Royal Government of Bhutan
Ministry of Agriculture and Forests
Department of Livestock
National Centre for Animal Health
Serbithang: Thimphu

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STATUS OF NOTIFIABLE ANIMAL DISEASES IN BHUTAN FOR 2018

VOLUME 5 ISSUE 8

National Centre for Animal Health, Department of Livestock, Ministry of Agriculture and Forests, Serbithang, Thimphu, Bhutan

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February 1, 2019

FOREWORD

This bulletin on Status of Notifiable Animal Diseases in Bhutan for 2018, compiled by Disease Prevention and Control Unit (DPCU) of the National Centre for Animal Health, provides an overview of all notifiable animal diseases reported in the country during 1996 to 2018. The main purpose of this bulletin is to provide an update on the notifiable animal disease situation in the country for information to all stakeholders including veterinarians, veterinary paraprofessionals, central and regional farms and policy makers. The information contained in this report could also be used for developing preparedness and response plans by the concerned government agencies responsible for disease prevention and control.

During 2018, there were 14 outbreaks of Foot and mouth disease (FMD), 12 outbreaks of Rabies, 2 outbreaks of Highly pathogenic avian influenza (HPAI), and one outbreak each for Infectious bursal disease(IBD) and Classical swine fever (CSF), reported from various parts of the country.

I would like to thank the Director General and the CVO, AHD, DoL for their support and guidance. I thank the Program Directors, Commodity Centres; the Regional Directors of RLDCs; DLOs and VOs of 20 Dzongkhags; Managers of livestock farms for their support and cooperation. I would like to thank Dr. Tenzin Head, Disease Prevention and Control Unit, NCAH for taking lead in producing this report. Special thanks to all the TADInfo focal points at the Regional Livestock Development Centres, Satellite Veterinary Laboratories and Dzongkhag Veterinary Hospitals for their active disease reporting and investigation.

I hope this edition of the disease status report in the country will be useful and informative.

We wish you a happy reading!

Dr. RB Gurung

Offtg. Program Director

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1. INTRODUCTION

Notifiable disease means a disease listed by the Veterinary Administration in the country, and that, as soon as detected or suspected, must be reported to any of the animal health service Centres by the fastest means of communication to contain the disease. Outbreaks of notifiable diseases have been reported every year from different parts of the country. This report present a brief descriptive analysis of the status of reported notifiable animal diseases in the country during 2018 (Jan-Dec 2018) and the trend of outbreaks since 1996. The data used for this analysis were retrieved from the Veterinary Information System database (VIS) for the period from 1996 to 2010 and the online Transboundary Animal Disease Information System (TADinfo database) for the period 2011−2018 plus from flash report and were validated accordingly. The information in this report can be used as baseline data in future.

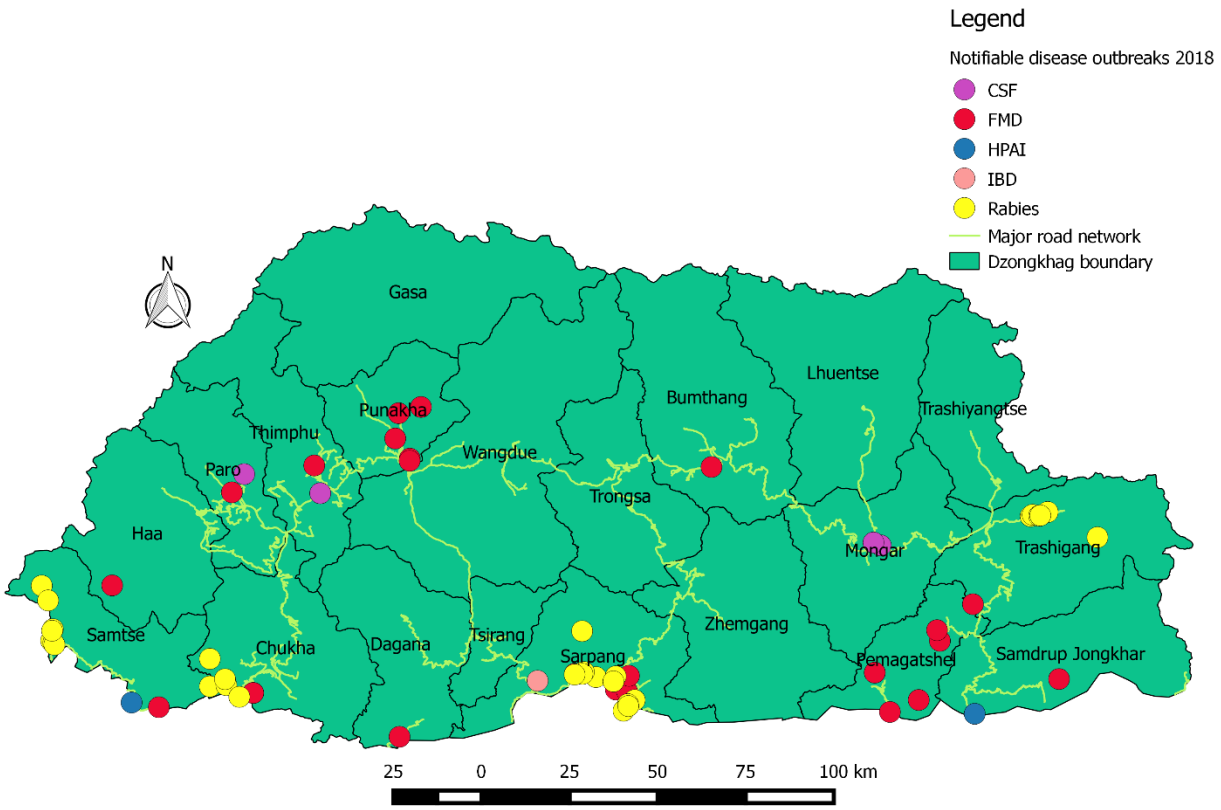


Figure 1: Distribution of reported outbreaks of notifiable animal diseases in Bhutan during 2018

During 2018, FMD was the major disease that occurred in several places in the country. The details of each specific disease are presented in the following respective section.

2. MULTIPLE SPECIES DISEASES

2.1. Foot and mouth disease

Foot-and-mouth disease (FMD) is a highly infectious viral disease of cloven-hoofed species characterized by fever and development of vesicles in the mouth and on the muzzle, teats, and feet. In a susceptible population, morbidity approaches 100% but the disease is rarely fatal except in young and very old animals.

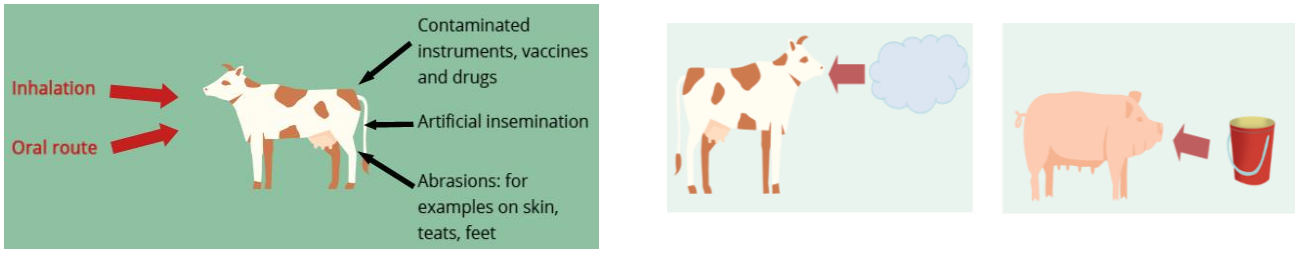


Figure 2: Routes of FMD infection

FMD Virus is excreted 2 days before appearance of clinical signs and 4 days before appearance of clinical signs in milk. Virus excretion stop about 4-5 days after appearance of vesicles.

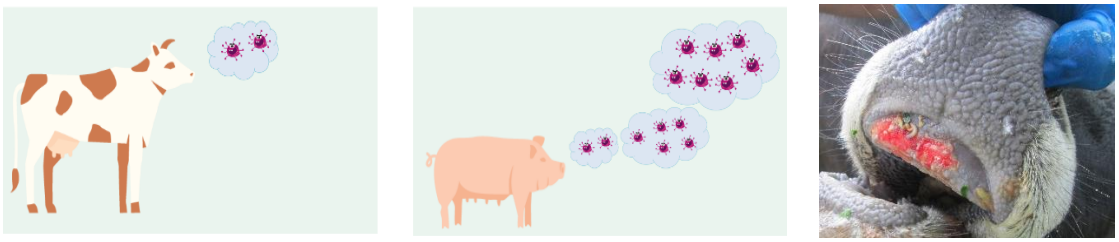


Figure 3: Virus excretion

Infection with one serotype does not give immunity to infection with a different serotype. Strain within a serotype may not provide protection against infection with other strains within the same serotype.

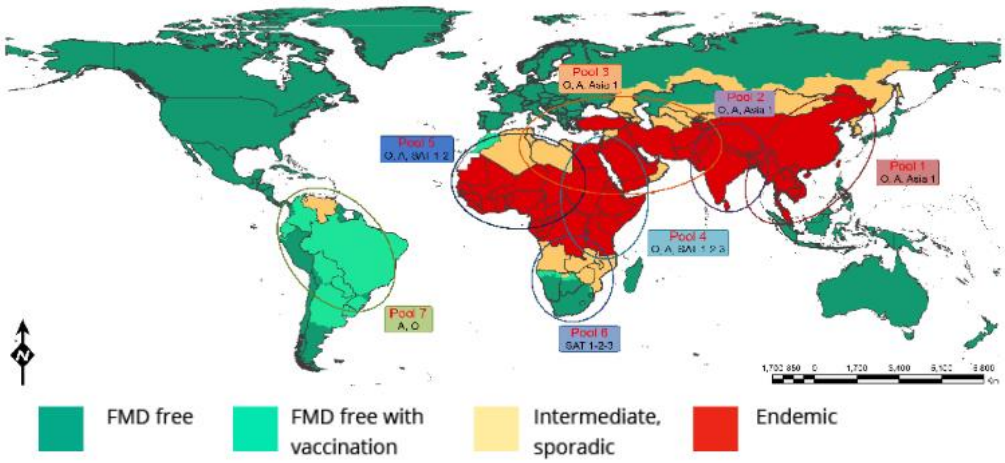


Figure 4: Global distribution of FMD virus pool

FMD is endemic in Bhutan and is reported from almost all parts of the country. Serotype O is the principal FMDV serotype involved in Bhutan, consistent with the disease epidemiology in the neighboring countries in the region. Serotype O was confirmed in all the outbreaks during 2018.

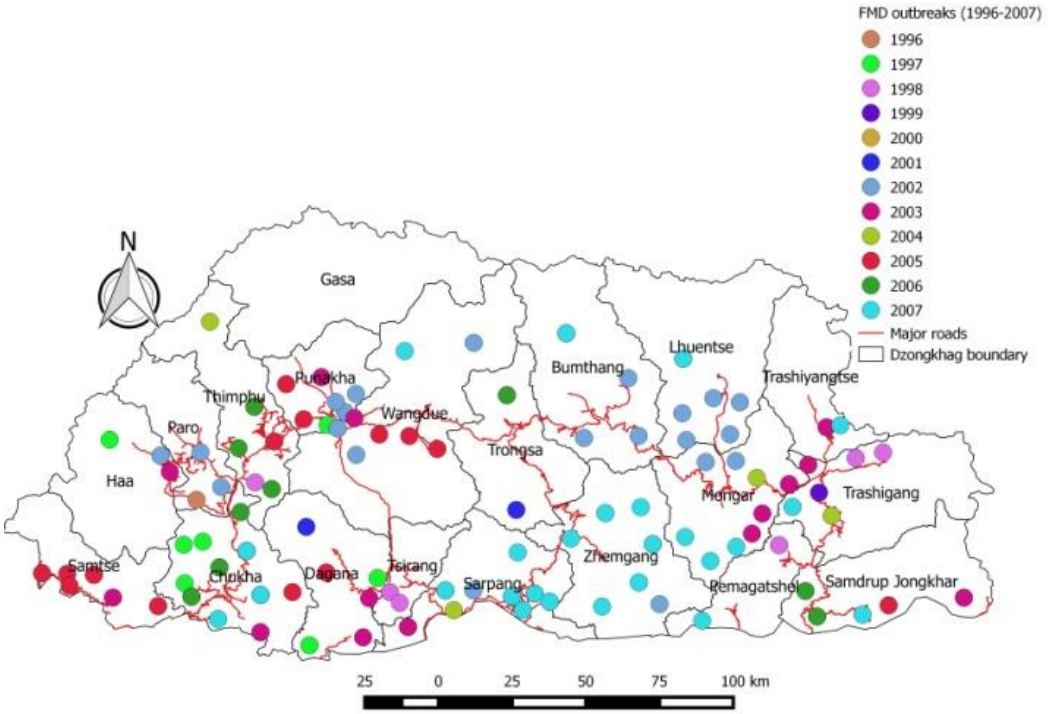


Figure 5. Spatial distribution of FMD outbreaks in Bhutan (1996-2007) (Source: Dr Tenzin)

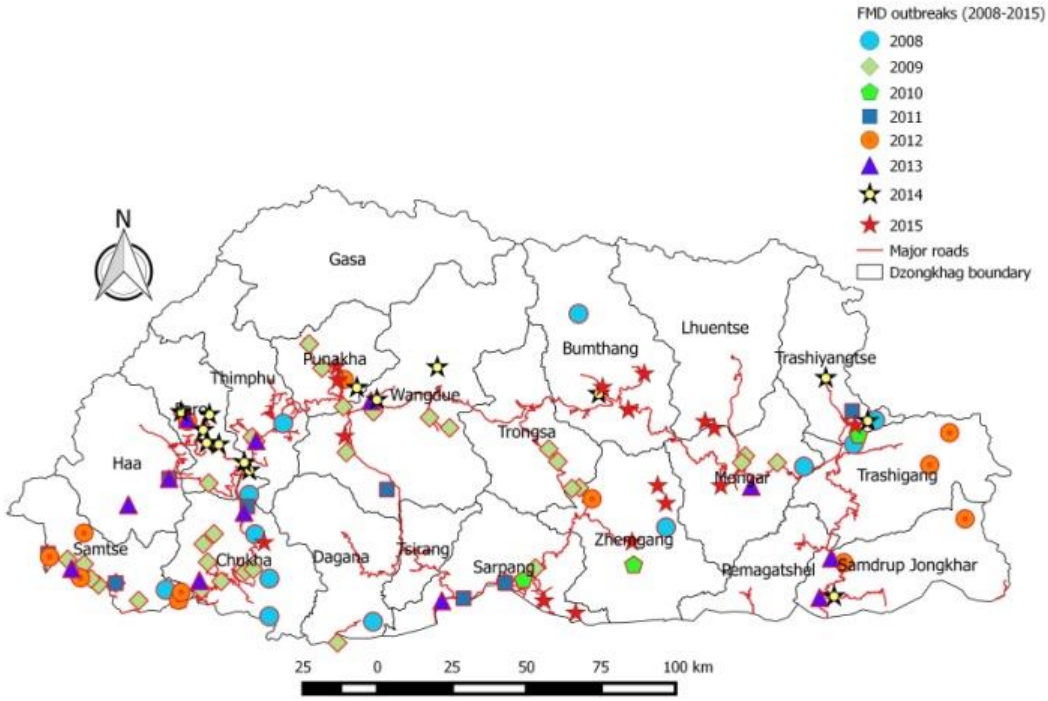


Figure 6. Spatial distribution of FMD outbreaks in Bhutan (2008-2015) (Source: Dr Tenzin)

