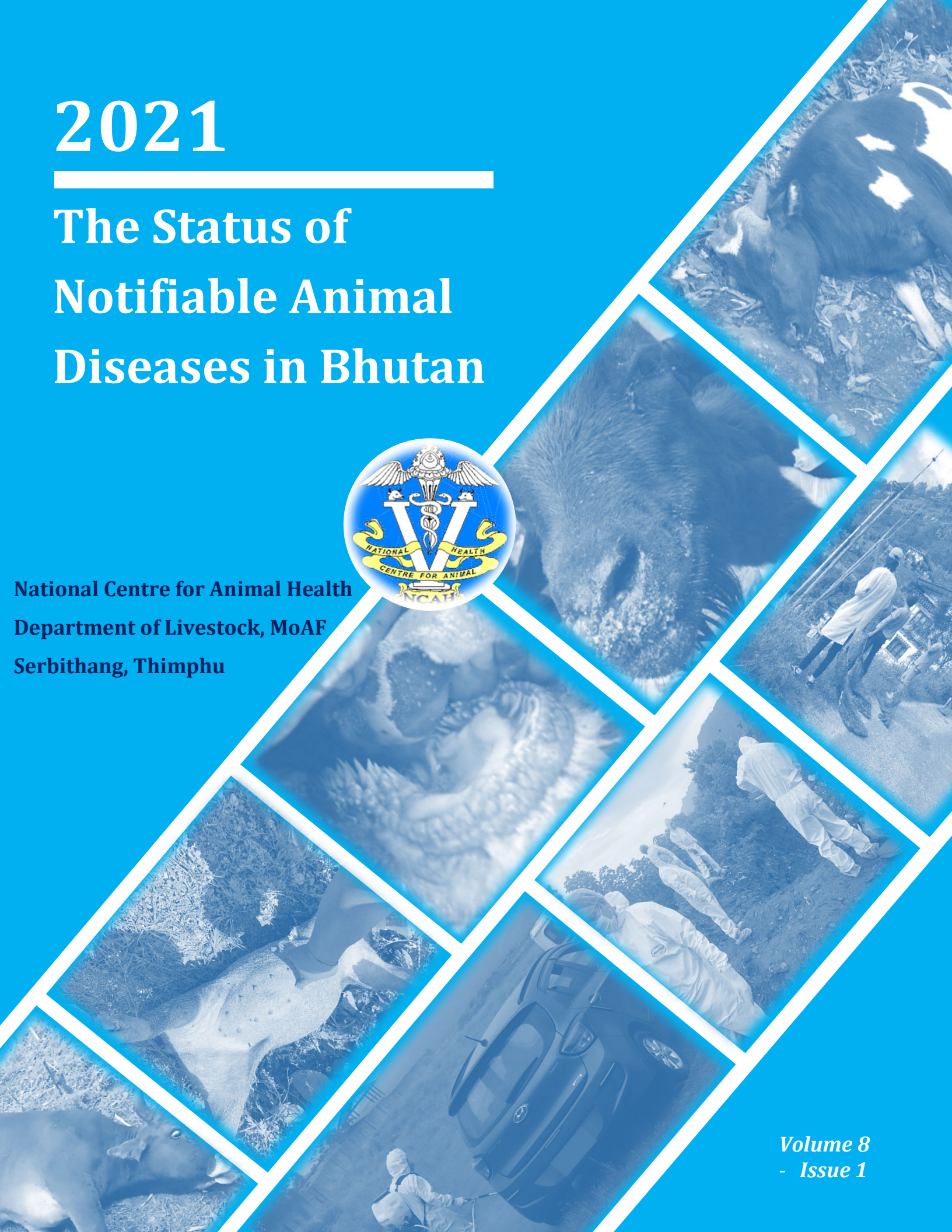
2021

The Status of Notifiable Animal Diseases in Bhutan



National Centre for Animal Health
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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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FOREWORD

This report, The Status of Notifiable Animal Diseases in Bhutan for 2021, compiled by the Disease Prevention and Control Unit (DPCU) of the National Centre for Animal Health (NCAH), provides an overview of all notifiable, zoonotic and non-zoonotic, animal diseases reported in the country since 1996. The report specifically presents a descriptive analysis of notifiable animal disease outbreaks reported in Bhutan during the calendar year 2021. The main purpose of this annual report is to provide an update and information sharing regarding the notifiable animal disease situations in the country to all stakeholders including veterinarians, veterinary paraprofessionals, livestock commodity centres, other relevant stakeholders, and the policymakers.

Firstly, I would like to thank the Director of the Department and the Chief Veterinary Officer, Animal Health Division, Department of Livestock for their support and guidance. I would also like to thank all the Regional Directors, Programme Directors, Farm Managers, Dzongkhag Livestock Officers, Veterinary Officers and Veterinary paraprofessionals of all the Dzongkhags for their kind support and cooperation in the implementation of animal diseases outbreak prevention and control programmes in the field. My sincere acknowledgement also goes to all the animal disease outbreak notification focal persons at the RLDCs, veterinary hospitals, livestock extension centres, regional and central farms, and research centres for actively reporting disease outbreak information to the concerned authorities on real-time basis.

Lastly, I would like to thank Disease Prevention and Control Unit (DPCU), NCAH for taking the lead in producing this annual report.

The information contained in this report could also be used for developing preparedness and response plans by the concerned government agencies responsible for animal disease prevention and control, and it can be used as baseline data for strategic plan development, policy interventions and other related programmes.

We wish you happy reading!

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1. BACKGROUND

Notifiable animal diseases are those animal diseases that upon suspicion or detection must be immediately notified to the nearest animal health centre or relevant agencies. In context to Bhutan, notifiable animal diseases are those zoonotic or non-zoonotic diseases listed by the Department of Livestock, Ministry of Agriculture and Forests, as enlisted in the Livestock Rules and Regulations of Bhutan 2017 (Table 1 & 2), and that, as soon as detected or suspected, must be reported to the nearest animal health centre by the fastest means of communication. The emerging diseases – causing a significant impact on animal or public health resulting from a change of a known pathogenic agent or its spread to a new geographic area or species; or a previously unrecognised pathogenic agent or disease diagnosed for the first time – of national importance as declared by the Department of Livestock should also be notified to the concerned veterinary authorities for immediate response or interventions.

As per the OIE's Terrestrial Animal Health Code 2019, the definition for case, outbreak and epidemiological unit are as follows:

Case: an individual animal infected by a pathogenic agent, with or without clinical signs.

Outbreak: occurrence of one or more cases in an epidemiological unit

Epidemiological Unit: a group of animals with a defined epidemiological relationship that shares approximately the same likelihood of exposure to a pathogenic agent. This may be because they share a common environment (e.g., animals in a pen), or because of common management practices. Usually, this is a herd or a flock. However, an epidemiological unit may also refer to groups such as animals belonging to residents of a village, or animals sharing a communal animal handling facility. The epidemiological relationship may differ from disease to disease, or even from strain to strain of the pathogenic agent.

For the purpose of this report, considering the small geographical area and the epidemiolocal relationships shared by the animals/herds in the sub-district, locally known as Gewog, an outbreak is defined as an occurrence of one or more confirmed disease-specific cases in a gewog within a month.

This report presents a brief descriptive analysis of the reported notifiable and emerging animal diseases during the calendar year 2021, January to December, and the trend of outbreaks since 1996. The data used for analyses in this report were retrieved from the Veterinary Information System, 1996 to 2010; the online Transboundary Animal Disease Information System (TAD*info*), 2011-2020; and the real-time animal disease outbreak information maintained at the Disease Prevention and Control Unit (DPCU), NCAH – recorded in reference to the flash and follow-up reports submitted by the disease outbreak investigation team from the field.

As per the Livestock Rules and Regulations (LRR) of Bhutan 2017, the notifiable animal diseases in Bhutan comprise 18 non-zoonotic and 19 zoonotic animal diseases, as listed in tables 1 & 2.

Table 1: Notifiable animal diseases in Bhutan (Source: LRR 2017)

Notifiable Diseases			
S.N.	**Disease name**	**S.N.**	**Disease name**
1	Anthrax	10	Glanders
2	Avian Influenza	11	Haemorrhagic Septicaemia
3	Avian Leucosis Complex	12	Infectious Bursal Disease
4	Black Quarter	13	Marek's Disease
5	Brucellosis	14	Newcastle Disease
6	Classical Swine Fever	15	Peste des petits ruminants
7	Contagious caprine pleuropneumonia	16	Porcine Reproductive and Respiratory Syndrome
8	Equine Influenza	17	Rabies
9	Foot and Mouth disease	18	Strangles

Table 2: Zoonotic notifiable animal diseases in Bhutan (Source: LRR 2017)

Zoonotic Diseases			
S.N.	**Disease name**	**S.N.**	**Disease name**
1	Anthrax	11	Leptospirosis
2	Brucellosis	12	Leishmaniasis
3	Campylobacteriosis	13	Listeriosis
4	Crimean Congo Haemorrhagic Fever	14	Rabies
5	Colibacillosis (*E.Coli*)	15	Salmonellosis
6	Cysticercosis	16	Trichenellosis
7	Dermatomycosis	17	Tuberculosis
8	Ehrlichiosis	18	Toxoplasmosis
9	Highly Pathogenic Avian Influenza	19	Toxocariasis
10	Hydatidosis		

Following official disease prevention and control plan documents provide guidance for the field professionals and relevant stakeholders for preparedness and response to notifiable and priority animal disease outbreaks in the country:

- National African Swine Fever (ASF) Prevention and Control Plan 2021
- National Lumpy Skin Disease (LSD) Prevention and Control Plan 2021
- National Gid (Coenurosis) Disease Prevention, Control and Elimination Plan 2021
- National Foot and Mouth Disease (FMD) Prevention and Control Plan 2020
- National Influenza Pandemic Preparedness Plans & Standard Operating Procedures 2020
- National Peste des petits ruminants (PPR) Prevention, Control and Eradication Plan 2020
- National Rabies Prevention and Control Plan 2017
- Guidelines for Preparedness, Surveillance and Control of Anthrax in Human and Animals in Bhutan 2013

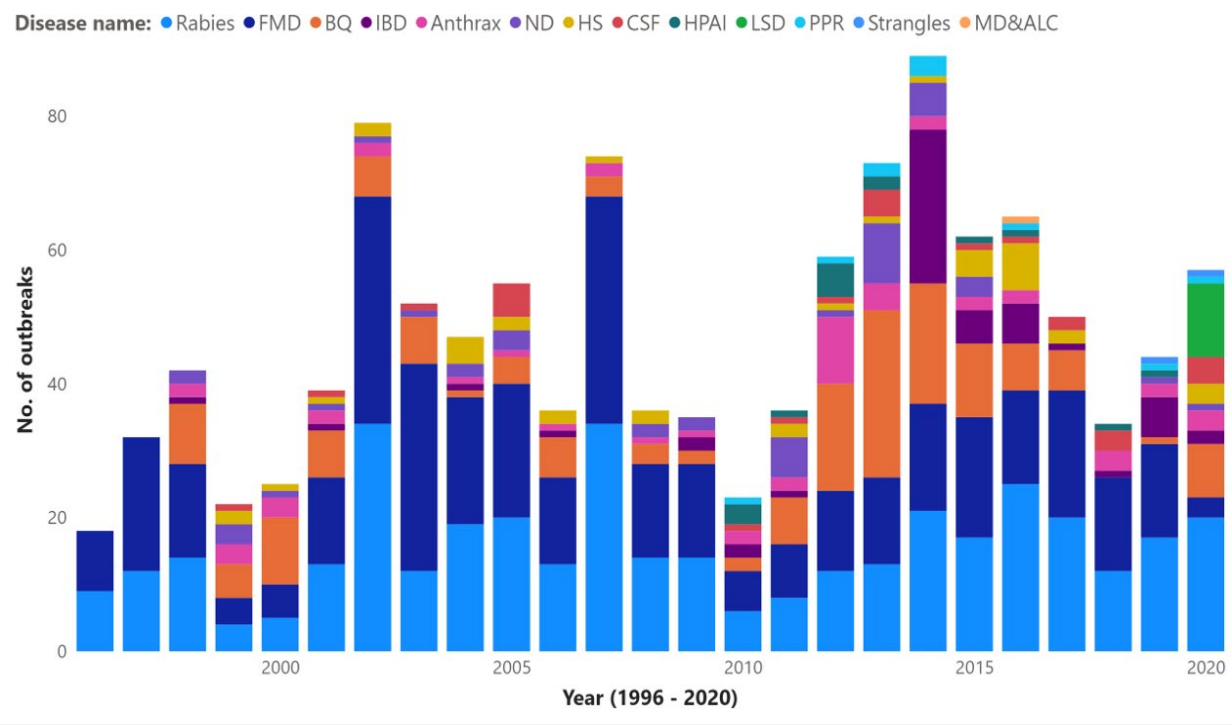
2. AN OVERVIEW OF NOTIFIABLE ANIMAL DISEASES IN BHUTAN

2.1. 1996 to 2020

Between 1996 and 2020, 1,184 outbreaks of 14 different notifiable and emerging animal diseases were reported from across the country, through flash and follow-up reports (Figure 1). The disease outbreaks reported during this period are listed below:

1. Anthrax
2. Avian leucosis complex (ALC)
3. Black quarter (BQ)
4. Classical swine fever (CSF)
5. Foot and mouth disease (FMD)
6. Highly pathogenic avian influenza (HPAI)
7. Hemorrhagic septicaemia (HS)
8. Infectious bursal disease (IBD)
9. Marek's disease (MD)
10. Newcastle disease (ND)
11. Pest des petits ruminants (PPR)
12. Rabies
13. Strangles
14. Lumpy skin disease (LSD) – emerging/exotic

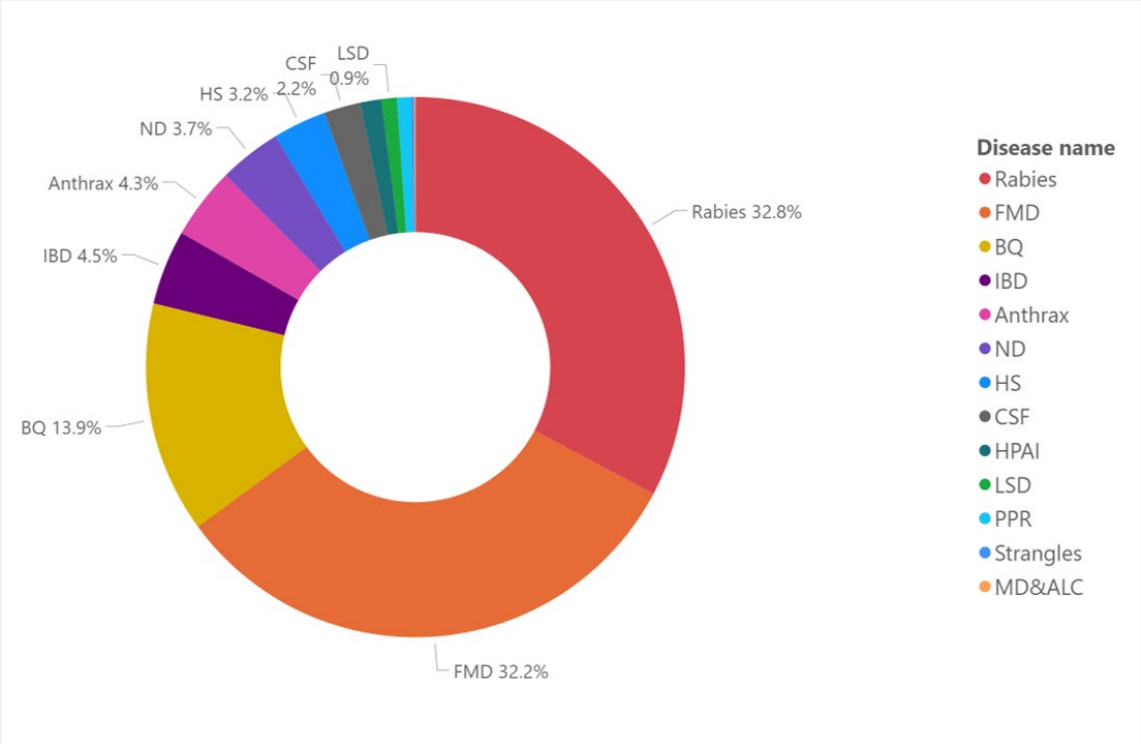
Figure 1: No. of notifiable animal disease outbreaks recorded, 1996 – 2020



Over this period of two-and-half decades, an annual average of 47 outbreaks of different notifiable animal diseases were reported, and rabies and FMD were the two notifiable diseases, outbreaks of which were consistently reported; an average of 16 rabies and 15 FMD outbreaks were reported every year. The calendar year 2014 recorded the highest number of outbreaks (n = 89), followed by 2002 (n = 79), 2007 (n = 74), 2013 (n = 73), 2016 (n = 65), etc. Concerning the zoonotic nature of the disease outbreaks reported, 62 per cent were non-zoonotic and 38 per cent zoonotic.

A total of 1,184 outbreaks were recorded, of which, rabies outbreaks account for 32.8 % (n = 388), closely followed by Foot-and-mouth disease (32.2 %, n = 381). Besides the outbreak of these two major diseases, rabies and FMD, sporadic outbreaks of other animal diseases have been reported: Black Quarter/ Blackleg (13.9 %, n = 164), Infectious bursal disease (4.5 %, n = 53), Anthrax (4.3 %, n = 51), Newcastle disease (3.7 %, n = 44), Haemorrhagic septicaemia (3.2 %, n = 38), etc. (Figure 2).

Figure 2: Notifiable disease outbreaks – by percentage, 1996 – 2020



From 13 different notifiable animal diseases reported over the past 25 years, only 3 were zoonotic, namely rabies, anthrax and highly pathogenic avian influenza.

For the first time, outbreaks of Lumpy skin disease (LSD) in cattle was reported in Bhutan in September 2020. A total of 11 outbreaks were reported from two districts, Samtse and Sarpang – both sharing porous border with India, affecting 160 cattle, and 3 died of the infection (apparent CFR = 1.87%).

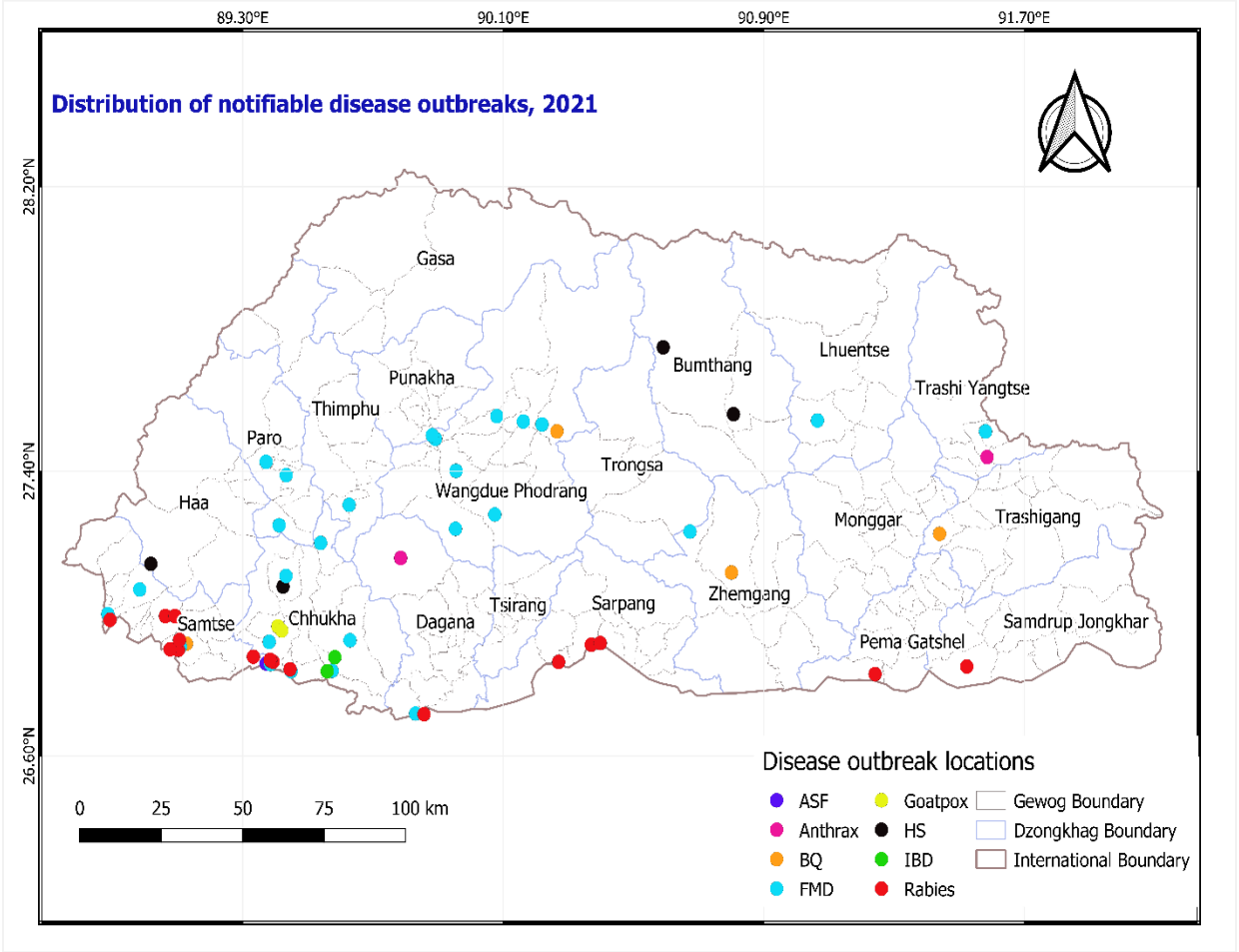
2.2. The calendar year 2021

During the calendar year 2021, notifiable animal disease outbreaks reported in the country are listed in the following table (Table 3).

Table 3: Notifiable animal diseases reported during the calendar year 2021

S.N.	Disease name	Species affected
1	Anthrax	Cattle
2	African swine fever	Pig
3	Black Quarter	Cattle
4	Foot-and-mouth disease	Cattle, Yak
5	Goatpox	Goat
6	Haemorrhagic septicaemia	Cattle
7	Infectious bursal disease	Poultry
8	Rabies	Dog, Cattle, Goat, Horse

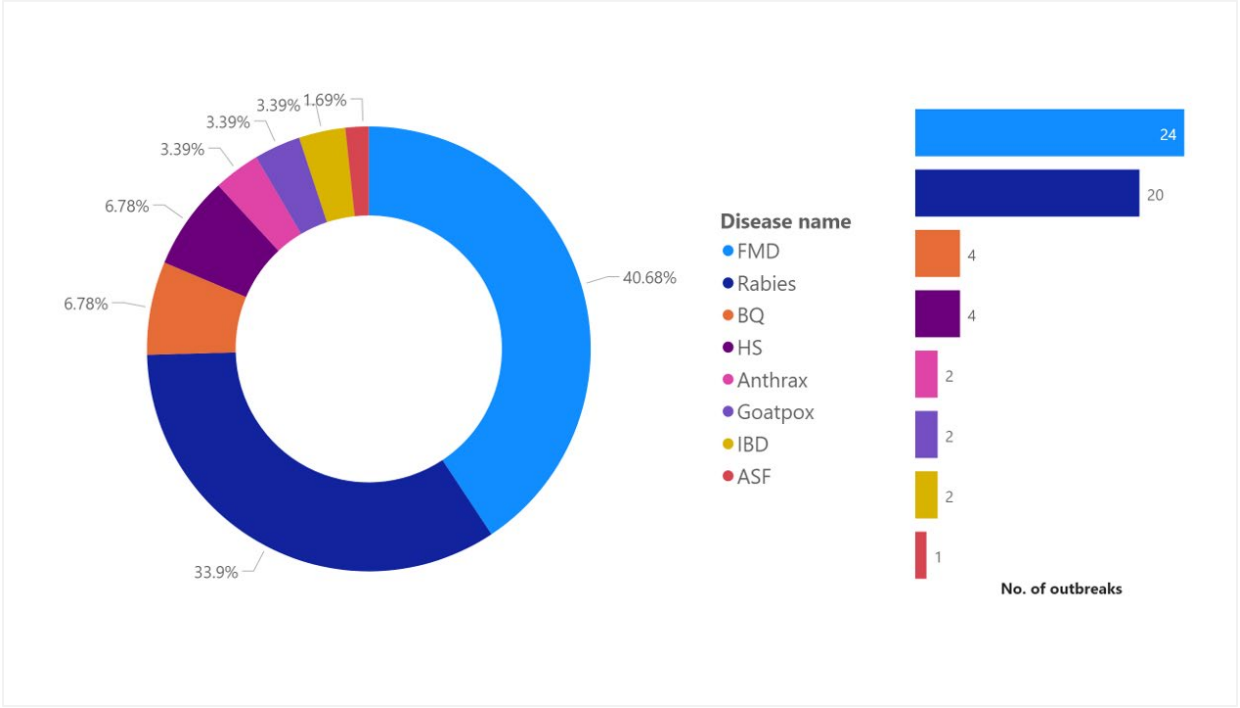
Figure 3: Spatial distribution of notifiable disease outbreaks in Bhutan, 2021



A total of 59 different notifiable animal disease outbreaks were reported from all over the country and the majority of them were reported from southern districts, particularly Chhukha and Samtse. A total of 16 districts reported at least one outbreak of a notifiable disease in 2021 (Figure 3 & 6); 72 villages in 38 gewogs were affected (Figure 7). Gasa, Monggar, Trongsa and Tsirang were the dzongkhags with no outbreak of notifiable animal disease reported (Figure 3).

