



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 2016

## VOLUME 3 ISSUE 6

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

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## FOREWORD

This bulletin on Status of Notifiable Animal Diseases in Bhutan for 2016 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 2016. 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 field livestock staff, veterinarians, central and regional farms and decision makers. The information contained in this report could also be used for preparedness and response plans by the concerned government agencies responsible for disease prevention and control.

During 2016, three major disease outbreaks has occurred in the country. Firstly, there was an incursion of rabies in Orong geog under Samdrup Jongkhar Dzongkhag from the bordering town, but was contained through implementation of emergency mass dog vaccination. Secondly, for the first time, rabies outbreak was confirmed on 29 July 2016 at Merak Geog that subsequently spread to Radhi, Rangjung and Trashigang town. The large number of free-roaming dogs and its movement has led to spread of rabies virus from dogs to dogs. The NCAH, RLDC Khangma and Dzongkhag Livestock Sector Trashigang has been implementing strategic and rapid containment measures to eliminate the infection foci and prevent establishment of endemicity in the region. Thirdly, an outbreak of HPAI H5N1 was reported in a backyard farm at Alubari-Wangkha under Chukha Dzongkhag which was immediately contained following implementation of the NIPPP.

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 VO of 20 Dzongkhags; Managers of livestock farms for their support and cooperation. I would like to thank in particular Dr. Tenzin and Mr. Lokey Thapa, 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. Kinzang Dukpa

**Program Director**

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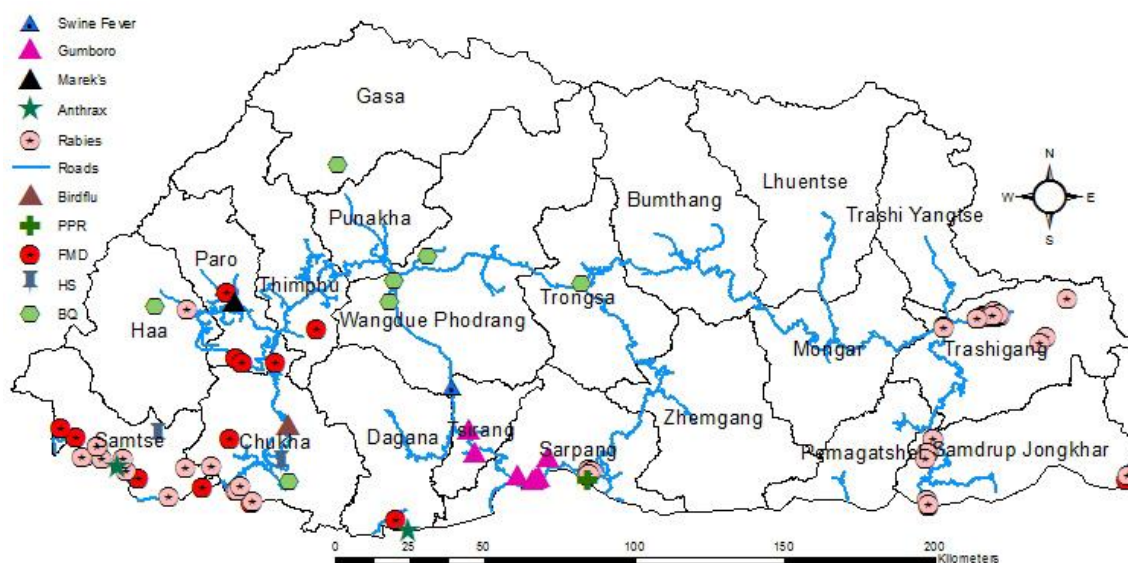
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## 1. INTRODUCTION

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 presents a brief descriptive analysis of the status of reported notifiable animal diseases in the country during 2016 (Jan-Dec 2016). 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 2011–2016 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 2016*

During 2016, Rabies was the major disease that occurred in Tashigang, Samtse, Sarpang, Samdrup Jongkhar and Chukha Dzongkhags as a result of incursion from the bordering town due to movement of rabid dogs. Marek's Disease and Avian leucosis complex in poultry was first reported in Regional Poultry Breeding Centre, Paro and was controlled through culling of the infected flock. HPAI outbreak was reported in a backyard poultry farm at Alubari-Wangkha under Chukha Dzongkhag. The details of each specific disease is presented in the following respective section.

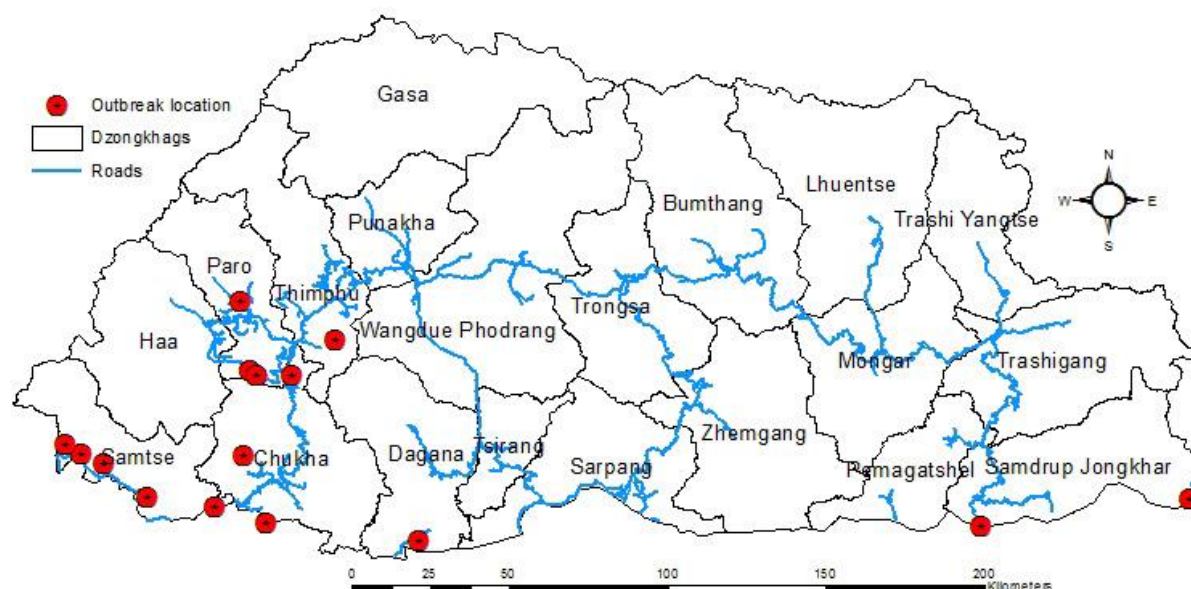


## 2. MULTIPLE SPECIES DISEASES

### 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.

FMD is endemic 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.



*Figure 2: Distribution of FMD outbreaks in animals between January and December 2016*

During 2016, 14 outbreaks have been reported in seven Dzongkhags, affecting 195 cattle when compared to 18 outbreaks in 2015 reported in 10 Dzongkhags, affecting 731 cattle and 14 sheep (Figures 2, 3 and annexure 1, 2). Most of the outbreaks have occurred in places along the highways and international borders in southern parts of the country (Figure 2). Outbreaks in Paro Naja villages were associated with migration of cattle from Chukha. Molecular studies conducted at the Pirbright Institute (FAO World Reference Laboratory for FMD) at UK showed that the FMD virus involved in the outbreaks in 2016 were all serotype O, and the virus belonged to the Middle East South Asia (ME-SA) toposotype and Ind-2001d lineage (Figure 3).

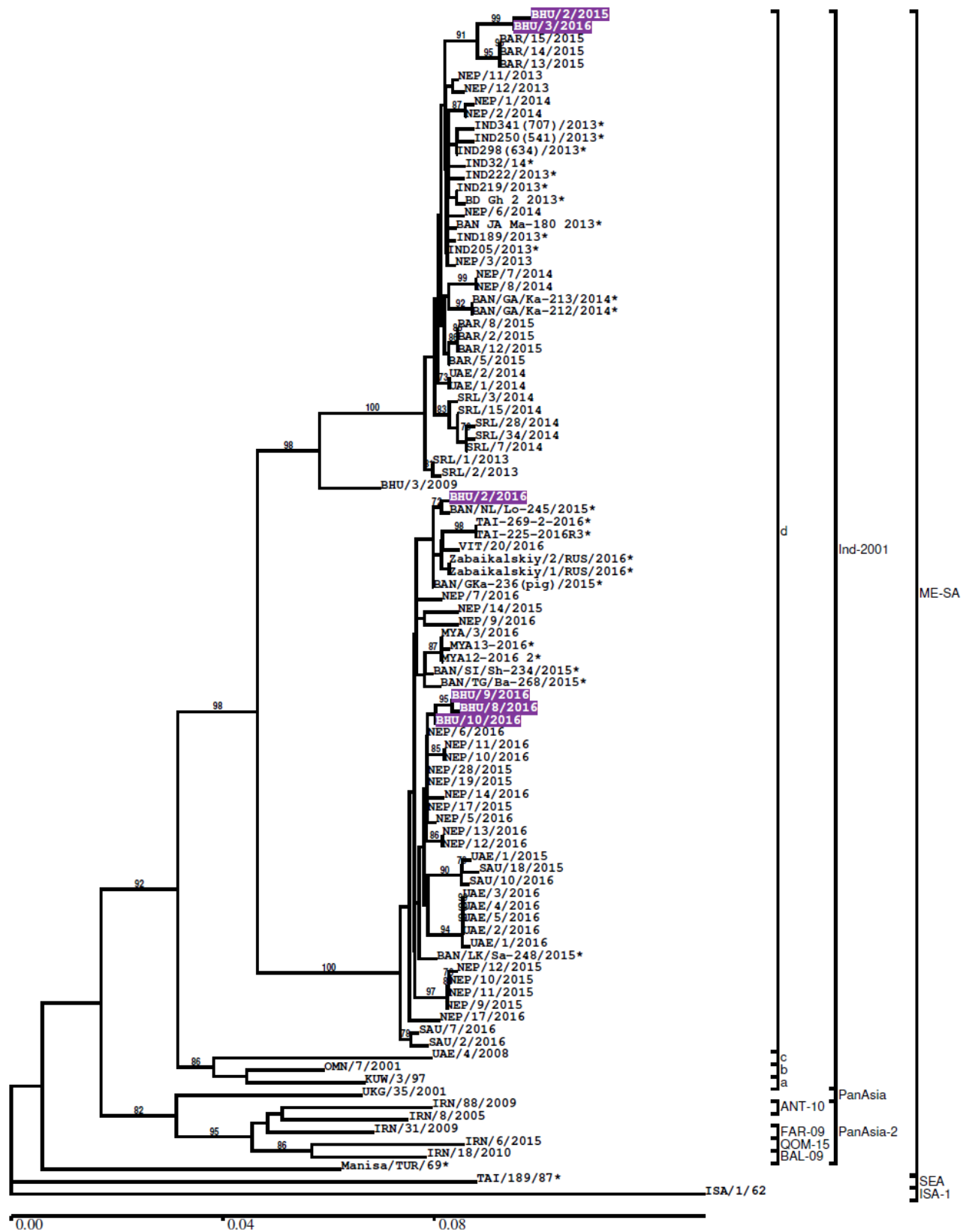


Figure 3: Phylogeny of FMD genotypes in Bhutan during 2015 and 2016

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 4).

