



## STATUS OF NOTIFIABLE ANIMAL DISEASES IN BHUTAN



**1996-2014**



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

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**ROYAL GOVERNMENT OF BHUTAN**  
 Ministry of Agriculture and Forests  
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 Serbithang, Thimphu



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2<sup>nd</sup> July 2015

## FOREWORD

The booklet on Status of Notifiable Animal Diseases 2014 in bhutan compiled by the Disease Prevention and Control Unit (DPCU) of the National Centre for Animal Health is a continuation of the annual publication of the status of notifiable diseases reported in Bhutan during the period. This edition gives an overview of all notifiable animal diseases reported in the country during 2014 including the spatio-temporal pattern of outbreaks from 1996 to 2014. This report is combination of several years outbreak data and the outbreak data recorded in the *TADInfo* online database system maintained at National Centre for Animal Health.

The main purpose of this booklet is to provide an update on the livestock disease situation in the country for information of all stakeholders including field livestock staff, veterinarians, livestock farmers and policy makers. The information contained in this booklet could also be used for preparedness and response plans by the concerned government agencies responsible for disease prevention and control.

I would like to urge the *TADInfo* focal persons of all Dzongkhags to ensure that all outbreaks of notifiable livestock diseases are entered compulsorily in the database to ensure such reports reflect the true situation in the ground. I would like to thank all the Program Directors of RLDCs, the *TADInfo* focal persons, and all field veterinarians for their active disease reporting and investigation. Further, I would like to extend my appreciation to all the colleagues in Disease Prevention Control Unit for their efforts in bringing out this useful publication.

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



Dr. Kinzang Dupa  
**Program Director**

Toll free number 124 for any queries/reporting on livestock and poultry diseases [www.ncah.gov.bt](http://www.ncah.gov.bt)



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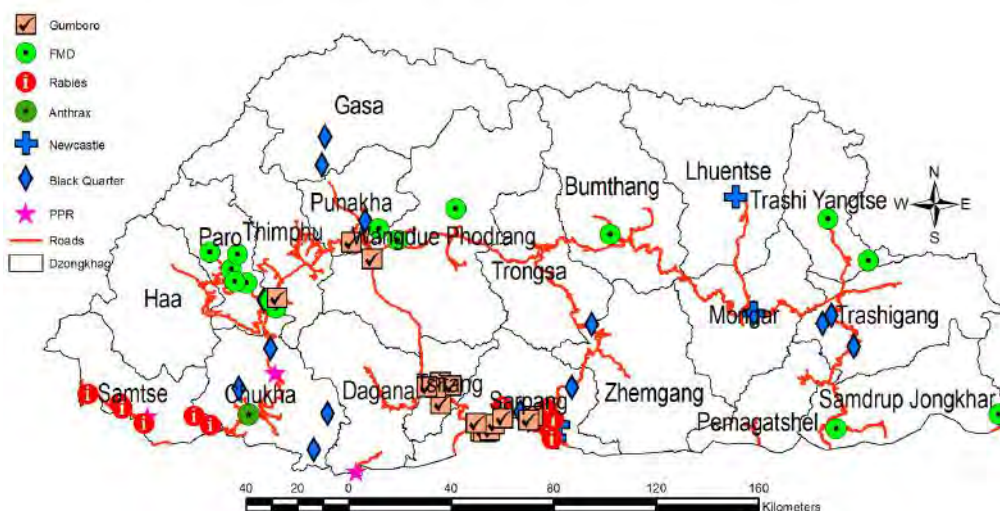




# 1. Introduction

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. A brief descriptive analysis is being attempted in this report to present the status of reported notifiable diseases reported in Bhutan during 2014 (Figure 1). The data used for this analysis were retrieved from the Veterinary Information System database (VIS) for the period from 1996 to 2010 and Transboundary Animal Disease Information System (TADinfo database) for the period 2011–2014 and were validated accordingly. Therefore, the data presented in this report can be used as baseline information in future.



**Figure 1: Distribution of reported outbreaks of notifiable animal diseases in Bhutan during 2014**

During 2014, major disease outbreak occurred in poultry. Infectious bursal disease (IBD) or Gumboro outbreaks have been reported in poultry farms in Sarpang, Tsirang, Wangdue, Punakha and Thimphu Dzongkhags.

## 2. Multiple species disease

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### 2.1 Foot and mouth disease

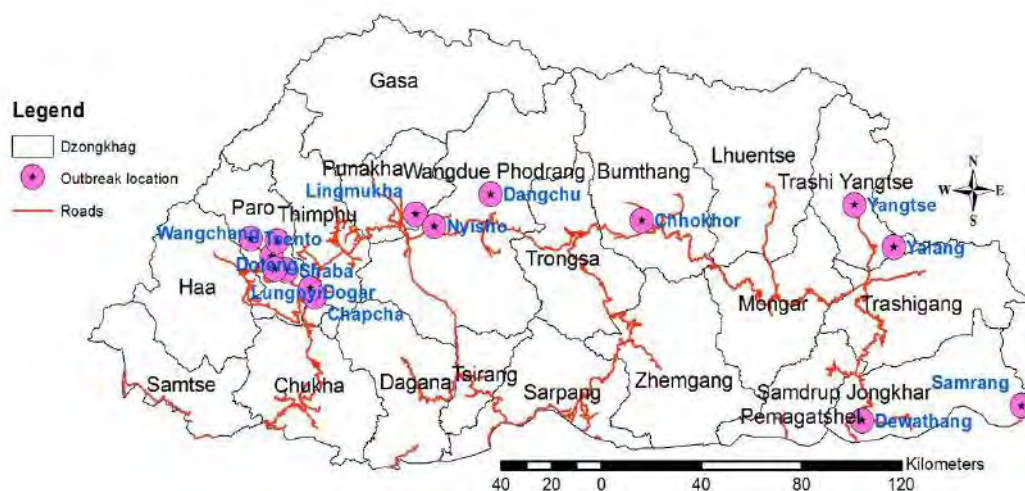
Foot-and-mouth disease (FMD) is a highly infectious viral disease of cloven-hoofed species characterized by fever and vesicles in the mouth and on the muzzle, teats, and feet. In a susceptible population, morbidity approaches 100% but the disease is rarely fatal except in young and very old animals. There are 7 immunologically distinct serotypes: A, O, C, Asia 1, and SAT1, SAT2, and SAT3 (Southern African Territories). Within each serotype, there are a large number of strains that exhibit a spectrum of antigenic characteristics; therefore, more than one vaccine strain for each serotype, particularly O and A, is required to cover the antigenic diversity.

FMD is endemic and is reported from almost all parts of the country. In the past there were more outbreaks reported from Dzongkhags bordering India, but during 2014 year, outbreaks have been reported mostly in the interior 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 through Sandwich ELISA performed at NCAH

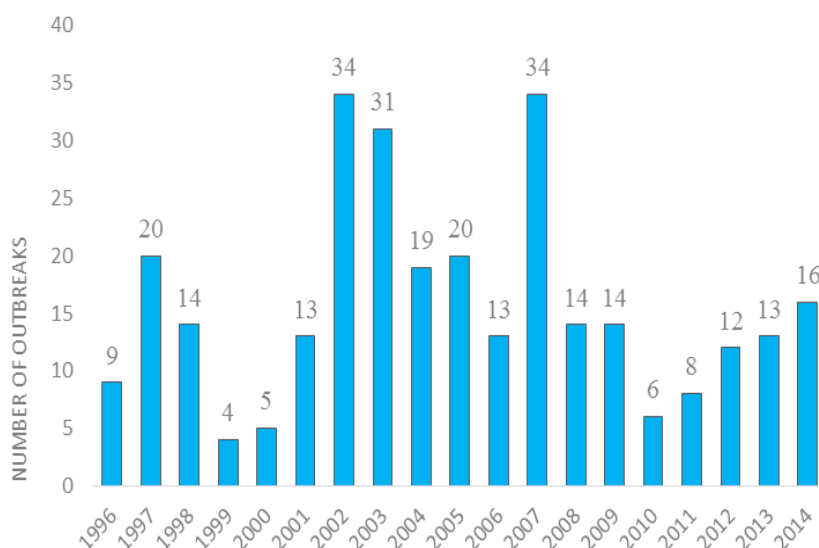
During 2014, 16 outbreaks have been reported in seven Dzongkhags, affecting 232 cattle and six pigs when compared to 13 reported outbreaks in 2013 (Figures 2, 3 and annexure 1, 2). Most of the outbreaks have occurred in places near the highways in interior Bhutan and near international borders in Samdrup Jongkhar. Although the source of infection was largely unknown, some outbreaks may have been associated with import of livestock products.

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 under the GF-TADs concept.