Foot-and-mouth disease (FMD) accounted for 40.68 percent (n = 24) of the total disease outbreaks followed by rabies (33.9 %, n = 20); Black Quarter (6.78 %, n = 4) and Haemorrhagic septicaemia (6.78 %, n = 4); Anthrax (3.39 %, n= 2), Goatpox ((3.39 %, n= 2) and Infectious bursal disease (3.39 %, n= 2); and African swine fever (1.69 %, n = 1) (Figure 4).

Figure 4: Disease-specific outbreaks recorded in Bhutan, 2021



Seven different livestock species were affected by different notifiable animal disease outbreaks reported in the country during the calendar year 2021. A total of 1,637 animals (live cases) were affected, 1,205 died, and 22 were culled to control the disease outbreaks.

From the 16 dzongkhags affected, Chhukha dzongkhag alone reported 18 outbreaks of different notifiable diseases followed by Chhukha (n = 10), Wangdue Phordang (n = 8), Sarpang (n = 4) and others (Figure 6).

Figure 5: No. of livestock species affected by different notifiable diseases, 2021

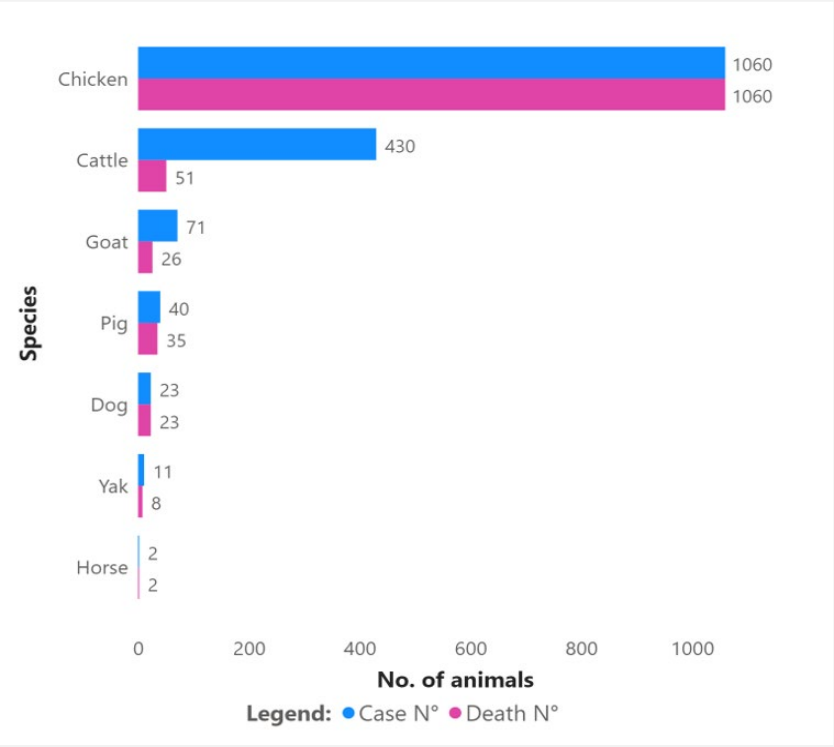
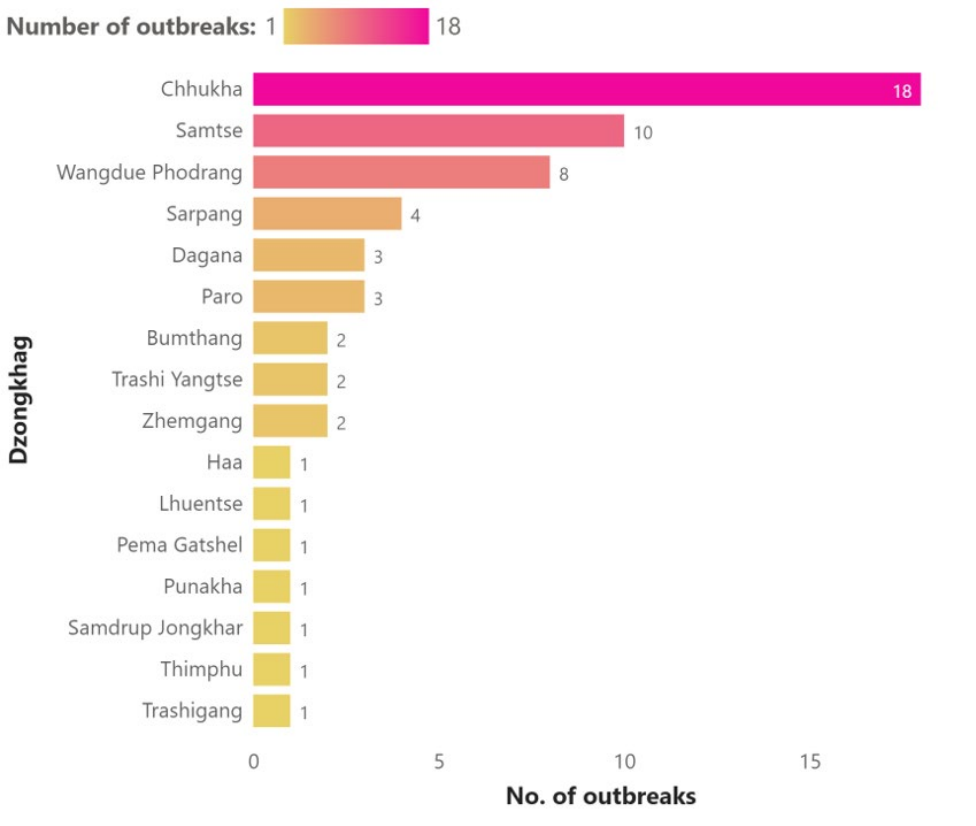
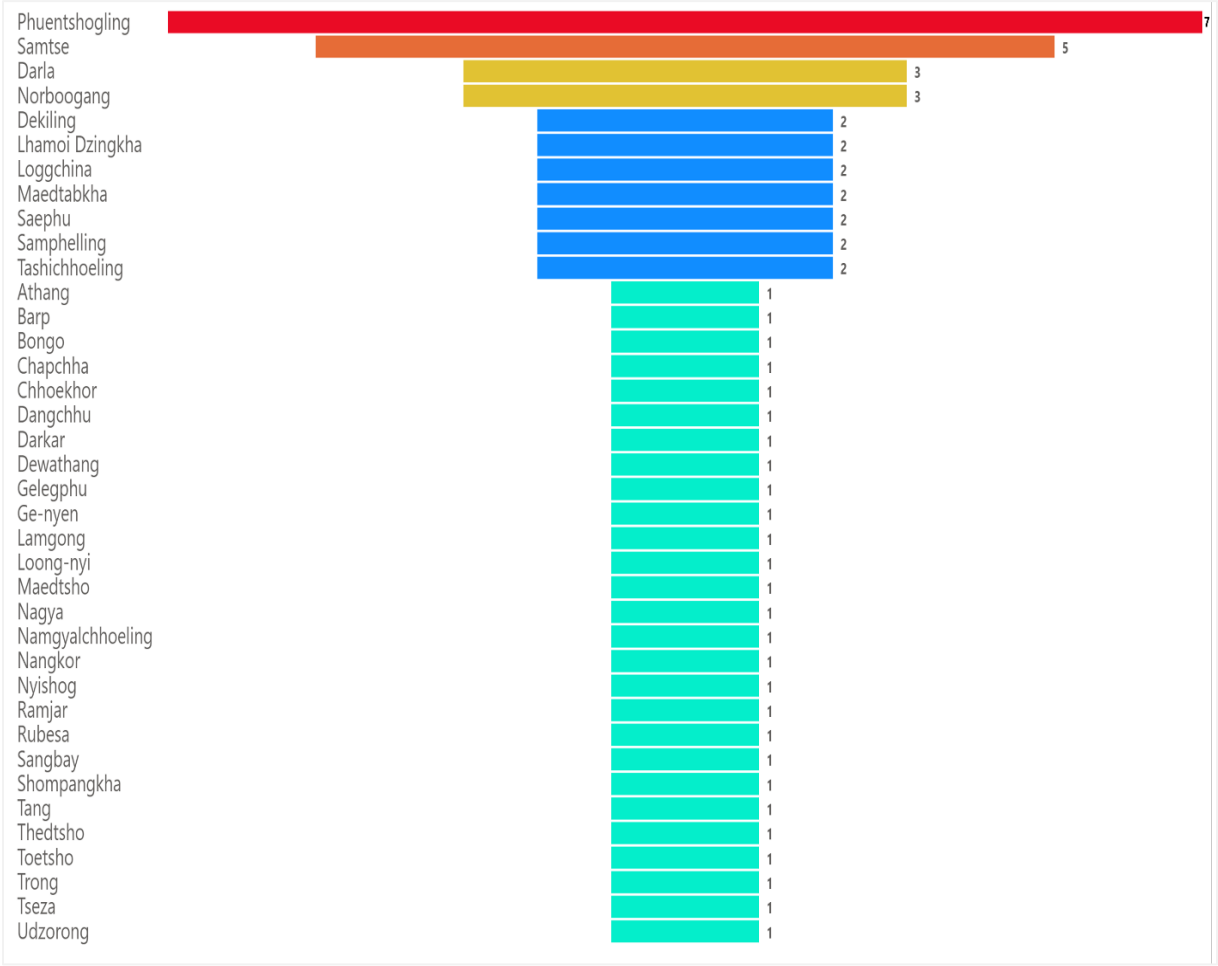


Figure 6: Dzongkhag-specific distribution of notifiable disease outbreaks, 2021



Phuentshogling gewog under Chhukha dzongkhag reported the highest number of notifiable disease outbreaks (n= 7), followed by Samtse gewog (n = 5) of Samtse dzongkhag, Darla gewog (n = 3) of Chhukha, Norboogang gewog (n = 3) of Samtse dzongkhag, and others (Figure 7).

Figure 7: Gewog-wise distribution of notifiable disease outbreaks, 2021



3. MULTIPLE SPECIES DISEASES

3.1. Anthrax

3.1.1. About the disease

Anthrax is caused by the spore-forming bacteria *Bacillus anthracis*. The name of the bacteria derives from the Greek word for coal, because of the ulcers with dark centres that develop on the skin of affected people. Anthrax spores are extremely resistant, and it can survive in the environment for decades, making the control or eradication of the disease very difficult.

Anthrax commonly causes high mortality, primarily in domestic and wild herbivores as well as most mammals and several bird species, and it is a serious zoonosis – transmitted from animals to humans.

Anthrax does not directly spread from animal to animal or from person to person. The bacteria produce spores on contact with oxygen; these spores are extremely resistant and survive for years in soil, or on wool or hair of infected animals, which if ingested or inhaled by an animal, or on entering through cuts in the skin, can germinate and cause disease. Because the blood of infected animals sometimes fails to clot and may leak from body orifices, insects can spread the bacteria to other animals.

Carnivores and humans can become infected by eating meat from an infected animal. But typically, animals become infected by ingesting spores that are in the soil or feed.

Per-acute, acute, sub-acute and, rarely, chronic forms of the disease are reported. Ante-mortem clinical signs may be virtually absent in per-acute and acute forms of the disease. Meanwhile, the only sign in chronic form may be enlarged lymph glands.

Ruminant animals are often found dead with no indication that they had been ill. In the acute form, there may be high fever, muscle tremors and difficult breathing is seen shortly before the animal collapses and dies. Un-clotted blood may exude from body openings and the body may not stiffen after death. The sub-acute form may be accompanied by progressive fever, depression, inappetence, weakness, prostration, and death.

In horses or sometimes in ruminants there may be digestive upsets and colic, fever, depression and sometimes swelling. These symptoms may last for up to four days before death results.

In carnivores when the animal feeds on an infected source there may be an intestinal form of the disease with fever and cramps from which animals sometimes recover.

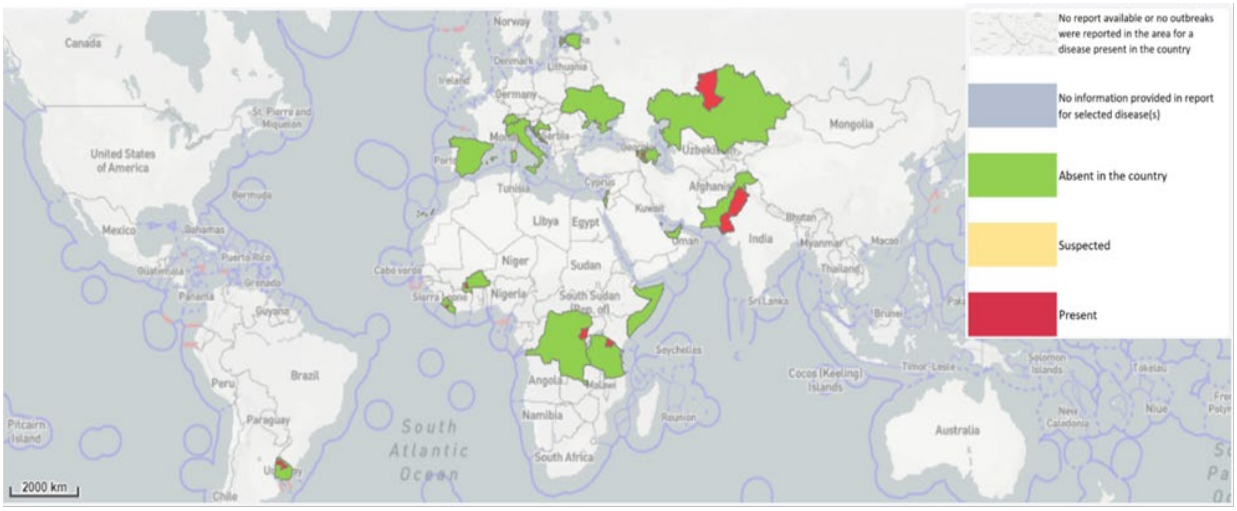
In humans, more than 95% of anthrax cases take the cutaneous form and result from handling infected carcasses or hides, hair, meat, or bones from such carcasses. The disease manifests itself in three distinct patterns (cutaneous, gastrointestinal, and inhalational). The most common is a skin infection, where people become infected handling animals or animal products that contain spores. This can happen to veterinarians, agricultural workers, livestock producers or butchers dealing with sick animals, or when the infection has been spread by wool or hides. *Bacillus anthracis* is not invasive and requires a lesion to infect. The spores enter the body through cuts or scratches in the skin and cause a local infection that if not controlled may spread throughout the body. The digestive form occurs when the spores are eaten. Tragically people who lose their animals may also lose their lives trying to salvage something and consuming the meat from an animal that died. Potentially the deadliest form is by inhalation. This has been called 'wool sorters disease' since spores on hides or hair could be inhaled. While inhalation

anthrax is rare in nature, anthrax spores have been developed and used as a biological weapon. Preventing the disease in animals will protect human public health.

3.1.2. Global distribution

Anthrax is found all over the world on all continents except Antarctica. There are endemic areas with more frequent outbreaks, other areas are subject to sporadic outbreaks in response to unusual weather patterns which can cause spores that were dormant in the soil to come to the surface where they are ingested by ruminants, germinate and cause illness.
Outbreak distribution of anthrax in the world during the calendar year 2021 is as shown in the figure below (Figure 8).

Figure 8: Global distribution of Anthrax outbreaks, 2021

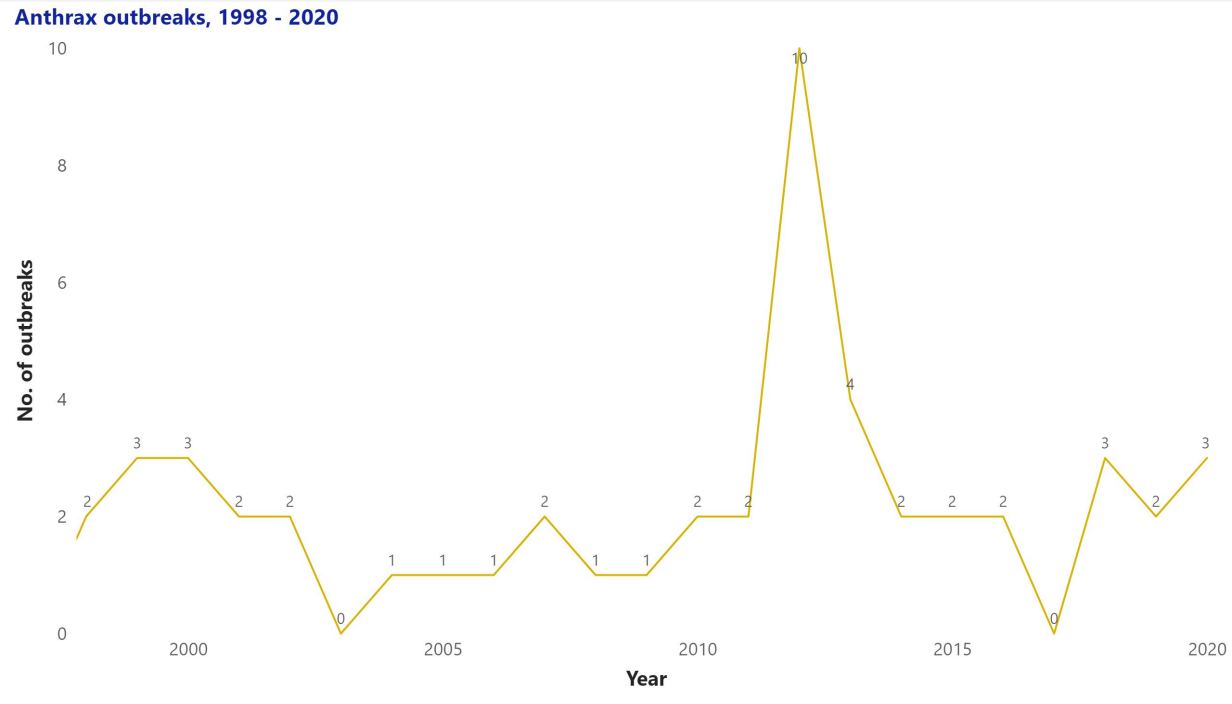


Source: WAHIS, January 2022

3.1.3. Past outbreaks in Bhutan: 1998 – 2020

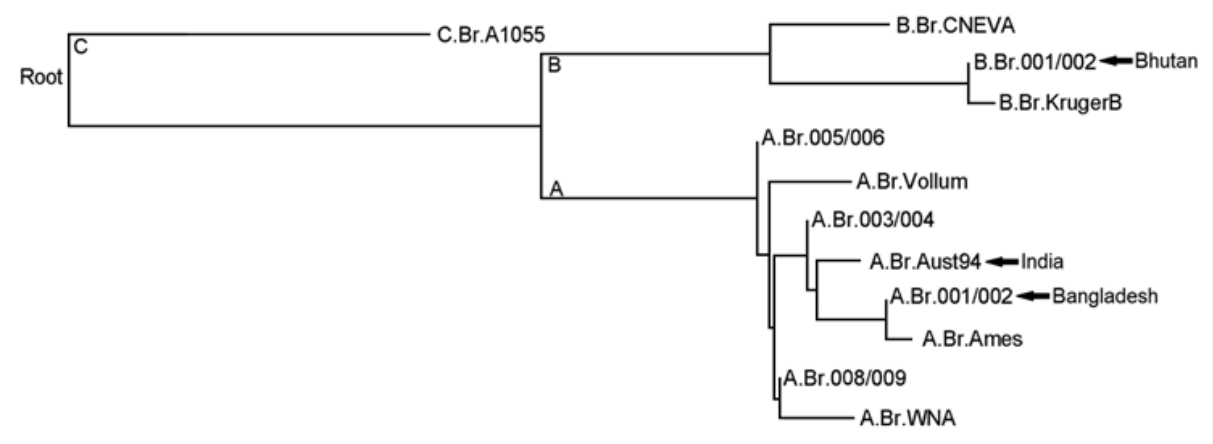
In Bhutan, anthrax cases are sporadically reported in cattle. Occasionally, cutaneous anthrax cases have been reported in humans following contact with infected animals.
Outbreaks of anthrax in Bhutan were recorded since 1998, and a total of 51 outbreaks were reported till 2020. Between 1998 and 2020, anthrax outbreak was not reported in 2003 and 2018. The number of outbreaks remained consistent for 22 years, except for the calendar year 2012, during which 10 separate outbreaks were recorded (Figure 9).

Figure 9: Anthrax outbreaks reported in Bhutan, 1998 – 2020



Data source: The status of notifiable animal diseases in Bhutan, 2020

Figure 10: Phylogeny of major Bacillus anthracis groups as determined by using canonical single nucleotide polymorphisms as described by Van Ert et al., 2007



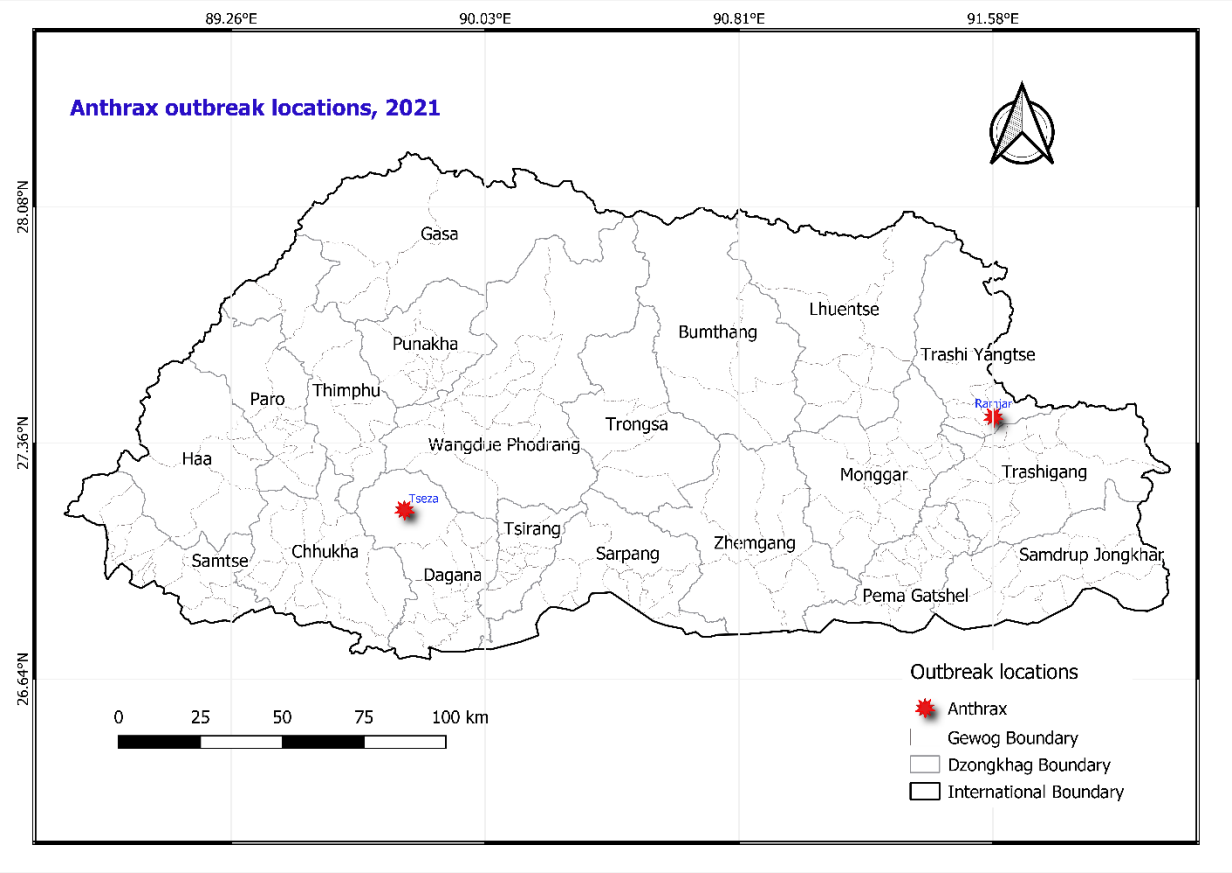
Source: Thapa et al., 2014

Anthrax isolate 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 (see figure 9). The B lineage is less widespread and primarily associated with South Africa, but it has been reported in parts of the US, Europe and Asia, including the Caucasus region. In contrast, the strains from nearby countries, Bangladesh and India, belong to the more widely dispersed A lineage.

