ANNUAL TECHNICAL REPORT
FISCAL YEAR 2078/79 (2021/22)

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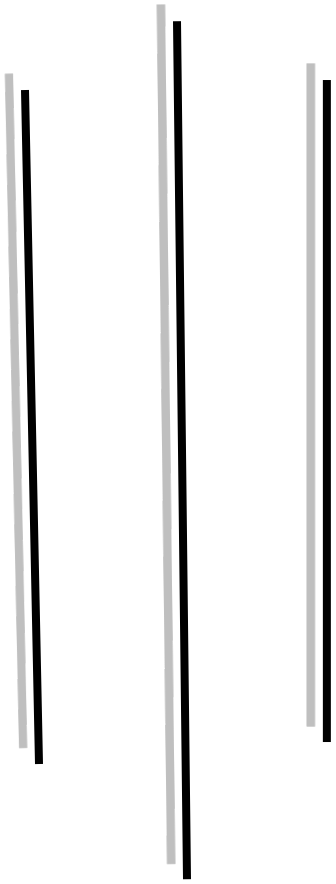

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FOREWORD

It is my pleasure to present this annual technical report of Central Veterinary Laboratory (CVL) for the fiscal year 2078/79 (2021/22). This issue includes activities and progress report of CVL and five Veterinary Laboratories (VLs) under CVL.

Nepal being the member of World Trade Organization (WTO), since 2004, has to implement Sanitary and Phytosanitary (SPS) measures on scientific merit. Laboratory based diagnosis is of paramount importance in implementing the SPS measures in the territory. Therefore, the role of central and veterinary laboratories including basic laboratories situated in the local level is crucial in diagnosis of disease among major livestock species in the country. Yet, there is a scope in uplifting the standards and quality assurance of the laboratory diagnosis process conducted utilizing existing facilities.

With the establishment of molecular diagnostic techniques at the CVL, routine molecular diagnosis of AI, ND, IBD, ASF, LSD, PPR and application multiplex PCR technology for the diagnosis of diseases of livestock and poultry are being performed. Similarly, the ELISA, FAT, and other routine diagnostic tests are used for the diagnosis of various livestock and poultry diseases. Apart from routine testing in the bacteriology, CVL also conducts the active Antimicrobial Resistance (AMR) surveillance program in collaboration with the VLs and National Avian Disease Diagnosis Laboratory (NADIL), Chitwan with the logistic support from the Fleming Fund Country Grant, Nepal. In public health section of CVL, the surveillance of antibiotic residue in meat and milk of animals with the application of ELISA has been started since FY 2075/76.

In the meantime, we are putting our efforts to upgrade CVL, VLs and collaborate with NADIL to provide reliable and prompt diagnostic services all over the country. We already have good co-ordination among the veterinary laboratories, provincial veterinary offices and local units to ensure the quality sample flow for advance diagnosis up to CVL, it being a national reference laboratory in the nation.

I would like to extend my sincere thanks to Food and Agriculture Organization (FAO) for their support in laboratory diagnostic reagents, Australian Animal Health Laboratory (AAHAL) for their molecular characterization of different viruses, and International Atomic Energy Agency (IAEA) lab for their support in Proficiency Testing and laboratory trainings and laboratory accessories. Also, I am thankful to FHI 360 (Fleming Fund) and FIND for supporting us in the sector of antimicrobial resistance and laboratory data management. Finally, I would express my personal appreciation and sincere thanks to all the VLs and staffs of CVL who worked hard to give this annual technical report in a good shape.

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Dr. Sharmila Chapagain Kafle
Chief Veterinary Officer

ABBREVIATIONS

AGID	Agar Gel Immuno-Diffusion
AI	Avian Influenza
AIV	Avian Influenza Virus
ALC	Avian Leucosis Complex
AMR	Anti-Microbial Resistance
ASF	African Swine Fever
AST	Antibiotic Sensitivity Test
CBPP	Contagious Bovine Pleuropneumonia
CCHF	Cremean Congo Haemorrhagic Fever
CCRR	Complex Chronic Respiratory Disease
CD	Canine Distemper
CFT	Complement Fixation Test
CLSI	Clinical and Laboratory Standards Institute
CMT	California Mastitis Test
CRD	Chronic Respiratory Disease
CRVH	Central Referral Veterinary Hospital
CS	Cloacal swab
CSF	Classical Swine Fever
CVL	Central Veterinary Laboratory
CVO	Chief Veterinary Officer
DLC	Differential Leukocyte Count
DLS	Department of Livestock Services
ELISA	Enzyme Linked Immunosorbent Assay
EPG	Egg per Gram
EQA	External Quality Assurance
ES	Environmental swab
ESBL	Extended Spectrum Beta Lactamase
ESR	Erythrocyte Sedimentation Rate
FAO	Food and Agriculture Organization.
FAT	Fluorescent Antibody Test
FMD	Foot and Mouth Disease
FY	Fiscal Year
GLP	Good Laboratory Practice
HA	Haemagglutination
Hb	Hemoglobin
HI	Haemagglutination Inhibition
HPAI	Highly Pathogenic Avian Influenza
IAEA	International Atomic Energy Agency

IB	Infectious Bronchitis
IBD	Infectious Bursal Disease
IBDV	Infectious Bursal Disease Virus
IBV	Infectious Bronchitis Virus
ILT	Infectious Laryngeotracheitis
JT	Junior Technician
JTA	Junior Technician Assistant
LIMS	Laboratory Information Management System
LSD	Lumpy Skin Disease
MCCPP	Mycoplasma Contagious Caprine Pleuropneumonia
MD	Marek's Disease
MoALD	Ministry of Agriculture and Livestock Development
MRL	Maximum Residual Limit
NADIL	National Avian Disease Investigation Laboratory
ND	New Castle Disease
NDV	Newcastle Disease Virus
NPHL	National Public Health Laboratory
NS	Nasal swab
PAT	Plate Agglutination Test
PCV	Packed Cell Volume
PM	Post-mortem
PPR	Peste des petits Ruminants
PRRS	Porcine Reproductive and Respiratory Disease
PT	Proficiency Testing
rRT PCR	Real Time Reverse Transcriptase Polymerase Chain Reaction
RVL	Regional Veterinary Laboratory
SLST	Sodium Lauryl Sulphate Test
SOP	Standard Operating Procedure
SPS	Sanitary and Phyto Sanitary Standard
SSRD	Small Ruminant Respiratory Disease
TEC	Total Erythrocyte Count
TLC	Total Leukocyte Count
TS	Tracheal swab
UTI	Urinary Tract Infection
VHLSEC	Veterinary Hospital and Livestock Service Expert Centre
VLs	Veterinary Laboratories
VO	Veterinary Officer
WOAH	World Organization for Animal Health
WTO	World Trade Organization

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CHAPTER I:
CENTRAL VETERINARY LABORATORY

1. Introduction

Central Veterinary Laboratory (CVL) focuses program with the objective of securing healthy national herd of livestock throughout the nation by mitigating the occurrence of diseases of livestock and poultry. CVL also works on epidemic investigation as well as surveillance and investigation on various diseases in its approved annual program. The direct benefit of the performance of various laboratories has been experienced in the field of veterinary medical care based on valid laboratory test results. To achieve these multidimensional activities, CVL works with a series of laboratory test procedures through its various laboratory sections; Pathology, Parasitology, Microbiology, Serology, Laboratory management and teaching laboratory and Molecular Biology with a considerable progress in the later.

CVL has Standard Operating Procedures (SOPs), test protocols and quality guideline manual. CVL is gradually practicing the biosafety/ biosecurity measures so that Good Laboratory Practice is followed in our all the diagnostic laboratories. CVL has already been adopting test verification system through international reference laboratories which will help in the accreditation of CVL for international certification in near future. The newly constructed well equipped BSL2+ laboratory will certainly help to increase the standard of test results and accreditation process as well.

To provide diagnostic facilities throughout the country, CVL works through its five Veterinary Laboratories (VLs) located in different provinces of the nation; Koshi Pradesh Veterinary Laboratory (Biratnagar), Madhesh Pradesh Veterinary Laboratory (Janakpur), Gandaki Pradesh Veterinary Laboratory (Pokhara), Karnali PradeshVeterinary Laboratory (Surkhet) and Sudurpashim Pradesh Veterinary Laboratory (Dhangadhi). Currently, Bagmati Pradesh and Lumbini Pradesh do not have veterinary laboratory as per new structure. However, diagnostic services are covered by the currently running laboratories. Specimens that cannot be processed in the aforementioned laboratories due to insufficient facilities and expertise or needed to be further tested for confirmation are referred to the CVL. Local level in coordination with Veterinary Diagnostic Laboratories also sends samples to the CVL for confirmatory diagnosis. In this way, CVL works as a reference veterinary laboratory in Nepal.

2. Objectives

The role of veterinary laboratory system has become dynamic with advent of food safety issues, economic liberalization and trade globalization. Nepal joined as a WTO member in 2004. Therefore, Nepal follows the guidelines provided by World Organization for Animal Health (WOAH) for the provision of Sanitary and Phytosanitary (SPS) agreement under WTO that seeks scientific procedures and evidence in the course of disease diagnosis as well as production chain. The roles of veterinary diagnostic laboratories are now therefore expanded and challenging in the new

context. Moreover, CVL works with the following objectives in the country.

- Provide laboratory diagnostic services in the country in the area of animal health and veterinary public health.
- Acts as a national veterinary reference laboratory.
- Conduct epidemiological disease investigation & laboratory diagnosis of livestock and poultry disease.
- Support the national disease control and surveillance programs.
- Acquire, adopt, upgrade and disseminate different laboratory diagnostic test methodologies for livestock and poultry diseases.
- Assist Department of Livestock Services (DLS) in the animal health policy development and formulation of animal disease control and eradication programs.
- Extend & disseminate information concerning livestock and poultry disease controls.
- Collaborate with international reference laboratories & institutions on veterinary laboratory diagnosis.
- Assist in implementation of national epidemic control strategies.
- Conduct laboratory diagnosis techniques training for the veterinarians and veterinary paraprofessionals.
- Strengthen and coordinate veterinary laboratories all across the nation.
- Conduct various programs to address public health issues such as veterinary drug residue testing, meat shop monitoring, insecticides/hormones/pesticides testing in milk, egg & meat.

3. Organization structure:

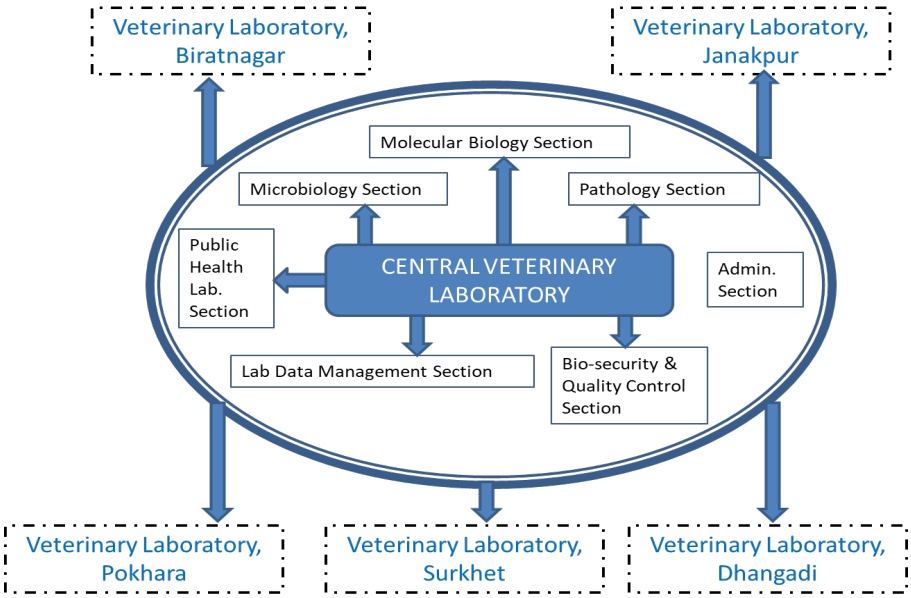


Figure 1: Organizational structure of CVL.

4. Human resources

There are total 39 permanent positions in CVL, which is led by Chief Veterinary Officer. Under Chief Veterinary Officer, there are four Senior Veterinary Officer, 12 Veterinary Officer, eight Animal Health Technicians and four Junior Animal Health Technicians. In the administration part, there are one accountant, one non-gazetted first class, two driver and six office assistants. The details of staffs at CVL are given in Table 1.

Table 1: List of Staffs working at CVL (F/Y 2078/79)

S.N.	Name	Position	Total Number	Fulfilled
1	Dr. Sharmila Chapagain	Chief Veterinary Officer	1	1
2	Dr. Pragya Koirala	Senior Veterinary Officer	4	3
3	Dr. Sita Rijal			
4	Dr. Ram Chandra Sapkota			
6	Mr. Purna Bahadur Budha	Veterinary Officer	12	12
7	Mr. Prakash Devkota			
8	Mr. Bal Bahadur Kunwar			
9	Mr. Tek Bahadur Aire			
10	Mr. Dhan Raj Rai			
11	Dr. Tulsi Ram Gompo			
12	Dr. Manju Maharjan			
13	Dr. Nabaraj Shrestha			
14	Dr. Luna Gongal			
15	Dr. Chanda Shrestha			
16	Dr. Suraj Subedi			
17	Dr. Binita Tamag			
18	Mr. Hari Lal Kandel	Animal Health Technician	8	8
19	Mr. Krishna Mani Kafle			
20	Mr. Mithilesh Karn			
21	Ms. Sunita Adhikari			
22	Mr. Sudeep Kafle			
23	Ms. Kamal Kumari Niraula			
24	Ms. Rita Dahal			
25	Ms. Surya Kumari Dhami			
26		Asst. Animal Health Technician	4	0
27	Mrs. Devi Dhungana	Accountant	1	1
28	Mrs. Sushma Pokhrel	Non-gazetted first class	1	1
29	Mr. Jeevan Rai	Computer Operator (Contract)	1	1
30	Mr. Damber Timilsina	Driver	2	2

S.N.	Name	Position	Total Number	Fulfilled
31	Mr. Kumar Nagarkoti			
32	Mr. Dipesh Rana Magar	Driver (Contract)		
33	Ms. Devaki Rimal	Office Assistant	6	6
34	Ms. Yam Kumari Rai			
35	Mrs. Bheema Acharya			
36	Mr. Chandra Bahadur Rana			
37	Ms. Laxmi Adhikari			
38	Mr. Dik Kumar Magar			
	Total		**39**	**35**

5. Annual progress

The detail of the annual program and progress of CVL for FY 2078-79 is given in table below.

Table 2: Annual program & progress report of CVL in the Fiscal Year 2078/79.

S.N.	Activities	Unit	Target	Progress
1	**Parasitology**			
1.1	EPG counts of parasites	Number	400	380
1.2	Skin scrapping examination	Number	60	216
1.3	Larvae culture of parasite	Number	40	40
1.4	Test protocol for parasitological techniques	Time	1	1
2	**Pathology**			
2.1	Clinical hematological examination	Number	600	1313
2.2	Bio-Chemical examination	Number	400	462
2.3	Post-Mortem Examination	Number	2400	2639
2.4	Histopathological examination	Number	80	62
3	**Microbiology**			
3.1	**Bacteriology**			
3.1.1	Isolation and Identification of Bacteria	Number	800	974
3.1.2	Sample collection, Isolation and Identification of Fungus	Number	80	80
3.2	**Virology**			
3.2.1	Rabies test	Number	60	104
3.2.2	Investigation of PPR outbreak	Times	4	3
3.2.3	PPR Diagnosis by Pen-side Test	Number	80	36
4	**Serology**			

S.N.	Activities	Unit	Target	Progress
4.1	Seromonitoring of PPR (National PPR Disease Control Program)	Number	6000	6000
4.2	Poultry sample collection and examination for salmonella and Mycoplasma	Times	8	8
4.3	Screening of cattle and buffalo disease in government and private farm)*M. bovis,* CCHF, CBPP, blood parasites	Number	400	471
4.4	Screening of goat disease in government and private farm (CCPP, Brucellosis etc.)	Number	400	471
4.5	Testing of Salmonella and Mycoplasma (ELISA)	Number	200	269
5	**Molecular unit**			
5.1	Molecular Diagnostic examination for Bird-Flu	Number	400	473
5.2	Molecular diagnosis (LSD, Anthrax etc.)	Number	40	104
5.3	Molecular diagnosis (Salmonella, PRRS, Erysepalas etc)	Number	40	274
5.4	Molecular diagnosis (PPR, CCPP, Pasturella etc)	Number	40	227
5.5	Dispatch of sample to international reference laboratories	Times	2	2
6	**Disease surveillance and investigation**			
6.1	Emergency disease investigation team (EDIT) deploying	Times	12	12
6.2	Surveillance of poultry disease (AI, ILT etc.)	Number	300	406
6.3	Avian Influenza Surveillance	Number	800	879
7	**Zoonotic disease Investigation**			
7.1	Sample collection and examination for Brucella.	Number	160	243
7.2	Surveillance of zoonotic diseases (Toxoplasmosis, Leptospirosis etc.)	Number	300	312
8	**Staff development**			
8.1	Laboratory Technology Transfer	Times	12	12
8.2	Training on Laboratory Technique (Non-Officer Level 14 days)	Times	2	2
8.3	Publishing laboratory result in international journal	Times	1	
9	**Public Health Program**			
9.1	Veterinary Drug Residue Testing	Number	800	898
9.2	Hormones detection in milk and meat	Number	240	370

S.N.	Activities	Unit	Target	Progress
9	**Laboratory Monitoring**			
9.1	Monitoring and inspection of veterinary laboratories at provincial and local level	Times	12	12
9.2	Monitoring and inspection of veterinary public health related programs	Times	12	10
10	**Publications**			
10.1	Publication of digital technical bulletin	Times	4	4
10.2	Standard Operating Procedure preparation for Biosecurity and Biosaftey and waste management and water treatment	Number	2	2
11	**Laboratory Management**			
11.1	Health examination of staffs	Person	39	27
11.2	LIMS Management	Times	12	12
11.3	Teaching lab management	Times	12	12
11.4	Management of Serum Bank	Times	12	12

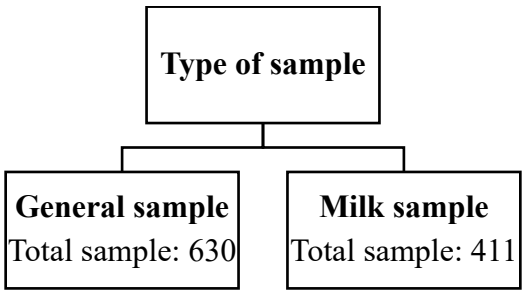
6. Microbiology section

Microbiology section consists of 2 units viz Bacteriology & mycology unit and Virology unit.

6.1 Bacteriology and mycology unit

6.1.1 Type of samples

In the fiscal year 2078/79, the bacteriology unit received 1041 samples from various sources such as farms, central veterinary referral hospitals, private clinics, veterinary laboratories, veterinary hospitals, and livestock service expert centers, and directly from the field-collected during the periodic sampling. The sample received was two types:



The general samples include urine, blood, nasal swabs, ear swabs, skin scrapping of animals, tissues of animals collected during postmortem examination, water and the animal feed. And, milk samples include milk from cattle Similarly, milk samples from the sick dairy animals iii) the environment samples, mainly water.

6.1.2 Types of isolates

Out of the total 630 general samples, 535 (84.92%) showed bacteria, and out of 411 milk samples, 336 (81.75%) showed bacterial growth on culture. Of the 535 general samples, 17 different types of isolates were identified by cultural characteristics, gram's staining, and biochemical tests. Similarly, of the 336 milk samples, 14 different types of bacteria were identified. The description of various bacteria isolated in general sample and milk sample are shown in tables below.

Table 3: Organism isolated from general samples.

S.N.	Organism	Nos.
1	*Escherchia coli*	350
2	*Staphylococcus species*	40
3	*Enterococcus spp.*	28
4	*Acinetobacter spp.*	3
5	*Pseudomonas spp.*	20
6	*Moraxella spp.*	6
7	*Haemophilus species*	9
8	*Salmonella spp.*	29
9	*Bacillus species*	7
10	*Pasteurella spp.*	7
11	*Yeast spp.*	3
12	*Streptococcus s spp.*	2
13	*Proteus spp.*	5
14	*Shigella spp.*	1
15	*Klebsiella spp.*	4
16	*Enterobacter spp.*	4
17	*Aeromonas spp.*	1
18	Unidentified species	16
	Total	**535**
	No growth	95
	Grand total	**630**

Table 4: Organism isolated from milk samples.

S.N.	Organism	Nos.
1	*Escherchia coli*	115
2	*Staphylococcus spp.*	110
3	*Streptococcus spp.*	21
4	*Klebsiella spp.*	8
5	*Moraxella spp.*	20
6	*Lactobacillus spp.*	2
7	*Bacillus spp.*	3
8	*Pasteurella spp.*	2
9	*Shigella spp.*	2
10	*Enterococcus spp.*	28
11	*Haemopholus spp.*	3
12	*Proteus spp.*	1
13	*Pseudomonas spp.*	10
14	*Micrococcus spp.*	3
15	Unidentified spp.	8
	Total	**336**
	No growth	75
	Grand total	**411**

Table 5: Month wise bacterial species isolated from general samples submitted to CVL.

Organism	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
E. coli	35	32	19	15	31	25	19	23	23	42	45	41	350
Staphylococcus	4	3	2	2	2	6	3	2	8	1	3	4	40
Enterococcus	4	4	3	3	5	1	1	4	1	1	1	0	28
Acinetobaactor	3	0	0	0	0	0	0	0	0	0	0	0	3
Pseudomonas	8	3	0	2	0	0	1	1	0	2	3	0	20
Morazella	1	3	0	2	0	0	0	0	0	0	0	0	6
Haemophilus	1	3	3	2	0	0	0	0	0	0	0	0	9
Salmonella	2	6	4	2	2	2	3	4	1	2	0	1	29
Pasteurella	2	0	0	0	1	1	0	0	2	1	0	0	7
Bacillus	2	0	2	1	2	0	0	0	0	0	0	0	7
Yeast cells	0	2	0	1	0	0	0	0	0	0	0	0	3
Shigella	0	0	0	1	0	0	0	0	0	0	0	0	1
Proteus	0	0	0	2	2	0	0	0	0	0	0	1	5
Klebsiella	0	0	0	0	1	0	0	3	0	0	0	0	4
Enterobacter	0	0	0	0	2	2	0	0	0	0	0	0	4
Aeromonas	0	0	0	0	0	0	0	0	1	0	0	0	1
Streptococcus	0	0	0	0	0	0	0	0	0	0	1	1	2
Others and unidentified	5	5	3	1	1	1	0	0	0	0	0	0	16
Total	**67**	**61**	**36**	**34**	**49**	**38**	**27**	**37**	**36**	**49**	**53**	**48**	**535**

Table 6: Month wise bacterial species isolated from milk samples submitted to CVL.

	No. of isolates												
Organism	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
E. coli	15	16	10	9	15	16	4	2	4	5	7	12	115
Staphylococcus	8	9	14	10	11	18	5	5	3	9	9	9	110
Streptococcus	5	2	2	2	2	5	1	1	0	0	0	1	21
Enterococcus	2	0	0	0	3	3	3	3	2	3	4	5	28
Pseudomonas	5	3	0	0	0	0	0	0	0	0	0	2	10
Morazella	4	4	6	4	0	0	0	0	0	2	0	0	20
Haemophilus	0	0	0	0	0	0	0	0	0	3	0	0	3

Organism	No. of isolates												
	Shrawan	**Bhadra**	**Ashoj**	**Kartik**	**Mangsir**	**Poush**	**Magh**	**Falgun**	**Chaitra**	**Baishakh**	**Jesth**	**Ashar**	**Total**
Pasteurella	0	0	0	0	1	0	0	0	0	0	1	0	2
Bacillus	0	0	0	0	2	0	0	0	0	1	0	0	3
Shigella	0	0	0	0	1	1	0	0	0	0	0	0	2
Proteus	0	0	0	0	0	0	0	0	0	0	0	1	1
Klebsiella	0	0	2	2		2	0	1	1	0	0	0	8
Micrococcus	3	0	0	0	0	0	0	0	0	0	0	0	3
Lactobacillus	0	1	0	1	0	0	0	0	0	0	0	0	2
Others and unidentified	0	4	2	0	1	0	0	0	1	0	0	0	8
Total	**42**	**39**	**36**	**28**	**36**	**45**	**13**	**12**	**11**	**23**	**21**	**30**	**336**

6.1.3 Antimicrobial susceptibility testing

All the bacteria isolated from the culture were routinely tested for their antimicrobial susceptibility by disc diffusion methods. The antibiotics against each isolate was matched according to Clinical and Laboratory Standard Institute (CLSI) guidelines, 2018.

6.1.3.1 General sample

All the isolated bacteria were tested for antimicrobial sensitivity testing. Commercially available antimicrobials such as Gentamycin, Ciprofloxacin, Tetracycline, Amikacin, Amoxycillin, Ceftriaxone, Cefoxitin, Chloramphenicol, Sulphanomaide and Trimethroprim, Penicillin G, Imipenem etc. Details of the major five bacteria; *E. coli, Salmonella, Enterococcus, Moraxella* and *Klebsiella* is presented in the table and figure below.