**Figure 2: Distribution of FMD outbreaks in animals between January & December 2014**



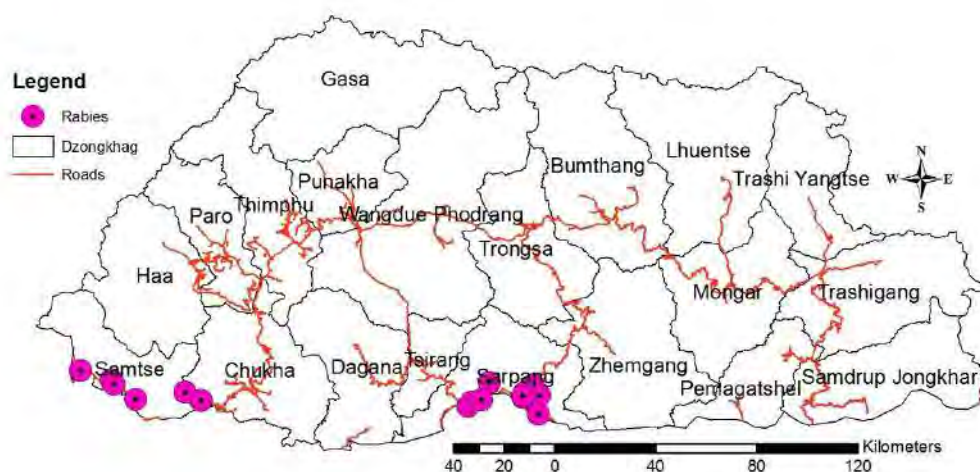
**Figure 3: Annual distribution of reported FMD outbreaks in Bhutan (1996 to 2014)**

## 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 mainly through mass vaccination and restrictive elimination of dogs. Currently the disease is endemic in the southern Dzongkhags of Bhutan along the border with India.

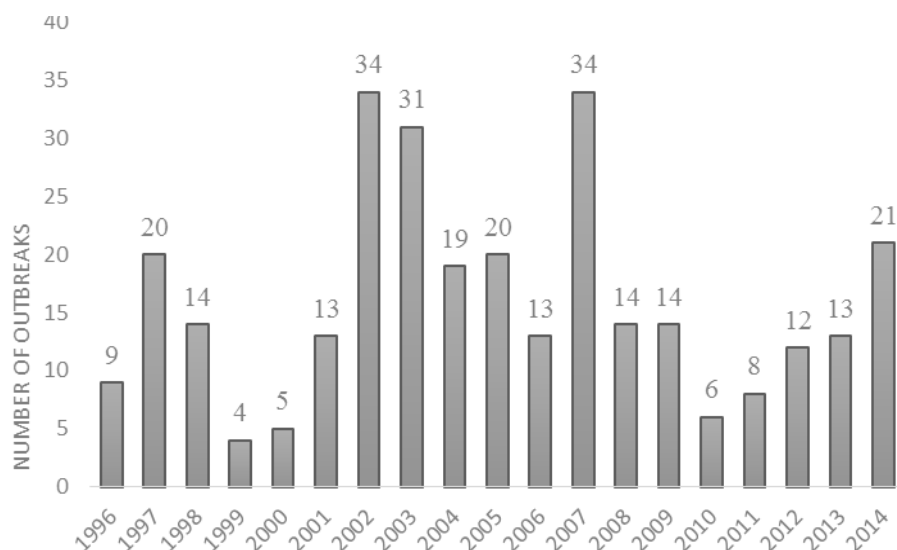
During 2014, 21 outbreaks of rabies were reported in Chukha, Samtse and Sarpang Dzongkhags affecting 16 cattle and 21 dogs when compared to 21 outbreaks in 2013 (Figures 4, 5 and annexure 3, 4). Highest outbreaks were reported in Sarpang (13) Dzongkhag followed by Samtse (5) and Chukha (3). The cases in domestic animals result from rabid dog bites.

In addition to the ongoing CNVR program in the country, a month long (October 2014) mass dog vaccination program against rabies was organized in high risk areas of south Bhutan covering 5700 dogs and cats.



**Figure 4: Distribution of reported rabies outbreaks in animals between January & December 2014**

In humans, 16 deaths due to rabies (mostly children) has been reported between 2006 and 2014 with only one death in 2013. No human rabies cases were reported during 2014.



**Figure 5: Annual distribution of Rabies outbreak in Bhutan (1996 to 2014)**

### 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. The anthrax isolates in Bhutan were found to be part of the multilocus variable-number tandem repeat analysis B1 lineage (genotype 83) and canonical single-nucleotide polymorphism subgroup B.Br.001/002 (Figure 6). The B lineage is less widespread and primarily associated with South Africa, but it has been reported in parts of the United States, Europe, and Asia, including the Caucasus region. In contrast, the strains from nearby Bangladesh and India belong to the more widely dispersed A lineage.

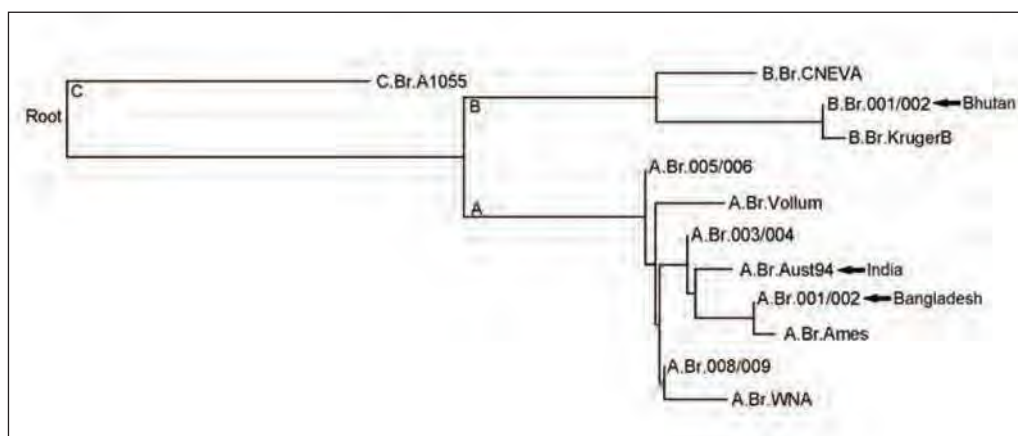


Figure 6. Phylogeny of major *Bacillus anthracis* groups as determined by using canonical single nucleotide polymorphisms. Arrows indicate the lineages/groups of genotyped *B.anthraxis* isolates from India, Bangladesh, and Bhutan (Source: Thapa et al., 2014).

During 2014, only one anthrax outbreak was reported from Chukha Dzongkhag when compared to three reported outbreaks in 2013 (Figure 7, 8 and Annexure 5). No human cases were reported during 2014.

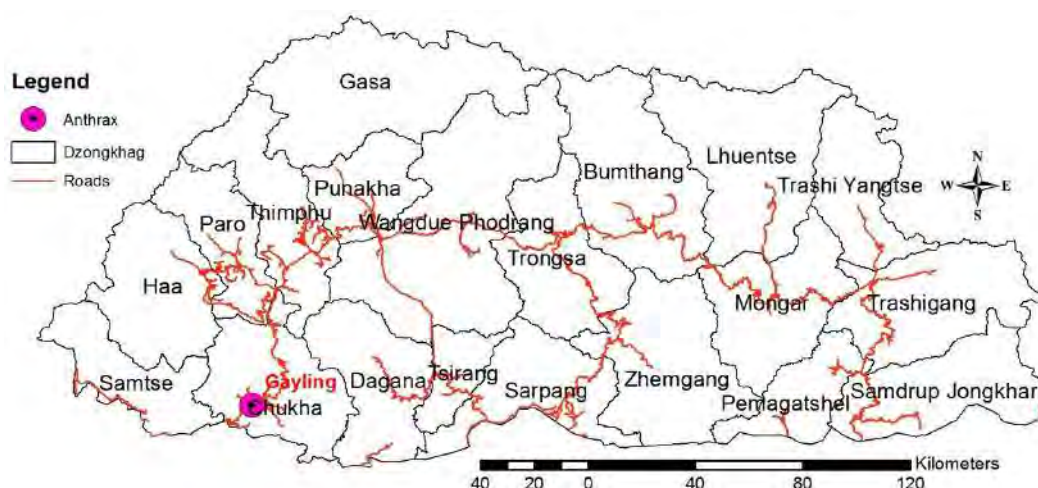


Figure 7: Distribution of reported anthrax outbreaks in animals between January & December 2014

