



## DEPARTMENT OF LIVESTOCK SERVICES

Ministry of Fisheries & Livestock  
Government of the People's Republic of Bangladesh



# Animal Health Laboratories in Bangladesh: *Current status*

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Deputy Director  
&  
OIE focal person  
Bangladesh



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# Introduction of Bangladesh



**Total land area about 1,47,570 Sq.Km; Total population is around 160 million; GDP growth rate around 8%; Fast growing economy in the world; Per capita income US\$ 1827.00**



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# Importance of Livestock in Bangladesh

- ❖ **Livestock sector is an integral part of agriculture**
- ❖ **Livestock meets the demands of animal proteins (meat, milk and eggs)**
- ❖ **A source of ready cash for the villagers**
- ❖ **Contributes in self employment and women empowerment**
- ❖ **About 75% of total population directly/ indirectly engaged in livestock husbandry**



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# Livestock at a glance



Cattle	24.86 million
Buffalo	1.48 million
Goat	26.1 million
Sheep	3.46 million
Chickens	282.14 million
Ducks	55.85 million

Milk (m.m. ton)	Meat (m.m. ton)	Egg (million)
9.41	7.26	15520.0

**Bangladesh is self sufficient in meat production (120gm/head/day)**





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# State Veterinary Services

State Veterinary services is

- Under Ministry of Fisheries and Livestock
- Regulated by Department of Livestock Services with 5 wing (directorate):  
Administration, Extension, Research, Production and Training.
- Laboratory activities is under Research and Training

<b>Set up of Department of Livestock Services</b>	
<b>Directorate</b>	<b>05</b>
<b>Districts HQ</b>	<b>64</b>
<b>Upazilla HQ</b>	<b>491</b>
<b>Metropolitan Thana</b>	<b>9</b>
<b>Central Diseases Investigation Lab</b>	<b>01</b>
<b>Distric Veterinary Hospital with lab</b>	<b>64</b>
<b>FDILs</b>	<b>09</b>
<b>Vaccine Production Lab</b>	<b>01 (produce 17 vaccines)</b>
<b>Epidemiology unit</b>	<b>01</b>



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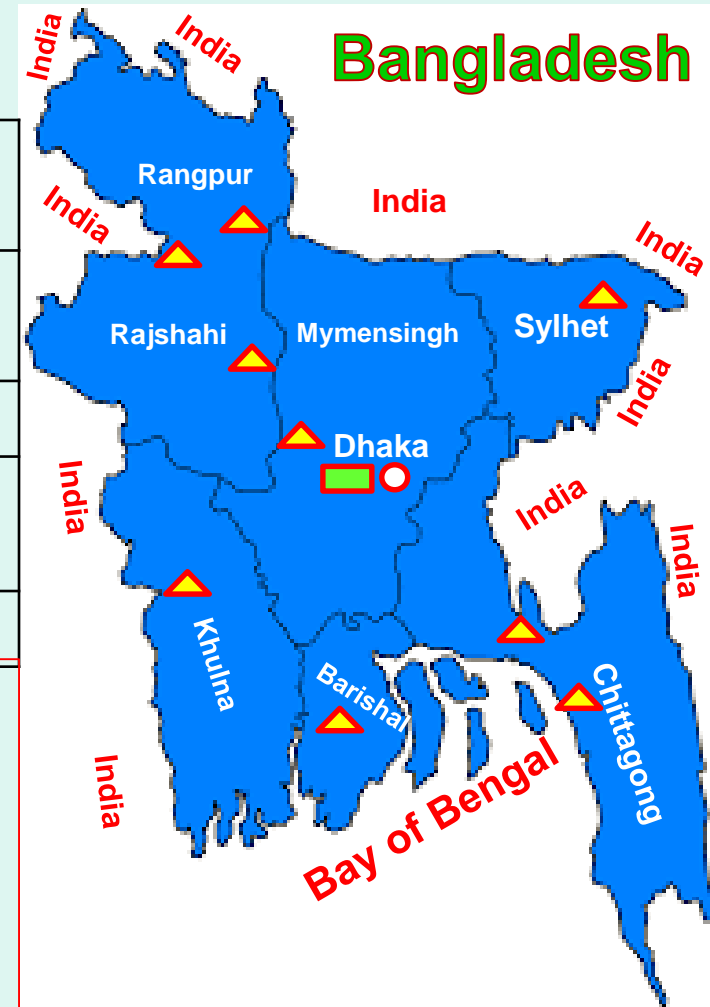
### Animal Health Laboratories in Bangladesh

