



# IN-COUNTRY LIVESTOCK BIOSECURITY GUIDELINES



Bhutan Agriculture and Food Regulatory Authority

Ministry of Agriculture and Forests

Royal Government of Bhutan

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Dedicated to 60<sup>th</sup> Birth Anniversary Celebration of His Majesty the 4<sup>th</sup> Druk Gyalpo



## Foreword

Infectious diseases of livestock are sporadic and widespread in Bhutan. These diseases are costly to Bhutan in terms of reduced production, the cost of treatment and eradication, loss of livestock, and transmissibility to humans. Prevention and control of infectious livestock diseases require livestock vaccination when available and good farm biosecurity. Good biosecurity on the farm is often a more effective and economical strategy for disease prevention as it directly addresses multiple disease threats simultaneously. Good farm biosecurity is therefore insurance for farmers and the government against the costs of infectious livestock diseases. Prevention of disease through good biosecurity is always cheaper than treating or suffering the effects of an outbreak.

Although the Biosecurity Policy of the Kingdom of Bhutan 2010 mandates Bhutan Agriculture and Food Regulatory Authority (BAFRA), Ministry of Agriculture and Forests, to implement livestock biosecurity measures in the country, effective implementation of the measure had been constrained by lack of such guiding document, and hence the need for the document was long been felt. Therefore, BAFRA has developed this *In-country Livestock Biosecurity Guidelines* which shall be used in conjunction with the Livestock Act of Bhutan 2001 and its rules as a reference resource to strengthen implementation of livestock biosecurity within the country.

The document explains standard biosecurity practices which can be promoted to all farm operations, especially commercial poultry and dairy farms. Besides, it also outlines steps for conducting a livestock movement assessment process which incorporates a routine evaluation of farm biosecurity practices and makes good biosecurity a condition of permitted livestock movement.

We would like to take this opportunity to dedicate this document to the glorious occasion of the 60<sup>th</sup> Birth Anniversary Celebration of His Majesty the 4<sup>th</sup> Druk Gyalpo.

  
Karma Dorji  
Director General



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## Acronyms and Abbreviations

CSF	Classical swine fever
FMD	Foot and mouth disease
BAFRA	Bhutan Agriculture and Food Regulatory Authority
DoL	Department of Livestock
HPAI	Highly pathogenic avian influenza
MoH	Ministry of Health
NCAH	National Centre for Animal Health

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## Introduction

Provisions under Section 9 of the Livestock Act of Bhutan 2001 require BAFRA to implement biosecurity measures to prevent and control the spread livestock diseases. *In-country Livestock Biosecurity Guidelines* (herein referred to as the Guidelines) is a reference document for BAFRA officials and livestock officers of the Department of Livestock (DoL) for practicing good livestock biosecurity in Bhutan. It is a common resource, giving the basic context and rationale for livestock biosecurity as well as a description of how to practice good biosecurity in Bhutan. The Guidelines refer to several supporting resources developed simultaneously and these should all be considered as essential requirements for improving livestock biosecurity:

1. Border /check point biosecurity sign board for livestock and livestock product movements (Appendix A);
2. Farm gate biosecurity sign board for visitors (Appendix A);
3. Application Form for Live Animal Movement Permit (Appendix B)

<https://drive.google.com/file/d/0B1t2NHfYoDOKt2RNcFdoUINUS2c/view?usp=sharing> ;

4. Online Processing of In-Country Movement Permit for Live Animals (Appendix B)

[https://docs.google.com/forms/d/1Zk5hWHjEDd6PJ3DIhseUq3i3DvwRHE3XLD26mZSiOoM/viewform?usp=send\\_form](https://docs.google.com/forms/d/1Zk5hWHjEDd6PJ3DIhseUq3i3DvwRHE3XLD26mZSiOoM/viewform?usp=send_form) ,

5. Biosecurity Checklist for Commercial Poultry Farms (Appendix C)

[https://docs.google.com/document/d/1ZYkxC65IR51D\\_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing](https://docs.google.com/document/d/1ZYkxC65IR51D_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing) ;

6. Biosecurity Checklist for Commercial Dairy Farms (Appendix D)

[https://docs.google.com/document/d/1ZYkxC65IR51D\\_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing](https://docs.google.com/document/d/1ZYkxC65IR51D_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing) .

Version 1 (February 2015) of the guidelines should be revised after a reasonable period of use by the officials of BAFRA and DoL. The Guidelines document should continue to reflect a mutual agreement of both agencies on best practices for livestock biosecurity so that the 'biosecurity message' is clear and regularly reinforced to all livestock farmers.



## 1 What is good livestock biosecurity?

With a susceptible host (e.g. unvaccinated or naïve livestock) and the right environmental conditions, transmissible<sup>1</sup>, pathogenic<sup>2</sup> microorganisms spread and invade animals and humans, growing and reproducing to cause a disease. Transmissible diseases of livestock can be unpredictable and can have severe effects on human health, household food security and safety, agricultural livelihoods and wildlife health. Good livestock biosecurity<sup>3</sup> is simply doing practical things to reduce the chance of pathogenic microorganisms spreading and hence reducing the incidence of disease and occurrence of outbreaks.

It is neither practical nor possible to completely eliminate the spread of transmissible livestock disease. Rather, good livestock biosecurity reduces the incidence of disease and occurrence of outbreaks to acceptable levels. The risks of notifiable diseases (Livestock Rules and Regulations of Bhutan, 2008) are a high priority for BAFRA, requiring that good biosecurity is applied. Zoonotic diseases<sup>4</sup> of livestock such as rabies, highly pathogenic avian influenza (HPAI) and anthrax are not acceptable at even a very low incidence and demand a high level of biosecurity to limit their occurrence. However, regardless of the expected impact of specific livestock disease, good livestock biosecurity is justifiable simply for the insurance it provides against unexpected impacts or rare disasters of livestock disease outbreaks. Furthermore, many biosecurity measures cost little to implement other than a little time for planning.

Good livestock biosecurity should be a routine practice that is sustainable because it is easy to understand and achievable to apply. These Guidelines provide a reference resource for BAFRA officers to justify the importance of good livestock biosecurity in Bhutan and provide relevant, achievable and practical biosecurity measures. As a resource for post-border biosecurity responsibilities for BAFRA, the Guidelines support BAFRA officials working closely with other government departments and agencies with related responsibilities for animal disease, particularly the DoL, and the Guidelines compliment the Animal Quarantine<sup>5</sup> Station Operation Manual (2014).