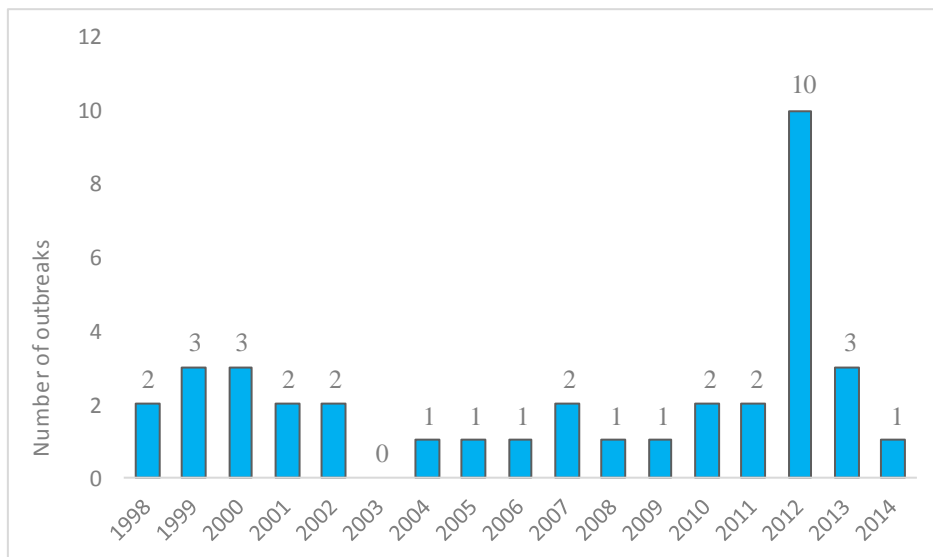


Figure 8: Annual distribution of Anthrax outbreak in Bhutan (1998 to 2014)

## 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 2014, a total of 17 outbreaks of BQ were reported from nine Dzongkhags affecting 48 cattle including 40 deaths when compared to 25 outbreaks reported outbreaks in 2013 (Figures 9, 10, and annexure 6, 7). BQ outbreaks have been reported throughout the year without much seasonal variation.

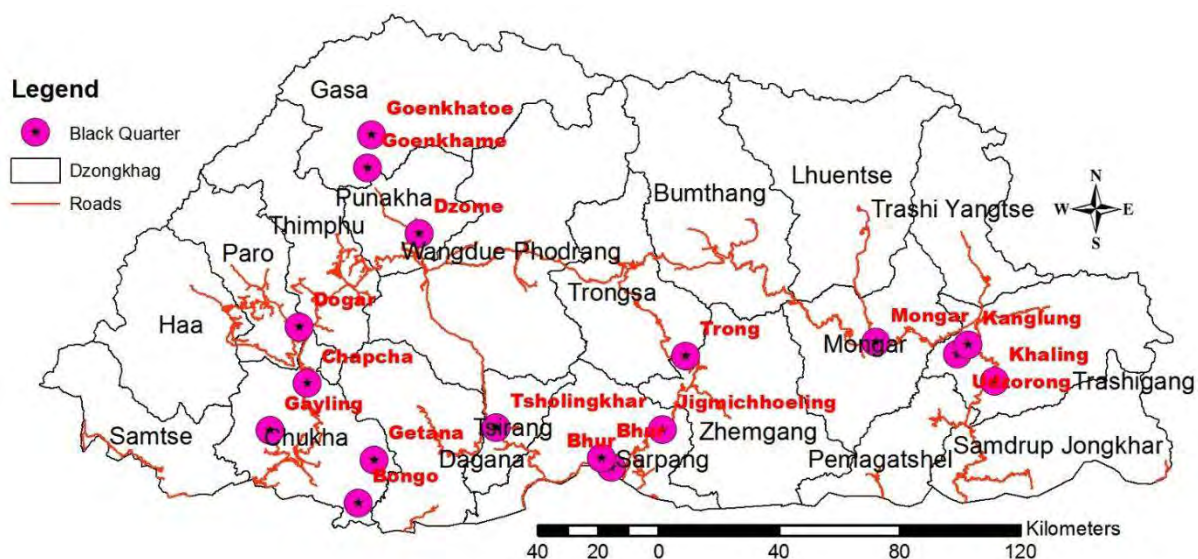


Figure 9: Distribution of reported BQ outbreaks in animals between January & December 2014

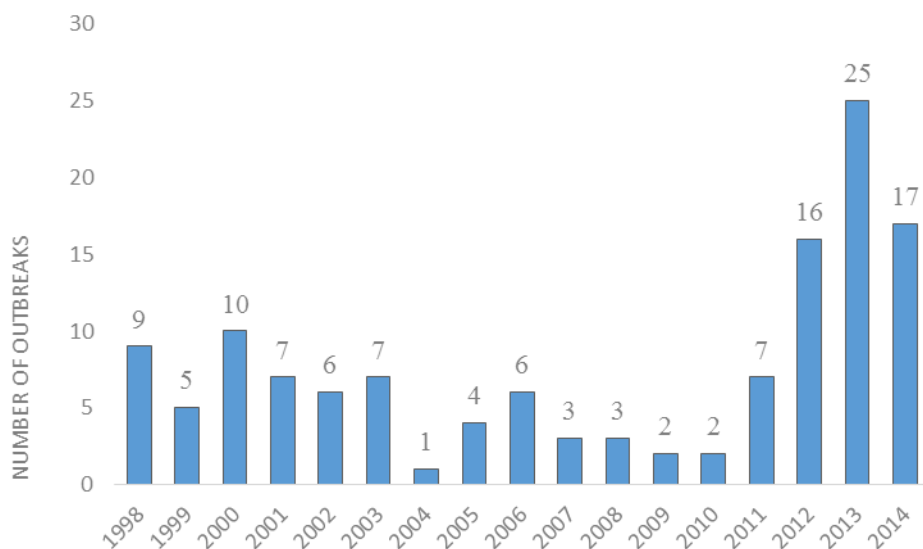


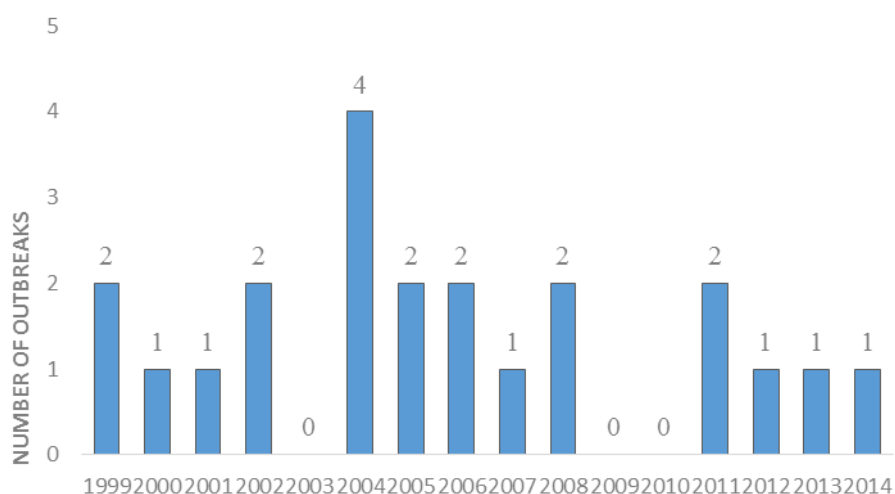
Figure 10: Annual distribution of Black Quarter outbreak in Bhutan (1998 to 2014)



### 3.2 Hemorrhagic Septicemia

Hemorrhagic septicemia (HS) is an acute, highly fatal disease of cattle caused by particular serotypes of *Pasteurella multocida*. HS is seen infrequently in swine and even less commonly in sheep and goats. Although HS may be seen at any time of year, is commonly occurring during the rainy season. The disease causes severe economic losses through morbidity and mortality and 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 11 & annexure 8). HS is diagnosed based on clinical signs as well as by laboratory test. HS vaccine is produced at the NCAH, Serbithang and is being distributed in the field for annual vaccination program.



**Figure 11: Annual distribution of Haemorrhagic Septicemia outbreaks in Bhutan (1999 to 2014)**

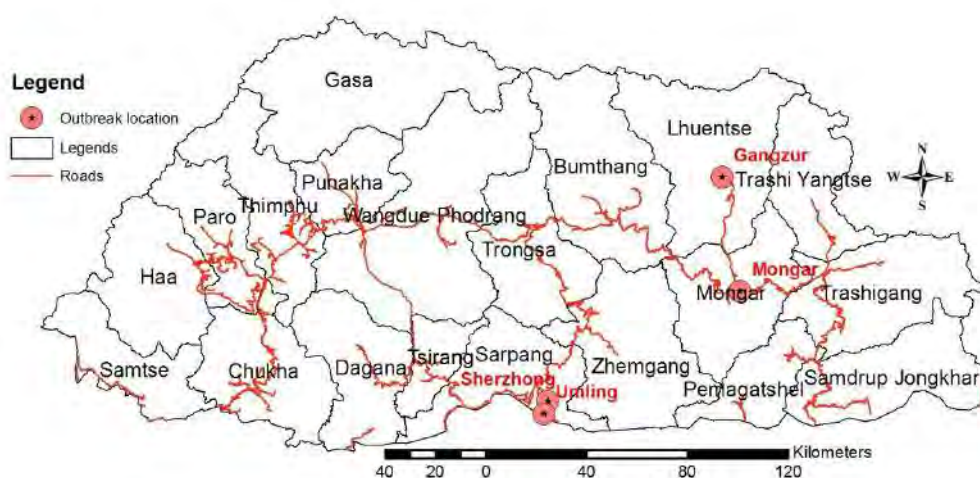
During 2014, only one outbreak of HS was reported from Lokchina Geog under Chukha Dzongkhag with four cases and 100% mortality. There was one outbreak reported in 2013.