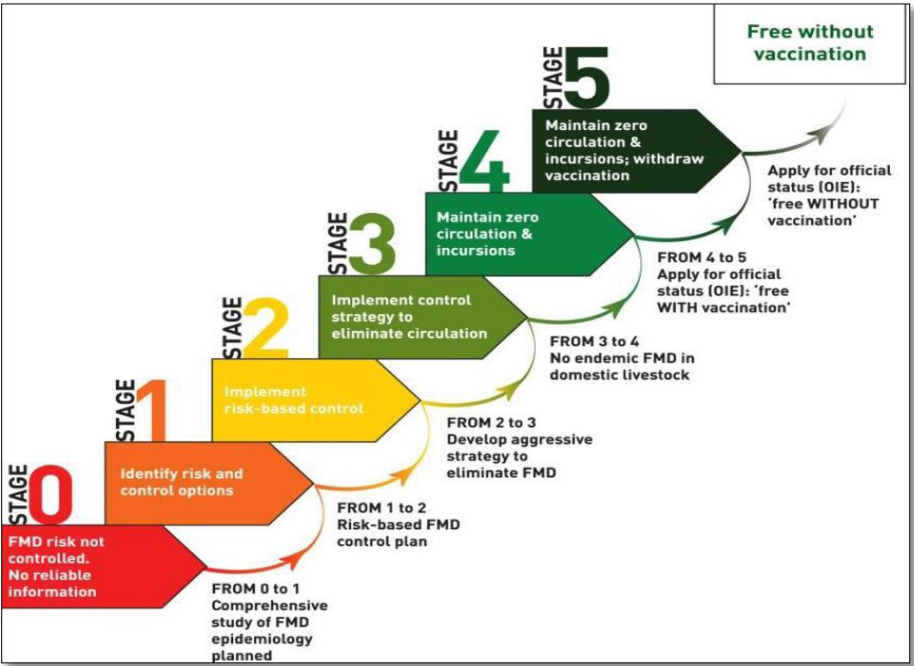


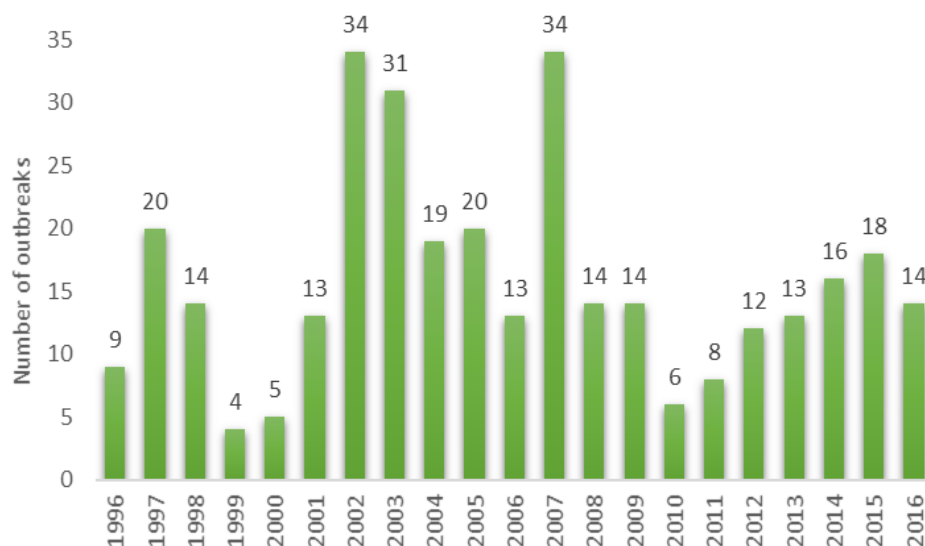
Figure 4: Progressive control pathway for FMD

Table 1: Time frame to achieve stage 3 of PCP in Bhutan as per Figure 4

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

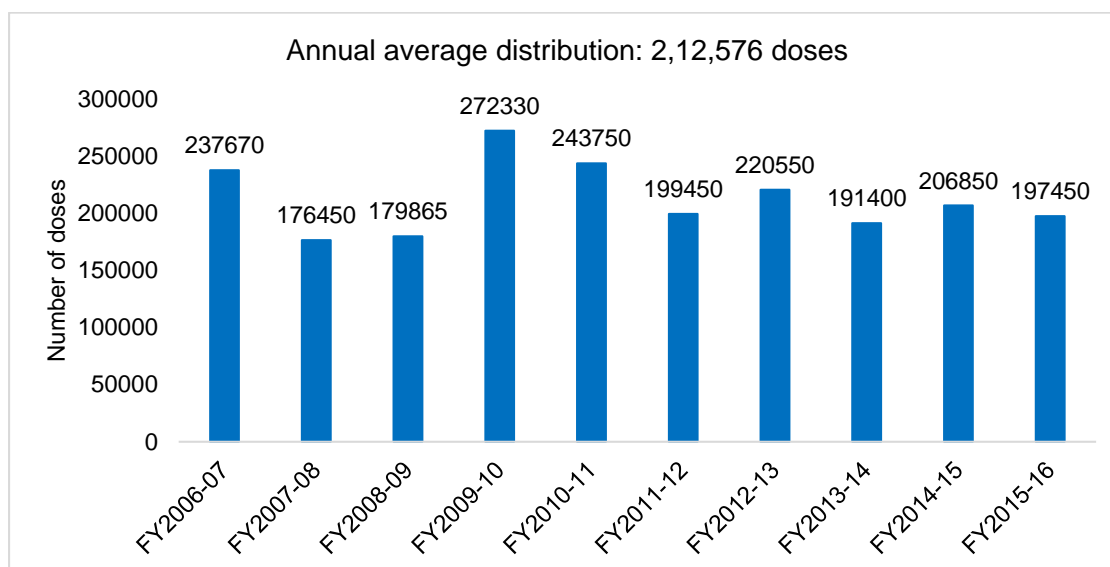
Those herds/villages that have implemented bi-annual vaccination with more than 70% coverage have not reported any outbreaks of FMD in animals (e.g. Chukha and Sarpang Dzongkhag). Chukha Dzongkhag which has traditionally been the hub for FMD has been seeing a gradual reduction in the incidences because of the stringent bi-annual vaccination undertaken through coordination between NCAH, RLDC Tsimasham and Chukha livestock sector.





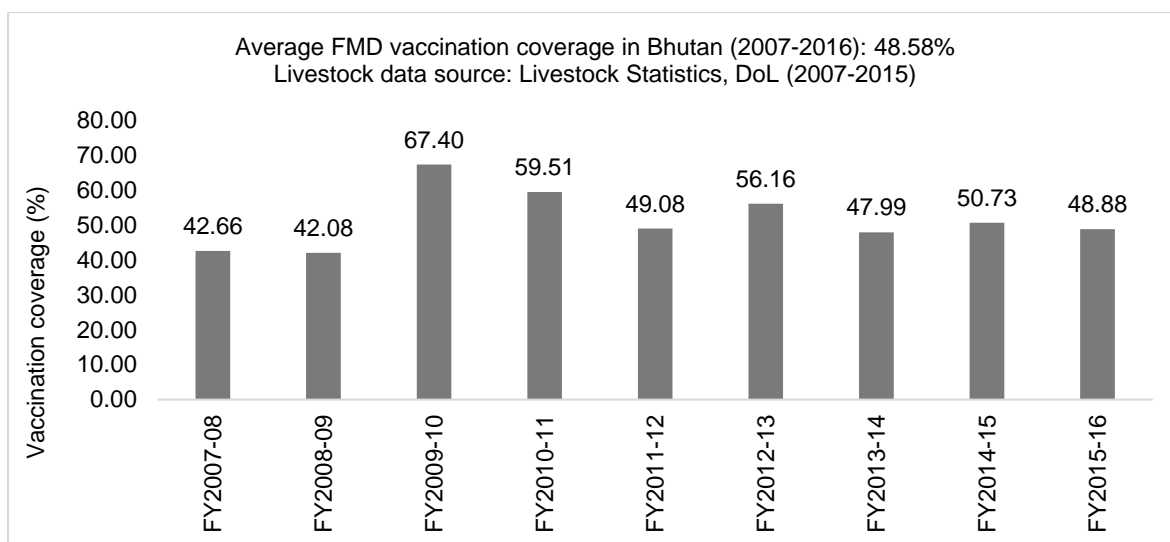
**Figure 5:** Annual distribution of reported FMD outbreaks in Bhutan (1996 to 2016)

Between 2007 and 2016 (Financial year), the Biological Production Unit of National Centre for Animal Health, Serbithang had distributed an average of 21, 2576 doses of FMD vaccine to 20 Dzongkhags annually for mass vaccination program (Figure 6).



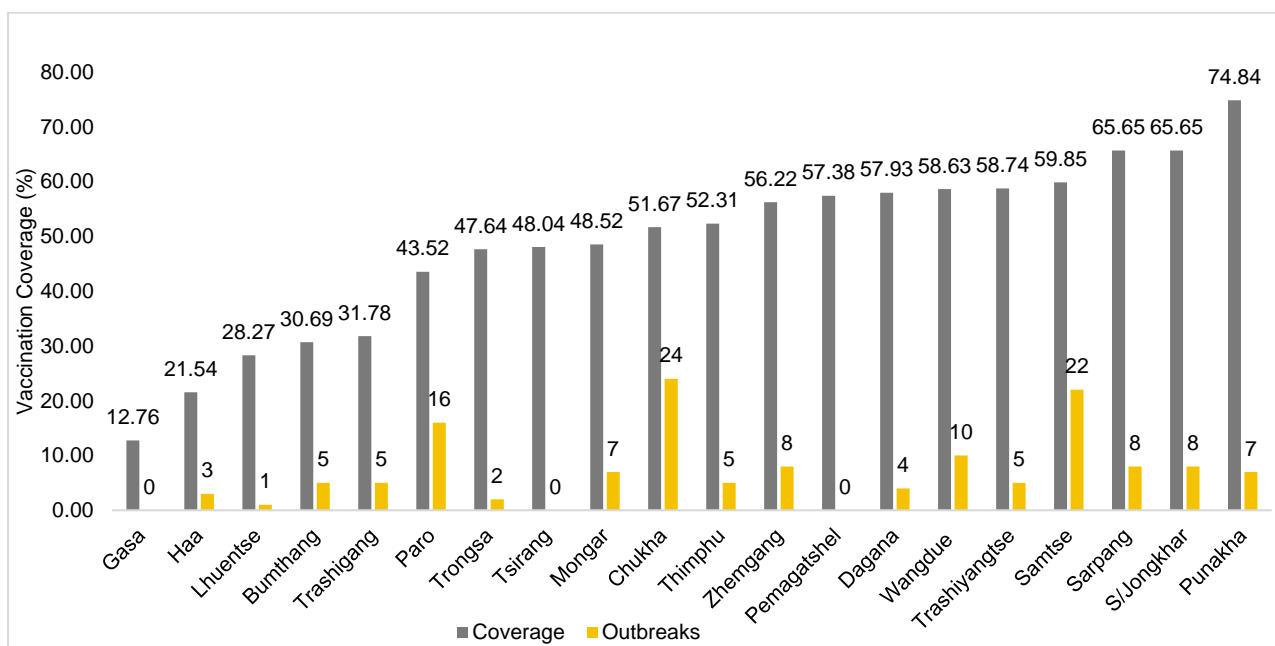
**Figure 6:** Number of FMD vaccine doses distributed to 20 Dzongkhags (2007-2016)

Based on the distribution figures of FMD vaccine by NCAH to the Dzongkhags (Central farms excluded) and by considering the susceptible animal population, the average vaccination coverage from 2007 to 2016 was estimated to be 48.58% (Figures 7). It is therefore important to implement a strategic plan (as per National FMD prevention and Control Plan 2016) to achieve recommended coverage of 70-80% to break the transmission cycle of FMDV.



**Figure 7:** Estimated FMD vaccination coverage in the country (2007-2016) (Vaccine doses distribution source: BPU, NCAH)

Figure 8 demonstrate the Dzongkhag wise vaccination coverage and FMD outbreaks at the village level (2007-2016).

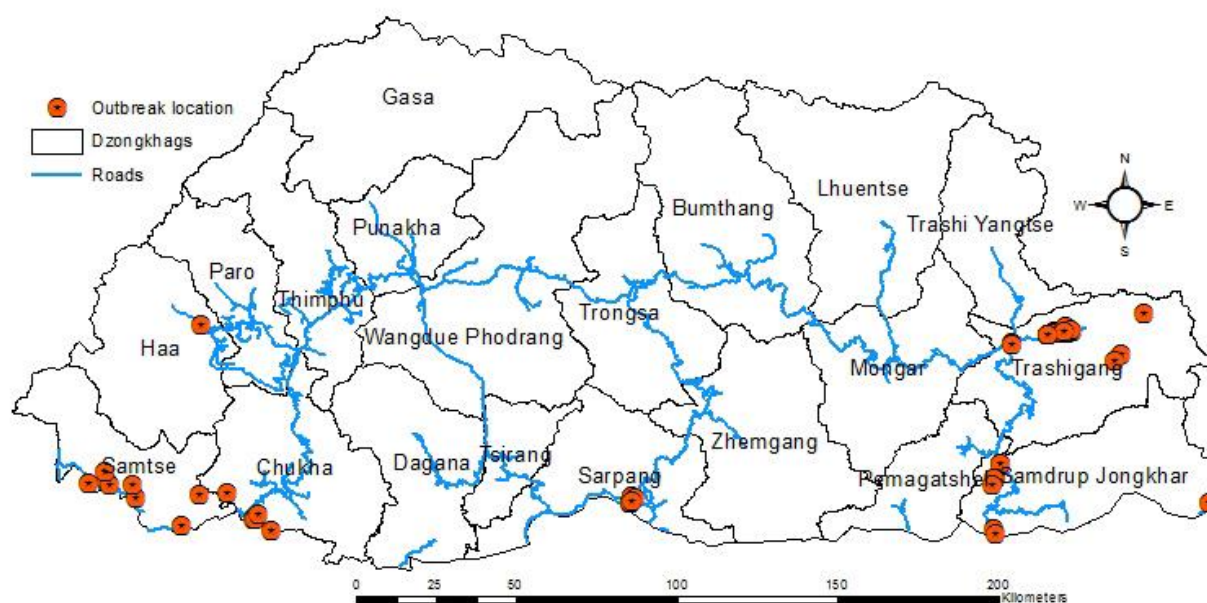


**Figure 8:** Estimated FMD vaccination coverage and number of FMD outbreaks in the country (2007-2016) (Note: bi-annual vaccination was not considered for calculation for those Dzongkhags that have conducted bi-annual vaccination campaign. Henceforth, real vaccination data will be used for estimating vaccination coverage).