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<sup>1</sup> A transmissible disease is a disease that can spread to other animals or people, etc.

<sup>2</sup> Pathogenic means an organism or biological agent that can cause disease in animals or humans.

<sup>3</sup> Biosecurity is protecting plants and animals from the introduction of pests and diseases.

<sup>4</sup> A zoonotic disease is a disease that can be passed between animals and humans.

<sup>5</sup> Quarantine is the confinement of animals or animal products that may be harboring disease to prevent disease introduction and spread. Quarantine is most often applied at a quarantine station where animals are intended for import or export but can also be applied on a farm or elsewhere.

## **2 Why is good livestock biosecurity important for Bhutan?**

The majority of Bhutanese depend upon healthy livestock for their nutrition and livelihood. However, subsistence livestock farming, with limited biosecurity implemented by farmers, is one of the main factors contributing to livestock disease outbreaks in the country. Good biosecurity is important to limit the spread of livestock diseases from one place to another through movement of infected livestock, and contaminated livestock products.

Several factors are increasing the emergence and the spread of transmissible livestock disease including climate change, increasing trade in livestock and livestock products, and tourism. These factors require that every country has an effective and efficient biosecurity system. Relevant examples of disease emergence include highly pathogenic avian influenza (HPAI) caused by H5N1 and H7N9, pandemic influenza H1N1 and FMD.

Infectious livestock disease outbreaks are costly in terms of economic losses to farmers and the costs of control and eradication; however they are preventable with good biosecurity. Good livestock biosecurity is therefore an 'insurance policy' against the cost of infectious disease outbreaks on livestock farmers and the country.

### 3 When and where is biosecurity important?

Bhutan's notifiable livestock diseases are both endemic<sup>6</sup> and exotic<sup>7</sup> and hence the spread pathways may begin either in neighboring countries or inside Bhutan. For exotic diseases, pathways of spread into Bhutan may be through official entry points (air or land) or may be through unofficial entry across Bhutan's border.

To represent the full extent of where biosecurity is important for Bhutan it is useful to describe biosecurity measures as a continuum (Figure 1) along the disease risk pathway from a disease source outside Bhutan's border, through the border, and to the farm (post-border) where disease outbreaks may occur and have their biggest impact. Biosecurity is important along the spread pathways of important diseases, particularly at intervention points that allow effective and efficient risk mitigation.

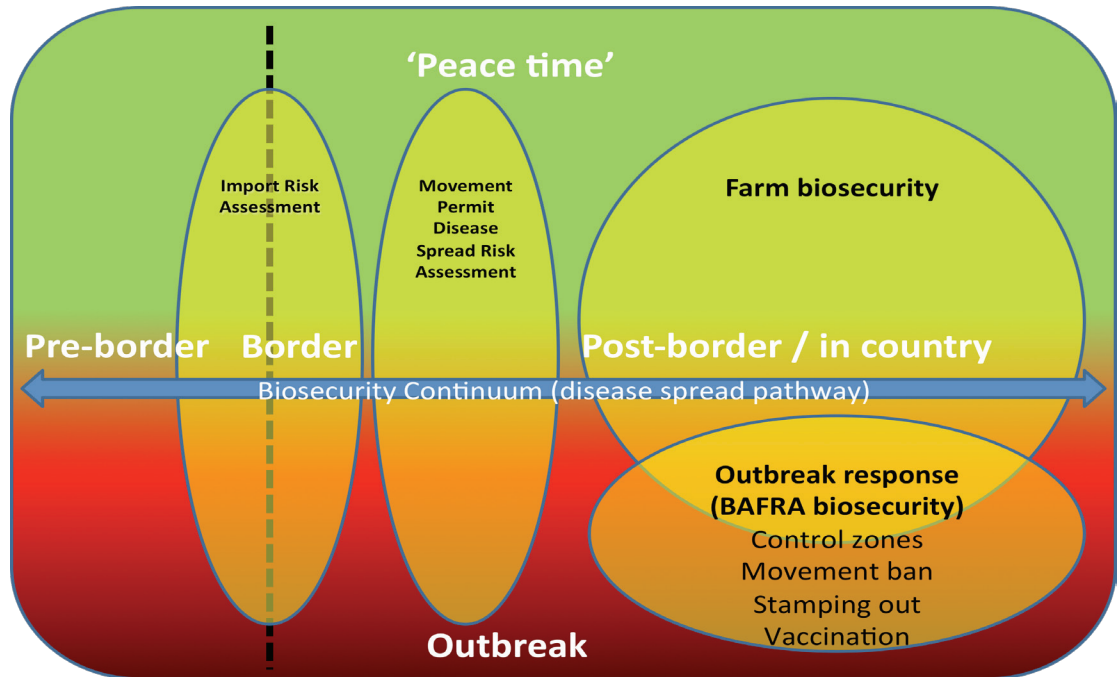
Biosecurity is likely to be most applicable and practicable on commercial-scale farms wanting to protect against notifiable diseases, however because biosecurity is also effective against common endemic diseases it is an investment that will return dividends to household and commercial farms alike.

Significant uncertainty exists describing the level of occurrence of notifiable disease, both endemic and exotic. Furthermore, inherent challenges in recognizing and reporting disease outbreaks in all countries, and between countries, adds to the uncertainty about the true disease status of livestock anywhere in Bhutan and their risk of incursion and spread. For these reasons it is practical to think of biosecurity as a set of actions equally relevant at all times.

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<sup>6</sup> The disease or infectious agent has a constant presence within a given geographic area or population.

<sup>7</sup> The disease or infectious agent normally do not occur within a given geographic area or population.



**Figure 1** Continuum of biosecurity importance along a risk pathway: pre-border, border and post-border.

### 3.1 Disease spread mechanisms

Understanding disease spread mechanisms is the basis for knowing where and how to apply good biosecurity. Good biosecurity is intervening in these mechanisms where it is efficient and effective to do so.

Livestock disease is spread by transmission of pathogens from an infected animal to a susceptible animal. Transmission can be either by direct or indirect contact. Direct contact means close contact with an infected animal (e.g. nose to nose, rubbing or biting) but this can also mean contact through the same environment if the environment is contaminated with blood, saliva, faeces or urine of infected animals. Indirect contact means that a dirty inanimate object (vehicles and equipment) are carrying pathogens from an infected animal to a susceptible animal, or through movement of people from farm to farm. For transmission by indirect contact, environmental conditions need to allow survival of the pathogen in saliva, blood, faeces or dirt. Because some diseases can infect several species, the risk from contamination can come from the same or another species of animal.