Table 7: AST result on *Escherchia coli.*

Drugs	I	R	S
GM	12.96%	38.43%	48.61%
CIP	6.05%	81.45%	12.50%
T	0.38%	88.55%	11.07%
AK	6.19%	28.32%	65.49%
AMX	1.84%	85.89%	12.27%
CRO	3.08%	13.85%	83.08%
FOX	3.83%	44.02%	54.55%
C	1.44%	44.02%	54.55%
TS	0.58%	83.63%	15.79%
PG	0.00%	100.00%	0.00%
IMI	15.00%	2.13%	85.11%

Table 8: AST result on *Salmonella spp.*

Drugs	I	R	S
GM	2.94%	11.76%	85.29%
CIP	50.00%	39.47%	10.53%
T	5.41%	27.03%	67.57%
AK	0.00%	25.00%	75.00%
AMX	8.33%	16.67%	75.00%
CRO	6.25%	3.13%	90.63%
FOX	0.00%	12.50%	87.50%
C	11.43%	22.86%	65.71%
TS	0.00%	57.14%	42.86%
PG	0.00%	100.00%	0.00%
IMI	0.00%	6.67%	93.33%

Table 9: AST result on *Enterococcus spp.*

Drugs	I	R	S
GM	0.00%	50.00%	50.00%
CIP	5.88%	47.06%	47.06%
T	29.41%	58.82%	11.76%
AK	0.00%	0.00%	100.00%
AMX	0.00%	77.78%	22.22%
CRO	0.00%	80.00%	20.00%
FOX	0.00%	63.64%	36.36%
C	11.11%	11.11%	77.78%
TS	0.00%	87.50%	12.50%
PG	0.00%	100.00%	0.00%
IMI	0.00%	0.00%	100.00%

Table 10: AST result on *Klebsiella spp.*

Drugs	I	R	S
GM	7.69%	46.15%	46.15%
CIP	23.08%	61.54%	15.38%
T	0.00%	66.67%	33.33%
AK	0.00%	0.00%	100.00%
AMX	0.00%	80.00%	20.00%
CRO	9.09%	18.18%	72.73%
FOX	12.50%	12.50%	75.00%
C	0.00%	33.33%	66.67%
TS	12.50%	62.50%	25.00%

Drugs	I	R	S
PG	0.00%	0.00%	100.00%
IMI	25.00%	0.00%	75.00%

Table 11: AST result on *Moraxella spp.*

Drugs	I	R	S
GM	0.00%	54.55%	45.45%
CIP	18.18%	63.64%	18.18%
T	0.00%	71.43%	28.57%
AK	NA	NA	NA
AMX	0.00%	33.33%	66.67%
CRO	0.00%	50.00%	50.00%
FOX	0.00%	100.00%	0.00%
C	25.00%	75.00%	0.00%
TS	0.00%	71.43%	28.57%
PG	0.00%	100.00%	0.00%
IMI	0.00%	0.00%	100.00%

6.1.3.2 Milk sample

366 milk samples produce bacteria which subsequently were subjected to antibiotic sensitivity test with different antibiotic panels. The detail description of major five bacteria; *E. coli, Staphylococcus, Streptococcus, Moraxella* and *Klebsiella* is depicted on table below.

Table 12: AST result on *Escherchia coli.*

Drugs	I	R	S
GM	3.90%	25.97%	70.13%
CIP	8.24%	37.65%	54.12%
T	5.56%	55.95%	40.48%
AK	4.00%	28.00%	68.00%
AMX	15.79%	73.68%	10.53%
CRO	2.27%	40.91%	56.82%
FOX	0.00%	64.58%	35.42%
C	4.23%	38.03%	57.75%
TS	0.00%	53.13%	46.88%
PG	0.00%	100.00%	0.00%
IMI	7.69%	7.69%	84.62%

Table 13: AST result on *Salmonella spp.*

Drugs	I	R	S
GM	6.45%	29.03%	64.52%
CIP	8.70%	31.88%	59.42%
T	4.65%	38.37%	56.98%
AK	6.67%	13.33%	80.00%
AMX	10.00%	65.00%	25.00%
CRO	7.69%	41.03%	51.28%
FOX	2.56%	25.64%	71.79%
C	1.85%	12.96%	85.19%
TS	2.44%	17.07%	80.49%
PG	0.00%	66.67%	33.33%
IMI	11.11%	22.22%	66.67%

Table14: AST result on *Moraxella spp.*

Drugs	I	R	S
GM	9.09%	22.73%	68.18%
CIP	16.00%	24.00%	60.00%
T	20.83%	29.17%	50.00%
AK	0.00%	100.00%	0.00%
AMX	0.00%	60.00%	40.00%
CRO	0.00%	36.84%	63.16%
FOX	20.00%	40.00%	40.00%
C	17.65%	35.29%	47.06%
TS	0.00%	80.00%	20.00%
PG	0.00%	100.00%	0.00%
IMI	0.00%	0.00%	100.00%

Table 15: AST result on *Streptococcus spp.*

Drugs	I	R	S
GM	18.18%	27.27%	54.55%
CIP	15.38%	46.15%	38.46%
T	6.67%	53.33%	40.00%
AK	33.33%	66.67%	0.00%
AMX	0.00%	33.33%	66.67%
CRO	0.00%	22.22%	77.78%
FOX	0.00%	33.33%	66.67%
C	0.00%	27.27%	72.73%
TS	20.00%	60.00%	20.00%

Drugs	I	R	S
PG	0.00%	100.00%	0.00%
IMI	0.00%	0.00%	100.00%

Table 16: AST result on *Klebsiella spp.*

Drugs	I	R	S
GM	14.29%	28.57%	57.14%
CIP	0.00%	20.00%	80.00%
T	0.00%	42.86%	57.14%
AK	NA	NA	NA
AMX	0.00%	100.00%	0.00%
CRO	0.00%	20.00%	80.00%
FOX	0.00%	100.00%	0.00%
C	0.00%	28.57%	71.43%
TS	0.00%	0.00%	100.00%
PG	0.00%	100.00%	0.00%
IMI	0.00%	0.00%	100.00%

Note: I=Intermediate, R=Resistant, S=Sensitive, GN=Gentamycin, CIP=Ciprofloxacin, T=Tetracycline, AK=Amikacin, AMX=Amoxycillin, CRO= Ceftriaxone, FOX= Cefoxitin, C= Chloramphenicol, TS=Sulphanomaide and Trimethroprim, PG=Penicillin G, IMI=Imipenem, NA = Not applicable.

6.1.4 Antimicrobial resistance related activity in Central Veterinary Laboratory

Antimicrobial resistance (AMR) is one of the major global challenges of both public and animal health. CVL is the national reference laboratory for the AMR surveillance from Animal Health aspects. There has been collaboration with CVL and National Public Health Lab (NPHL) for the laboratory trainings and collaborative projects. As a part of quality assurance, CVL takes part in External Quality Assessment (EQA) of national and international laboratories. For instance, CVL receives unknown bacterial strains from NPHL quarterly for isolation, identification, and antimicrobial susceptibility test reporting. Along with this, CVL participated in EQA with Mahidol University and Chulalongkorn university, Thailand in collaboration with Denmark technical university (DTU) quarterly in year 2020 to 2021. CVL also provide EQA system among the veterinary laboratories within the country.

In recent years, the Fleming Fund Country Grant in Nepal (FFCGN) supported CVL in capacity building through human resources training, infrastructure development. FFCGN also assisted in the laboratory document preparation, such as surveillance plans and guidelines. As a part of this support, CVL has initiated a program for active AMR surveillance program in poultry fecal and cecal samples since 2020. The main targeted bacteria for the surveillance are *E. coli, Salmonella, Enterococcus, and Campylobacter spp.* CVL is leading the active surveillance activity, and three

veterinary laboratories of Biratnagar, Pokhara, and the national avian laboratory, Chitwan, are participating in the program aimed to be completed in 2022.

In addition, the microbiology unit of CVL is participating the WHO tricycle project on Extended Spectrum *E. coli* (ESBL) -Animal health component in collaboration with NPHL focusing the resistance patterns of ESBL E. coli in healthy chicken through One Health approach.

6.2 Virology unit

This unit is responsible for the diagnosis of viral diseases. Most of the samples are submitted from the postmortem unit of CVL, Veterinary Laboratories in different provinces, NADIL, Central Veterinary Referral Hospital (CRVH) and Veterinary Hospital and Livestock Services Expert Center (VHLSEC). Samples are also submitted by quarantine check posts, private clinicians, farmers, and staffs of CVL during disease outbreak investigations. The unit has a facility for competitive ELISA, Fluorescent Antibody Test, Plate Agglutination Test and rapid antigen detection test. Mainly, Rapid antigen detection test is used for the initial diagnosis of Avian Influenza, Newcastle Disease, Infectious Bursal Disease, Infectious Bronchitis, PPR, ASF and Rabies. For the further confirmative diagnosis of Avian Influenza, the samples are sent to the Molecular Section. Likewise, for rabies the confirmative diagnosis is done through Fluorescent Antibody Test (FAT).

6.2.1 Rapid Diagnostic Test (RDT)

In the fiscal year 2078/79, a total of 1394 samples were tested by rapid test kit method where 263 samples were positive for the disease.

Table 17: Rapid diagnostic test record of different viral diseases.

Month	Samples	Rapid test						Total
		AIV	NDV	IBDV	IBV	PPR	Rabies	
Shrawan	Total	40	33	18	15	8	9	123
	Positive	0	9	8	0	3	3	23
Bhadra	Total	32	27	17	11	2	4	93
	Positive	0	4	6	1	0	2	13
Ashoj	Total	32	27	17	11	2	4	93
	Positive	2	1	10	2	1	1	17
Kartik	Total	43	5	15	13	1	1	78
	Positive	3	2	8	2	0	0	15
Mangsir	Total	38	15	25	19	5	1	103
	Positive	0	0	9	1	4	0	14
Poush	Total	38	15	25	19	4	1	102
	Positive	3	2	5	2	0	6	18
Magh	Total	30	13	16	15	5	12	91

Month	Samples	Rapid test						Total
		AIV	NDV	IBDV	IBV	PPR	Rabies	
	Positive	5	1	6	2	0	1	15
Falgun	Total	79	27	20	12	5	7	150
	Positive	24	0	6	4	0	6	40
Chaitra	Total	92	16	19	16	1	7	151
	Positive	22	0	8	2	0	3	35
Baishakh	Total	76	15	21	8	2	7	129
	Positive	11	2	12	1	0	3	29
Jesth	Total	87	19	22	14	3	7	152
	Positive	15	1	13	1	0	3	33
Ashar	Total	82	15	25	5	0	2	129
	Positive	0	1	5	1	2	2	11
Total	**Total**	**669**	**227**	**240**	**158**	**38**	**62**	**1394**
	Positive	**85**	**23**	**96**	**19**	**10**	**30**	**263**

6.2.2 Rabies diagnosis

In the fiscal year 2078/79, 72 rabies suspected samples were tested out of which 40 (55%) were found to be positive. Most of the samples received were of canine. Month wise details of rabies are presented in the Table.

Table 18: Month wise rabies disease in different species.

Species		Dog	Buffalo	Cat	Human	Goat	Cattle	Horse	Total
Shrawan	Total	0	1	0	0	0	0	0	1
	Positive	0	1	0	0	0	0	0	1
Bhadra	Total	1	1	0	0	0	0	0	2
	Positive	1	0	0	0	0	0	0	1
Ashoj	Total	0	1	2	0	0	0	0	3
	Positive	0	1	0	0	0	0	0	1
Kartik	Total	1	0	0	0	0	0	0	1
	Positive	0	0	0	0	0	0	0	0
Mangsir	Total	3	0	0	0	1	2	0	6
	Positive	3	0	0	0	0	1	0	4
Poush	Total	13	1	0	0	0	0	0	14
	Positive	6	0	0	0	0	0	0	6
Magh	Total	10	3	0	0	1	1	0	15
	Positive	6	3	0	0	0	1	0	10
Falgun	Total	4	0	0	0	0	1	2	7
	Positive	4	0	0	0	0	1	1	6
Chaitra	Total	5	0	1	0	1	0	0	7

Species		Dog	Buffalo	Cat	Human	Goat	Cattle	Horse	Total
	Positive	3	0	0	0	0	0	0	3
Baishakh	Total	6	1	0	0	0	0	0	7
	Positive	3	0	0	0	0	0	0	3
Jesth	Total	5	0	1	0	0	0	0	6
	Positive	2	0	0	0	0	0	0	2
Ashar	Total	3	0	0	0	0	0	0	3
	Positive	3	0	0	0	0	0	0	3
Total	**Total**	**51**	**8**	**4**	**0**	**3**	**4**	**2**	**72**
	Positive	**31**	**5**	**0**	**0**	**0**	**3**	**1**	**40**

Table 19: District wise rabies case.

District	Total	Positive
Bhaktapur	3	0
Chitwan	8	5
Dhanusha	1	0
Kathmandu	35	18
Kavrepalanchowk	8	7
Lalitpur	14	8
Makawanpur	1	0
Nuwakot	1	1
Sindhupalchowk	1	1
Total	**72**	**40**

7. Pathology section

Pathology section consists of postmortem unit, histopathology, parasitology and clinical hematology and biochemistry unit.Samples are submitted either by VLs, NADIL, CRVH, VHLSEC and Local level or they are brought directly by the veterinary practitioners, livestock, and poultry farms as well as by the farmers themselves.

7.1 Postmortem unit

Necropsy examination is the first step of disease diagnosis for morbid animals. The history, clinical findings, epidemiological surveillance information is also helps for the proper diagnosis of disease which is confirmed through various tests that are available in CVL.

During the fiscal year 2078/79, a total of 1363 animal farmers, including 1243 poultry farmers and 120 animal farmers had brought their dead animals and birds for necropsy examination at CVL. Detail month wise and species wise distribution is shown in the table below.

7.1.1 Poultry postmortem

A total of 1243 farmers brought poultry for the post mortem examination. Among different types of poultry, broiler (48.02 %) was the predominant poultry type followed by commercial layer and local poultry. Other species such as kuroiler, giriraj, pheasant, breeders, duck, quail, turkey, pigeon, game birds and crow were also brought at PM for PM examination.

Table 20: Month-wise types of poultry species brought for PM at CVL.

Poultry Type	Sharawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Broiler	32	34	30	49	57	47	45	58	70	43	64	68	**597**
Layer	27	4	16	15	9	6	9	16	20	10	16	35	**183**
Local	16	11	4	21	3	4	7	7	11	13	18	14	**129**
Kuroiler/Giriraj	25	7	7	12	6	21	9	13	9	7	11	19	**146**
Turkey	3	0	0	1	0	0	0	1	1	0	1	0	**7**
Pheasant	8	10	13	16	2	2	2	8		6	1	13	**81**
Breeder	4	6	1	6	5	4	2	4	5	11	3	0	**51**
Duck	0	2	0	7	1	3	2	6	1	0	1	1	**24**
Pigeon	0	3	0	1	0	0	0	2	0	0		1	**7**
Quail	5	2	2	1	0	0	0	0	0	0	1	1	**12**
Game birds	0	0	0	1	0	1	0	1	0	0	0	0	**3**
Crow	0	0	0	0	1	0	0	2	0	0	0	0	**3**
Total	**120**	**79**	**73**	**130**	**84**	**88**	**76**	**118**	**117**	**90**	**116**	**152**	**1243**

7.1.2 Poultry diseases diagnosis

During PM examination, various types of infectious as well as non-infectious diseases were diagnosed grossly. As always, Colibacillosis was the top most disease diagnosed at CVL during FY 2078-79. This year, cases of neoplastic diseases such as Marek's disease and Avian leucosis complex were found to be increased, especially in Pheasant.

Table 21: Month-wise distribution of poultry diseases diagnosed by PM in CVL.

Type	Disease	Sharawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Bacterial	**Colibacillosis**	14	19	13	26	19	16	18	26	21	14	28	16	**230**
	CRD	8	5	3	8	3	4	5	6	8	6	19	12	**87**
	CCRD	2	2	5	1	3	8	3	2	3	6	1	0	**36**

Type	Disease	Sharawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
	Salmonellosis	7	7	5	10	5	6	4	6	6	1	0	9	**66**
	Fowl cholera	1	1	0	0	2	0	0	0	1	0	1	0	**6**
	Infectious Coryza	1	0	1	0	0	0	0	0	0	0	1	1	**4**
Viral	**IBD**	7	3	7	10	6	4	5	5	10	10	11	17	**95**
	ND	10	3	1	5	1	1	1	1	1	2	0	2	**28**
	AI	0	0	4	2	0	3	5	31	22	11	15	32	**125**
	IB	1	1	2	2	0	1	1	0	2	1	3	0	**14**
	MD	4	3	1	6	5	1	0	0	0	0	0	0	**20**
	ALC	3	1	0	10	0	1	2	2	1	0	0	0	**20**
	Fowl Pox	1	0	0	0	0	1	0	0	0	0	0	0	**2**
Mycotoxin	**Mycotoxicosis**	20	14	11	22	12	9	8	16	10	12	12	23	**169**
Metabolic	**Gout**	2	0	0	0	2	3	2	5	2	0	1	0	**17**
	Ascites	3	2	3	3	12	11	9	8	7	3	2	1	**64**
Parasitic	**Coccidiosis**	7	3	2	3	1	5	2	2	4	3	6	4	**42**
	Histomoniasis	2	2	2	0	0	0	0	0	0	0	0	1	**7**
	Round worm	1	1	3	3	1	2	1	1	0	1	0	0	**14**
	Tapeworm	0	0	0	1	0	0	1	0	0	0	0	0	**2**
Others	**Others***	26	12	10	18	12	12	9	7	19	20	16	34	**195**
Total		**120**	**79**	**73**	**130**	**84**	**88**	**76**	**118**	**117**	**90**	**116**	**152**	**1243**

*Other diseases include fatty liver disease, urolithiasis, nephritis, enteritis, stress, immunesupression, injury, sudden death, starvation etc.

Note:
CRD-Chronic Respiratory Disease, CCRD-Complex Chronic Respiratory Disease, IBD-Infectious Bursal Disease, ND-Newcastle Disease, AI-Avian Influenza, IB-Infectious Bronchitis, MD-Mareks Disease, ALC-Avian Leukosis Complex

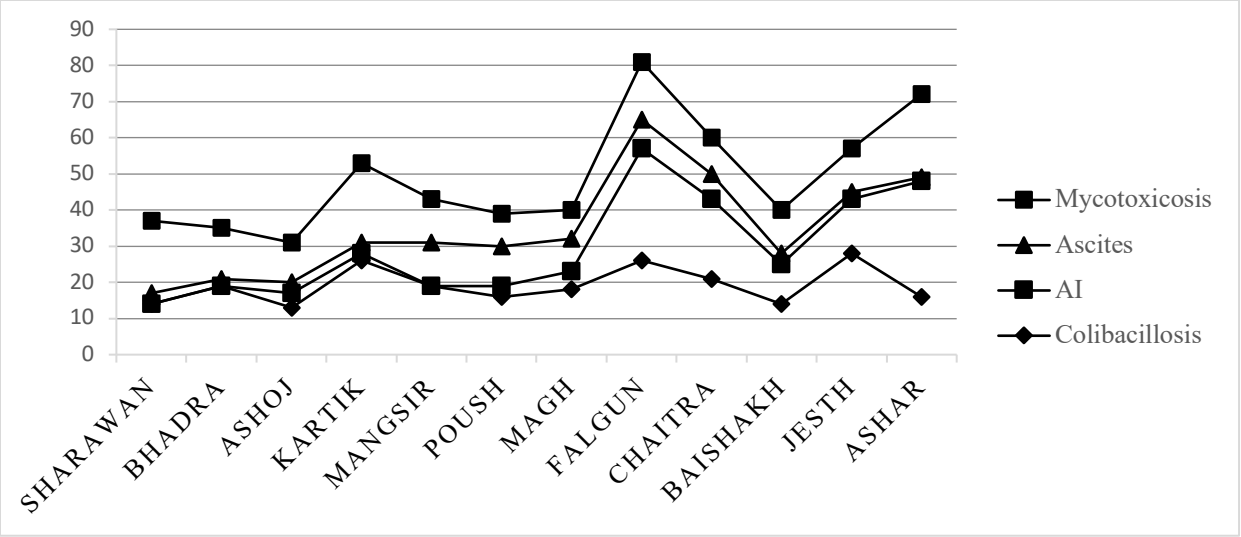


Figure 2: Line graph showing month wise distribution of major diseases of poultry.

Table 22: Poultry type wise diseases of avian species diagnosed by PM in CVL.

Type	Name	Broiler	Layer	Local	Kuroiler/Giriraj	Turkey	Pheasant	Breeder	Duck	Pigeon	Quail	Game birds	Crow	Total
Bacterial	Colibacillosis	171	16	12	17	0	3	8	2	0	0	1	0	**230**
	CRD	55	3	8	15	2	1	3	0	0	0	0	0	**87**
	CCRD	27	2	3	2	0	0	2	0	0	0	0	0	**36**
	Salmonellosis	11	27	5	4	0	9	3	6	0	1	0	0	**66**
	Fowl cholera	2	1	1	0	0	0	0	2	0	0	0	0	**6**
	Infectious Coryza	0	0	0	4	0	0	0	0	0	0	0	0	**4**
Viral	IBD	67	9	5	10	0	0	4	0	0	0	0	0	**95**
	ND	4	5	9	5	0	0	1	0	3	0	1	0	**28**
	AI	19	48	22	16	3	6	3	5	0	1	0	2	**125**
	IB	8	0	3	0	0	1	1	1	0	0	0	0	**14**
	MD	0	3	5	7	1	2	0	0	1	0	1	0	**20**
	ALC	0	2	2	4	0	11	1	0	0	0	0	0	**20**
	Fowl Pox	0	0	1	1	0	0	0	0	0	0	0	0	**2**
Mycotoxin	Mycotoxicosis	50	35	20	16	0	23	17	3	1	4	0	0	**169**
Metabolic	Gout	9	2	0	4	0	0	1	0	0	1	0	0	**17**
	Ascites	60	2	0	0	0	0	1	1	0	0	0	0	**64**
Parasitic	Coccidiosis	14	3	7	12	0	2	3	0	0	0	0	1	**42**
	Histomoniasis	0	2	1	3	1	0	0	0	0	0	0	0	**7**

Type	Name	Broiler	Layer	Local	Kuroiler/Giriraj	Turkey	Pheasant	Breeder	Duck	Pigeon	Quail	Game birds	Crow	Total
	Round worm	1	0	3	7	0	1	0	0	2	0	0	0	**14**
	Tapeworm	0	0	1	1	0	0	0	0	0	0	0	0	**2**
Others	Others	99	23	21	18	0	22	3	4	0	5	0	0	**195**
Total		**597**	**183**	**129**	**146**	**7**	**81**	**51**	**24**	**7**	**12**	**3**	**3**	**1243**

7.1.3 Postmortem of animals

During this year, 120 animals were brought at CVL for PM examination. Details of the animal species are presented below in the table.

Table 23: Month wise animal species brought for PM in CVL (FY 2078-79).

Animal	Sharawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Goat	2	7	5	3	4	3	5	6	1	2	7	2	47
Pig	0	0	1	2	0	3	4	4	2	12	2	3	33
Dog	2	1	0	1	4	9	3	1	4	4	4	2	35
Cat	0	0	2	0	0	0	0	0	1	0	0	0	3
Rabbit	0	0	0	0	1	0	0	0	0	0	0	0	1
Sheep	0	0	0	0	0	0	0	0	0	1	0	0	1
Total	**4**	**8**	**8**	**6**	**9**	**15**	**12**	**11**	**8**	**19**	**13**	**7**	**120**

7.1.4 Animal disease diagnosis

In goat, enterotoxaemia was the predominant disease diagnosed in goat, rabies was predominant in dog and African swine fever was predominant in pig. Anthrax was diagnosed in one goat and one sheep. Details of animal disease are presented in the table below.

Table 24: Animal type wise disease diagnosed by PM in CVL (2078-79).

Disease	ET	Pneumonia	Rabies	HS	Anthrax	Helminthiasis	Poisoning	PPR	PRRS	CSF	ASF	Fasciolosis	Ascites	Others	Total
Goat	14	12	0	2	1	5	3	1	0	0	0	1	0	8	**47**
Pig	0	4	0	1	1	0	0	0	1	5	12	0	1	8	**33**

Disease	ET	Pneumonia	Rabies	HS	Anthrax	Helminthiasis	Poisoning	PPR	PRRS	CSF	ASF	Fasciolosis	Ascites	Others	Total
Dog	0	0	21		0	0	0	0	0	0	0	0	0	14	**35**
Cat	0	0	0	0	0	0	0	0	0	0	0	0	0	3	**3**
Rabbit	0	0	0	0	0	0	0	0	0	0	0	0	0	1	**1**
Sheep	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Total	**15**	**16**	**21**	**3**	**2**	**5**	**3**	**1**	**1**	**5**	**12**	**1**	**1**	**34**	**120**

Note: ET: Enterotoxaemia, HS: Haemorrhagic Septicaemia, PPR: Peste des Petits Ruminants, PRRS: Porcine Reproductive and Respiratory Syndrome, CSF: Classical Swine Fever, ASF: African Swine Fever

7.2 Hematology and biochemistry unit

A total of 1710 blood samples were tested in F/Y 2078/79 for blood analysis. Blood samples are tested for hematological parameters and blood smear (TEC, TLC, DLC, Hemoglobin, Platelets). Out of 1710, 394 samples were positive for at least one hemoprotozoan.