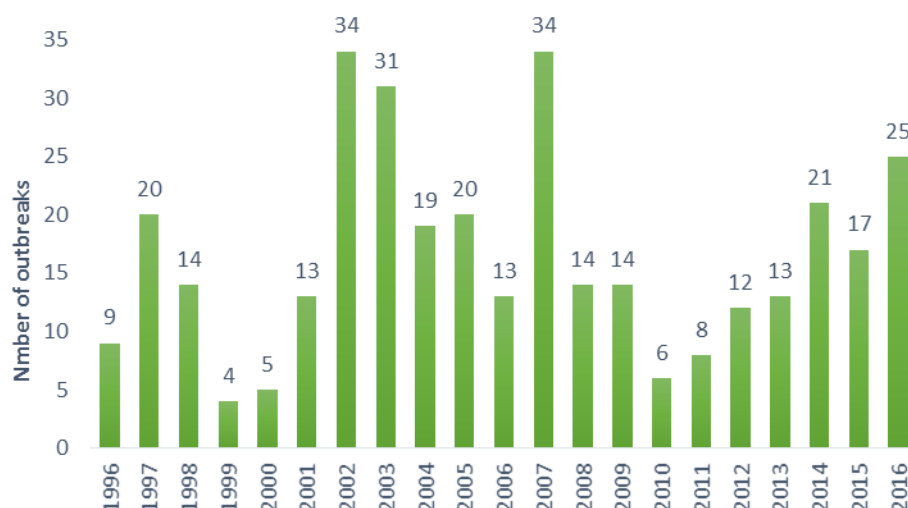
## 2.2. Rabies

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 sporadic outbreaks 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.

During 2016, 25 outbreaks of rabies were reported in Tashigang, Samtse, Samdrup Jongkhar, Sarpang, and Chukha Dzongkhags affecting 18 cattle, 38 dogs, 1 cat and 2 yaks when compared to 17 outbreaks in 2015 (Figures 4, 5 and annexure 3, 4). Highest cases were reported in Tashigang (27) followed by Samdrup Jongkhar (10), Samtse (8), Sarpang (7), Chukha (5) and Ha (1). The cases in livestock were as a result of spill over infection from rabid dogs.



*Figure 9: Distribution of rabies outbreaks in animals between January & December 2016*



**Figure 10:** Annual distribution of Rabies outbreak in Bhutan (1996 to 2016)

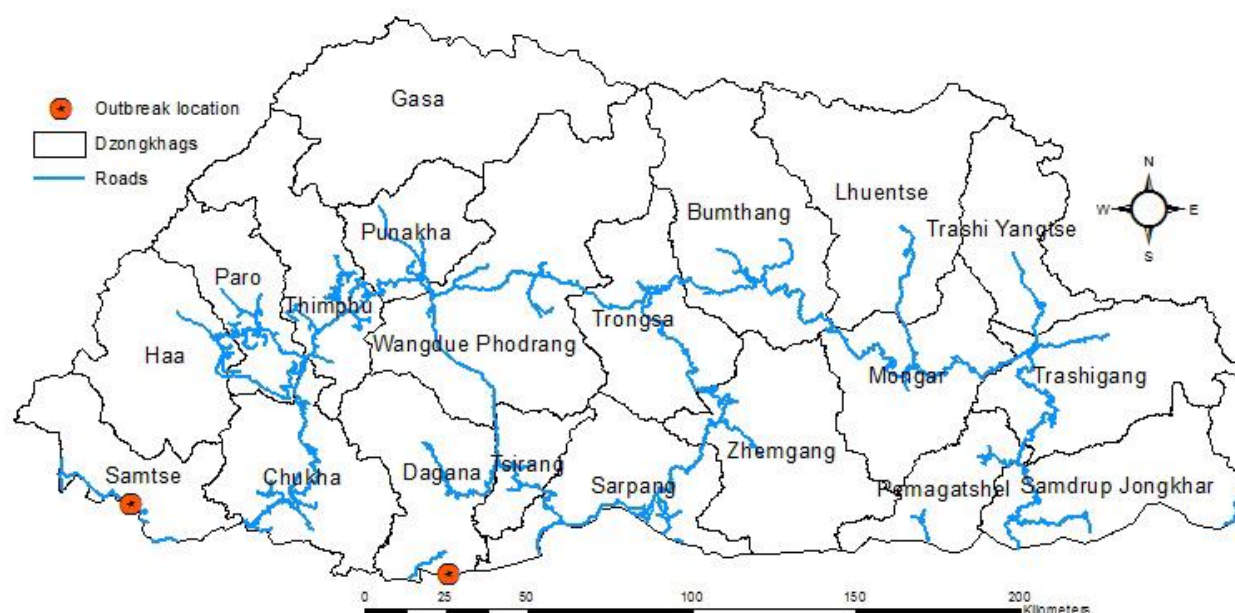
The year saw emergence of rabies and incursion into rabies-free areas. For instance, there were incursion of rabies in Orong geog under Samdrup Jongkhar Dzongkhag during late 2015 that eventually spread to Narphung, Deothang and Samdrup Jongkhar town in January 2016. Movement of rabid dog from the bordering town was responsible for the spread of rabies in Orong but was controlled by implementing rapid containment measures such as emergency mass dog vaccination and surveillance. The year also saw first case of rabies in Merak geog in a stray dog at Merak village on 29 July 2016. The disease eventually spread to various places under Shongphu, Radi and Samkhar geogs including Trashigang town. The rabies incursion into Merak geog might have occurred due to movement of rabies infected dog along with pilgrims/traders from Arunachal Pradesh state of India. Although rapid containment measures is being implemented by the Rapid Response Team, the outbreak is still continuing at Rangjung town. A strategic containment measures will be implemented to eliminate the infection foci and prevent establishment of rabies endemicity in eastern region. The first imported case of rabies was detected in a pet dog at Haa (4 March 2016) that was illegally brought from Assam state of India. However, it has not led to further spread into other dogs in Haa.

In humans, 17 deaths due to rabies (mostly children) has been reported between 2006 and 2016 with only one death in 2016 as a result of rabies suspected dog bite in Phuentsholing town. The victim have not received PEP from the hospital. No human rabies cases were reported during 2014 and 2015. A national rabies prevention and control plan has been developed which will guide the control strategy towards elimination of dog mediated rabies by 2020.

### 2.3. Anthrax

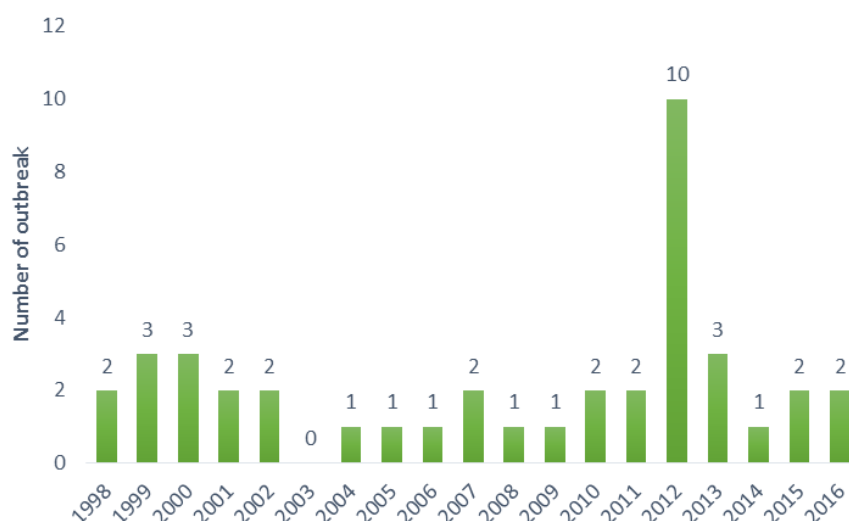
Anthrax is a serious zoonotic disease caused by the spore forming bacterium *Bacillus anthracis*. Anthrax commonly presents as an acute septicemia with a high fatality rate in herbivore animals. The most common signs are sudden death, discharge of un-clotted tarry blood from natural orifices, rapid bloating and absence of rigor mortis.

In Bhutan, anthrax cases are sporadically reported in domestic animal, primarily in cattle. Occasionally, cutaneous anthrax cases have been reported in humans following contact with infected animals. During 2016 two outbreaks were reported in Dagana and Samtse Dzongkhag when compared to two outbreak reported from Wangdue and Chukha Dzongkhags during 2015 (Figures 6, 7 and Annexure 5, 6). No human cases were reported during 2016.



**Figure 11:** Distribution of reported anthrax outbreaks in animals between January & December 2016





**Figure 12:** Annual distribution of Anthrax outbreak in Bhutan (1998 to 2016)

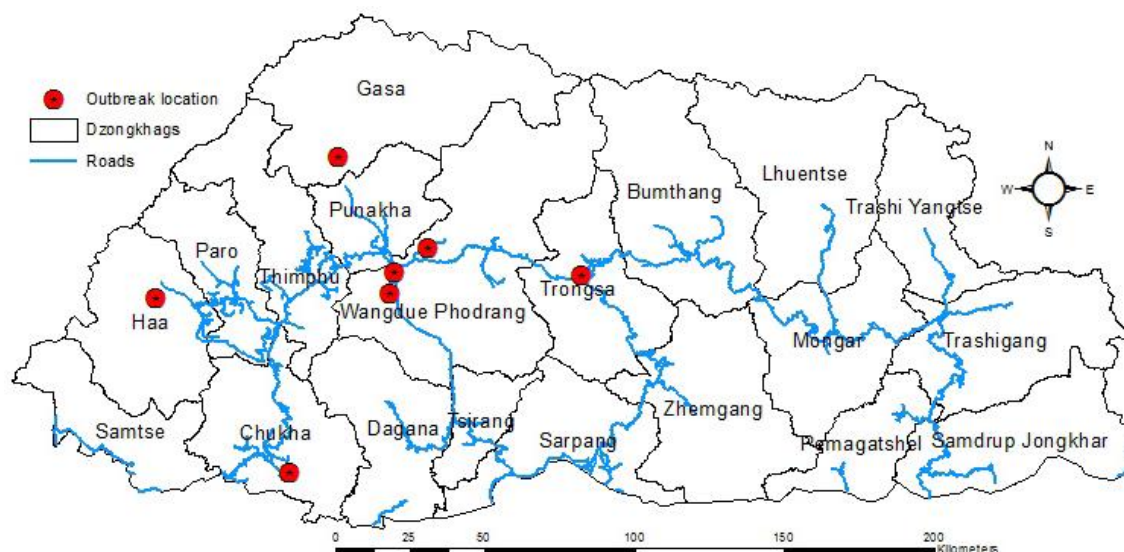
### 3. DISEASES IN CATTLE

#### 3.1. Black Quarter

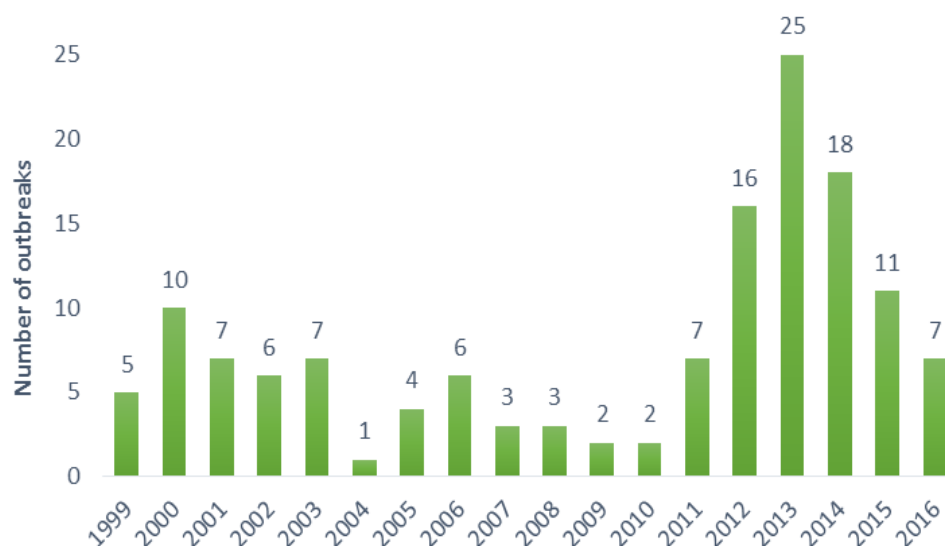
Black Quarter (BQ) is an acute, febrile disease of cattle and sheep caused by *Clostridium chauvoei* and characterized by emphysematous swelling, usually in the heavy muscles. Spores of *Clostridium chauvoei* can remain viable in the soil for many years and the animal gets infection through ingestion of the organisms.

During 2016, seven outbreaks of BQ were reported from five Dzongkhags affecting 30 cattle including 22 deaths when compared to 11 outbreaks in 2015 (Figures 8, 9 and annexure 7, 8).

BQ outbreaks have been reported throughout the year without much seasonal variation.