Infected livestock, particularly their movement, is the biggest risk for spreading livestock disease. This is because infected livestock are reservoirs of pathogens, allowing pathogen survival, reproduction and shedding. Major routes for disease transmission through infected

livestock include local movements for access to pasture (e.g. cattle), transfer of any livestock for buying and selling, seasonal migration and joining of animals for breeding.

Livestock which have died from a transmissible disease are a big risk because pathogens can persist in and on a carcass and the fluids from decaying carcasses can contaminate the surrounding environment (for example, decaying anthrax-infected carcasses can produce resistant spores that can persist in the soil for many years). If carcasses are not disposed of swiftly and properly disease can spread to and through scavenging or curious wildlife, rodents and other livestock.

Outside of infected livestock, disease pathogens are incapable of reproducing but can survive for weeks or months in soil, faeces, saliva, blood, or meat. Some pathogens can also survive as an aerosol secretion or as a dust (for example avian influenza viruses). People working and handling livestock, and their equipment and vehicles can be readily contaminated and then their movement becomes a major cause of disease spread. Specifically, disease transmission by people includes movement onto and off the farm of workers, visitors, farmers and householders living on the farm, neighbours, maintenance personnel and others. The mechanism of people spreading disease is usually through dirty and contaminated hands, boots, clothing or hair. The mechanism of disease transmission through vehicles and equipment includes any unclean vehicle or equipment; particularly those previously used on, or recently visited other farms.

Feed and water are particularly risky sources of livestock disease spread because their consumption provides a ready route of infection. Additionally, feed and water may afford pathogens the right environmental conditions for prolonged survival. Major routes for disease transmission through feed and water include water supplies or feed contaminated by animal faeces or urine (wildlife or livestock). Feed may be contaminated as a raw material, after production, during transport or during storage or use on the farm.

## 4 Good Biosecurity in Bhutan

BAFRA is the regulatory authority for the enforcement of rules and regulations pertaining to livestock biosecurity, however effective biosecurity is only achievable through ongoing cooperation and collaboration with the people who contribute to the risk of livestock disease spread. These people include all farmers and people working with farms and livestock viz. householders, traders, transporters, government officers and others.

This part of the Guidelines describes how to implement good biosecurity in Bhutan in cooperation with farmers, other government officials and the public.

### 4.1 On-farm Biosecurity

On-farm biosecurity is doing practical things to prevent the movement of pathogenic microorganisms onto and off the farm. The basic principles in order of importance are:

1. Separation of farm animals from potentially infected livestock and potentially contaminated objects;
2. Cleaning of all vehicles and equipment that is required to enter the farm area;
3. Disinfection of clean equipment that is required to enter the farm.

Sections 4.1.1 through to 4.1.6.2 translate these principles into practical on-farm actions.

#### 4.1.1 Standards for establishment of commercial poultry and dairy farms

Required standards for construction and operation of a designated farm are provided in Annexure 3 of the Livestock Rules and Regulations of Bhutan, 2008. Standards related to good biosecurity and additional recommendations are included here.

##### 4.1.1.1 Layout

As previously described in section 3.1 (Disease spread mechanisms) of this document, the risk of livestock disease introduction onto a farm, and any subsequent spread within a farm, can be minimised if direct and indirect contact with diseased livestock is limited. The layout and set-up of poultry and dairy farms is important to effectively and efficiently minimise contact and where possible should be planned at the establishment of a farm.

The farm layout should be demarcated and managed as two zones: clean zone and buffer zone. All livestock housing and yards are managed within the clean zone. Arriving visitors and vehicles, equipment storage, feed storage, storage of livestock products, and disposal of dead livestock and manure are managed within the buffer zone.

To limit contact and achieve good biosecurity, commercial poultry and dairy farms should be located as much as practicable away from residential areas, away from public roads, and avoid direct contact with livestock on neighboring farms.

Within a farm, a disease outbreak will spread more rapidly if livestock are housed close together. Therefore, where practicable, if more than one animal shed or pens are constructed they should have a minimum distance between them of 15 meters.<sup>8</sup>

The set-up of a farm should include separate livestock housing away from healthy livestock to isolate and treat diseased animals. This livestock housing must also be in a clean zone.

#### **4.1.1.2 Managing access**

Managing access to and within a farm is important for managing direct and indirect contact with diseased livestock. Managing access requires a farm perimeter fence, or geographic features acting as a fence, to minimise trespassing and to stop stray animals. Gates in perimeter fences, for both vehicles and people, should be located for easy monitoring by the farmer and should have a sign board directing arrivals to first contact the farm manager (Appendix A: Biosecurity Sign Boards).

To facilitate any required cleaning and disinfection of people, vehicles and equipment entering the property, a farm set-up should include running water available for hand washing and for any cleaning of vehicles and equipment. Hand washing facilities should be available where visitors arrive and at entry points to livestock housing areas for workers. A dedicated site for washing vehicles and equipment should be allocated away from livestock housing areas.

Livestock housing (sheds and yards) areas are the highest risk areas for disease spread and as such need to be set up as designated clean zones. The clean zone should have a clearly defined boundary and have lockable gates or doors to control access. The feed storage area must be away from the clean zone so that the transport delivery vehicle and their workers do not have to enter or have close contact with the clean zone.

Any livestock product storage area (e.g. egg storage) for collection should also be away from the clean zone and access for collection should be from the non-biosecure side.

For further information on managing access see section 4.1.3 of this document.

#### **4.1.1.3 Drainage**

Accumulated water attracts wildlife and stray animals, can promote arboviral disease (disease spread by insects), and can carry effluent with livestock disease pathogens. To achieve good biosecurity, farms need to avoid low-lying areas and be set-up so that quick drainage of surface water occurs off the farm and not near livestock housing areas. Farm

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<sup>8</sup> Livestock Rules and Regulations of Bhutan (2008), Annexure 3: Standards of Construction and Operation of Designated Farm, Item 2.10.

location and set-up should ensure that drainage water or effluent from nearby residences or other farms cannot enter the farm.

#### **4.1.1.4 Disposal**

Disposal of dead, diseased animals and any contaminated manure, bedding and feed must be done away from susceptible livestock (including the clean zone and farm boundary) to avoid potential disease transmission by aerosols or fomites<sup>9</sup>, i.e. the disposal area must be in the buffer zone.