3.1.4. Status in Bhutan during the calendar year 2021

During the calendar year 2021, two outbreaks of Anthrax were reported, one each from Tseza gewog of Dagana dzongkhag and Ramjar gewog of Trashi Yangtse (Figure 11). A total of 4 cattle died of the infection (Annexure 1).

Figure 11: Location of Anthrax outbreaks reported in Bhutan, 2021.



3.2. Black Quarter (BQ)

3.2.1. About the disease

Black quarter, also known as blackleg or quarter evil or quarter ill is an infectious bacterial disease most commonly caused by *Clostridium chauvoei*, a Gram-positive, rod-shaped, anaerobic, and motile bacteria, and can produce environmentally persistent spores when conditions are not ideal for growth. These spores can remain in the soil for years in an inactive state, and return to their infectious form when consumed by grazing livestock.

It is seen in livestock all over the world, usually affecting cattle, sheep, and goats. Most losses due to blackleg occur when the cattle are between the ages of six months and two years, although it can occur when they are as young as two months. Typically, cattle that have a high feed intake and are well-conditioned tend to be the most susceptible to blackleg. Furthermore, many blackleg cases occur during the hot and humid summer months or after a sudden cold period, but cases can occur at any time during the year.

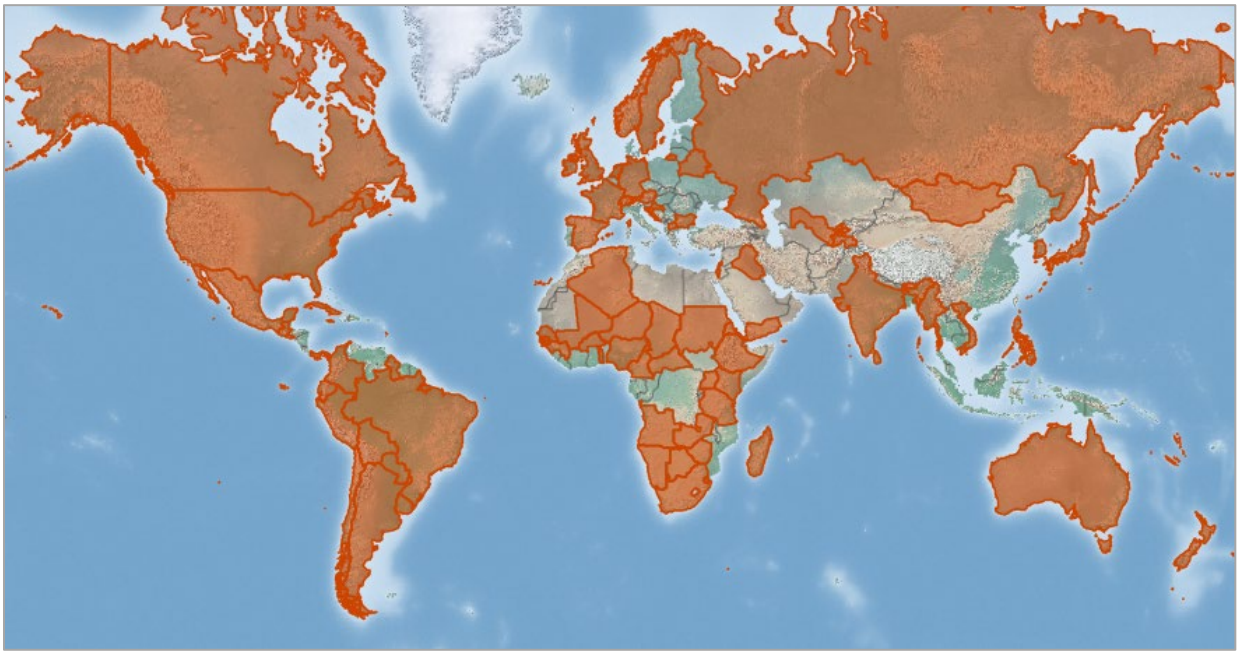
When an infection begins, the animal may develop a fever, and the affected limb can feel hot to the touch. The limb usually swells significantly, and the animal can develop lameness on the affected leg. *C. chauvoei*, when growing and reproducing can produce a large amount of gas as a metabolic byproduct which builds up in infected tissue, usually large muscles, and causes the tissue to make a crackling or popping sound - Crepitation (the sensation of air under the skin) – when pressed. Large gas-filled blisters can also form, which can be extremely painful as they build up in the tissues.

Once clinical signs develop, the animal may only live a short while, sometimes as few as 12 hours. Occasionally, cattle succumb to the disease without showing any symptoms, and only a necropsy reveals the cause. During a necropsy, a diagnosis is usually made very quickly, as the affected muscle is usually mottled with black patches, which are dead tissue, killed by the toxins the bacteria release when they infect live tissue. If viewed under a microscope, small rod-like bacteria can be seen to confirm the diagnosis.

3.2.2. Global distribution

The distribution of Black Quarter or Blackleg is worldwide. The figure below shows the global distribution of BQ outbreaks compiled by the Centre for Agriculture and Bioscience International (CABI), last modified on 19 November 2019 (Figure 12).

Figure 12: Global distribution of Black Quarter

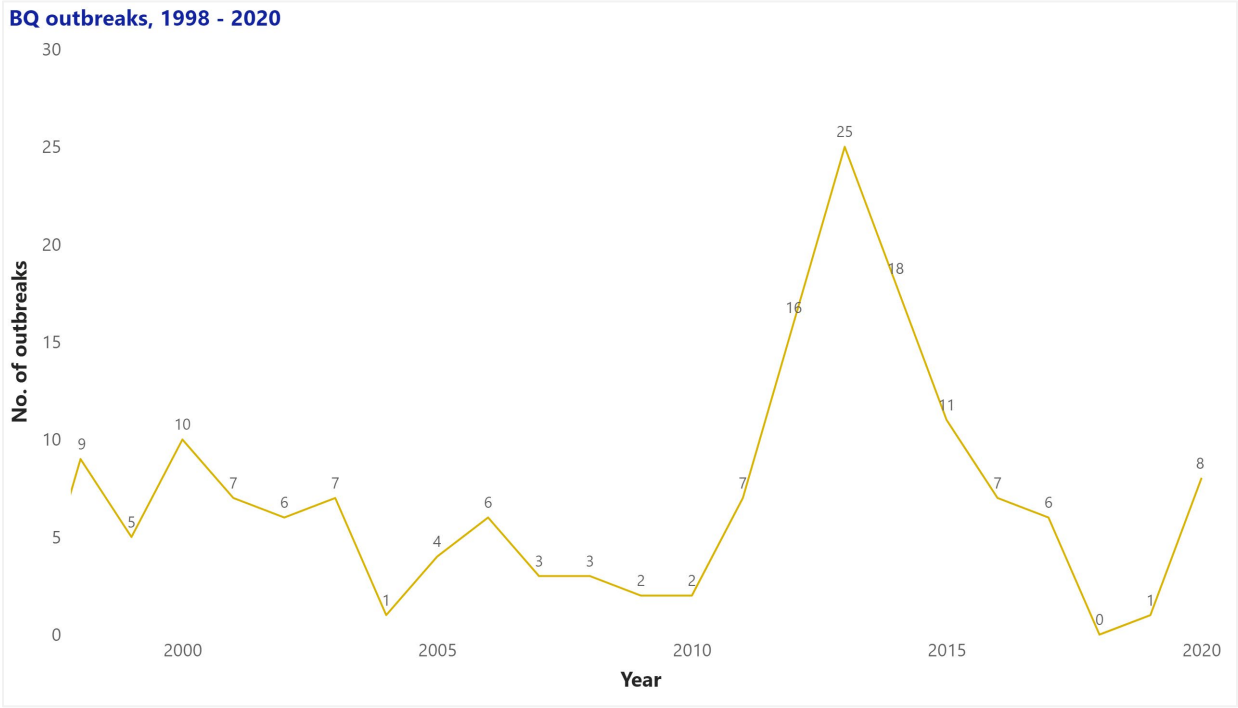


Source: CAB International

3.2.3. Past outbreaks in Bhutan: 1998 to 2020

Black quarter outbreaks were recorded in Bhutan since 1998, and until 2020, a total of 164 outbreaks were reported (Figure 13) – an annual average of 7 outbreaks. During this entire period, 1998 – 2020, not a solitary outbreak was reported in 2018. The major number of outbreaks were reported between 2012 and 2014: 16 outbreaks in 2012, 25 in 2013 and 18 in 2014.

Figure 13: BQ outbreaks reported in Bhutan, 1998 – 2020

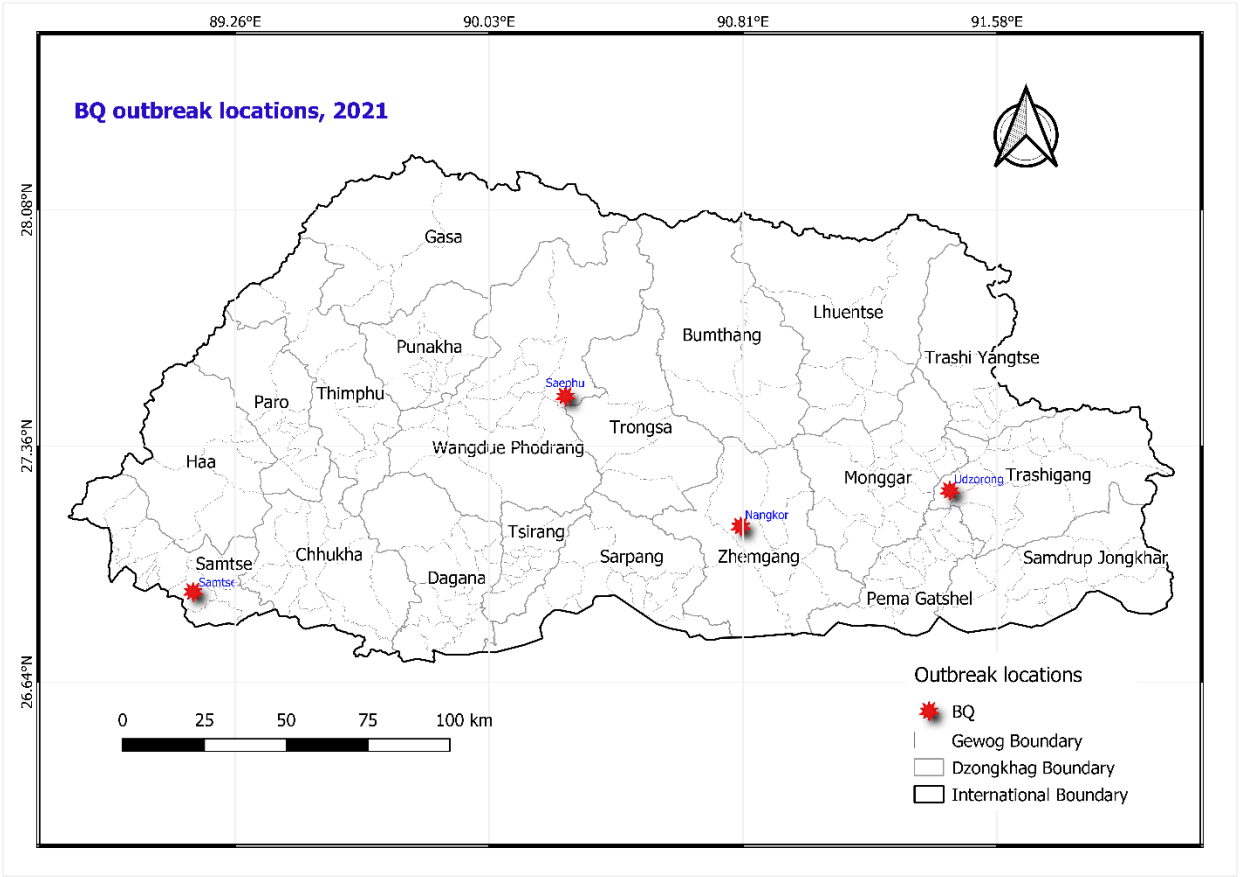


Data source: The status of notifiable animal diseases in Bhutan, 2020

3.2.4. Status in Bhutan during the calendar year 2021

During the year 2021, 4 outbreaks of BQ were reported in the country, one each from Udzorong gewog, Trasigang dzongkhag; Samtse gewog, Samtse dzongkhag; Saephu gewog, Wangdue Phodrang; and Nangkor gewog, Zhemgang dzongkhag (Figure 15). From the total of 15 affected cattle, 10 died (Apparent case-fatality rate (CFR) = 66.7%) (Annexure 2).

Figure 14: Location of BQ outbreaks reported in Bhutan, 2021



3.3. Foot-and-mouth disease (FMD)

3.3.1. About the disease

FMD is caused by a virus of the family Picornaviridae, genus *Aphthovirus*. There are seven immunologically distinct serotypes: A, O, C, SAT-1, SAT-2, SAT-3 and Asia-1, and they do not confer cross-immunity. The global distribution of these serotypes is not even:

- Serotypes A and O can be found in most FMD endemic regions, except for southern Africa
- The Asia 1 serotype can be found in the FMD endemic regions of Asia
- The African buffalo is the natural host for the Southern African Territories (SAT) serotypes. Serotypes SAT 1 and SAT 2 can be found throughout Africa, while SAT 3 is limited to southern and a small area in eastern Africa
- FMDV serotype C has not been detected since 2004 (in Kenya and Brazil), so this serotype may be no longer circulating

Mutation from error-prone RNA replication, recombination, and host selection generate constant new FMDV variants.

All domestic cloven-hoofed animals are susceptible, including cattle, pigs, sheep, goats and buffalo, and all wild cloven-hoofed animals are also susceptible, including deer, antelope, wild pigs, elephants, giraffes and camelids. African buffalo are the only wildlife species to play a significant role in the epidemiology of FMD.

Strains of the FMD virus that infect cattle have been isolated from wild pigs and deer. Rats, mice, guinea pigs and armadillos can be infected experimentally.
Transmission of the disease occurs as follows:

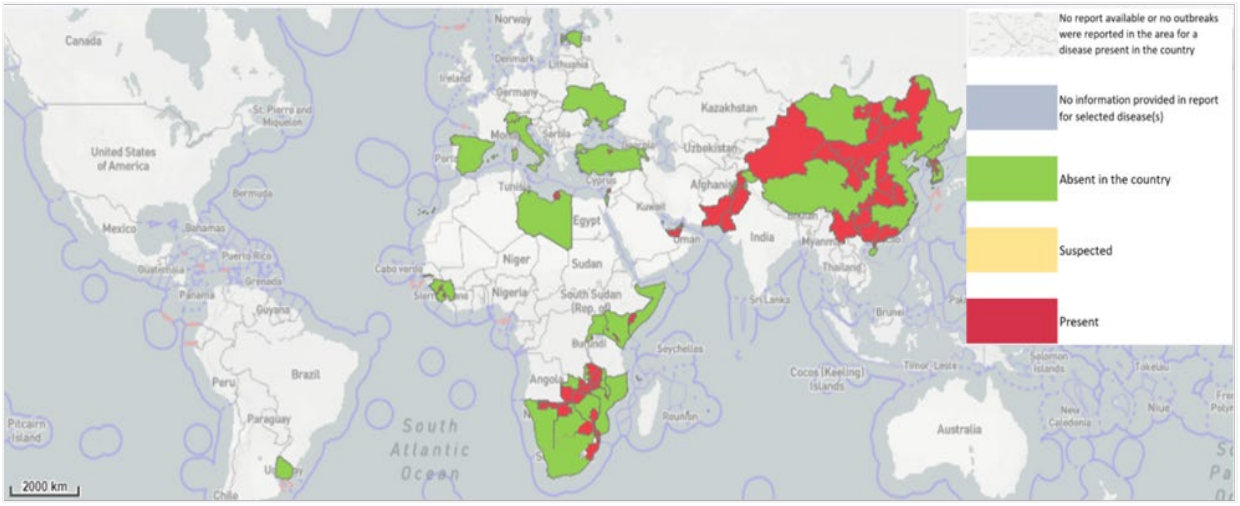
- Direct contact between infected and susceptible animals
- Direct contact of susceptible animals with contaminated inanimate objects (hands, footwear, clothing, vehicles, etc.)
- Consumption (primarily by pigs) of untreated contaminated meat products (swill feeding)
- Ingestion of contaminated milk (by calves)
- Artificial insemination with contaminated semen
- Inhalation of infectious aerosols
- Airborne, especially temperate zones (up to 60 km overland)

The incubation period is 2–14 days, and for the purposes of the OIE Terrestrial Animal Health Code, the incubation period for FMD is 14 days.
The severity of clinical signs varies with the strain of virus, exposure dose, age and breed of animal, host species and degree of host immunity, and signs can range from mild or inapparent to severe. Morbidity may approach 100%, and mortality, in general, is low in adult animals (1–5%) but higher in young calves, lambs and piglets (20% or higher). Recovery in uncomplicated cases is usually about two weeks. Generally observed signs of the disease are pyrexia, anorexia, shivering, reduction in milk production, smacking of the lips, grinding of the teeth, drooling, lameness, etc.
Typical lesions are vesicles or blisters on the tongue, dental pad, gums, cheek, hard and soft palate, lips, nostrils, muzzle, coronary bands, teats, udder, the snout of pigs, corium of dewclaws and inter-digital spaces. During the postmortem, erosions on rumen pillars in ruminants and grey or yellow streaking in the heart from degeneration and necrosis of the myocardium in young animals of all species (‘tiger heart’) will be observed.

3.3.2. Global distribution

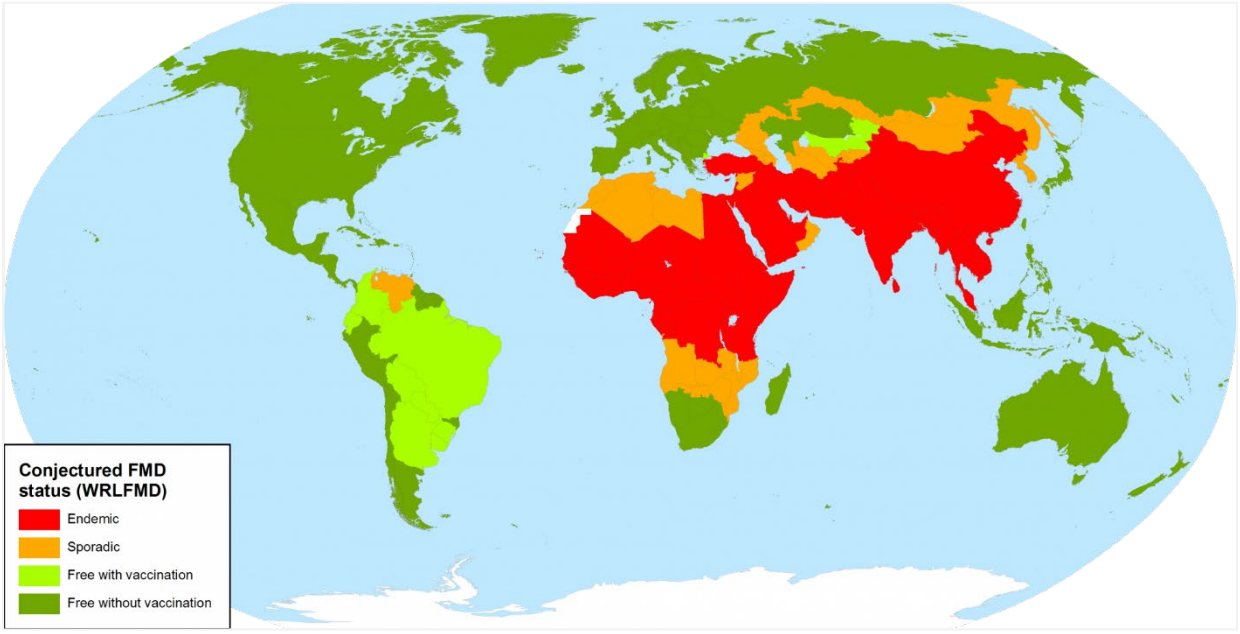
Foot-and-mouth disease has been eradicated from North America, some Pacific nations and Western Europe. The disease is endemic across a large swath of Eurasia, the Middle East, Africa and a few countries in South America. FMD outbreak distribution in the world during the calendar year 2021 is shown in the figure below (Figure 15).
Figure 16 shows the distribution of the seven endemic pools of Foot-and-Mouth Disease showing conjectured status of Foot-and-Mouth Disease in countries during 2015.
Virus circulation and evolution within these regional virus pools results in changing priorities for appropriately adapted vaccines. Periodically, viruses spread between pools and to free regions, and countries at the interfaces between pools (such as in North Africa and Central Asia) often experience FMD outbreaks from different regional sources.