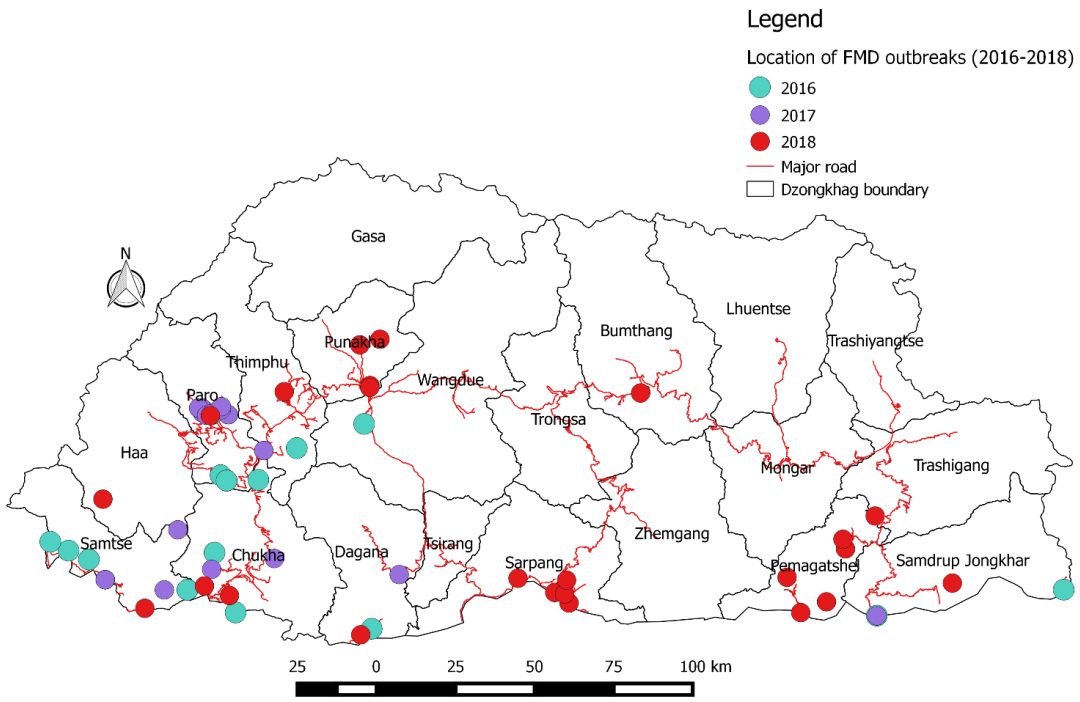


Figure 7. Spatial distribution of FMD outbreaks in Bhutan (2016-2018) (Source: Dr Tenzin)

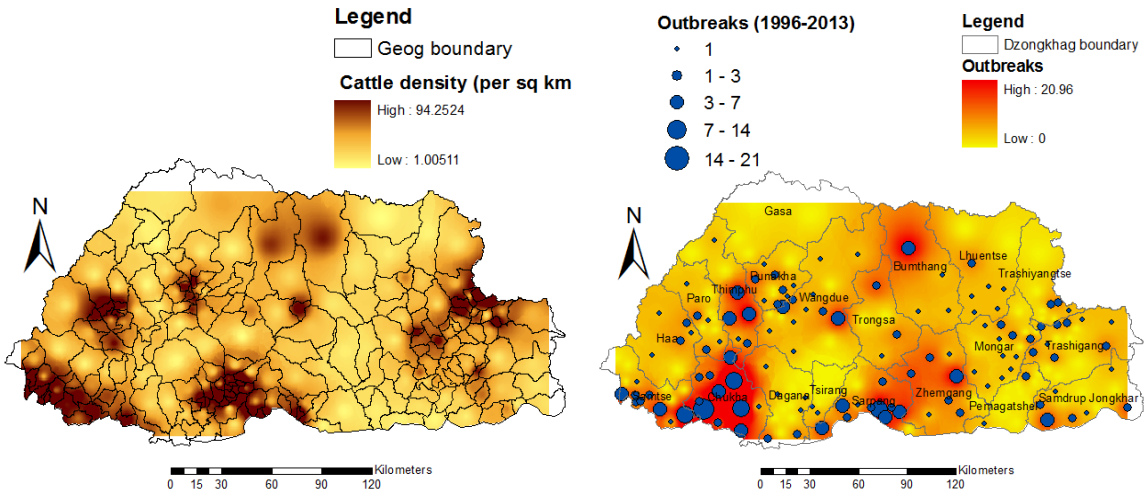


Figure 8: Cattle density and FMD outbreak risk in Bhutan (Source: Dr Tenzin)

During 2018, 14 outbreaks of FMD were reported in thirteen dzongkhags; Bumthang, Chhukha, Dagana, Haa, Paro, Pemagatshel, Punakha, Samdrup Jongkhar, Samtse, Sarpang, Tashigang, Thimphu and Wangdi Phodrang (see Annexure 3), compared to 9 reported outbreaks in 2017 (see Annexure 2). Outbreaks had occurred in vaccinated herds and also in previously FMD free

areas. National Centre for Animal Health Serbithang is conducting a sero-monitoring study in cattle to understand the effectiveness of FMD vaccine used in the country.

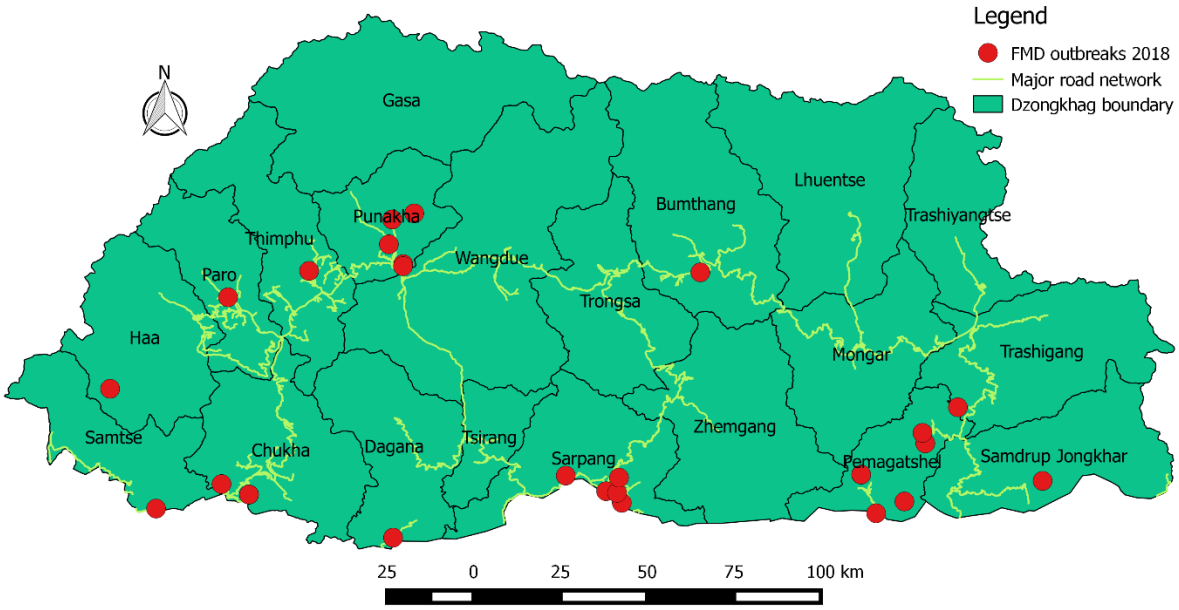


Figure 9: Distribution of FMD outbreaks in animals between January and December 2018

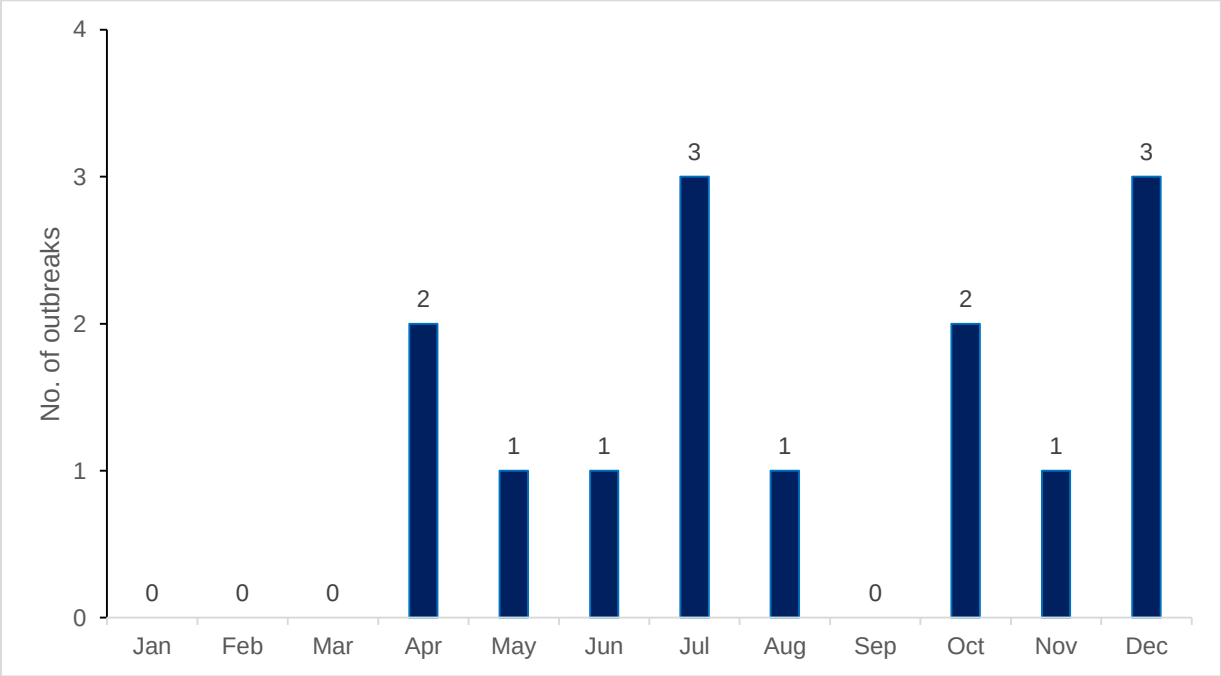


Figure 10: Monthly distribution of FMD outbreaks between January and December 2018.

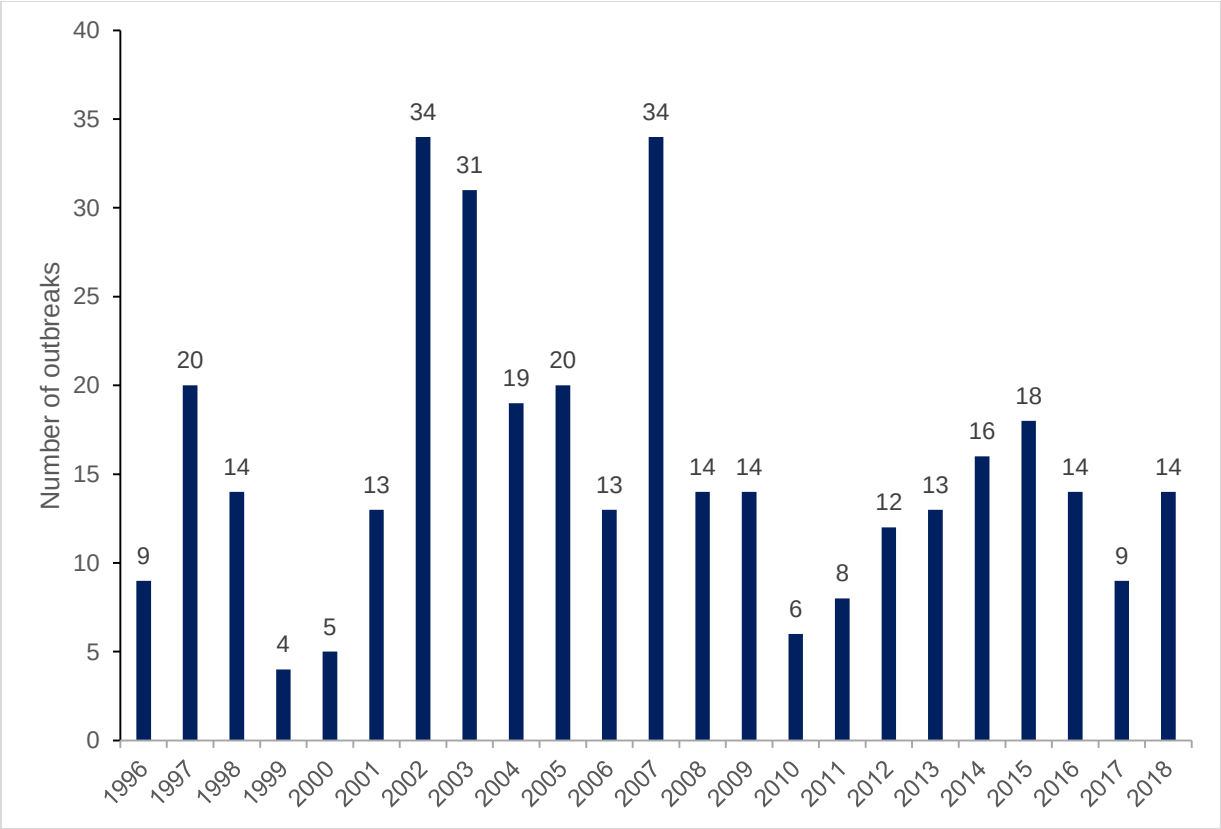


Figure 11: Annual distribution of reported FMD outbreaks in Bhutan (1996 to 2018)

A Progressive Control Pathway (PCP) approach for control of FMD is being implemented in the country with an ultimate objective to enable Bhutan reach Stage 3 of the PCP by the year 2020.

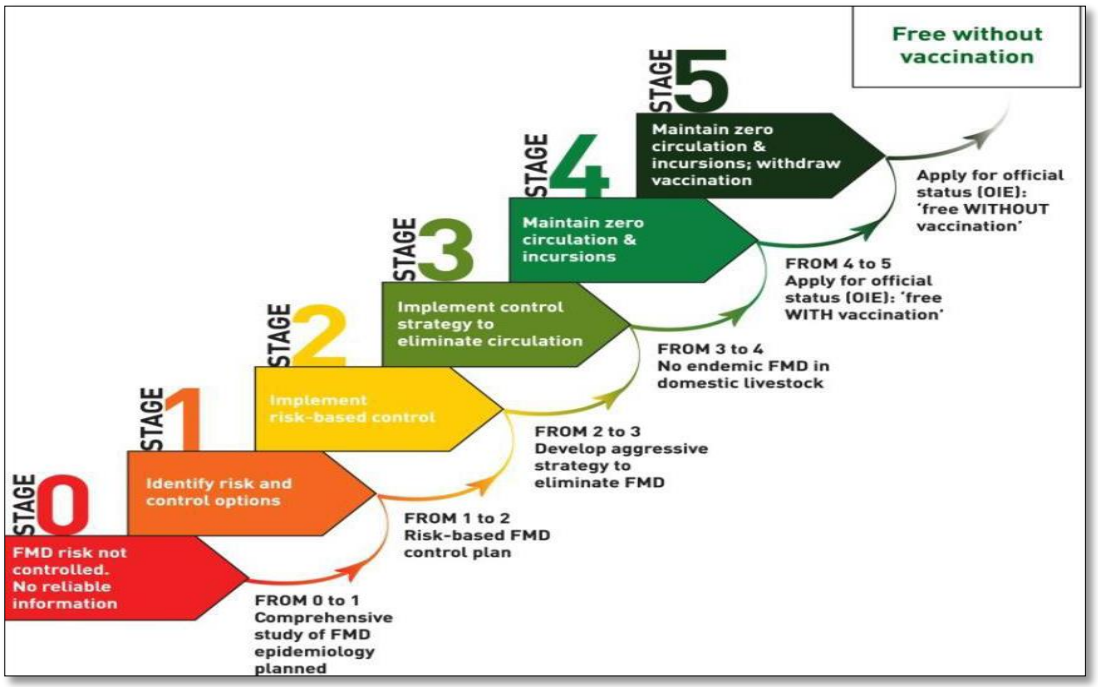


Figure 12: Progressive control pathway for FMD

Table 1: Time frame to achieve stage 3 of PCP in Bhutan as per Figure 5

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Stage of PCP	1	1	1	1	2	2	2	2	3

Between 2006 and 2018 (financial year), the Biological Production Unit of National Centre for Animal Health, Serbithang had distributed an average of 213,951 doses of FMD vaccine to 20 dzongkhags annually, for mass vaccination program (Figure 6).