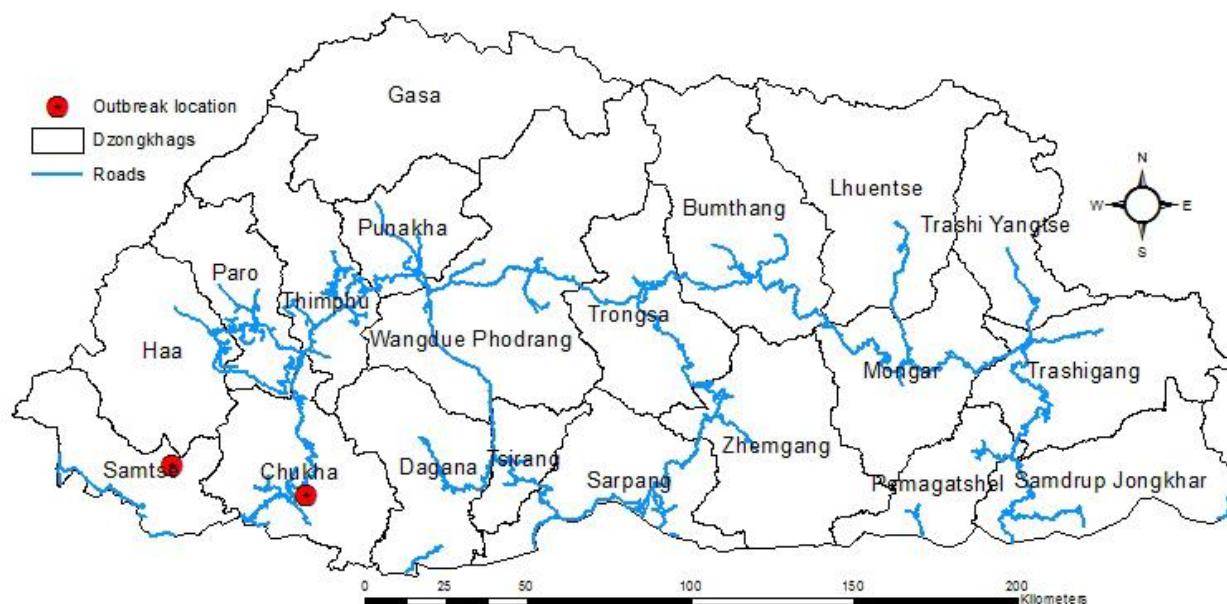
**Figure 13:** Distribution of reported BQ outbreaks in animals between January & December 2016



**Figure 14:** Annual distribution of Black Quarter outbreak in Bhutan (1999 to 2016)

### 3.2. Hemorrhagic Septicemia

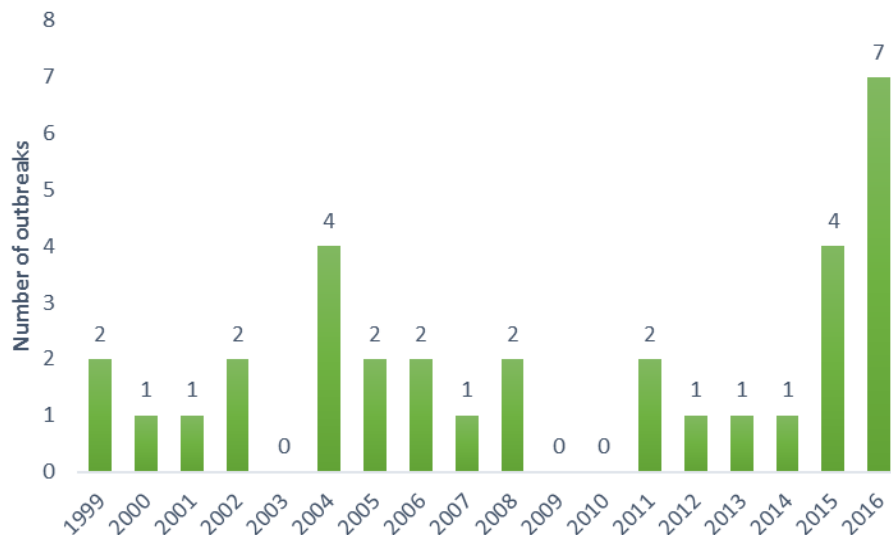
Hemorrhagic septicemia (HS) is an acute, highly fatal disease of cattle caused by particular serotypes of *Pasteurella multocida*. Although HS may be seen at any time of year, it occurs commonly during the rainy season due to stress created by adverse environmental conditions. The disease can be prevented by vaccination. HS is sporadically reported in cattle every year. A total of 22 outbreaks have been reported between 1998 and 2014 with a report of 215 cases and 130 deaths of cattle (Figure 10, 11 & annexure 9, 10).



**Figure 15:** Distribution of reported HS outbreaks from January & December 2016

In 2016, two outbreaks of HS were reported from Chukha and Samtse Dzongkhag when

compared to reports of four outbreak in 2015. A total of three cattle were affected with 100% mortality.

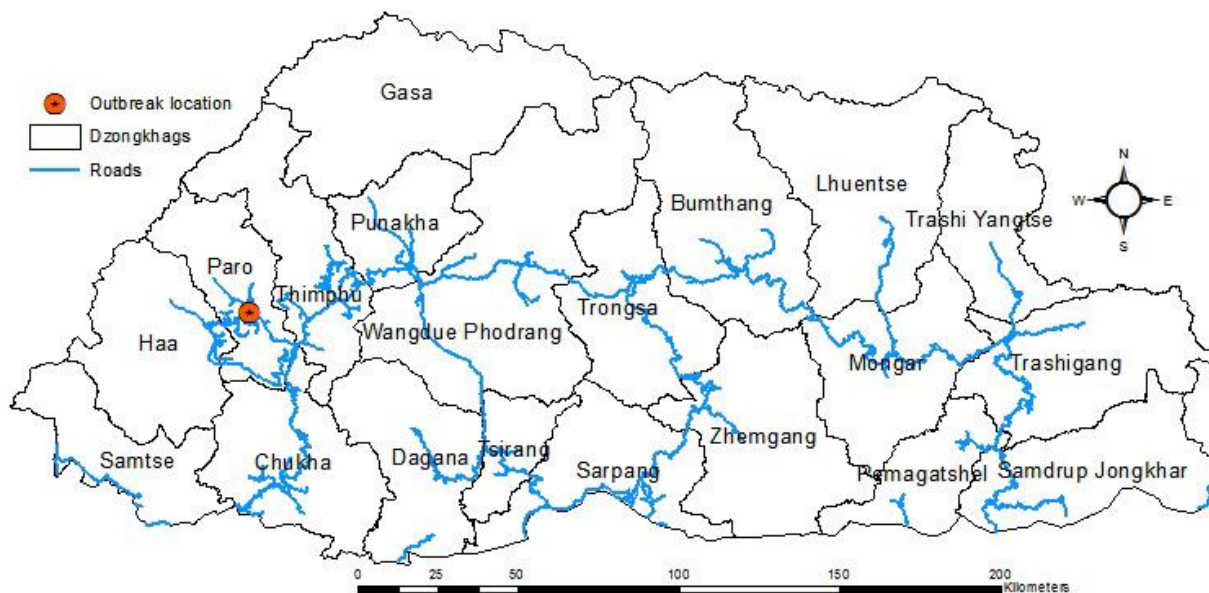


*Figure 16: Annual distribution of Hemorrhagic Septicemia outbreaks in Bhutan 1999 to 2016)*

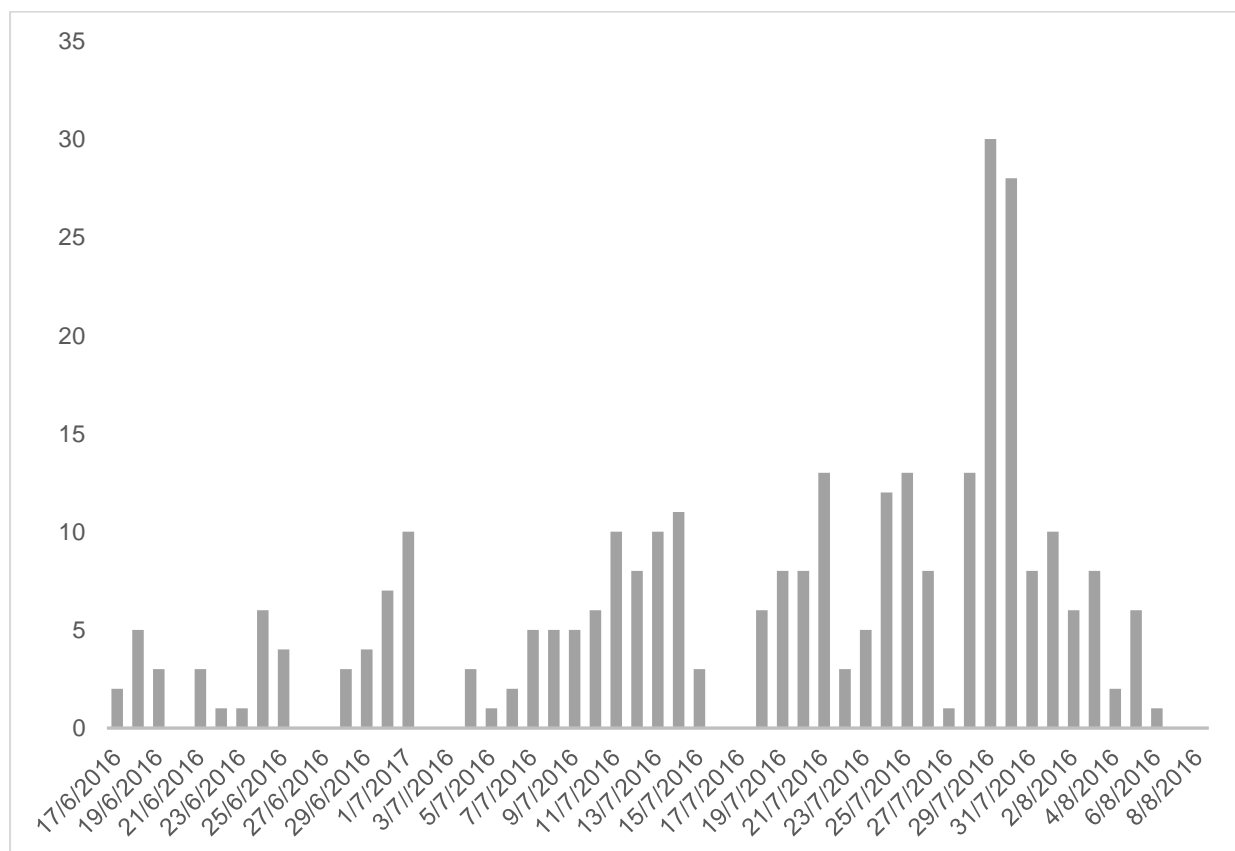
## 4. DISEASES IN POULTRY

### 4.1. Marek's Disease and Avian Leucosis Complex

The Regional Poultry Breeding Centre at Khangkhu, Paro reported its first outbreak of Marek's disease on 17 June 2016 (Figure 12). The farm have imported a total of 1,794 (female: 1560; male: 234) Silver Brown parent stock from India. The bird started showing signs of leg paralysis, ruffled feathers, unusual gait, droopiness, weakness and paralysis of both the legs. A total of 307 birds (female: 227; (74%) and male: 80 (26%) have died as of 11 August 2016 with an overall mortality of 17% (307/1794) as shown in (Figure 13 & annexure 12). Few samples were collected and referred to international laboratory for diagnosis and confirmed as Marek's disease and Avian Leucosis Complex. A viral antigen detection test using ELISA at NCAH also confirmed ALC in the flock. ALC is a highly contagious viral infection caused by retrovirus and the infected birds become shedders and life-long carrier. The virus is vertically transmitted through light albumin of egg. Therefore, hatchery will be infected and then to next generation stock affecting the entire production chain. In order to control the infection and prevent further spread into other flocks in the country, all remaining flock were culled.



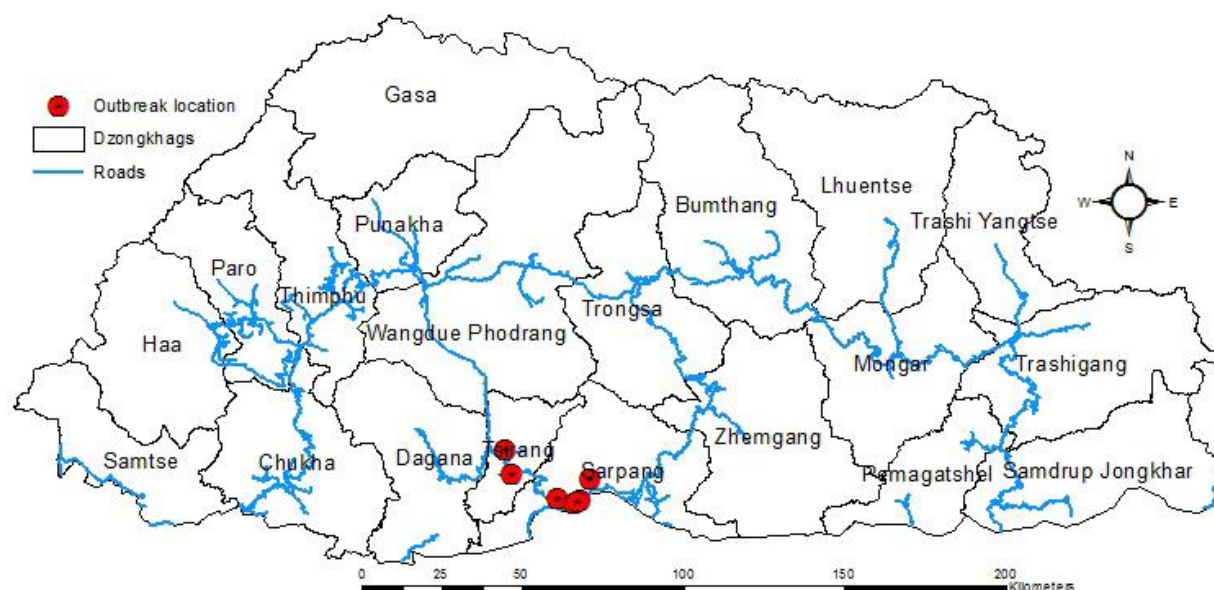
**Figure 17:** Distribution of reported outbreaks of Marek's disease & ALC in poultry during 2016



**Figure 18:** Daily mortality record of poultry birds at the time of Marek's disease and ALC infection at RPBC, Paro between June and August 2016

## 4.2. 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.



**Figure 19:** Distribution of reported IBD outbreaks between January & December 2016

During 2016, six outbreaks of IBD were reported from Tsirang and Sarpang Dzongkhags compared to five outbreaks in 2015 (Figure 14 and annexure 14, 15). Of the 6104 suspected cases reported, 1589 birds have died of IBD. However, the incidence of IBD has decreased after NCAH changed the vaccine and vaccination schedule.