Figure 15: Global distribution of FMD outbreaks, 2021



Source: WAHIS, January 2022

Figure 16: Global conjectured status of FMD



Source: WRLFMD

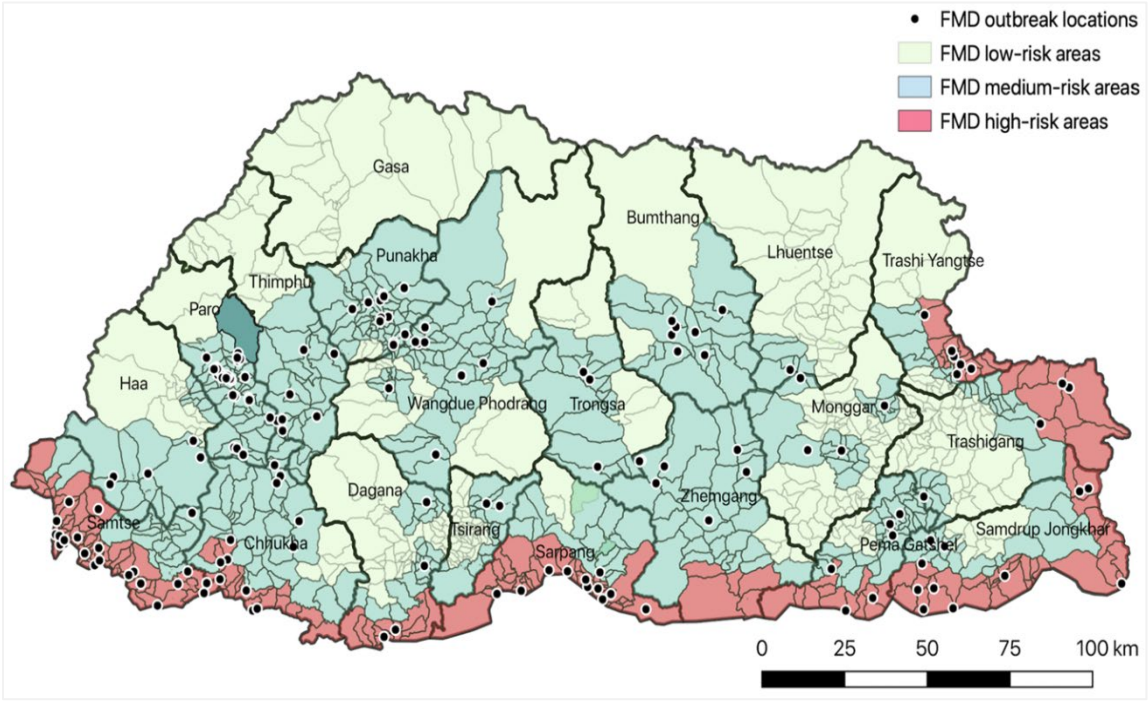
3.3.3. Past outbreaks in Bhutan: 1996 – 2020

FMD is endemic in Bhutan and is reported from almost all parts of the country (Figure 17). Serotype O is the principal FMDV serotype involved in Bhutan, consistent with the disease epidemiology in the neighbouring countries in the region. As per the review of laboratory reports from the World Reference Laboratory for FMD (WRLFMD), Pirbright, UK, the temporospatial distribution of FMD serotypes in Bhutan are summarized below:

- Serotype O is the most recorded serotype in the country. The Pan Asia strain of the Middle East–South Asia (ME–SA) topotype of type O is reported since 2003. The outbreaks reported from Samtse and Paro dzongkhags in 2017 were associated with serotype O
- Serotype A was identified in Bhutan in 1982 and 1984, and again in 2002 and 2003. It was also identified in 2017 from Chhukha and Samdrup Jongkhar districts
- Serotype Asia I was identified in Bhutan in 1986 and then in 2002
- Serotype C was last identified in Bhutan in 1991

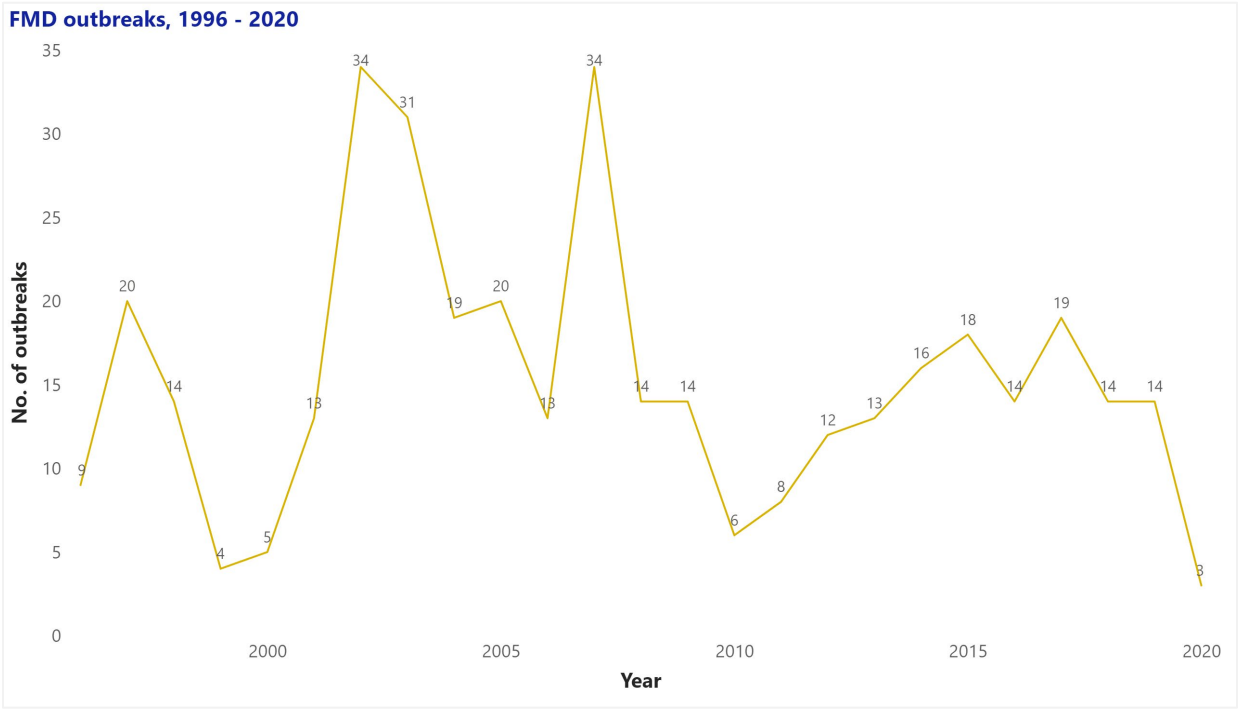
Foot and mouth disease outbreaks were recorded in Bhutan since 1996; a total of 381 separate outbreaks were reported till 2020 (Figure 18) – an annual average of 15 outbreaks.

Figure 17: FMD risk map of Bhutan and the outbreaks reported between 2011 – 2019



Source: National FMD Prevention and Control Plan 2020.

Figure 18: FMD outbreaks reported in Bhutan, 1996 – 2020



Data source: The status of notifiable animal diseases in Bhutan, 2020

3.3.4. Status in Bhutan during the calendar year 2021

During the calendar year 2021, a total of 24 outbreaks were reported from 24 different gewogs under 10 dzongkhags (Figure 19 & 20). A total of 380 animals were affected and only 2 died (Apparent CFR = 0.53 %) (Figure 21 and Annexure 3).

Cattle, pig, goat and yaks were the different livestock species affected by the disease; cattle being the primarily affected animal types (96.32 %, n=366) (Figure 22 and Annexure 3).

The incursion and spread of foot and mouth disease (FMD) in Bhutan occur mainly through:

- mixing of animals through sharing of common grazing area
- trade of live animals and animal products within the country
- poor management practices
- inadequate regulatory system and
- seasonal migration of livestock

To define the strategies based on risk zones and establish disease status in the country, the country is divided into three risk zone – High, Medium and Low – based on the disease epidemiology, proximity to neighbouring countries and FMD outbreaks data (2011 – 2019) (Figure 17). The disease risk zones guide the strategies for surveillance, vaccination and animal movement regulation. To increase the efficiency of the FMD prevention and control programme in the country, the risk zones shall be reviewed periodically based on the disease status and epidemiology.

Figure 19: Location of FMD outbreaks reported in Bhutan, 2020.

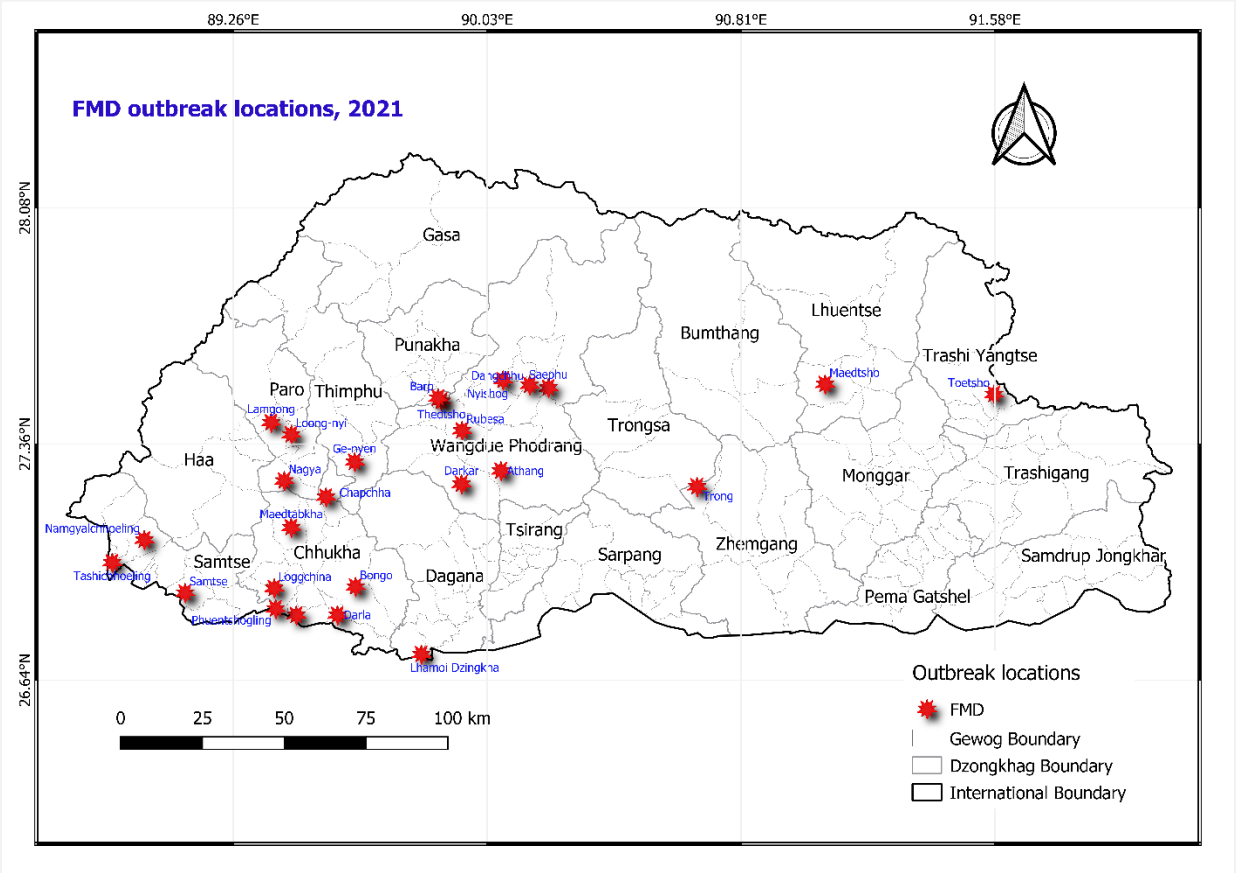


Figure 20: Dzongkhag and gewog-wise distribution of FMD outbreaks, 2021

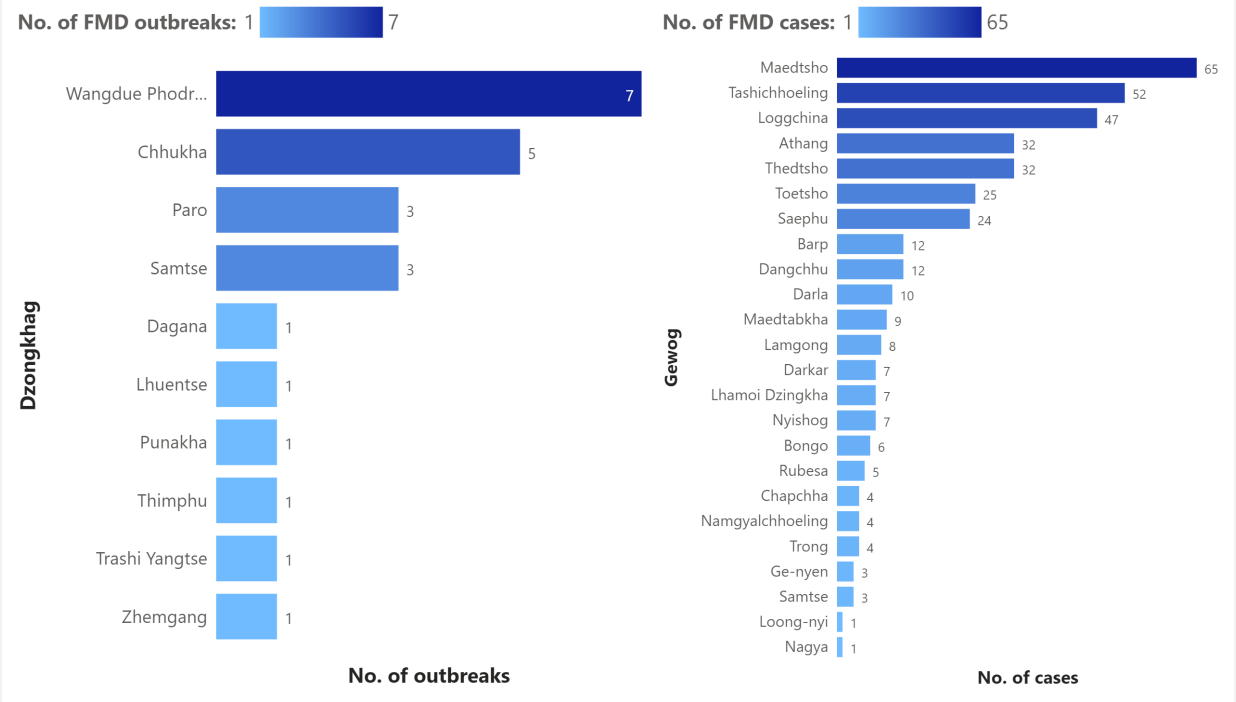


Figure 21: Domestic animals affected by FMD (live/dead), 2021

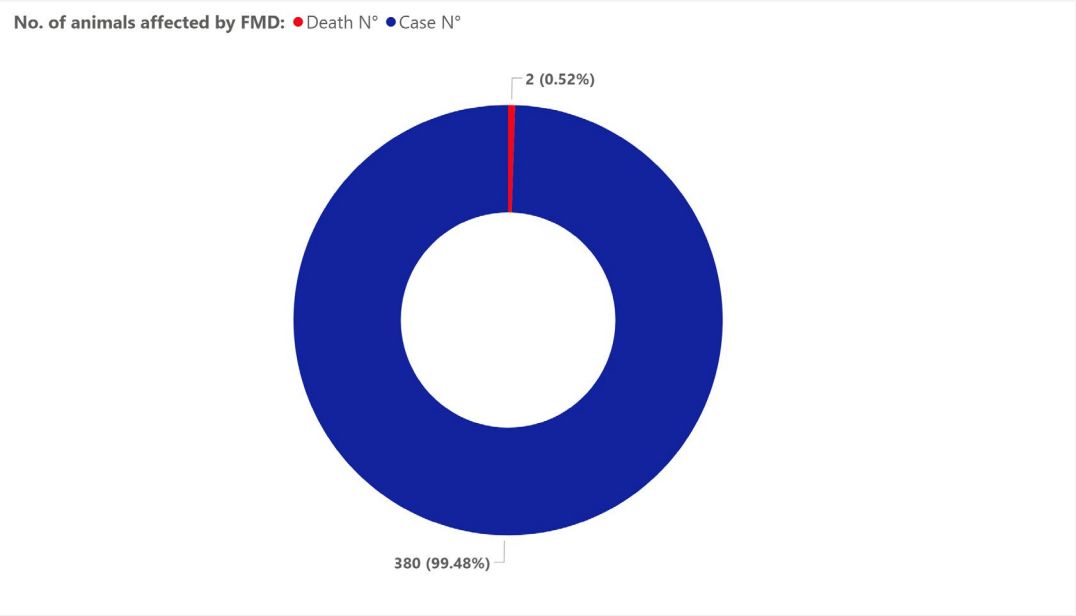
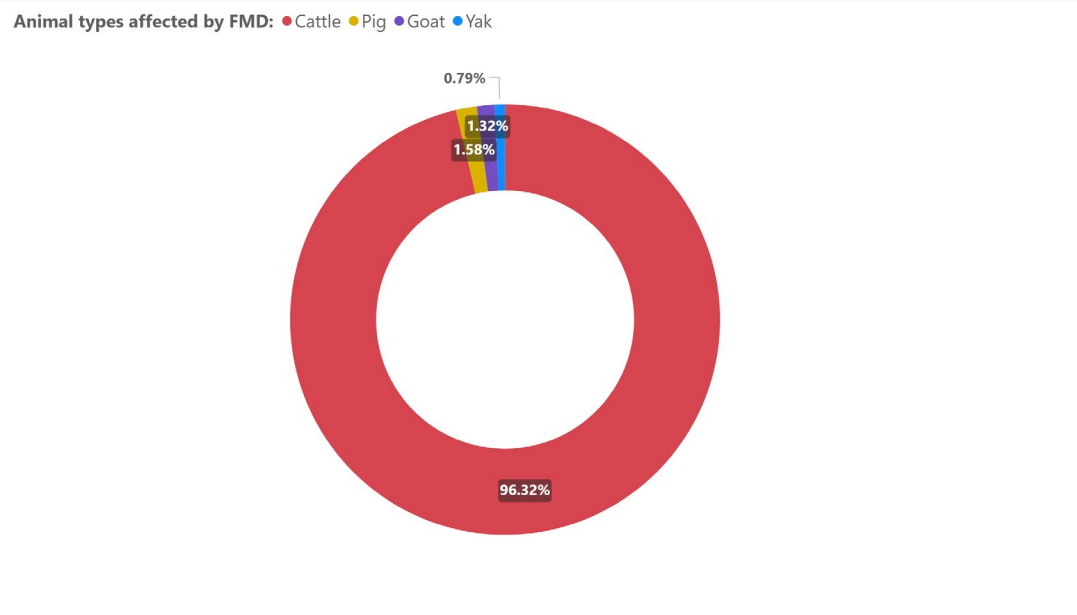
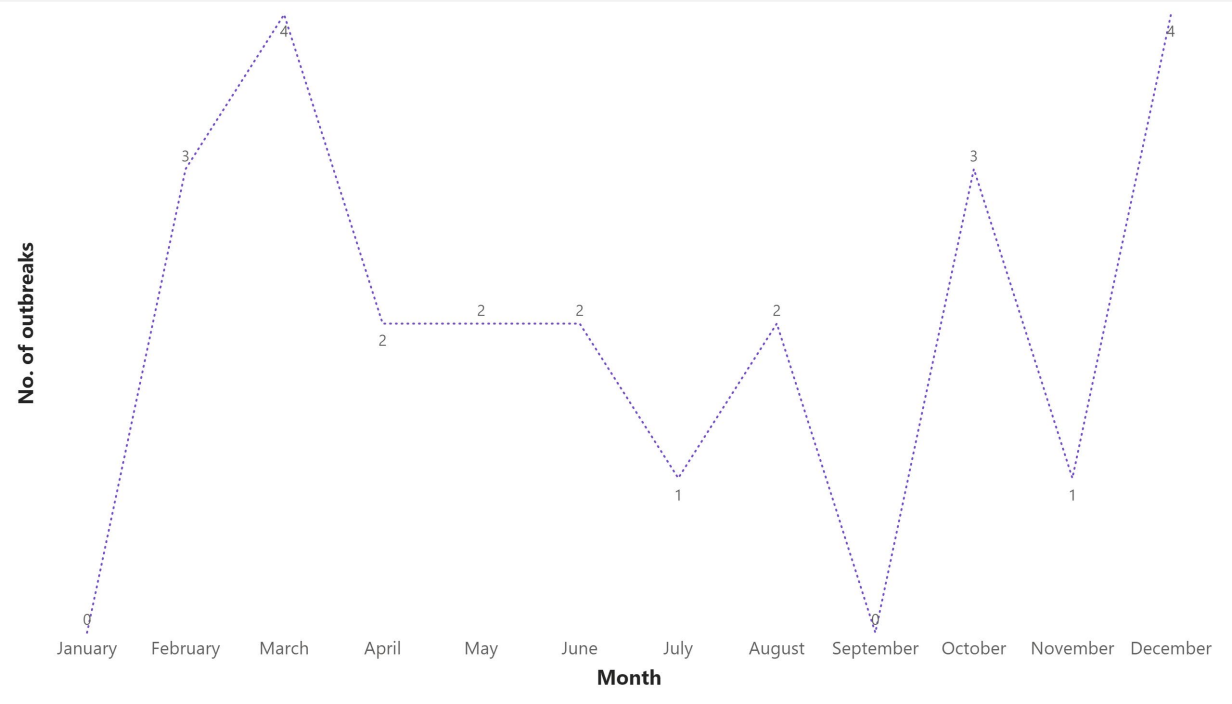


Figure 22: Different animal types affected by FMD, 2021.



During the calendar year 2021, except for January and December months, all other months of the year reported at least one outbreak each. The highest number of FMD outbreaks was reported in March (n=4) and December (n=4), followed by 3 each in February and October, 2 each in May, June and August, and 1 each in July and November.

Figure 23: Monthly distribution of FMD outbreaks reported, 2021



3.4. Rabies

3.4.1. About the disease

Rabies is caused by neurotropic RNA viruses of the genus *Lyssavirus* in the family Rhabdoviridae of the order Mononegavirales and is transmissible to all mammals. Twelve distinct *lyssavirus* species can be distinguished within the genus, namely classical rabies virus (RABV), Lagos bat virus (LBV), Mokola virus (MOKV), Duvenhage virus (DUVV), European bat lyssaviruses type-1 (EBLV-1) and type-2 (EBLV-2), Australian bat lyssavirus (ABLV), Aravan virus (ARAV), Khujand virus (KHUV), Irkut virus (IRKV), West Caucasian bat virus (WCBV), Shimoni bat virus (SHIBV). Of all the lyssaviruses known to date, RABV is the most important one for public and animal health.

All mammals are susceptible to varying degrees, particularly members of the order Carnivora and Chiroptera. A broad spectrum of animals can be infected experimentally with the rabies virus.

The rabies virus can be transmitted between mammals, whether they belong to the same or different species. It is primarily transmitted through the saliva of an infected animal - infection occurs primarily via bite wounds, or infected saliva entering an open cut or wound or mucous membranes, such as those in the mouth, nasal cavity, or eyes.

Occasional, albeit rare, transmission by inhalation of infected aerosol has been described.

The incubation period varies from a few days to more than 7 years. For the purposes of the OIE Terrestrial Code, the incubation period is considered to be 6 months.

Clinical observations may only lead to a suspicion of rabies because signs of the disease are not pathognomonic and may vary greatly from one animal to another.

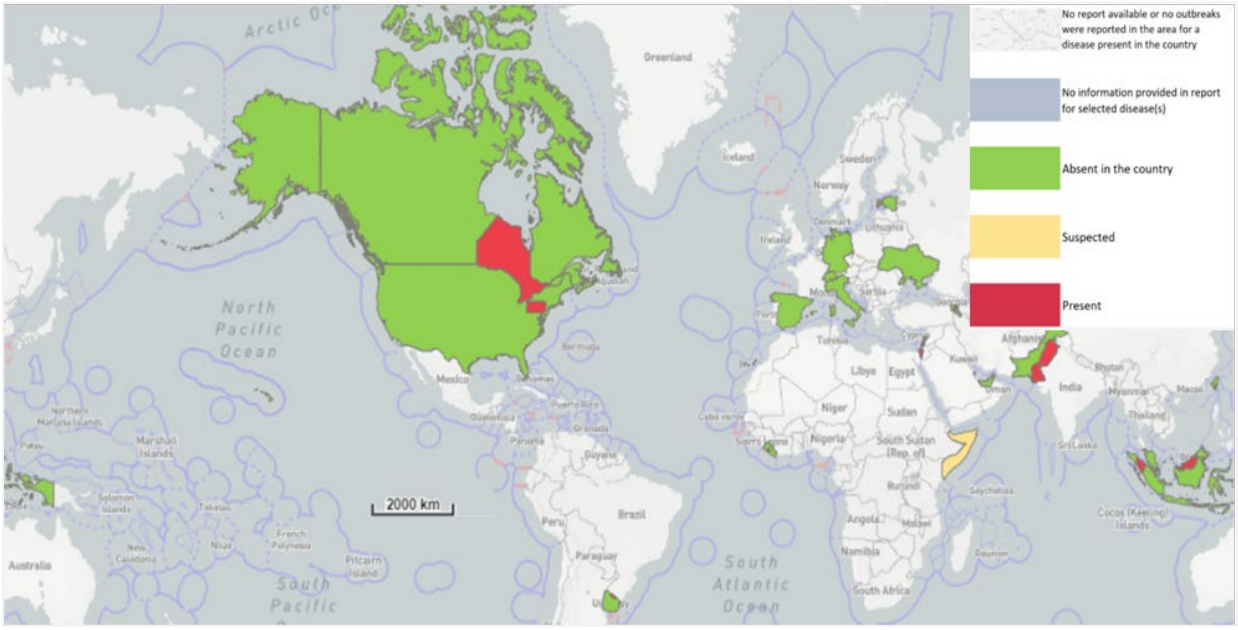
All lyssa viruses cause clinical disease indistinguishable from classical rabies. Typical signs include sudden behavioural changes that can lead to increased aggression and progressive paralysis leading to death. Clinical rabies could be presented in two different forms: *furious rabies* when animals show aggressive behaviour, and *dumb or paralytic rabies* which refers to infected animals in which the behavioural changes are minimal, and the disease is manifested principally by paralysis.