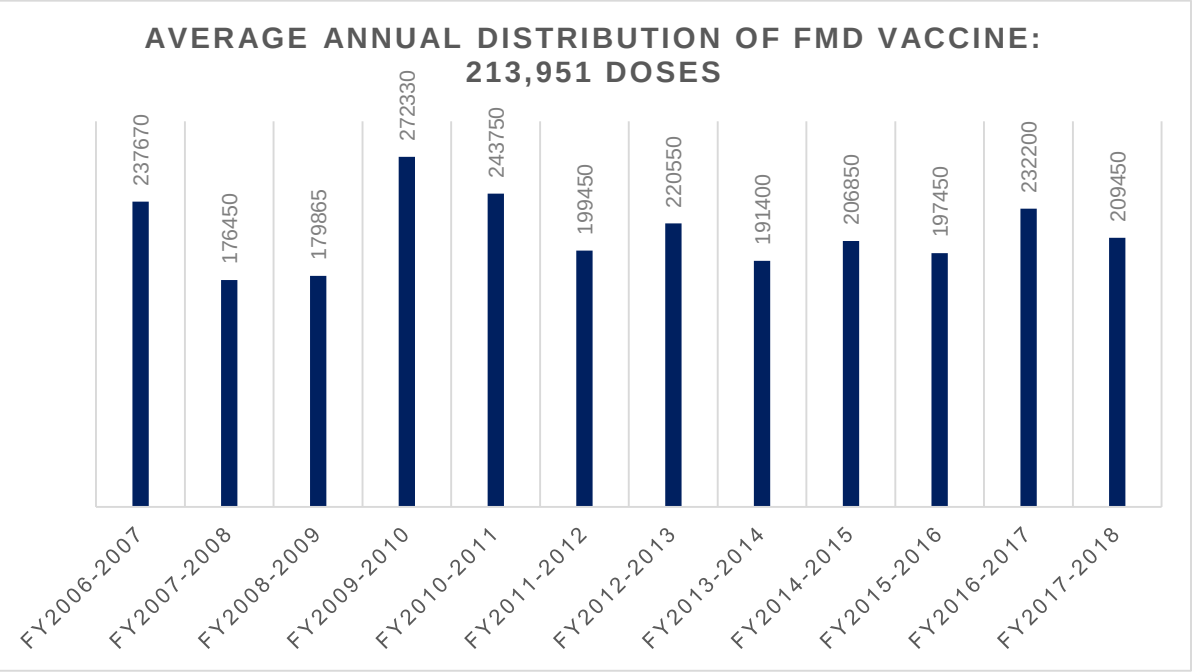


Figure 13: Number of FMD vaccine doses distributed to 20 dzongkhags (FY 2007-2018)

2.2. Rabies

Rabies is a fatal zoonotic disease transmitted mainly by the bite of rabid animals, predominantly domestic dogs. Rabies was present in most parts of Bhutan until the early 1990s but has been controlled now. Currently the disease is endemic in the southern dzongkhags of Bhutan along the border with India. However, there has been a sporadic outbreak in the interior Bhutan as a result of spread from the south Bhutan areas and incursion, indicating possible re-emergence if strategic control program is not implemented.

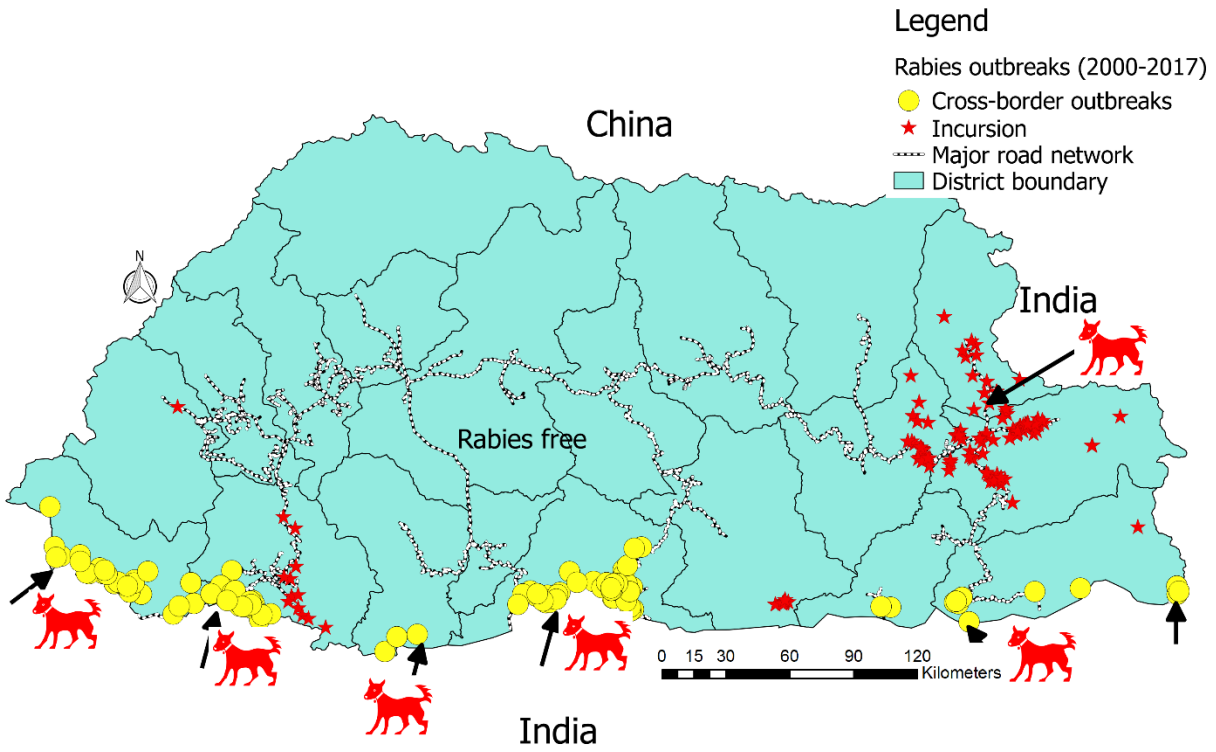


Figure 14: Rabies risk map in Bhutan (Source Dr Tenzin)

During 2018, 12 outbreaks of rabies were reported in Chhukha, Samtse, Sarpang and Trashigang dzongkhags (Annexure 6), compared to 20 outbreaks in 2017 (Annexure 5). The outbreak is Trashigang is as a result of introduction from across the border and subsequent spread via movement of rabid dogs.

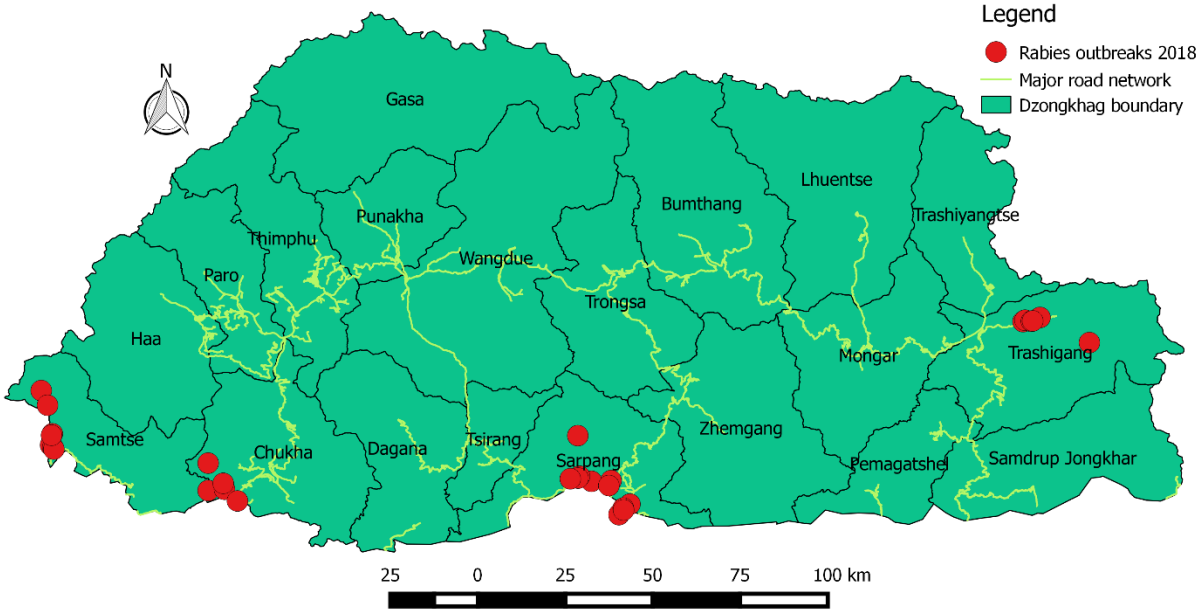


Figure 15: Distribution of rabies outbreaks in animals between January & December 2018

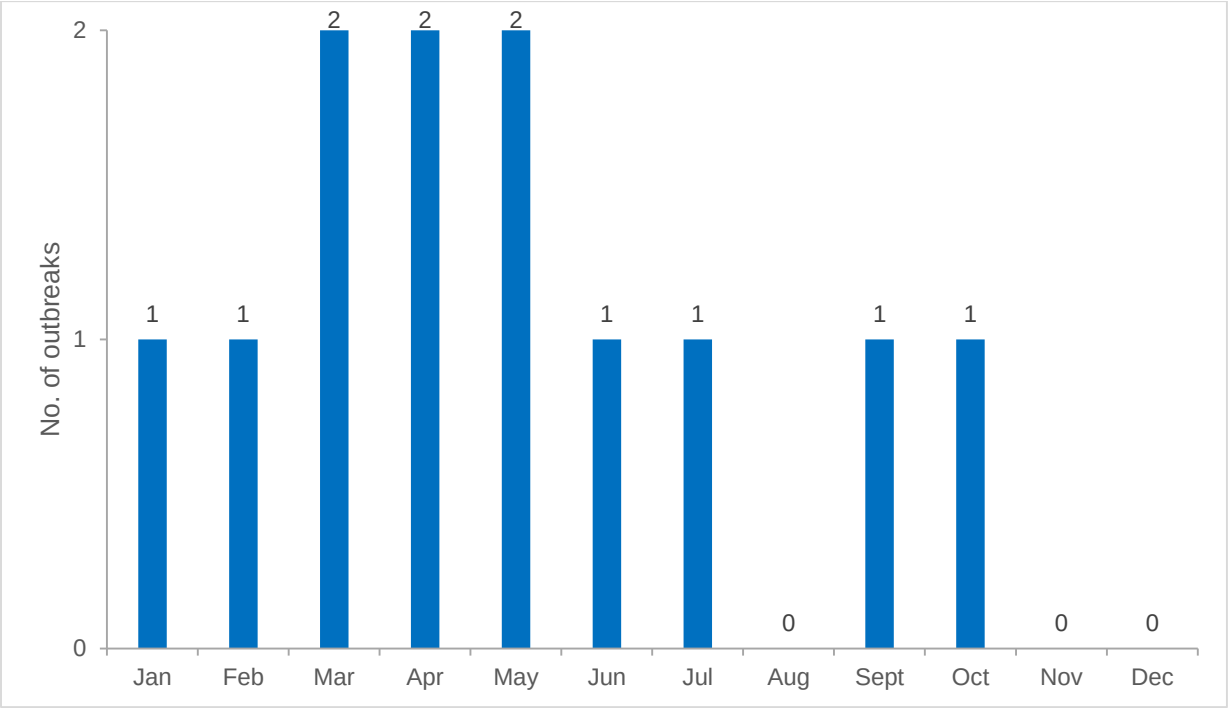


Figure 16: Monthly Distribution of rabies outbreaks between January & December 2018

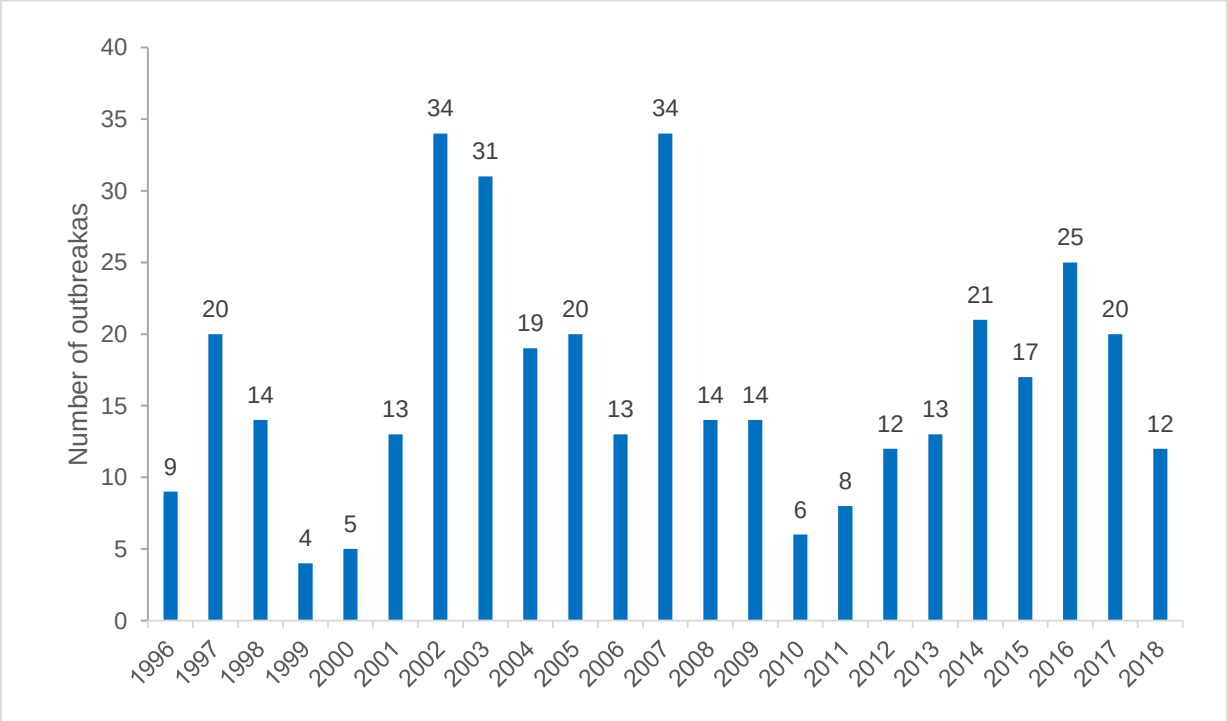


Figure 17: Annual distribution of Rabies outbreak in Bhutan (1996 to 2018)

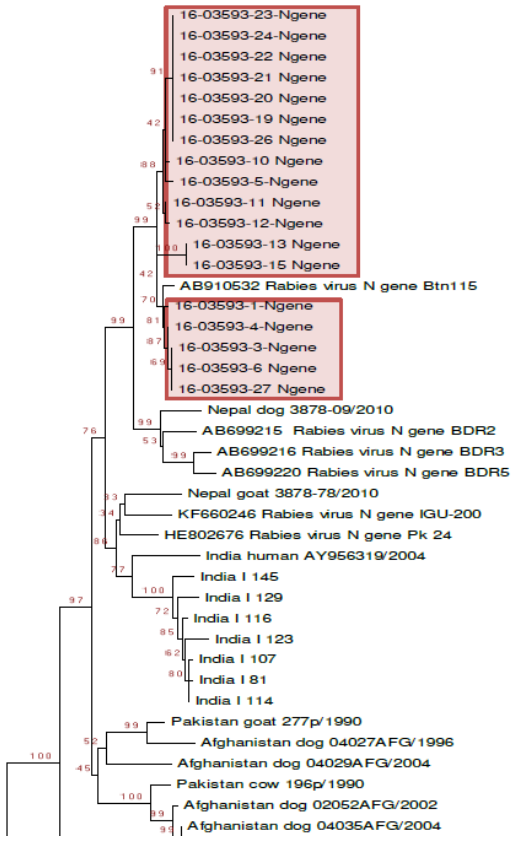


Figure 18: Phylogenetic analysis of rabies virus

Phylogenetic analysis of rabies virus based on N gene indicate that Bhutan viruses belong to the Arctic-related clade which is widely circulating in northern India (Tenzin et al., 2011).