Central Diseases Investigation Lab (CDIL)	01
Field Disease Investigation Laboratories (FDIL)	09
District Veterinary Hospital with lab	64
Vaccine Production Lab	01 (produce 17 vaccines)
Epidemiology unit	01

CDIL 

FDIL 

- Vaccine lab is at Dhaka
- In each District Centre there is District Vet Hospital
- In addition there is one Pathology lab, one Toxicology lab, one Ectoparasitology lab and one endoparasitology lab at Dhaka





## Laboratory Activities related setup

- There are setup with Veterinarians at Upazilla level (sub-district level)
- Veterinarians are engaged with initial disease diagnosis, treatment and extension services.
- If, necessary they send samples to lab for confirmatory diagnosis.
- If there is any outbreak, they report to the higher authority for investigation and lab become engaged for epidemiological investigation thereof with the help of EPI unit of DLS and/or donor agencies.
- Laboratory and epi unit contribute in control activities/strategy development



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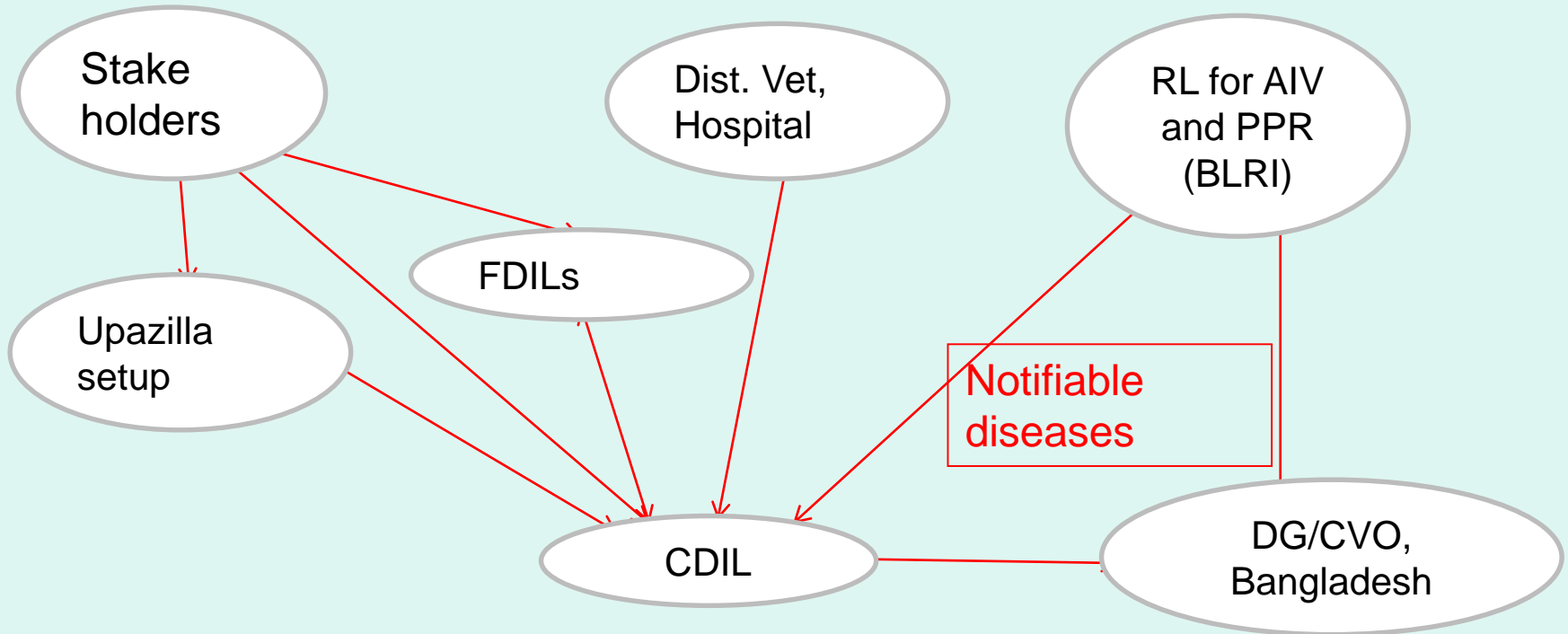
# Laboratory Activities

- Among the Laboratories, CDIL act as the National & Central Animal health laboratory.
- CDIL is linked with other laboratories (District Veterinary hospital, FDILs) and Upazilla setup
- Even livestock stake holders can communicate directly to CDIL or other labs
- Labs reports diseases (other than notifiable diseases) directly to the stake holders
- In case of notifiable diseases, reported to CVO, Bangladesh for reporting to OIE





# Laboratory work flow



- Diseases reports are sent to EPI unit
- EPI unit and CDIL/other labs contribute in epidemiological investigation.