As a routine biosecurity practice, the disposal method chosen must be quick, convenient and cheap. Disposal options include burning, burial or composting. Burning is not recommended because of the large amount of fuel required. Burial is suitable for disposal of many carcasses following a disease outbreak (and required for anthrax cases) however it requires a deep pit with 1-2 m depth of soil to cover carcasses to ground level and must be away from ground water sources.

Composting, which is aerobic microbial breakdown of organic matter, is a good method for routine disposal of carcasses but must be done in a secure and well drained area, not accessible to susceptible animals or scavenging. It requires a proper carbon to nitrogen ratio by mixing sawdust or woodchips, paper, dried leaves (carbon source) with a nitrogen source (the animal). Composting is best done from a free-standing, well drained pile beginning with 60 cm of sawdust or woodchips. Composting can be ongoing by continuing to add a cover of sawdust or woodchips as dead animals are added, as needed to soak up moisture and minimise odour. A compost pile must be secured from scavenging by wildlife, feral animals, dogs and cats by a high fence. Drainage can be achieved by making channels around compost pile.

Composting is also a suitable method of manure disposal including poultry litter. Animal manure is a rich source of nitrogen rather than carbon and will need to be mixed with carbon rich materials for break down.

**Table 1 Standards for establishment of commercial poultry and dairy farms**

*The layout and setup of commercial poultry and dairy farms should include:*

1. 15 meters minimum distance between livestock housing areas within a farm;
2. A perimeter fence and/or geographic features around livestock housing areas and feed storage area that prevent the uncontrolled passage of people, stray animals

<sup>9</sup> Inanimate objects likely to carry infection, e.g. footwear and equipment.



and wildlife;

3. Gated entrances to livestock housing areas to control and direct the movement of vehicles and people with parking for visitors, delivery and collection vehicles away from livestock housing areas;
4. Taps for hand and footwear washing located at the arrival location for visitors and at the entrance to livestock housing areas for workers;
5. Vehicle washing area for vehicles entering the livestock housing area;
6. Drainage to prevent accumulation and stagnation of water or flow of draining water through livestock housing areas;
7. A designated disposal area in the buffer zone managed to prevent access by livestock, feral animals and wildlife and the surrounding drained to prevent leakage of disposed animals and materials into waterways or the environment.

#### **4.1.2 Swill feeding and drinking water**

Feeding of human food scraps to livestock, known as swill feeding, is popular because it reduces livestock feeding costs and reduces waste. However, swill feeding to pigs and cattle can easily spread livestock diseases (e.g. foot and mouth disease, classical swine fever) if the scraps include meat or have been in contact with meat. All kitchen scraps from commercial or domestic kitchens should be assumed to include or have been in contact with meat because a disease risk exists with even small exposure to infected meat or water used to wash meat.

Swill can be safely fed to pigs and cattle only if it is first boiled to destroy viruses. To destroy viruses swill should be fully immersed in water in a pot, heated to boiling point, and boiled for 20 minutes with occasional stirring.

Pigs (and carnivores) may acquire anthrax infection through ingestion of meat (including meat, bones, blood, offal and hide) of an animal that died of anthrax or food waste which inadvertently included meat and bones from anthrax carcasses. Hence, mammal carcasses should not be fed to pigs.

Water provided in poultry farms can easily introduce avian influenza or Newcastle disease if contaminated with faeces of sick or infected wild birds. Hence, water storage at poultry farms should be protected from faecal contamination by wild birds.

**Table 2 Food and water**

*To limit the spread of disease through potentially contaminated food and water farmers should:*

1. If feeding human food scraps to pigs or cattle, boil first for 20 minutes;
2. Avoid feeding mammal carcasses to pigs;
3. Protect water storage at poultry farms from faecal contamination by wild birds.

#### **4.1.3 People, visitor vehicles and equipment**

People handling livestock can easily spread livestock diseases if their hands, shoes or clothes are contaminated with secretions (e.g. saliva) or manure of sick animals (for example, veterinarians and livestock extension officials, or workers having livestock at their home). Equally, vehicles and equipment used to handle livestock can easily carry and spread disease if similarly contaminated. To minimise the risk of disease spread from people, vehicles and equipment, all people entering the farm should be instructed on cleaning and disinfection by the farm manager.

Workers and visitors intending to enter the clean zone should not have had recent contact with other similarly susceptible livestock species or their manure at home residence, other workplaces or as a visitor to other farms. In addition, workers and visitors must not have had contact with other people who may have had similar recent contact (e.g. family members). If recent exposure has occurred the persons must shower and change into freshly washed clothes before entry to the clean zone. Footwear to be worn in the clean zone should not have been worn outside that zone, i.e. used only for the clean zone.

Visitor and service vehicles entering the farm should be minimised. If required to enter, visitor and service vehicles should only enter the farm if they are visibly clean of manure and organic material and they should be parked in the designated location (4.1.1.1) which should be away from livestock housing.

Equipment entering the clean zone should be minimised and only entered if clean and disinfected.

Ideally, visitors and workers required to enter the clean zone should make a personal and signed biosecurity declaration in a visitor book that they are clean and agree to abide by the farm's biosecurity rules.

All arriving feed and equipment intended for use in the clean zone should be stored in a clean, dry and secure room in the buffer zone (away from the livestock housing area). This short quarantine period will allow time for some surface disinfection from handling to occur by drying.

**Table 3 People, vehicles and equipment**

*To limit the spread of disease through potentially contaminated people, vehicles and equipment farmers should:*

1. Minimise the number of visitors;
2. Request in advance that visitors minimise unnecessary contact with farm animals for 24 hours prior to visiting and delay entry by those with recent contact;
3. Control access and provide signage for visitors instructing on entry/exit points and requirements for cleaning footwear and accessible areas;
4. Direct visitor vehicles to be parked off the farm and direct delivery/pick-up vehicles to a designated parking area away from the livestock housing area;
5. Encourage personal cleanliness (e.g. clean footwear, clothes and hand washing) for farm visitors who may have been handling similar livestock recently;
6. Minimise the number of workers with access and responsibilities in the livestock housing area and control access preferably with clear signage for example 'biosecure area – authorized persons only';
7. Not allow entry by farm workers or visitors if suffering from flu-like illness (pig farms);
8. Provide disinfectant footbaths at arrival location for visitors and at the entrance to livestock housing areas for workers;
9. Encourage cleaning of vehicles and equipment used to handle livestock elsewhere, before arriving on the farm.