In humans, 17 deaths due to rabies had been reported between 2006 and 2016 with only one death in 2016. No human rabies cases were reported during 2014, 2015 and 2017 and 2018. 2018. Bhutan implements One health approach to achieve zero human deaths due to dog mediated rabies by 2023. Bhutan is in track to achieve the global target of zero death by 2030.

With the goal of strengthening a One Health-based strategy for rabies control in Bhutan and to achieve zero by 30, technical experts from Ministry of Agriculture and Forests and Ministry of Health held a collaborative meeting on World Rabies day – 28 September 2017 – to evaluate the national rabies control programme and determine future needs for rabies control in Bhutan using the Stepwise Approach towards Rabies Elimination (SARE) tool (https://canineraabiesblueprint.org/A-stepwise-approach-to-planning). The team reviewed the rabies situation in Bhutan in terms of rabies incidence in animals and humans, past and current control measures, gaps and future needs for rabies control. This was followed by description of the features of the SARE tool and then conducted rabies control programme assessment by

providing scores for the activities implemented and also highlight the areas where more attention is required in order to eliminate rabies in Bhutan. The assessment indicated that 107 of the 120 Stage-specific activities were accomplished and the country have progressed to Stage 3.5/5. The SARE output was used to develop a “Strategic plan for elimination of dog mediated framework for the elimination of dog- rabies in Bhutan by 2023” by incorporating all the activities within the broad framework of the agreed activities of global goal to eliminate dog-mediated human rabies deaths.

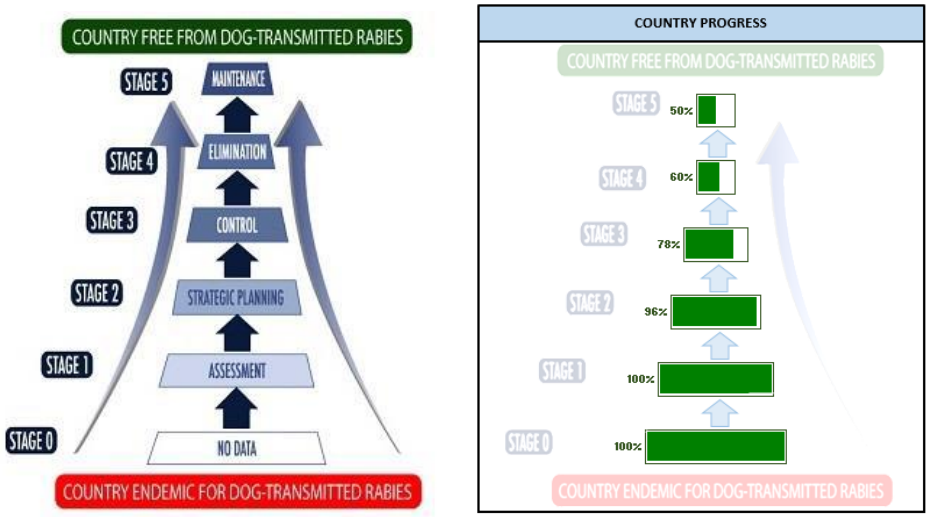


Figure 19: Five stage of SARE and Bhutan progress of rabies control

2.3. Brucellosis

Brucellosis is an infectious zoonotic disease of animals and humans caused by bacteria of the genus Brucella. Usually, Brucellosis in cattle is caused by *Brucella abortus*, *Brucella suis* in swine, and *Brucella melitensis* in sheep and goats. Under appropriate conditions, however, Brucellosis may be caused in one species by a Brucella organism normally associated with other host species. Therefore, Brucellosis is a "multi-species" infectious and contagious disease. It is a herd/flock disease and the epidemiological unit of the infection is the herd, the flock or the group including all sensitive animals epidemiologically-related and exposed to same risk-factors. Brucellosis cause abortion (however, most infected females give birth normally), the birth of weak or dead calves and infertility.

Brucellosis is commonly transmitted to susceptible animals by direct contact with infected animals or with an environment contaminated by discharges from infected animals. As the disease primarily localizes in the udder and/or reproductive organs of animal, the milk, aborted fetuses, placental membranes and

fluids, and other reproductive tract discharges of an infected animal are all highly contaminated with infectious Brucella organisms. The disease may also be spread when wild animals or animals from an affected herd mingle with Brucellosis-free herds. The general rule is that Brucellosis is carried from one herd to another by an infected or exposed animal.

Brucellosis poses serious public health risk when humans are infected. Human infection with Brucella organisms usually occurs through occupational contact with discharges from infected animals, particularly through calving, but also through slaughtering or ingestion of unpasteurised dairy products.

In sero-survey conducted for Brucellosis in eight government cattle farms in 2015, National Jersey Breeding Centre (NJBC), Samtse was detected with an alarming rate of 24.6% (28/114) in farm animals. In absence of vaccination programme, detection of sero-reactive adult animals was considered as a serious concern. Subsequently, series of longitudinal studies were conducted in the affected farm that included retesting of sero-positive animals through serological, culture and molecular tests. The longitudinal study showed that the sero-prevalence had increased to 38% thus indicating spread of disease within the NJBC farm. Similarly, the culture and molecular test detected increasing number of animals shedding Brucella abortus organism in milk.

	NJBC	CRC	NHP	BSF	RMBF-A	RMBF-Z	NNBF	NDDC	Overall
Total sample	114	33	25	112	55	69	58	12	478
Positive	28	0	0	0	0	0	0	0	28
Negative	86	33	25	112	55	69	58	12	448
Prevalence (%)	24.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.86

The Department of Livestock has taken series of interventions to control and prevent spread of infection. Retrospective investigations showed that the disease incursion occurred through import and introduction of new cattle into the farm. To determine the infection status at national level, the NCAH, DoL has also

completed risk-based sero-survey in 220 milk cooperatives and collected 1099 serum samples from 1099 cattle. Of the 1099 samples, 21 tested (2%) sero-positive to Brucellosis from 10 Dzongkhags.

Dzongkhag	Haa	Paro	Thimphu	Gasa	Samtse	Wangdue	Dagana	Bumthang	Trashigan	S/Jongkh	Total
No of sero-positive cases	6	2	1	1	2	1	1	2	3	2	21 (21/1099) ≈ 2%)

In 2018, 22 of the 33 cattle tested sero-positive to Brucellosis (sampled referred by RLDC Khangma) in Trashigang (Radi: 2 farm; Samkhar: 2 farm).

The NCAH is re-collecting and re testing the samples from the seropositive cases to guide policy decision on brucellosis prevention, control and eradication programme.

Human infection

Five human (2 from Paro and 3 from Samtse) were tested positive to Brucellosis infection by Royal Centre for Disease Control, Serbithang following report of suspect cases. All infected people were treated by the human health using standard treatment regime.

An emergency strategy for prevention, control and eradication of brucellosis in animals had been developed with the following objectives:

- To eradicate Brucellosis infection and reduce associated abortions and low production in cattle
- To prevent human infection
- To produce safe animal products for human consumption free from infection
- To enhance trade of animal and animal product

Emergency Implementation modalities includes the following activities:

Phase I: Management of Brucellosis cases in cattle at NJBC, Samtse

Phase II: Management of Brucellosis through development of disease control plan

- Confirmation of sero-positive cases in cattle in the affected villages
- Contact tracing survey and screening of people in the affected farms/villages
- Risk-based surveillance to eradicate Brucellosis in animals
- Management of Brucella positive cases in cattle in villages
- Quarantine and movement control
- Public Health hazard management/intervention
- Installation of pasteurization unit in milk collection centres
- Advocacy program

3. DISEASES IN POULTRY

3.1. Infectious Bursal Disease

Infectious Bursal Disease (IBD) or Gumboro disease is a highly contagious and infectious disease of poultry. The target organ of the virus is the *Bursa of fabricius*, an important organ in the chickens for developing immune system. One outbreak of IBD was reported from Samtse in 2017 (Annexure 8), and similarly, only one outbreak of the disease was reported during 2018 from Gakiling geog under Sarpang Dzongkhag, affecting 250 layers (Annexure 9).

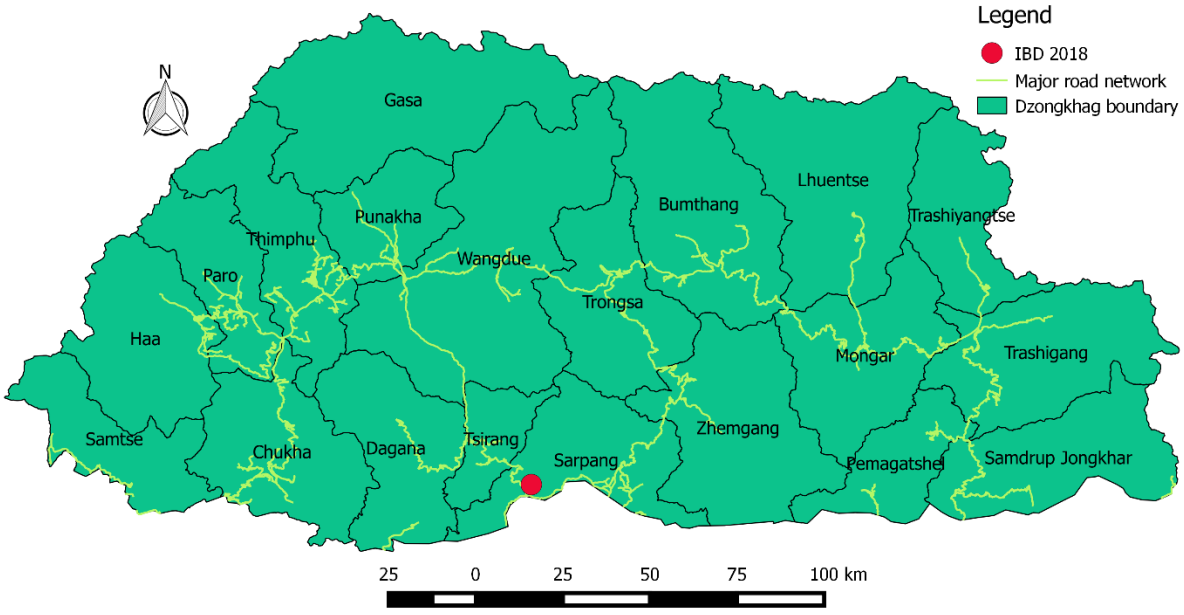


Figure 20: Distribution of reported IBD outbreaks between January & December 2018

3.2. Highly pathogenic avian influenza

Bhutan reported its first HPAI H5N1 outbreak on 23 February 2010 to the Office International Des Epizooties (OIE). The disease was first detected on 18 February 2010 at Rinchending village, Chhukha district in free-ranging poultry, that was subsequently confirmed by High Security Animal Disease Laboratory (HSADL), Bhopal, India and the National Institute of Animal Health (NIAH), Bangkok, Thailand. Subsequently, at least ten separate outbreaks of HPAI H5N1 were confirmed in the country in 2011, 2012, 2013, 2015, 2016 and 2018. All these outbreaks were rapidly contained following the implementation of National Influenza Pandemic Preparedness Plan (NIPPP) and Standard Operating Procedures for response to HPAI outbreaks.

The phylogenetic analysis of the first Bhutan isolates belonged to 'Qinghai like lineage' virus clade 2.2 (sub clade 2.2.3) and shared common progenitor virus with Bangladesh virus. Based on phylogeny and molecular markers, it was concluded that the outbreaks in Bhutan and Bangladesh in 2010 were due to independent introductions of virus probably through migratory birds. The outbreaks during 2012 in Chhukha, Thimphu and Mongar involved clade 2.3.2.1 which is antigenitically similar to 2011 chicken virus clade of India.

Figure 21: Distribution of reported HPAI outbreaks between 2010 and 2016

No outbreaks of HPAI was reported during 2017, however, two outbreaks of HPAI were reported from Samtse (Kalapani village under Phuentshopelri geog) and Samdrup Jonglhar (Zangdopelri area of Samdrup Jongkhar Throm) during March in 2018 (Annexure 12).

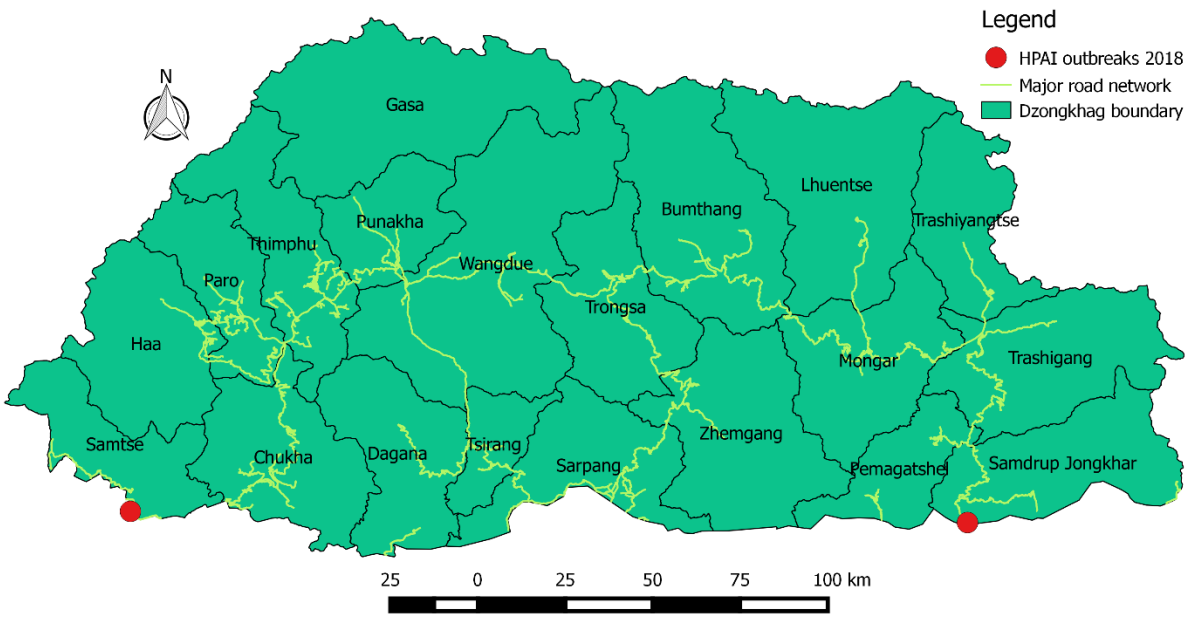


Figure 22: Distribution of reported HPAI outbreaks between January & December 2018

4. DISEASE IN PIGS

4.1. Classical Swine fever

Classical swine fever (CSF) is a contagious febrile disease of pigs caused by Pestivirus, family flaviviridae. The main source of infection is the pig either live animals (movement of infected pigs) or through illegally imported pig meat and meat products that find their way into the porcine food chain through the feeding of waste food (e.g., Swill feeding).