The typical histological signs, found in the central nervous system, are multifocal, mild, polioencephalomyelitis and craniospinal ganglionitis with mononuclear perivascular infiltrates, diffuse glial proliferation, regressive changes in neuronal cells and glial nodules. Negri bodies can be seen in some but not all cases.

3.4.2. Global distribution

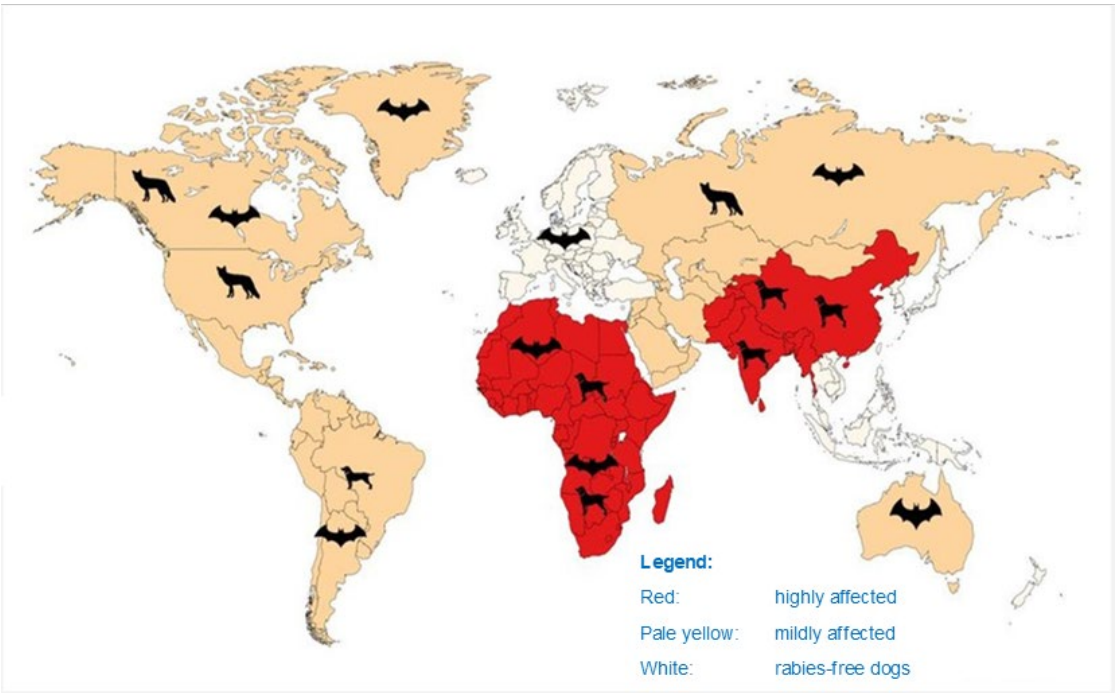
About 99% of rabies cases are dog-mediated and the burden of disease is disproportionally borne by rural poor populations. Dog-mediated rabies has been eliminated from Western Europe, Canada, the United States of America, Japan and some Latin American countries. Australia and many Pacific island nations have always been free from dog-mediated rabies. These countries may still report imported cases and incur costs for maintaining disease freedom or surveillance of endemic transmission in wildlife. Rabies is a major burden in Asia, with an estimated 35,172 human deaths per year. India accounts for 59.9% of rabies deaths in Asia and 35% of deaths globally. An estimated 21,476 human deaths occur each year in Africa due to dog-mediated rabies.

Figure 24: Global distribution of rabies outbreaks, 2021



Source: WAHIS, January 2022

Figure 25: Worldwide rabies virus circulation



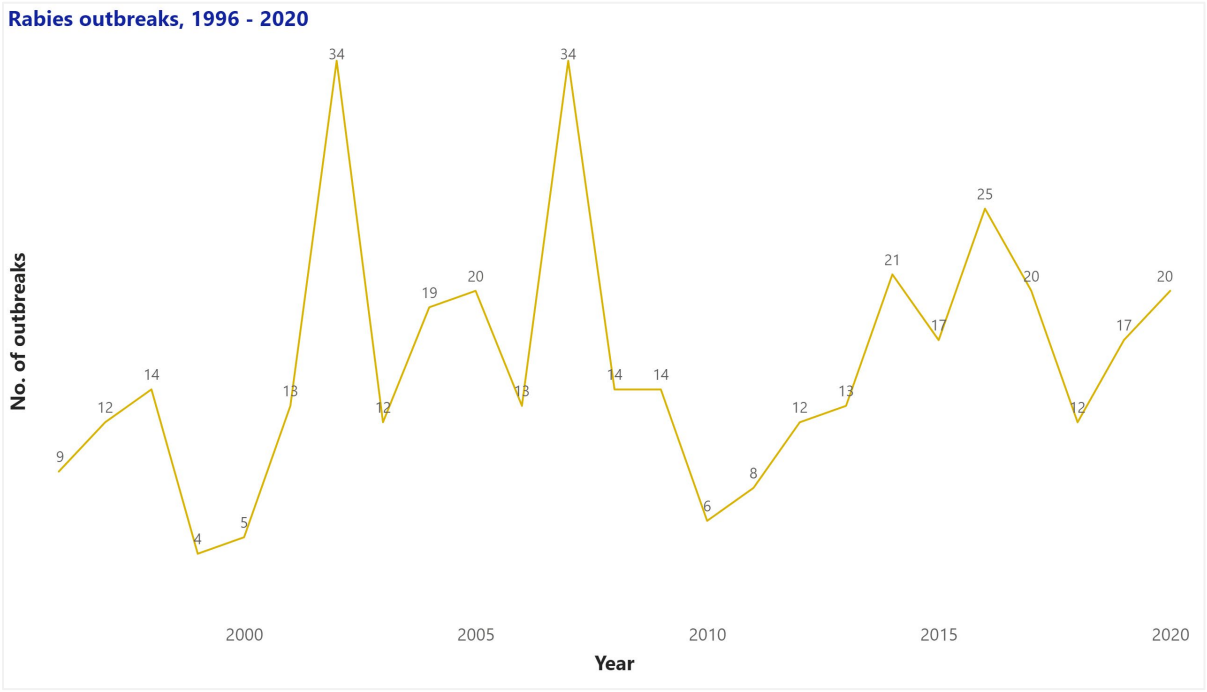
Source: Abraham et al., 2017

3.4.3. Past Outbreaks in Bhutan: 1996 – 2020

Between 1996 and 2020, a total of 388 outbreaks of rabies (annual average of 16 outbreaks) were reported from across the country (Figure 26) – affecting mainly the southern and eastern districts of Bhutan and further incursion, as shown in figure 27**,** which was based on the rabies cases reported between 2000 and 2017.

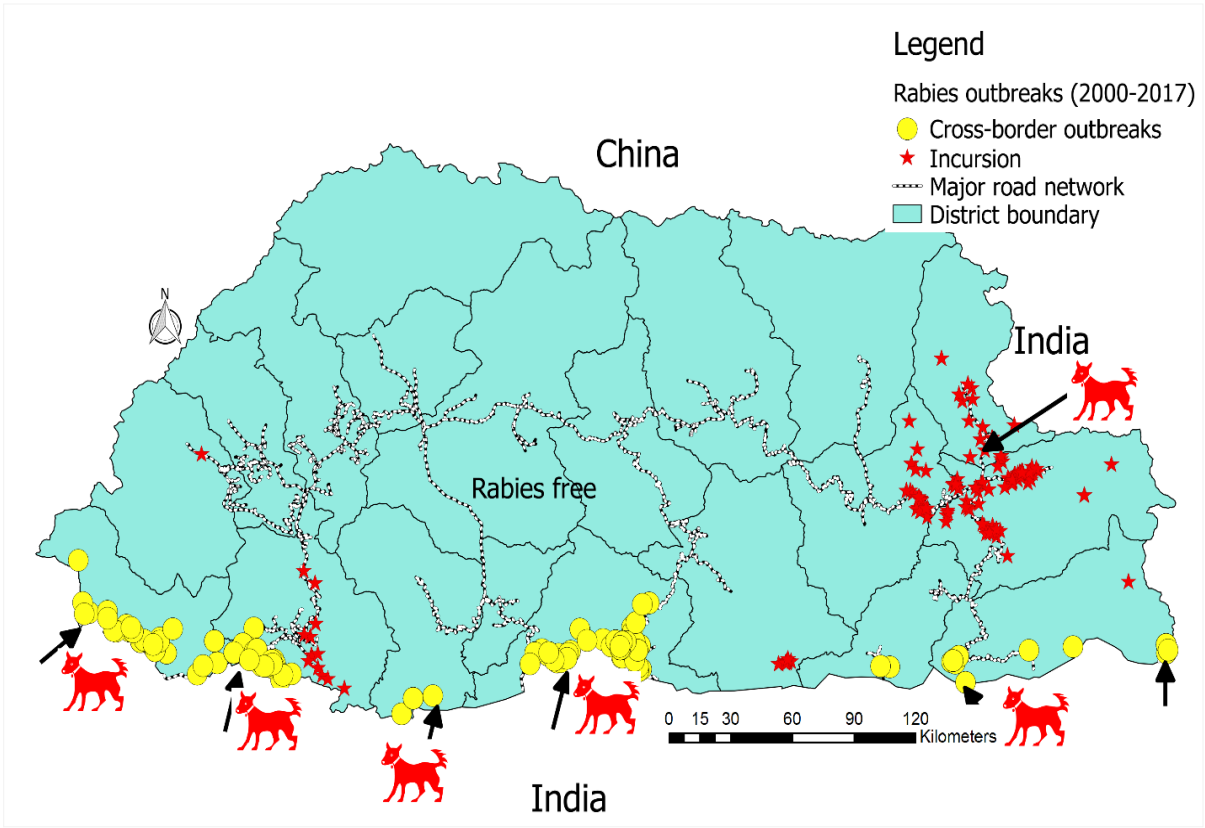
As per Tenzin et al. (2011), phylogenetic analysis of rabies virus based on N gene indicates that the rabies virus circulating in Bhutan belong to the Arctic-related clade which is widely circulating in northern India (Figure 28).

Figure 26: Rabies outbreaks reported in Bhutan, 1996 – 2020



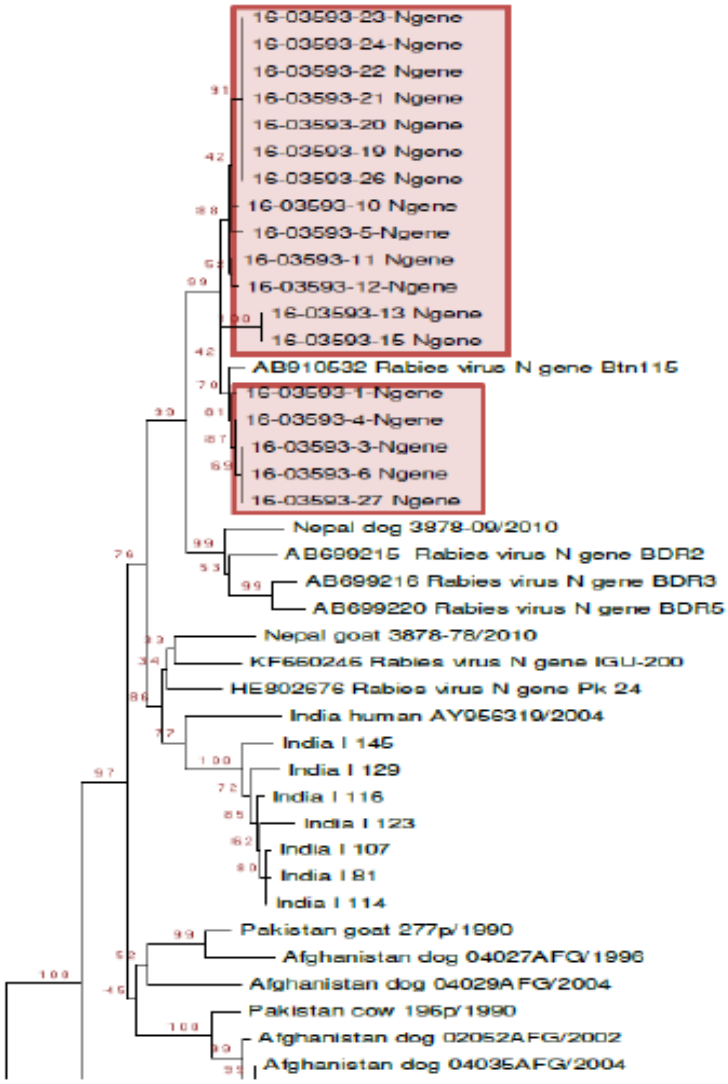
Data source: The Status of notifiable animal diseases in Bhutan, 2020

Figure 27: Risk map for rabies virus incursion into Bhutan



Source: Dr Tenzin (from 'The status of notifiable animal diseases in Bhutan 2019')

Figure 28: Phylogenetic analysis of rabies virus

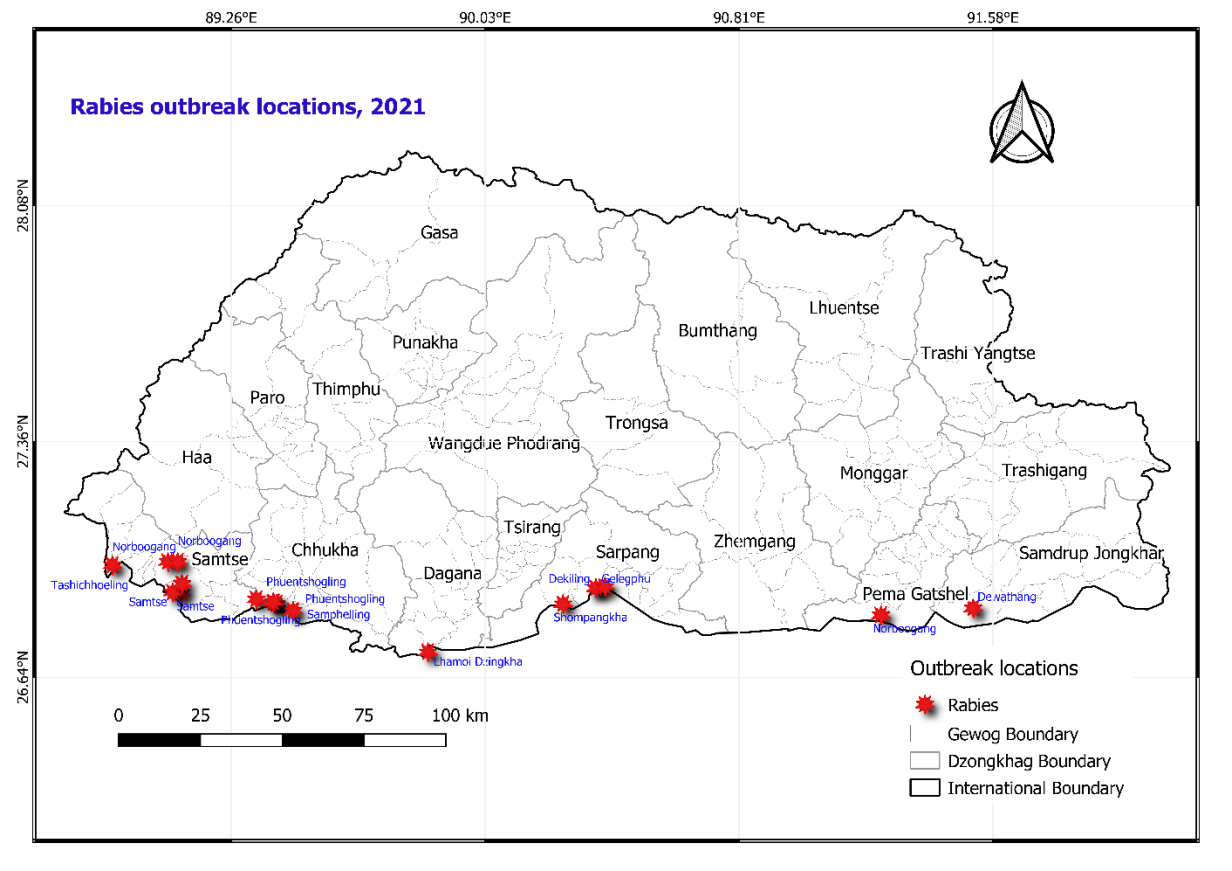


In humans, 18 deaths due to rabies had been reported between 2006 and 2020. No human rabies cases were reported in 2014, 2015, 2017, 2018 and 2019. In line with the global target of achieving zero dog-mediated human rabies death by 2030; Bhutan implements various activities enlisted in the Stepwise Approach Towards Rabies Elimination (SARE), the planning tool developed by FAO, GARC and WHO to support countries in planning the progressive control of dog-transmitted human rabies.

3.4.4. Status in Bhutan during the calendar year 2021

During the calendar year 2021, twenty-four outbreaks of rabies were reported from 29 villages in 24 gewogs under 10 dzongkhags (Figure 29); all these rabies outbreak reporting places are located along the southern belt, sharing a porous border with the Indian states of West Bengal and Assam.

Figure 29: Location of rabies outbreaks reported in Bhutan, 2021



Chhukha dzongkhag reported the highest number of outbreaks (n=7), followed by Samtse (n= 6) and Sarpang (n=4). Dagana, Pema Gatshel and Samdrup Jongkhar dzongkhags reported one outbreak each. Dekiling gewog of Sarpang dzongkhag reported the highest number of rabies cases (n=11), followed by Phuetshogling gewog, Chhukha (n=8), Norboogang (n=8) and Samtse (4) gewog, Samtse, etc. (Figure 30 and Annexure 4).

Figure 30: Dzongkhag and gewog-wise distribution of rabies outbreaks, 2021

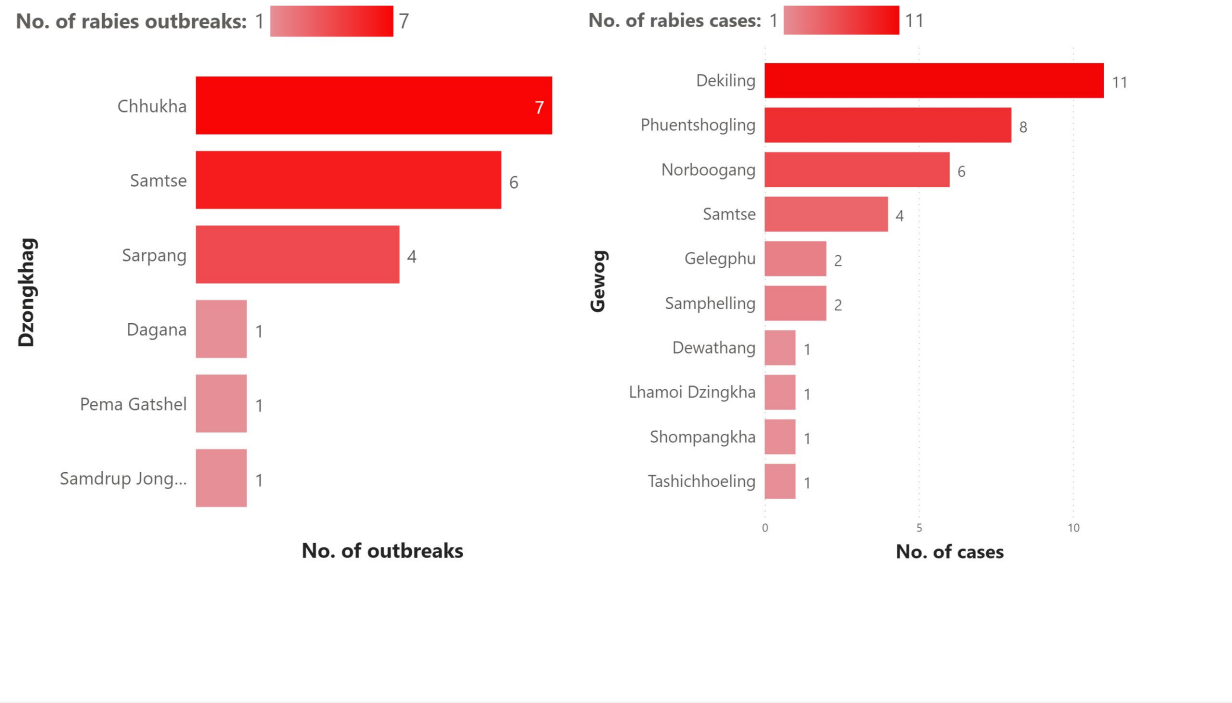
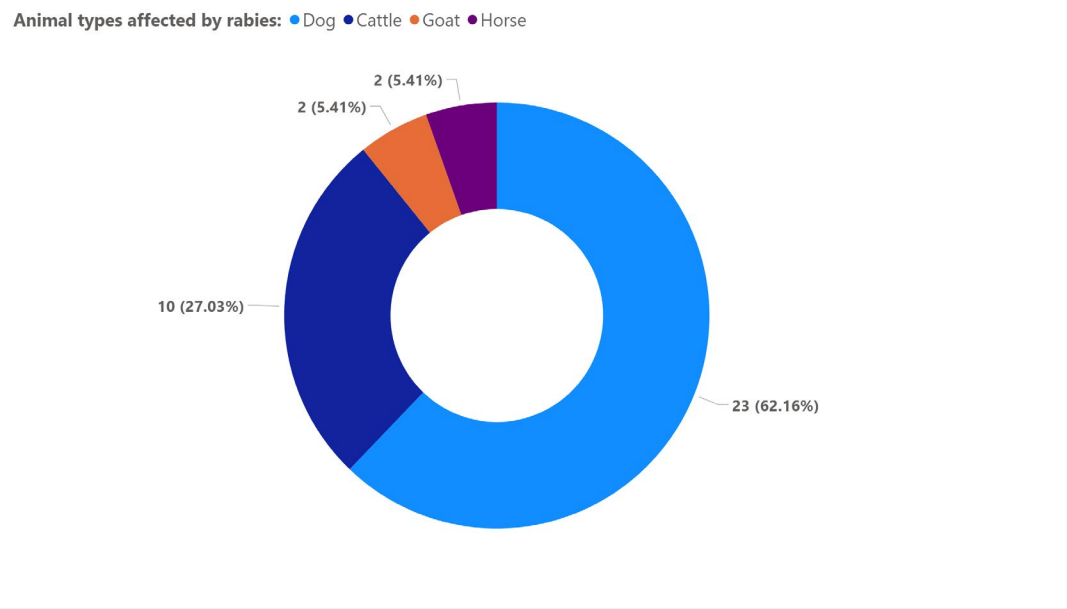


Figure 31: Species affected by rabies in Bhutan, 2021



A total of 37 cases were reported; 23 dogs (62.3%), 10 cattle (27%), 2 goats (5.4%) and 2 horses (5.4%) (Figure 31 and Annexure 4).