Disease investigation/diagnosis and reporting system



# Lab Facilities

**Bacteriology:** Culture, isolation & identification, AMR, AST, Staining & microscopy, Biochemical test and molecular detection, Rapid test kit

**Serology:** ELISA, HA & HI, Plate agglutination

**Parasitology:** Hemoprotozoa, Gastro-intestinal parasite by direct smear and floatation or sedimentation method

**Necropsy**

**CDIL**

**Histopathology**

**Virology:** Only molecular detection by PCR & qPCR.  
Rapid kit based diagnosis  
(Culture, Isolation id under progress)

- CDIL has SOP for each test
- CDIL has facilities of Biosafety level II
- CDIL has facilities of record keeping and reporting
- CDIL is well equipped with lab instruments



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# Lab Facilities

Bacteriology: Culture, Identification, Staining & microscopy,

Necropsy

Serology: HA & HI, Plate agglutination

Parasitology: Hemoprotozoa, Gastro-intestinal parasite by direct smear and floatation or sedimentation method

FDILS

Bacteriology: Staining & microscopy,

Necropsy

Parasitology: Gastro-intestinal parasite by direct smear and microscopy

Dist. Vet hospitals



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# Status of Animal Health Laboratories

Name	status	Accreditation status
CDIL	National Central Lab	Not accredited <b>(preparing to apply for accreditation)</b>
FDIL	Regional lab	Not accredited
District Veterinary Hospital	Peripheral lab	Not accredited
QC lab, DLS	On process of establishment	Needs help from regional, international level for accreditation, GLP, Biosafety and biosecurity
Bangladesh Livestock Research Institute (BLRI)	Research lab for innovation (Vaccine)	Not accredited?
National Reference lab for AIV	RL	Not accredited?
National Reference lab for PPR	RL	Not accredited?



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# Stakeholders

- Livestock rearer throughout the country
- Bangladesh National Zoo
- Other Zoo/Safari
- Military Farms
- BGB Farms
- Police Academy farms
- Dog squad of Army, BGB, RAB, Police and other
- Samples from District, Upazilla and other Livestock Offices
- Bango Bhaban and Gono Bhaban
- Export and Import items
- Others



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# CDIL at a glance

**Established: 1957**

Address: 48, Kazi Alauddin Road,  
Dhaka-1000

One Two storied building  
(Total 12000 sqft)

Manpower: 15

One vehicle for sample transportation

One incinerator





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# Services

- Disease diagnosis
- Disease outbreak investigation
- Microbial Analysis of Export & Import Items
- Assistancess in research work
- Training



# Disease diagnosis

## Based on

- Necropsy
- Culture
- Biochemical
- Staining & microscopy
- Histopathology
- Serology
- Molecular biology (PCR, RT-PCR and Real time PCR)





# Viral Diseases

- ❖ CDIL have facilities for diagnosis of AIV, FMDV, PPR, SRDs, CSF, ND, IB, IBD, Avian Leukosis, ILT, IBH, Avian respiratory diseases using PCR&/or real time PCR.
- ❖ For serological approach, there are ELISA facilities for AIV, FMDV, PPRV, ND, IB, Avian Retro virus.
- ❖ CDIL also conduct HA and HI test.
- ❖ Rapid detection of AIV, MG, Canine Parvo virus



# Bacterial Diseases

- ❖ Bacterial disease detection is based on Culture, biochemical test, staining and microscopy
  - ❖ Culture free detection method (Staining & microscopy and/or PCR) is applied for Anthrax, TB, brucellosis (Rapid test & RBT).
  - ❖ Thus facilities are available for Anthrax, BQ, Pasteurellosis, Salmunellosis, TB, Brucellosis
- 
- CDIL regularly conduct AST for bacterial diseases.
  - It also conducting AMR test by disc diffusion method as well as PCR



## Other diseases

CDIL also have facilities to detect hemoprotozoan parasites (Babesia, Theileria, anaplasma, Trypanosoma, Avian plasmodia) based on Staining and microscopy.