## 4.3. Highly Pathogenic Avian Influenza

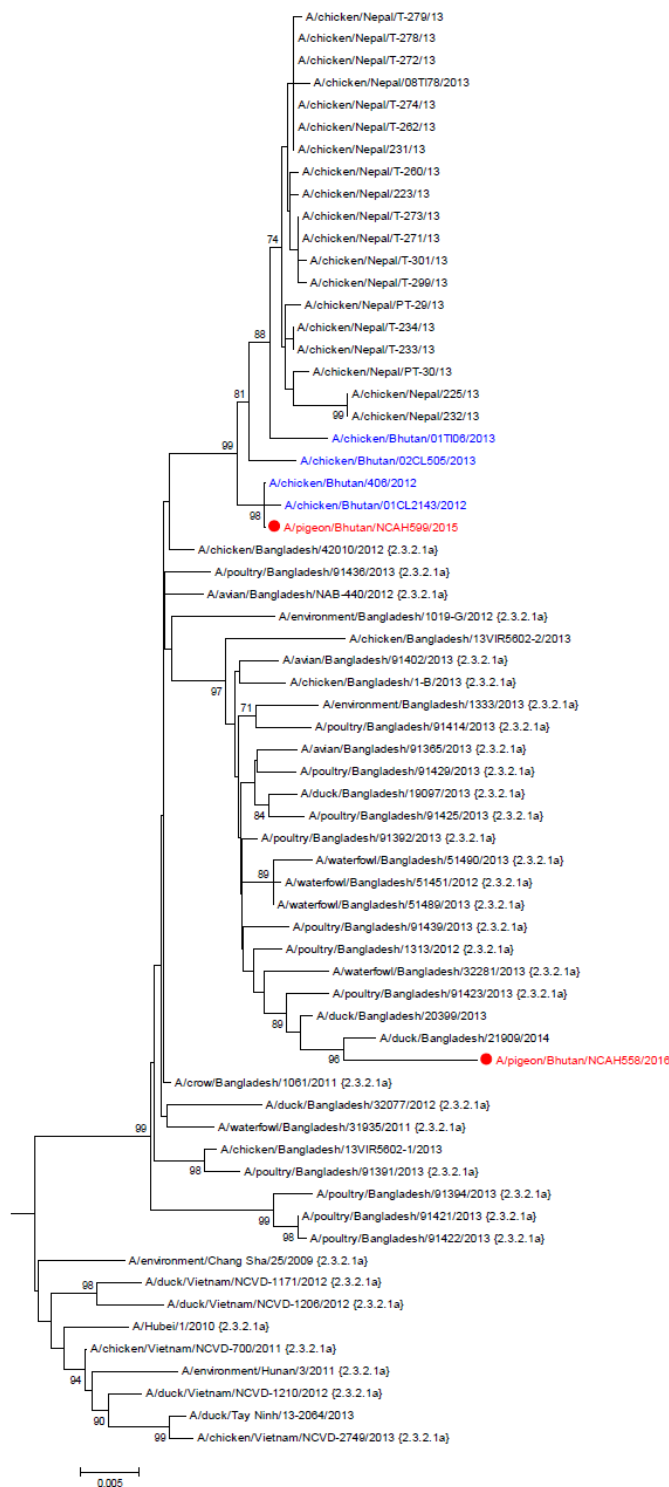
Bhutan reported its first HPAI H5N1 outbreak on 23 February 2010 to the Office International Des Epizooties (OIE). The disease was first detected on 18th February 2010 at Rinchening village, Chukha district in free-ranging poultry that was subsequently confirmed by the High Security Animal Disease Laboratory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



outbreak. 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 the evidence of phylogeny and molecular markers, it was concluded that the outbreaks in Bhutan and Bangladesh in 2010 were due to independent introductions of the virus probably through migratory birds. The outbreaks during 2012 in Chukha, Thimphu and Mongar involved clade 2.3.2.1a which is antigenically similar to the 2011 chicken virus clade of India. During 2016, one outbreak of HPAI was recorded on 14 October 2016 at Alubari, Wangkha under Bjaapcho Geog, Chukha Dzongkhag (Figure 15, annexure 15 & 16). A total of thirteen cases in poultry were reported. The outbreak was confirmed using RT-PCR test at the National Centre for Animal Health, Serbithang, Bhutan and subsequently confirmed at the High Security Animal Disease Laboratory Bhopal, India. During 2015, one outbreak of HPAI was recorded on 3rd April in Mothithang, Chang Geog under Thimphu Dzongkhag. As in the past, poor biosecurity has been the main reason for the introduction of disease in the backyard free ranging poultry population.



**Figure 20:** Distribution of reported IBD outbreaks between January & December 2016



**Figure 21:** Phylogenetic tree based on complete HA gene sequences showing relationship of Bhutan H5N1 viruses, relative to other clade 2.3.2.1a H5N1 HPAI viruses currently circulating in the region (Bhutan viruses sequenced by AAHL, Geelong, Australia).

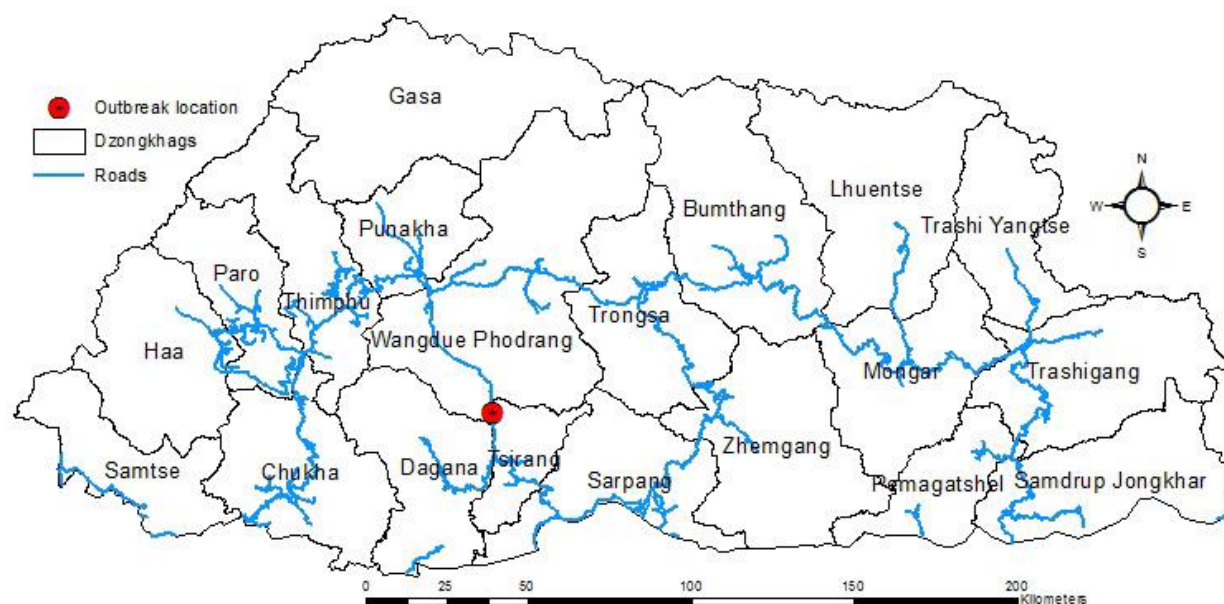
## 5. DISEASE IN PIGS

### 5.1. 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 distribution to the farmers are done after vaccination at the farms.

During 2016, only one outbreak of swine fever was reported from Tsirang Dzongkhag. There was also one reported outbreak of swine fever during 2015 from Zhemgang Dzongkhag (Figure 15 and Annexure 17, 18).

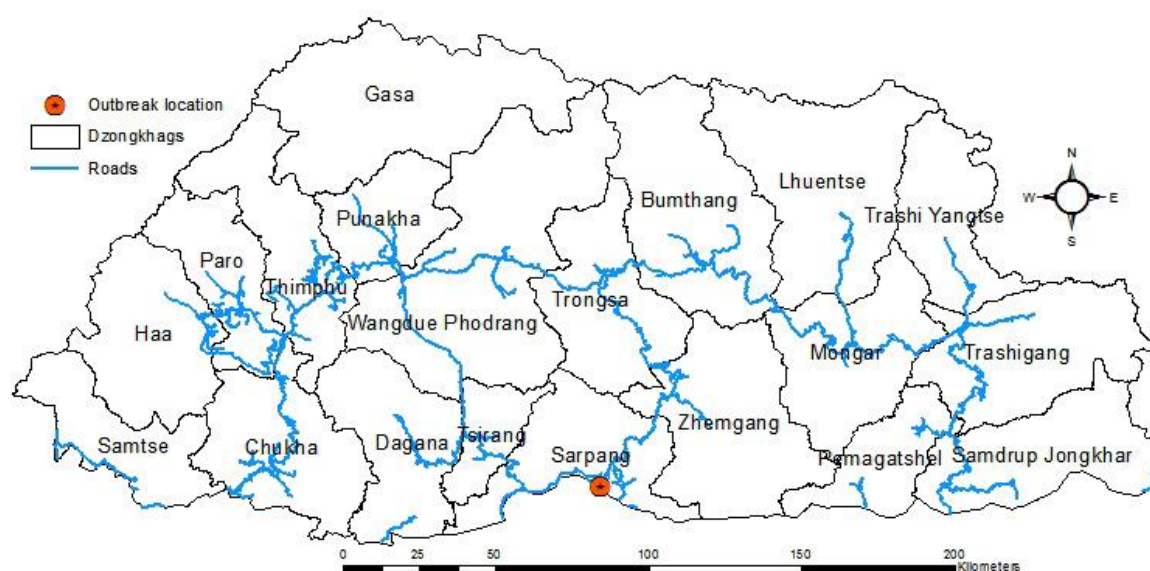


*Figure 22: Distribution of reported Swine Fever outbreaks between January & December 2016*

## 6. DISEASE IN GOAT

### 6.1. Peste des petits ruminants

Peste des petits ruminants (PPR) is a highly contagious and economically important disease of small ruminants caused by morbillivirus, family Paramyxoviridae. The first clinical description of PPR was made in 1942 in West Africa. In Bhutan, first outbreak of PPR in goat was reported on 15 July in 2010 at CHPCL Chukha dog pound where the Tsethar goats were stationed.



**Figure 23:** Distribution of reported PPR outbreaks between January & December 2016

During 2016, PPR outbreak was reported in a Quarantine Station in Gelephu on 4th May 2016 (Figure 17 & annexure 19, 20). Out of 19 cases, all have died in the Quarantine station. The goats were imported from Rajasthan, India for breeding purposes and showed clinical signs of PPR during the quarantining period. The cases were confirmed by laboratory test at NCAH, Serbithang.