Table 25: Total blood samples analyzed for hematological parameters.

Blood Test	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Complete Blood Count	185	197	200	138	80	84	50	75	69	303	156	173	1710

7.2.1 Haemoprotozoans

Out of 1710 blood samples, 394 samples (23.04%) were found to be positive for at least one hemoprotozoan. *Babesia spp.* (79.89%) is the predominant hemoprotozoan found especially in the cattle.

Table 26: Month wise number of hemoprotozoans observed.

Blood Test	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Total blood samples	185	197	200	138	80	84	50	75	69	303	156	173	1710
Positive	83	58	38	42	8	4	5	5	9	65	36	41	394

Blood Test	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Positive percentage	**44.9**	**29.4**	**19.0**	**30.4**	**10.0**	**4.8**	**10.0**	**6.7**	**13.0**	**21.5**	**23.0**	**23.7**	**23.04**

Table 27: Month wise species of hemoprotozoans diagnosed at CVL.

Hemoprotozoan	Shrawan	Bhadra	Ashoj	Kartik	Mangsir	Poush	Magh	Falgun	Chaitra	Baishakh	Jesth	Ashar	Total
Babesia	81	57	33	21	4	2	4	2	7	41	33	29	314
Theileria	0	0	0	0	0	1	0	0	0	2	0	0	3
Anaplasma	2	1	4	20	2	0	0	3	2	22	2	12	70
Trypanosoma	0	0	1	0	0	0	1	0	0	0	1	0	3
Ehrlichia	0	0	0	1	1	1	0	0	0	0	0	0	3
Total	**83**	**58**	**38**	**42**	**7**	**4**	**5**	**5**	**9**	**65**	**36**	**41**	**393**

Table 28: Blood parasites identified in different animal species.

Animal	*Babesia*	*Theileria*	*Anaplasma*	*Trypanosoma*	*Ehrlichia*	Total
Cattle	303	3	68	1	0	**375**
Goat	7	0	0	0	0	**7**
Buffalo	1	0	0	0	0	**1**
Canine	2	0	2	2	3	**9**
Cat	1	0	0	0	0	**1**
Total	**314**	**3**	**70**	**3**	**3**	**393**

7.3 Parasitology unit

The parasitology unit is involved in routine examination of different types of internal and external parasites of animals and birds. For the investigation and diagnosis of parasites, fecal samples, and skin scrapings samples are collected and examined by adopting standard veterinary laboratory protocols.

7.3.1 Fecal examination

As a routine examination or diagnosis of parasites, direct smear method, sedimentation method and the floatation methods are used. During FY 2078-79 a total 514 faecal samples were tested, outof which 254 samples (49.42%) were found to be positive for at least one parasitic egg.

Table 29: Number of positive sample for at least one parasitic eggs.

Animal	Total sample	Positive	Positive Percentage
Goat	216	129	59.72
Sheep	56	35	62.50
Poultry	10	7	70.00
Pig	5	4	80.00
Cattle	56	46	82.14
Buffalo	16	1	6.25
Yak	155	32	20.65
Total	**514**	**254**	**49.42**

Table 30: Parasites identified.

Parasite	Goat	Sheep	Poultry	Pig	Cattle	Buffalo	Yak	Total
Fasciola	0	0	0	0	2	0	3	5
Paramphistomes	2	0	0	0	13	1	0	16
Ascaris	0	0	1	0	0	0	2	3
Trichuris	7	10	0	4	23	0	0	44
Strongyle	54	22	0	0	2	0	26	104
Capillaria	1	0	0	0	1	0	2	4
Moniezia	6	2	0	0	0	0	0	8
Coccidia	47	5	6	0	11	0	4	73
Strongyloides	44	19	0	0	11	1	0	75
Oesophagostomum	0	4	0	0	0	0	0	4
Total	**161**	**62**	**7**	**4**	**63**	**2**	**37**	**336**

Table 31: Parasites identified in the government farm.

Office	Animal	Total sample	Positive	Positive Percentage
Chitlang Goat Farm, Makawanpur	Goat	5	4	80.00
Goat Research Station, Tanahun	Goat	34	24	70.59
Goat Genetic Resource Centre, Kailali	Goat	46	31	67.39
Cattle Genetic Resource Centre, Dolakha	Cattle	44	32	72.73
Sheep Genetic Resoruce Centre, Nuwakot	Sheep	54	33	61.11
Langtang Yak (Research sample for Thesis)	Yak	155	32	20.65
Total		**338**	**156**	46.15

Table 32: Parasitic species identified in government farm.

Office	Animal	*Fasciola*	*Paramphistomes*	*Ascaris*	*Trichuris*	*Strongyle*	*Capillaria*	*Moniezia*	*Coccidia*	*Strongyloides*	*Oesophagostomum*	Total
Chitlang Goat Farm, Makawanpur	Goat					2	1		1			4
Goat Research Station, Tanahun	Goat					9		1	17	11		38
Goat Genetic Resource Centre, Kailali	Goat				3	10		3	26			42
Cattle Genetic Resource Centre, Dolakha	Cattle		9		15		1		11	5	4	45
Sheep Genetic Resoruce Centre, Nuwakot	Sheep				10	19		2	5	17		53
Langtang Yak (Research samplef for Thesis)	Yak	3		2		26		2	4			37
Total		**3**	**9**	**2**	**28**	**66**	**2**	**8**	**64**	**33**	**4**	**219**

7.3.2 Larva culture

Table 33: Larva culture of parasite from government livestock farms.

S.N.	Office	Species	Sample	No. of sample	Positive sample	Larvae identified (No./kg)				
						Trichostrongylus	*Ostertagia*	*Haemonchus*	*Oesophagostomum*	*Nematodirus battus*
1	Goat Genetic Resoruce Centre, Kailali	Oat	Oat	1	1	298	80	182		
		Napier	Napier	1	0					
		Goat	Fecal	6	6	127	163	209		193
2	Sheep Genetic Resource	Oat	Oat	1	0					312
		Ground grass	Grass	1	1	206				

S.N.	Office	Species	Sample	No. of sample	Positive sample	Larvae identified (No./kg)				
						Trichostrongylus	*Ostertagia*	*Haemonchus*	*Oesophagostomum*	*Nematodirus battus*
	Centre, Nuwakot	Sheep	Fecal	15	15	315				
3	Cattle Genetic Resource Centre, Dolakha	Grass	Grass	2	2		80			61
		Cow	Fecal	8	0					
4	Bagaicha Farm House Resort, Nawalparasi	Grass	Grass	2	2		170		190	
		Goat	Fecal	6	6	307	267		303	
5	National Animal Breeding Office, Banke	Grass	Grass	4	0					
		Goat	Feces	10	0					
		Buffalo	Feces	1	0					
		Ox	Feces	1	0					
6	National Goat Research Station, Tanahun	Grass	Grass	4	0					
		Goat	Feces	20	11	175				
Total				**83**	**44**					

8. Molecular biology section

8.1 Molecular biology unit

Molecular biology unit was established in Central Veterinary Laboratory (CVL) in 2003 A.D. Earlier this laboratory started to diagnose avian influenza by using RT-PCR technique. Later, from 2010, CVL started real time PCR for diagnosis of avian diseases like Avian Influenza (AI), Newcastle disease (ND), and Infectious Bursal Disease (IBD). CVL also started multiplex for respiratory disease of small ruminant (PPR, MCCP, Capripox, Pasteurella) and swine diseases (African swine fever virus, Classical swine fever virus, Salmonella and Erysipelas*)* and other diseases like Porcine Reproductive and Respiratory Syndrome (PRRS-NA and PRRS-EU), since 2016. Later on the technologies expand for diagnosis of other zoonotic and economic importance diseases like Glanders, Lumpy skin Diseases (LSD) and Enterotoxaemia. Molecular unit also participate in proficiency testing (PT) for AI, PPR and Swine diseases since 2016.

In the Fiscal year 2078/79, a total of 473 swab samples of avian species suspected for avian influenza were received from thirty districts. Those samples were tested by using Real Time Reverse Transcriptase Polymerase Chain Reaction (rRT PCR). Out of those samples, 44.19% samples were found to be positive for subtype H9N2. During this period, HPAI outbreak was also occurred in eighteen districts like Kathmandu, Lalitpur, Bhaktapur, Kaski, Chitwan, Makwanpur etc. and 194 samples were found to be positive for HPAI (H5N1). Some of the samples were sent to OIE Reference laboratory, Australia. According to WOAH Report, (HPAI) H5N1 associated with the current 2.3.2.1a clade.

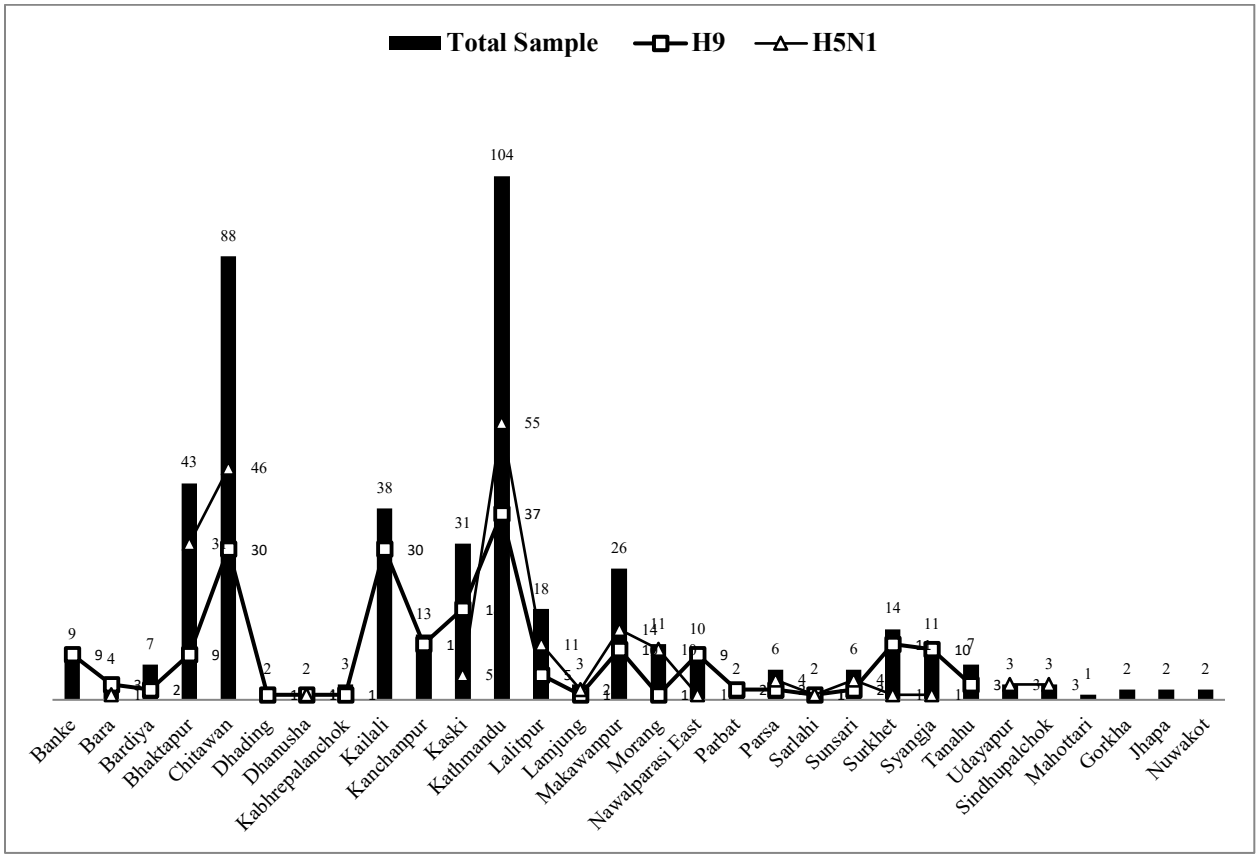


Figure 3: District wise H9 and H5 outbreak of AI.

CVL also received different types of bio-surveillance sample (TS/CS/ES/NS) for avian influenza from fourteen districts. A total of 879 samples were tested by using PCR method. 16.84% samples from Banke, Kavre, Sunsari, Kathmandu, Bhaktapur, Jhapa, Makawanpur and Chitwan were positive for Subtype H9.

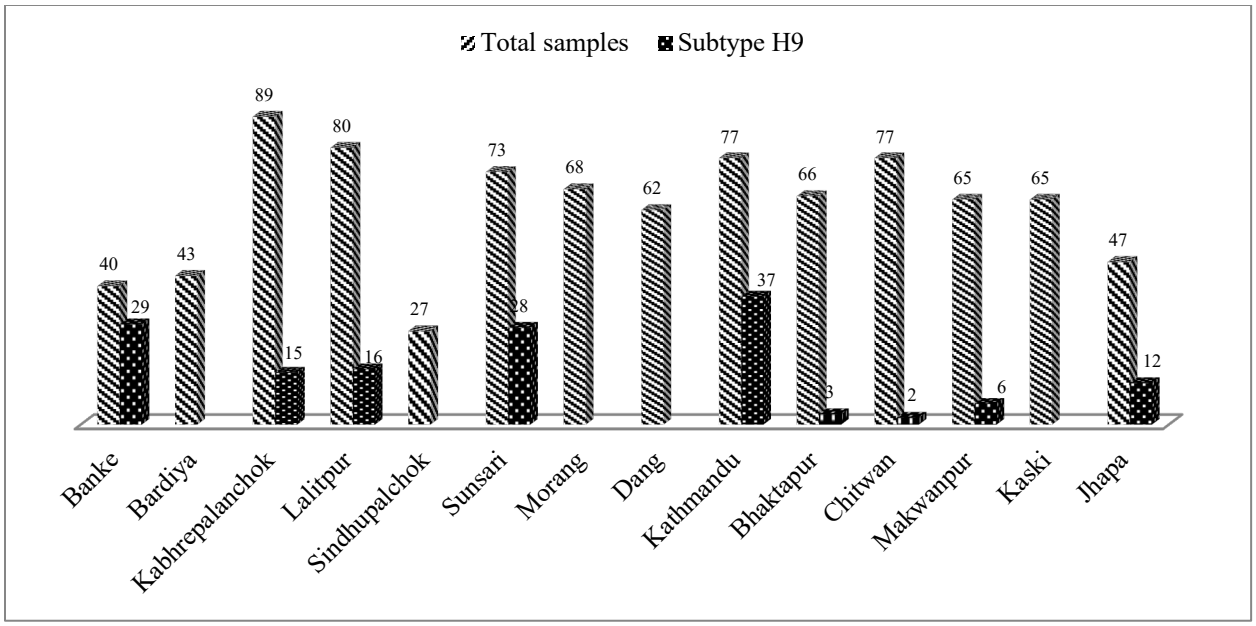


Figure 4: District wise biosurveillance of H9 of AI as diagnosed by PCR.

Likewise, CVL received a total of 252 samples of avian species suspected for Newcastle Disease (ND) from 24 districts. Out of those samples, 23.41% samples were found to be positive for ND virus. According to WOAH Report, F-gene sequences of the Nepal isolates (virus) belonging to genotype VII.

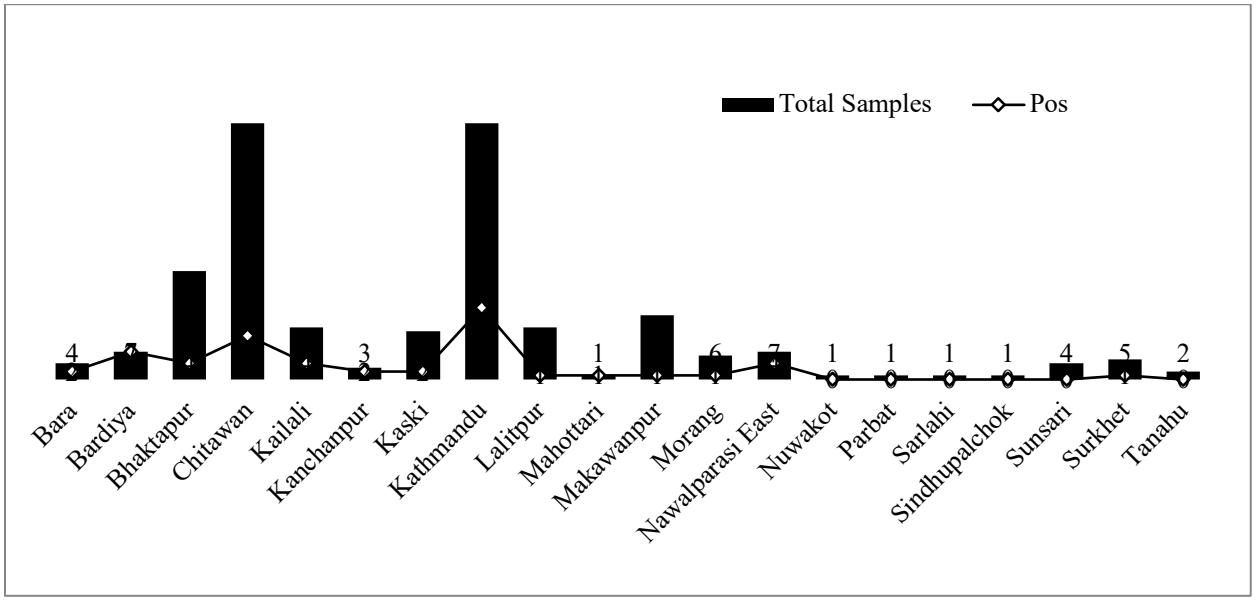


Figure 5: District wise Newcastle disease as diagnosed by PCR.

Similarly, CVL received 36 numbers of samples for the diagnosis of Enterotoxaemia, out of which 18 of sample were positive from Kathmandu district only.

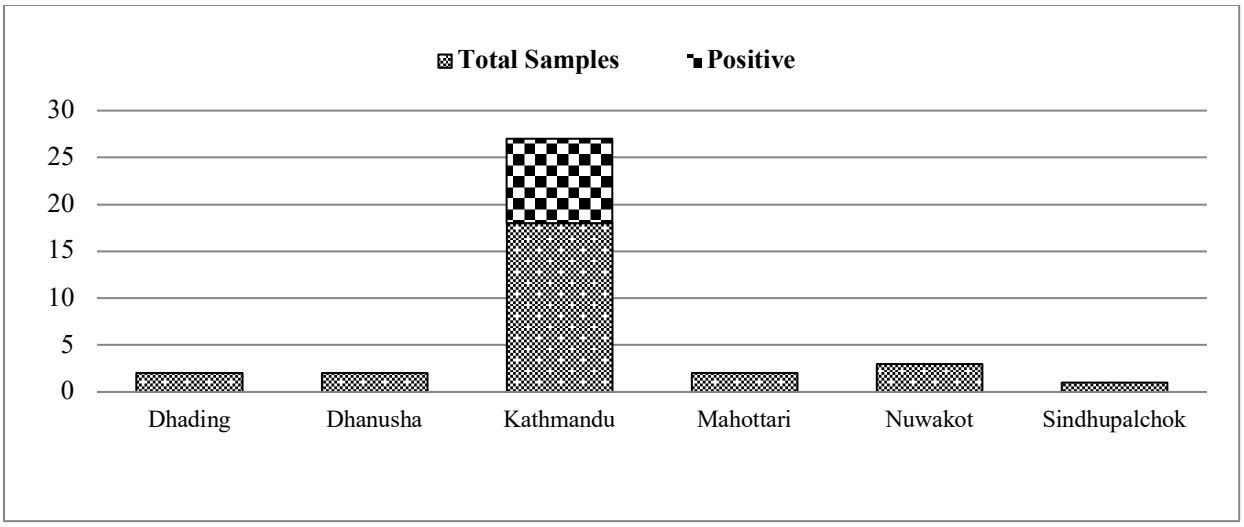


Figure 6: District wise Enterotoxaemia in goats.

Likewise, CVL received 125 samples (Tissues/blood) from fifteen districts for Swine diseases. The samples were initially tested for ASF followed by CSF, PRRS-NA and PRRS-EU. Out of those samples, 31.2% and 7.2% samples were found to be positive for ASF and CSF respectively. According to OIE Report, phylogenetic analysis based on partial p72 nucleotide gene sequences of ASFV belonging to Genotype II. None of the samples were positive for either PRRS-NA or PRRS-EU.

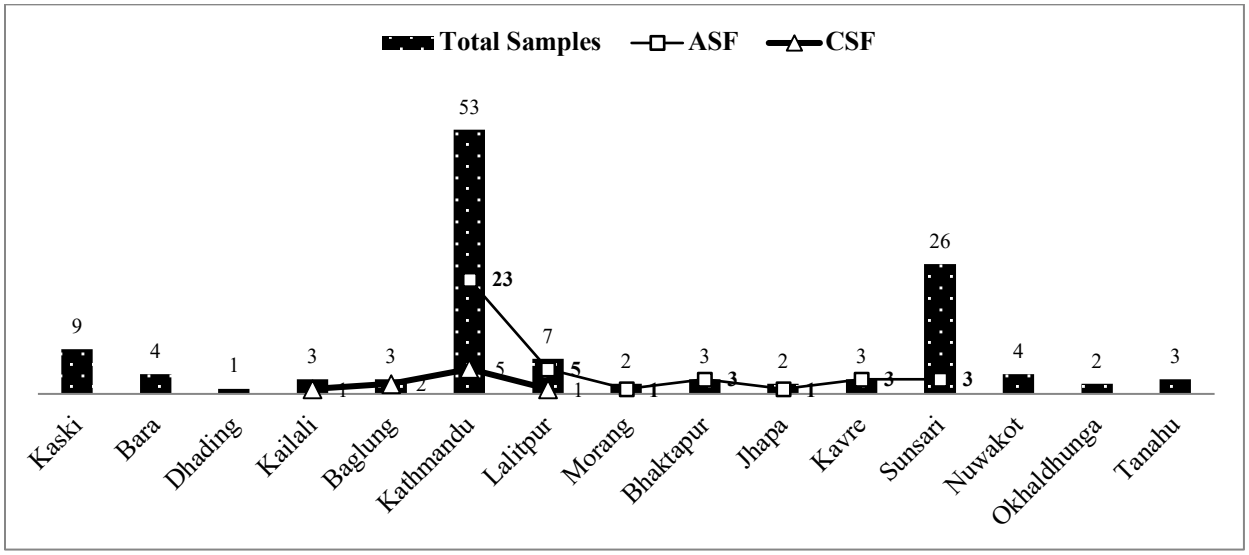


Figure 7: District wise ASF and CSF in pig.

Likewise, CVL received 108 swab samples of caprine from twenty districts. Only 14.81 % and 8.33% samples were found to be positive for PPR and Pasteurella respectively by using multiplex PCR method for small ruminant respiratory diseases (SRRD). None of these samples were positive for Capripox.

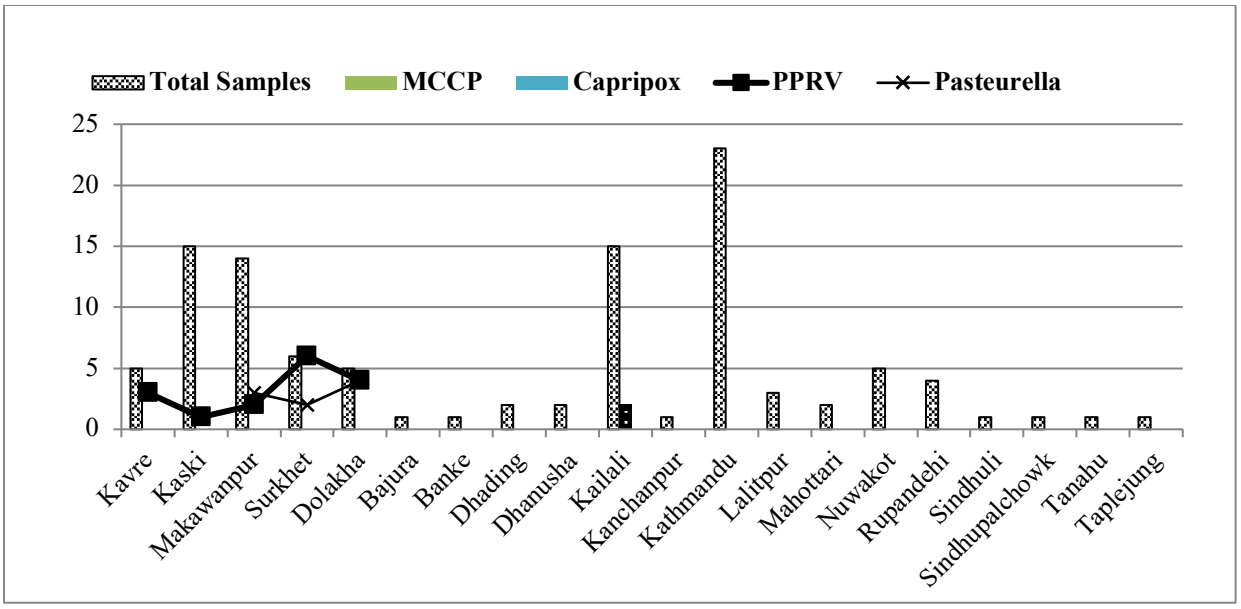


Figure 8: District wise MCCP, Capripox, PPRV and *Pasteurella* in goat.