Only sporadic cases of CSF are reported in village pigs in Bhutan. Although CSF vaccine is available, vaccination has been very limited due to practical field difficulties in the village pigs. However, pigs in the government farms are regularly vaccinated and the piglet distributions to the farmers are done after vaccination at the farms.

During 2018, three outbreak of CSF was reported from a native pig breeding farm, Wangchutaba, Thimphu, Paro and Mongar (Annexure 15), compared to two outbreaks in 2017 (Annexure 14). Between 2-19 April 2018, 35 pigs have died in the farm of which 16 were adult, 8 suckler, 10 weaner and 1 grower.

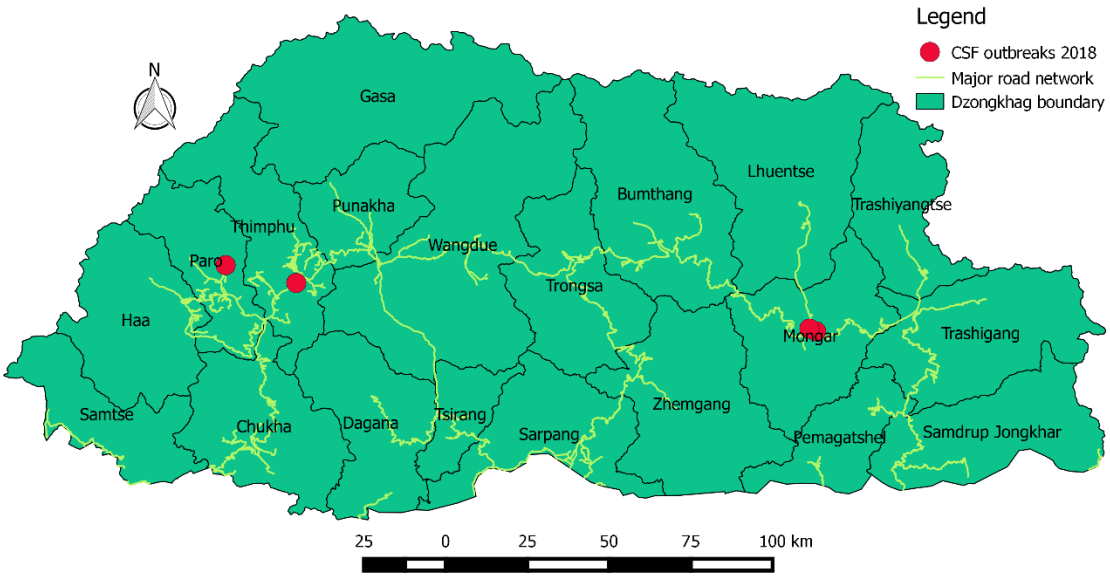


Figure 23: Distribution of reported Swine Fever outbreaks between January & December 2018

The typical classical signs of CSF was observed during postmortem examination and the following images will be of value for the field vets and extension staffs in diagnosing CSF in pigs:

	
Hemorrhage on epiglottis	Inflamed lungs
	
Hemorrhage on peritoneal wall	Severe congestion of mesentery

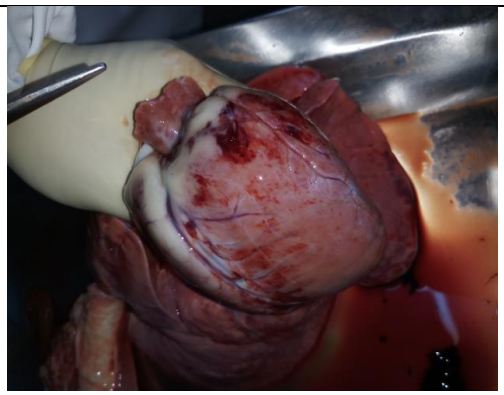
	
Button ulcer on the mucosa of large intestine	Enlarged and inflamed lymph nodes
	
Pin point hemorrhages on the surface of the kidney	Hemorrhage on medulla and pelvis of kidney
	
Heemorrhage on stomach	Enlargement and infarction of spleen
	
Pin point hemorrhage on epiglottis	Heemorrage of heart (myocarditis)

Figure 24: PM lesion of CSF cases in pigs (Picture source: Drs Tenzin and Thapa)

The samples collected during the PM examination were tested against Classical Swine Fever (CSF) using CSFV Antigen detection ELISA and tested positive to CSF virus. The samples tested positive to CSF using PCR test at NCAH, Serbithang confirming CSF virus infection in pigs.

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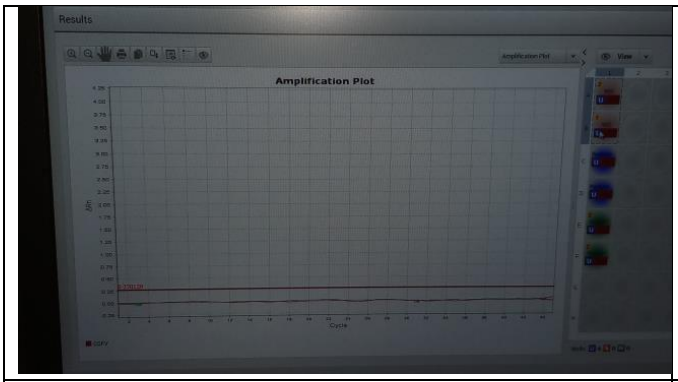
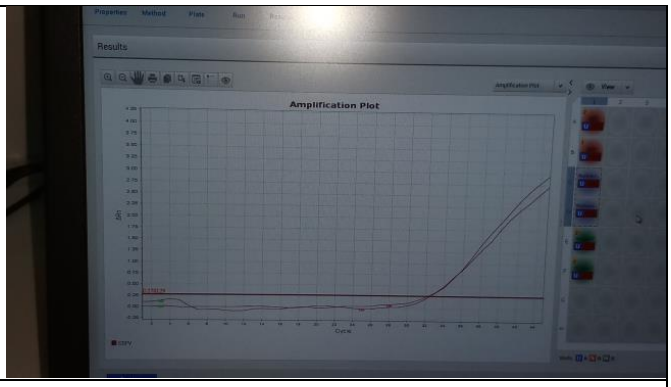
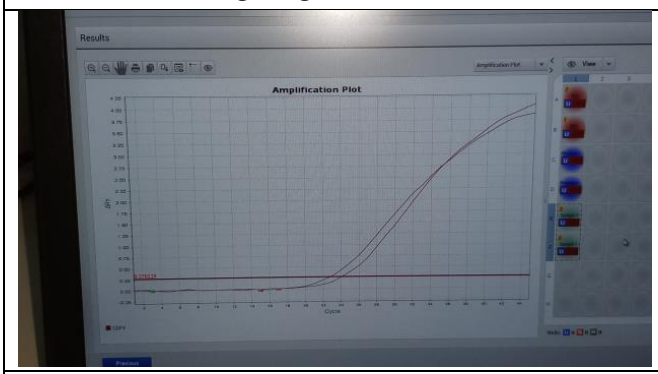
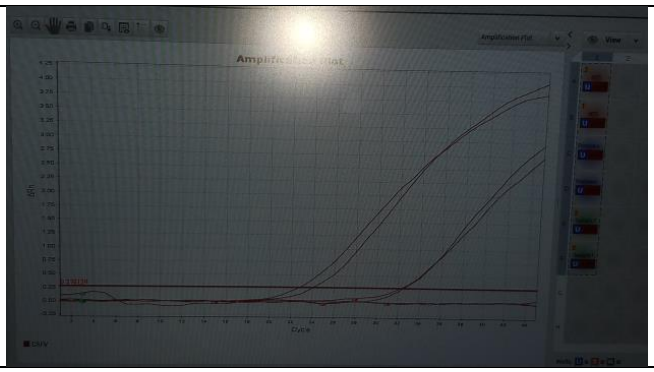
<tr><td>  </td><td>  </td></tr>
<tr><td>PCR test showing Negative control</td><td>PCR test showing positive control</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>PCR test showing sample positive to CSF</td><td>PCR test showing both sample positive to CSF and CSF positive control</td></tr>
</table>

Figure 25: PCR test for CSF

5. ACKNOWLEDGEMENTS

The National Centre for Animal Health, Serbithang would like to acknowledge all the TADInfo focal points at Regional Livestock Development Centres, Satellite Veterinary Laboratories and Dzongkhag Veterinary Hospitals for their reporting and updating the disease outbreaks into TADInfo online database system and also submitting flash report and disease outbreak investigation report.

6. REFERENCES

1. Animal Health Bulletin 2010, National Centre for Animal Health, Serbithang, Bhutan
2. Livestock Rules and Regulation of Bhutan 2008, Ministry of Agriculture, Thimphu, Bhutan
3. Dukpa, K., Robertson, I.D., Edwards, J.R., Ellis, T.M., Tshering, P., Rinzin, K. and Dahal, N. (2011) Risk factors for foot-and-mouth disease in sedentary livestock herds in selected villages in four regions of Bhutan. New Zealand Veterinary Journal 59 (2), 51-58.
4. Dukpa, K., Robertson, I.D., Edwards, J. and Ellis, T.M. (2011) A retrospective study on the epidemiology of foot-and-mouth disease in Bhutan. Tropical Animal Health and Production, 43 (2), 495-502.
5. Dubey, SC., Dahal, N., Nagarajan, S., Tosh C, Murugkar HV, Rinzin K, Sharma B, Jain R, Katare M, Patil S, Khandia R, Syed Z, Tripathi S, Behera P, Kumar M,Kulkarni DD, Krishna L. (2012). Isolation and characterization of influenza A virus (subtype H5N1) that caused the first highly pathogenic avian influenza outbreak in chicken in Bhutan. Veterinary Microbiology. 155: 100-105.
6. Tenzin., Dhand, N.K., Dorjee, J. and Ward,M.P(2010).Re-emergence of rabies in dogs and other domestic animals in eastern Bhutan, 2005–2007. Epidemiology and Infection, 139 : 220–225.
7. Tenzin., Sharma, B., Dhand, N.K., Timsina, N. and Ward, M.P. (2010). Re-emergence of rabies in Chhukha district, Bhutan, 2008. Emerging Infectious Diseases, 16: 1925−1930.
8. Tenzin., Ward, M.P. and Dhand, N.K. (2012). Epidemiology of rabies in Bhutan: Geographic Information System based analysis. The Reality of rabies: setting the scene. Compendium of the OIE Global Conference on Rabies Control (OIE eds).
9. Tenzin., Dhand, N.K. and Ward, M.P. (2012). Surveillance of animal rabies in Bhutan, 1996 – 2009. Epidemiologie en sanitarie anaimal, 59-60, 254–256.
10. Tenzin and Tshering, P. (2005): Notifiable animal disease situation in Bhutan: Review report, NCAH, Department of Livestock, MoA, and Thimphu.
11. Tenzin, Kinzang Dukpa, Yeshey Tshering, Lokay Thapa (2012). Status of notifiable animal diseases in Bhutan, 1996−2012. NCAH
12. Tenzin, Dhand, N.K and Ward, M.P (2011). Patterns of Rabies Occurrence in Bhutan between 1996 and2009. Zoonoses Public Health. 58: 463–471.
13. Thapa, N.K, Tenzin, Wangdi, K, Dorji, T, Migma, Dorjee, J, Marston, C.K, Hoffmaster, A.R. (2014). Investigation and Control of Anthrax Outbreak at the Human–Animal Interface, Bhutan, 2010. Emerging Infectious Diseases, 20: 1524-1526.
14. Status of Notifiable Animal Diseases in Bhutan 2013, NCAH, Serbithang

15. Status of Notifiable Animal Diseases in Bhutan 2014, NCAH, Serbithang
16. Status of Notifiable Animal Diseases in Bhutan 2015, NCAH, Serbithang
17. Status of Notifiable Animal Diseases in Bhutan 2016, NCAH, Serbithang
18. National FMD Prevention and Control Plan 2016, NCAH, Serbithang
19. National Rabies Prevention and Control Plan 2017, NCAH, Serbithang
20. Tenzin et al., 2018. Classical Swine Fever disease outbreak in native Pigs at Wangchutaba Pig Farm, Thimphu: Investigation report
21. Chendu et al., 2018. Rabies outbreak investigation report, Chukha
22. FMD outbreak investigation report, Sarpang

7. ANNEXURE

Annexure 1: Details of FMD outbreaks in the country, 2012-2015.

(Source: TADInfo database, NCAH)

Date	Month	Village	Geog	Dzongkhag	Species	Cases	Deaths
27-07-2012	July	Titring	Tading	Samtse	Bovine	146	2
17-08-2012	August	Thothang	Lauri	S/Jongkhar	Bovine	30	1
29-08-2012	August	Richanglo	Gomdar	S/Jongkhar	Bovine	47	1
02-09-2012	September	Khelphu	Merak	Trashigang	Bovine	111	12
03-09-2012	September	Pusa	Sakteng	Trashigang	Bovine	30	0
04-09-2012	September	Gonong	Lauri	S/Jongkhar	Bovine	30	1
07-09-2012	September	Borangmang	Sakteng	Trashigang	Bovine	43	0
16-10-2012	October	Giri Gaon	Sipsu	Samtse	Bovine	72	1
16-10-2012	October	Penjorling A	Sipsu	Samtse	Buffalo	4	
16-10-2012	October	Penjorling A	Sipsu	Samtse	Bovine	19	
16-10-2012	October	Peljorling B	Sipsu	Samtse	Bovine	119	1
17-10-2012	October	Jogimara	Sipsu	Samtse	Bovine	9	
17-10-2012	October	Hangay	Sipsu	Samtse	Buffalo	5	
17-10-2012	October	Hangay	Sipsu	Samtse	Bovine	55	
17-10-2012	October	Hangay	Sipsu	Samtse	Caprine	2	
18-10-2012	October	Khelphu	Merak	Trashigang	Bovine	387	3
15-11-2012	November	Mujuwa	N/Chhoeling	Samtse	Buffalo	5	
15-11-2012	November	Mujuwa	N/Chhoeling	Samtse	Bovine	23	
28-11-2012	November	Torsatar	Phuntsholing	Chukha	Bovine	7	0
28-11-2012	November	Torsatar	Phuntsholing	Chukha	Swine	2	
28-11-2012	November	Dagphel	Nangkor	Zhemgang	Bovine	3	1
27-12-2012	December	Jangsa	Ugentse	Samtse	Bovine	12	
07-01-2013	January	Jagarthan	Lamgong	Paro	Bovine	6	0
13-02-2013	February	Khasadrapchu	Mewang	Thimphu	Bovine	2	0
29-05-2013	May	Bunakha	Chapcha	Chukha	Bovine	10	
06-06-2013	June	Phuentsholing	Phuntsholing	Chukha	Bovine	4	
30-09-2013	September	Phuentsholing	Phuntsholing	Chukha	Bovine	16	
10-10-2013	October	Shebji	Sombeykha	Haa	Bovine/Swine	179	6
18-11-2013	November	Dangloe	Lamgong	Paro	Bovine/Swine	6	0
11-12-2013	December	Phakpashi	Drepung	Mongar	Bovine	3	0
11-12-2013	December	Phakpashi	Drepung	Mongar	Bovine	2	
18-12-2013	December	S/jongkhar	Dewathang	S/Jongkhar	Bovine	13	7
24-12-2013	December	Yarpheling	Sengye	Sarpang	Bovine	12	
29-12-2013	December	Chaebakha	Nyisho	Wangdue	Bovine	10	
30-12-2013	December	Narphung	Jangchhubling	S/Jongkhar	Bovine	2	0
30-12-2013	December	Labarbotay	Chargharey	Samtse	Bovine	5	0
08-01-2014	January	Gebjakha	Lungnyi	Paro	Bovine	3	1
23-01-2014	January	Pang Gomo	Lingmukha	Punakha	Bovine	29	