Mastitis detection based on CMT and cultural techniques.

Steroid detection in fattened cattle based on ELISA

Recently introduced Somatic cell counter for detection of sub-clinical mastitis.



# Export & Import Items

- Some test facilities for Export and import sample are available
- Small ruminant respiratory diseases by multiplex q-RT- PCR and ELISA.
- Screening of avian respiratory diseases (ND, AIV, IBV, ILT,IC, MG, aMPV) by PCR and RT-PCR
- Regular screening of AIV type-A in imported day old chicks
- Microbial analysis of meat, frozen foods, sweets. leather, bully sticks, feather, duck down, dried ear, tail hair, omasum, horn, hoof, bone



# Collaborative Projects

- ✓ Vet Lab network project with IAEA-FAO
- ✓ AMR detection project with FAO
- ✓ Anthrax detection project with CDC-Atlanta
- ✓ Rabies detection strengthening project with CDC-Atlanta
- ✓ Liaison with different national and international labs.
- ✓ Network between laboratories home and abroad (FDIL, BLRI, BAU, CVASU, icddr,b, IEDCR, IAEA, CDC) although not black and white
- ✓ **PREDIC-II study for emerging disease detection**



# Training

- CDIL Provides training for FDIL and LRI Scientists, Field officers and Staffs, University Intern Students.
- MS students also work in CDIL
- Sample collection, preparation, transportation and preservation
- ELISA, PCR, RT-PCR, bio-safety & biosecurity
- Anthrax sample collection, handling and transportation
- Anthrax detection by PCR and staining
- Different staining protocol
- Performing necropsy of birds and small animals
- Performing HI, HA tests
- Diagnosis of parasitic diseases



# Recent developments

- Application of multiplex qPCR for Small ruminant Respiratory disease detection
- Application of PCR for avian respiratory disease detection
- Identification of meat of different species
- AMR testing and detection of anti-microbial resistance gene in *E. coli* using PCR techniques
- In a recent ongoing study, 108 *E. coli* isolates were tested for AST from 164 samples collected, of which 50% isolates ESBL-resistant.
- Partial renovation of the Lab
- **H9 Survey at Breeder farm**
- **H5 Vaccination monitoring for new vaccines**
- Classical Swain Fever detected



## Recent developments

- CDIL has dedicated incinerator for waste disposal
- Installed online power backup for Molecular lab
- Conduct yearly calibration of few biosafety cabinet
- Developing efficiency for in-lab calibration of micropipettes
- Installed new qPCR machine
- Collected ATCC strains
- Conduct yearly Bio-risk assessment
- Scientists and staffs participates in biosafety and biosecurity training
- Lab has biosafety and risk assessment team
- Lab is updating the existing SOPs to be used
- Lab has different forms





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## UTILIZING EXISTING SURVEILLANCE PLATFORMS TO ESTABLISH A SUSTAINABLE AMR NATIONAL SURVEILLANCE AND MONITORING SYSTEM IN BANGLADESH

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4. International Centre for Diarrhoeal Disease Research, Bangladesh, Dhaka, Bangladesh

### Abstract

A national surveillance system for avian influenza (AI) monitoring was adapted for inclusion of active poultry AMR surveillance programme by the Department of Livestock Services (DLS) in Bangladesh with technical support from the Food and Agriculture Organization of the United Nations (FAO). To make the AMR surveillance system efficient and sustainable, existing human and financial resources are being used for a low-cost longitudinal AMR monitoring system rather than relying on external support or cross-sectional studies. Extended spectrum  $\beta$ -lactamase (ESBL)-resistant *Escherichia coli* (*E. coli*) identified through the disk diffusion antimicrobial sensitivity testing (AST) method were selected as the indicator bacteria for AMR in the first phase of surveillance.

### Introduction

Although the usage of significant amounts of OIE and WHO critically important antibiotics in livestock production is well recognized, the impact of antimicrobial usage (AMU) on antimicrobial resistance (AMR) in Bangladesh is still poorly characterized. Furthermore, no standard surveillance system is in place to monitor AMR over time. As a result, impact of changes in AMR policy and AMU practices cannot be assessed. Within the poultry sector specifically, there is limited data to assess the magnitude of AMR burden in poultry and to increase awareness amongst frontline veterinarians on the public health impacts of inappropriate AMU. Recognizing that available government human and laboratory resources for animal surveillance activities are limited due to existing activities, a AMR monitoring and surveillance system was needed which would not require additional field sampling staff, sampling expense, or additional lab staffing.