CVL also received bovine samples (Swab/pus/scar) from twelve districts for Lumpy Skin Disease (LSD). A total of 66 samples were tested by using PCR method. Only 65.15% samples were positive for LSD.

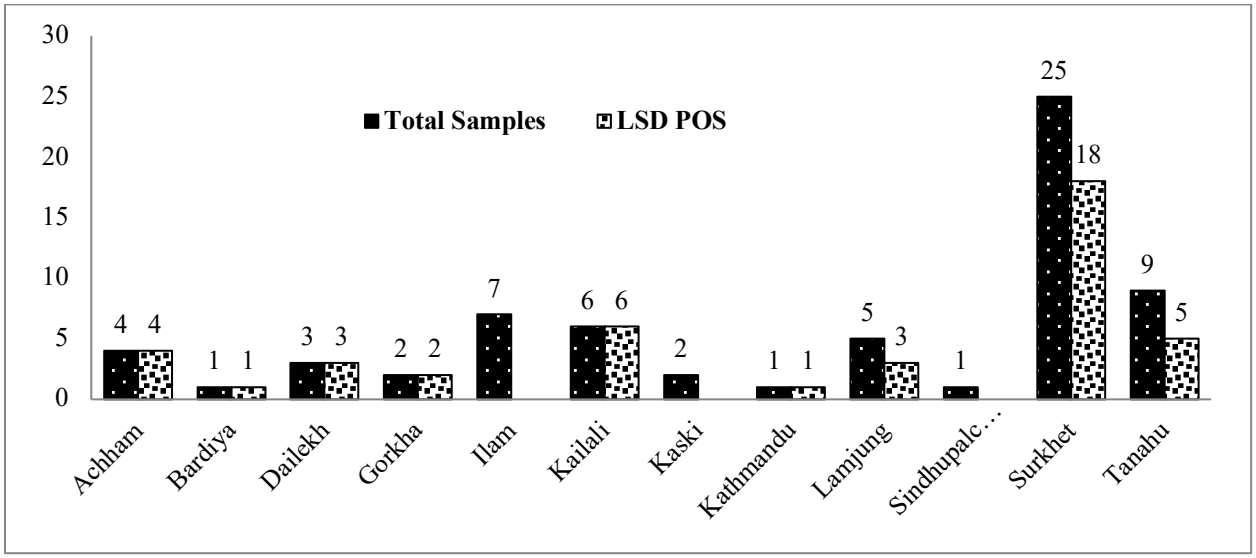


Figure 9: District wise LSD in bovine.

CVL also received 6 equine pus swab samples from Dhadhing and Bhaktapur districts. Only 4 samples were found to be positive for glanders.

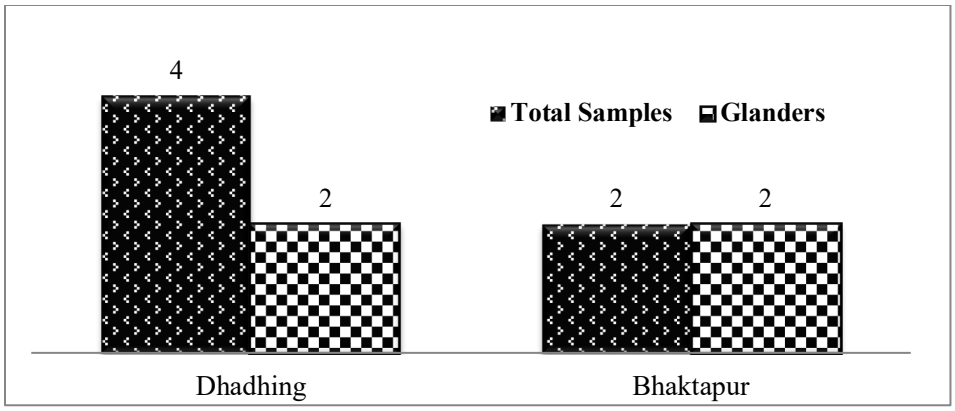


Figure 10: District wise glanders in equines.

8.2 Serology unit

Serology section of CVL performs different serological tests for the diagnosis, monitoring and surveillance of animal diseases mainly associated with viral and bacterial infection. Most of the samples are submitted to this unit by Veterinary Laboratories, National Avian Disease Investigation Laboratory, District Offices, Quarantine Check-posts, private practitioner, farmers and staff of CVL during disease outbreak investigations, routine diagnosis well as sero-monitoring. This section possesses capacity and facility of Competitive Enzyme Linked Immunosorbent Assay (ELISA), Immuno-capture ELISA, Indirect ELISA, Tube agglutination Test, Agar-Gel Immuno-Diffusion (AGID) test, Plate agglutination test and rapid tests.

Serology unit also participate in proficiency testing (PT) especially for PPR diagnosis by ELISA method and Brucellosis by PAT since 2016. Progress report of Serological investigation of various diseases in animals and birds during 2078/79 is as follows.

8.2.1 PPR outbreak

A total of 12 serum samples of goats were received from different outbreaks areas of three districts at different seasons. These samples were tested by ELISA method and 75 % samples were found positive for PPR.

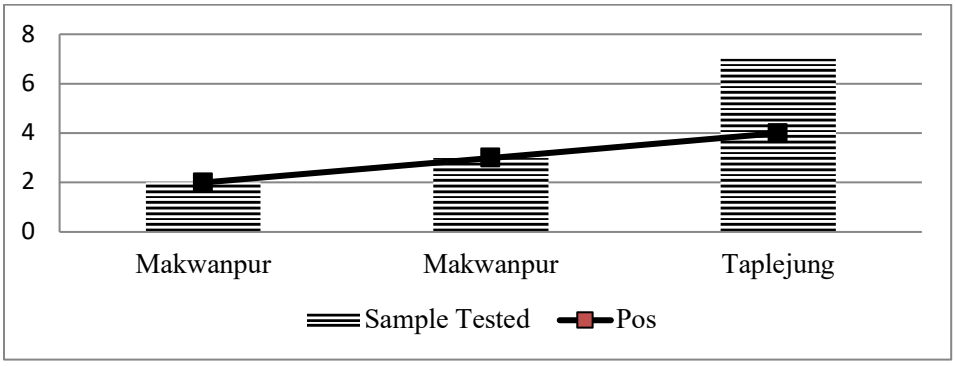


Figure 11 : Peste-des Petitis Ruminant (PPR), test results (Outbreak samples)

8.2.2 PPR Seromonitoring

In case of sero-monitoring, sample collection was done in the end of 2077/78 but tested in 2078/79. CVL received serum samples from 17 districts. During 2078-79, a total 5000 serum samples of vaccinated Goats were tested. Out of those samples, 73.61% were found positive for PPR antibody. The result shows that the PPR antibody positive percentage was found highest (more than 90%) in three districts Illam, Kanchanpura and Rautahat, respectively. The antibody positive percentage found in the serum samples of Sindhuli and West Rukum (2 districts) were not satisfctory (below 50%). The antibody positive percentage between 50-89 found in remaining 12 districts (Okhaldhunga, Makwanpur, Rasuwa, Kavre, Chitwan, Ramechhap, Kathmandu, Nuwakot, Dhading, Dolakha, Nawalparasi, and Kailali).

The low antibody positive percentage might be due to either sampling error or cold chain problem or the samples were collected earlier.

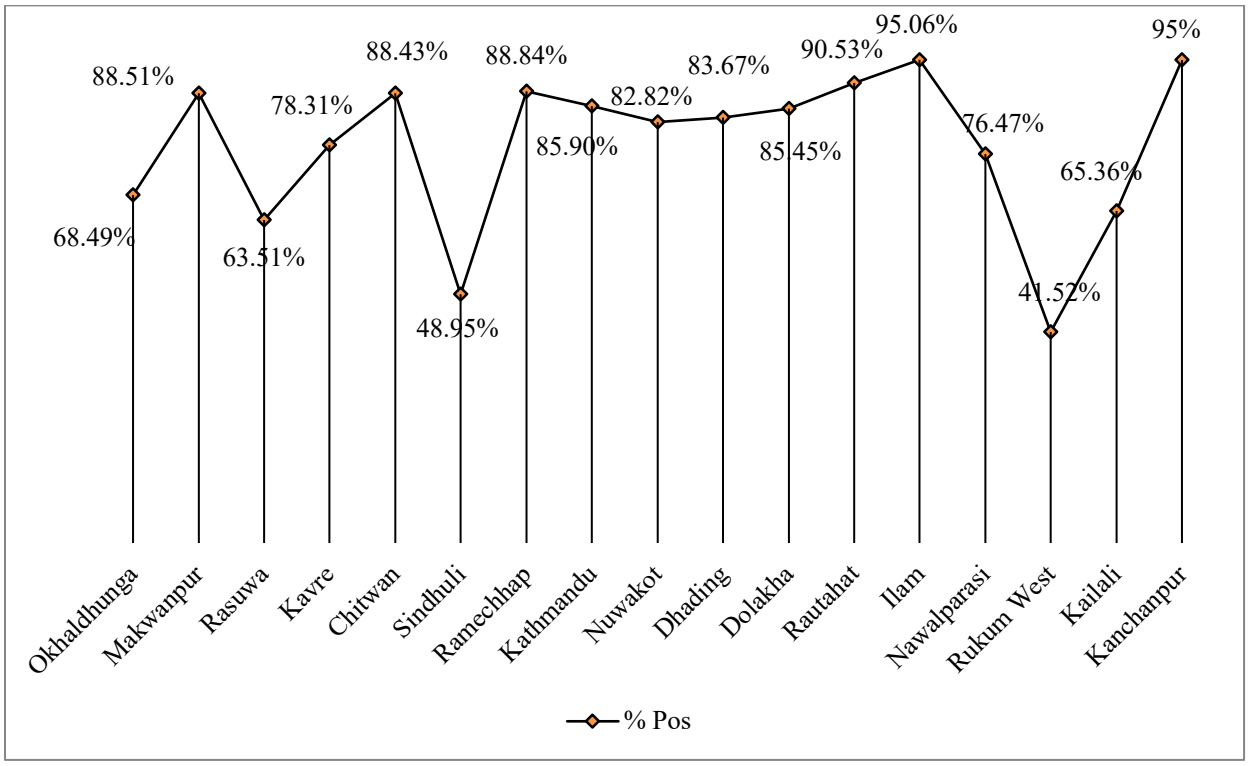


Figure 12 : Peste-des Petitis Ruminant (PPR) seromonitoring C-ELISA antibody test results

8.2.3 Brucellosis

A total of 627 serum samples from bovine and caprine were tested for *Brucellosis* antibody by ELISA and PAT method and among them 7 (1.21%) samples were found positive for brucellosis.

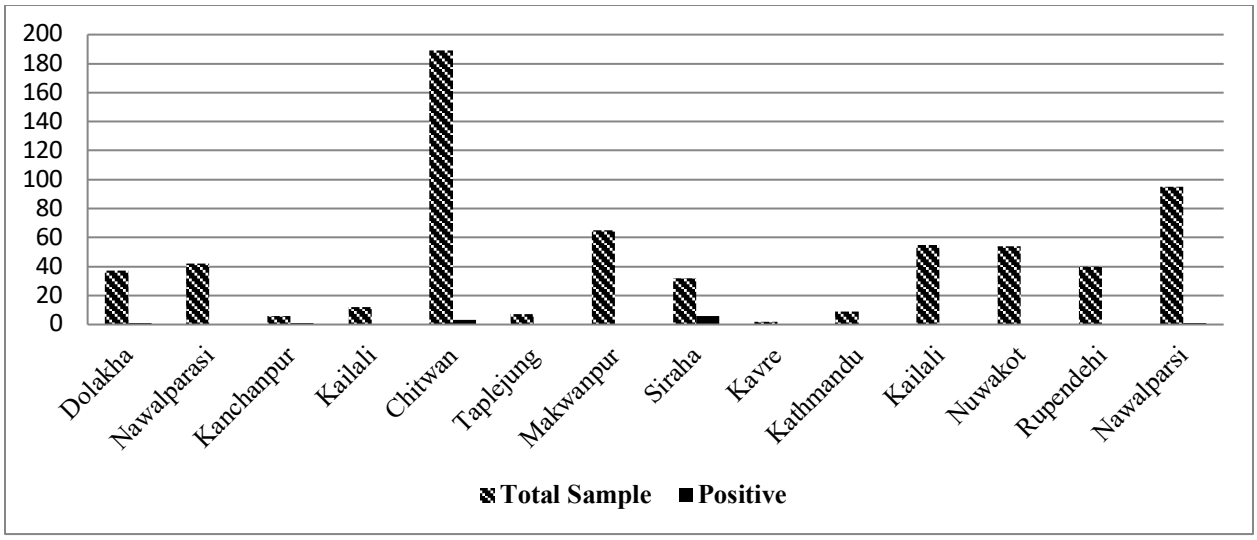


Figure 13: Antibody test result of Brucellosis antibody by ELISA /PAT

Table 34: Specieswise brucellosis positive percentage

S.N.	Species	Total	Positive	Negative	Positive %
1	**Bovine**	403	11	392	2.73%
2	**Caprine**	180	1	179	0.56%
3	**Ovine**	62	0	62	0
	Total	645	12	633	1.86%

8.2.4 Toxoplasmosis

A total of 264 caprine and bovine serum samples from Dolakha, Nawalparasi, Makwanpur, Siraha, Kailali and Nuwakot were tested for antibody of Toxoplasma by ELISA method among them, 33% samples were found positive for Toxoplasmosis.

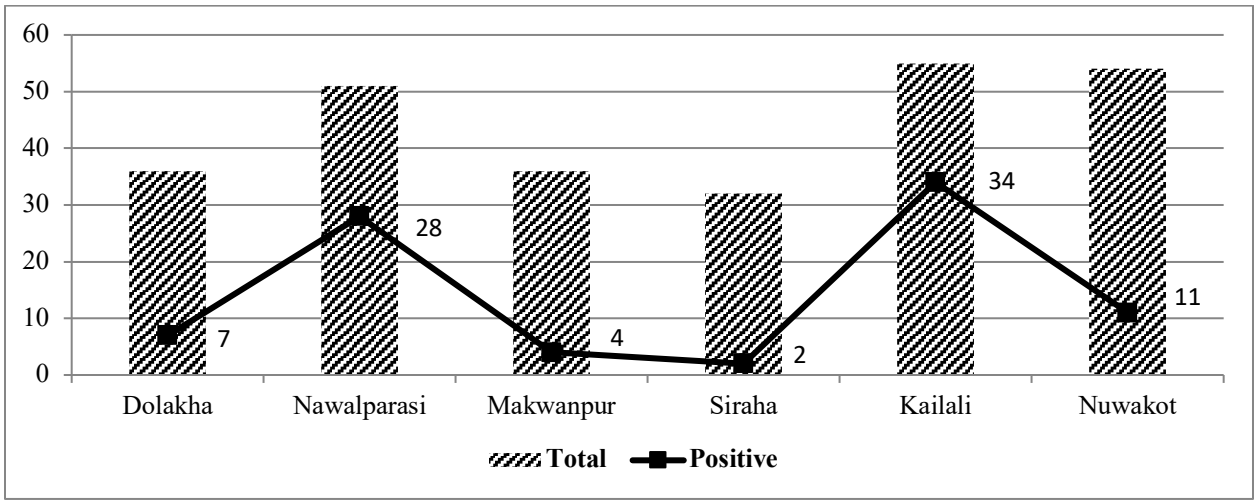


Figure 14 : Toxoplasmosis antibody test results

8.2.5 Cremean Congo Hamemorrhagic Fever (CCHF) Surveillance

A total of 153bovine serum samples from Dolakha, Siraha, Bhairawa, Banke and Bandipurwere tested for antibody of Cremean Congo Haemorrhagic Fever (CCHF) by Ab-ELISA method among them, 3% samples were found positive for CCHF.

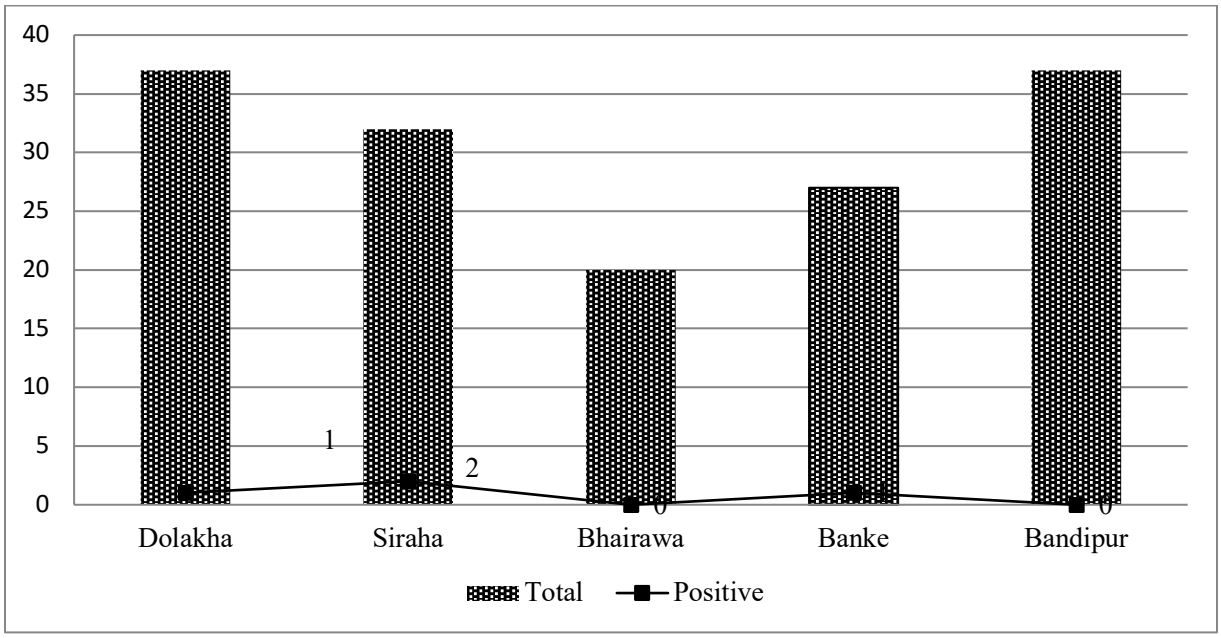


Figure 15 : CCHF Antibody test results

8.2.6 Mycoplasma Contagious Caprine Pleuropneumonia (MCCPP)

A total of 402 caprine serum samples from Dolakha, Rukum West and Chitwan were tested for antibody of Mycoplasma Contagious Caprine Pleuropneumonia (MCCPP) by Ab-ELISA method among them, 3.4% samples were found positive for MCCPP.

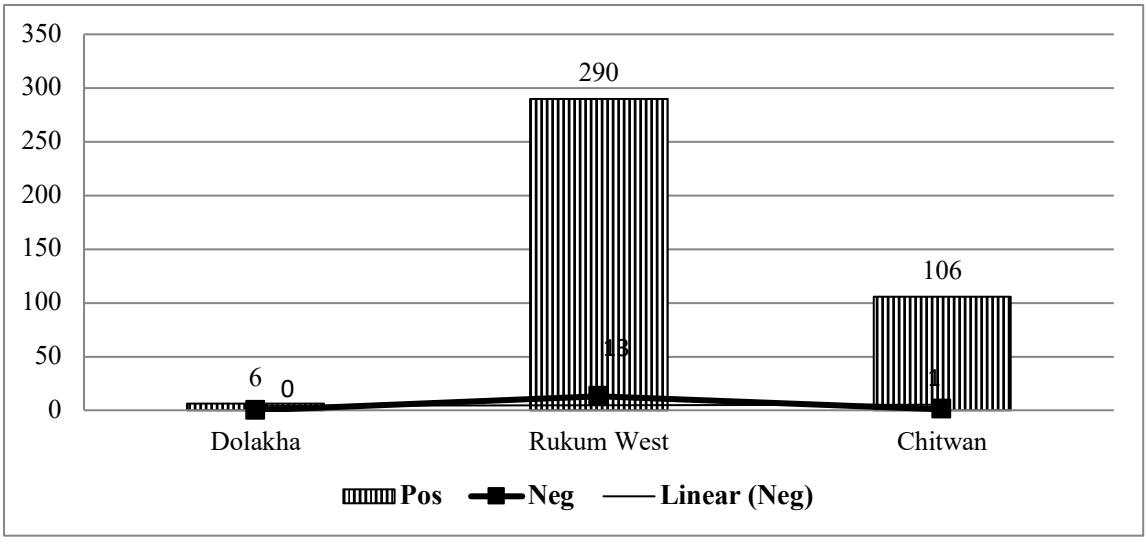


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Figure 16 : MCCPP antibody test results

8.2.7 Plate Agglutinaiton Test (PAT)

A total 155 number of poultry serum samples were collected from Sindhuli, Nuwakot and Dhading districts and tested for *Salmonella pullorum* and *Mycoplasma gallisepticum* antibody respectively by PAT method. 19 samples were found positive for *Salmonella pullorum* and 101 samples for *Mycoplasma gallisepticum* antibody.

Table 35: Antibody Test Results of *Salmonella pullorum* and *Mycoplasma gallisepticum* in poultry serum by using Plate Agglutination Test (PAT)

S.N.	**Districts**	***Salmonella pullorum* (PAT)**			***Mycoplasma gallisepticum* (PAT)**		
		Total sample	**Positive**	**Negative**	**Total sample**	**Positive**	**Negative**
1	Sindhuli	51	2	49	51	36	15
2	Nuwakot	49	12	37	49	26	23
3	Dhading	54	5	49	55	39	16
Total		**155**	**19**	**135**	**155**	**101**	**54**

9. Veterinary public health section

Veterinary Public Health section is responsible to assure the safety of public with consumption of animal products. This section conducts various programs to address public health issues such as veterinary drugs, insecticides/hormones/pesticides residue testing in milk, egg, meat and fish. This section is conducting antibiotic residue testing in certain group of antibiotics like as Streptomycin, Gentamycin, Sulphonamides and Tetracycline. It conducts hormone test in the milk and meat that are harmful to the health of people. It is conducting the ractopomine and progesterone hormone residue test in milk and meat sample. It is responsible to conduct zoonotic disease surveillance that are prevalent and at high risk in Nepal and monitoring of meat shop.

9.1 Antibiotic residue test in milk

During fiscal year 2078/79, a total of 285 milk samples were collected from Sindhui, Dhading, Kathmandu and Kavre district. Milk samples were tested for antibiotic residue of Streptomycin and Sulphonamide by ELISA test where all of the samples were found to have residual value below Maximum Residual Limit (MRL) i.e. 100 ug/L. Similarly, 66 milk samples were tested for residues of Colistin sulphate, Gentamycin and Sulphonamides as shown in table below.

Table 36: Antibiotic residues in milk.

S.N.	**District**	**Antibiotics**	**Test**	**No. of sample**	**Result**
1	Sindhuli, Dhading, Kavre, Kathmandu	Streptomycin	ELISA	203	All below residual limit i.e. 100 ug/L
2	Sindhuli, Dhading	Sulphonamide	ELISA	82	
3		Colistin sulphate	Rapid	9	
4		Gentamycin	Rapid	48	
5		Sulphonamide	Rapid	9	

9.2 Antibiotic residue test in Meat

During fiscal year 2078/79, a total of 368 meat samples were tested for the antibiotic residue. Details of the antibiotic residue test are given in the table below.

Table 37: Antibiotic residues in meat.

S.N.	District	Antibiotic	No. of sample	Result
1	Kathmandu, Sindupalchwok	Gentamycin	42	MRL 200ug/kg, all were found within permissible limit.
2	Kailali	Gentamycin	42	1 sample found beyond permissible limit (MRL 100ug/kg)
3	Chitwan	Fluroquinolones	40	All were found within permissible limit.
4	Tanahun, Khotang	Tetracycline	80	MRL 200ug/kg, all were found within permissible limit.
5	Sindhuli, Dhading	Tetracycline	82	MRL 200ug/kg, all were found within permissible limit.
6	Sindhuli, Dhading	Gentamycin	82	MRL 100ug/kg, all were found within permissible limit.

9.3 Other tests

During FY 2078/79, 174 milk samples from Dhading were tested for Brucellosis and 82 milk samples were tested for Ractopamine, of which all of the samples were negative for both. Similarly, 40 fish samples from different districts were tested for malachite green, 41 meat samples tested for the presence of aflatoxins and 75 blood samples from goat were tested for progesterone hormone.

Table 38: Different tests (Brucellosis, Ractopamine, Malachite green, Aflatoxins and Progesterone).