## 4. Diseases in poultry

### 4.1. Newcastle disease

Newcastle (NCD) is an acute viral disease of domestic poultry and many other bird species caused by Newcastle disease virus, synonymous with avian paramyxovirus-1.

NCD incidence in poultry is reported sporadically in Bhutan and cause morbidity and mortality of poultry birds, but most cases remain unreported due to small and scattered nature of flocks in the villages. Also vaccination against NCD in government poultry farms is mandatory, but in village poultry vaccination is limited due to the small and scattered nature of flocks.



**Figure 12: Distribution of reported NCD outbreaks in poultry between January & December 2014**

During 2014, five outbreaks were reported from four Dzongkhags compared to nine outbreaks in 2013 (Figures 12, 13 and annexure 9 , 10). The increased report of NCD cases in poultry is associated with increased surveillance activities for HPAI wherein tests for both avian influenza viruses and NCD are conducted simultaneously. Thus, the detection rate of NCD virus in poultry has increased due to active surveillance for avian influenza viruses.

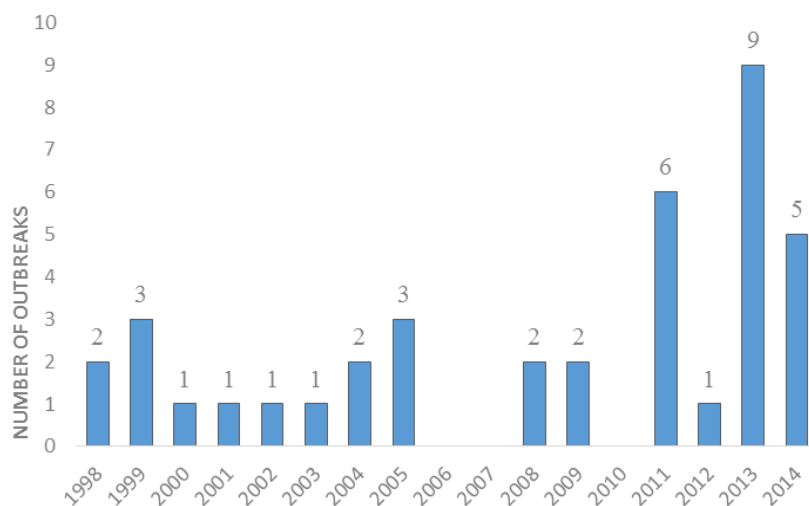


Figure 13: Annual distribution of reported NCD outbreaks in Bhutan (1998 to 2014)

#### 4.2. Infectious Bursal Disease

Infectious Bursal Disease (IBD), or Gumboro Disease is a highly contagious disease of poultry caused by infectious bursal disease virus affecting chicks. The target organ of the virus is the Bursa of Fabricius, an important organ in the chickens for developing immune system. The disease is of economic to the poultry industry.

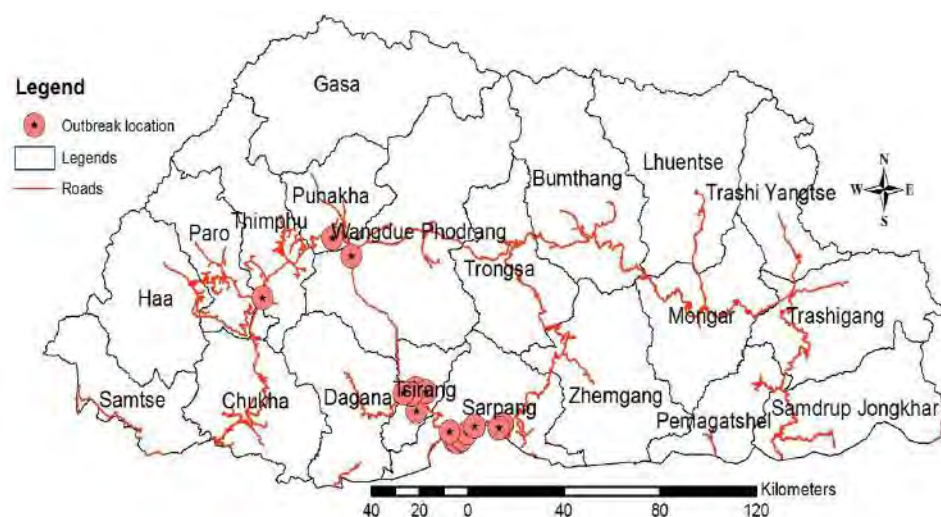


Figure 14: Distribution of reported IBD outbreaks between January & December 2014

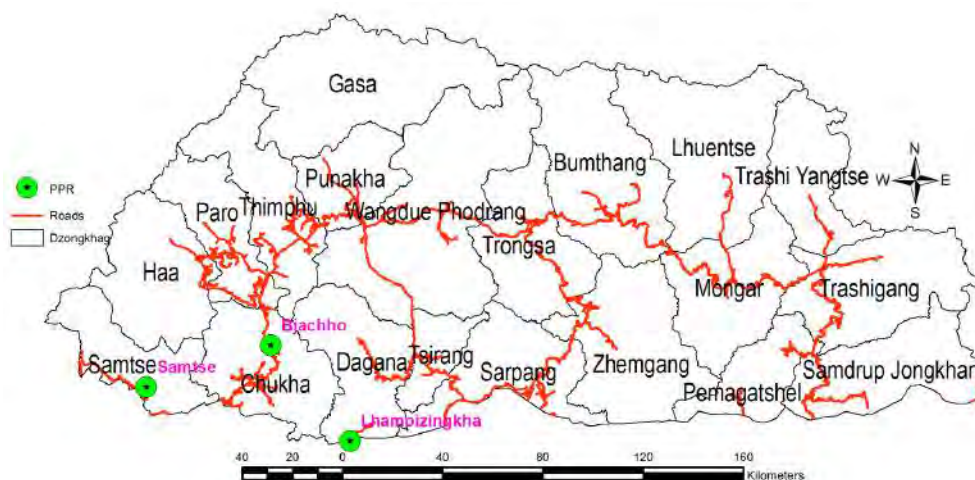
During 2014, the first outbreak of Gumboro was reported on 6th April 2014 at National Poultry Development Centre and other nearby Geogs in Sarpang Dzongkhags. A total of 23 outbreaks were reported from five Dzongkhags of Sarpang, Tsirang, Wangdue, Punakha & Thimphu with 15, 5 and one outbreaks each, respectively (Figure 14 and annexure 14 , 15). Of the 23,158 susceptible population, 3,890 birds have died from IBD and approximately 8,000 birds were affected during the outbreaks in five Dzongkhags.

## 5. Disease in goat

### *5.1. Peste des petits ruminants (PPR)*

*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.

During 2014, three outbreaks of PPR were reported from Lhamoyzingkha under Dagana, Bjapcho under Chukha & Samtse under Samtse Dzongkhags (Figure 15, 16 and annexure 11). Source of outbreaks in Dagana & Samtse were due to introduction of imported goats in the group. The outbreak in Lhamoyzingkha was in the Government farms which were imported from India. Out of 182 cases, 57 have died.



**Figure 15: Distribution of reported PPR outbreaks between January & December 2014**

The surveillance and disease control program will be initiated in the country in line with the global elimination program for PPR. Vaccination against PPR will be initiated soon to control the disease.



**Figure 16: Mucopurulent discharges from eyes, nostril and greenish watery diarrhea of PPR affected goats (Picture: Sangay Rinchen, RLDC Tsimasham)**

## Acknowledgements

The NCAH would like to acknowledge all the TADinfo focal units of RLDC, SVL and DVH for their prompt reporting and update of the disease outbreaks in their locality in the TADInfo database system. The centre would also like to urge all animal health staff and veterinarians to compulsorily undertake flash reporting of all notifiable diseases and enter the outbreak data into the TADinfo database so that the annual health report produced by NCAH reflects the disease situation in the country more accurately.