Footbaths can greatly reduce or eliminate pathogens carried on footwear but only if they are used correctly. Footwear must be washed with water and a brush before dipping in a footbath. Disinfectant solutions in a foot bath should be replenished every 1-3 days depending on the disinfectant used, level of soiling, and whether it has been diluted by rain or evaporated.

**Table 4 Footbaths**

*To ensure a footbath is used effectively:*

1. Footwear must be washed with water and a brush before dipping in a footbath. Soil and faeces on footwear will prevent complete disinfection and will rapidly reduce the efficacy of the footbath solution. (a footbath is not a footwear washing point);
2. Locate footbaths at the entrance to the farm and at the entrance to livestock housing areas. A perimeter fence and gated entrances will help ensure that everyone who goes onto the farm has to pass through and use the foot baths;
3. Locate footbaths on a solid surface (concrete), and not on soil;
4. Footbaths should be clearly signed and highly visible, directing passage through them from the less clean area and instructing that passage occurs only after dipping;
5. Footbaths should preferably be covered when not in use to prevent dilution from rain, entry of dirt, and evaporation;
6. The volume of footbaths must be known to ensure the correct disinfectant concentration is made;
7. Footbaths should be large enough for stepping through with both feet;
8. Footbaths should be replenished regularly.

**4.1.4 Livestock and livestock product transport vehicles**

Livestock and livestock product delivery and pickup vehicles are a major risk of disease spread because they routinely travel between farms and districts and may mix livestock and products from various farms. Their high frequency of stops and tight travelling schedules makes cleaning for biosecurity prior to entry at every farm impractical and hence special biosecurity precautions are needed.

A dedicated delivery and pickup location should be selected for the farm which is away from livestock or where livestock may have access to. The area should not readily drain toward the farm livestock or the areas they have access to. If possible the location should be at the farm boundary, on land adjacent to the farm. If arriving livestock will be isolated prior to introduction to the herd or flock (4.3) then the dedicated delivery area should not cause the introduced animals to pass close to other animals on the farm when moving to the isolation area/housing. If possible, handling facilities for arriving livestock should not be accessible or

used by existing farm livestock, at least until the isolation period has passed and if arriving livestock are considered disease free.

Clear signage and advance communication should be used to direct transporters to use the dedicated delivery and pick-up location.

**Table 5 Transport vehicles**

*To limit the spread of disease through livestock and livestock product transport vehicles farmers should:*

1. Designate a suitable delivery and pick-up location away from farm livestock;
2. Provide clear signage and advance direction to transporters to use the designated delivery and pick-up location.

#### **4.1.5 Biosecurity in farm maintenance**

A poorly maintained farm increases the risk of disease spread when healthy farm livestock are exposed to dead, diseased livestock or come in contact with rodents, stray animals and wildlife which may carry disease. Farm maintenance for good biosecurity is ensuring that disposal of dead livestock is swift (after clinical investigation by the DoL) and biosecure. Farm maintenance for good biosecurity is also ensuring that fences are maintained to prevent mixing of farm livestock with stray animals and wildlife, and that the farm is neat and tidy (e.g. no feed spills, no water accumulation) to minimise attracting wildlife (e.g. wild birds) and rodents.

**Table 6 Farm maintenance**

*To maintain a farm for good biosecurity farmers should:*

1. Clean up feed spills promptly;
2. Ensure drainage to prevent water accumulation;
3. Dispose of dead livestock promptly and biosecurely (after clinical investigation by DoL);
4. Maintain perimeter fences and keep gates routinely closed;
5. Keep the farm clean and tidy.

#### **4.1.5.1 Record keeping**

Records of the details of origin of all farm inputs (livestock, equipment, feed) and visitors are important to enable any disease incursions to be understood and avoided in future. Record details should include the source from where it has been transported and produced, route of transportation and transporter, and dates.

#### **4.1.5.2 Routine cleaning**

Farms areas around livestock housing should be checked daily to ensure they are kept neat and tidy (free from rubbish, debris, spilt feed etc).

#### **4.1.5.3 Pest control**

Rodents and insects (flies, fleas, lice, mites, beetles and rodents) can pick up and transport disease pathogens and their abundance needs to be limited to minimise their risk of disease spread.

#### **4.1.5.4 Biosecurity in batch- type production (broiler chickens)**

Batch-type production is a rotational system of rearing and slaughtering livestock as a group of similar age animals. Good biosecurity in batch-type production aims to minimise the risk of introducing disease during collection of animals at the end of rearing and to minimise the spread of disease between batches.

To minimise the risk of introducing disease during collection of broiler chickens, the same biosecurity practices should be applied as described for vehicles and visitors above (4.1.3 and 4.1.4). Specifically:

- ☐ A dedicated delivery and pickup location should be selected for the farm which is away from the livestock housing area or where livestock may have access to (in the buffer zone). This is to ensure that the risk of disease transfer from collection vehicles and equipment is minimised;
- ☐ Clear signage and advance communication should be used to ensure workers use the dedicated delivery and pick-up location;
- ☐ The number of workers with access and responsibilities in the sheds should be minimised;
- ☐ Personal cleanliness of collection workers is very important if recent contact or handling (within 24 hours) of livestock is likely, i.e. clean footwear and use of disinfectant footbaths, clean clothes and hand washing prior to entry on the farm.

To minimise the risk of spreading disease between batches, decontamination of the environment is needed after collection. Specifically:

- ☐ Dead birds must be collected and disposed of (4.1.1.4) away from the poultry sheds and away from the farm boundary (i.e. in the buffer zone);

- ☐ Any containers or equipment used for collecting dead birds (e.g. bins or buckets) must be washed and disinfected before returning them to the poultry sheds;
- ☐ Litter and manure deposits must be removed and housing washed and disinfected;
- ☐ All the litter and manure should be removed and disposed of away from the poultry sheds, the shed surfaces and feeders/drinkers washed and then disinfected with phenol solution. Removable equipment should be sun dried. Lime powder should be applied;
- ☐ Housing (shed) doors should be kept closed as much as practical during maintenance, cleaning and disinfection to keep out wild birds;
- ☐ Any store rooms for feed or equipment should be emptied, cleaned and disinfected between batches;
- ☐ The livestock housing should be rested for at least two weeks, after washing and disinfection before restocking, to allow dehydration and solar radiation to assist with disinfection.

To minimise the risk of introducing disease during batch rearing, routine maintenance should be conducted, where possible, between batches but before final cleaning and disinfection. Good visitor biosecurity should be practiced for any maintenance workers.