Disease/ Chemical	District	Type of sample	Species	No. of samples	Test	Result
Brucellosis	Dhading	Milk	Bovine	174	ELISA Ab	All samples were negative
Ractopamine	Dhading	Milk	Bovine	82	Ractopamine	
Malachite green	Dhanusha, Dolakha, Sindhuli and Dhading	Fish	Fish	40	Malachite green test	29 (72.5%)
Aflatoxins	Dolakha	Meat	Poultry	41	ELISA	All samples were negative
Progesterone hormone	West Rukum	Serum	Goat	75	Progesterone test	

CHAPTER II
VETERINARY LABORATORY

1. Introduction

To provide diagnostic facilities throughout the country, CVL works through its five Veterinary Laboratories (VLs) located in different provinces of the nation; Koshi Pradesh Veterinary Laboratory (Biratnagar), Madhesh Pradesh Veterinary Laboratory (Janakpur), Gandaki Pradesh Veterinary Laboratory (Pokhara), Karnali PradeshVeterinary Laboratory (Surkhet) and Sudurpashim Pradesh Veterinary Laboratory (Dhangadhi). Currently, Bagmati Pradesh and Lumbini Pradesh do not have veterinary laboratory as per new structure. However, diagnostic services are covered by the currently running laboratories. Specimens that cannot be processed in the aforementioned laboratories due to insufficient facilities and expertise or needed to be further tested for confirmation are referred to the CVL.

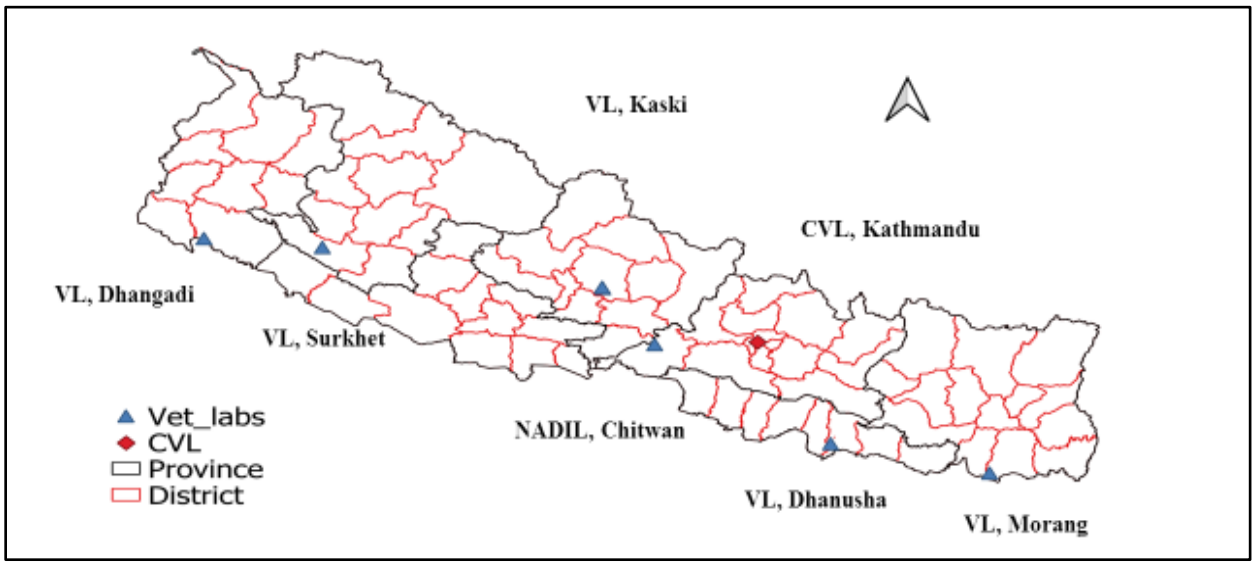


Figure 1: Map showing veterinary laboratories in Nepal.

2. Objectives

The objectives of veterinary laboratories as follows;

- To provide prompt and efficient disease diagnostic services to the farmers of respective province.
- To investigate and diagnose the epidemics in the province.
- To assist and support Veterinary Hospital and Expert Service Centers and local level governments in disease diagnosis and epidemic control.
- To supervise and assist in diagnostic services to basic and primary laboratories situated in Veterinary Hospital and Expert Service Centers in the province.
- To collect, analyze and predict the animal diseases prevailing in the province.
- To develop human resources for the field level veterinary services.

- To co-ordinate and support national livestock disease control and eradication program.
- To support and facilitate the national veterinary regulatory services.
- To participate actively in collaborative and coordinated research program in animal health and production in the region.

3. Laboratory services at Veterinary Laboratory

To meet the above mentioned objectives, the veterinary laboratories has been providing services under four sections.

3.1 Pathology section

Post-mortem examination, hematology & biochemistry are major areas under the pathology section. Mostly the section receives specimens from all over the province either directly or through the respective Veterinary hospital and expert service center or local level government. Besides this, veterinary practitioners, livestock and poultry farms as well as farmers deliver specimens for the purpose of disease diagnosis. There are different units under pathology section, which are as follows.

A. **Parasitology unit:** Parasitological unit tests for internal parasites through microscopic examination of faecal samples. Skin scrappings are also tested for the presence of external parasitic infection e.g., Mange, Sarcopties. It also conducts blood parasite test using thick and thin blood smear examination.
B. **Post-mortem unit**: Pathology unit mainly performs post mortem examination on various species of animals and collects appropriate samples for the microbiological, parasitological and molecular biological examination. The unit performs necropsy of morbid and dead birds and animals.
C. **Biochemistry unit**: Biochemistry unit analyzes mainly serum for the estimation of Ca, P, Mg, TP, Fe, albumin etc. It also performs urine tests by estimating albumin, bilirubin, ketone bodies, urobilinogen etc.
D. **Hematology unit**: This unit provides routine hematological examinations of all animals and birds using an automated hemato-analyzer.

3.2 Microbiology section

This section is responsible for isolation and identification of bacteria, virus and fungus, which receives samples from various sources such as farmers, local level governments, referral samples from private clinics, Veterinary Hospital and Expert Service Centers and directly from the field during the outbreaks. Various samples like milk, urine, tissues, water, nasal swabs, ear swabs and skin scrapping are received in this section. There are different units under pathology section, which are as follows.

A. Bacteriology and mycology unit: It performs identification of the bacterial and fungal organisms using various biochemical tests, staining, morphology etc. The microbiology unit also performs antibiotic susceptibility test and advice for the appropriate antibiotic for the treatments.

B. Virology unit: This section is responsible for the diagnosis of viral disease through different tests like rapid diagnostic tests. Rapid test (antigen based) is used for the initial diagnosis of Newcastle Disease, Infectious Bursal Disease, Avian Influenza, Infectious Bronchitis, African Swine Fever and Rabies. For the further confirmative diagnosis of disease, the samples are sent to the Central Veterinary Laboratory. Also, this unit performs Hemaglutination and Hemagglutination inhabitation test.

3.3 Molecular biology section

Molecular tools are increasingly important in modern animal disease investigation. Molecular biology section has biosafety level 2 facilities for handling infectious agents. This section also has the facility for ELISA and other serological tests. Most of the samples are submitted to this unit by the post mortem unit. For the further confirmative diagnosis of disease, the samples are sent to the Central Veterinary Laboratory. Molecular biology section consists of two units.

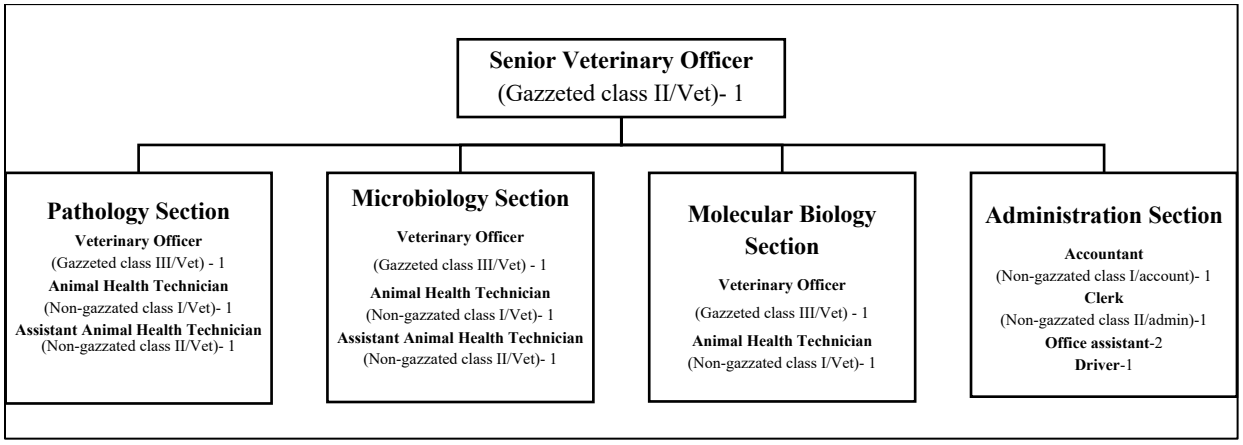
A. Serological Unit: Serological unit mainly performs RBPT for *Brucella*, Penside test for PPR, PAT test for *Mycoplasma* and *Salmonella* as well as ELISA for various viral and bacterial diseases of livestock and poultry.

B. **Molecular unit**: The Molecular unit is not so functional in all veterinary laboratory. VL, Pokhara is performing PCR test for FMD and PPR disease of ruminants using real time and conventional PCR machine.

3.4 Administration Section

This section governs overall financial, logistic and administrative management of the laboratory. The section is responsible for revenue collection, maintenance of reagents and supplies, financial transaction, vehicle management etc.

4. Organizational structure



VETERINARY LABORATORY DHANGADI

1. Introduction

Veterinary Laboratory is situated in Dhangadhi sub metropolitan city of far western province Nepal. This laboratory was established as the reference laboratory of the far western development region with its service area covering the nine districts& two zones. Veterinary Laboratory, Dhangadhi was established in 2049/050 as with the name of Regional Veterinary Laboratory, Dhangadhi. With the administrative reconstruction of Nepal during the year 2074/75, the laboratory was renamed as Veterinary laboratory, Dhangadhi, Kailali. Veterinary laboratory aims to protect the livestock with the provision of prompt diagnosis of diseases.

2. Human resource

Table 1: Staffing of Veterinary Laboratory, Dhangadi, Kailali

S.N.	Type of post	Class	Number	Fulfilled	Vacant	Remark
1	Senior veterinary officer	G. II	1	1	0	
2	Veterinary officer	G. III	3	2	1	
3	Animal Health Technician	NG. I	3	3	0	
4	Junior Animal Health Technician	NG. II	2	2	0	
5	Accountant	NG. I	1	1	0	
6	Clerk	NG. 2	1	1	0	
7	Driver	No class	1	1	0	Contract
8	Office helper	No class	2	2	0	
Total			14	13	1	

3. Laboratory services

3.1 Pathology section

3.1.1 Parasitological examination

Altogether 478 (faecal sample 361, blood protozoa 92 & skin scraping 25) samples were tested for different parasitic conditions of livestock populations. Samples for examination mainly consisted of the regular fecal samples submitted to the livestock service section, Dhangadhi Submetropolitan, Kailali. Apart from this samples were also collected from field during epidemic disease investigation and the investigation programme in our set annual programme.

The most common helminthes identified during faecal examination were *Fasciola sp.*, *Paramphistomum sp.*, *Strongylus sp.*, *Hemonchus sp.*, *Trichuris sp.* and *Coccidia*. It was found that most of the fecal samples examined at the VL were positive for more than one parasites. Out of 361 faecal samples tested (EPG) 285 (81%) samples were positive. In case of blood protozoa, out of 92 samples tested, 13 (12%) samples were positive. Likewise, for external parasites, out of 25 skin scraping samples tested, 5 (20%) samples were positive.

3.1.2 Haematological examination

A total of 212 samples were examined at Hematology section of VL, Dhangadhi. The test parameters included were TLC, DLC, PCV and Haemoglobin estimation. Blood samples were mainly collected from goat, cattle, buffalo, dog and sheep during outbreak of epidemics, cases referred by the VHLEC and local level Livestock Services Section.On our examination of hematological parameters of parasitic infestation animals invariably showed low Hb concentration and lowered packed cells volume.

3.1.3 Post-mortem examination

This postmortem unit mostly receives poultry, goat & pig carcasses for necropsy examination and disease diagnosis. However, dead bodies of other animal species are also received occasionally, especially during disease outbreak. Most of the pathological samples comprises of poultry. During the fiscal year 076/77, altogether 1056 carcasses belonging to 728 farms were registered at VL, Dhangadhi for postmortem examination. The major conditions diagnosed in the pathology section are presented in the table below.

3.1.3.1 Post mortem in poultry

Table 2: Poultry diseases diagnosed in poultry.

S.N.	**Disease/condition**	**Number of farms**	**Percentage**
1	Infectious bursal disease	127	17
2	Colibacilosis	99	14
3	Newcastle Disease	85	12
4	Toxicity	78	11
5	Sudden death syndrome	72	10
6	Stress	67	9
7	Chronic respiratory disease	47	6
8	Avian influenza type A	33	5
9	Asities	31	4
10	Non-specific death	19	3
11	Salmonellosis	18	2
12	Enteritis	16	2
13	Ascariasis	9	1
14	Coccidiosis	7	1
15	Immunosupression	6	1
16	Early chick mortality	5	1
17	Mixed Infection	4	1
18	Gout	3	0.4
19	Fowl Pox	2	0.3

3.1.3.2 Post mortem findings in animals

Table 3: Species wise disease in animals

S. N.	Animal species	Disease/condition	Number of farms
1	Swine	Enteritis	1
		Non-specific death	2
2	Caprine	Non-specific death	6
		Pneumonia	2
		Plant poisoning	2
		Parasitic gastroenteritis	1

3.1.4 Biochemistry:

Altogether 304 samples were collected & tested in the current fiscal year for calcium, phosphorus and total protein. Biochemical examination of serum was performed in serum sample of buffaloes suffering from Khari disease & healthy goats, mainly for estimation of serum calcium & phosphorus level. The Calcium content of the serum was recorded from a low in most of the cases.

3.2 Microbiology section

The samples received to microbiological examination at the Veterinary Laboratory, Dhangadhi constitutes of milk, nasal swab, vaginal swab, and swab from visceral organs like liver, lungs, intestine etc. of various animal species. The media used for microbiological culture were Nutrient agar, McConkey agar, Blood agar, and Saboroud Dextrose agar. Bacteria and fungi were identified on the basis of colony characteristics, Gram's staining property and the structure of the organism as seen under the microscope. Due to limitation of the facility in the laboratory biochemical tests for identification of bacteria could not be performed. The result of microbiological test is presented in the table as below:

Table 4: Bacterial isolates identified from culture.

Animal type	Sample type	Number of samples	Results	Major bacteria identified
Cattle/Buffalo	Milk	97	28 +ve	*Streptococcus, Staphylococcus, E.coli, Bacillus*
Goat	Liver, spleen, kidney	14	6 +ve	*Pasteurella, Streptococcus, Staphylococcus, E.coli*
Poultry	Liver, lungs, heart	190	60 +ve	*E.coli, Streptococcus, Enterococcus, Staphylococcus*
Total	301	94 +ve		

The milk samples positive for California mastitis were tested for antibiotic sensitivity test following preliminary culture in order to choose right antibiotic for the treatment of mastitis. The result of antibiotic sensitivity test (Muller Hington Agar) showed that Ceftriaxone, Ciprofloxacin, Tetracycline and Gentamicin were more effective in mastitis (milk samples). Likewise, Amikacin,

Ciprofloxacin, Lefofloxacin, Gentamicin, Enrofloxacin and Chlortetracycline were more sensitive in tissue samples (poultry).

3.3 Molecular biology section

3.3.1 Serology

During the fiscal year 2076/77 Most of the serum samples collected were from goats and cattle for various diagnostic tests PPR (Pen side Test), Brucellosis (Rose Bengal Plate Agglutination Test-RBPAT), Rabies rapid antigen test, salmonella and Mycoplasma (Plate Agglutination Test-PAT) and rapid test of other for poultry disease was conducted in the laboratory. Some of the samples were forwarded to CVL Tripureshwar, Kathmandu.

Serum samples collected from bovine, caprine & poultry population were mainly obtained from Baitadi, Kailali, Kanchanpur, Doti, Dadeldhura, Darchula, Bajhang, Bajura and Achham. Performing the regular screening test of Brucellosis using Rose Bengal Plate Agglutination Test & *Salmonella* and *Mycoplasma* by PAT. Test detail is given below.

Table 5: Results of serological examination performed at the VL.

S.N.	Disease Name	Test method	Sample Tested	Result
1.	Salmonellosis	PAT	307	233 +ve
2.	Mycoplasmosis	PAT	304	108 +ve
3.	Brucellosis	PAT	150	7 +ve
4.	Peste des petits ruminants (PPR)	Antigen test + Penside test	53	17+ve
5	Rabies	Antigen test	14	7 +ve
6	Avian Influenza type A	Antigen test (rapid method)	812	33+ve
7	New Castle Disease			85 +ve
8	Infectious bursal disease			127 +ve

4. Other laboratory work

4.1 Investigation of Kumri (*Seteria sp.*) in goats

A part from above activities this laboratory has performed a Kumri in Goat investigation program in Kailali & Kanchanpur district. The main objective of study was to see the prevalence of Kumri in goat, especially in Hilly area & Terai area of Kailali & Kanchanpur district. Active surveillance was done through questionnaire as well as samples like serum feaces were taken from infected goats.

This investigation program was conducted in sites of Kailali district, namely, Chure Rural Municipality and Lamki Chuha municipality. In this study a total of 61 house hold were interviewed and sampled, there were 2978 goats in that area.

Method of investigation and result: Active surveillance through administration of standard questionnaire, clinical examination and laboratory testing. Major findings are given below

1. None of the goats were affected by Kumari (*Setaria sp.*).
2. Prevalence of Kumri disease was found to be 0% in Kailali district.

4.2 Investigation of sub clinical mastitis in dairy animals

This program was conducted to know the prevalence of sub clinical mastitis in milking cattles & buffaloes of Kailali & Kanchanpur districts. So fresh milk samples were taken from farmers directly and tested by California Mastitis test (CMT) immediately.

Investigation Site: Kailali & Kanchanpur

Method: Active surveillance & questionnaire

- Milk sample were directly taken from animals.
- Test method: CMT

Table 6: Summary of Sub clinical mastitis investigation program.

District	Number of farms	Number of cattle milk samples	Number of buffalo milk samples	Total samples tested
Kailali	100	85	57	142
Kanchanpur	78	66	43	109
Total	**178**	**151**	**100**	**251**

Major findings: The total number of samples positive for mastitis in cattle & buffalo: 48 (19.1%). There was low prevalence of sub clinical mastitis in local breeds of cattle as compared to the exotic breeds.

4.3 PPR outbreak status

Table 7: Details of PPR outbreak in different districts of Sudhurpaschim Province.

District	No. of Outbreaks	Location	Animal type	No. of affected animals	No. of deaths	No. of animals at risk
Dadeldhura	1	Parsuram municipality	Goat	453	38	4800
Kailali	1	Lamki Chuha municipality	Goat	1059	259	19000

5. Vaccine bank

Table 8: Storage and distribution of various animal vaccines as per national animal health program in Sudurpaschim province.

District	**PPR**	**FMD**	**Anti-Rabies**	**ND I-2**	**H.S + B.Q**	**CSF**
Darchula	37000	0	500	10000	0	0
Baitadi	72000	0	700	20000	0	0
Dadeldhura	87000	40000	1500	20000	0	0
Kanchanpur	84000	52000	2520	20000	20000	10000
Bajhang	54000	0	700	15000	5000	0
Bajura	45000	0	100	10000	0	0
Doti	59000	0	500	25000	0	0
Achham	58000	0	100	25000	0	0
Kailali	84000	54000	2620	30000	20000	10000
Total	**580000**	**146000**	**9340**	**175000**	**45000**	**20000**

VETERINARY LABORATORY SURKHET

1. Introduction

Veterinary Laboratory (VL), Surkhet is located at Birendranagar Municipality-7, of the Karnali Province. Since its establishment in F/Y 1988/1989 AD, it has been providing diagnostic services in 10 districts of Karnali Province and six districts of Lumbini province. The diagnostic services have been further supported after establishment of basic labs in Banke, Dang and Jumla districts which perform parasitological examination including microbiological culture and antibiotic sensitivity test.

The mission of the VL, Surkhet is to promote the health of livestock, poultry and ensure safe animal products for consumer by assisting Veterinary Hospital and Livestock Service Expert Centers (VHLSEC), veterinarians, animal health workers, and others who are responsible for animal health in detection and prevention of animal diseases.

2. Human resource

Table 1: Staffing of Veterinary Laboratory, Birendranagar, Surkhet

S.N.	Type of post	Class	Number	Fulfilled	Vacant	Remark
1	Senior veterinary officer	G. II	1	1	0	
2	Veterinary officer	G. III	3	3	0	
3	Animal Health Technician	NG. I	3	3	0	
4	Junior Animal Health Technician	NG. II	2	2	0	
5	Accountant	NG. I	1	1	0	
6	Clerk/Kharidar	NG. 2	1	1	0	
7	Driver	Class less	1	1	0	
8	Office helper	Class less	2	0	0	Contract
Total			14	12	2	

3. Laboratory services

3.1 Pathology section

3.1.1 Parasitological examination

Parasitological unit examines the fecal samples of animal species using different methods to estimate the parasitic burden of the nematode, trematode and cestode by various methods. A total of 924faecal samples were examined and 587 were found positive for various internal parasites. Among them *Fasciola, Coccidia*, *Haemonchus, Strongylus, Paramphistomum, Trichuris,* were found major internal parasites identified. Reports of faecal examination is presented in table below.

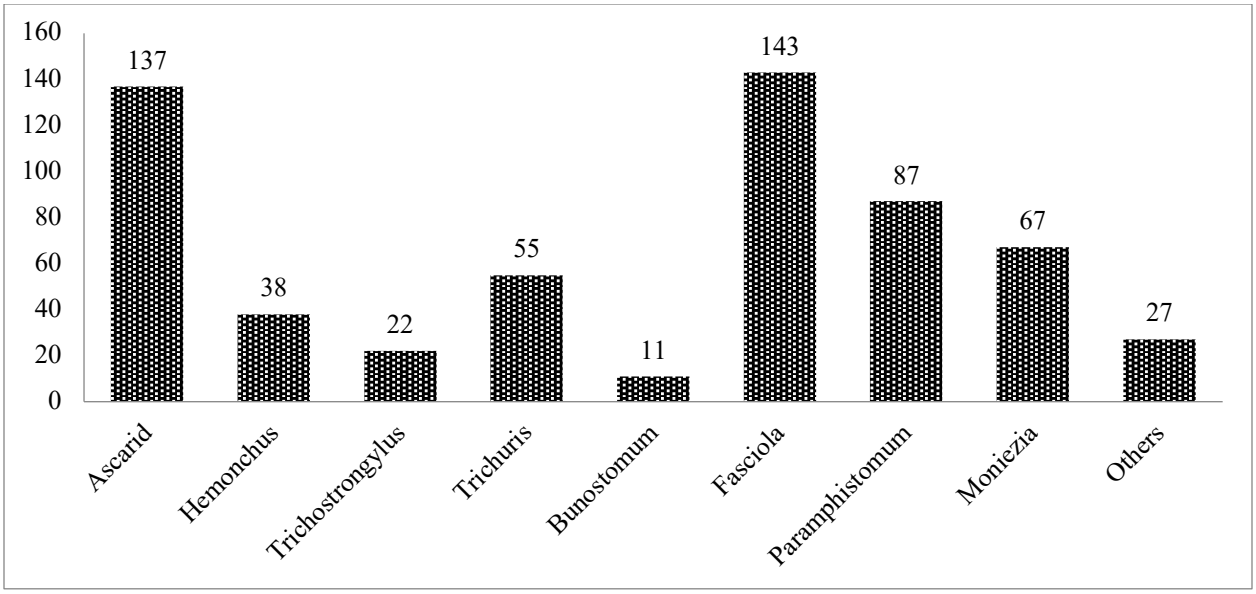


Figure 1: Fecal examination of different animal conducted at VL, Surkhet

Table 2: EPG count

Species	**Total positive sample**	**Nematodes**						**Trematodes**		**Cestodes**	
		Ascarid	***Hemonchus***	***Trichostrongylus***	***Trichuris***	***Bunostomum***	**Others**	***Fasciola***	***Paramphistomum***	***Moniezia***	**Others**
Cattle	188	57	-	13	13	7	2	66	23	7	-
Buffalo	123	31	-	7	2	4	-	63	14	2	-
Sheep	17	-	7	-	6	-	-	1	1	2	-
Goat	231	42	31	2	34	-	17	13	49	36	7
Pig	21	5	-	-	-	-	-	-	-	15	1
Dog	7	2	-	-	-	-	-	-	-	5	-
Total	**587**	**137**	**38**	**22**	**55**	**11**	**19**	**143**	**87**	**67**	**8**

3.1.2 Hematological examination

Altogether, 162 sample were tested for hematological parameters such as. Out of 141samples, 10 samples were positive for blood protozoa and all the samples were positive for *Babesia spp*.

3.1.3 Urine test

Out of 42 urine samples tested 6 samples were found abnormal.

3.1.4 Postmortem examination

In a total, 822 birds were brought at VL for postmortem examination. The details of the disease diagnosed are presented in the figure below.