### Methods

To achieve the desired efficiency target of no additional staff recruitment or expense for either field sampling or laboratory staff, the AMR monitoring and surveillance system for poultry was integrated with the ongoing AI Sink Surveillance programme which monitors influenza virus circulation within the urban live bird markets (LBM) of Dhaka. The following steps were utilized to design and initiate the AMR Sink Surveillance programme:

1. Poultry AMR surveillance guideline and standard operating procedures (SOP) for sample collection and laboratory testing of antimicrobial sensitivity were developed.
2. Utilizing existing Market Environment Surveillance Officers (MESOs) within the Government of Bangladesh who were already collecting samples for the national AI Sink Surveillance programme were cross-trained by FAO in the sampling method for AMR surveillance. Two scientific officers of the government of Central Disease Investigation Laboratory (CDIL) were trained at the icddr.b microbiology laboratory on bacterial culture and antimicrobial sensitivity testing (AST) using the disk diffusion method.
3. Sample collection was initiated in March 2018. Within each LBM visited by the MESO, one broiler and one Sonali breed viscera with intact caeca are selected and placed in a resealable plastic quart bags. The collected caecal samples are then delivered with sample submission form in cooler box with



Government staff taking a caecal sample from a live bird market in Dhaka

pre-chilled ice pack to the Central Disease Investigation Laboratory (CDIL) within 24 hours.

4. Caecal samples are processed and cultured according to the SOP for the isolation of *Escherichia coli* and tested for resistance to 15 commonly antibiotics through the disk diffusion method. ESBL producers were characterized at initial screening test level using disk diffusion method with ceftazidime (30 $\mu$ g) and cefotaxime (30 $\mu$ g) antibiotic disks.

5. To improve data management and minimize classification errors of zone of inhibition (ZOI) readings, an information management system was developed by FAO for managing all sample and test result data, including automatic classification of ZOI readings based on established standards.

### Results

Each month MESOs collect 48 poultry caecal samples from 24 LBMs in Dhaka and sent to DLS Central Disease Investigation Laboratory for bacterial culture and AST at no additional cost compared to the previous AI surveillance programme. Thus far 164 caecal samples have been collected and 44 isolates of *E. coli* have been successfully isolated. Of those, 23 (52%) were ESBL-resistant.

### Conclusions

Bangladesh has demonstrated that it is possible to successfully establish an AMR monitoring and surveillance system in poultry when human and laboratory resources are limited. In the case of Bangladesh, integration with the existing avian influenza Sink Surveillance programme enabled initiation of the AMR surveillance system with no additional sampling or staffing costs. The surveillance findings are reported by DLS to stakeholders on a regular basis to assess impact of AMU interventions as well as to inform policy and practice. Efforts are underway to further mainstream surveillance efforts such that all costs for the surveillance system can be borne within a realistic government budget.



Laboratory scientist at CDIL measuring the zone of inhibition on *E. coli* isolated from poultry in Dhaka





# Recent Achievements

- Successfully completed both the serological and molecular proficiency test (PT) for PPRV with IAEA lab and obtained absolute score
- Participated in PT for AIV -2019 with AAHL



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Joint FAO/IAEA Division  
of Nuclear Techniques in Food and Agriculture

Joint FAO/IAEA Division  
Animal Production and Health Laboratory

### *Certificate of Successful Participation*

This is to certify that the

#### **Central Disease Investigation Laboratory**

has participated in the **2018** proficiency test on **diagnosis of Peste des Petits Ruminants by serological methods** and obtained a perfect score

*Score: 100%*

The Animal Production and Health Laboratory of the Joint FAO/IAEA Division would like to congratulate the laboratory team for this significant result.

  
Dr. Giovanni Cattoli  
Laboratory Head  
Animal Production and Health Laboratory  
Seibersdorf/ Vienna, Austria

December 2018



Joint FAO/IAEA Division  
of Nuclear Techniques in Food and Agriculture

Joint FAO/IAEA Division  
Animal Production and Health Laboratory

### *Certificate of Successful Participation*


This is to certify that the

#### **Central Disease Investigation Laboratory**

has participated in the **2018** proficiency test on **diagnosis of Peste des Petits Ruminants by molecular methods (nucleic acid detection)** and obtained a perfect score

*Score: 100%*

The Animal Production and Health Laboratory of the Joint FAO/IAEA Division would like to congratulate the laboratory team for this significant result.