#### **4.1.6 Monitoring livestock health and knowing reporting triggers**

Good farm biosecurity requires that livestock are checked regularly for sickness (morbidity) or death (mortality) and unusual findings are followed up promptly. Farmers are in the best position to monitor and know the health of their livestock because they have the best opportunity to handle and/or see their livestock.

A log of livestock movements and a record of health observations should be kept for reference. A movement log is useful for animal health officials to trace and control disease in an outbreak and a health record allows for independent monitoring of vaccination and treatment requirements by the farmer. It also allows for any vaccination failure to be investigated and avoided in future. Vaccination records should include:

- ☐ Age at vaccination
- ☐ Strain of vaccine
- ☐ Manufacturer and batch number of the vaccine
- ☐ Dose given
- ☐ Method of application
- ☐ Original planned date of vaccination
- ☐ Actual date of vaccination
- ☐ Name and signature of the applicator

New livestock should be physically isolated (no direct or indirect contact) from previously present livestock and their health monitored closely for one week before mixing. One week will allow disease signs to show and the opportunity to avoid infecting others livestock on the farm.

**Table 7 Monitoring livestock health**

*To effectively monitor livestock health farmers should:*

1. Isolate new livestock for one week;
2. Check livestock daily for death and illness;
3. Keep a daily record of mortality and morbidity including a description of any unusual sickness;
4. Keep an independent record of, and monitor, all vaccinations and treatments applied;
5. Seek advice from a livestock extension officer or government veterinarian of any uncertain sickness or death;
6. Report suspicion of unusual sickness or death or notifiable disease to BAFRA or DoL within **24 hours** by the fastest means of communication (Toll Free Hotline 124/155).







#### 4.1.6.1 Mortality as a reporting trigger

Farmers should be advised that sudden death in any species is potentially a fatal zoonotic disease.

The level of mortality in a herd or flock is relevant for detecting notifiable diseases which show sudden death as a common sign of illness.








**Table 8 Mortality reporting triggers**





Livestock Category	Farm Type	Reporting trigger	Potential notifiable disease showing sudden death
	Smallholder or household dairy farmer Commercial dairy farmer	Report if any previously healthy cow dies unexpectedly	Anthrax, haemorrhagic septicaemia
	Smallholder or household pig farmer Commercial piggery	Report if any previously healthy pig dies unexpectedly	Anthrax
 (layer or broiler)	Smallholder/household poultry farmer Commercial poultry farmer	Report if daily deaths for 2 consecutive days exceed 5 in 100 birds (5%)	HPAI, Newcastle disease HPAI, Newcastle disease
	Horses	Report if any previously healthy horse dies unexpectedly	Anthrax

#### 4.1.6.2 Morbidity as a reporting trigger

Sick livestock could indicate a serious disease outbreak and/or feed safety issue. The level of morbidity in a herd or flock is relevant for notifiable diseases where sudden death is uncommon however livestock may show signs characteristic of notifiable diseases.

**Table 9 Morbidity reporting triggers**

Livestock category	Common disease signs	Reporting trigger	Potential notifiable disease	Exotic or endemic
	Excessive salivation or nasal discharge	Report if any cattle shows these signs	Foot and mouth disease (FMD)	Endemic
 (also buffalo, pigs, sheep and goats)	Blisters or sores on mouth, tongue, nose, teats and feet			
	Swelling in the heavy muscles	Report if any cattle shows these signs	Black quarter	Endemic
 (also yaks, sheep, goats, horses and pigs)	Bleeding from nose, ears, mouth, anus following sudden death	Report if any cattle shows these signs	Anthrax	Endemic
  (also horses, cats, pigs, goats, sheep)	Aggression, paralysis, seizure, excess salivation,	Report if any cattle or dog shows these signs	Rabies	Endemic
	Blue/purple coloration (cyanosis) of comb, nasal discharge, watery eyes Gasping or coughing	Report if any chicken shows these signs	HPAI, Newcastle disease	Newcastle Disease endemic, HPAI exotic

	Depression, weakness or not eating	Report if any pig or chicken shows these signs	Classical swine fever (CSF), HPAI	CSF endemic, HPAI exotic
	Paralysis of limbs	Report if any chicken shows these signs	Marek's disease	Exotic
	Recumbent and watery diarrhoea		Infectious bursal disease	Endemic
	Persistent swelling of genitals with discharge	Report if any horse or mule shows these signs	Glanders, Dourine	Exotic
	Skin blisters, ulcers or lumps	Report if any goat or sheep shows these signs	Sheep pox	Exotic
All species	Any signs considered unusual or worrying	Report if any animal shows these signs	Other exotic diseases	

## 4.2 Biosecurity for livestock exhibitions

Livestock exhibitions provide a significant opportunity for livestock diseases to spread because potentially diseased and susceptible animals from many areas are mixed in close contact (direct and indirect), then returned to their origin or are moved elsewhere. The same risks of disease spread exist for livestock exhibitions as for any livestock movement (4.3) and require the same biosecurity precautions, i.e., if livestock are moving to another district for the purpose of exhibition, a movement permit is required and BAFRA needs to assess the level of disease spread risk.

In addition to seeking movement permits, awareness and practice of good biosecurity by farmers and the public at livestock exhibitions will minimise the risk of livestock disease spread. Table 10 is a list of relevant biosecurity measures for livestock exhibitions.

**Table 10 Livestock exhibitions**

*To limit the spread of disease through livestock exhibitions, farmers participating in exhibitions should:*

1. Practice good farm biosecurity on their farm (4.1);

2. Isolate exhibition animals for one week prior to movement and observe for signs of disease;
3. Apply for movement permit from BAFRA (4.3);
4. Check livestock at the exhibition daily for signs of serious disease and immediately report any such observed signs to the nearest livestock or BAFRA office (4.1.6);
5. Request livestock handlers to minimise unnecessary contact with other exhibition animals;
6. Minimise mixing and direct contact between their livestock and other exhibition livestock;
7. Practice and encourage personal cleanliness (e.g. clean footwear, clothes and hand washing) for livestock handlers and exhibition visitors who may have been handling other livestock (4.1.3).

### 4.3 Biosecurity for moving livestock

Moving livestock from one place to another is the biggest risk for spreading livestock diseases in Bhutan (as it is in many countries). The level of risk is based upon the likelihood that livestock are infected before departure and the level of biosecurity practiced during the movement and at the livestock destination.