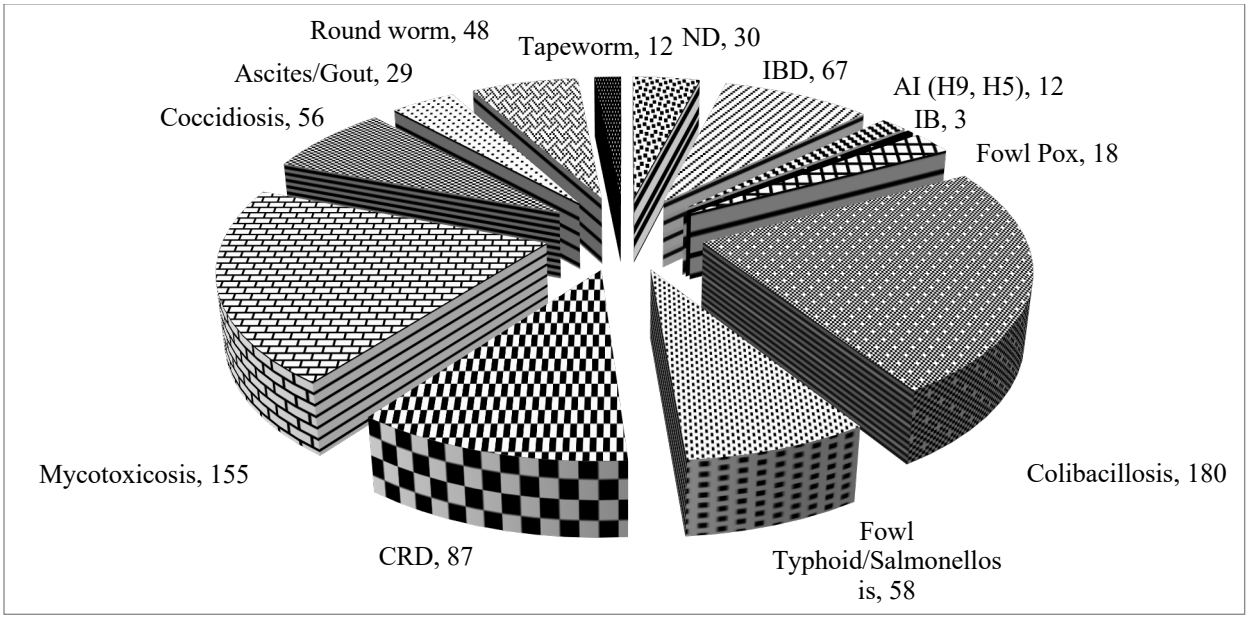


Figure 2: Disease diagnosed at VL in postmortem examination.

Table 3: Animal species brought at VL for PM examination.

S.N.	Species	Total samples (Annual)	Major Diseases identified
1	Commercial Broiler	377	Colibacillosis, ND, AI, IBD, IB, Fowl Pox, CRD, Fowl Typhoid/Salmonellosi, Mycotoxicosis, Coccidiosis, Ascites, Gout Round worm, Tape worm, Stress
2	Commercial Layers	162	
3	Commercial Parents	17	
4	Local Birds	167	
5	Duck	13	
6	Turkey	4	
7	Quail	9	
8	Pheasent	6	
9	Goat	31	PPR, Endoparasite
10	Pig	22	Pneumonia, Endoparasite
11	Dog	14	Parvo, CD, Endoparasite
Total		**822**	

Table 4: Month wise poultry diseases according to PM examination is shown in table below.

Postmortem	Shrawan	Bhadra	Ashwin	Kartic	Mansir	Poush	Magh	Falgun	Chaitra	Baishak	Jestha	Ashar	Total
Colibacillosis	12	27	17	9	11	23	10	22	19	34	13	46	243
CRD	15	11	6	8	12	5	6	5	5	3	5	12	93
IBD	8	25	6	6	7	12	7	12	13	8	7	17	128
ND	2	1	2	0	5	1	11	1	1	6	2	0	32
Ascites	0	1	0	0	8	12	9	20	9	2	6	5	72
Gout	4	7	4	2	4	1	4	1	1	4	9	14	55
Mycotoxicosis	11	8	10	3	8	7	5	9	10	17	13	55	156
Other	0	2	0	0	0	2	0	2	2	7	8	20	43
Total	**52**	**82**	**45**	**28**	**55**	**63**	**52**	**72**	**60**	**81**	**63**	**169**	**822**

3.1.5 Skin scraping test

Out of 41skin scrapings tested, 4 samples were found positive in which two Sarcoptic mite in goat and two Demodex mites in dog.

3.2 Microbiology section

3.2.1 Bacteriological examination

The count of major samples submitted for the microbiological examinations were milk, water, tissues etc. In a total 558 samples were received at VL for culture and AST. Similarly, 22 samples were received for identification of fungus by culture method.

Out of 580 samples submitted at microbiology, 405 and 13 samples produced bacteria and fungus respectively. The distributions of major bacterial isolates are described in table below.

Table 5: Types of bacteria isolated.

S.N.	Name of bacteria isolated	No of isolates
1	*E. coli*	183
2	*Salmonella*	52
3	*Streptococcus*	49
4	*Staphylococcus*	17
5	*Pseudomonas*	12
6	*Proteus*	7
7	*Bacillus*	15
8	*Klebsiella*	56
9	*Shigella*	5

S.N.	Name of bacteria isolated	No of isolates
10	Fungus	22
11	No growth	162
	Total	**580**

3.2.2 California mastitis test result

California mastitis test was used to diagnose clinical and sub clinical mastitis of animal in laboratory as well as in field level. Total 237 milk sample were tested. Among them 119 sample were positive.

Table 6: CMT result.

CMT Test	Positive	Negative	Total
No of Sample tested	119	118	237

3.2.3 Virological examination

A total of 1058 samples of different domestic animal were collected at field level for virological analysis through rapid test Kit. The results of the test are presented in the table below.

Table 7: Rapid tests of viral diseases.

S.N.	Rapid Test	Positive	Negative	Total
1	AIV	17	412	429
2	IBDV	25	81	106
3	NDV	37	358	395
4	IBV	3	103	106
5	Rabies	3	19	22
Total		**85**	**973**	**1058**

3.3 Molecular biology section

3.3.1 Serological examination

A total of 1001 serum samples of different domestic animal were collected and tested at VL, Surkhet. The results of the test are presented in the table below.

Table 8: Result of plate agglutination test different diseases.

S.N.	Conducted Test	Total Sample Tested	No of Positive Sample	Positive %
1	Rose Bengal Plate	204	0	0
2	Salmonella Plate	253	85	33.59
3	Mycoplasma Plate	214	110	51.40
4	PPR Penside Test	330	28	8.48

3.3.2 Seromonitoring program

3.3.2.1 National PPR program

Under the National PPR Control program, Department of Livestock Services had provided 1636000 doses of PPR vaccine for 16 districts of this region. Vet Lab Surkhet supported the program by sero-monitoring. Sample were collected FY 077/078 and tested in FY 2078/079. District-wise collection of serum sample and laboratory test result is presented in the table below.

Table 9: District-wise collection of serum sample and laboratory test result

S.N.	Name of District	Target of Sample	Collected Sample	Test Sample	Positive	Negative	Positive Percent
1	Banke	200	200	184	144	40	78.26
2	Bardiya	200	200	184	149	35	80.98
3	Dailekh	150	150	140	124	16	88.57
4	Dang	200	200	184	161	23	87.50
5	Humla	100	100	98	74	24	75.51
6	Jajarkot	150	150	102	85	17	83.33
7	Jumla	150	150	110	102	8	92.73
8	Kalikot	100	100	92	79	13	85.87
9	Pyuthan	150	150	96	70	26	72.92
11	Mugu	100	100	115	105	10	91.30
12	RukumPaschim	100	100	98	73	25	74.49
13	Salyan	150	150	96	83	13	86.46
14	Surkhet	200	200	184	152	32	82.61
	Total	**2050**	**2050**	**1683**	**1401**	**282**	**83.24**

3.3.2.2 Swine Fever Disease sero-monitoring program

The total number of swine fever Vaccines distributed from Department of Livestock service150000 dose under national swine fever vaccine program for 3 districts for this region. VL, Surkhet supported the program by sero-monitoring. The table below shows district wise collection of serum sample.

Table 10: District wise collection of serum sample (Swine Fever Ab ELISA Test)

S. N.	District	Vaccination	Serum collection		No of Sample	Positive Sample	Percentage
			Target	Progress			
1	Banke	50000	60	61	61	41	67.21
2	Bardiya	50000	60	62	62	46	74.19
3	Dang	50000	60	61	61	27	44.26
Total		**150000**	**180**	**184**	**184**	**114**	**61.95**

3.2.2.3 FMD Sero-monitoring program

The total number of FMD Vaccines distributed from Department of Livestock service was 150000 doses under FMD vaccine program for 3 districts for this region. VL, Surkhet supported the program by sero-monitoring. The table below shows district wise collection of serum sample.

Table 11: District wise collection of serum sample (FMD O type ELISA test).

S. N.	District	Vaccination	Serum collection		No of Sample	Positive Sample	Percentage
			Target	Progress			
1	Banke	50000	200	184	184	138	75
2	Bardiya	50000	200	190	184	162	88.04
3	Dang	50000	200	186	184	156	84.78
	Total	**150000**	**600**	**560**	**552**	**456**	**82.60**

3.2.2.4 Newcastle Disease Sero-monitoring Program

The total number of ND Vaccines of poultry distributed from Department of Livestock service 195000doses under national ND control program for 9 districts for this region. VL, Surkhet supported the program by sero-monitoring. The table below shows district wise collection of serum sample.

Table 12: District wise collection of serum sample.

S. N.	District	Test result ND serosurvillance		
		Sample collected & tested	No of positive	Positive %
1	Rolpa	38	17	44.73
2	Pyuthan	81	16	19.75
3	Salyan	31	12	38.70
4	Jajarkot	31	31	100
	Total	**181**	**76**	**41.98**

4. Antibiotic residue test

4.1 Residue test in meat sample

Out of 80 total tests of meat, antibiotic residue was found positive in 12.5% meat samples were positive for Gentamicin drug.

4.2 Residue test in milk sample

In 50 milk sample collected from Surkhet district about 12percent positive in Antibiotic Residue test. Among them 30 sample were taken from buffalo and 20 samples from cattle. In buffalo milk 4 sample positive in Antibiotic Residue test through in ELISA Test Kit. Among 20 sample of cattle 2 samples were positive.

5. Epidemic investigation

Various disease outbreaks of animal and poultry were investigated during F/Y 2078/79. Whenever request for investigation of an outbreak was received from the district to the VL, a veterinarian or a technician or a team of technicians with necessary sampling kit visited to the site of epidemic, collected epidemiological information and appropriate pathological samples. In the laboratory, pathological samples collected from the field were processed to find out the etiology of the outbreak. Epidemiological information gathered from the site of the outbreak was used to decide the test to be performed in the laboratory and to assist in the confirmation of disease diagnosis. Samples, not possible to process in this laboratory were referred to CVL, Kathmandu.

5.1 Status of PPR outbreaks

Table 13: PPR outbreak

S.N.	Date of Outbreak	Location	Remarks
1	2078/4/19	Kumakh 3, Salyan	PPR rapid test and RT PCR (CVL)
2	2078/4/29	Khajura 2, Banke	
3	2078/5/2	Gurbhakot 6, Surkhet	
4	2078/5/16	Bheriganga 6, Surkhet	
5	2078/11/18	Bheriganga 3, Surkhet	

5.2 Status of FMD outbreaks

Table 14: FMD outbreaks

S.N.	Date of Outbreak	Location	Remarks
1	2078/5/23	Raptisonary 6, Banke	RT PCR (FMD & TADs Lab.)
2	2078/5/24	Birendranagar 14, Surkhet	
3	2078/11/01	Gurbhakot, Surkhet	
4	2078/11/20	Babai 2, Dang	
5	2079/01/12	Kalimati 2, Salyan	

5.3 Status of LSD outbreaks

Table 15: LSD outbreaks

S.N.	Date of Outbreak	Location	Remarks
1	2078/4/32	Panchapuri, Chaukuna, Barahatal, Birendranagar and LekhbasiMuncipality of Surkhet	RT PCR (CVL)
2	2078/4/32	Bhairabi and Dullu of Dailekh	
3	2078/06/08	Madhuwan 6, Bardiya	

5.4 Status of Classical Swine Fever outbreaks

Table 16: CSF outbreaks

S.N.	Date of Outbreak	Location	Remarks
1	2078/11/03	Birendranagar 2, Surkhet	RT PCR (FMD & TADs Lab.)

5.5 Status of Low Pathogenic Avian Influenza outbreaks

Table 17: LPAI outbreaks

S.N.	Date of Outbreak	Location	Remarks
1	2078/4/28	RaptiSonary and Narinapur of Banke	Rapid test and RT PCR (CVL)
2	2078/8/02	Birendranagar, Surkhet	
3	2078/09/26	Khajura, Banke	
4	2078/11/15	Basgadhi, Bardiya	
5	2078/11/17	Basgadhi, Bardiya and Birendranagar 12, Surkhet	
6	2079/1/12	Birendranagar 7, Surkhet	
7	2079/1/14	Birendranagar 2, Surkhet Barahatal 3, Surkhet	
8	2079/3/29	Birendranagar 9, Surkhet	

5.6 Status of Highly Pathogenic Avian Influenza outbreaks

Table 18: HPAI outbreaks

S.N.	Date of Outbreak	Location	Remarks
1	2079/03/08	Birendranagar 3, Surkhet in turkey sample	Rapid test and RT PCR (CVL)

6. Regional vaccine bank

In FY 2078/79, vaccines of PPR and ND were distributed in different districts as the part of animal disease control program. A detail of the distribution is mentioned in table below.

Table 19: List of vaccine distribution of PPR and ND

S.N.	District	PPR	ND
1	Surkhet	146000	25000
2	Dailekh	147000	25000
3	Salyan	304000	25000
4	Jajarkot	84000	25000
5	Jumla	40000	10000
6	Kalikot	40000	10000
7	Humla	60000	

S.N.	District	PPR	ND
8	Dolpa	50000	
9	Mugu	45000	
10	West Rukum	90000	25000
11	Dang	200000	
12	Banke	180000	
13	Bardiya	200000	
14	Rolpa	150000	25000
15	Pyuthan	140000	25000
16	East Rukum	50000	
	Total	**1636000**	**195000**

VETERINARY LABORATORY POKHARA

1. Introduction

Veterinary Laboratory, Pokhara was established in 2049 B.S. as a Regional Veterinary Laboratory with the objective of disease diagnosis and outbreak investigation in sixteen districts of western development region at that time. With the shift to federalism, this laboratory belongs to the federal government and provides services to 11 districts of Gandaki province and 6 districts of Lumbini Province. The mission of the Veterinary Laboratory, Pokhara is to promote the health of livestock, poultry and companion animals and to ensure safe animal products for the consumer by assisting Veterinary Hospital and Livestock Service Expert Centers (VHLSEC) of these provinces and Animal Health Sections (AHS) of local levels, veterinarians, clients, and others responsible for animal health in the detection and prevention of disease by conducting responsible investigation on animal diseases and providing accessible, accountable, timely, and accurate diagnostic services. The laboratory is responsible for food safety, outbreak investigation, formulating disease control strategy, prepare epidemiological profile of livestock and poultry diseases and maintain and disseminate the regional epidemiological information database on animal health in the regional as well as in the national networks.

In the present context, commercialization in Livestock and poultry production has increased the challenge for precise and prompt diagnosis of different animal and poultry diseases. For this specific reason the molecular basis of disease diagnosis has been set up at Veterinary Laboratory. Currently we have PCR facility for Foot and Mouth disease (FMD) and PPR disease diagnosis.

2. Human resources

Table 1: Staffing of Veterinary Laboratory, Pokhara, Kaski

S.N.	Type of post	Class	Number	Fulfilled	Vacant	Remark
1	Senior veterinary officer	G. II	1	1	0	
2	Veterinary officer	G. III	3	3	0	
3	Animal Health Technician	NG. I	3	3	0	
4	Junior Animal Health Technician	NG. II	2	2	0	
5	Accountant	NG. I	1	1	0	
6	Clerk/Kharidar	NG. 2	1	1	0	
7	Asst. Computer Operator	-	-	1	0	Additional seat
8	Driver	Class less	1	1	0	
9	Office helper	Class less	2	2	0	
Total			14	15	0	

3. Laboratory service

3.1 Pathological section

3.1.1 Hematological examinations

Table 2: Species wise hemoprotozoans.

S.N.	Species	Total samples tested	Parasites found
1	Dog	511	*Babesia* (9), *Anaplasma* (3), *Trypanosoma* (2) *E. canis* (14)
2	Cattle	51	*Babesia* (2), *Theleria* (1), *Anaplasma* (2)
3	Buffalo	24	-
4	Pig	17	*Babesia spp* (3)
5	Horse	5	-
6	Goat	35	*Babesia* (1)
	Total	**643**	

3.1.2 Biochemical test

Table 3: Result of biochemical test.

S.N.	Species	Total samples tested	Major findings
1	Bovine	169	Hypocalcemia, Hypoglycemia, Hypoproteinemia
2	Canine	37	

3.1.3 Post mortem examination

3.1.3.1 Postmortem of poultry

Out of the total cases presented, 78% were broilers, 7% layers and remaining 15% were local, giriraj, fighter and turkey. Most of the cases (83%) recorded were from small farmers (<2000 birds), followed by 11% medium farmers (2000-5000 birds) and remaining 6% large farmers (>5000 birds). Majority of the cases were from Kaski (67%) followed by Tanahun (21.7%), Syangja (6.3%) and other districts (5%) as shown in Table 4.

Table 4: District wise number of cases and disease.

Disease	Kaski	Tanahun	Syangja	Baglung	Myagdi	Gorkha	Lamjung	Nawalparasi	Gulmi	Total
PM Cases	**2289**	741	206	34	43	0	30	12	6	3415
Colibacillosis	**327**	51	24	4	19		8	1	0	451
Salmonellosis	**163**	62	9	7	17		11	1	0	284
Mycoplasmosis	**141**	18	9	11			0		0	179
IBD	**121**	76	8	11	3	0	1		0	233
ND	**9**	7	2	1	0	1	1		0	21
AIV	**31**	5	0	0	0	0	1	0	0	38

Disease	Kaski	Tanahun	Syangja	Baglung	Myagdi	Gorkha	Lamjung	Nawalparasi	Gulmi	Total
Coccidiosis	**356**	54	21	0	0	1	11	2	1	461

Table 5: Month wise poultry disease.

Month	Kaski	Tanahun	Syangja	Parbat	Baglung	Myagdi	Lamjung	Nawalparasi	Gulmi	Total
Shrawan	157	46	18	16	3	2	1	1	0	244
Bhadra	124	39	19	4	8	6	5	4	1	210
Aswin	196	113	16	1	7	5	1			339
Kartik	206	130	19	6	3	5	4			373
Mangsir	245	80	22	2	1	6	4	1		361
Poush	150	78	21	2	1	1	5			258
Magh	253	59	16	2	1	7	1	1	2	342
Falgun	223	43	15	2	4	1	2	5		295
Chaitra	250	41	16	12	1	2	1		3	326
Baishak	188	33	12	3	3	3	0	0		242
Jestha	54	17	14	2	1	2	6	0		96
Aswin	243	62	18	2	1	3		0		329
Total cases	**2289**	**741**	**206**	**54**	**34**	**43**	**30**	**12**	**6**	**3415**

3.1.4 Parasitological examination

The prevalence of internal parasite of migratory flocks was conducted in Kaski and Mustang district.

Table 6: Study population

Address	Species		Age		Sex	
	Goat	Sheep	>1 yr	<1Yr	Male	Female
Pokhara-20, Kaski	78	68	107	39	39	107
Machhapuchre-4, Kaski	75	62	114	23	333	104
Mustnag-5, Gharpajhong	75	47	100	22	32	90

Out of 405 fecal samples examined, 144 samples (35.55%) were found to be positive for at least one parasite. The percentage prevalence of parasite is presented in the figure below.

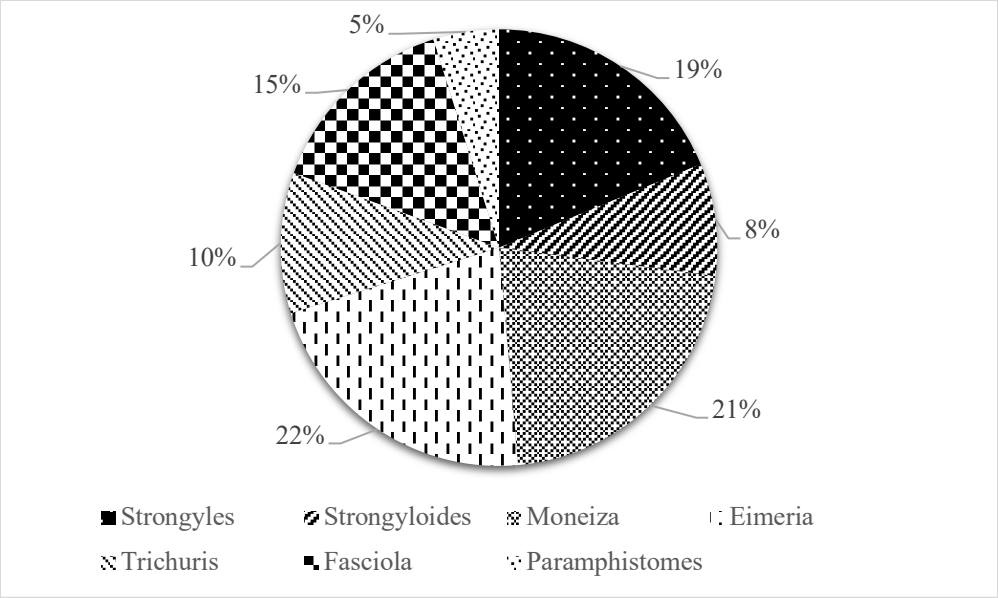


Figure 1: Parasitic species in fecal examination.

3.2 Microbiology section

3.2.1 Annual milk test

Table 7: Sodium Lauryl Sulphate Test (SLST)

S.N.	Species	SLST Positive	SLST Negative	Total
1	Cattle	321	89	410
2	Bufflao	188	91	279
3	Goat	7	3	10
	Total	517	182	699

3.2.2 Clinical mastitis test

All the SLST positive milk samples were subjected to cultural examination on Nutrient agar, Mac Conkey agar and EMB media. They were incubated at 37º C for 24 hours. Cultural isolates were identified based on colony characteristics, Gram's staining, and different biochemical tests; IMViC, Oxidase, Catalase and Motility.

3.2.3 Microbiological test

In a total 498 samples (milk, tissue and urine) were tested for bacterial culture, out of which 372 samples were grown in the culture. Details of the bacterial growth are presented in the table below.

Table 8: Bacterial isolates in different samples.

Type of sample	No. of sample tested	Organism isolated	No growth	Type of Bacteria isolated
Milk	292	209	83	*E. coli, Streptococcus spp, staphylococcus spp*

Type of sample	No. of sample tested	Organism isolated	No growth	Type of Bacteria isolated
Poultry liver	194	157	37	*E coli, Salmonella spp, Enterococcus spp*
Bone marrow	5	3	2	*Pasteurella hemolytica*
Urine	7	3	4	*E coli, Klebsiella spp*
Total	**498**	**372**	**126**	

Table 9: Antimicrobial sensitivity pattern against *E. coli*.

S.N.	Antibiotic Name	Sensitivity %	Intermediate %	Resistance %
1	Amoxycillin	12	65	23
2	Ceftriaxone	52	31	17
3	Ciprofloxacin	31	29	40
4	Chloramphenicol	21	46	33
5	Doxycycline	23	43	34
6	Cotrimoxazole	27	43	30
7	Enrofloxacin	43	24	33
8	Amikacin	78	14	8
9	Gentamicin	66	13	21
10	Levofloxacin	14	48	38
11	OTC	57	27	16

3.2.4 Virological test

In the virology unit, 14 brain samples were tested for the Rabies by using rapid test, all of the samples were positive for rabies.

Table 10: Species wise Rabies cases

S. N.	Species	Address	Type of Test	Result
1.	Cattle	Pokhara-29, Patneri, Kaski	Rapid Ag test	Positive
2.	Canine	Pokhara-31, Kaski	Rapid Ag test	Positive
3.	Goat	Suklagandaki-2, Tanahun	Rapid Ag test	Positive
4.	Dog	Pokhara-33, Kaski	Rapid Ag test	Positive
5.	Cattle	Waling-10, Syangja	Rapid Ag test	Positive
6.	Dog	Pokhara-16, Kaski	Rapid Ag test	Positive
7.	Cattle	Putalibazaar-11, Syangja	Rapid Ag test	Positive
8.	Dog	Pokhara-30, Kaski	Rapid Ag test	Positive
9	Canine	Puskar Pariyar, Suklagandaki-5, Tanahun	Rapid Ag test	Positive
10	Goat	Pashu Sewa Sakha, Waling-2, Syangja	Rapid Ag test	Positive
11	Goat	Rishi Ram Lamichhane, Pokhara-33, Kaski	Rapid Ag test	Positive

S. N.	Species	Address	Type of Test	Result
12	Canine	Bal Kalyan Sanstha, Pokhara-18, Kaski	Rapid Ag test	Positive
13	Buffalo	Bhirkot -2, Syangja	Rapid Ag test	Positive
14	Buffalo	Bhanu -5, Tanahun	Rapid Ag test	Positive

3.3 Molecular biology section

3.3.1 Serological test

3.3.1.1 PPR outbreak conditions

A total of 187 samples from goat were tested by Penside and Rapid kit (ID-Vet) for PPR diagnosis.