28-01-2014	January	Tongchen	Yangtse	T/ Yangtse	Bovine	28	
03-02-2014	February	Geptoe	Wangchang	Paro	Bovine	1	0
10-02-2014	February	Paga Gempa	Chapcha	Chukha	Bovine	1	
23-02-2014	February	Gelekha	Nyisho	Wangdue	Bovine	20	
25-02-2014	February	Jakar Kha	Chhokhor	Bumthang	Bovine	41	
31-03-2014	March	Chuzom	Dogar	Paro	Bovine	29	0
04-04-2014	April	Juka	Doteng	Paro	Swine	6	0
07-04-2014	April	Dekha	Shaba	Paro	Bovine	1	0
30-04-2014	April	Zor,ChhemaDung	Yalang	T/ Yangtse	Bovine	27	2
16-06-2014	June	Hilley	Samrang	S/Jongkhar	Bovine	8	
14-07-2014	July	Domphu	Dewathang	S/Jongkhar	Bovine	7	
02-09-2014	September	Drugyel school	Tsento	Paro	Bovine	3	0
14-10-2014	October	Gobja	Dangchu	Wangdue	Bovine	14	
23-10-2014	October	Gebjakha	Lungnyi	Paro	Bovine	14	0
05-02-2015	February	Nagakha	Chhubu	Punakha	Bovine	32	0
04-03-2015	March	Changyul	Guma	Punakha	Bovine	13	0
15-05-2015	May	Taraythang	Taraythang	Sarpang	Bovine	6	0
12-06-2015	June	Dangling	Umling	Sarpang	Bovine/Ovine	29	0
27-07-2015	July	Ugyen choling	Tang	Bumthang	Bovine	94	3
12-08-2015	August	Radi	Shingkhar	Zhemgang	Bovine	65	1
10-09-2015	September	Tangsibi	Ura	Bumthang	Bovine	200	0
13-09-2015	September	Bardo	Bardo	Zhemgang	Bovine	40	0
05-10-2015	October	Toktogom	Bongo	Chukha	Bovine	4	0
06-11-2015	November	Bapalathang	Chhokhor	Bumthang	Bovine	40	0
06-11-2015	November	Yumchen	Jarey	Lhuentse	Bovine	28	1
14-11-2015	November	Khuling	Tsamang	Mongar	Bovine	47	0
19-11-2015	November	Duinmang	Nangkor	Zhemgang	Bovine	3	0
24-11-2015	November	Tsenjebi	Saleng	Mongar	Bovine	73	0
24-11-2015	November	Phungyang	Yalang	T/ Yangtse	Bovine	4	0
27-12-2015	December	Shingkhey	Gasetshowom	Wangdue	Bovine	62	0
28-12-2015	December	Geptoe	Wangchang	Paro	Bovine	17	0
28-12-2015	December	Chazam	Shaba	Paro	Bovine	6	0

Annexure 2: Details of FMD outbreaks in the country, 2016-2017.

(Source: TADInfo database, NCAH)

Date	Month	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
09-02-2016	February	Samdzong	Deothang	S/Jongkhar	Bovine	29	0	1
11-02-2016	February	Bukey	Samtse	Samtse	Bovine	13	0	1
13-02-2016	February	Shegeoan	Chapcha	Chukha	Bovine	14	0	1
15-02-2016	February	Nemjo Pel	Lungnyi	Paro	Bovine	1	0	1
17-02-2016	February	Titring	Tading	Samtse	Bovine	9	0	1

26-02-2016	February	Jitti'B'	Chargharey	Samtse	Bovine	7	0	1
05-03-2016	March	Damchekha	Lokchina	Chukha	Bovine	38	0	1
05-03-2016	March	Boteykharka	Ugentse	Samtse	Bovine	11	0	1
23-03-2016	March	Tshocheykha	Genye	Thimphu	Bovine	5	0	1
01-04-2016	April	Shinkhey	GaseTshowom	Wangdue	Bovine	30	0	1
13-04-2016	April	Bichgaon	Nichula	Dagana	Bovine	9	0	1
22-05-2016	May	Tsebji	Naja	Paro	Bovine	4	0	1
28-05-2016	May	Tsebji	Naja	Paro	Bovine	3	0	0
31-05-2016	May	Tsebji	Naja	Paro	Bovine	1	0	0
01-06-2016	June	Pana 'C'	Samphelling	Chukha	Bovine	24	0	1
02-06-2016	June	Singu	Naja	Paro	Bovine	3	0	0
06-06-2016	June	Naja	Naja	Paro	Bovine	5	0	0
06-06-2016	June	Singu	Naja	Paro	Bovine	5	0	0
07-06-2016	June	Tsebji	Naja	Paro	Bovine	1	0	0
14-07-2016	July	Golanti	Langchhenphu	S/Jongkhar	Bovine	8	0	1
10-10-2016	October	Pemaling	Biru	Samtse	Bovine	2	0	1
11-10-2016	October	SJ QS	Deothang	S/Jongkhar	Bovine	30	26	1
11-01-2017	Januray	Thotney	Tading	Samtse	Bovine	16	1	1
15-02-2017	February	Namcheyla	Tashiding	Dagana	Swine	28	0	1
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	5		1
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	3		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	3		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	2		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	1		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	2		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	3		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	3		0
25-02-2017	February	Samtse	Samtse	Samtse	Bovine	3		0
31-03-2017	March	Qurantine station	Orong	Samdrup Jongkhar	Bovine	11	11	1
03-04-2017	April	Benekha	Denchukha	Samtse	Bovine	20		1
04-05-2017	May	Pangji	Lokchina	Chukha	Bovine	116	8	1
01-06-2017	June	Chhukha	Lamgong	Paro	Bovine	2	0	1
01-06-2017	June	Chhukha	Lamgong	Paro	Bovine	3	0	0
07-06-2017	June	Jingga	Lamgong	Paro	Bovine	6	0	0
11-06-2017	June	Chhukha	Lamgong	Paro	Bovine	5	0	0
11-06-2017	June	Jingga	Lamgong	Paro	Bovine	5	0	0
12-06-2017	June	Chhukha	Lamgong	Paro	Bovine	6	0	0
12-06-2017	June	Jijokha	Lamgong	Paro	Bovine	3	0	0
13-06-2017	June	Jagarthan	Lamgong	Paro	Bovine	5	1	0
14-06-2017	June	Jijokha	Lamgong	Paro	Bovine	4	0	0
20-06-2017	June	Chhukha	Lamgong	Paro	Bovine	4	0	0
21-06-2017	June	Chhukha	Lamgong	Paro	Bovine	4	2	0
21-06-2017	June	Chhukha	Lamgong	Paro	Bovine	4	2	0
23-06-2017	June	Chhukha	Lamgong	Paro	Bovine	3	1	0

26-06-2017	June	Chhukha	Lamgong	Paro	Bovine	4	0	0
25-06-2017	June	Shomo	Lamgong	Paro	Bovine	4	1	0
25-06-2017	June	Chhukha	Lamgong	Paro	Bovine	7	0	0
28-06-2017	June	Jagarthan	Lamgong	Paro	Bovine	4	0	0
30-06-2017	June	Jagarthan	Lamgong	Paro	Bovine	7	0	0
02-07-2017	July	Tenchhen	Lamgong	Paro	Bovine	2	0	0
06-07-2017	July	Damchona	Dopshari	Paro	Bovine	4	0	0
07-07-2017	July	Damchona	Dopshari	Paro	Bovine	1	0	0
07-07-2017	July	Damchona	Dopshari	Paro	Bovine	1	0	0
05-07-2017	July	Jangsa	Lungnyi	Paro	Bovine	2	0	0
08-07-2019	July	Rotogong	Dopshari	Paro	Bovine	1	0	0
08-07-2019	July	Shari	Dopshari	Paro	Bovine	1	0	0
07-09-2017	September	Bangtegang	Bongo	Chukha	Bovine	12	0	1
02-09-2017	September	Chufakilo	Genye	Thimphu	Bovine	4	0	1
04-09-2017	September	Chufakilo	Genye	Thimphu	Bovine	3	0	0

Annexure 3: Details of FMD outbreaks in the country during 2018.

(Source: TADInfo database, NCAH)

Date of first case	Month	Village	Geog	Dzongkhag	Cases	Outbreak
17-04-2018	April	Malaybasay	Samphelling	Chukha	1	1
18-04-2018	April	Malaybasay	Samphelling	Chukha	32	0
26-04-2018	April	Malaybasay	Samphelling	Chukha	5	0
29-04-2018	April	Droenja Gonpa	Lungnyi	Paro	11	1
20-05-2018	May	Above Torsatar	Phuentsholing	Chukha	19	1
24-06-2018	June	Nanglam QS	Norbugang	Pemagatshel	25	1
04-07-2018	July	Bawani	Phuntshothang	Samdrup Jongkhar	15	1
05-07-2018	July	Gomtu town	Phuentshopelri	Samtse	31	1
13-07-2018	July	Samtenling	Chang	Thimphu	40	1
31-08-2018	August	Tshogonpa	Lumang	Trashigang	9	1
02-10-2018	October	Gelephu	Gelephu	Sarpang	65	1
08-10-2018	October	Kerong	Chokhorling	Pemagatshel	60	1
09-10-2018	October	Khengzor	Khar	Pemagatshel	10	0
13-10-2018	October	Umling	Umling	Sarpang	56	0
24-10-2018	October	Mendrelgang	Dechenling	Pemagatshel	45	0
01-11-2018	November	Gelephu	Gelephu	Sarpang	558	0
01-11-2018	November	Nangkor	Shumar	Pemagatshel	6	0
05-11-2018	November	Chuzergang	Chuzergang	Sarpang	86	0
08-11-2018	November	Sershong	Sershong	Sarpang	73	0
17-11-2018	November	Nangar	Chumme	Bumthang	13	1
30-11-2018	November	Jigmeling	Dekiling	Sarpang	37	0
04-12-2018	December	Tempakha	Chubu	Punakha	57	1

04-12-2018	December	Omteykha	Lingmukha	Punakha	97	0
09-12-2018	December	Sangbaykha	Sangbaykha	Haa	77	1
12-12-2018	December	Tamidamchu	Toewang	Punakha	5	0
16-12-2018	December	Matalungchu	Thedtsho	Wangdi	28	0
22-12-2018	December	Gangtokha	Nichula	Dagana	44	1
28-12-2018	December	Guma	Guma	Punakha	2	0

Annexure 4: Details of Rabies outbreaks in the country, 2012-2015.

(Source: TADInfo database, NCAH).

Date	Month	Village	Geog	Dzongkhag	Species	Death
27-07-2012	July	Tsangchhu	Phuntsthothang	S/Jongkhar	Bovine	1
10-08-2012	August	Yub_Khezo	Jamkhar	T/ Yangtse	Bovine	1
13-08-2012	August	Golanti	Langchhenphu	S/Jongkhar	Bovine	1
13-08-2012	August	Golanti	Langchhenphu	S/Jongkhar	Canine	1
25-08-2012	August	wangtsa	Katsho	Haa	Canine	1
04-09-2012	September	RBA Colony	Dewathang	S/Jongkhar	Canine	1
04-09-2012	September	Laring	Hiley	Sarpang	Feline	1
12-09-2012	September	Golanti	Langchhenphu	S/Jongkhar	Bovine	5
09-10-2012	October	Phuentsholing	Phuntsholing	Chukha	Canine	1
10-10-2012	October	Phuentsholing	Phuntsholing	Chukha	Canine	1
10-10-2012	October	RBA Colony	Dewathang	S/Jongkhar	Canine	1
12-10-2012	October	Chumkuna	Phuntsholing	Chukha	Canine	1
25-10-2012	October	Gelephu	Gelephu	Sarpang	Canine	1
28-10-2012	October	Kuwapani	Hiley	Sarpang	Caprine	1
13-11-2012	November	Gelephu	Gelephu	Sarpang	Bovine	1
17-11-2012	November	Chenari	Dewathang	S/Jongkhar	Canine	1
17-11-2012	November	Chenari	Dewathang	S/Jongkhar	Bovine	1
17-11-2012	November	Chenari	Dewathang	S/Jongkhar	Feline	1
06-12-2012	December	Pelrithang	Gelephu	Sarpang	Feline	1
20-12-2012	December	Pelrithang	Gelephu	Sarpang	Canine	1
22-12-2012	December	Gelephu	Gelephu	Sarpang	Bovine	1
05-01-2013	January	Phuentsholing	Phuntsholing	Chukha	Canine	1
07-01-2013	January	Gelephu	Gelephu	Sarpang	Canine	1
12-01-2013	January	Phuentsholing	Phuntsholing	Chukha	Canine	1
18-01-2013	January	Sarkitar	Samtse	Samtse	Canine	1
22-02-2013	February	BCCL Colony	Samphelling	Chukha	Bovine	1
24-02-2013	February	Phuentsholing	Phuntsholing	Chukha	Canine	1
26-02-2013	February	BCCL Colony	Samphelling	Chukha	Bovine	1
12-03-2013	March	DVH Samtse	Samtse	Samtse	Bovine	1
28-03-2013	March	Phuentsholing	Phuntsholing	Chukha	Canine	1
28-03-2013	March	Phuentsholing	Phuntsholing	Chukha	Canine	3
02-04-2013	April	Deptshang	Serthig	S/Jongkhar	Bovine	5
04-04-2013	April	Samtse	Samtse	Samtse	Canine	1