BAFRA's live animal movement permit requirement provides an opportunity to ensure that minimum biosecurity standards are met and help to avoid high risk livestock movements. Minimum standards include that vaccinations for controlled diseases are current and that there is no evidence or suspicion of notifiable diseases in the livestock for movement (Section 91b of the Livestock Rules and Regulations of Bhutan, 2008). All animals migrating from one Dzongkhag to another must be vaccinated or treated against notifiable diseases in sufficient time for the vaccination to be effective before the date of migration (at least 2 weeks prior).

The movement permit requirement also provides a routine contact point between BAFRA and farmers/agents to check on and reinforce their farm biosecurity standards. Permits granted should be subject to conditions to implement good biosecurity during movement and at the destination. Permits granted can also be subject to specific demands from BAFRA for improvement to farm biosecurity. To be effective in limiting the chance of spreading livestock disease through movement, cooperation and a shared responsibility is required between farmers, the concerned livestock extension officers and BAFRA.

The steps shown in Appendix B describe a revised movement permit application process, including a new requirement for a completed application form and online processing.

#### **4.4 Communicating the importance of good biosecurity**

On any one farm notifiable livestock disease outbreaks may strike rarely, whilst at the same time across Bhutan these may appear to BAFRA and the DoL to be frequent. And often insufficient biosecurity of neighboring farmers in a district will spread disease regardless of biosecurity efforts on any one farm. For these reasons it must be recognized that the importance of livestock biosecurity may be viewed or prioritized differently ‘on-farm’ and the role of BAFRA officials and livestock officers is to constantly raise awareness on the importance of biosecurity and relate this to the context of the farmer.

Working directly with concerned farmers and district officers during a notifiable disease outbreak is an obvious opportunity to promote good biosecurity. Other opportunities include:

1. Risk communication through delivering the ‘biosecurity message’ in routine BAFRA work;
2. Random check point vehicle inspections by BAFRA;
3. National education campaigns –TV, brochures, radio, newspaper, BAFRA street shows, website e.g. [www.moa.gov.bt/birdflu](http://www.moa.gov.bt/birdflu) (e.g. live panel discussions with Dzongkhag BAFRA officers on radio and BBS);
4. Communicating and explaining disease risk through the use of movement permits and their conditions (4.3);
5. Displaying biosecurity notices at border entry points and in-country check points (Appendix A: Biosecurity Sign Boards);
6. Conducting biosecurity checks of poultry and dairy farms (Appendix C and D);
7. Displaying farm gate biosecurity notices (Appendix A: Biosecurity Sign Boards);
8. Distributing farm biosecurity brochures (supplementary to the Guidelines).

##### **4.4.1 Annual livestock biosecurity award**

Publically recognizing good biosecurity practice is an efficient way of promoting biosecurity awareness to farmers. Award receivers can be encouraged to share their experience with applying good livestock biosecurity and the benefits for their farm. Communicating this experience to other farmers will reinforce how to implement good livestock biosecurity as well as provide role models of good biosecurity practice for other farmers to benefit from.

An annual livestock biosecurity award cycle should be adopted by BAFRA in each Dzongkhag and implemented through use of biosecurity checklists (Appendix C: Poultry Farm Biosecurity Checklist and Appendix D: Dairy Farm Biosecurity Checklist). The results of routine use of the checklists (commercial poultry and dairy farms) should be recorded by BAFRA and

commercial poultry and dairy farms should be encouraged by BAFRA to undertake an ad-hoc biosecurity assessment to enter the biosecurity award.

## **4.5 Roles and Responsibilities**

### **4.5.1 Controlled animal diseases in Bhutan**

Figure 2 shows the government roles for different disease outbreaks in livestock and other animals.

### **4.5.2 Surveillance and control of notifiable livestock disease outbreaks**

Control of notifiable diseases begins with the owner of livestock or farmer reporting unusual sickness or death of livestock to their nearest livestock office or BAFRA office. Subsequent reporting to the District Livestock Office, National Centre for Animal Health (NCAH) and BAFRA enable a veterinary investigation of the report to be conducted . Figure 3 summarizes the report information flow and coordination of responsibilities.

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<sup>10</sup> Livestock Rules and Regulations of Bhutan 2008