Table 11: District wise PPR disease.

Districts	Positive	Negative	Total Test
Kaski	2	14	16
Syangja	4	0	4
Gorkha	2	12	14
Kaski	32	57	89
Tanahun	0	7	7
Rupandehi	0	3	3
Kapilvastu	0	2	2
Lamjung	0	11	11
Parbat	0	8	8
Myagdi	0	2	2
Palpa	0	4	4
Nawaparasi E	7	20	27
Total	**47**	**140**	**187**

3.3.1.2 Sero-monitoring of FMD vaccine

The ID-Screen® FMD Type O Competition ELISA kit was used for the detection of antibodies in individual serum. Out of 1014 samples tested for antibodies against the Foot and Mouth Disease Virus (FMDV) serotype O by competitive ELISA, 896 samples (88.36%) samples were found to be positive while 118 samples (11.64%) tested were found to be negative (Table 3).

Table 12: Seropositivity of FMD virus.

Total number of samples	Test result		Seropositivity (%)
	Number of positive samples	Number of negative samples	
1014	896	118	88.36 %

Table 13: Test result of seropositivity of FMD Vaccine among different districts.

District	Total number of samples	Number of positive samples	Number of negative samples	Seropositivity (%)
Kaski	200	153	47	76.50
Tanahun	186	183	3	98.39
Nawalpur	100	97	3	97.00
Gorkha	80	30	50	37.50
Lamjung	104	100	4	96.15
Myagdi	50	49	1	98.00
Parbat	90	85	5	94.44
Baglung	104	100	4	96.15
Syangja	100	99	1	99.00
Total	1014	896	118	88.36

3.3.1.3 Sero-monitoring of PPR Vaccine:

The ID-Screen® PPR Competition ELISA kit was used for the detection of antibodies in individual serum. Out of 1051 samples tested for antibodies against the Peste des Petits Ruminants (PPR) Virus by competitive ELISA, 844 samples (80.30%) samples were found to be positive while 207 samples (19.70%) tested were found to be negative (Table 5).

Table 14: Test result and seropositivity of PPR Vaccine

Total number of samples	Test result		Seropositivity (%)
	Number of positive samples	Number of negative samples	
1051	844	207	80.30 %

Table 15: Test result of seropositivity of PPR Vaccine among different districts.

District	Total number of samples	Number of positive samples	Number of negative samples	Seropositivity (%)
Kaski	200	135	65	67.50
Tanahun	124	114	10	91.94
Nawalpur	81	61	20	75.31
Gorkha	90	79	11	87.78
Lamjung	92	77	15	83.70
Myagdi	92	80	12	86.96
Parbat	153	125	28	81.70
Baglung	78	63	15	80.77
Syangja	141	110	31	78.01
Total	**1051**	**844**	**207**	**80.30**

VETERINARY LABORATORY JANAKPUR

1. Introduction

Veterinary Laboratory is situated in Janakpurdham city of Madhesh province. The laboratory is providing diagnostic services six districts of Madhesh Pradesh and occasionally to adjoinging districts of Bagamati province. The working areas of this Laboratory mainly focused on surrounding districts: Dhanusha, Mahottari, Sarlahi, Rauthat, Bara, Parsa, Siraha, Saptari, and Sinduli. The laboratory has various units viz pathology, parasitology, microbiology, hematology, biochemistry, sterilization and serology. Histopathological and molecular laboratory test results are obtained by dispatching the relevant specimens to CVL, as these diagnostic facilities are not available in Veterinary Laboratory, Janakpur at present.

2. Human resources

Table 1: Staffing of Veterinary Laboratory, Jankpur, Dhanusha

S.N.	Type of post	Class	Number	Fulfilled	Vacant	Remark
1	Senior veterinary officer	G. II	1	1	0	
2	Veterinary officer	G. III	3	2	1	
3	Animal Health Technician	NG. I	3	3	0	
4	Junior Animal Health Technician	NG. II	2	0	2	
5	Accountant	NG. I	1	1	0	
6	Clerk/Kharidar	NG. 2	1	1	0	
7	Driver	Class less	1	1	0	Contract
8	Office helper	Class less	2	2	0	
Total			14	11	3	

3. Laboratory service

The routine Laboratory works of veterinary laboratory Janakpur, mainly involves examination of fecal Sample, Postmortem Examination, Sero-Surveillance, CMT test of milk samples and culture examination of mastitis. Positive milk samples were carried to isolate and identify the bacteria responsible for these diseases. Blood samples brought here from different districts of surroundings particularly for Hb, PCV, TC, DLC and blood protozoa identification. Blood serum samples were examined for total protein, calcium, phosphorus, glucose, magnesium, brucellosis, etc. Examination of skin scraping & urine test was frequently conducted in VL Janakpur. Drug sensitivity test are in regular basis after bacterial culture of positive sample.

3.1 Pathology section

3.1.1 Parasitological examination

Parasitological examination (Internal & external), fecal examination of different animals has been done routinely. The fecal sample are received mainly from farmers directly or referred by province

veterinary hospitals and also collected from Dhanusha, Mahottari, Sarlahi, Sinnduli, Rauthat and Bara, field area during surveillance and investigation program. For the gastro intestinal parasites, Mc'master technique is followed to quantity the eggs per gram (EPG) in feces.

In the F/Y 2078/79 total 1778 fecal samples were received among them 1712 from cattle and 66 from goat & examined. Among these samples 1682 samples (95%) were positive result and 96 samples (5%) showed negative results. The results of fecal test revealed that *Fasciola* 670(38%), *Paramphistomum* 572 (32%), *Ascaris* 261 (14%), *Strongylus* 137 (8%), *Trichuris* 124(7%) and *Toxocara* 14(1%).

Table 2: Average number of eggs found in EPG.

Nematodes			
Species	**Mild infection**	**Moderate infection**	**Severe infection**
Cattle/Buffalo	100-300	300-600	600-800
	3	13	6
Sheep/Goat	300-500	1000-1500	2000-3000
	2	7	1
Trematodes			
Cattle/ Buffalo	50-100	100-200	200-400
	23	73	94
Sheep/Goat	50-100	100-200	300-600
	4	9	2

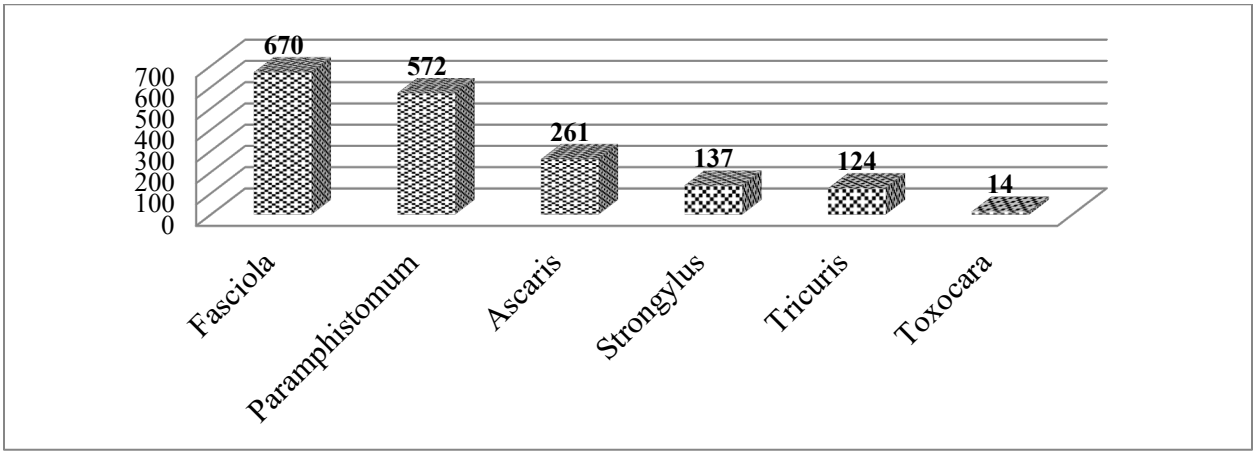


Figure 1: Showing species of parasite found during feacal examination

3.1.2 Haematological examination

Haematological examination TLC, TEC, DLC, PCV, & Hb test are done in this laboratory. Total count of RBC, WBC by haemocytometer for DLC blood sample were stained with Giemsa blood samples received from different district of central region. Total 120 Blood sample were examined for different

blood parameters as well as for blood parasites. Among them 78 samples were found negative for any blood parasites & rest 42 were found positive for different blood parasites.

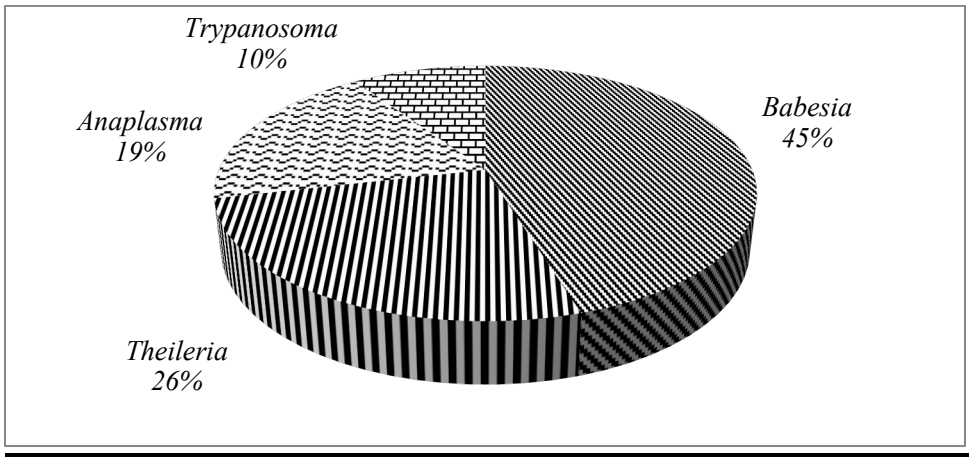


Figure 2: Hemoprotozoans species identified at VL.

3.1.3 Pathological examination

The pathological examination includes mostly post mortem examination of the dead birds received from commercial poultry farms Most of the cases were from Dhanusha & Mahottari district and sometimes from Sindhuli, Sarlahi, Rauthat and Sirha district. A total 1032 cases of post mortem examination were presented during the F/Y 2078/079 all the case received were birds. No cases of other species of animals were received. The status of poultry disease in the area is shown in table.

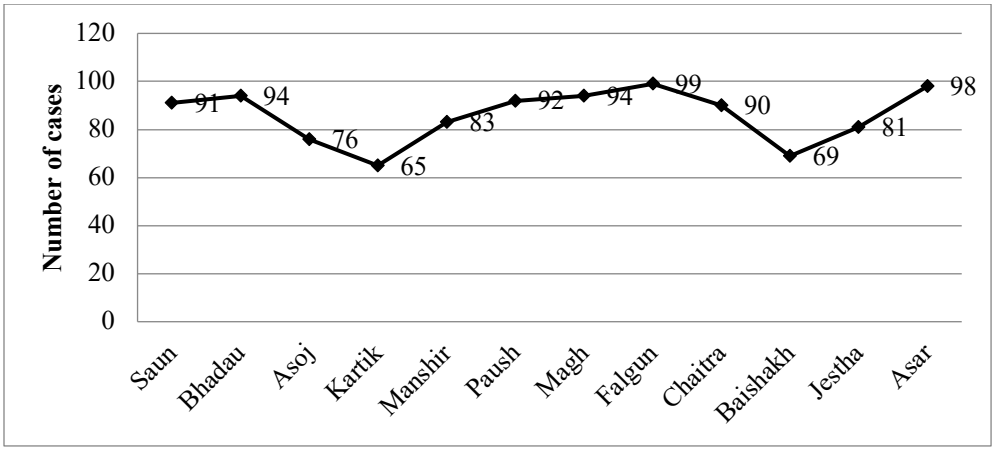


Figure 3: Month wise postmortem case flow rate at veterinary laboratory Janakpur.

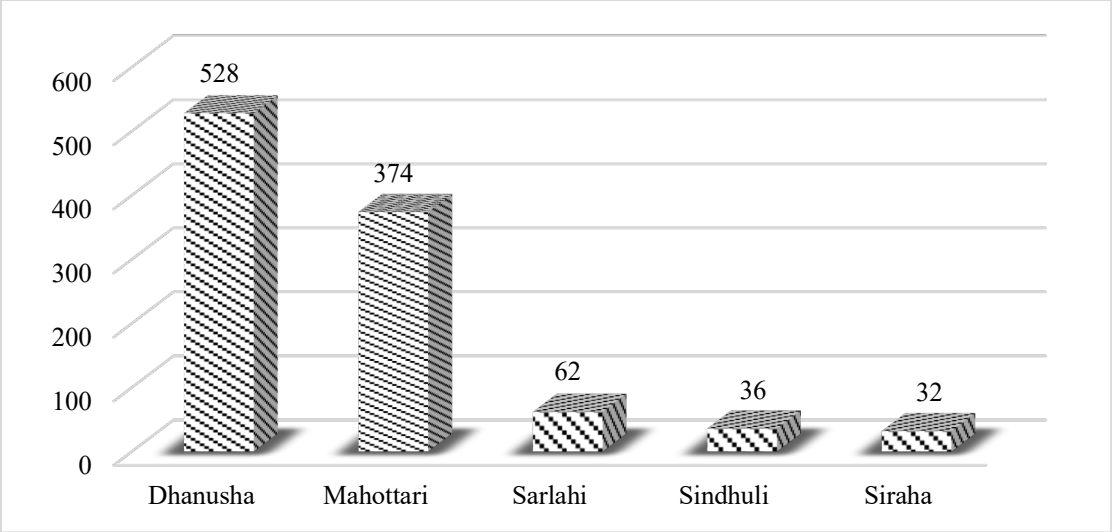


Figure 4: District wise case flow at VL.

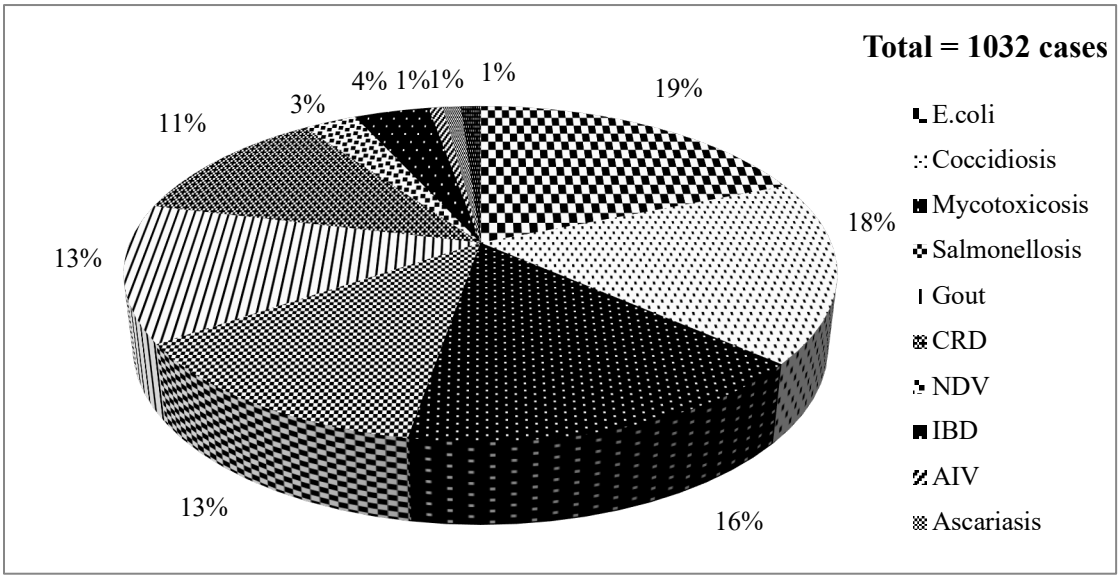


Figure 5: Disease found in postmortem examination

3.1.4 Biochemical examination

Table 3: Result of biochemical tests.

Type of animal	Number of Sample	Calcium gm/100 ml Normal Value	Calcium gm/100ml Normal Result	Phosphors gm/100ml Normal Value	Phosphors gm/100ml Normal Result
Cow	152	9-12	7-9	4-7	3-6
Buffalo	127	9-12	7-10	4-7	3-6
Goat	21	10-11	9-10	3-11	4-8
Poultry	1	9-12	10-12	4-8	4-7
Total	85				

3.2 Microbiology section

The milk samples were received from farmers at veterinary laboratory Janakpur for the bacterial identification of cow & buffalo milk total of 356 (Cattle-202 & Buffalo-154) milk sample collected from the following district & Sample were tested for the presence of bacteria in milk. The most prevalent bacteria isolated show *Staphylococcus, Streptococcus & E. coli* etc.

Table 4: Bacterial species isolated at VL.

S.N.	District	No. of samples	Organism
1.	Dhanusha	181	*Staphylococcus, Streptococcus & E. coli*
2.	Mohattari	115	*Staphylococcus, Streptococcus & E. coli*
3.	Sindhuli	9	*Staphylococcus, Streptococcus & E. coli*
4.	Sarlahi	12	*Staphylococcus, Streptococcus & E. coli*
5.	Bara	2	*Staphylococcus, Streptococcus & E. coli*
6.	Parsa	1	*Staphylococcus, Streptococcus & E. coli*

3.3 Molecular biology section

3.2.1 Serological examination

Total of 204 samples were tested PPR in which 47 were positive, Similarly, 172 samples were tested for Avian Influenza Virus (AIV) in which 8 samples were positive which was further Confirmed H5N1 by CVL. The 84 samples from the infertile and repeat breeder cattle/buffalo were tested for Brucellosis in which none of them were positives. There is outbreak of Foot and Mouth Disease in the working area of VL Janakpur from where 184 samples collected and tested in which 32 were positive for FMD. For mycoplasma 207 samples were tested among them 137 found positive. The 188 samples from suspected Salmonellosis had been tested in which 132 were positive & similarly 106 and 108 samples of Ranikhet and IBD were tested in which 30 and 42 samples were found positive respectively.

3.4 Sample send to CVL for further investigation

Veterinary Disease Investigation Laboratory, Janakpur is not well equipped with the modern equipment. The samples are sent to CVL for diagnosis of the disease. In total 137 Samples dispatched to CVL.

VETERINARY LABORATORY BIRATNAGAR

1. Introduction

The present Veterinary Laboratory was formerly the Regional Veterinary Laboratory. This laboratory is located in Biratnagar Metropolitan City in Koshi Province. It was established inF.Y.1988/1989. Previously, the area of RVL was in all the 16 districts under the organizational structure of the Eastern Development Zone and currently the scope of this laboratory is all 14 districts of Koshi Province. But still this laboratory is providing service in two districts of Province-2 (Saptari and Siraha). In Veterinary Laboratory, Biratnagar, following diagnostic services are available: feacal test, blood test, skin scraping and postmortem examination, bacterial culture etc.

2. Human resource

Table 1: Staffing of Veterinary Laboratory, Biratnagar, Morang

S.N.	Type of post	Class	Number	Fulfilled	Vacant	Remark
1	Senior veterinary officer	G. II	1	1	0	
2	Veterinary officer	G. III	3	3	0	
3	Animal Health Technician	NG. I	3	2	1	
4	Junior Animal Health Technician	NG. II	2	2	0	
5	Accountant	NG. I	1	1	0	
6	Clerk/Kharidar	NG. 2	1	1	0	
7	Driver	Class less	1	1	0	
8	Office helper	Class less	2	2	0	
Total			14	13	1	

3. Laboratory service

3.1 Pathology section

3.1.1 Parasitological examination

Parasitology unit examine the faecal samples of various species. In this laboratory, under the surveillance program, we tested only goat feces by the using different methods: direct smear, sedimentation and flotation method. Parasitological unit not only identify the parasites but also quantify the parasitic burden of the nematodes, trematodes and cestodes by Mc-Master method. In this fiscal year 078/79, total 127 faecal samples were examined under microscope and were found positive for various species. Internal parasites like; *Haemonchus, Strongylus, Trochoostrongylus, Fasciola Paramphistomum, Trichuris* etc. are major internal parasites. Result of the faecal examination is presented in table and figure below.

2: Fecal examination result.

District	Species	Total sample	Positive	Negative	Positive %
Dhankuta	Goat	50	30	20	60%
Bhojpur	Goat	25	7	18	28%
Morang	Goat	52	17	35	32%
Total		**127**	**54**	**73**	**42.5%**

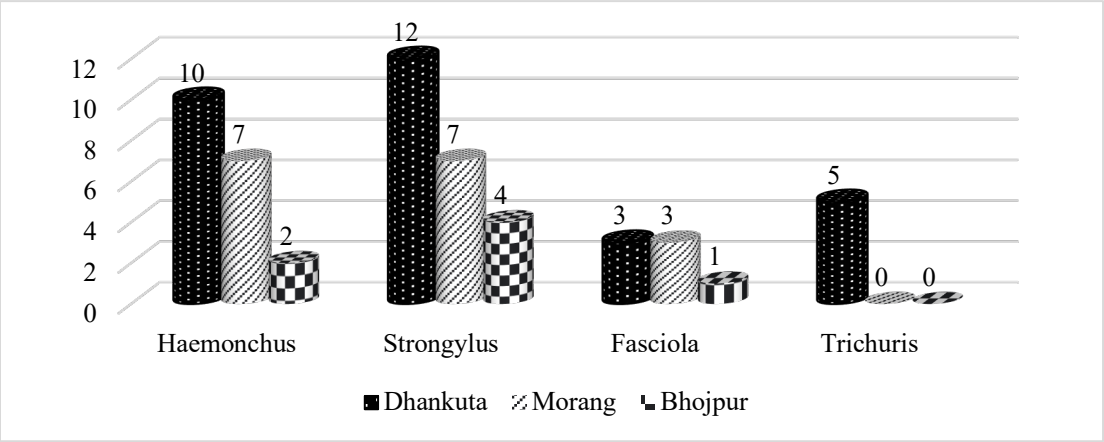


Figure 1: District wise helminthes parasites incidence pattern

3.1.2 Hematological test

Hematology unit examine the blood samples of various species of animals from Sunsari, Morang, Jhapa, Saptari and Udayapur. Hematological test includes the Hb, PCV, DLC, ESR, PLT etc. and also include the identification of blood protozoa. This test performed by the hematoanalyzer and microscopic examination of blood. In this fiscal year total of 642 blood samples were tested in the VL Biratnagar, of which 130 samples are positive for blood protozoa. Blood protozoa like; *Trypanosoma sps., Babesia sps., Anaplasma sps., and Theileria sps.* were identified. Result of the blood examination is presented in graphical representation in below.

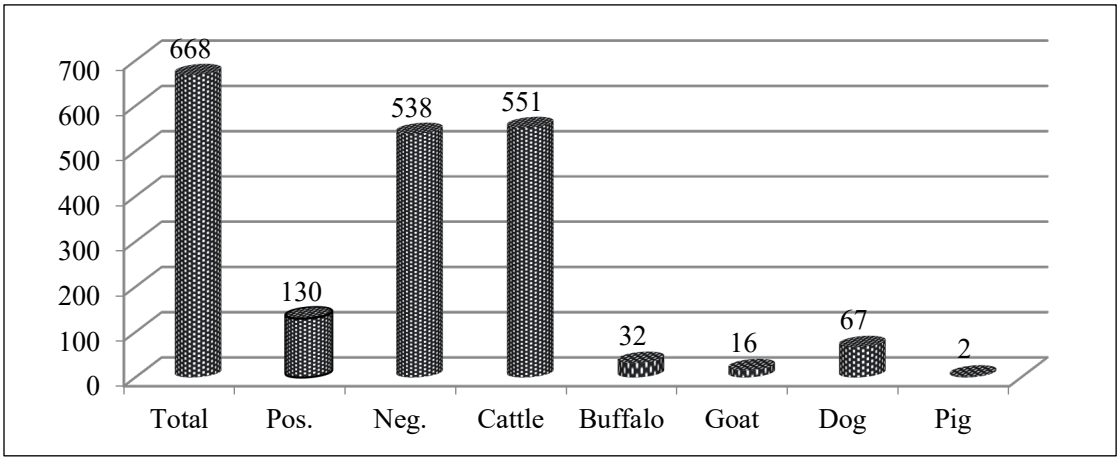


Figure 2: Species wise blood samples received at the laboratory.