Figure 32: Monthly distribution of rabies outbreaks in Bhutan, 2021

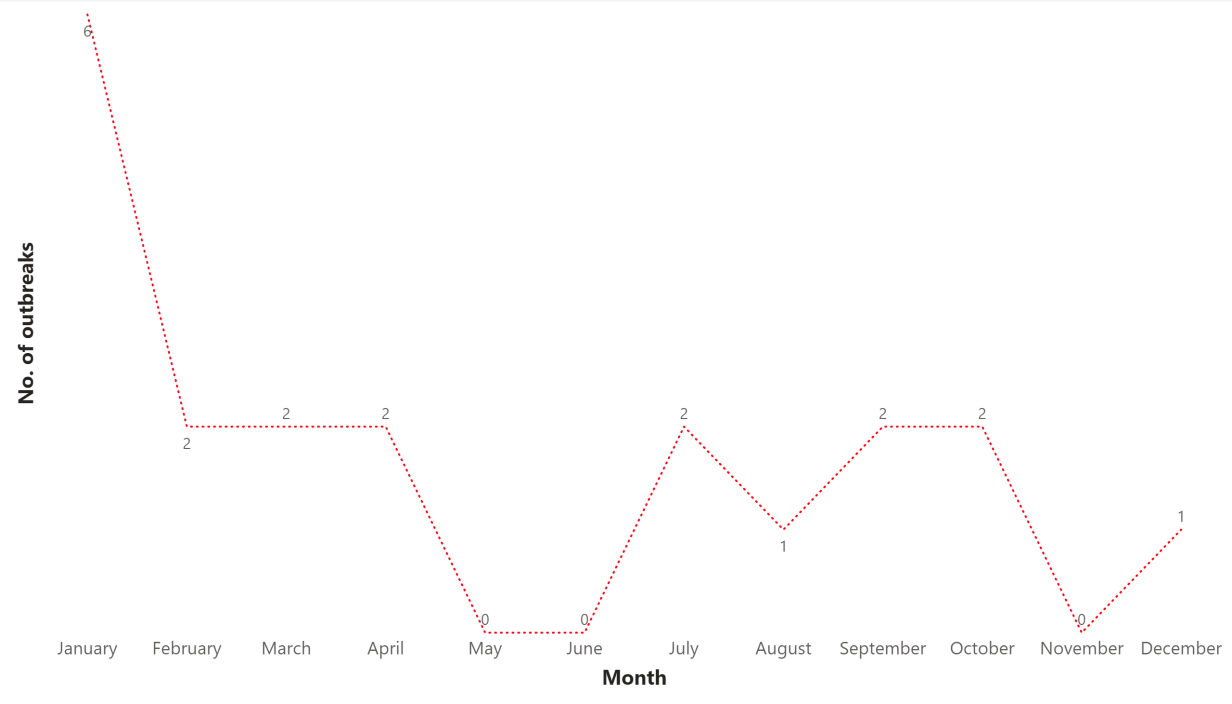


Figure 32 shows the monthly distribution of rabies outbreaks reported in Bhutan during the calendar year 2021. Except for May, June and November months, all other months reported at least one rabies outbreak. The highest number of cases was recorded in January (n=6), followed by 2 each in March, April, July, September and October, and one each in August and December.

4. BOVINE DISEASES

4.1. Haemorrhagic septicaemia (HS)

4.1.1. About the disease

Haemorrhagic septicaemia is a major disease of cattle and buffaloes characterised by an acute, highly fatal septicaemia with high morbidity and mortality. The disease is caused by certain serotypes of *Pasteurella multocida*, a Gram-negative coccobacillus residing mostly as a commensal in the nasopharynx of animals. The Asian serotype B:2 and the African serotype E:2 (Carter and Heddleston system), corresponding to the newer 6:B and 6:E classification (Namioka-Carter system), are mainly responsible for the disease.

In many Asian countries, HS disease outbreaks mostly occur during the climatic conditions typical of the monsoon (high humidity and high temperatures). Cattle and water buffaloes (*Bubalus bubalis*) are the principal hosts of hemorrhagic septicaemia, and it is widely considered that buffaloes are the more susceptible. Although outbreaks of hemorrhagic septicaemia have been reported in sheep, goats and swine, it is not a frequent or significant disease. Infrequent cases have been reported in deer, camels, elephants, horses, donkeys and yaks. North American range bison may also be infected. Cattle, water buffalo, and bison appear to be the reservoirs of infection.

P. multocida is transmitted by direct contact with infected animals and on fomites. Cattle and buffalo become infected when they ingest or inhale the causative organism, which probably originates in the nasopharynx of infected animals. In endemic areas, up to 5% of cattle and water buffalo may normally be carriers. The worst epidemics occur during the rainy season, in animals in poor physical condition. Stresses such as a poor food supply are thought to increase susceptibility to infection, and close herding and wet conditions seem to contribute to the spread of the disease.

Most cases in cattle and buffalo are acute or per-acute. A fever, dullness, and reluctance to move are the first signs. Salivation and a serous nasal discharge develop, and oedematous swellings become apparent in the pharyngeal region; these swellings spread to the ventral cervical region and brisket. Respiratory distress occurs, and the animal usually collapses and dies 6–24 hours after the first signs are seen. Either sudden death or a protracted course of up to 5 days is also possible.

The season of the year, rapid course, and high herd incidence, with fever and oedematous swellings, indicate typical HS. The incubation period varies from 3–5 days. Morbidity depends on immunity and environmental conditions, including both weather and husbandry; morbidity is higher when animals are herded closely, in poor condition, or exposed to wet conditions. Mortality is nearly 100% unless the animal is treated very early in the disease; few animals survive once they develop clinical signs. Antibiotic treatment is effective if it is started very early, during the pyrexic stage.

4.1.2. Global distribution

Hemorrhagic septicaemia is an important disease in Asia, Africa, some countries in southern Europe, and the Middle East. It has never been confirmed in Mexico, Central or South America. The B:2 serotype has been seen in southern Europe, the Middle East, Southeast Asia, Egypt, and Sudan. The E:2 serotype has been reported in Egypt, Sudan, the Republic of South Africa, and several other African countries. Confirmed outbreaks have been reported in one bison herd in the United States; however, there is no evidence that the disease spread to neighbouring cattle.

The following figure shows the outbreaks of HS reported to OIE from across the world in 2021 (Figure 33).

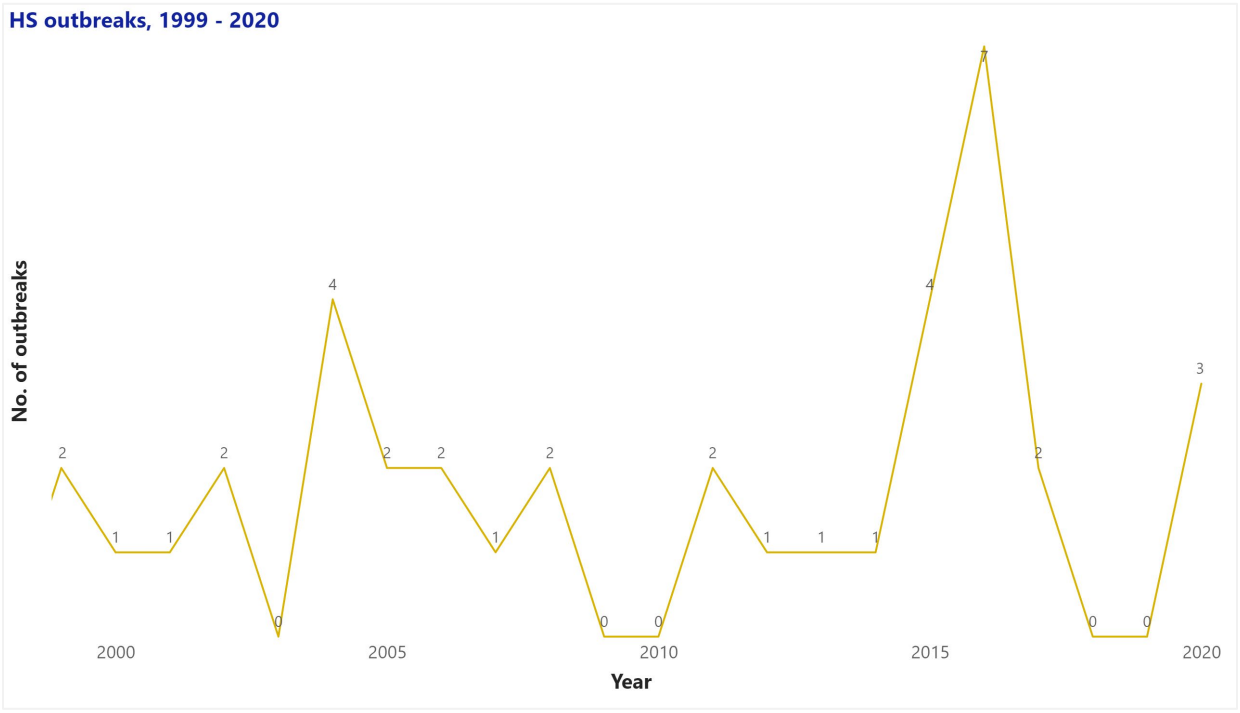
Figure 33: Global distribution of HS outbreaks, 2021

Source: WAHIS, January 2022

4.1.3. Past outbreaks in Bhutan: 1999 – 2020

Outbreaks of hemorrhagic septicaemia in Bhutan was recorded since 1999, and till 2020, a total of 38 outbreaks were reported from across the country. Between 1999 and 2020, no outbreak was reported during the calendar years 2003, 2009, 2010, 2018 and 2019. The calendar year 2016 recorded the highest number of HS outbreaks in the country (n=7). The following figure shows the number of HS outbreaks reported in Bhutan between 1999 and 2020 (Figure 34).

Figure 34: HS outbreaks reported in Bhutan, 1999-2020.



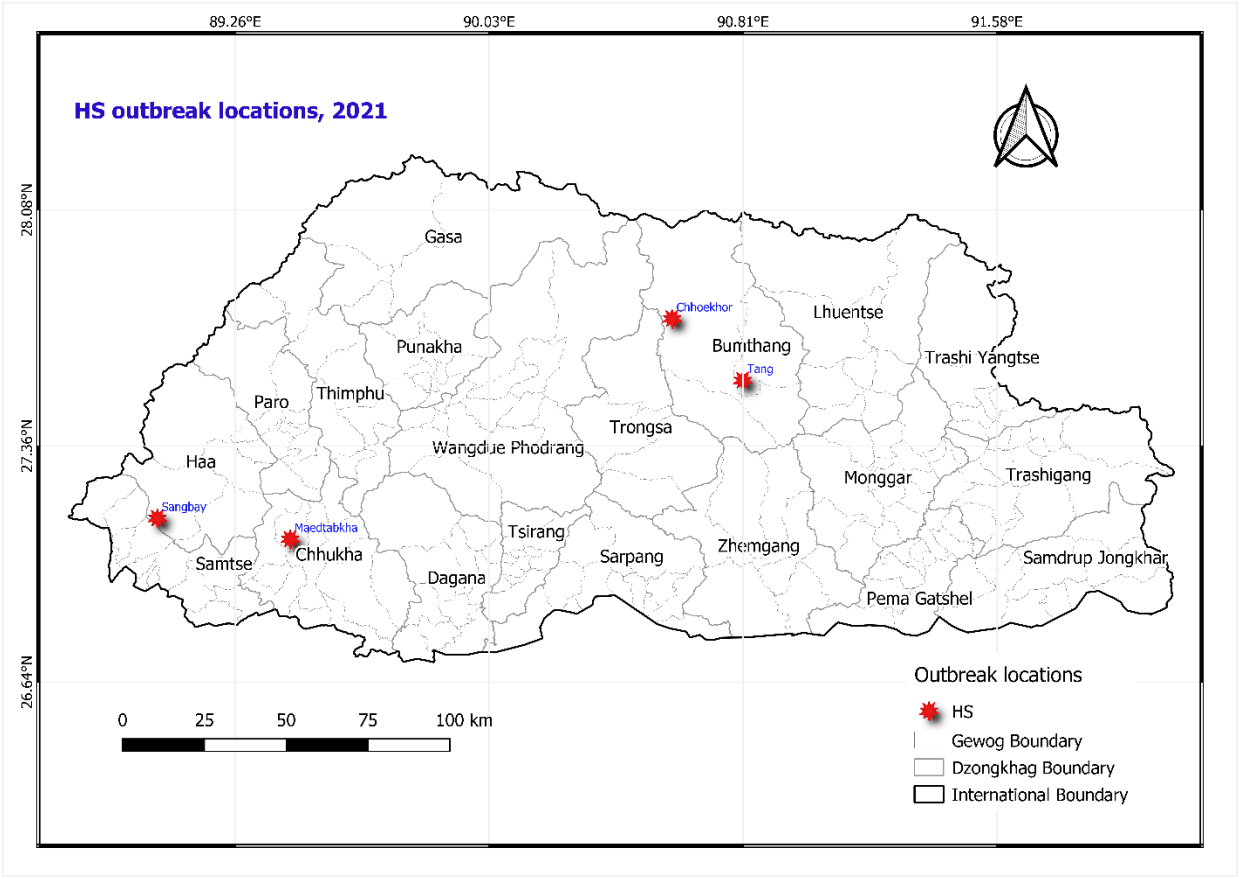
Data source: The status of notifiable animal diseases in Bhutan, 2020

4.1.4. Status in Bhutan during the calendar year 2021

The calendar year 2021 recorded 4 outbreaks of hemorrhagic septicaemia from Bumthang, Chhukha and Haa dzongkhag (Figure 35). A total of 35 cattle and 8 yaks were infected and 34 died (including 8 yaks) (Annexure 5).

All these outbreaks were suspected to have occurred due to seasonal migration-related stress and the herds not having received the annual vaccination against HS, which the dzongkhag livestock sector conducts on annual basis.

Figure 35: Location of HS outbreaks reported in Bhutan, 2021



5. CAPRINE AND OVINE DISEASE

5.1. Goatpox

5.1.1. About the disease

Goatpox is a viral disease caused by goatpox virus (GPPV) belonging to Capripoxvirus genus in the family Poxviridae, which in addition to GPPV consists of two species – lumpy skin disease virus, which causes disease in cattle and sheeppox virus (SPPV) which cause sheep pox. Goat pox is characterised by disseminated cutaneous nodules and up to 100% mortality in fully susceptible breeds of goats. In indigenous animals, generalised disease and mortality are less common, although they are seen where the disease has been absent from an area or village for a period of time when intensive husbandry methods are introduced, or in association with other disease agents, such as peste des petits ruminants virus or foot and mouth disease virus. Goat pox is a major constraint to the introduction of exotic breeds of goats to endemic areas, and the development of intensive livestock production.

Strains of SPPV and GTPV can pass between sheep and goats, although most cause more severe clinical disease in only one species.

The incubation period of goat pox is between 8 and 13 days following contact between infected and susceptible animals. It may be as short as 4 days following experimental infection by intradermal inoculation or mechanical transmission by insects. The disease is characterized by an initial rise in rectal temperature to above 40°C, followed in 2–5 days by the development of, at first, macules – small, circumscribed areas of hyperaemia, which are most obvious on unpigmented skin – and then of papules – hard swellings of between 0.5 and 1 cm in diameter – which may cover the body or be restricted to the groin, axilla and perineum. Papules may be covered by fluid-filled vesicles, but this is rare.

Within 24 hours of the appearance of generalised papules, affected animals develop rhinitis, conjunctivitis and enlargement of all the superficial lymph nodes, in particular the prescapular lymph nodes. Papules on the eyelids cause blepharitis of varying severity. As the papules on the mucous membranes of the eyes and nose ulcerate, the discharge becomes mucopurulent, and the mucosae of the mouth, anus and prepuce or vagina become necrotic. Breathing may become laboured and noisy due to pressure on the upper respiratory tract from the swollen retropharyngeal lymph nodes, due to the developing lung lesions.

If the affected animal does not die in this acute phase of the disease, the papules start to become necrotic from ischaemic necrosis following thrombi formation in the blood vessels at the base of the papule. In the following 5–10 days the papules form scabs, which persist for up to 6 weeks, leaving small scars. The skin lesions are susceptible to fly strikes, and secondary pneumonia is common. Anorexia is not usual unless the mouth lesions physically interfere with feeding. Abortion is rare.

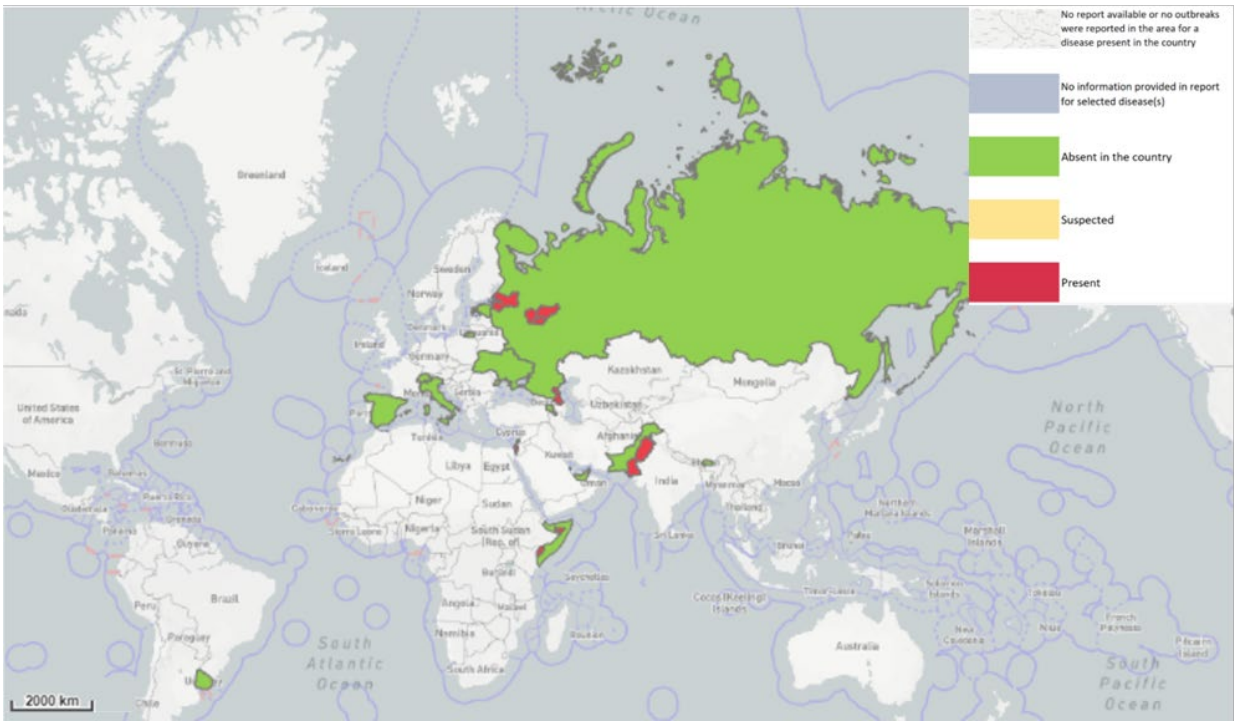
On post-mortem examination of the acutely infected animal, the skin lesions are often less obvious than on the live animal. The mucous membranes appear necrotic, and all the body lymph nodes are enlarged and oedematous. Papules, which may be ulcerated, can usually be found on the abomasal mucosa, and sometimes on the wall of the rumen and large intestine, on the tongue, hard and soft palate, trachea and oesophagus. Pale areas of approximately 2 cm in

diameter may occasionally be seen on the surface of the kidney and liver and have been reported to be present in the testicles. Numerous hard lesions of up to 5 cm in diameter are commonly observed throughout the lungs, but particularly in the diaphragmatic lobes.

5.1.2. Global distribution

Goatpox is a transboundary disease that regularly spreads into adjacent, non-endemic areas. Goat pox is endemic in Africa north of the Equator and parts of the Middle East and Asia. Outbreaks have been reported in non-endemic countries of Asia, Europe and the Middle East. Numerous studies and reports suggest that SPP and GTP viruses are highly distributed in northern and central Africa, the Middle East, Europe and Asia.

Figure 36: Global distribution of sheep pox and goatpox, 2021



5.1.3. Past outbreaks in Bhutan: 2020

In 2020, goatpox outbreaks were first detected in Bhutan affecting both wild and domestic caprids.

Firstly, an outbreak of an unknown disease was reported in March 2020 from the winter pasture areas under Jigme Dorji National Park (JDNP), Khamaed gewog, Gasa dzongkhag. Later, in October 2020, mortality in Himalayan gorals was reported from the Chagri monastery area of Kawang gewog, Thimphu dzongkhag. In the following months, Himalayan gorals and domestic goats' mortality were reported from Darla and Loggchina gewogs of Chukha dzongkhag, and Doomtoed and Dophuchen gewogs of Samtse dzongkhag. In November 2020, mortality of Himalayan serows was reported from lower Sangbay gewog of Haa dzongkhag. Since the

diseases caused by Capripox viruses remained exotic to Bhutan until 2020, the animal health laboratories in the country were not equipped with the capacity to detect these pathogens.

The National Centre for Animal Health, Department of Livestock, MoAF explored the possibility of establishing pox disease diagnostic capacity and contacted the International Atomic Energy Agency (IAEA) in Vienna, Australia, a specialized agency for the production of all range of animal disease diagnostics. The IAEA, Vienna agreed and supplied multiplex PCR reagents that can detect 4 diseases in ruminants. After receiving the multiplex PCR reagents from IAEA, Vienna, the archived samples were tested against the Capripox virus. On 16 December 2020, the first batch of samples from gorals in Chagri monastery area was tested positive for Capripoxvirus. Following this, other archived samples from goats and takins (Khamaed, Gasa) were also tested and found positive. Later, the samples from domestic goats in Chhukha and Himalayan serows in Haa, referred to the NCAH, Serbithang, were tested positive to the same group of viruses.

Laboratory test and analysis results are briefly described below:

- Analysis of seven wildlife samples (Himalayan serow, Goral and Takin) based on the RPO30 and GPCR gene sequences identified them as GTPVs closely related to those from East and South Asia (e.g., Bangladesh, India, and Oman) and different from GTPVs from West and Central Asia (e.g., Turkey) or Africa (e.g., Ghana and Chad).
- Based on the RPO30, EEV glycoprotein, and the B22R genes, one Barking deer sample tested GTPV positive
- One sample from cattle tested LSDV positive based on the EEV glycoprotein gene sequence
- One goat sample was tested GTPV positive based on the RPO30 gene sequence

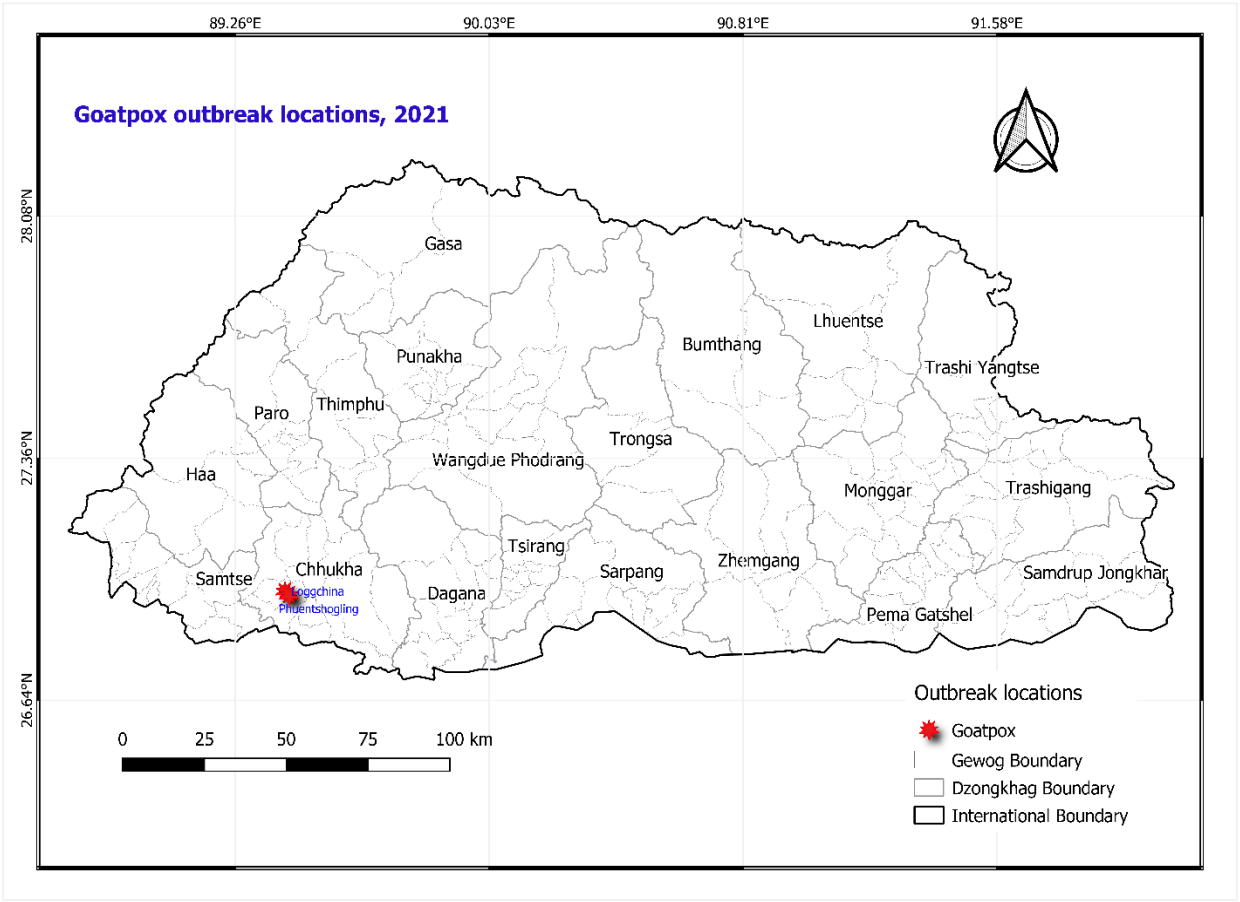
Table 4: Suspected and confirmed outbreaks of Capripox in Bhutan, 2020

Dzongkhag	Gewog	Date	Species	Samples	Nos.	Result
Gasa	Khamaed	Mar 2020	Takin	Ocular/Nasal swabs	7	Capripox
Thimphu	Kawang	Oct 2020	Goral	Ocular/Nasal swabs	4	Capripox
Thimphu	Kawang	Oct 2020	Goat	Ocular/Nasal swabs	2	Capripox
Chhukha	Darla	Nov 2020	Goral	Not collected	N/A	N/A
Haa	Sangbay	Nov 2020	Serow	Ocular/Nasal swabs	3	Capripox
Chhukha	Loggchina	Jan 2021	Goral, Goat	Ocular/Nasal swabs	5	Capripox
Samtse	Doomtoed	Jan 2021	Goral	Not collected	N/A	N/A
Samtse	Dophuchen	Jan 2021	Goral	Not collected	N/A	N/A

5.1.4. Status in Bhutan during the calendar year 2021

During the calendar year 2021, the first outbreak of Goatpox in domesticated goats was reported on 11 January 2021 from Amdo-Dolepchen village of Loggchina gewog, Chhukha dzongkhag. Later, between 25 February to 7 March 2021, another outbreak of goatpox in goats was reported from Kungkha and Dophulakha villages of Phuentshogling gewog (adjoining Loggchina gewog) (Figure 37), Chhukha dzongkhag. During these two reported outbreaks, a total of 64 goats were affected and 24 died (Annexure 6).