## 7. 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.

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17. National FMD Prevention and Control Plan 2016, NCAH, Serbithang
18. National Rabies Prevention and Control Plan 2017, NCAH, Serbithang

## 9. ANNEXURE

Annexure 1: Details of FMD outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
27-Jul-12	Titring	Tading	Samtse	Bovine	146	2
17-Aug-12	Thothang	Lauri	S/Jongkhar	Bovine	30	1
29-Aug-12	Richanglo	Gomdar	S/Jongkhar	Bovine	47	1
2-Sep-12	Khelphu	Merak	Trashigang	Bovine	111	12
3-Sep-12	Pusa	Sakteng	Trashigang	Bovine	30	0
4-Sep-12	Gonong	Lauri	S/Jongkhar	Bovine	30	1
7-Sep-12	Borangmang	Sakteng	Trashigang	Bovine	43	0
16-Oct-12	Giri Gaon	Sipsu	Samtse	Bovine	72	1
16-Oct-12	Penjorling A	Sipsu	Samtse	Buffalo	4	
16-Oct-12	Penjorling A	Sipsu	Samtse	Bovine	19	
16-Oct-12	Peljorling B	Sipsu	Samtse	Bovine	119	1
17-Oct-12	Jogimara	Sipsu	Samtse	Bovine	9	
17-Oct-12	Hangay	Sipsu	Samtse	Buffalo	5	
17-Oct-12	Hangay	Sipsu	Samtse	Bovine	55	
17-Oct-12	Hangay	Sipsu	Samtse	Caprine	2	
18-Oct-12	Khelphu	Merak	Trashigang	Bovine	387	3
15-Nov-12	Mujuwa	N/Chhoeling	Samtse	Buffalo	5	
15-Nov-12	Mujuwa	N/Chhoeling	Samtse	Bovine	23	
28-Nov-12	Torsatar	Phuntsholing	Chukha	Bovine	7	0
28-Nov-12	Torsatar	Phuntsholing	Chukha	Swine	2	
28-Nov-12	Dagphel	Nangkor	Zhemgang	Bovine	3	1
27-Dec-12	Jangsa	Ugentse	Samtse	Bovine	12	
7-Jan-13	Jagarthan	Lamgong	Paro	Bovine	6	0
13-Feb-13	Khasadrapchu	Mewang	Thimphu	Bovine	2	0
29-May-13	Bunakha	Chapcha	Chukha	Bovine	10	
6-Jun-13	Phuentsholing	Phuntsholing	Chukha	Bovine	4	
30-Sep-13	Phuentsholing	Phuntsholing	Chukha	Bovine	16	
10-Oct-13	Shebji	Sombeykha	Haa	Bovine/Swine	179	6
18-Nov-13	Dangloe	Lamgong	Paro	Bovine/Swine	6	0
11-Dec-13	Phakpashi	Drepung	Mongar	Bovine	3	0
11-Dec-13	Phakpashi	Drepung	Mongar	Bovine	2	
18-Dec-13	S/Jongkhar	Dewathang	S/Jongkhar	Bovine	13	7
24-Dec-13	Yarpheling	Sengye	Sarpang	Bovine	12	

29-Dec-13	Chaebakha	Nyisho	Wangdue	Bovine	10	
30-Dec-13	Narphung	Jangchhubling	S/Jongkhar	Bovine	2	0
30-Dec-13	Labarbotay	Chargharey	Samtse	Bovine	5	0
8-Jan-14	Gebjakha	Lungnyi	Paro	Bovine	3	1
23-Jan-14	Pang Gomo	Lingmukha	Punakha	Bovine	29	
28-Jan-14	Tongchen	Yangtse	T/ Yangtse	Bovine	28	
3-Feb-14	Geptoe	Wangchang	Paro	Bovine	1	0
10-Feb-14	Paga Gempa	Chapcha	Chukha	Bovine	1	
23-Feb-14	Gelekha	Nyisho	Wangdue	Bovine	20	
25-Feb-14	Jakar Kha	Chhokhor	Bumthang	Bovine	41	
31-Mar-14	Chuzom	Dogar	Paro	Bovine	29	0
4-Apr-14	Juka	Doteng	Paro	Swine	6	0
7-Apr-14	Dekha	Shaba	Paro	Bovine	1	0
30-Apr-14	Zor,ChhemaDung	Yalang	T/ Yangtse	Bovine	27	2
16-Jun-14	Hilley	Samrang	S/Jongkhar	Bovine	8	
14-Jul-14	Domphu	Dewathang	S/Jongkhar	Bovine	7	
2-Sep-14	Drugyel school	Tsento	Paro	Bovine	3	0
14-Oct-14	Gobja	Dangchu	Wangdue	Bovine	14	
23-Oct-14	Gebjakha	Lungnyi	Paro	Bovine	14	0
5-Feb-15	Nagakha	Chhubu	Punakha	Bovine	32	0
4-Mar-15	Changyul	Guma	Punakha	Bovine	13	0
15-May-15	Taraythang	Taraythang	Sarpang	Bovine	6	0
12-Jun-15	Dangling	Umling	Sarpang	Bovine/Ovine	29	0
27-Jul-15	Ugyen choling	Tang	Bumthang	Bovine	94	3
12-Aug-15	Radi	Shingkhar	Zhemgang	Bovine	65	1
10-Sep-15	Tangsibi	Ura	Bumthang	Bovine	200	0
13-Sep-15	Bardo	Bardo	Zhemgang	Bovine	40	0
5-Oct-15	Toktogom	Bongo	Chukha	Bovine	4	0
6-Nov-15	Bapalathang	Chhokhor	Bumthang	Bovine	40	0
6-Nov-15	Yumchen	Jarey	Lhuentse	Bovine	28	1
14-Nov-15	Khuling	Tsamang	Mongar	Bovine	47	0
19-Nov-15	Duinmang	Nangkor	Zhemgang	Bovine	3	0
24-Nov-15	Tsenjebi	Saleng	Mongar	Bovine	73	0
24-Nov-15	Phungyang	Yalang	T/ Yangtse	Bovine	4	0
27-Dec-15	Shingkhey	Gasetshowom	Wangdue	Bovine	62	0
28-Dec-15	Geptoe	Wangchang	Paro	Bovine	17	0
28-Dec-15	Chazam	Shaba	Paro	Bovine	6	0

**Annexure 2: Details of FMD outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
9/2/2016	Samdzong	Deothang	S/Jongkhar	Bovine	29	0	1
11/2/2016	Bukey	Samtse	Samtse	Bovine	13	0	1
13/2/2016	Shegeoan	Chapcha	Chukha	Bovine	14	0	1
15/2/2016	Nemjo Pel	Lungnyi	Paro	Bovine	1	0	1
17/2/2016	Titring	Tading	Samtse	Bovine	9	0	1
26/2/2016	Jitti'B'	Chargharey	Samtse	Bovine	7	0	1
5/3/2016	Damchekha	Lokchina	Chukha	Bovine	38	0	1
5/3/2016	Boteykharka	Ugentse	Samtse	Bovine	11	0	1
23/3/2016	Tshocheykha	Genye	Thimphu	Bovine	5	0	1
1/4/2016	Shinkhey	GaseTshowom	Wangdue	Bovine	30	0	1
13/4/2016	Bichgaon	Nichula	Dagana	Bovine	9	0	1
22/5/2016	Tsebj	Naja	Paro	Bovine	4	0	1
28/5/2016	Tsebj	Naja	Paro	Bovine	3	0	0
31/5/2016	Tsebj	Naja	Paro	Bovine	1	0	0
1/6/2016	Pana 'C'	Samphelling	Chukha	Bovine	24	0	1
2/6/2016	Singu	Naja	Paro	Bovine	3	0	0
6/6/2016	Naja	Naja	Paro	Bovine	5	0	0
6/6/2016	Singu	Naja	Paro	Bovine	5	0	0
7/6/2016	Tsebj	Naja	Paro	Bovine	1	0	0
14/7/2016	Golanti	Langchhenphu	S/Jongkhar	Bovine	8	0	1
10/10/2016	Pemaling	Biru	Samtse	Bovine	2	0	1
11/10/2016	SJ QS	Deothang	S/Jongkhar	Bovine	30	26	1

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

**Annexure 3: Details of Rabies outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Death
27-Jul-12	Tsangchhu	Phuntsthothang	S/Jongkhar	Bovine	1
10-Aug-12	Yub_Khezo	Jamkhar	T/ Yangtse	Bovine	1
13-Aug-12	Golanti	Langchhenphu	S/Jongkhar	Bovine	1
13-Aug-12	Golanti	Langchhenphu	S/Jongkhar	Canine	1
25-Aug-12	wangtsa	Katsho	Haa	Canine	1

4-Sep-12	RBA Colony	Dewathang	S/Jongkhar	Canine	1
4-Sep-12	Laring	Hiley	Sarpang	Feline	1
12-Sep-12	Golanti	Langchhenphu	S/Jongkhar	Bovine	5
9-Oct-12	Phuentsholing	Phuntsholing	Chukha	Canine	1
10-Oct-12	Phuentsholing	Phuntsholing	Chukha	Canine	1
10-Oct-12	RBA Colony	Dewathang	S/Jongkhar	Canine	1
12-Oct-12	Chumkuna	Phuntsholing	Chukha	Canine	1
25-Oct-12	Gelephu	Gelephu	Sarpang	Canine	1
28-Oct-12	Kuwapani	Hiley	Sarpang	Caprine	1
13-Nov-12	Gelephu	Gelephu	Sarpang	Bovine	1
17-Nov-12	Chenari	Dewathang	S/Jongkhar	Canine	1
17-Nov-12	Chenari	Dewathang	S/Jongkhar	Bovine	1
17-Nov-12	Chenari	Dewathang	S/Jongkhar	Feline	1
6-Dec-12	Pelrithang	Gelephu	Sarpang	Feline	1
20-Dec-12	Pelrithang	Gelephu	Sarpang	Canine	1
22-Dec-12	Gelephu	Gelephu	Sarpang	Bovine	1
5-Jan-13	Phuentsholing	Phuntsholing	Chukha	Canine	1
7-Jan-13	Gelephu	Gelephu	Sarpang	Canine	1
12-Jan-13	Phuentsholing	Phuntsholing	Chukha	Canine	1
18-Jan-13	Sarkitar	Samtse	Samtse	Canine	1
22-Feb-13	BCCL Colony	Samphelling	Chukha	Bovine	1
24-Feb-13	Phuentsholing	Phuntsholing	Chukha	Canine	1
26-Feb-13	BCCL Colony	Samphelling	Chukha	Bovine	1
12-Mar-13	DVH Samtse	Samtse	Samtse	Bovine	1
28-Mar-13	Phuentsholing	Phuntsholing	Chukha	Canine	1
28-Mar-13	Phuentsholing	Phuntsholing	Chukha	Canine	3
2-Apr-13	Deptshang	Serthig	S/Jongkhar	Bovine	5
4-Apr-13	« Samtse »	Samtse	Samtse	Canine	1
22-May-13	Malaybasay	Samphelling	Chukha	Canine	1
12-Jun-13	Lower Toribari	Phuntsholing	Chukha	Bovine	1
24-Jul-13	Phuentsholing	Phuntsholing	Chukha	Canine	1
6-Oct-13	Pana 'A'	Samphelling	Chukha	Bovine	1
14-Nov-13	RBA Colony	Dewathang	S/Jongkhar	Canine	1
25-Nov-13	Bukey	Samtse	Samtse	Bovine	1
13-Dec-13	Samdrupling	Dewathang	S/Jongkhar	Bovine	1
1-Mar-14	Dolungang	Dekiling	Sarpang	Bovine	2
4-Mar-14	DVH Samtse	Samtse	Samtse	Bovine	1
20-Mar-14	Yeuling	Chhuzagang	Sarpang	Canine	1



25-Mar-14	Chaskar	Chhuzagang	Sarpang	Bovine	1
31-Mar-14	Kaphung	Sherzhong	Sarpang	Bovine	2
17-Apr-14	Kalimati	Sipsu	Samtse	Bovine	1
22-Apr-14	Phuentsholing	Phuntsholing	Chukha	Canine	1
1-May-14	Gelephu	Gelephu	Sarpang	Canine	5
5-May-14	Gaden	Umling	Sarpang	Canine	2
13-May-14	Sarpangtar	Shompangkha	Sarpang	Canine	1
20-May-14	Pelrithang	Gelephu	Sarpang	Canine/bovine	2
21-May-14	Rai Gaon	Ugentse	Samtse	Bovine	1
10-Jun-14	Pelrithang	Gelephu	Sarpang	Bovine	1
10-Jun-14	Pemaling	Sherzhong	Sarpang	Bovine	1
24-Jun-14	Phuentsholing	Phuntsholing	Chukha	Canine	1
8-Jul-14	Pakhaygaun	Shompangkha	Sarpang	Canine	1
16-Jul-14	DVH Samtse	Samtse	Samtse	Canine	1
5-Aug-14	Sukreti	Samtse	Samtse	Bovine	1
7-Aug-14	Gaden	Umling	Sarpang	Bovine	1
29-Aug-14	Dzomlingthang	Gelephu	Sarpang	Canine	1
5-Sep-14	DVH Samtse	Samtse	Samtse	Canine	2
8-Sep-14	Dekiling	Dekiling	Sarpang	Bovine	1
12-Sep-14	Serzhong	Sherzhong	Sarpang	Bovine	1
21-Sep-14	Bhimtar	Chengmari	Samtse	Canine	1
17-Oct-14	Pelrithang	Gelephu	Sarpang	Caprine	1
9-Dec-14	Dzomlingthang	Gelephu	Sarpang	Bovine	1
29-Dec-14	Phuentsholing	Phuntsholing	Chukha	Canine	2
8-Jan-15	Pelrithang	Gelephu	Sarpang	Bovine	1
16-Jan-15	Pelrithang	Gelephu	Sarpang	Bovine	1
23-Jan-15	Pelrithang	Gelephu	Sarpang	Bovine	1
23-Jan-15	Pelrithang	Gelephu	Sarpang	Bovine	1
5-Feb-15	Lahatar	Pagli	Samtse	Bovine	1
11-Feb-15	Pelrithang	Gelephu	Sarpang	Bovine	1
11-Feb-15	Balatung	Sengye	Sarpang	Canine	1
14-Feb-15	Bukey	Samtse	Samtse	Bovine	1
14-Feb-15	Bukey	Samtse	Samtse	Caprine	1
14-Feb-15	Bukey	Samtse	Samtse	Canine	2
14-Feb-15	Bukey	Samtse	Samtse	Bovine	1
2-Mar-15	Lewkhop	Dekiling	Sarpang	Bovine	1
14-Mar-15	Uttarey/Sangla	Pagli	Samtse	Bovine	1
27-Mar-15	Dzomlingthang	Gelephu	Sarpang	Bovine	1