  
Dr. Giovanni Cattoli  
Laboratory Head  
Animal Production and Health Laboratory  
Seibersdorf/ Vienna, Austria

December 2018



# Needs regarding sustainability and accreditation

1. Human Resources needs more training to improve lab expertise as well as GLP.
2. Calibrations services need to be developed
3. Improvements in software based record keeping (software development)
4. Renovations
5. Development of virology lab (culture, isolation)
6. Fund



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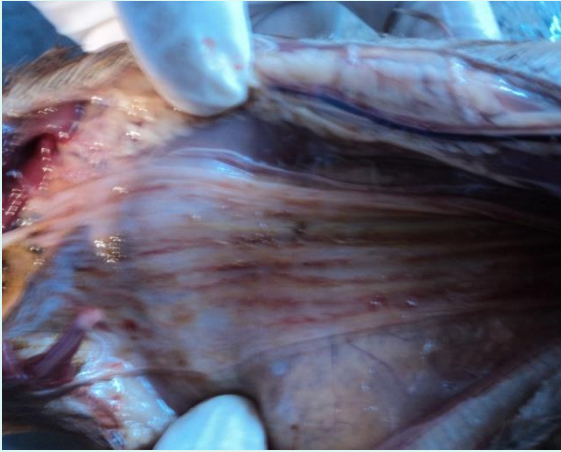


- Some pictures





# Necropsy



**DUCK PLAGUE**



**Gross lesion of AI in chicken**



**Clinical signs of AI in Chicken**



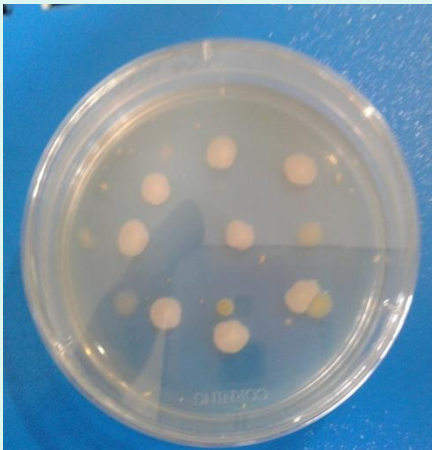
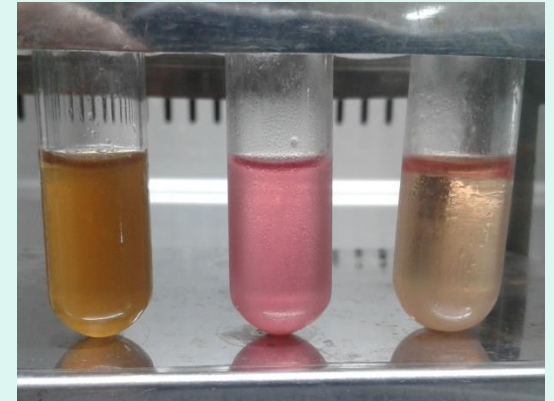
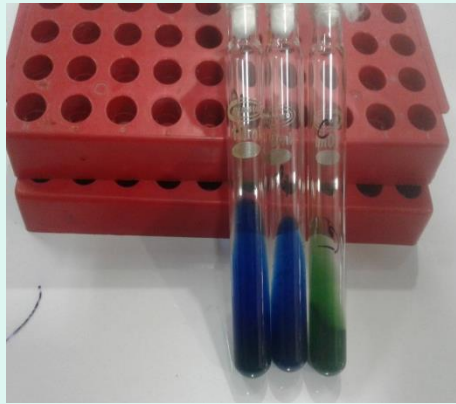
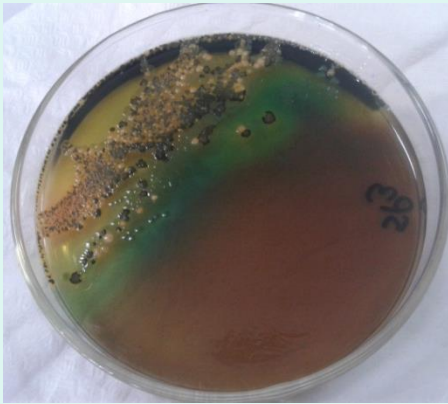


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# Bacteriology





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Thanks  
for  
patience  
hearing