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## 8. Annexure

**Annexure 1: Details of FMD outbreaks during 2011, 2012 & 2013 (Source: TADInfo database, NCAH).**

Date of out break	Village	Geog	Dzongkhag	Species	Cases	Deaths
Feb 23, 2011	Sertscho	Toetscho	T/Yangtse	Cattle	26	0
Mar 23, 2011	Bhur	Bhur	Sarpang	Cattle	7	2
April 18, 2011	Saureni	Samtse	Samtse	Cattle	15	1
June 28, 2011	Dorikha, Kowna	Sama	Haa	Cattle	8	0
June 2, 2011	Gaybekha	Daga	Wangdue	Cattle	11	0
July 2, 2011	Lomneykha	Chapcha	Chukha	Cattle	2	0
July 20, 2011	Sarpangtar	Shompangkha	Sarpang	Cattle	13	0
Sep 9, 2011	Belbotay	Sipsu	Samtse	Cattle	20	0
Sept 14, 2011	Titring	Tading	Samtse	Cattle	69	0
Feb 6, 2012	Jangsaby	Dzome	Punakha	Cattle	27	0
Feb 10, 2012	Jagarthan	Lamgong	Paro	Cattle	8	0
May 9, 2012	P/ling	P/ling	Chukha	Cattle	33	5
July 27, 2012	Titring	Tading	Samtse	Cattle	146	2
Aug 21, 2012	Richanglo	Gomdar	S/Jongkhar	Cattle	47	1
Aug 20, 2012	Gonong	Shingkhar Lauri	S/Jongkhar	Cattle	30	1
Aug 4, 2012	Thothang	Shingkhar Lauri	S/Jongkhar	Cattle	30	1
Sept 3, 2012	Pusa	Sakteng	Trashigang	Cattle	30	0
Sept 7, 2012	Borangmang	Sakteng	Trashigang	Cattle	43	0
Sept 2, 2012	Khelphu	Merak	Trashigang	Cattle	111	12
Oct16, 2012	Giri Gaon	Sipsu	Samtse	Cattle	72	1
Oct 16, 2012	Penjorling A	Sipsu	Samtse	Cattle	19	0
Oct 16, 2012	Penjorling A	Sipsu	Samtse	Buffalo	4	0
Oct 16, 2012	Peljorling B	Sipsu	Samtse	Cattle	119	1
Oct 16, 2012	Jogimara	Sipsu	Samtse	Cattle	14	0
Oct 16, 2012	Hangay	Sipsu	Samtse	Cattle	50	0
Oct16, 2012	Hangay	Sipsu	Samtse	Buffalo	5	0
Oct 18, 2012	Khelphu	Merak	Trashigang	Cattle	387	3

Nov 15, 2012	Mujuwa/ Tundara	Namgyel Chhoeling	Samtse	Cattle	24	0
Nov 15, 2012	Mujuwa/ Tundara	Namgyel Chhoeling	Samtse	Buffalo	4	0
Nove 26, 2012	Dagphel	Nangkor	Zhemgang	Cattle	3	1
Nov 28, 2012	Torsatar	Phuentsholing	Chukha	Cattle	8	0
Nove 28, 2012	Torsatar	Phuentsholing	Chukha	Pig	1	0
Dec 26, 2012	Jangsa	Ugentse	Samtse	Cattle	12	0
Feb13, 2013	Khasadrapchu	Mewang	Thimphu	Bovine	2	0
Jan 7, 2013	Jagarthan	Lamgong	Paro	Bovine	6	0
May 29, 2013	Bunakha	Chapcha	Chukha	Bovine	10	0
June 6, 2013	Phuentsholing	Phuntsholing	Chukha	Bovine	4	0
Sept 30, 2013	Phuentsholing	Phuntsholing	Chukha	Bovine	16	0
Oct 10, 2013	Shebji	Sombeykha	Haa	Swine	1	0
Oct 10, 2013	Shebji	Sombeykha	Haa	Bovine	100	5
Oct 8, 2013	Pajab herd	Sama	Haa	Bovine	78	1
Nov 18, 2013	Dangloe	Lamgong	Paro	Bovine	5	0
Nov 18, 2013	Dangloe	Lamgong	Paro	Swine	1	0
Dec 11, 2013	Phakpashi	Drepung	Mongar	Bovine	3	0
Dec 18, 2013	Samdrujongkhar	Dewathang	S/Jongkhar	Bovine	13	7
Dec 24, 2013	Yarpheling	Sengye	Sarpang	Bovine	12	0
Dec 29, 2013	Chaebakha	Nyisho	W/Phodrang	Bovine	10	0
Dec 30, 2013	Narphung	Jangchhubling	S/ Jongkhar	Bovine	2	0
Dec 30, 2013	Labarbotay/ Lengthey Chargharey	Samtse	Bovine	5	0	

**Annexure 2: Details of Foot and Mouth outbreak in domestic animals in Bhutan during 2011 (Source: TADInfo Database system,)**

Date	Village	Geog	Species	Cases	Deaths
02/25/14	Jakar Kha	Chhokhor	Bovine	41	0
02/10/14	Paga Gempa	Chapcha	Bovine	1	0
03/31/14	Chuzom	Dogar	Bovine	29	0
04/04/14	Juka	Doteng	Swine	6	0
01/08/14	Gebjakha	Lungnyi	Bovine	3	1
10/23/14	Gebjakha	Lungnyi	Bovine	14	0
04/07/14	Dekha	Shaba	Bovine	1	0
09/02/14	Drugyel school	Tsento	Bovine	3	0
02/03/14	Geptoe	Wangchang	Bovine	1	0
01/23/14	Pang Gomo	Lingmukha	Bovine	29	0
07/14/14	Domphu	Dewathang	Bovine	7	0
06/16/14	Hilley	Samrang	Bovine	8	0
04/30/14	Zor, Chhema, Dungs	Yalang	Bovine	27	2
01/28/14	Tongchen	Yangtse	Bovine	28	0
10/14/14	Gobja	Dangchu	Bovine	14	0
02/23/14	Gelekha	Nyisho	Bovine	20	0

**Annexure 3: Details of reported rabies outbreaks in domestic animals in Bhutan during 2011, 2012 & 2013 (Source: TADInfo Database system)**

Date	Month	Place	Geog	Dzong-khag	Species	Cases
11/01/2011	January	RBA camp	Gelephu	Sarpang	Dog	1
11/01/2011	January	Puranobasti	Gelephu	Sarpang	Pig	1
11/01/2011	January	Puranobasti	Gelephu	Sarpang	Cattle	1
11/01/2011	January	Puranobasti	Gelephu	Sarpang	Cattle	1
11/01/2011	January	Kabretar	Phuentsholing	Chukha	Dog	1
9/02/2011	February	Tali Dratshang	Gelephu	Sarpang	Dog	1
25/2/2011	February	Samtse	Samtse	Samtse	Cat	1
3/02/2011	February	Phuentsholing	Phuentsholing	Chukha	Dog	1
21/03/2011	March	Gelephu	Gelephu	Sarpang	Cattle	1
24/03/2011	March	Gelephu	Gelephu	Sarpang	Dog	1
30/03/2011	March	Phuentsholing	Phuentsholing	Chukha	Dog	1
22/04/2011	April	Gelephu	Gelephu	Sarpang	Dog	1
28/04/2011	April	Phuentsholing	Phuentsholing	Chukha	Cat	1
2/05/2011	May	Bukey	Samtse	Samtse	Dog	1