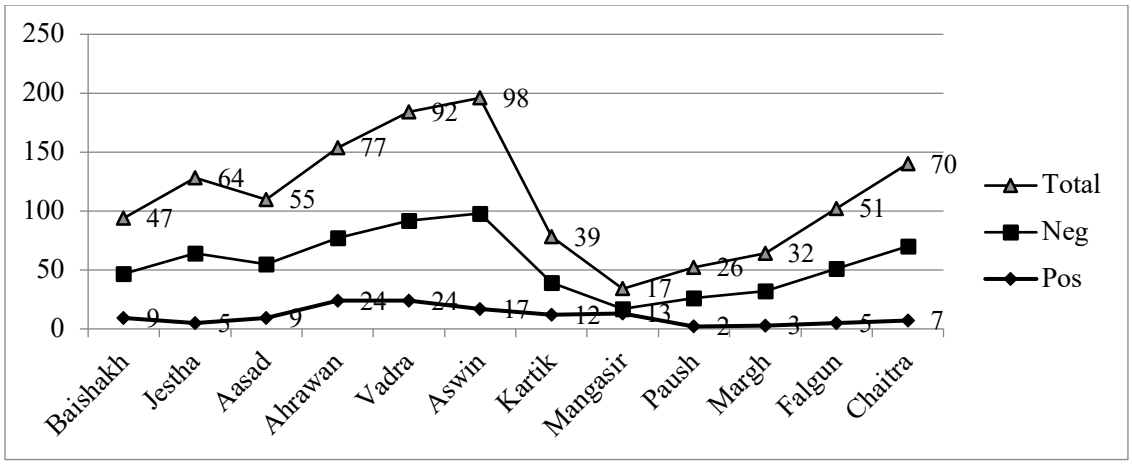


Figure 3: Month wise positive cases of blood parasites.

3.1.3 Skin scraping test

Skin scraping is also a function of parasitology unit. In this year, out of a total 71 samples, 7 were of cow and 64 were of dogs. All the samples from cattle were negative while samples from dogs were positive (8 psoroptes and 3 demodex).

3.1.4 Urine test

Out of 57 urine sample, 12 samples were found abnormal (3 with traces of blood, 7 with increased urobilinogen and two with pus).

3.1.5 Post-mortem examination

Pathology unit includes the post-mortem examination of animals. Most of the cases were poultry and some are goat and pigs. Out of total 1171 samples, 1104 chickens, 60 goats and 7 pigs were brought at VL Biratnagar for postmortem examination.

3.1.5.1 Postmortem of poultry

Diseases of poultry are shown in below figure.

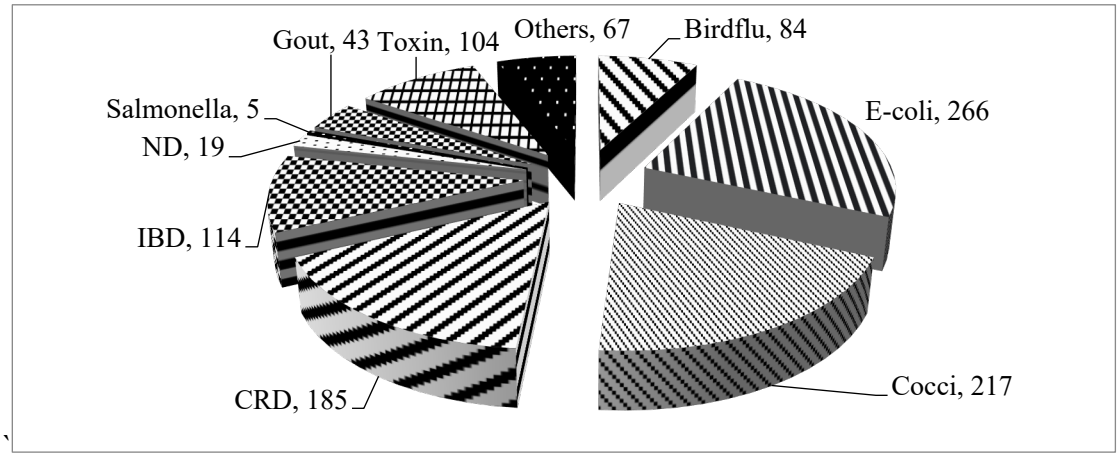


Figure 4: PM examination of poultry.

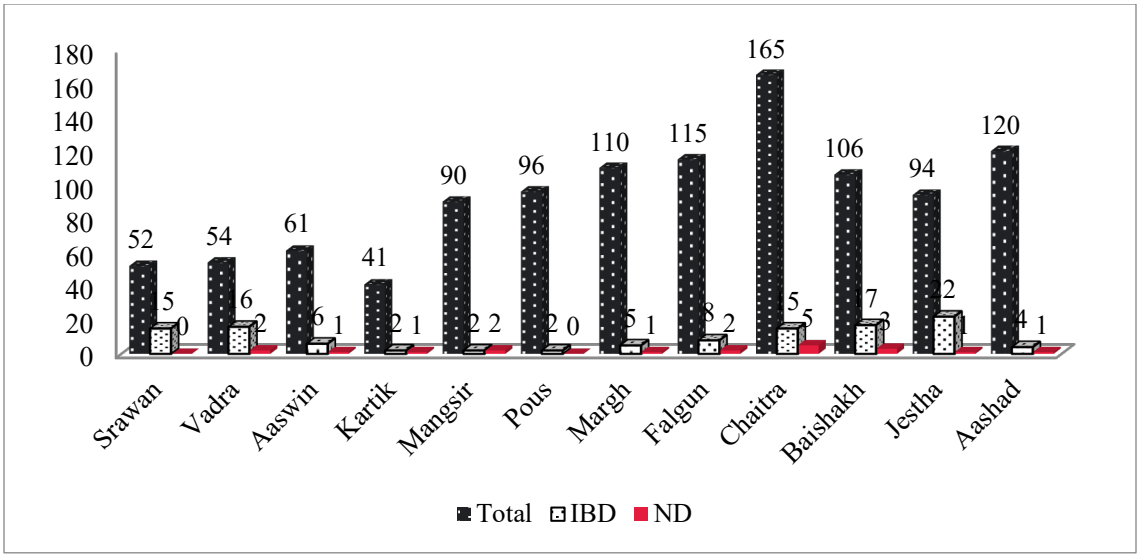


Figure 5: Month wise comparison of positive case IBD & ND.

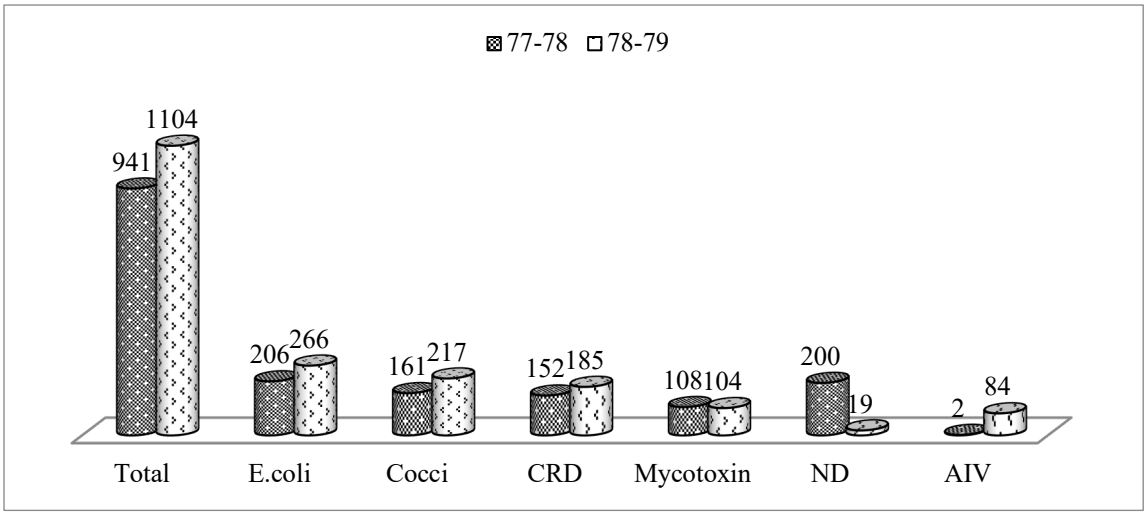


Figure 6: comparison of the poultry diseases.

In this fiscal year 2078/79 Koshi province had to suffer huge losses due to the sudden outbreak of the bird flu disease. Bird flu occurred in Morang, Sunsari and Udayapur. The bird flu control program was strictly followed and it was controlled within a few months. Details of this disease also mention in below.

Sunsari
• Outbreak-3 • Total bird-11000

Morang
• 10 outbreak • Total birds-111259

Udayapur
• 1 outbreak • Total birds-1625

Figure 7: Bird flu Outbreak in Koshi Province.

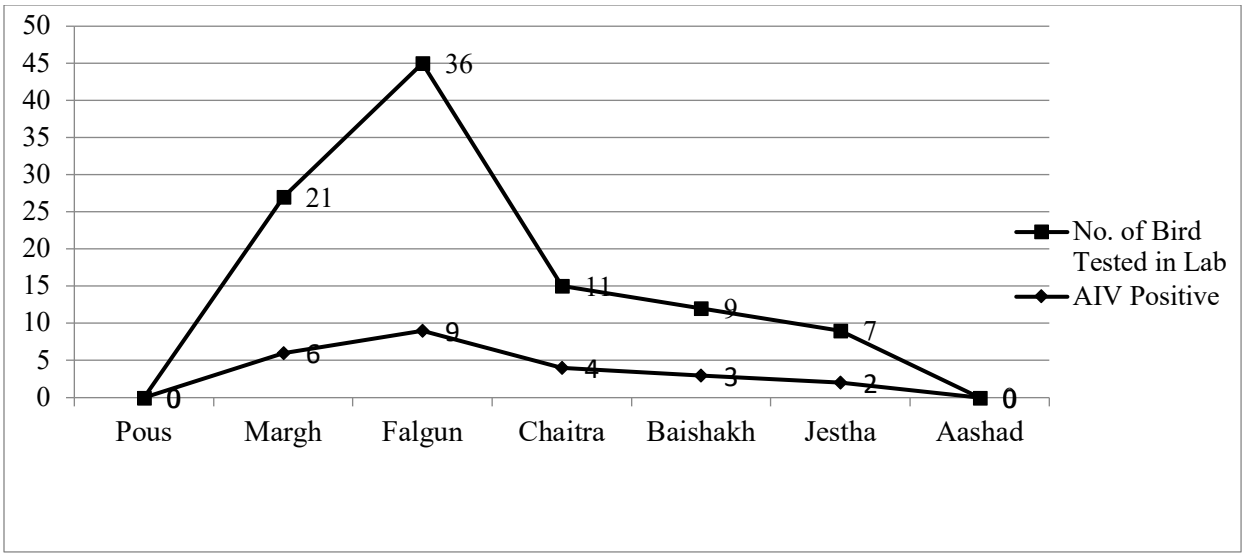


Figure 8: Sample flow pattern of Bird flu.

3.1.5.2 Animal disease

A total of 60 dead goats were brought at VL for post mortem examination. Enterotoxemia also known as overeating or pulpy kidney disease was found to be the major cause of death in goats.

Table 3: District wise goat brought at VL for post mortem.

S.N.	District	Species	No. of samples	Test Method
1	Sunsari	Goat	17	PM, Clinical symptoms
2	Morang	Goat	26	"
3	Jhapa	Goat	7	"
4	Udayapur	Goat	5	"
5	Dhankuta	Goat	5	"
6	Total		60	

Similarly, seven pigs were brought for post mortem examination, out of which all were diagnosed with African swine fever by rapid diagnostic test.

Table 4: District wise pig brought at VL for post mortem.

S.N.	District	Species	No. of samples	Test Method	Result
1	Morang	Pig	4	PM, Clinical symptoms	CSF Ag +ve
2	Sunsari	Pig	3	PM, Clinical symptoms	CSF Ag +ve

3.2 Microbiology section

3.2.1 California mastitis test

This test was used to diagnose for the clinical and sub-clinical mastitis of an animals in the VL. Total 777 milk samples were tested, 332 were found positive and rests are negative. Positive milk samples were forward for the bacteria culture, identification & Antibiotic Sensitivity Test.

3.2.2 Bacteriology

Bacteriological culture, bacteria identification and antibiotic sensitivity test was conducted for the microbiological investigation. The samples were milk, blood and tissue. Total 355 culture samples, 332 were milk and 23 were blood & tissue. Result of the microbiological examination is presented in figure below.

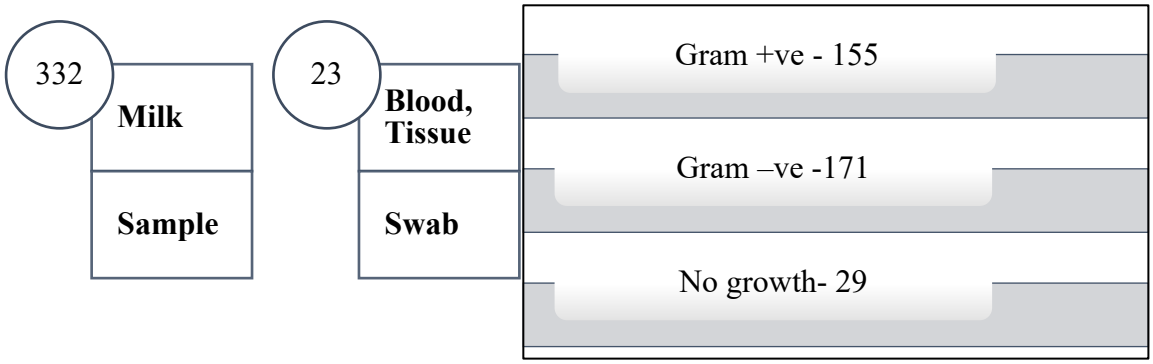


Figure 9: Microbiological examination result.

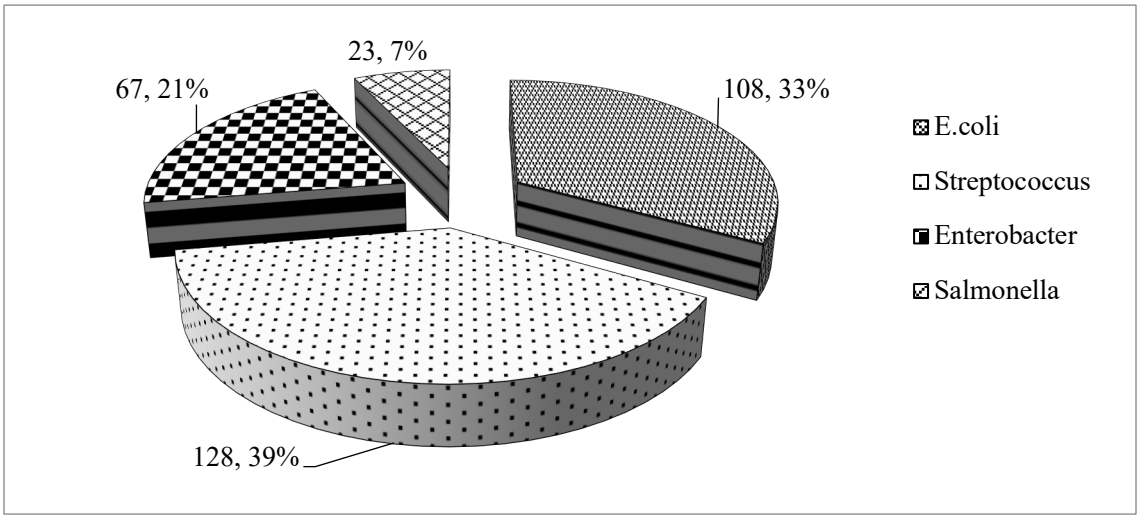


Figure 10: Types of bacteria found in culture.

3.2.3 Antibiotic sensitivity test:

Antibiotic sensitivity test was used to help find the best treatment for a bacterial infection. In this test we used disc of an antibiotic for the diagnosis of sensitivity of drug on a culture. Total 326 culture sample, chloramphenicol, ceftriaxone, gentamicin, ciprofloxacin, enrofloxacin, ampicilline and tetracycline are sensitive respectively as shown in below figure.

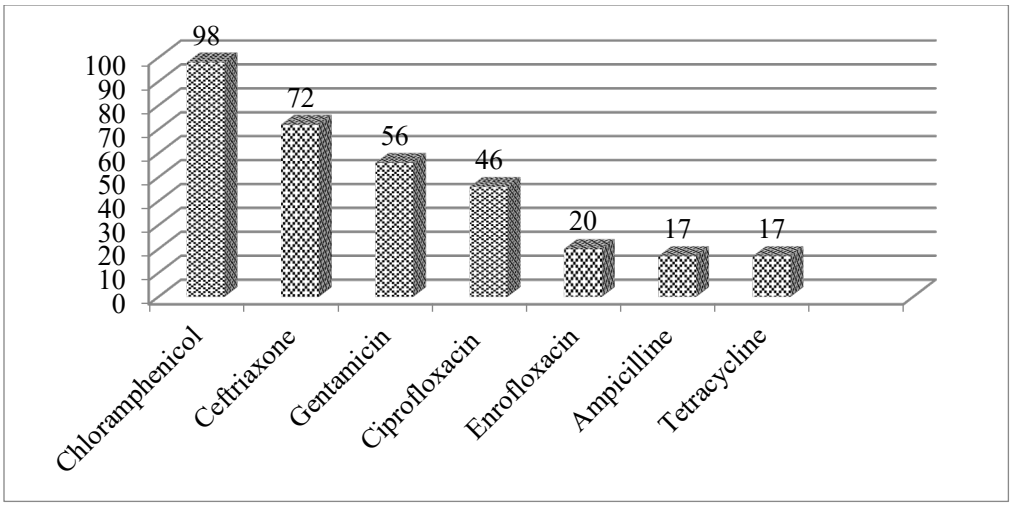


Figure 11: AST result.

In this year, under the Fleming fund FHI 360 active AMR surveillance program, VL Biratnagar examines 121 bird samples from Sunsari (31 samples) and Morang (90 samples) district. VL Biratnagar following the CLSI guideline for the bacterial culture, 75.20% was E. coli, 51.2% were *Enterococcu*s and 11.57% were *Salmonella*. All the details of this surveillance program are mentioned below table and figure.

3.2.4 Virological test

Virological unit of VL Biratnagar examined different types of viral diseases of an animal. Disease diagnosis was done by the using of rapid test kits and ELISA. The test detects Ag or Ab of the virus and also detect the serotype of the virus of some disease like; FMD. List of the virological test conducted by VL, Biratnagar were:

i. Animal disease: - FMD, PPR, ASF, CSF, Rabies, Canine distemper, PRRS, Canine parvo, Canine corona, Rota viral, BVD, etc.
ii. Avian disease: - ND, IBD, IBV, AIV, etc.

Table 5: Details of the appropriate sample collection for the disease diagnosis:

Disease	Appropriate samples
FMD Ag	Follicular fluid
FMD Ab	Blood, serum, plasma
PPR Ag	Nasal discharge, Lacrimation
CSF Ab	Blood, serum, plasma
ASF Ag	Blood, serum, plasma
Rabies Ag	Brain sample
AIV Ag, NDV, IBDV,IBV	Tracheal swab
CDV Ag	Lacrimation
CPV Ag/CCV Ag	Feces

Table 6: Virological case details.

S.N.	Disease	Total sample	Type of sample	Result	No. of +ve
1	Rabies	55	Brain, saliva	2 were +ve	2

3.3 Molecular biology section

3.3.1 Serological test

Serological unit of VL Biratnagar conduct the different types of test like PAT, Rapid Kit Test, Biochemical Test and ELISA. Details of the tests are shown in below table and Figure.

Table 7: Types of tests conducted at VL.

S.N.	Test	Disease
1	PAT	Salmonella, Mycoplasma, RBPT
2	Rapid kit test	Bovine TB, B. Brucellosis, *E. canis*, etc

Table 8: Result of different serological tests.

Test	Annual Target	Total sample	Positive	Negative
RBPT	150	217	4	213
***Salmonella* PAT**	150	245	4	241
***Mycoplasma* PAT**	150	245	34	211
Total	**450**	**707**	**42**	**665**

Similarly, 227 samples were collected from Sunsari, Morang, Jhapa, Saptari and Udayapur and were tested for Bovine TB and 183 samples were tested for Bovine Brucellosis and the result is presented below.

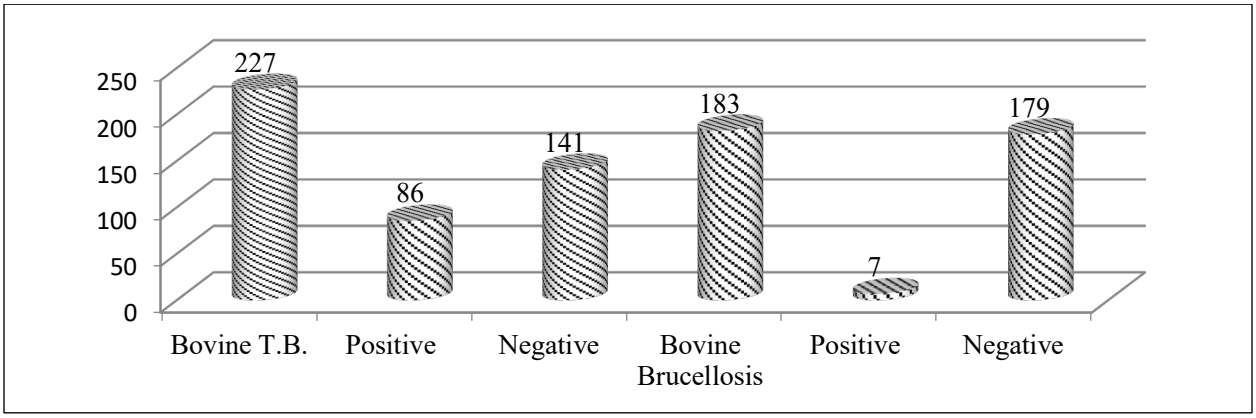


Figure 12: Serological test of the cattle diseases.

Note:

- B.T.B. Positive sample from Sunsari, Morang & Jhapa
- B.B. Positive sample from Sunsari & Jhapa

4. Vaccine bank

In this fiscal year, under the national disease control programmed vaccine distribution was also the same to previous year by the VL Biratnagar to the all-district of the Koshi province. Distributed vaccine includes the FMD, PPR, CSF, RD, and HSBQ. This laboratory has been distributing vaccine not only under the program but also for the control of epidemic diseases. Although the working area of this laboratory is only the Koshi province, but veterinary services have also been providing to districts of Madhesh province; Siraha and Saptari.

ANNEX: PHOTOGRAPHS OF LABORATORY SERVICES

Avian Leukosis Complex in Poultry

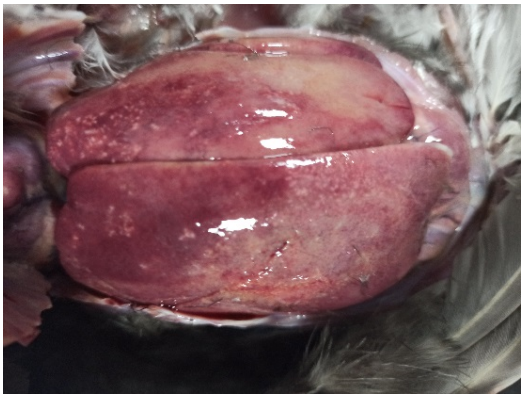


Figure 1. Hepatomegaly and diffused necrosis in liver.

Figure 2. Multiple white nodules, diffused necrosis in liver and hepatomogaly.

Marek's Disease in Poultry

Figure 3. Multiple tumors in proventriculus.

Figure 4. Multiple tumors in liver.

Figure 5. Tumor on heart.

Figure 6. Tumors on mesentery.

Newcastle Disease in Poultry

Figure 7 and 8. Caecal tonsil and payer's patches hemorrhages in small intestine.

Figure 9. Pin point hemorrhage in proventriculus.

Figure 10. Hemorrhages in trachea.

Fowl Typhoid in Poultry

Figure 11. Necrotic foci with bronze colored liver.

Figure 12. Pedunculated ovary.

African Swine Fever in Pig

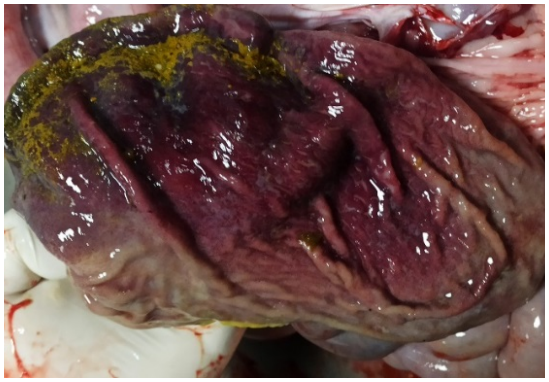


Figure 13: Hemorrhages in stomach.

Figure 14. Hemorrhagic spleen.

Figure 15. Hemorrhagic and necrosis of kidney.

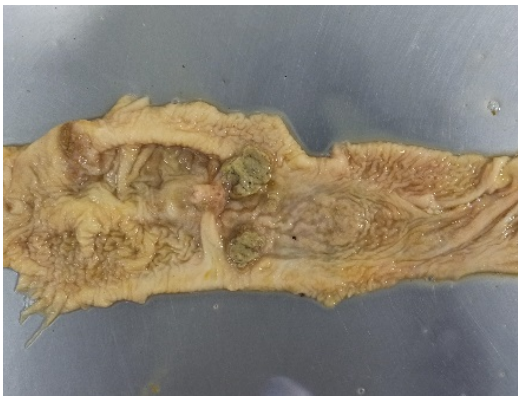


Figure 16. Button like ulcer in caecum.

Figure 17. Congested lungs.

Figure 18. Hemorrhagic mesenteric lymphnodes.