithromycin, amoxycillin, penicillin) were appropriate for pneumonia; whereas steroids, non-steroidal anti-inflammatory drugs (NSAIDs) and pseudoephedrine were inappropriate and potentially harmful.

Among 100 selected pharmacies, none had oseltamivir available for sale during the survey. Ninety-nine (99%) drug sellers had no knowledge of oseltamivir and only 1 (1%) drug seller dispensed oseltamivir as recommended by the government of Bangladesh during the 2009 influenza pandemic. Drug sellers dispensed drugs for the patient in 383 (64%) of 600 FRA visits, asked FRAs to take the patient to a physician or hospital in 184 (31%) visits and refused to give drugs without the patient present in 33 (6%) visits. In 84 (14%) of the 600 visits, drug sellers dispensed drugs at the behest of FRAs despite referral or refusing to treat the patient. Among all the dispensed drugs, acetaminophen was dispensed in 238 (40%) visits, antibiotics in 224 (37%), antihistamines in 177 (30 %), bronchodilators in 103 (17%), cough expectorants in 83 (14%), , herbal cough syrups in 52 (9%), gastric ulcer healing drugs in 30 (5%), prophylactics for bronchial asthma in 25 (4%), cough suppressants in 20 (3%), steroids in 12 (2%) and

other drugs in 15 (3%) visits. An average of 1.6 drugs was dispensed per visit. According to the guidelines, 687 (70%) of the dispensed drugs were inappropriate but not harmful, 225 (23%) were appropriate, 52 (5%) (herbal medicines) could not be judged appropriate or inappropriate and 15 (2%) were inappropriate and potentially harmful. In 150 (25%) visits, advice was provided by drug sellers during consultation. The most common advice provided was to take antibiotics if the patient was not cured within 3-5 days in 69 (46%) visits, avoidance of cold drinks in 22 (15%) visits, and to take antibiotic according to physician if not cured in 19 (13%) visits.

Drug sellers were unfamiliar with and did not stock oseltamivir. Their dispensing practices for ARI were often inappropriate. Formal training on the empirical management of acute respiratory illness may promote safer dispensing practices.

Day 3: **Poster Presentation**

Title: Fighting Zoonoses in Bangladesh: Increase Awareness, Prevention and Control

Sumon K. Biswas

Senior Program Officer, Community Engagement and Bio-risk Management, One Health Asia Program, Relief International-UK

The poster presentation will highlight key facts about zoonosis and One Health concept with particular reference to Bangladesh and Relief International-UK's One Health program in the country. More specifically, the posters will showcase the following information with relevant graphical illustration and images: what is zoonosis, key facts and figures about zoonosis in Bangladesh, what is the One Health concept, RI-UK's response to zoonosis, how does relief international-UK combat zoonosis in Bangladesh.

The poster will showcase various activities undertaken by RI such as, community engagement, anti-zoonosis media campaign, community health worker engagement, participation of youth and teachers in rural areas, disease monitoring and surveillance, vaccine distribution and administration system strengthening, inclusion of zoonosis and one health issues into the academic curriculum at university level, establishment of Zoonotic research center at university.

Through the poste presentation, participants will be aware of an existing One Health Program in Bangladesh in addition to exploring potential collaboration with the program, and replicate or scale up similar program activities by their respective organizations/institutions.

Day 3: **Poster Presentation**

Environmentmove.com a dedicated web hub on environment-nature-wildlife.

Md. Tawhid Hossain;

Editor in Chief, environmentmove.com

www.environmentmove.com is an independent Bangladeshi web portal published both in Bengali and English based on interrelated matter of environment, nature, wildlife as well as environmental protection and conservation. This fundamental and being first of its kind exceptional web portal in Bangladesh is an initiative of some enthusiastic, energetic and nature lover students of department of soil, water and environment, university of Dhaka. This web portal started its journey on September 2012.

The cardinal objective of this portal is to represent information regarding environment-nature-wild life-agriculture from a centralize platform to the mass people. We believe that, the right circulation and distribution of knowledge is necessary for assuring a tidy and clean environment for all the human being to lead a healthy and nutritious life. For the advancement and quality social change, there is no alternative way of taking proper decision; and proper decision can be taken when the knowledge is right and on time. Our belief lies in that, positive change in our society can be brought by serving exclusive and proper representation of information. The responsibility of presenting environment should not only be a duty of our government but also as a rational and conscious citizen, it is our duty. It can be performed efficiently by ensuring the unobstructed and comprehensible flow of information throughout self-segment to large industrial sector. Knowledge or information get proper repletion only when it is accessible to everyone. It is our responsibility to free this enormous information storehouse of nature and environment in this 21st century era of information and internet technology.

As its responsibility to spread knowledge about environment- nature-wildlife-agriculture, environmentmove.com has already published more than 2000 articles which has reached over 111500 readers. This web portal is visited by people of various age and occupation and by sharing the contents in many social media; they help bringing a positive change in the society by discussing environment, nature, wildlife and agriculture as a whole.