2/05/2011	May	Bukey	Samtse	Samtse	Cattle	2
4/05/2011	May	Hot Spring	Jigmichhoe- ling	Sarpang	Dog	1
8/06/2011	June	K/Bangang	Tading	Samtse	Sheep	2
8/06/2011	June	K/Bangang	Tading	Samtse	Goat	4
8/08/2011	August	Sarpang	Sarpangtrar	Sarpang	Dog	1
8/08/2011	August	Sarpang	Sarpangtrar	Sarpang	Dog	1
8/08/2011	August	Hiley	Hiley	Sarpang	Dog	1
8/08/2011	August	Gelephu	Gelephu	Sarpang	Dog	1
9/09/2011	September	Phuentsholing	P/ling	Chukha	Horse	1
21/09/2011	September	Phuentsholing	P/ling	Chukha	Dog	1
5/09/2011	September	Kuwapani	Hiley	Sarpang	Cattle	1
5/09/2011	September	Kuwapani	Hiley	Sarpang	Dog	1
5/09/2011	September	Kuwapani	Hiley	Sarpang	Dog	1
5/09/2011	September	Kuwapani	Hiley	Sarpang	Cat	1
9/09/2011	September	Phuentsholing	Pling	Chukha	Dog	1
5/09/2011	September	Dubeni	Lokchina	Chukha	Horse	1
24/10/2011	October	Darla	Darla	Chukha	Dog	1
10/10/2011	October	Sibsuni	L/Zingkha	Dagana	Cattle	2
10/10/2011	October	Sibsuni	L/Zingkha	Dagana	Dog	3
20/10/2011	October	Kuwapani	Hiley	Sarpang	Cattle	1
17/10/2011	October	Bisti	Hiley	Sarpang	Cattle	1
25/12/2011	December	Phuentsholing	P/ling	Chukha	Dog	1
1/02/2012	February	Dorji Phu	Deorali	Dagana	Cattle	3
1/02/2012	February	Dorji Phu	Deorali	Dagana	Goat	1
1/02/2012	February	Dorji Phu	Deorali	Dagana	Dog	1
1/02/2012	February	Dorji Phu	Deorali	Dagana	Pig	1
6/02/2012	February	Samtse	Samtse	Samtse	Cattle	1
11/02/2012	February	Juprey	Bhur	Sarpang	Dog	2
12/03/2012	March	Patabari	Shompangkha	Sarpang	Cattle	2
2/04/2012	April	Phuentsholing	Phuntsholing	Chukha	Cat	1
25/06/2012	June	RBA Colony	Dewathang	S/Jongkhar	Dog	1
25/07/2012	July	Tsangchhu	Phuntsthothang	S/Jongkhar	Cattle	1
6/08/2012	August	Yub_Khezo	Jamkhar	T/yangtse	Cattle	1
13/08/2012	August	Golanti	Langchhenphu	S/Jongkhar	Dog	1
13/08/2012	August	Golanti	Langchhenphu	S/Jongkhar	Cattle	1

4/09/2012	Sept	S/Jongkhar	Dewathang	S/Jongkhar	Dog	1
4/09/2012	Sept	Laring	Hiley	Sarpang	Cat	1
12/09/2012	Sept	Golanti	Langchhenphu	S/Jongkhar	Cattle	1
8/10/2012	October	Phuentsholing	Phuntsholing	Chukha	Dog	1
25/10/2012	October	Gelephu	Gelephu	Sarpang	Dog	1
10/10/2012	October	RBA Colony	Dewathang	S/Jongkhar	Dog	1
10/10/2012	October	Chumkuna	Phuntsholing	Chukha	Dog	1
27/10/2012	October	Kuwapani	Hiley	Sarpang	Goat	1
15/11/2012	Nov	Chenari	Dewathang	S/Jongkhar	Cattle	1
15/11/2012	Nov	Chenari	Dewathang	S/Jongkhar	Cat	1
15/11/2012	Nov	Chenari	Dewathang	S/Jongkhar	Dog	1
13/11/2012	Nov	Gelephu	Gelephu	Sarpang	Cattle	1

**Annexure 4: Details of reported rabies outbreaks in domestic animals in Bhutan during 2014 (Source: TADInfo Database system)**

Date of outbreaks	Village	Geog	Dzongkhag	Species	Death
January 7, 2013	Gelephu	Gelephu	Sarpang	Canine	1
January 5, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	1
January 12, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	1
February 24, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	1
February 22, 2013	BCCL Colony	Samphelling	Chukha	Bovine	1
January 18, 2013	Sarkitar	Samtse	Samtse	Canine	1
March 12, 2013	DVH Samtse	Samtse	Samtse	Bovine	1
March 28, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	1
April 2, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	2
April 4, 2013	Samtse	Samtse	Samtse	Canine	1
February 26, 2013	BCCL Colony	Samphelling	Chukha	Bovine	1
May 22, 2013	Malaybasay	Samphelling	Chukha	Canine	1
June 12, 2013	Lower Toribari	Phuntsholing	Chukha	Bovine	1
April 2, 2013	Deptshang	Serthig	S/Jongkhar	Bovine	5
July 24, 2013	Phuentsholing	Phuntsholing	Chukha	Canine	1
October 8, 2013	Pana 'A'	Samphelling	Chukha	Bovine	1
November 14, 2013	RBA Colony	Dewathang	S/Jongkhar	Canine	1
November 25, 2013	Bukey	Samtse	Samtse	Bovine	1
December 17, 2013	Samdrupling	Dewathang	S/Jongkhar	Bovine	1



Date	Village	Geog	Dzongkhag	Species	Cases	Deaths
03/01/14	Dolungang	Dekiling	Sarpang	Bovine	2	2
03/04/14	DVH Samtse	Samtse	Samtse	Bovine	1	1
03/20/14	Yeuling	Chhuzagang	Sarpang	Canine	1	1
03/25/14	Chaskar	Chhuzagang	Sarpang	Bovine	1	1
03/31/14	Kaphung	Sherzhong	Sarpang	Bovine	2	2
04/17/14	Kalimati	Sipsu	Samtse	Bovine	1	1
04/22/14	Phuentsholing	Phuntsholing	Chukha	Canine	1	1
05/01/14	Gelephu	Gelephu	Sarpang	Canine	5	5
05/05/14	Gaden	Umling	Sarpang	Canine	2	2
05/13/14	Sarpangtar	S/kha	Sarpang	Canine	1	1
05/20/14	Pelrithang	Gelephu	Sarpang	Canine/bovine	2	2
05/21/14	Rai Gaon	Ugentse	Samtse	Bovine	1	1
06/10/14	Pelrithang	Gelephu	Sarpang	Bovine	1	1
06/10/14	Pemaling	Sherzhong	Sarpang	Bovine	1	1
06/24/14	Phuentsholing	P/ling	Chukha	Canine	1	1
07/08/14	Pakhaygaun	Shompangkha	Sarpang	Canine	1	1
07/16/14	DVH Samtse	Samtse	Samtse	Canine	1	1
08/05/14	Sukreti	Samtse	Samtse	Bovine	1	1
08/07/14	Gaden	Umling	Sarpang	Bovine	1	1
08/29/14	Dzomlingthang	Gelephu	Sarpang	Canine	1	1
09/05/14	DVH Samtse	Samtse	Samtse	Canine	2	1
09/08/14	Dekiling	Dekiling	Sarpang	Bovine	1	1
09/12/14	Serzhong	Sherzhong	Sarpang	Bovine	1	1
09/21/14	Bhimtar	Chengmari	Samtse	Canine	1	1
10/17/14	Pelrithang	Gelephu	Sarpang	Caprine	1	1
12/09/14	Dzomlingthang	Gelephu	Sarpang	Bovine	1	1
12/29/14	P/ling	P/ling	Chukha	Canine	2	2

**Annexure 5: Details of reported anthrax outbreaks in domestic animals in Bhutan (1998–2014) (Source: VIS and TADInfo system NCAH).**

Year	Out break*	Death	Species	Geog	Dzongkhag
1998	2	2	Cattle	Kazhi	Wangdue
1999	3	9	Cattle, Pig	Dzomi, Khaling	Punakha, Tiashigang
2000	3	6	Cattle	Samtse, Phuentsholing, Silambi	Samtse, Chhukha, Mongar
2001	2	3	Cattle	Samtse, Tsirangtoe	Samtse, Tsirang
2002	2	2	Cattle	Yoseltse	Samtse
2004	1	3	Cattle	Yoseltse	Samtse
2005	1	20	Cattle	Lhamoizingkha	Dagana
2006	1	12	Cattle	Bjachho, Lhamoizingkha	Chhukha, Dagana
2007	2	6	Cattle	Rupisa	Wangdue
2008	1	2	Cattle	Chapcha	Chhukha
2009	1	1	Cattle	Trong	Zhemgang
2010	2	45	Cattle, horses, cats	Nangla, Bji	Zhemgang, Haa pigs,
2011	2	14	Cattle	Nichula, Patshaling	Dagana, Tsirang
2012	10	19	Cattle	Nubi, Kanglung, Uesu, Phuentsholing	Trongsa, Sangacholing, Trashigang, Katsho, Tseza, Samtse, Haa, Dagana, Chhuka
2013	3	15	Cattle	Nubi, Shumar & Samtse	Trongsa Samtse & Pema Gatshel
2014	1	1	Cattle	Geling	Chukha

*\*number of outbreaks reported and year 2003 have not reported anthrax*

**Annexure 6: Details of reported BQ outbreaks animals in Bhutan between 2011, 2012 and 2013**  
**(Source: TADInfo Database system, NCAH).**