Figure 37: Location of goatpox outbreaks in Bhutan, 2021



6. SWINE DISEASE

6.1. African swine fever (ASF)

6.1.1. About the disease

The disease is caused by the African swine fever virus (ASFV), a DNA virus in the Asfarviridae Family; genus Asfivirus. ASFV is the sole member of its Family. It is the only known DNA arbovirus.

All varieties of Sus scrofa (domestic and wild) are susceptible to the pathogenic effects of ASFV. African wild suid species: warthogs (Phacochoerus spp.), bush pigs (Potamochoerus spp.), giant forest hogs (Hylochoerus meinertzhageni) are usually inapparently infected and act as reservoir hosts of ASFV. Ticks of the genus Ornithodoros are the only known natural arthropod hosts of the virus and act as reservoirs and biological vectors.

Transmission of the infection occurs directly through contact between sick and healthy animals. Indirect transmission occurs through feeding on garbage containing infected meat (ASFV can remain infectious for 3–6 months in uncooked pork products), biological vectors – soft ticks of the genus Ornithodoros, and fomites (include, premises, vehicles, implements, clothes). Transstadial, transovarial, and sexual transmission occur within tick vectors.

The incubation period in nature is usually 4–19 days; acute form 3–4 days. For the purposes of the OIE Terrestrial Animal Health Code, the incubation period in Sus scrofa shall be 15 days. Depending on the virulence of the virus, the clinical manifestation of the disease occurs in different forms: peracute (highly virulent virus), acute (highly virulent virus), subacute (moderately virulent virus) and chronic (moderately or low virulent virus). In peracute form, sudden death occurs with few clinical signs. Commonly observed clinical signs and symptoms in the acute form of the disease are in domestic pigs, the mortality rate is usually close to 100% high fever (40.5–42°C); early leucopenia and thrombocytopenia (48–72 hours); reddening of the skin (white pigs) – tips of ears, tail, distal extremities, ventral aspects of chest
and abdomen; anorexia, listlessness, cyanosis and incoordination within 24–48 hours before death; increased pulse and respiratory rate; and death within 6–13 days, or up to 20 days. Vomiting, diarrhoea (sometimes bloody) and eye discharges may occur. In pregnant sows, abortion may occur. In domestic swine, the mortality rate often approaches 100%. Lesions observed in the affected and dead pigs are pronounced haemorrhages in the gastrohepatic and renal lymph nodes; petechial haemorrhages of the renal cortex, also in medulla and pelvis of kidneys; congestive splenomegaly; oedematous areas of cyanosis in hairless parts; cutaneous ecchymoses on the legs and abdomen; excess of pleural, pericardial and/or peritoneal fluid; petechiae in the mucous membranes of the larynx and bladder, and on visceral surfaces of organs; and oedema in the mesenteric structures of the colon and adjacent to the gall bladder, and also the wall of the gall bladder.

6.1.2. Global distribution

As per the ASF events reported to the OIE by its Members through the World Animal Health Information System, WAHIS from 2016 to 2020, since 2016, a pattern of a significant increase in the number of outbreaks was identified. The disease is present in the African, European, and

Asian regions. In this period, 30% (60/201) of the reporting countries and territories have reported the disease as present. In Europe, many countries reported the first occurrence of the disease since 2016. Moldova notified the disease as present in September 2016, the Czech Republic in June 2017, followed by Romania in July 2017, Hungary in April 2018, Bulgaria in August 2018, the recurrence of the disease was reported by Belgium in September 2018 (the last event occurred in 1985), Slovakia reported the first occurrence of the disease in July 2019, and most recently, Serbia in January 2020 and Greece in February 2020. In Asia and the Pacific, China People's Republic of) notified the presence of the disease for the first time in August 2018, Mongolia in January 2019, then Vietnam in February 2019, Cambodia in March 2019, Hong Kong (SAR-PRC) in May 2019, Korea (Dem. People's Rep.) in May 2019, Laos in June 2019, Myanmar in August 2019, the Philippines in July 2019, Korea (Rep. of) in September 2019, Timor-Leste in September 2019, Indonesia in November 2019, Papua New Guinea in March 2020 and India in May 2020. The distribution of the disease since 2016 is illustrated in Figure 38. The disease is endemic in most South-Saharan African countries.

Figure 38: Global situation of ASF, 2016 - 2020

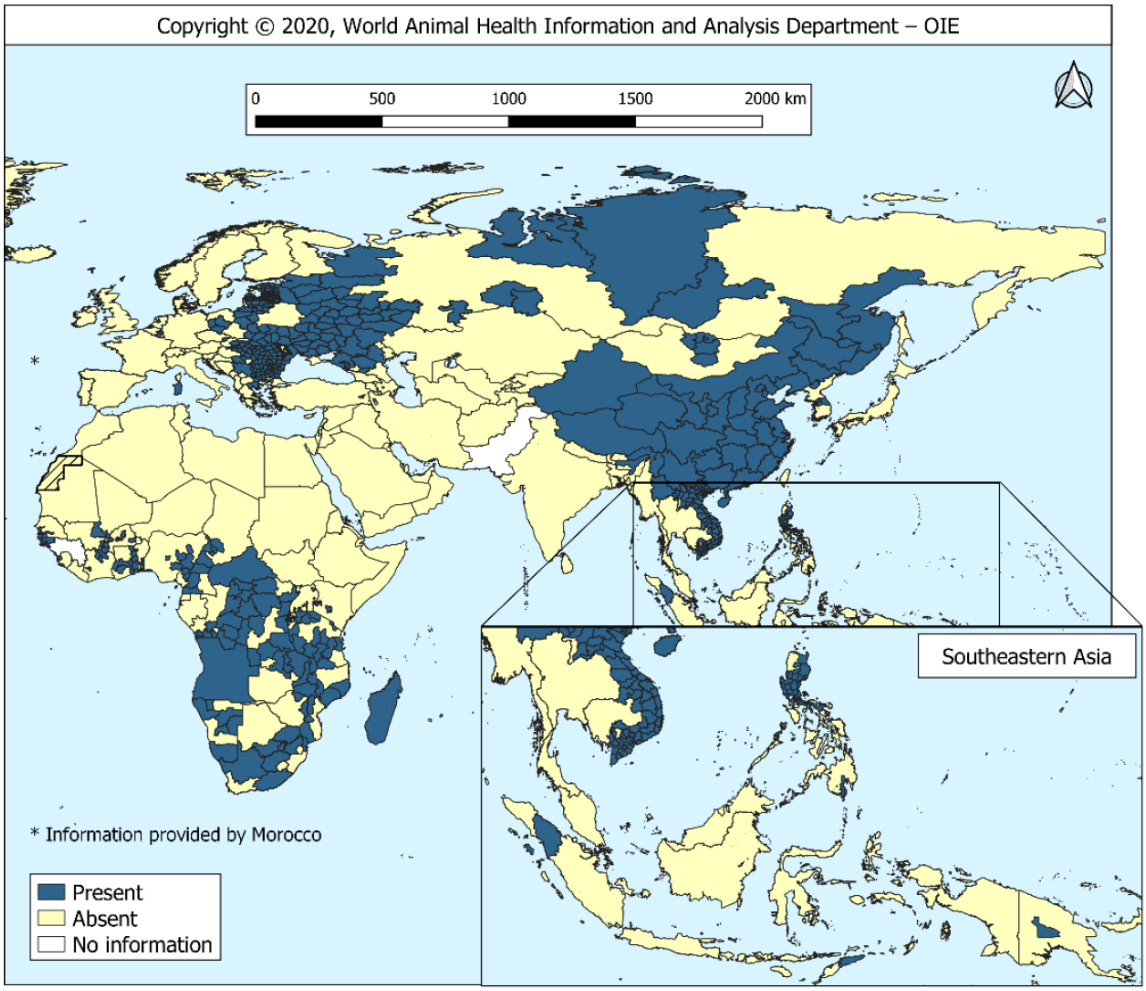
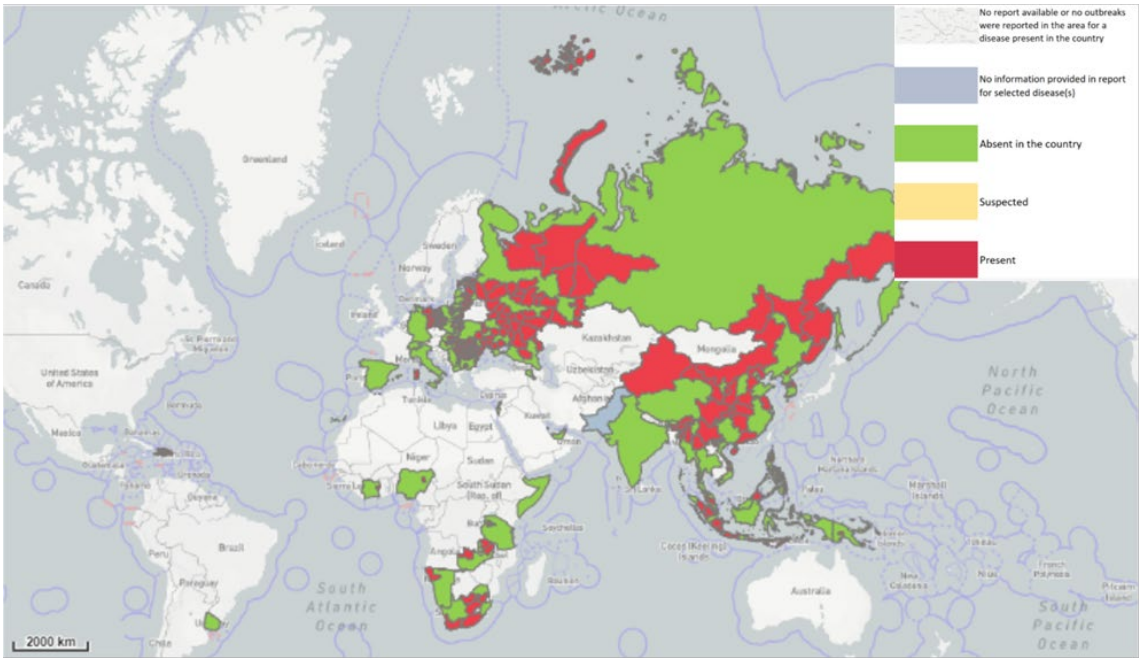
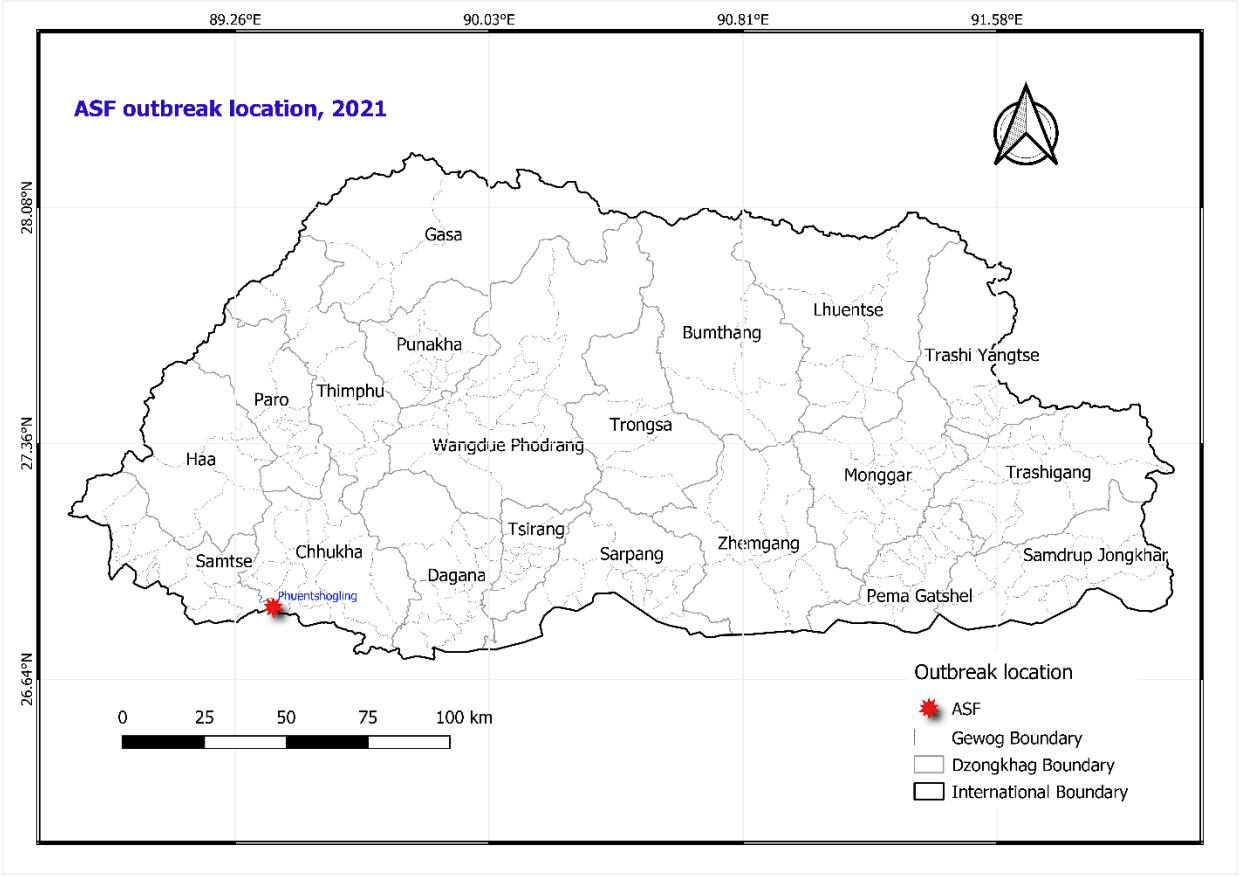


Figure 39: Global distribution of ASF, 2021



6.1.3. The first outbreak in Bhutan – 2021

Figure 40: Location of ASF outbreak in Bhutan, 2021



The first outbreak of ASF was reported in Bhutan in May 2021. The first case of African Swine Fever was confirmed in a stray female pig from a point-of-entry (POE) area, between Bhutan and India, in Phuentshogling thromde, Chhukha district on 13 May 2021 (Figure 40). The disease was confirmed by Real-time PCR at the National Veterinary Laboratory, National Centre for Animal Health, Serbithang, Thimphu.

A total of 34 stray pigs died were affected, all of which died. In response to the outbreak, 21 susceptible stray pigs were culled to control and prevent the further spread of the disease outbreak (Annexure 7).

Figure 41: Pictures from the ASF outbreak investigation conducted

Source: Disease Outbreak Investigation Team, Phuentshogling

7. AVIAN DISEASES

7.1. Infectious bursal disease (IBD)

7.1.1. About the disease

Infectious bursal disease, also known as Gumboro, is an immuno-suppressive disease of domestic poultry caused by a *birnavirus*. There are three types of IBD: the highly virulent (vv IBD), the US IBD and the subclinical IBD.

The domestic fowl is the natural host; sub-clinical infection may occur in turkeys. Chickens infected with the IBD virus shed the virus in their faeces. Feed, water, and poultry house litter become contaminated. Other chickens in the house become infected by ingesting the virus. Because of the resistant nature of the IBD virus, it is easily transmitted mechanically among the farms by people, equipment and vehicles.

The incubation period is very short: two to three days. Mortality commences on the third day of infection, reaches a peak by day four, then drops rapidly, and the surviving chickens recover a state of apparent health after five to seven days.

The disease is most common in 3 to 6 weeks old birds; however severe infection occurs in Leghorn up to 18 weeks. One of the earliest signs is for birds to peck at their vent. Other signs include infection by opportunist germ which are not normally pathogenic; poor body weights and feed conversions; reluctance to move; depression; anorexia ruffled feathers; trembling; watery diarrhoea; and sudden death.

Post-mortem findings include enlarged cloacal bursa, swollen and haemorrhagic, and it is atrophied in recovered birds; skeletal muscles dark with haemorrhages (especially thigh and pectoral muscles); thymus opaque with thickened gelatinous capsule; liver may be swollen; kidneys were swollen and fatty; and increased mucus in the intestines.

7.1.2. Global distribution

The first report of a specific disease affecting the bursa of Fabricius in chickens was made by Cosgrove in 1962. The first cases were observed in the area of Gumboro, in Delaware (United States of America), which is the origin of the name, although the terms 'IBD' or 'infectious bursitis' are more accurate descriptions.

Between 1960 and 1964, the disease was observed in most parts of the US and became a devastating disease in Europe in the years 1962 to 1971. With its pandemic movement from the year 1966 to 1974, the disease was reported in southern and western Africa, the Far East, the Middle East, India and Australia.

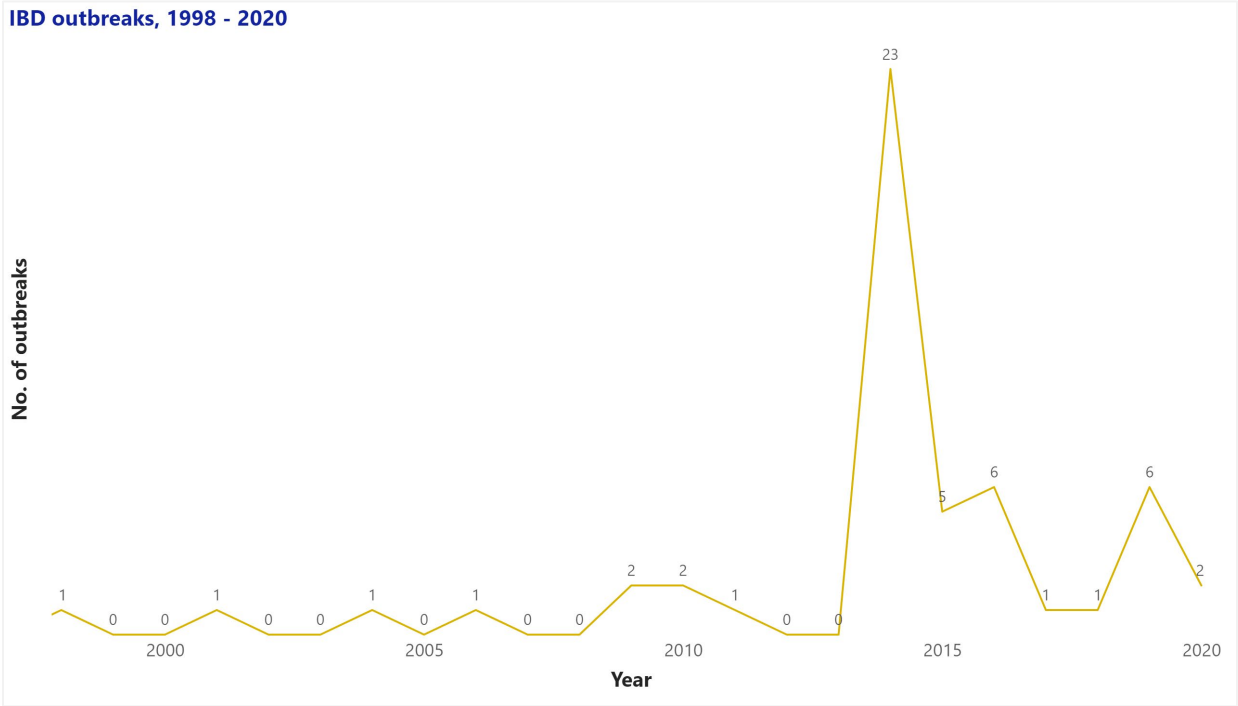
Figure 42: Global distribution of IBD outbreaks, 2021.

Source: WAHIS, January 2022

7.1.3. Past outbreaks in Bhutan: 1998 – 2020

Between 1998 and 2020, a total of 53 outbreaks of infectious bursal disease (IBD) were reported in Bhutan, averaging 2 outbreaks per year. The highest number of IBD outbreaks was recorded in 2014 (n = 23) forming 43 per cent of the total outbreaks recorded (Figure 43).

Figure 43: IBD outbreaks reported in Bhutan, 1998-2020

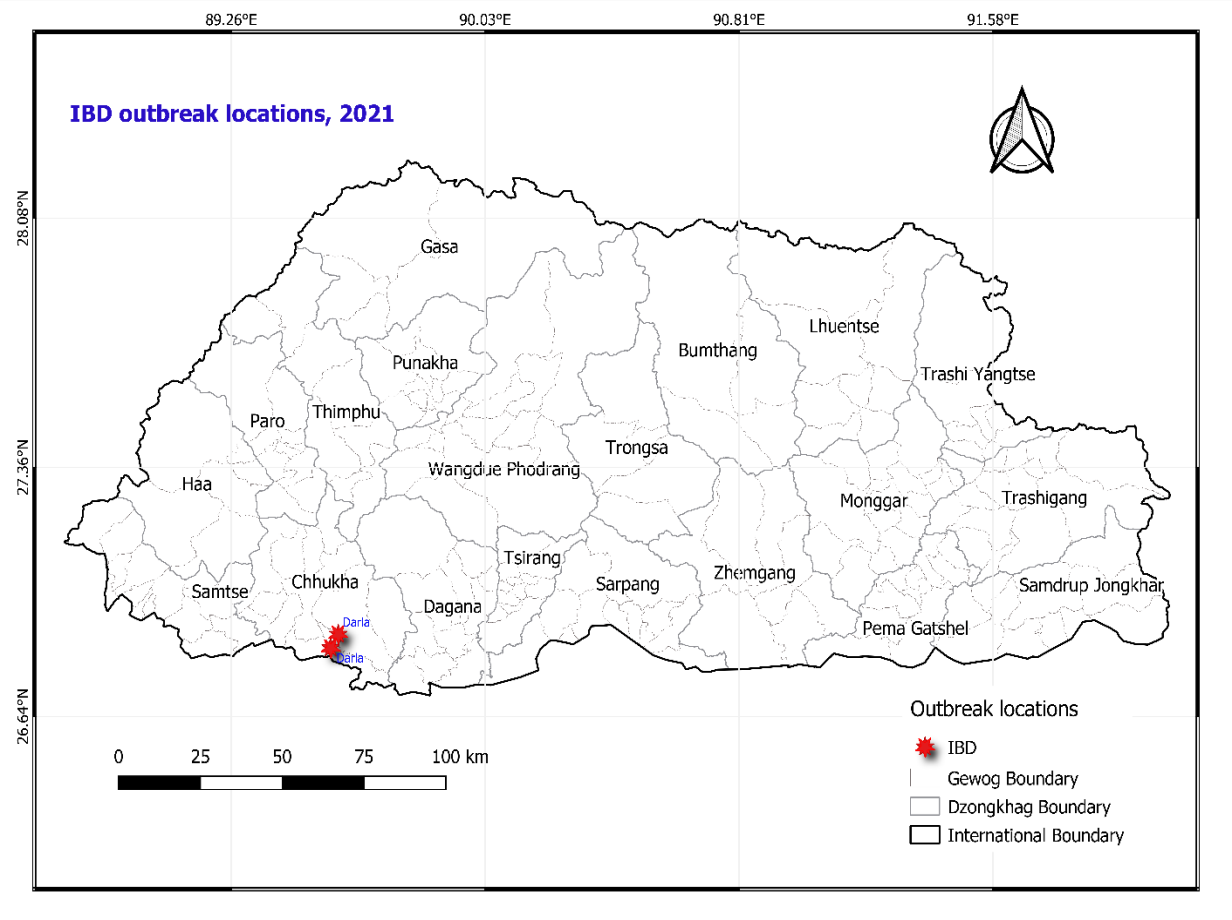


Data source: The status of notifiable animal diseases in Bhutan, 2020

7.1.4. Status in Bhutan during the calendar year 2020

In 2021, a total of 2 outbreaks of infectious bursal disease (IBD) were reported in Darla gewog of Chhukha dzongkhag (Figure 44); one each in January and April 2021. During these outbreaks, a total of 1060 juvenile chickens were affected, and all died, translating to an apparent case fatality rate of 100% (Annexure 8).