24-Apr-15	Pelrithang	Gelephu	Sarpang	Bovine	1
6-May-15	Pelrithang	Gelephu	Sarpang	Caprine	1
11-May-15	Chhar	Shompangkha	Sarpang	Bovine	2
16-May-15	Pelrithang	Gelephu	Sarpang	Bovine	1
14-Jun-15	Phuentsholing	Phuntsholing	Chukha	Bovine	3
29-Jun-15	Malaybasay	Samphelling	Chukha	Caprine	2
11-Aug-15	Saureni	Samtse	Samtse	Bovine	2
17-Sep-15	Norbuling	Sherzhong	Sarpang	Canine	3
24-Nov-15	Tala Busty	Langchhenphu	S/Jongkhar	Bovine	1
18-Dec-15	Dugsa	Jangchhubling	S/Jongkhar	Canine/Bovine	4 & 2
31-Dec-15	Khare Pakhey	Shompangkha	Sarpang	Swine	1

**Annexure 4: Details of Rabies outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Deaths	Outbreak
8/1/2016	Namkhaling	Gelephu	Sarpang	Canine	1	1
11/1/2016	Gonpa	Jangchhubling	S/Jongkhar	Bovine	1	1
21/1/2016	Narphung	Jangchhubling	S/Jongkhar	Canine	1	1
22/1/2016	Gonpa	Jangchhubling	S/Jongkhar	Bovine	1	0
22/1/2016	Lower Langchenphu	Langchhenphu	S/Jongkhar	Canine	1	1
31/1/2016	Charkilo	Dewathang	S/Jongkhar	Canine	1	1
2/2/2016	Narphung	Jangchhubling	S/Jongkhar	Canine	1	0
4/2/2016	RICB Sjongkhar	Dewathang	S/Jongkhar	Canine	1	0
7/2/2016	Pelrithang	Gelephu	Sarpang	Bovine	1	0
26/2/2016	Boti kharka	ugyentse	Samtse	Canine	1	1
27/2/2016	RBA Samtse	Samtse	Samtse	Canine	1	1
2/3/2016	Baazar Area	Pagli	Samtse	Bovine	1	1
2/3/2016	Daragaon	Samphelling	Chukha	Bovine	1	0
3/3/2016	Ahally	Samphelling	Chukha	Canine	1	1
28/3/2016	Haa town	Uesu	Haa	Canine	1	0
7/4/2016	Pelrithang school	Gelephu	Sarpang	Canine	1	1
12/4/2016	Rabdeyling	Gelephu	Sarpang	Canine	1	0
15/4/2016	Khairayne-torsa	Phuntsholing	Chukha	Canine	1	1
18/4/2016	Lamatar	Samtse	Samtse	Bovine	1	1
5/4/2016	Pelrithang	Gelephu	Sarpang	Bovine	1	0
28/7/2016	Merak	Merak	Trashigang	Canine	1	1

13/8/2016	Serkem Laptsa	Merak	Trashigang	Yak	1	0
13/8/2016	Wooling	Jangchhubling	S/Jongkhar	Canine	1	1
24/8/2016	Ahally	Samphelling	Chukha	Canine	1	0
17/9/2016	Boteykharka	Ugentse	Samtse	Canine	1	0
7/10/2016	Rai Gaon	Ugentse		Bovine	1	1
7/10/2016	Tsakaling	Yoeseltse	Samtse	Bovine	1	1
18/10/2016	Bhimtar-Hat khola	Chengmari	Samtse	Canine	1	1
21/10/2016	Wooling	Jangchhubling	S/Jongkhar	Bovine	1	0
6/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	1
7/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
12/10/2016	Rangjung town	Shongphu	Trashigang	canine	1	0
14/10/2016	Rangjung Chongthi	Shongphu	Trashigang	Feline	1	0
17/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
17/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
17/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
17/10/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
18/10/2016	Sakteng	Sakteng	Trashigang	Bovine	1	1
20/10/2016	Rangjung town	Shongphu	Trashigang	canine	1	0
2/11/2016	Lekithang	Gelephu	Sarpang	Canine	1	1
11/7/2016	Radi Khatoe	Radi	Trashigang	canine	1	1
11/11/2016	Trashigang town	Samkhar	Trashigang	canine	1	1
11/12/2016	Trashigang town	Samkhar	Trashigang	canine	1	0
29/11/2016	Rangjung School	Shongphu	Trashigang	canine	1	0
29/11/2016	Radi Pakaling	Radi	Trashigang	canine	1	0
1/12/2016	Buna	Shongphu	Trashigang	Bovine	1	0
3/12/2016	Tokshingmang	Radi	Trashigang	canine	1	0
3/12/2016	Radi bazar	Radi	Trashigang	canine	1	0
4/12/2016	Dekiling	Radi	Trashigang	Bovine	1	0
11/12/2016	Goumounay	Samphelling	Chukha	Canine	1	1
4/12/2016	Buna	Shongphu	Trashigang	Bovine	1	0
5/12/2016	Tsangkhar	Radi	Trashigang	canine	1	0
16/12/2016	Langten	Radi	Trashigang	Bovine	1	0
18/12/2016	Buna	Shongphu	Trashigang	Bovine	1	0
26/12/2016	Pemathang	Gelephu	Sarpang	Bovine	1	1
29/12/2016	Dekiling	Radi	Trashigang	Bovine	1	0
31/12/2016	Thonkorong	Orong	S/Jongkhar	canine	1	1

Note: outbreak definition same as for FMD

**Annexure 5: Details of Anthrax outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
17-Jan-12	Mikche	Nubi	Trongsa	Bovine	1	1
18-Feb-12	Yonphula	Kanglung	Trashigang	Bovine	3	3
26-Feb-12	Lower Ghathia	Chargharey	Samtse	Bovine	3	3
26-Feb-12	Rongthung	Kanglung	Trashigang	Bovine	1	1
28-Feb-12	kongkha	Phuntsholing	Chukha	Bovine	1	1
9-Mar-12	Kadam	Kanglung	Trashigang	Bovine	1	1
21-Mar-12	Tselungkha	Uesu	Haa	Bovine	1	1
22-Mar-12	Bali	Katsho	Haa	Bovine	1	1
17-Apr-12	Willing	Nubi	Trongsa	Bovine	1	1
22-Apr-12	Chhuchhup	Nubi	Trongsa	Bovine	1	1
15-Jul-12	Willing	Nubi	Trongsa	Bovine	1	1
15-Sep-12	Kalizimgkha	Tseza	Dagana	Bovine	3	3
7-Jul-14	Gonglhakha Zero	Gayling	Chukha	Bovine	1	1
1-Jan-15	RNR EC Kazhi	Kazhi	Wangdue	Bovine	5	5
26-Oct-15	Sinchula	Darla	Chukha	Swine	1	1

**Annexure 6: Details of Anthrax outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
27/2/2016	Samtse town	samtse	Samtse	Bovine	1	1	1
6/4/2016	Maula	Nichula	Dagana	Bovine	2	2	1

**Annexure 7: Details of Black Quarter outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
8-Feb-12	Chongzhik	Shengana	Punakha	Bovine	3	2
12-Feb-12	Semji	Nubi	Trongsa	Bovine	1	1
2-Mar-12	Mirichemo	Bongo	Chukha	Bovine	4	4
7-Mar-12	Gonpa Woo	Dechhenling	Pemagatshel	Bovine	5	5

9-Mar-12	kongkha	Phuntsholing	Chukha	Bovine	1	1
17-Mar-12	Rizor	Udzorong	Trashigang	Bovine	1	1
17-Mar-12	Rizor	Udzorong	Trashigang	Bovine	1	1
10-Apr-12	Cheeyul	Getana	Chukha	Bovine	1	1
16-Apr-12	Cheeyul	Getana	Chukha	Bovine	1	1
16-Apr-12	Cheeyul	Getana	Chukha	Bovine	1	1
16-Apr-12	Jikhu	Getana	Chukha	Bovine	3	3
26-Apr-12	Tshachhup	Toewang	Punakha	Bovine	3	3
4-May-12	Choilicop	Samtse	Samtse	Bovine	2	1
4-Jul-12	Gangkha	Nahi	Wangdue	Bovine	4	4
12-Sep-12	NNBF	Khaling	Trashigang	Bovine	1	1
21-Sep-12	Willing	Nubi	Trongsa	Bovine	1	
13-Oct-12	Bjasa	Goenkham	Gasa	Bovine	3	3
20-Oct-12	NNBF	Khaling	Trashigang	Bovine	1	0
18-Nov-12	NNBF	Khaling	Trashigang	Bovine	1	1
23-Nov-12	Goling	Nangkor	Zhemgang	Bovine	4	4
8-Jan-13	Namling	Saleng	Mongar	Bovine	1	0
8-Jan-13	Gangjug	Saleng	Mongar	Bovine	5	0
10-Jan-13	Namling	Saleng	Mongar	Bovine	1	0
25-Jan-13	Jarogang	Athang	Wangdue	Bovine	9	8
2-Feb-13	Dzomesa	Dzome	Punakha	Bovine	2	2
6-Feb-13	Gangtramo	Talo	Punakha	Bovine	3	3
6-Feb-13	Labtsakha	Talo	Punakha	Bovine	1	1
7-Feb-13	Silipang	Guma	Punakha	Bovine	1	
26-Feb-13	PWD Colon	Bapisa	Punakha	Bovine	1	1
28-Feb-13	Tshachhup	Toewang	Punakha	Bovine	12	12
4-Mar-13	Kadam	Mongar	Mongar	Bovine	1	0
9-Mar-13	Chadokha	Lokchina	Chukha	Bovine	14	14
10-Mar-13	Willing	Nubi	Trongsa	Bovine	1	
29-Mar-13	Bartsheri	Shumar	Pemagatshel	Bovine	1	1
3-Apr-13	Ramatoto	Chang	Thimphu	Bovine	1	1
16-Apr-13	Shangling	Nangkor	Zhemgang	Bovine	21	21
21-May-13	Tshangkha	Tangsibji	Trongsa	Bovine	1	1
19-Jun-13	Pamlamfrang	Samkhar	Trashigang	Bovine	1	
28-Jun-13	Alubari	Bjachho	Chukha	Bovine	1	1
2-Jul-13	Alubari	Bjachho	Chukha	Bovine	1	1
11-Jul-13	Pakhaygaun	Shompangkha	Sarpang	Bovine	4	4
26-Jul-13	Chazam	Samkhar	Trashigang	Bovine	1	

1-Aug-13	Norgang	Chhokhor	Bumthang	Bovine	1	
26-Aug-13	Phungputhoe	Yangtse	T/ Yangtse	Bovine	1	
1-Sep-13	DechenPelri	Tang	Bumthang	Bovine	1	1
3-Sep-13	Sisithangka	Sama	Haa	Bovine	1	1
6-Sep-13	BS farm	Chhokhor	Bumthang	Bovine	1	1
25-Sep-13	Riserboo	Mendrelgang	Tsirang	Bovine	7	7
28-Nov-13	Thangu	Thedtsho	Wangdue	Bovine	1	1
8-Dec-13	Om Teykha	Rubesa	Wangdue	Bovine	1	1
10-Dec-13	Thangu	Thedtsho	Wangdue	Bovine	1	1
19-Dec-13	Tshangkha	Tangsibji	Trongsa	Bovine	1	1
5-Jan-14	BarsaKab	Goenkham	Gasa	Bovine	3	1
9-Jan-14	Baikunza	Bongo	Chukha	Bovine	8	8
17-Jan-14	Kadam	Mongar	Mongar	Bovine	2	1
30-Jan-14	Juprey	Bhur	Sarpang	Bovine	1	1
23-Feb-14	Gothong	Udzorong	Trashigang	Bovine	10	10
7-Mar-14	Bunakha	Chapcha	Chukha	Bovine	2	1
13-Mar-14	Yonphula	Kanglung	Trashigang	Bovine	1	1
14-Mar-14	Dungkharling	Bhur	Sarpang	Bovine	3	3
17-Mar-14	Samkhara	Jigmichhoeling	Sarpang	Bovine	4	4
5-May-14	Lungkha	Dzome	Punakha	Bovine	2	1
17-Jun-14	Omchhu	Gayling	Chukha	Bovine	3	3
19-Jun-14	ManiChol	Goenkhatoe	Gasa	Bovine	1	0
5-Jul-14	Bachhu	Getana	Chukha	Bovine	3	3
24-Aug-14	NNBF	Khaling	Trashigang	Bovine	1	1
24-Sep-14	Goensakha	Dogar	Paro	Bovine	2	0
11-Nov-14	Drupchugang	Tsholingkhar	Tsirang	Bovine	1	1
10-Feb-15	Padichhu	Bongo	Chukha	Bovine	3	3
10-Feb-15	Tangsibji	Tangsibji	Trongsa	Bovine	1	1
10-Feb-15	Philuma	Jangchhubling	S/Jongkhar	Bovine	11	11
6-Mar-15	Kangugom	Rubesa	Wangdue	Bovine	3	3
9-Mar-15	Jangsa	Dopshari	Paro	Bovine	1	1
30-Mar-15	Dungbi	Trong	Zhemgang	Bovine	11	11
19-Jun-15	Loushong	Nubi	Trongsa	Bovine	2	2
24-Sep-15	Bunakha	Chapcha	Chukha	Bovine	8	7
13-Oct-15	Jadigang	Dogar	Paro	Bovine	1	1
20-Oct-15	Peljorling	Rubesa	Wangdue	Bovine	3	3
26-Oct-15	Tamcho	Dogar	Paro	Bovine	2	0