Date of outbreak	Villages	Geog	Dzongkhag	Cases	Death
April 8, 2011	Ngashigarkha	Rubesa	Wangdue	1	1
May 5, 2011	NNBF, Tashiyangphu	Khaling	Trashigang	2	2
May 25, 2011	Zampe	Wangchang	Paro	1	1
June 3, 2011	NNBF, Tashiyangphu	Khaling	Trashigang	1	1
June 5, 2011	NNBF, Tashiyangphu	Khaling	Trashigang	1	1
July 27, 2011	Jachhegpo	Yangtse	Trashiyangtse	1	1
August 12, 2011	Tongchen	Yangtse	Trashiyangtse	1	1
Sept 19, 2011	Amtse	Gangzur	Lhuentse	1	1
Dec 20, 2011	Dorjibee	Chhokhor	Bumthang	1	1
Feb 3, 2012	Chongzhik	Shengana	Punakha	3	2
Feb 11, 2012	Semji	Nubi	Trongsa	1	1
Feb 13, 2012	Gonpawoong	Dechhenling	Pemagatshel	5	5
March 16, 2012	Rizor	Udzorong	Trashigang	2	1
March 9, 2012	Kongkha	Phuentsholing	Chukha	1	1
March 9, 2012	Wangdigatshel	Phuentsholing	Chukha	4	4
May 2, 2012	Choilicop	Samtse	Samtse	2	1
April 10, 2012	Cheeyul	Getana	Chukha	6	1
July 4, 2012	Gangkha	Nahi	Wangdue	4	4
March 2, 2012	Mirichemo School	Bongo	Chukha	4	4
Sept 11, 2012	NNBF, Tashiyangphu	Khaling	Trashigang	1	1
Oct 13, 2012	Bjasa	Goenkhamé	Gasa	3	3
Oct 20, 2012	NNBF, Tashiyangphu	Khaling	Trashigang	1	0
Nov 18, 2012	NNBF, Tashiyangphu	Khaling	Trashigang	1	1
Sept 21, 2012	Willing	Nubi	Trongsa	1	1
Nov 15, 2012	Goling	Nangkor	Zhemgang	4	4

Jan 8, 2013	Namling	Saleng	Mongar	Bovine	2	2
Jan 25, 2013	Jarogang	Athang	Wangdue Phodrang	Bovine	9	8
Feb 7, 2013	Silipang	Guma	Punakha	Bovine	1	0
Jan 8, 2013	Gangjug	Saleng	Mongar	Bovine	5	0
Mar 10, 2013	Willing	Nubi	Trongsa	Bovine	1	0
Feb 2, 2013	Dzomesa	Dzome	Punakha	Bovine	2	2
Feb 6, 2013	Gangtramo	Talo	Punakha	Bovine	3	3
Feb 6, 2013	Labtsakha	Talo	Punakha	Bovine	1	1
Fe 26, 2013	PWD Colon	Bapisa	Punakha	Bovine	1	1
Feb 28, 2013	Tshachhup	Toewang	Punakha	Bovine	12	12
Mar 9, 2013	Chadokha	Lokchina	Chukha	Bovine	14	14
Mar 29, 2013	Bartsheri	Shumar	Pemagatshel	Bovine	1	1
April 3, 2013	Ramatoto	Chang	Thimphu	Bovine	1	1
May 21, 2013	Tshangkha	Tangsibji	Trongsa	Bovine	1	1
June 19, 2013	Pamlamfrang	Samkhar	Trashigang	Bovine	1	0
June 28, 2013	Alubari	Bjachho	Chukha	Bovine	1	1
April 16, 2013	Shangling	Nangkor	Zhemgang	Bovine	21	21
July 2, 2013	Alubari	Bjachho	Chukha	Bovine	1	1
July 11, 2013	Pakhaygaun	Shompangkha	Sarpang	Bovine	4	4
Mar 4, 2013	Kadam	Mongar	Mongar	Bovine	1	0
July 26, 2013	Chazam	Samkhar	Trashigang	Bovine	1	0
Aug 26, 2013	Phungputhoe	Yangtse	Trashy Yangtse	Bovine	1	0
Aug 1, 2013	Norgang	Chhokhor	Bumthang	Bovine	1	0
Sept 6, 2013	BS farm	Chhokhor	Bumthang	Bovine	1	1
Sept 1, 2013	sheep farm	Tang	Bumthang	Bovine	1	1
Sept 3, 2013	Sisithangka	Sama	Haa	Bovine	1	1
Sept 25, 2013	Riserboo	Mendrelgang	Tsirang	Bovine	7	7
Nov 28, 2013	Thangu	Thedtsho	Wangdue Phodrang	Bovine	3	3
Dec 10, 2013	Thangu	Thedtsho	Wangdue Phodrang	Bovine	1	1
Dec 19, 2013	Tshangkha	Tangsibji	Trongsa	Bovine	1	1

**Annexure 7: Details of reported BQ outbreaks animals in Bhutan for 2014 (Source: TADInfo Database system, NCAH).**

Date	Villages	Geog	Dzongkhag	Species	Cases	Death
1/9/2014	Baikunza	Bongo	Chukha	Bovine	8	8
3/7/2014	Bunakha	Chapcha	Chukha	Bovine	2	1
6/17/2014	Omchhu	Gayling	Chukha	Bovine	3	3
7/5/2014	Bachhu	Getana	Chukha	Bovine	3	3
1/5/2014	BarsaKab	Goenkham	Gasa	Bovine	3	1
6/19/2014	ManiChol	Goenkhatoe	Gasa	Bovine	1	0
1/17/2014	Kadam	Mongar	Mongar	Bovine	2	1
9/24/2014	Goensakha	Dogar	Paro	Bovine	2	0
5/5/2014	Lungkha	Dzome	Punakha	Bovine	2	1
1/30/2014	Juprey	Bhur	Sarpang	Bovine	1	1
	Dungkharlin					
3/14/2014	g	Bhur	Sarpang	Bovine	3	3
3/17/2014	Samkhara	J/chholing	Sarpang	Bovine	4	4
2/23/2014	Gothong	Udzorong	Trashigang	Bovine	10	10
3/13/2014	Yonphula	Kanglung	Trashigang	Bovine	1	1
8/24/2014	T/Yangphu	Khaling	Trashigang	Bovine	1	1
11/11/2014	Drupcugang	Tsholingkhar	Tsirang	Bovine	1	1
8/18/2014	Dungbi	Trong	Zhemgang	Bovine	1	1

**Annexure 8 : Details of HS outbreak in cattle in Bhutan (1998 – 2014) (Source: VIS and TADInfo Database system, NCAH).**

Year	Out break	Cases	Death	Geog	Dzongkhag
1999	2	10	9	Soe, Tang	Thimphu, Bumthang
2000	1	10	4	Pagli	Samtse
2001	1	1	0	Dogar	Paro
2002	2	50	0	Jamkhar, Phuentsholing	Tashiyangtse, Chhukha
2004	4	44	29	Shompangkha, Sarpang,	Bjachho, Chhukha
2005	2	20	17	Athang, Nichula	Wangdue, Dagana
2006	2	20	18	Shompangkha	Sarpang
2007	1	2	2	Shingkhari	Zhemgang
2008	2	14	8	Logchina	Chhukha
2011	2	32	29	Dungna, Rupisa	Chhukha, Wangdue
2012	1	6	6	Rupisa	Wangdue
2013	1	1	1	Mongar	Mongar
2014	1	4	4	Lokchina	Chukha

\*Number of reported outbreaks. Year 1999, 2003, 2009 and 2010 have not reported any outbreaks

**Annexure 9: Details of NCD outbreaks at the Geog level in Bhutan during 2011–2013 (TADInfo system, NCAH).**

Date of outbreak	Cases	Deaths	Geog	Dzongkhag
January 3, 2011	5	5	Chargharey	Samtse
January 10, 2011	3	2	Samtse	Samtse
March 24, 2011	7	7	Bongo	Chukha
June 1, 2011	11	10	Wangchang	Paro
July 29, 2011	20	12	Tang	Bumthang
Sept 20, 2011	40	37	Tsholingkhar	Tsirang
March 23, 2011	100	100	Chapcha	Chukha
Sept 13, 2012	5	5	Kikhorthang	Tsirang
May 28, 2013	97	97	Bongo	Chukha
May 23, 2013	260	210	Pling	Chukha
Feb 26, 2013	3	2	Mongar	Mongar
Sept 11, 2013	300	200	Toribari	Chukha
Sept 14, 2013	170	100	Phuentsholing	Chukha
Dec 4, 2013	20	15	Dogar	Paro
Dec 29, 2013	82	77	Gondue	Mongar
Sept 23, 2013	10	6	Darla	Chukha
Jan 29, 2013	10	7	Dekiling	Sarpang
Dec 28, 2013	194	194	Lhampy Zingkha	Dagana

**Annexure 10: Details of NCD outbreaks in Bhutan 2014 (TADInfo Database System)**

Date of outbreak	Cases	Deaths	Geog	Dzongkhag
2/14/2014	41	41	Gangzur	Lhuntse
5/10/2014	7	7	Mongar	Mongar
2/19/2014	73	38	Samrang	S/Jongkhar
3/8/2014	30		Umling	Sarpang
3/9/2014	50	30	Shershong	Sarpang