22-05-2013	May	Malaybasay	Samphelling	Chukha	Canine	1
12-06-2013	June	Lower Toribari	Phuntsholing	Chukha	Bovine	1
24-07-2013	July	Phuentsholing	Phuntsholing	Chukha	Canine	1
06-10-2013	October	Pana 'A'	Samphelling	Chukha	Bovine	1
14-11-2013	November	RBA Colony	Dewathang	S/Jongkhar	Canine	1
25-11-2013	November	Bukey	Samtse	Samtse	Bovine	1
13-12-2013	December	Samdrupling	Dewathang	S/Jongkhar	Bovine	1
01-03-2014	March	Dolungang	Dekiling	Sarpang	Bovine	2
04-03-2014	March	DVH Samtse	Samtse	Samtse	Bovine	1
20-03-2014	March	Yeuling	Chhuzagang	Sarpang	Canine	1
25-03-2014	March	Chaskar	Chhuzagang	Sarpang	Bovine	1
31-03-2014	March	Kaphung	Sherzhong	Sarpang	Bovine	2
17-04-2014	April	Kalimati	Sipsu	Samtse	Bovine	1
22-04-2014	April	Phuentsholing	Phuntsholing	Chukha	Canine	1
01-05-2014	May	Gelephu	Gelephu	Sarpang	Canine	5
05-05-2014	May	Gaden	Umling	Sarpang	Canine	2
13-05-2014	May	Sarpangtar	Shompangkha	Sarpang	Canine	1
20-05-2014	May	Pelrithang	Gelephu	Sarpang	Canine/bovine	2
21-05-2014	May	Rai Gaon	Ugentse	Samtse	Bovine	1
10-06-2014	June	Pelrithang	Gelephu	Sarpang	Bovine	1
10-06-2014	June	Pemaling	Sherzhong	Sarpang	Bovine	1
24-06-2014	June	Phuentsholing	Phuntsholing	Chukha	Canine	1
08-07-2014	July	Pakhaygaun	Shompangkha	Sarpang	Canine	1
16-07-2014	July	DVH Samtse	Samtse	Samtse	Canine	1
05-08-2014	August	Sukreti	Samtse	Samtse	Bovine	1
07-08-2014	August	Gaden	Umling	Sarpang	Bovine	1
29-08-2014	August	Dzomlingthang	Gelephu	Sarpang	Canine	1
05-09-2014	September	DVH Samtse	Samtse	Samtse	Canine	2
08-09-2014	September	Dekiling	Dekiling	Sarpang	Bovine	1
12-09-2014	September	Serzhong	Sherzhong	Sarpang	Bovine	1
21-09-2014	September	Bhimtar	Chengmari	Samtse	Canine	1
17-10-2014	October	Pelrithang	Gelephu	Sarpang	Caprine	1
09-12-2014	December	Dzomlingthang	Gelephu	Sarpang	Bovine	1
29-12-2014	December	Phuentsholing	Phuntsholing	Chukha	Canine	2
08-01-2015	January	Pelrithang	Gelephu	Sarpang	Bovine	1
16-01-2015	January	Pelrithang	Gelephu	Sarpang	Bovine	1
23-01-2015	January	Pelrithang	Gelephu	Sarpang	Bovine	1
23-01-2015	January	Pelrithang	Gelephu	Sarpang	Bovine	1
05-02-2015	February	Lahatar	Pagli	Samtse	Bovine	1
11-02-2015	February	Pelrithang	Gelephu	Sarpang	Bovine	1
11-02-2015	February	Balatung	Sengye	Sarpang	Canine	1
14-02-2015	February	Bukey	Samtse	Samtse	Bovine	1
14-02-2015	February	Bukey	Samtse	Samtse	Caprine	1
14-02-2015	February	Bukey	Samtse	Samtse	Canine	2

14-02-2015	February	Bukey	Samtse	Samtse	Bovine	1
02-03-2015	March	Lewkhop	Dekiling	Sarpang	Bovine	1
14-03-2015	March	Uttarey/Sangla	Pagli	Samtse	Bovine	1
27-03-2015	March	Dzomlingthang	Gelephu	Sarpang	Bovine	1
24-04-2015	April	Pelrithang	Gelephu	Sarpang	Bovine	1
06-05-2015	May	Pelrithang	Gelephu	Sarpang	Caprine	1
11-05-2015	May	Chhar	Shompangkha	Sarpang	Bovine	2
16-05-2015	May	Pelrithang	Gelephu	Sarpang	Bovine	1
14-06-2015	June	Phuentsholing	Phuntsholing	Chukha	Bovine	3
29-06-2015	June	Malaybasay	Samphelling	Chukha	Caprine	2
11-08-2015	August	Saureni	Samtse	Samtse	Bovine	2
17-09-2015	September	Norbuling	Sherzhong	Sarpang	Canine	3
24-11-2015	November	Tala Busty	Langchhenphu	S/Jongkhar	Bovine	1
18-12-2015	December	Dugsa	Jangchhubling	S/Jongkhar	Canine/Bovine	4 & 2
31-12-2015	December	Khare Pakhey	Shompangkha	Sarpang	Swine	1

Annexure 5: Details of Rabies outbreaks in the country, 2016-2017.

(Source: TADInfo database, NCAH)

Date	Month	Village	Geog	Dzongkhag	Species	Deaths	Outbreak
08-01-2016	January	Namkhaling	Gelephu	Sarpang	Canine	1	1
11-01-2016	January	Gonpa	Jangchhubling	S/Jongkhar	Bovine	1	1
21-01-2016	January	Narphung	Jangchhubling	S/Jongkhar	Canine	1	1
22-01-2016	January	Gonpa	Jangchhubling	S/Jongkhar	Bovine	1	0
22-01-2016	January	Lower Langchenphu	Langchhenphu	S/Jongkhar	Canine	1	1
31-01-2016	January	Charkilo	Dewathang	S/Jongkhar	Canine	1	1
02-02-2016	February	Narphung	Jangchhubling	S/Jongkhar	Canine	1	0
04-02-2016	February	RICB Sjongkhar	Dewathang	S/Jongkhar	Canine	1	0
07-02-2016	February	Pelrithang	Gelephu	Sarpang	Bovine	1	0
26-02-2016	February	Boti kharka	ugyentse	Samtse	Canine	1	1
27-02-2016	February	RBA Samtse	Samtse	Samtse	Canine	1	1
02-03-2016	March	Baazar Area	Pagli	Samtse	Bovine	1	1
02-03-2016	March	Daragaon	Samphelling	Chukha	Bovine	1	0
03-03-2016	March	Ahally	Samphelling	Chukha	Canine	1	1
28-03-2016	March	Haa town	Uesu	Haa	Canine	1	0
07-04-2016	April	Pelrithang school	Gelephu	Sarpang	Canine	1	1
12-04-2016	April	Rabdeyling	Gelephu	Sarpang	Canine	1	0
15-04-2016	April	Khairayne-torsa	Phuntsholing	Chukha	Canine	1	1
18-04-2016	April	Lamatar	Samtse	Samtse	Bovine	1	1
05-04-2016	April	Pelrithang	Gelephu	Sarpang	Bovine	1	0
28-07-2016	July	Merak	Merak	Trashigang	Canine	1	1
13-08-2016	August	Serkem Laptsa	Merak	Trashigang	Yak	1	0
13-08-2016	August	Wooling	Jangchhubling	S/Jongkhar	Canine	1	1
24-08-2016	August	Ahally	Samphelling	Chukha	Canine	1	0

17-09-2016	September	Boteykharka	Ugentse	Samtse	Canine	1	0
07-10-2016	October	Rai Gaon	Ugentse		Bovine	1	1
07-10-2016	October	Tsakaling	Yoeseltse	Samtse	Bovine	1	1
18-10-2016	October	Bhimtar-Hat khola	Chengmari	Samtse	Canine	1	1
21-10-2016	October	Wooling	Jangchhubling	S/Jongkhar	Bovine	1	0
06-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	1
07-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	0
12-10-2016	October	Rangjung town	Shongphu	Trashigang	canine	1	0
14-10-2016	October	Rangjung Chongthi	Shongphu	Trashigang	Feline	1	0
17-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	0
17-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	0
17-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	0
17-10-2016	October	Rangjung School	Shongphu	Trashigang	canine	1	0
18-10-2016	October	Sakteng	Sakteng	Trashigang	Bovine	1	1
20-10-2016	October	Rangjung town	Shongphu	Trashigang	canine	1	0
02-11-2016	November	Lekithang	Gelephu	Sarpang	Canine	1	1
07-11-2016	November	Radi Khatoe	Radi	Trashigang	canine	1	1
11-11-2016	November	Trashigang town	Samkhar	Trashigang	canine	1	1
11-12-2016	December	Trashigang town	Samkhar	Trashigang	canine	1	0
29-11-2016	November	Rangjung School	Shongphu	Trashigang	canine	1	0
29-11-2016	November	Radi Pakaling	Radi	Trashigang	canine	1	0
01-12-2016	December	Buna	Shongphu	Trashigang	Bovine	1	0
03-12-2016	December	Tokshingmang	Radi	Trashigang	canine	1	0
03-12-2016	December	Radi bazar	Radi	Trashigang	canine	1	0
04-12-2016	December	Dekiling	Radi	Trashigang	Bovine	1	0
11-12-2016	December	Goumounay	Samphelling	Chukha	Canine	1	1
04-12-2016	December	Buna	Shongphu	Trashigang	Bovine	1	0
05-12-2016	December	Tsangkhar	Radi	Trashigang	canine	1	0
16-12-2016	December	Langten	Radi	Trashigang	Bovine	1	0
18-12-2016	December	Buna	Shongphu	Trashigang	Bovine	1	0
26-12-2016	December	Pemathang	Gelephu	Sarpang	Bovine	1	1
29-12-2016	December	Dekiling	Radi	Trashigang	Bovine	1	0
31-12-2016	December	Thonkorong	Orong	S/Jongkhar	canine	1	1
18-01-2017	January	Pelrithang	Gelephu	Sarpang	Bovine	1	1
07-01-2017	January	Samdrup Jongkhar	Orong	Sjongkhar	Dog	1	1
11-02-2017	February	Lower Langchenphu	Langchhenphu	Sjongkhar	Bovine	1	1
08-03-2017	March	Girigoan	Chengmari	Samtse	Bovine	1	1
17-01-2017	January	Nyabasti	Samphelling	Chukha	Dog	1	1
29-01-2017	January	Kharkhola	Samphelling	Chukha	Dog	1	0
08-02-2017	February	Phuentsholing-GOL building	Phuntsholing	Chukha	Dog	1	0
08-02-2017	February	Nyabasti	Samphelling	Chukha	Dog	1	0
08-02-2017	February	Nyabasti	Samphelling	Chukha	Dog	1	0
05-04-2017	April	Balatung	Sengye	Sarpang	Bovine	1	1
07-04-2017	April	Penjorling A	Sipsu	Samtse	Dog	1	1

11-05-2017	May	Bahaunitar	Chargharey	Samtse	Bovine	1	1
19-06-2017	June	Gelephu	Gelephu	Sarpang	Bovine	1	1
16-03-2017	March	Karmaling	Deorali	Dagana	Dog	1	1
14-07-2017	July	Samrang	Samrang	S/Jongkhar	Dog	1	1
05-08-2017	August	Pelrithang	Gelephu	Sarpang	Bovine	1	1
01-07-2017	July	Samtse	Samtse	Samtse	Dog	1	1
03-08-2017	August	Lower Ghathia	Chargharey	Samtse	Bovine	1	1
14-08-2017	August	Dzomlingthang	Gelephu	Sarpang	Bovine	1	1
27-05-2017	May	Samphelling	Samphelling	Chukha	Dog	1	1
09-09-2017	September	Phuntsholing	Phuntsholing	Chukha	Equine	1	1
08-01-2017	January	Rangjung Chongthi	Shongphu	Trashigang	Dog	1	1
02-01-2017	January	Buna VTI	Shongphu	Trashigang	Dog	1	0
06-02-2017	February	Yangchenma	Bidung	Trashigang	Dog	1	0
09-02-2017	February	Rangjung Duthroe	Shongphu	Trashigang	Dog	1	0
10-02-2017	February	Dekiling	Radi	Trashigang	Dog	1	0
10-02-2017	February	Dramang	Shongphu	Trashigang	Bovine	1	0
24-02-2017	February	Restong	Samkhar	Trashigang	Dog	1	0
14-02-2017	February	Drungoenpa	Radi	Trashigang	Dog	1	0
24-02-2017	February	Dupwang_galing	Shongphu	Trashigang	Dog	1	0
14-03-2017	March	Dupwang_galing	Shongphu	Trashigang	Dog	1	0
14-03-2017	March	Dupwang_galing	Shongphu	Trashigang	Dog	1	0
14-03-2017	March	Dupwang_galing	Shongphu	Trashigang	Dog	1	0
15-03-2017	March	Kibuhoeling lhakhang	Shongphu	Trashigang	Dog	1	0
18-03-2017	March	RCS	Shongphu	Trashigang	Dog	1	0
25-03-2017	March	Galing gonpa	Shongphu	Trashigang	Dog	1	0
25-03-2017	March	Trashigang	Samkhar	Trashigang	Dog	1	0
28-03-2017	March	Changmey	Shongphu	Trashigang	Dog	1	0
29-03-2017	March	Dupwang_galing	Shongphu	Trashigang	Bovine	1	0
01-04-2017	April	Dupwang_galing	Shongphu	Trashigang	Dog	1	0
15-04-2017	April	RCS	Shongphu	Trashigang	Dog	1	0
09-05-2017	May	RCS	Shongphu	Trashigang	Dog	1	0
14-06-2017	June	Dupwang_galing	Shongphu	Trashigang	Bovine	1	0
26-06-2017	June	Radi bazar	Radi	Trashigang	Dog	1	0
03-09-2017	September	Tungudempa	Ngangla	Zhemgang	Dog	1	1
11-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0
14-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0
14-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0
15-09-2017	September	Marangdut	Ngangla	Zhemgang	Bovine	1	0
15-09-2017	September	Tungudempa	Ngangla	Zhemgang	Dog	1	0
17-09-2017	September	Sonamthang (lower)	Ngangla	Zhemgang	Dog	1	0
17-09-2017	September	Sonamthang (upper)	Ngangla	Zhemgang	Dog	1	0
17-09-2017	September	Marangdut	Ngangla	Zhemgang	Bovine	1	0
19-09-2017	September	Panbang	Ngangla	Zhemgang	Dog	1	0
19-09-2017	September	Sonamthang (lower)	Ngangla	Zhemgang	Dog	1	0
22-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0

23-09-2017	September	Marangdut	Ngangla	Zhemgang	Bovine	1	0
24-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0
25-09-2017	September	Tungudempa	Ngangla	Zhemgang	Dog	1	0
26-09-2017	September	Marangdut	Ngangla	Zhemgang	Bovine	1	0
27-09-2017	September	Thinleygang	Ngangla	Zhemgang	Dog	1	0
28-09-2017	September	Sonamthang	Ngangla	Zhemgang	Dog	1	0
29-09-2017	September	Sonamthang dratshang	Ngangla	Zhemgang	Dog	1	0
02-10-2017	October	Tungudempa	Ngangla	Zhemgang	Bovine	1	0
03-10-2017	October	Thinleygang	Ngangla	Zhemgang	Bovine	1	0
03-10-2017	October	Tungudempa	Ngangla	Zhemgang	Bovine	1	0
07-10-2017	October	Marangdut	Ngangla	Zhemgang	Bovine	1	0
10-10-2017	October	Marangdut	Ngangla	Zhemgang	Bovine	1	0
17-10-2017	October	Marangdut	Ngangla	Zhemgang	Bovine	1	0
23-12-2017	December	Tendruk	Tendruk	Samtse	Bovine	1	1

Annexure 6: Details of Rabies outbreaks in the country during 2018.