**Annexure 8: Details of Black Quarter outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
5/23/2016	Kazhi	Kazhi	Wangdue	Bovine	9	9	1
29/6/2016	Katsho Goenpa	Katsho	Haa	Bovine	4	1	1
8/20/2016	Damji	Goenkhamé	Gasa	Bovine	5	5	1
8/28/2016	Tshangkha	Tangsibji	Trongsa	Bovine	1	1	1

**Annexure 9: Details of Hemorrhagic Septicaemia outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
22-Jun-12	Peljorling	Rubesa	Wangdue	Bovine	6	6
9-Oct-12	Norgang	Chhokhor	Bumthang	Bovine	1	1
19-Nov-12	Nangsephe	Chhokhor	Bumthang	Bovine	2	2
10-Nov-13	Mongar	Mongar	Mongar	Bovine	1	0
19-Jan-14	Jedokha lumbukha	Lokchina	Chukha	Bovine	4	4
24-Mar-15	Jamisa	Mewang	Thimphu	Bovine	2	2
29-Mar-15	Tomla	Dangchu	Wangdue	Bovine	1	1
2-Apr-15	Yebisa	Chhubu	Punakha	Bovine	4	4
22-Jul-15	Kalizingkha	Tseza	Dagana	Bovine	1	1

**Annexure 10: Details of Hemorrhagic Septicaemia outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
28/2/2016	Dorokha	Dorokha	Samtse	Bovine	1	1	1
6/10/2016	Gedu	Bongo	Chukha	Bovine	2	2	1

**Annexure 11: Details of Newcastle Disease outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
13-Sep-12	Lower Salami	Kikorthang	Tsirang	Avian	1000	5
18-Dec-12	Serjung	Martshala	S/Jongkhar	Avian	10	9
29-Jan-13	Chuwabari	Dekiling	Sarpang	Avian	10	7

26-Feb-13	RNR EC Mongar	Mongar	Mongar	Avian	3	0
23-May-13	Phuentsholing	Phuntsholing	Chukha	Avian	260	8
28-May-13	Toktokha	Bongo	Chukha	Avian	97	97
17-Jul-13	Lower Toribari	Phuntsholing	Chukha	Avian	30	5
11-Sep-13	Lower Toribari	Phuntsholing	Chukha	Avian	300	6
14-Sep-13	Wangdi Gasel	Phuntsholing	Chukha	Avian	170	8
23-Sep-13	Gurung Drangra	Darla	Chukha	Avian	10	6
4-Dec-13	Khamdra	Dogar	Paro	Avian	20	0
28-Dec-13	Dangragoon	Lhamoizingkha	Dagana	Avian	194	194
29-Dec-13	Yangbari	Gongdue	Mongar	Avian	82	77
14-Feb-14	Gangzur	Gangzur	Lhuentse	Avian	41	41
19-Feb-14	Hilley	Samrang	S/Jongkhar	Avian	73	38
8-Mar-14	Ree Jue	Umling	Sarpang	Avian	30	20
9-Mar-14	Tashiphug	Sherzhong	Sarpang	Avian	50	30
10-May-14	Kadam	Mongar	Mongar	Avian	7	7
18-Jan-15	Barpang	Bjoka	Zhemgang	Avian	50	21
7-Feb-15	Denphu	Serthig	S/Jongkhar	Avian	32	29
16-Feb-15	Barpang	Bjoka	Zhemgang	Avian	10	5
21-Aug-15	Kichhu	Lamgong	Paro	Avian	3	0

**Annexure 12: Details of mixed infection with Marek's disease and ALC outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
6/28/2016	Poultry Farm	Wangchang	Paro	Avian	307	307	1

**Annexure 13: Details of IBD outbreaks in the country (2014-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
6-Apr-14	Rani Bagan	Hiley	Sarpang	Avian	1120	1120
6-Apr-14	Patabari	Shompangkha	Sarpang	Avian	2450	1106
8-Apr-14	Juprey	Bhur	Sarpang	Avian	4150	865
19-May-14	Gawathang	Dekiling	Sarpang	Avian	657	657
30-May-14	Lower Lobsibotay	Goserling	Tsirang	Avian	4571	2230
31-May-14	LowerTsholingkha	Tsholingkhar	Tsirang	Avian	1000	252
5-Jun-14	Sarpangtar	Shompangkha	Sarpang	Avian	350	350
11-Jun-14	Petakarpo	Theedtsho	Wangdue	Avian	901	734

16-Jun-14	Chhoekhorling	Dekiling	Sarpang	Avian	47	13
8-Jul-14	Juprey	Bhur	Sarpang	Avian	48	17
8-Jul-14	Chhuzomsa	Beteni	Tsirang	Avian	881	297
11-Jul-14	Jaruwa	Bhur	Sarpang	Avian	6	3
19-Jul-14	Chhoekhorling	Dekiling	Sarpang	Avian	29	11
21-Jul-14	Khorsanay	Dunglegang	Tsirang	Avian	600	103
23-Jul-14	Norbugang	Shompangkha	Sarpang	Avian	60	37
25-Jul-14	Charkilo	Genye	Thimphu	Avian	44	36
1-Aug-14	Patabari	Shompangkha	Sarpang	Avian	55	29
1-Aug-14	Dekiling	Dekiling	Sarpang	Avian	62	27
6-Aug-14	Chilikhar	Toepisa	Punakha	Avian	385	385
7-Aug-14	Chhoekhorling	Dekiling	Sarpang	Avian	12	5
11-Aug-14	Juprey	Bhur	Sarpang	Avian	35	17
22-Aug-14	Lower Bokray	Kikorthang	Tsirang	Avian	495	215
27-Aug-14	Rani Bagan	Hiley	Sarpang	Avian	700	500
15-Mar-15	Pemathang	Goserling	Tsirang	Avian	500	28
21-Apr-15	Dekiling	Dekiling	Sarpang	Avian	16	16
14-May-15	Kencholing	Shompangkha	Sarpang	Avian	5	4
2-Jul-15	Rani Bagan	Hiley	Sarpang	Avian	44	38
13-Dec-15	Tingtibhi	Trong	Zhemgang	Avian	1400	400

**Annexure 14: Details of Gumboro outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreaks
1/4/2016	Dekiling	Dekiling	Sarpang	Avian	300	80	1
9/4/2016	Chuzomsa	Beteni	Tsirang	Avian	300	90	1
19/4/2016	Gawaithang	Dekiling	Sarpang	Avian	328	65	1
24/5/2016	Dolungang	Dekiling	Sarpang	Avian	120	45	1
8/6/2016	Kikhorthang	Goserling	Tsirang	Avian	3500	400	1
7/10/2016	Rani Bagan	Hiley	Sarpang	Avian	1000	789	1
12/12/2016	Tashiling	Dekiling	Sarpang	Avian	556	120	1

**Annexure 15: Details of HPAI outbreaks in the country (2012-2015) (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases
13-Jan-12	Motithang	Chang	Thimphu	Avian	49
4-Jan-12	Tshemakha	Bjachho	Chukha	Avian	87

6-Jan-12	Mepesa	Bjachho	Chukha	Avian	16
8-Jan-12	Mepaiarig	Bjachho	Chukha	Avian	3
28-Jan-12	Kamji school area	Gayling	Chukha	Avian	4
30-Jan-12	Bunakha	Chapcha	Chukha	Avian	38
19-Feb-12	Gedu	Bongo	Chukha	Avian	10
14-Feb-12	Wangdi Gasel	Phuntsholing	Chukha	Avian	12
27-Mar-12	Yangbari	Gongdue	Mongar	Avian	70
14-Oct-12	Wangdi Gasel	Phuntsholing	Chukha	Avian	24
27-Dec-12	Kalikhola	Lhamoizingkha	Dagana	Avian	18
3-Mar-12	Burkhay	Samphelling	Chukha	Avian	1
10-Feb-12	Alay	Phuntsholing	Chukha	Avian	5
15-Feb-12	Thakuri Gaon	Ugentse	Samtse	Avian	12
14-Oct-12	Wangdi Gasel	Phuntsholing	Chukha	Avian	24
27-Dec-12	Kalikhola	Lhamoizingkha	Dagana	Avian	18
15-Jan-13	Gelephu	Gelephu	Sarpang	Avian	50
18-Jan-13	Pelrithang	Gelephu	Sarpang	Avian	8
25-Jan-13	Shawapang	Chhuzagang	Sarpang	Avian	6
3-Apr-15	Motithang	Chang	Thimphu	Avian	16

**Annexure 16: Details of Highly Pathogenic Avian Influenza outbreaks during 2016**  
(Source: TADInfo database, NCAH).

Date	Village	Geog	Dzongkhag	Species	Cases	Outbreak
14/10/2016	Wangkha	Bjachho	Chukha	Avian	13	1

**Annexure 17: Details of Classical Swine Fever outbreaks in the country (2012-2015)**  
(Source: TADInfo database, NCAH).

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
1-Apr-13	Bapalathang	Chhokhor	Bumthang	Swine	1	1
13-Aug-13	Damchu	Chapcha	Chukha	Swine	2	1
21-Nov-13	Phumu	Doteng	Paro	Swine	9	1
23-Oct-15	Dungbi	Trong	Zhemgang	Swine	1	1

**Annexure 18: Details of Classical Swine Fever outbreaks during 2016** (Source: TADInfo database, NCAH).

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
1/9/2016	Waklaytar	Patale	Tsirang	Swine	9	9	1

**Annexure 19: Details of PPR outbreaks in the country (2010-2015) (Source: TADInfo database, NCAH).**

Date	Geog	Dzongkhag	Species	Cases	Deaths
15/06/2010	Bjapcho	Chukha	Caprine	84	27
12/21/2012	Samtse	Samtse	Caprine	1	0
6/5/2013	Bjachho	Chukha	Caprine	87	41
7/1/2013	Bhur	Sarpang	Caprine	14	10
7/3/2014	Lhamoizingkha	Dagana	Caprine	120	46
7/11/2014	Bjachho	Chukha	Caprine	20	7
8/18/2014	Samtse	Samtse	Caprine	42	4

**Annexure 20: Details of PPR outbreaks during 2016 (Source: TADInfo database, NCAH).**

Date	Village	Geog	Dzongkhag	Species	Cases	Deaths	Outbreak
4/5/2016	QS Gelephu	Gelephu	Sarpang	caprine	19	19	1

## Annexure 21: Laboratory diagnostic capacity at LSU, NCAH, Serbithang

Disease	Bhutan*	OIE**
Anthrax	Agt id	-
Foot and mouth disease	ELISA, PCR	ELISA, VN, CF
Leptospirosis	Agt id, MAT	MAT
Paratuberculosis (JD)	ELISA	ELISA, DHT
Rabies	IC, FAT	ELISA, VN
Trichinellosis	Agt id	Agt id, ELISA
Trypanosomiasis	Agt id	-
AI (A, H5N1, H7N9)	PCR, HAI, IC	VI, AGID, HAI
Avian Mycoplasmosis	ELISA	SAT, HAI
IBD (Gumboro disease)	ELISA	ELISA, AGID
NCD	PCR	VI, HAI
Bovine anaplasmosis	Agt id	CAT, CF
Bovine babesiosis	Agt id	CF, ELISA, IFA
Bovine brucellosis	RBT, SAT, ELISA	BBAT, CF, ELISA, FPA
Bovine cysticercosis	Agt id	Agt id
Bovine tuberculosis	IDT	IDT, IFN $\gamma$
Bovine viral diarrhoea	ELISA	Agt id
CBPP	ELISA	ELISA, CF
HS	Agt id	Agt id
IBR	ELISA	Agt id, ELISA, PCR, VN
Theileriosis	Agt id	Agt id, IFA
Trypanosomiasis	Agt id	IFA
EI	IC, ELISA	AGID, ELISA
Equine piroplasmosis	Agt id	ELISA, IFA, CF
PPR	IC, ELISA	VN, ELISA
CSF	ELISA	ELISA, FAVN, NPLA
PRRS	PCR	ELISA, IFA, IPMA
Toxoplasmosis	ELISA	Agt id

\*Practical value

\*\*Prescribed/alternative



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