Day 3: **Poster Presentation**

The Contemporary Challenges of Emerging Novel Diseases and the Training of the New Health Workforce Generation under One Medicine

***E. Farag*[1]**, *A. Hummaida*[1], *S. Himatt*[1], *M. Al-Hajri*[1], *H. Al-Romaihi*[1], *M. Nour*[1], *A. Elsayed*[1], *M. Al-Thani, S. Al-Marri, M. Hussni*[2], *M. Koopmans*[3]

[1]*Supreme Council of Health, Qatar;*
[2]*Weill Cornell University – Doha, Qatar;*
[3]*Erasmus MC, Netherlands*

Recently, the world has witnessed emergence of novel diseases such as avian influenza, MERS.COV and Ebola. The evolution of these pathogens has been facilitated mainly by a constantly evolving animal-human interface. The increasing interaction between man and animals and the ease of global movement of these two populations has exacerbates the risk of spread of zoonotic diseases, often with detrimental effect on public health. With the growing realization that pathogens do not respect traditional epistemological divides, the 'One Health' initiative has emerged to advocate for closer collaboration across the health disciplines and has provided a new agenda for health professionals education in the new area. Against this background, we addressed the directions of new public health training programs which have to be developed to generate a cadre of health professionals with a broad understanding of disease control and prevention. Aiming at equipping the scientists with multidisciplinary skill sets to match the contemporary challenges of human, animal and zoonotic disease prevention and control.

The training of new health work force generation under One Health approach umbrella is an important discipline for both public and animal health. WHO, OIE, FAO and the UN organizations have strongly endorsed the concept of One Health as ultimate solution to this contemporary health challenges. Public health training programs around the world adopted a reductionist approach—focusing exclusively either on the human or the animal component of the zoonotic paradigm. The reductionist approach failed to produce trained cadre that is armed with knowledge and skills to address the factors that led to the evolution, introduction, transmission, and perpetuation of these diseases. The knowledge on these factors at the source, environment, and host level, combined with the necessary skills, is critical for control and prevention of these outbreaks. A one health interdisciplinary program that integrates training in human and animal public health at the intersection of the ecosystem will produce cadre that is competent and confident to meet the emerging challenges to the Eco health with its complementary components—man, animal, and the environment.

Medical education intuitions need to take a pioneer step by supporting the One Health Education, Advocacy, Research and Training, aiming at sustaining the health of the communities by addressing various issues of concern shaping the future of humanity today like the zoonotic and emerging diseases in their education curriculums as well as integrated training programs.

Day 3: **Poster Presentation**

Laboratory-based surveillance for genetic characterization of wild-type viruses, Bangladesh

Khondoker Mahbuba Jamil[1], *ABM Musa, Director*[2], *Tajul Islam Bari*[3], *Jayantha Liyanage*[4], *Tanbirul Islam*[4], *Patcha Incomserb*[5], *Pattamadiloc Sirima*[6],

[1]*National Polio, Measles and AMES Laboratory*
[2]*PHC-DGHS, Bangladesh*
[3]*EPI, DGHS, Bangladesh*
[4]*WHO, Bangladesh*
[5]*RRL SEA, Bangkok*
[6]*WHO-SEARO, India*

Bangladesh has been experiencing relatively low level of measles transmission for last few years. The country is on track to eliminate measles through aggressive vaccination program which is the principal contributor in international efforts to control measles infections. EPI and Surveillance system, Bangladesh has been monitoring the status of measles elimination activity through its virological surveillance system supported by National Polio, Measles and AMES laboratory(NPML) in Institute of Public Health(IPH), accredited by WHO. The laboratory-based surveillance is the most valuable tool for measuring the effectiveness of measles control programs. The Measles virus surveillance has been conducted throughout the all phases of measles control and has been expanded to give an accurate description of the distribution of measles genotypes in Bangladesh. These genetic studies in virological surveillance enhance our ability to identify the source and transmission pathways of the virus and thus help in control and elimination program.

Clinical sample were received from clinically suspected case and contacts through national surveillance system conducted by EPI with technical support of WHO. Samples were tested in NPM laboratory, IPH. Serology, virus isolation in cell culture and confirmation by realtime PCR was done. To know the genetic characterization sequencing was completed for few positive samples.

In 2014, a total 1835 specimen tested in NPML which is a proficient laboratory accredited by WHO Measles lab network and 6.9% was positive for measles. Annualized incidence of confirmed measles cases per million populations in 2014 is 1.1. 94% serum specimen tested and reported to program on time within 4 days of receipt.

Genetic characterization of wild type measles viruses focused on analysis of the genes coding for the H and/or N proteins, which contained up to 6-8% nucleotide variability. The 450 – nucleotide region which is the most variable parts of the measles genome, coded for COOH-terminus of N protein. N protein nucleotide variability approached 12% between our wild type viruses.

This study contributes to baseline data on circulating measles virus genotypes for measles elimination for Bangladesh. Laboratory activities are going on for updating circulation patterns of measles genotypes. Extensive virological surveillance by EPI, NPML laboratory and WHO are the important steps of government being appreciated by stakeholders.