(Source: TADInfo database, NCAH)

Date of first case	Month	Village	Geog	Dzongkhag	Cases	Outbreak
26-01-2018	January	Torsa	Phuentsholing	Chhukha	1	1
26-01-2018	January	RCS	Shongphu	Trashigang	1	0
12-02-2018	February	Rangjung Chongthi	Shongphu	Trashigang	1	0
28-02-2018	February	Khaireney	Phuentsholing	Chhukha	1	0
28-02-2018	February	Phugaygoan	Bangra	Samtse	1	1
03-03-2018	March	Torsa	Phuentsholing	Chhukha	1	0
17-03-2018	March	Pachudara	Phuentsholing	Chhukha	1	0
23-03-2018	March	Barshong	Chuzagang	Sarpang	1	1
28-03-2018	March	Samtenling	Samtenling	Sarpang	1	1
18-04-2018	April	Tendu Central School	Tendru	Samtse	1	1
22-04-2018	April	Sipsu	Tashicholing	Samtse	1	1
18-05-2018	May	Singaygang	Tashicholing	Samtse	1	0
14-05-2018	May	Pelrithang	Gelephu	Sarpang	1	1
15-05-2018	May	Lower Peljorling	Tashicholing	Samtse	1	0
27-05-2018	May	Jigmeling	Dekiling	Sarpang	1	1
20-06-2018	June	Jigmeling	Dekiling	Sarpang	1	0
25-06-2018	June	Norbuling School	Serzhong	Sarpang	1	1
02-07-2018	July	Jigmeling	Dekiling	Sarpang	1	0
07-07-2018	July	Tshojan	Chuzagang	Sarpang	1	1
08-07-2018	July	Chuzargang	Chuzagang	Sarpang	1	0
09-07-2018	July	Barthang	Chuzagang	Sarpang	1	0
25-07-2018	July	Sipsu	Tashicholing	Samtse	1	0
26-07-2018	July	Lekithang	Gelephu	Sarpang	1	0
24-08-2018	August	Shivalaya	Sibsoo	Samtse	1	0

05-09-2018	September	Layul_Margaon	Chudzom	Sarpang	1	1
13-10-2018	October	Toribari	Samphelling	Chhukha	1	1
08-10-2018	October	Chimuna	Logchina	Chhukha	1	0
09-10-2018	October	Merak LEC	Merak	Trashigang	1	0
17-10-2018	October	Radi MSS	Radi	Trashigang	1	0
18-10-2018	October	Pakaling	Radi	Trashigang	1	0
28-10-2018	October	Dekiling	Radi	Trashigang	1	0

Annexure 7: Details of IBD outbreaks in the country, 2014-2015.

(Source: TADInfo database, NCAH).

Date	Month	Village	Geog	Dzongkhag	Species	Cases	Deaths
06-04-2014	April	Rani Bagan	Hiley	Sarpang	Avian	1120	1120
06-04-2014	April	Patabari	Shompangkha	Sarpang	Avian	2450	1106
08-04-2014	April	Juprey	Bhur	Sarpang	Avian	4150	865
19-05-2014	May	Gawaithang	Dekiling	Sarpang	Avian	657	657
30-05-2014	may	Lower Lobsibotay	Goserling	Tsirang	Avian	4571	2230
31-05-2014	may	LowerTsholingkha	Tsholingkhar	Tsirang	Avian	1000	252
05-06-2014	June	Sarpangtar	Shompangkha	Sarpang	Avian	350	350
11-06-2014	June	Petakarpo	Thedtsho	Wangdue	Avian	901	734
16-06-2014	June	Chhoekhorling	Dekiling	Sarpang	Avian	47	13
08-07-2014	July	Juprey	Bhur	Sarpang	Avian	48	17
08-07-2014	July	Chhuzomsa	Beteni	Tsirang	Avian	881	297
11-07-2014	July	Jaruwa	Bhur	Sarpang	Avian	6	3
19-07-2014	July	Chhoekhorling	Dekiling	Sarpang	Avian	29	11
21-07-2014	July	Khorsanay	Dunglegang	Tsirang	Avian	600	103
23-07-2014	July	Norbugang	Shompangkha	Sarpang	Avian	60	37
25-07-2014	July	Charkilo	Genye	Thimphu	Avian	44	36
01-08-2014	August	Patabari	Shompangkha	Sarpang	Avian	55	29
01-08-2014	August	Dekiling	Dekiling	Sarpang	Avian	62	27
06-08-2014	August	Chilikhar	Toepisa	Punakha	Avian	385	385
07-08-2014	August	Chhoekhorling	Dekiling	Sarpang	Avian	12	5
11-08-2014	August	Juprey	Bhur	Sarpang	Avian	35	17
22-08-2014	August	Lower Bokray	Kikorthang	Tsirang	Avian	495	215
27-08-2014	August	Rani Bagan	Hiley	Sarpang	Avian	700	500
15-03-2015	March	Pemathang	Goserling	Tsirang	Avian	500	28
21-04-2015	April	Dekiling	Dekiling	Sarpang	Avian	16	16
14-05-2015	May	Kencholing	Shompangkha	Sarpang	Avian	5	4
02-07-2015	July	Rani Bagan	Hiley	Sarpang	Avian	44	38
13-12-2015	December	Tingtibhi	Trong	Zhemgang	Avian	1400	400

Annexure 8: Details of IBD outbreaks in the country, 2016-2017.

(Source: TADInfo database, NCAH).

Date	Month	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreaks
01-04-2016	April	Dekiling	Dekiling	Sarpang	Avian	300	80	1
09-04-2016	April	Chuzomsa	Beteni	Tsirang	Avian	300	90	1
19-04-2016	April	Gawaithang	Dekiling	Sarpang	Avian	328	65	1
24-05-2016	May	Dolungang	Dekiling	Sarpang	Avian	120	45	1
08-06-2016	June	Kikhorthang	Goserling	Tsirang	Avian	3500	400	1
07-10-2016	Oct	Rani Bagan	Hiley	Sarpang	Avian	1000	789	1
12-12-2016	Dec	Tashiling	Dekiling	Sarpang	Avian	556	120	1
03-06-2017	June	Uttarey/Broiler farm	Pagli	Samtse	Avian	250	250	1

Annexure 9: Details of IBD outbreaks in the country during 2018.

(Source: TADInfo database, NCAH).

Date of first case	Month	Village	Geog	Dzongkhag	Species	Cases	Death	Outbreak
21-11-2018	November	Getemkha	Gakiling	Sarpang	Avian	250	250	1

Annexure 10: Details of HPAI outbreaks in the country, 2012-2015.

(Source: TADInfo database, NCAH).

Date	Month	Village	Geog	Dzongkhag	Species	Cases
13-01-2012	January	Motithang	Chang	Thimphu	Avian	49
04-01-2012	January	Tshemakha	Bjachho	Chukha	Avian	87
06-01-2012	January	Mepesa	Bjachho	Chukha	Avian	16
08-01-2012	January	Mepaiarig	Bjachho	Chukha	Avian	3
28-01-2012	January	Kamji school area	Gayling	Chukha	Avian	4
30-01-2012	January	Bunakha	Chapcha	Chukha	Avian	38
19-02-2012	February	Gedu	Bongo	Chukha	Avian	10
14-02-2012	February	Wangdi Gasel	Phuntsholing	Chukha	Avian	12
27-03-2012	March	Yangbari	Gongdue	Mongar	Avian	70
14-10-2012	October	Wangdi Gasel	Phuntsholing	Chukha	Avian	24
27-12-2012	December	Kalikhola	Lhamoizingkha	Dagana	Avian	18
03-03-2012	March	Burkhay	Samphelling	Chukha	Avian	1
10-02-2012	February	Alay	Phuntsholing	Chukha	Avian	5
15-02-2012	February	Thakuri Gaon	Ugentse	Samtse	Avian	12
14-10-2012	October	Wangdi Gasel	Phuntsholing	Chukha	Avian	24
27-12-2012	December	Kalikhola	Lhamoizingkha	Dagana	Avian	18

15-01-2013	January	Gelephu	Gelephu	Sarpang	Avian	50
18-01-2013	January	Pelrithang	Gelephu	Sarpang	Avian	8
25-01-2013	January	Shawapang	Chhuzagang	Sarpang	Avian	6
03-04-2015	April	Motithang	Chang	Thimphu	Avian	16

Annexure 11: Details of HPAI outbreaks in the country, 2016-2017.

(Source: TADInfo database, NCAH)

Date	Village	Geog	Dzongkhag	Species	Cases	Outbreak
14-10-2016	Wangkha	Bjachho	Chukha	Avian	13	1
2017						no outbreak

Annexure 12: Details of HPAI outbreaks in the country during 2018.

(Source: TADInfo database, NCAH).

Date of first case	Month	Village	Geog	Dzongkhag	Species	Cases	Outbreak
06-03-2018	March	Zangdopelri	Deothang	S/Jongkhar	Poultry	60	1
18-03-2018	March	Kalapani	Phuentshopelri	Samtse	Poultry	381	1

Annexure 13: Details of CSF outbreaks in the country, 2013-2015.

(Source: TADInfo database, NCAH).

Date	Month	Village	Geog	Dzongkhag	Species	Cases	Deaths
01-04-2013	April	Bapalathang	Chhokhor	Bumthang	Swine	1	1
13-08-2013	August	Damchu	Chapcha	Chukha	Swine	2	1
21-11-2013	November	Phumu	Doteng	Paro	Swine	9	1
Year 2014							nil
23-10-2015	October	Dungbi	Trong	Zhemgang	Swine	1	1

Annexure 14: Details of CSF outbreaks in the country, 2016-2017.

(Source: TADInfo database, NCAH).

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
01-09-2016	Waklaytar	Patale	Tsirang	Swine	9	9	1
2017			Paro	Swine			1
2017		Gelephu	Sarpang	Swine			1

Annexure 15: Details of CSF outbreaks in the country during 2018.

(Source: TADInfo database, NCAH).

Date of first case	Month	Location	Geog	Dzongkhag	Species	Cases	Death	Outbreak
04-02-2018	April	Wangchutaba	Chang	Thimphu	Pig	35	3	1
01-08-2018	August	Dotey	Doteng	Paro	Pig	1	1	1
20-10-2018	October	Resgarang	Mongar	Mongar	Pig	7	3	1
24-10-2018	October	Gangola	Mongar	Mongar	Pig	11	5	0

Note: *outbreaks were defined by considering the temporal and spatial distribution plus the incubation period of the disease and thus some cases were reflected as zero ,indicating continuation of the previous outbreaks.*

Annexure 16: Details of vaccine procured and distributed to various dzongkhags and central units for disease prevention and control, FY 2017-18.

(Source: BPU, NCAH).

Sl. No.	Dzongkhags/ Central Units	Locally Produced	Imported									
		Anthrax	SF	FMD Oil	HSBQ	IBD	Fowl Pox	NDB_1	R_2B	Marek's	Rabisin	DHPPi + L	PPR
	Dzongkhags												
1	Bumthang			6000	2100	2000	2500		1000		600		
2	Chhukha			10000	510	169600	15000	118000	40000		1000		
3	Dagana		600	8000	5400	2000		7200	3200		710		
4	Gasa			1000	510						150	4	
5	Haa			3000	420	5800	7500	2800	4400	2000	1200	20	
6	Lhuentse			6500	3090	20000	5000	8000	7000	10000			
7	Mongar			21400	5100	40000		19000	19000		1000		
8	Paro		100	4600	1050	50000	20000	22000	20000		1300	244	
9	Pemagatshel			3000	3000	40000	2500	20000	10000	5000	700		
10	Punakha			10000	5490	29000	6000	10600	20000		1300	25	
11	S/Jongkhar			10000	5100	40000	5000	12000	10000	20000	1500		
12	Samtse		300	36500	3000	310000	41000	203000	40000	20000	4000	50	800
13	Sarpang		600	17500	4500	792000	340000	310000	230000		2200		2000
14	Thimphu			9100	900	34200	14500	22200	15500		900		
15	Trashigang			16500	5100	40000		40000	20000		2000	20	
16	Trashiyangtse			12500	3600	800	2000	600	1000	3000	700		
17	Trongsa			5500	3990	11600	1000	1000	6000		300	20	
18	Tsirang		900	11000	3000	252000	45000	125000	60000		2000	20	
19	Wangdue Phodrang			12000	4650	70000	25000	36000	50000	5000	2800	75	

20	Zhemgang			200	3480	21800	5500	11200	17100		1000		
	Central Units												
1	NDDC, Yusipang			150	90								
2	BSF, Bumthang			600	450								
3	NJBC, Samtse	200		400	300								
4	NNBF, Trashiyangphu			700	480						20		
5	NPoDC, Sarpang					103000	38000	20600	42000	200000			
6	NPBC, Yusipang		450	1200									
7	NSBC, Bumthang												
8	NPiDC, Gelephu		2200	1000									
9	Calf Rearing Centre,Wangkha				210								
10	RPPBC, Lingmethang		400	650		10000	7000	7000	3500	100000			
11	RMBF, Arong			100	90						20		
12	RMBF, Wangdigang												
13	RPBC, Paro					14000	1000	6000	5000	53000			
14	National Animal Hospital										2700	31	
15	Private Poultry Farm					78400	5000	42600	14000	150000			
16	RDC Jakar, Samrang			350	360	76600	31000	25600	51000	5000			100
17	RLDC Wangdue												
18	RLDC Tsimasham										850	25	
19	RLDC Zhemgang										400	70	
20	RLDC Kanglung											6	
21	NDPM & RCP (HSI)										1300		
22	Local Use / Campaign											1	
	Total doses distributed	**200**	**5550**	**209450**	**65970**	**2212800**	**619500**	**1070400**	**689700**	**573000**	**30650**	**611**	**2900**
	Vaccines produced/procured	2000	5700	240000	81000	2100000	750000	1000000	600000	550000	32000	800	10000

Annexure 17: Laboratory diagnostic capacity at NCAH, Serbithang.

(Source: LSU, NCAH)

Disease	Bhutan*	OIE**
Anthrax	Agent identification	-
Foot and mouth disease	ELISA, real time RT-PCR, Rapid test	ELISA, VN, CF
Leptospirosis	Agent identification, MAT	MAT
Paratuberculosis (JD)	ELISA	ELISA, DHT
Rabies	Rapid test, FAT, RIAD, VNT	ELISA, VN
Trichinellosis	Agent identification	Agent identification, ELISA
Trypanosomiasis	Agent identification	-
AI (A, H5N1, H7N9)	Real time RT-PCR, HAI, Rapid test	VI, AGID, HAI
Avian Mycoplasmosis	ELISA, SAT	SAT, HAI
Salmonellosis	Agent identification	-
E coli	Agent identification	-

Staphylococcus aureus	Agent identification	-
IBD (Gumboro disease)	ELISA, Rapid test	ELISA, AGID
NCD	Real time RT-PCR	VI, HAI
Bovine anaplasmosis	Agent identification	CAT, CF
Bovine babesiosis	Agent identification	CF, ELISA, IFA
Bovine brucellosis	RBT, MRT, ELISA , Conventional PCR	BBAT, CF, ELISA, FPA
Bovine cysticercosis	Agent identification	Agent identification
Bovine tuberculosis	IDT	IDT, IFN gamma
Bovine viral diarrhoea	ELISA	Agent identification
CBPP	ELISA	ELISA, CF
HS	Agent identification, Conventional PCR	Agent identification
IBR	ELISA	Agent identification, ELISA, PCR, VN
Theileriosis	Agent identification	Agent identification, IFA
Trypanosomiasis	Agent identification	IFA
EI	Rapid test, ELISA	AGID, ELISA
Equine piroplasmosis	Agent identification	ELISA, IFA, CF
PPR	Rapid test, ELISA	VN, ELISA
CSF	Real time RT-PCR, ELISA	ELISA, FAVN, NPLA
PPMV	Real time RT-PCR	
PRRS	Real time RT-PCR	ELISA, IFA, IPMA
Toxoplasmosis	ELISA	Agent identification
African Swine fever	Real time PCR	Real time PCR
CCHF	ELISA, IF test	-
CPV	Rapid test	-
CD	Rapid test, ELISA	-
AMR	Disk diffusion	Disk diffusion, MIC (Agar dilution and broth micro dilution)
Mastitis	CMT	Cell count
Fascioliasis	Agent identification, ELISA	Agent identification
Fungal infection	Agent identification	-
Aflatoxin	ELISA, Rapid test	-
Ochratoxin	ELISA, Rapid test	-
Fuminosin	ELISA, Rapid test	-
Mineral estimation (P, Ca and Mg)	ELISA	-

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