**Annexure 11: Details of PPR outbreaks in Bhutan 2010-2014 (TADInfo Database System)**

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 12: Details of CSF outbreaks in pigs in Bhutan (1998 – 2014) (Source: VIS And TADInfo database system, NCAH)**

Year	Out break*	Cases	Death	Geog	Dzongkhag
1999	1	9	7	Bjachho	Chhukha
2001	1	21	15	Balam	Mongar
2003	1	4	4	Tsento	Paro
2005	5	121	88	Wangchang, Lungyni, Chhubu, Thedtsho, Nanong	Paro, Punakha, Wangdue, Pemagatshel
2010	1	2	2	Chhubu	Punakha
2011	1	4	4	Rupisa	Wangdue
2012	1	1	1	Guma	Punakha
2013	4	13	5	Chokhor, Lamgong, Doteng & Chapcha	Bumthang, Paro Chukha

\*Number of reported outbreak. Year 1998, 2000, 2002, 2004, and 2006 to 2009 & 2014 have not reported any outbreaks

**Annexure 13: Detail of Highly Pathogenic Avian Influenza (H5N1) outbreak in poultry during 2010 - 2014 (Source: TADinfo)**

Date	Village	Geog	Dzongkhag	Cases	Deaths
2/17/2010	Wangdigasel	Phuntsholing	Chukha	25	25
2/19/2010	Kotiline	Samphelling	Chukha	40	40
2/25/2010	Torsatar	Phuntsholing	Chukha	5	5
1/4/2012	Tshemakha	Bjachho	Chukha	87	87
1/6/2012	Mepesa	Bjachho	Chukha	16	3
1/8/2012	Mepairig	Bjachho	Chukha	3	3
1/13/2012	Motithang	Chang	Thimphu	49	38
1/28/2012	Kamji	Gayling	Chukha	4	4
1/30/2012	Bunakha	Chapcha	Chukha	38	38
2/10/2012	Alay	Phuntsholing	Chukha	5	5
2/14/2012	Wangdigasel	Phuntsholing	Chukha	12	12
2/15/2012	Thakurigaon	Ugentse	Samtse	12	12
2/19/2012	Gedu	Bongo	Chukha	10	8
3/3/2012	Burkhay	Samphelling	Chukha	1	1
3/27/2012	Yangbari	Gongdue	Mongar	70	70
10/14/2012	Wangdigasel	Phuntsholing	Chukha	24	24
12/27/2012	Kalikhola	Lhamoizingkha	Dagana	18	18
1/15/2013	Gelephu	Gelephu	Sarpang	50	50
1/18/2013	Pelrithang	Gelephu	Sarpang	8	8
1/25/2013	Shawapang	Chhuzagang	Sarpang	6	6
2/2/2013	Dungkar	Yoeseltse	Samtse	2	2

**Annexure 14: Details of IBD outbreaks in Bhutan (1998 – 2011) (Source: VIS and TADInfo system, NCAH)**

Date of report	Cases	Deaths	Geog	Dzongkhag
March 3, 1998	??	??	Chang	Thimphu
November 29, 2001	250	200	Saleng	Mongar
March 15, 2004	200	120	Gelephu	Sarpang
September 25, 2006	520	520	Gelephu	Sarpang
June 11, 2009	478	478	Bhur	Sarpang
August 5, 2009	413	313	Gozhing	Dagana
August 26, 2010	497	173	Talo	Punakha
October 13, 2010	1200	1200	Kikorthang	Tsirang
May 20, 2011	30	30	Lhamoizingkha	Dagana
Total	3588	3034		

**Annexure 15: Details of IBD outbreaks in Bhutan (2014) (Source: TADInfo database System, NCAH).**

Date	Village	Geog	Dzongkhag	Cases	Deaths
4/6/2014	Rani Bagan	Hiley	Sarpang	1120	1120
4/6/2014	Patabari	Shompangkha	Sarpang	2450	1106
4/8/2014	Juprey	Bhur	Sarpang	4150	865
5/19/2014	Gawaithang	Dekiling	Sarpang	657	657
5/30/2014	Lower Lobsibotay	Goserling	Tsirang	4571	2230
5/31/2014	LowerTsholingkha	Tsholingkhar	Tsirang	1000	252
6/5/2014	Sarpangtar	Shompangkha	Sarpang	350	350
6/11/2014	Petakarpo	Thedtsho	Wangdue	901	734
6/16/2014	Chhoekhorling	Dekiling	Sarpang	47	13
7/8/2014	Juprey	Bhur	Sarpang	48	17
7/8/2014	Chhuzomsa	Beteni	Tsirang	881	297
7/11/2014	Jaruwa	Bhur	Sarpang	6	3
7/19/2014	Chhoekhorling	Dekiling	Sarpang	29	11
7/21/2014	Khorsanay	Dunglegang	Tsirang	600	103
7/23/2014	Norbugang	Shompangkha	Sarpang	60	37
7/25/2014	Charkilo	Genye	Thimphu	44	36
8/1/2014	Patabari	Shompangkha	Sarpang	55	29
8/1/2014	Dekiling	Dekiling	Sarpang	62	27
8/6/2014	Chilikhar	Toepisa	Punakha	385	385
8/7/2014	Chhoekhorling	Dekiling	Sarpang	12	5
8/11/2014	Juprey	Bhur	Sarpang	35	17
8/22/2014	Lower Bokray	Kikorthang	Tsirang	495	215
8/27/2014	Rani Bagan	Hiley	Sarpang	700	500

**LABORATORY DIAGNOSTIC CAPACITY**  
**Ministry of Agriculture and Forests**  
**Department of Livestock**  
**National Centre for Animal Health, Serbithang**  
**(2014)**

Test	Disease/conditions
<b>Agent identification</b>	Anthrax Leptospirosis
	Trichinellosis
	Trypanosomiasis
	Bovine anaplasmosis
	Bovine babesiosis
	Bovine cysticercosis
	Theileriosis
	Trypanosomiasis
	Equine piroplasmiasis
	HS
<b>Enzyme linked immunosorbent assay</b>	FMD (NSP, LPB)
	Avian mycoplasmosis
	IBD (Gumboro disease)
	CBPP
	PPR (antibody, antigen capture)
	CSF
	Toxoplasmosis
	EIA
	IBR
	Paratuberculosis/Johne's disease
	Rabies
	Brucellosis
	AI
	BVD CDV
	Canine parvovirus
<b>LFIC (field rapid test)</b>	FMD

Test	Disease/conditions
Dot ELISA	AI (A,
	H5) ND
	IBD
	O157 E coli
	Rabies
	PPR
	CDV
	Canine parvovirus
	Leptospirosis
	FMD (multiplex serotyping)
Polymerase chain reaction	AI (A, H5N1,
	H7N9) ND
	Brucellosis
	PRRS
	Leptospirosis
Parasite egg count (qualitative/ quantitative)	Nematodes
	Trematodes
	Cestodes
	Fungal spores and mycelium
Skin scrapping test	Mites
	Tick
Ectoparasite identification	Mite
	Louse
	Flies
	Fleas
	Bovine tuberculosis
Intra-dermal test	Brucellosis
Slide agglutination test	Mycoplasmosis
	Salmonellosis
	AI (H7
Haemagglutination test	Anhui) ND
	Rabies
Fluorescence antibody test	

Test	Disease/conditions
<b>Immunohistochemistry</b>	Canine distemper
<b>Biochemical test</b>	Macro mineral estimation (Mg, Ca, iP)
	Blood sugar
	Bilirubin
	Urine analysis
	Blood biochemistry
<b>Toxicology test</b>	Aflatoxin, ochratoxin, fumonisins
<b>Culture and drug sensitivity test</b>	Major bacterial pathogen
	Biochemical characterization
<b>Pepsin digestion test</b>	Trichinellosis

## Abbreviations

A	AI type A	H5N1	AI subtype H5N1
AI	Avian influenza	H7N9	AI subtype H75N9
Anhui	AI haemagglutinin H7 Chinese strain	HS	Haemorrhagic septicaemia
BVD	Bovine viral diarrhoea	IBD	Infectious bursal disease
CBPP	Contagious bovine pleuropneumonia	IBR	Infectious bovine rhinotracheitis
CDV	Canine distemper virus	LPB	Liquid phase blocking
CSF	Classical swine fever	ND	Newcastle disease
E coli	Escherichia coli pathogenic strain 0157	NSP	Non-structural protein
EIA	Equine infectious aenemia	PPR	Peste des petits ruminants
FMD	Foot and mouth disease	PRRS	Porcine reproductive respiratory syndrome
H5	AI subtype haemagglutinin H5		

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