Day 3: **Poster Presentation**

Improving Biosecurity at Live Bird Markets (LBMs): A Journey So Far in Bangladesh

***S.D.Gupta**, N.C. Debnath, G.M. Ahmed and M.Yamage*

Emergency Centre for Transboundary Animal Diseases (ECTAD), Food and Agriculture Organization of the United Nations (FAO), Bangladesh

Since 2007, outbreaks of Highly Pathogenic Avian Influenza (HPAI) H5N1 virus infection in Bangladesh have resulted in a high number of losses in domestic trade of poultry and poultry products, socioeconomic impacts, losses to farmers' livelihoods, with potential public health risks. In addition to outbreaks of HPAI at the farm level, cases of the virus in birds and humans have also been detected in LBMs. Live bird market (LBM) has been recognized as a venue for HPAI virus transmission to the workers, traders and patrons of the market, as well as to the homes of the consumers, farms and the environment. In order to control and eliminate the threat posed by avian influenza to humans & poultry and ensure safe food to consumers, the improvement of LBMs in structure and practice is of utmost importance. The food chain of LBM is indicative of the ways HPAI can appear in parallel with population density and movement. Consequently, in collaboration with Department of Livestock Services (DLS), Emergency Centre for Transboundary Animal Diseases (ECTAD), Food and Agriculture Organization of the United Nations (FAO), Bangladesh has been working with LBM stakeholders including city corporations/municipalities, market committees, and poultry vendors to improve biosecurity at LBMs. The major interventions include targeted renovation, stakeholder capacity building, communication & advocacy, introduction of weekly rest day and decontamination activities. Since 2008, with financial support from United States Agency for International Development (USAID) a total of 31major LBMs have been renovated throughout the country with a view to improve the biosecurity facilities of the markets. ECTAD FAO's continuous advocacy and awareness facilitated the introduction of a weekly LBM rest-day/closure in Dhaka city in 2012 for the first time in Bangladesh. Subsequently, five additional city corporation/municipalities imposed rest days. ECTAD FAO continued to provide its technical and advocacy support to raise public awareness with LBM stakeholders and local governments to ensure biosecurity practices are promoted and enforced. Despite different interventions in LBMs, various challenges continue to persist. Strong commitment from government as well as other LBM stakeholders is indispensable to sustain the interventions.

Day 3: **Poster Presentation**

Identification of Salmonella spp. by Inv A gene Specific PCR with Antimicrobial Resistance Pattern from Stray dog at Chittagong Metropolitan Area, Bangladesh

***Tofazzal Md. Rakib*[1]**, *Md. Shafiqul Islam*[1], *Shariful Islam*[2], *Nur-E-Azam*[1], *Mohammad Mahmudul Hasan*[3], *Md. Masuduzzaman*[1], *Sharmin Chowdhury*[1]

[1]*Department of Pathology and Parasitology, CVASU, Chittagong*
[2]*Department of Medicine and Surgery, CVASU, Chittagong*
[3]*Department of Physiology, Biochemistry and Pharmacology, CVASU, Chittagong.*

Salmonellosis is one of the most common and widely distributed global public health issues. During the last decade, multi-resistance of Salmonella spp. has increased a great deal, especially in developing countries with an increased and indiscriminate use of antibiotics in veterinary practice. Therefore, a cross sectional study was conducted to investigate the prevalence and antimicrobial resistance pattern in Salmonella spp. isolated from rectal swab of stray dogs in the randomly selected 9 areas of Chittagong City Corporation to assess the risk of possible transmission of Salmonella from dogs to humans. Rectal swabs were collected for isolating Salmonella spp. (bacteriological culture methods) followed by antimicrobial susceptibility testing (disk diffusion method) against Salmonella isolates. Inv A gene specific primer was used to detect Salmonella spp. Out of 108 dog 67(62%) fecal samples was primarily identified as positive for Salmonella in bacteriological isolation method. But among the 67 isolates 7 (10.45%) sample was found positive in PCR. Bacteriological isolated Salmonella was tested for resistance to twelve different antimicrobial agents, using disc diffusion method. Among these 100% resistance were found to Amoxicillin followed by Azithromycin (91.67-100%), Cefixime (90-100%), Ampicillin (83.33-100%), Pefloxacin (83.33-100%), Potentiated Sulfonamide (66.67-100%), Tetracycline (50-100%), Colistin (50-100%), Gentamycin (0-100%) and Ceftriaxone (0-70%). Ceftriaxone remained sensitive in 29.85%, Gentamycin and Colistin appeared to be 22.39% and 7.46%, respectively. In conclusion, it can be said that the rational use of antibiotics need to be adopt in veterinary and human practice of Bangladesh to prevent the emergence of multi-drug resistance Salmonella. In addition, appropriate measures should be taken to prevent occurrence of zoonotic Salmonella spp. in human.

Notes:

Notes:

One Health Secretariat:

ONE health BANGLADESH

Institute of Epidemiology, Disease Control And Research (IEDCR)
Mohakhali, Dhaka-1212, Bangladesh
Phone : +880-2-9898796, +880-2-9898691, Fax : +880-2-9880440
E-mail : info@iedcr.org, Website : www.iedcr.gov.bd