Figure 44: Location of IBD outbreaks reported in Bhutan, 2021



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National Centre for Animal Health (NCAH), Department of Livestock (DoL), Ministry of Agriculture and Forests (MoAF) would like to thank all the stakeholders for timely notifying the Centre about the outbreaks (suspected/confirmed) of notifiable and emerging animal diseases in the country through various means of communication, primarily through sharing of flash and follow-up reports and updating the information in the existing online system of reporting. Moreover, all these stakeholders are acknowledged for their preparedness and response to these disease outbreaks, aligning with the national disease-specific prevention and control plans and guidelines for Bhutan. The Centre also acknowledges the regional and international organizations/ institutes for the support rendered through sharing of technical and financial resources to build capacity in responding to animal disease outbreaks in the country.

The important stakeholders are:

- Ministry of Agriculture and Forest (MoAF)
- Department of Livestock (DoL), MoAF
- Animal Health Division, DoL
- Regional Livestock Development Centres (RLDCs)
- Dzongkhag Livestock Sectors/ Dzongkhag Veterinary Hospitals
- Livestock Extension Centres/ RNR-ECs
- Central and Regional Livestock Farms
- Livestock Research Centres
- Bhutan Agriculture and Food Regulatory Authority (BAFRA), MoAF
- Department of Forest and Park Services (DoFPS), MoAF
- Department of Public Health (DoPH), Ministry of Heatlh (MoH)
- Dzongkhag Administrations
- Local Governments (Thromdes and Gewogs)
- World Organization for Animal Health (OIE)
- Food and Agriculture Organization of the United Nations (FAO)
- Regional and International Veterinary Referral Laboratories

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ANNEXURE

Annexure 1: Anthrax outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	30-Dec-20	01-Jan-21	Jangshagang	Tseza	Dagana	Cattle	Young	Male	1	1	n/a	0	1
2	10-May-21	11-May-21	Wamringma	Ramjar	Trashi Yangtse	Cattle	Adult	Female	3	3	6	0	1

Annexure 2: Black Quarter (BQ) outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	13-Jul-21	15-Jul-21	Bolphay	Udzorong	Trashigang	Cattle	Young	Both	2	1	14	0	1
2	03-Aug-21	10-Aug-21	Thunkay	Samtse	Samtse	Cattle	Adult	Female	1	1	42	0	1
3	16-Sep-21	21-Sep-21	Penchemeri (Rukubji)	Saephu	Wangdue Phodrang	Cattle	Mixed	Both	9	5	140	0	1
4	25-Nov-21	02-Dec-21	Nyakar	Nangkor	Zhemgang	Cattle	Mixed	Both	3	3	350	0	1

Annexure 3: Foot-and-mouth disease (FMD) outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	08-Feb-21	09-Feb-21	Gengu	Darla	Chhukha	Cattle	Adult	Both	5	0	150	0	1
2	08-Feb-21	09-Feb-21	Gengu	Darla	Chhukha	Goat	Adult	Male	5	0	121	0	0
3	17-Feb-21	25-Feb-21	Bjachey-Chungkha	Bongo	Chhukha	Cattle	Mixed	Both	6	0	200	0	1
4	27-Feb-21	27-Feb-21	Rimtakha	Chapchha	Chhukha	Cattle	Mixed	Both	4	0	100	0	1
5	04-Mar-21	07-Mar-21	Amaley	Loggchina	Chhukha	Cattle	Mixed	Both	7	0	46	0	1
6	07-Mar-21	08-Mar-21	Tshosarling	Namgyalchhoeling	Samtse	Cattle	Mixed	Female	4	0	60	0	1
7	22-Mar-21	29-Mar-21	Somelakha	Loggchina	Chhukha	Cattle	Mixed	Both	20	0	100	0	0
8	04-Mar-21	01-Apr-21	Gangchu Dorona-Longtey	Saephu	Wangdue Phodrang	Cattle	Mixed	Both	21	0	853	0	1

9	04-Mar-21	01-Apr-21	Gangchu Dorona-Longtey	Saephu	Wangdue Phodrang	Yak	Mixed	Both	3	0	853	0	0
10	28-Mar-21	01-Apr-21	Eusagang	Dangchhu	Wangdue Phodrang	Cattle	Mixed	Both	12	0	300	0	1
11	04-Apr-21	15-Apr-21	Zamtog	Ge-nyen	Thimphu	Cattle	Adult	Male	3	0	3	0	1
12	28-Apr-21	04-May-21	Ngoba	Lamgong	Paro	Pig	Young	Both	6	1	33	0	1
13	20-Apr-21	08-May-21	Chumina	Loggchina	Chhukha	Cattle	Mixed	Both	20	0	n/a	0	0
14	18-May-21	22-May-21	Tsendona	Lamgong	Paro	Cattle	Mixed	Female	2	0	45	0	0
15	23-May-21	26-May-21	Papling	Maedtabkha	Chhukha	Cattle	Adult	Both	9	0	6	0	1
16	18-May-21	03-Jun-21	Bemphu	Nagya	Paro	Cattle	Young	Male	1	0	1	0	1
17	15-Jun-21	17-Jun-21	Zeal	Nyishog	Wangdue Phodrang	Cattle	Adult	Both	7	0	150	0	1
18	17-Jun-21	22-Jun-21	Bongdey	Loong-nyi	Paro	Cattle	Adult	Female	1	0	10	0	1
19	27-Jul-21	18-Aug-21	Dungbi	Trong	Zhemgang	Cattle	Mixed	Both	4	0	25	0	1
20	26-Aug-21	23-Aug-21	Cholikop	Samtse	Samtse	Cattle	Adult	Male	3	0	84	0	1
21	31-Aug-21	01-Sep-21	Suntala Bari	Lhamoi Dzingkha	Dagana	Cattle	Mixed	Both	7	0	70	0	1
22	05-Oct-21	18-Oct-21	Rinchengang (toed and maed)	Thedtsho	Wangdue Phodrang	Cattle	Mixed	Both	32	0	150	0	1
23	26-Oct-21	28-Oct-21	Ngachegaykha	Rubesa	Wangdue Phodrang	Cattle	Mixed	Both	5	0	n/a	0	1
24	30-Oct-21	05-Nov-21	Tshokona	Barp	Punakha	Cattle	Mixed	Both	12	0	120	0	1
25	15-Nov-21	03-Dec-21	Peljorling B	Tashichhoeling	Samtse	Cattle	Mixed	Both	24	0	n/a	0	0
26	15-Nov-21	03-Dec-21	Peljorling A	Tashichhoeling	Samtse	Cattle	Mixed	Both	11	0	n/a	0	0
27	15-Nov-21	03-Dec-21	Singaygang	Tashichhoeling	Samtse	Cattle	Mixed	Both	17	1	n/a	0	1
28	06-Dec-21	09-Dec-21	Gewog Centre, Kamichu	Darkar	Wangdue Phodrang	Cattle	Mixed	Both	7	0	n/a	0	1
29	06-Dec-21	09-Dec-21	Phandru	Athang	Wangdue Phodrang	Cattle	Mixed	Both	32	0	40	0	1
30	12-Dec-21	18-Dec-21	Tongthrong	Maedtsho	Lhuentse	Cattle	Mixed	Both	65	0	10	0	1
31	22-Dec-21	28-Dec-21	Sengphu	Toetsho	Trashi Yangtse	Cattle	Mixed	Both	25	0	32	0	1

Annexure 4: Rabies outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	31-Dec-20	01-Jan-21	Yangphelthang	Norboogang	Samtse	Dog	Adult	Male	1	1	8	0	1
2	04-Jan-21	04-Jan-21	Daragaon	Lhamoi Dzingkha	Dagana	Dog	Adult	Female	1	1	30	0	1
3	25-Dec-20	08-Jan-21	Khaireny	Phuentshogling	Chhukha	Cattle	Calf	Male	1	1	18	0	1
4	11-Jan-21	12-Jan-21	Samtse College	Samtse	Samtse	Dog	Young	Male	1	1	n/a	0	1
5	21-Jan-21	25-Jan-21	Martang	Dewathang	Samdrup Jongkhar	Cattle	Adult	Female	1	1	17	0	1
6	23-Jan-21	26-Jan-21	Lower Peljorling	Tashichhoeling	Samtse	Dog	Juvelin e	Male	1	1	15	0	1
7	19-Feb-21	20-Feb-21	Zing I POE	Samtse	Samtse	Dog	Adult	Male	1	1	4	0	1
8	23-Feb-21	23-Feb-21	Baagtongnang (Bukey)	Samtse	Samtse	Dog	Young	Female	1	1	18	0	0
9	24-Feb-21	27-Feb-21	Pasakha	Samphelling	Chhukha	Horse	Young	Female	1	1	4	0	1
10	07-Mar-21	08-Mar-21	Pemaling	Phuentshogling	Chhukha	Dog	Young	Female	1	1	n/a	0	1
11	14-Mar-21	15-Mar-21	Kabreytar	Phuentshogling	Chhukha	Horse	Adult	Female	1	1	17	0	0
12	18-Mar-21	18-Mar-21	Town area	Phuentshogling	Chhukha	Dog	Adult	Female	1	1	200	0	0
13	20-Mar-21	21-Mar-21	Toorsa	Phuentshogling	Chhukha	Dog	Adult	Male	1	1	4	0	0
14	31-Mar-21	21-Apr-21	Chhoekhorling and Jigmeling	Dekiling	Sarpang	Dog	Adult	Both	3	3	540	0	1
15	31-Mar-21	21-Apr-21	Chhoekhorling and Jigmeling	Dekiling	Sarpang	Cattle	Mixed	Both	5	5	540	0	0
16	31-Mar-21	21-Apr-21	Choekhorling	Dekiling	Sarpang	Goat	Adult	Female	1	1	540	0	0
17	19-Apr-21	22-Apr-21	Lower Kabreytar	Phuentshogling	Chhukha	Goat	Adult	Female	1	1	9	0	1
18	24-Apr-21	29-Apr-21	Samdrupling	Gelegphu	Sarpang	Dog	Adult	Both	2	2	9	1	1
19	07-Jul-21	08-Jul-21	Jigmeling	Dekiling	Sarpang	Dog	Adult	Female	1	1	317	0	1
20	09-Jul-21	13-Jul-21	Dekiling	Dekiling	Sarpang	Cattle	Adult	Female	1	1	530	0	0
21	30-Jul-21	30-Jul-21	Kabraytar	Phuentshogling	Chhukha	Cattle	Young	Male	1	1	4	0	1
22	10-Aug-21	11-Aug-21	Sarpang Tar	Shompangkha	Sarpang	Dog	Adult	Male	1	1	190	0	1
23	07-Sep-21	09-Sep-21	Majathang	Samtse	Samtse	Dog	Adult	Male	1	1	6	0	1

24	11-Sep-21	11-Sep-21	Damdara	Phuentshogling	Chhukha	Dog	Adult	Male	1	1	5	0	1
25	19-Oct-21	19-Oct-21	Lower Gurungdara	Samphelling	Chhukha	Dog	Puppy	Male	1	1	n/a	0	1
26	24-Oct-21	24-Oct-21	Tshongduekha and Yangphelthang	Norboogang	Samtse	Dog	Mixed	Both	4	4	13	0	1
27	19-Dec-21	21-Dec-21	Satsallo	Norboogang	Pema Gatshel	Cattle	Adult	Female	1	1	n/a	0	1

Annexure 5: Haemorrhagic septicaemia (HS) outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	18-Apr-21	22-Apr-21	Babji-Zomtokha	Sangbay	Haa	Cattle	Young	Both	6	3	30	0	1
2	01-Aug-21	11-Aug-21	Gamshi	Chhoekhor	Bumthang	Yak	Mixed	Both	8	8	140	0	1
3	05-Aug-21	11-Aug-21	n/a	Tang	Bumthang	Cattle	Mixed	Both	5	5	32	0	1
4	01-Oct-21	03-Oct-21	Zuzingkha	Maedtabkha	Chhukha	Cattle	Mixed	Both	19	16	95	0	1
5	01-Oct-21	03-Oct-21	Zuzingkha	Maedtabkha	Chhukha	Cattle	Mixed	Both	5	2	88	0	0

Annexure 6: Goatpox outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	11-Jan-21	26-Jan-21	Amdo-Dolepchen	Loggchina	Chhukha	Goat	Mixed	Both	10	2	1500	0	1
2	18-Jan-21	27-Jan-21	Toribari-Dubini	Loggchina	Chhukha	Goat	Mixed	Both	16	3	1500	0	0
3	25-Feb-21	10-Mar-21	Kungkha	Phuentshogling	Chhukha	Goat	Mixed	Both	17	8	846	0	1
4	25-Feb-21	10-Mar-21	Kungkha	Phuentshogling	Chhukha	Goat	Mixed	Both	18	11	846	0	0
5	07-Mar-21	10-Mar-21	Dophulakha	Phuentshogling	Chhukha	Goat	Mixed	Both	3	0	846	0	0

Annexure 7: African swine fever (ASF) outbreak reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	06-May-21	06-May-21	Sewerage area, Toorsa	Phuentshogling	Chhukha	Pig	Mixed	Both	34	34	2035	21	1

Annexure 8: Infectious bursal disease outbreaks reported in Bhutan, 2021

S.N	Index case date	Reporting date	Village	Gewog	Dzongkhag	Sp.	Age	Sex	Case	Death	Susceptible	Culled	Outbreak
1	02-Jan-21	07-Jan-21	Chumilakha	Darla	Chhukha	Chicken	Juveline	Male	127	127	373	0	1
2	02-Jan-21	07-Jan-21	Chumilakha	Darla	Chhukha	Chicken	Juveline	Male	117	117	383	0	0
3	02-Jan-21	07-Jan-21	Chumilakha	Darla	Chhukha	Chicken	Juveline	Male	113	113	387	0	0
4	05-Jan-21	07-Jan-21	Chumilakha	Darla	Chhukha	Chicken	Juveline	Male	62	62	438	0	0
5	05-Jan-21	07-Jan-21	Rinchentse	Darla	Chhukha	Chicken	Juveline	Male	606	606	394	0	0
6	14-Apr-21	15-Apr-21	Chumilakha	Darla	Chhukha	Chicken	Young	Both	35	35	1200	0	1

Annexure 9: Laboratory diagnostic capacity at NCAH, 2021

S.N.	Disease	Bhutan*	OIE**
A	**Bacterial Diseases**		
1	Anthrax	Agent identification, PCR	-
2	Antimicrobial resistance	Disk diffusion	Disk diffusion, MIC (Agar dilution and broth microdilution)
3	Avian mycoplasmosis	ELISA, SAT	SAT, HAI
4	Bovine brucellosis	RBT, MRT, ELISA, Conventional PCR	RBT, CF, ELISA, FPA
5	Bovine tuberculosis	IDT	IDT, IFN gamma
6	Colibacillosis	Agent identification	-
7	Contagious Caprine Pleuropneumonia (CCPP)	Multiplex real time PCR	PCR
8	*Erysipelas*	Agent identification, PCR	

9	Haemorrhagic septicaemia (HS)	Agent identification, Conventional PCR, Multiplex real time PCR	Agent identification
10	Leptospirosis	MAT	MAT
11	Mastitis	CMT, WST, agent identification	Cell count
12	*Mycoplasma hyopneumoniae*	ELISA	ELISA
13	Paratuberculosis (JD)	ELISA	ELISA, DHT
14	Salmonellosis	Agent identification	-
15	Staphylococcal infection	Agent identification	-
16	Strangles	Agent identification	
17	Streptococcal infection	Agent identification	
B	**Fungal Diseases**		
1	Fungal infections	Agent identification	-
C	**Viral Diseases**		
1	African swine fever (ASF)	Real time PCR	Real time PCR
2	Avian Influenza (Type A, H5N1, H7N9), H5N8	Real time RT-PCR, HAI, Rapid test	VI, AGID, HAI
3	Bovine viral diarrhoea (BVD)	ELISA	Agent identification
4	Canine distemper (CD)	Rapid test, ELISA	-
5	Canine parvovirus (CPV)	Rapid test	-
6	*Capripox*	Multiplex real-time PCR	PCR
7	Classical swine fever (CSF)	Real time RT-PCR, ELISA	ELISA, FAVN, NPLA
8	Contagious bovine pleuropneumonae (CBPP)	ELISA	ELISA, CF
9	Crimean Congo haemorrhagic fever (CCHF)	ELISA, IF test	-
10	Equine Influenza (EI)	Rapid test, ELISA	AGID, ELISA
11	Foot and mouth disease (FMD)	ELISA, real time RT-PCR, Rapid test	ELISA, VN, CF
12	Infectious bovine rhinotracheitis (IBR)	ELISA	Agent identification, ELISA, PCR, VN
13	Infectious bursal disease (IBD)	ELISA, Rapid test, Histopathology	ELISA, AGID

14	Lumpy skin disease (LSD)	Real time PCR	
15	Newcastle disease (NCD)	Rapid test, Real time RT-PCR	VI, HAI
16	Peste des petits ruminants (PPR)	Rapid test, ELISA, Multiplex real time PCR	VN, ELISA
17	Pigeon paramyxovirus (PPMV)	Real time RT PCR	-
18	Porcine circovirus	ELISA	……..
19	Porcine reproductive and respiratory syndrome (PRRS)	Real time RT-PCR	ELISA, IFA, IPMA
20	Rabies	Rapid test, FAT, RIAD, VNT	ELISA, VN
D	**Parasitic Diseases**		
1	Bovine anaplasmosis	Agent identification	CAT, CF
2	Bovine babesiosis	Agent identification	CF, ELISA, IFA
3	Bovine cysticercosis	Agent identification	Agent identification
4	Equine piroplasmosis	Agent identification	ELISA, IFA, CF
5	Fascioliasis	Agent identification, ELISA	Agent identification
6	Histomoniasis	Agent identification	
7	Taeniasis	Agent identification, PCR	
8	Theileriosis	Agent identification	Agent identification, IFA
9	Toxoplasmosis	ELISA	Agent identification
10	Trichinellosis	Agent identification	Agent identification, ELISA
11	Trypanosomiasis	Agent identification	IFA
E	**Mycotoxin Screening**		
1	Aflatoxin	ELISA, Rapid test	-
2	Fumonisin	ELISA, Rapid test	-
3	Ochratoxin	ELISA, Rapid test	-
F	**Mineral estimation**		
1	P, Ca and Mg	Spectrophotometry, ELISA	-

***Test of practical value, **OIE prescribed test**

Annexure 10: Livestock vaccines (doses) distributed in Bhutan, the fiscal year 2020 – 2021

S.N.	Dzongkhags/ Farms/Other Agencies	Locally Produced		Imported								
		Anthrax	CSF	FMD	HS-BQ	IBD	Fowl Pox	NDB_1	R_2B	MD	ARV	PPR
Dzongkhags												
1	Bumthang			4750	5520						4450	
2	Chhukha			12500		142500	64000	109000	72000		3000	100
3	Dagana		350	11000	5010	80000	70000	50000	55000		3150	
4	Gasa				1320				2000		150	
5	Haa			2000	1500	20500	17000	8500	12900	3000		
6	Lhuentse				780	2500	1000	1000	1600		400	
7	Monggar				7500	130000	10000	82000	50000		300	
8	Paro		40	10000	420	107500	31000	41600	48500		300	
9	Pema Gatshel				420	50000	20000	20000	10000		600	
10	Punakha			8000	2160	95600	23000	31000	50200		2000	
11	Samdrup Jongkhar			100	100						1000	
12	Samtse		550	25000	9480	560000	68000	260000	70000	50000	2500	2950
13	Sarpang		900	6000	6000	374000	206000	86000	140000		3400	
14	Thimphu		10		3000	54700	18000	16000	9800		250	
16	Trashi Yangtse			3000	3000						1500	
15	Trashigang				2490						4000	
17	Trongsa	500		2000	5800	13600	11000	3600	8100		550	
18	Tsirang		580	1000	3000	88000	90000	100000	40000		500	
19	Wangdue Phodrang			23800	3985	20000	25000	11500	34000		3200	200
20	Zhemgang		30	3500	360	9000	4000		8000		500	
Subtotal		500	2110	112650	61845	1747900	658000	820200	612100	53000	31750	3250
Farms and other agencies												
1	BLDC, Sarpang/Samrang			250	270	54000	20000	18000	28000			100

2	CNR, Lobesa											
3	CRC, Wangkha			200	90							
4	National Veterinary Hospital			50	30	2200		3500	700	8000	3300	
5	NCD, DoFPS											
6	NDPM & RCP (HSI)										6800	
7	NDRDC, Yusipang			200	125							
8	NJBC, Samtse	100		550	125							
9	NNBF, Trashiyangphu			200	270							
10	NPBC, Yusipang		1450	500								
11	NPiRDC, Gelephu		3000	1500								
12	NPRDC, Sarpang					118000	70000	40000	76000	190000		
13	NSBC, Bumthang				270							
14	Private Poultry Farm					3800	1000	4500	1000	50000		
15	RCBC, Bumthang			250	270							
16	RLDC, Kanglung			19000	9000	108000	15000	36000	29500	11000	10200	
17	RLDC, Tsimasham											
18	RLDC, Wangdue											
19	RLDC, Zhemgang					150		3000			500	500
20	RMBF, Arong											
21	RMBF, Wangdigang			300								
22	RPBC, Paro					15000	5000	5500	6000	50000		
23	RPPBC, Lingmethang		1270	500		13000	4000	4600	3500	110000		
24	Sertsham Farm, Lhuentse			200						1000		
Subtotal		100	5720	23700	10450	314150	115000	115100	144700	420000	20800	600
Total		**600**	**7830**	**136350**	**72295**	**2062050**	**773000**	**935300**	**756800**	**473000**	**52550**	**3850**

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Things you need to know about RABIES

Rabies as infectious disease

- It is caused by rabies virus
- There is no cure once infected
- However, It is 100% preventable if vaccinated in time

Source of rabies

- All mammals are susceptible to rabies
- Dogs are the common source of rabies in Bhutan

Transmission routes

- Rabies is mainly transmitted by the bite and scratch sustained from rabid animals

Rabies prevention measures

Prevent dog bites

- Don't appraoch or disturb angry or scared dogs
- Don't disturb dogs that are feeding or suckling puppies
- Approach dogs slowly, quietly and confidently

Wash your wounds

- Immediately wash bite wounds with soap and water for 10 - 15 minutes.

Be a
RESPONSIBLE PET OWNER

PREVENT RABIES!
Vaccinate your pet animals regularly

Consult Health Workers

- Immediately consult health workers and seek medical help from the nearest health facility.

Get vaccinated

- If anti-rabies vaccine is advised, complete all the vaccine doses.

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WORLD ORGANISATION FOR ANIMAL HEALTH
Protecting animals, preserving our future

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