## Responsibility shared with...

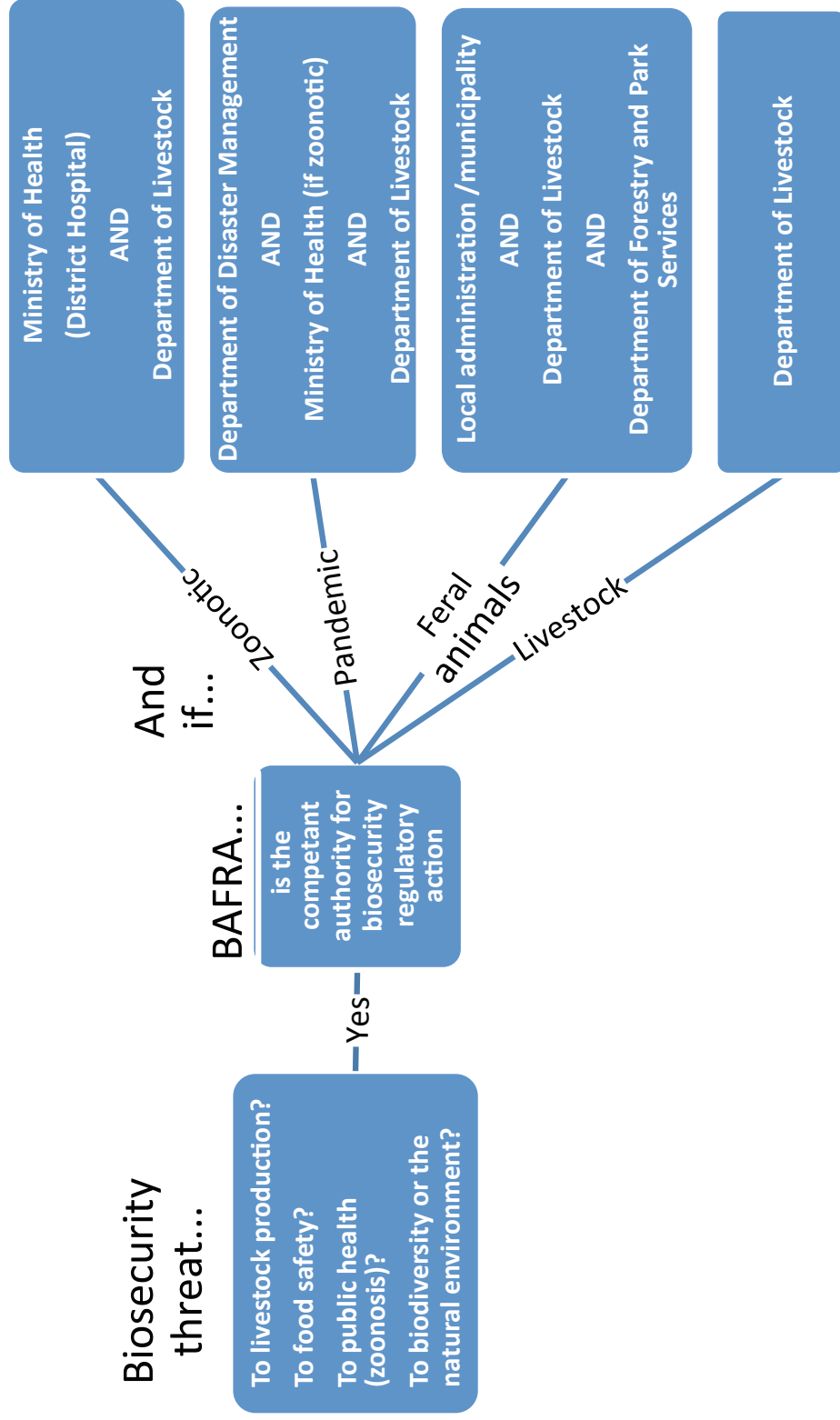


Figure 2 Disease outbreak command structure

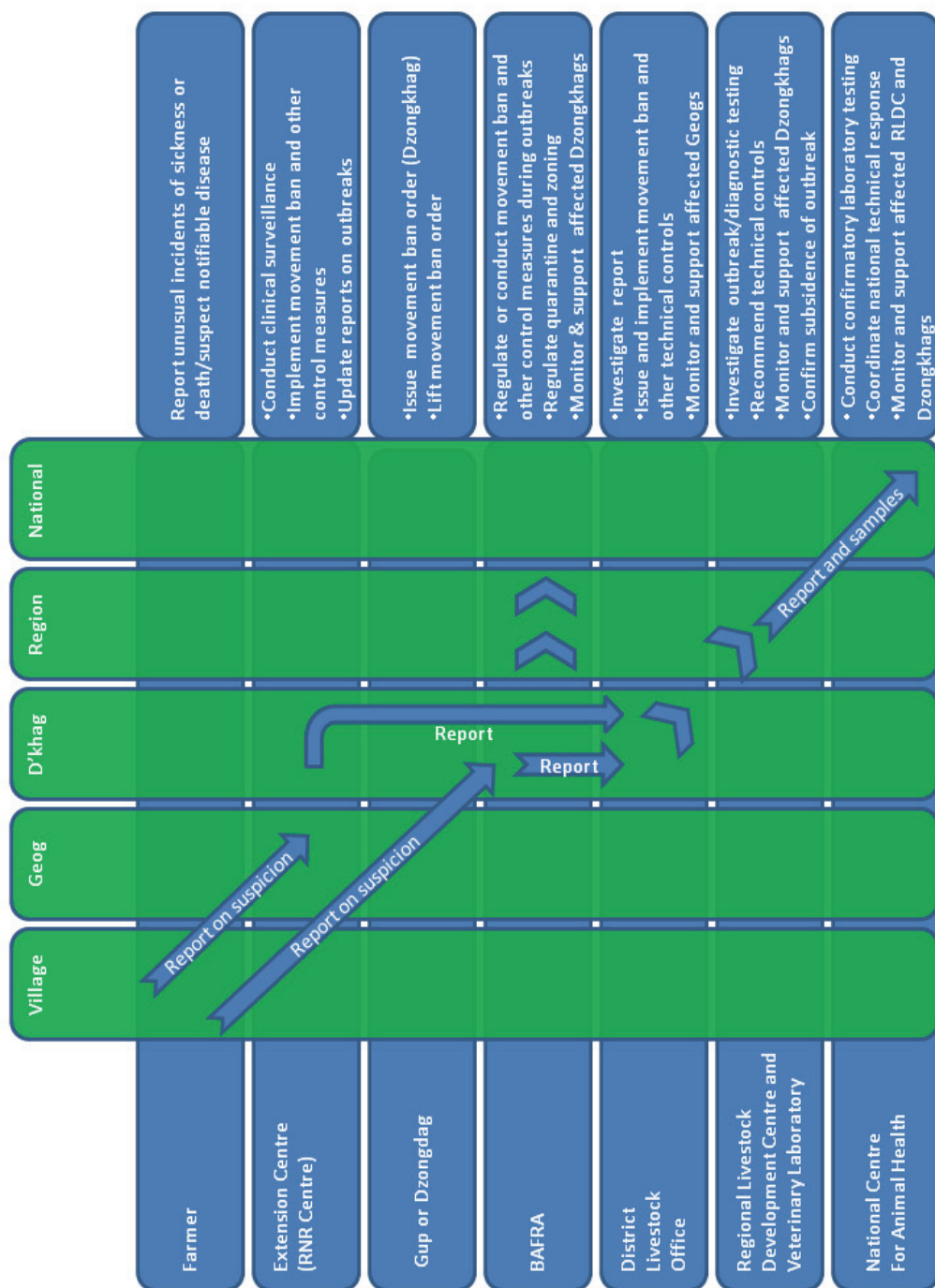


Figure 3 Summary of roles and responsibilities for surveillance and control of notifiable livestock diseases



## 4.6 Outbreak response procedures and BAFRA

In the event of a confirmed notifiable disease outbreak (by NCAH) the Regional Livestock Development Centre will provide technical control recommendations to the Dzongkhag Livestock Office and Geog Livestock Extension Officials. The Dzongkhag office will officially declare the outbreak and issue an executive order banning movement of livestock/livestock products with information to all relevant stakeholders.

BAFRA is responsible for any stamping out required (depopulation) and any quarantine and movement controls required. The following subheadings (4.6.1 to 4.6.6) describe possible outbreak response procedures and highlight the role of BAFRA in each. The relevance of each procedure to specific notifiable diseases (rabies, anthrax, HPAI, black quarter and hemorrhagic septicemia) is also highlighted.

### 4.6.1 Issuing a provisional ban order and conducting a disease investigation

Some of Bhutan's notifiable diseases have the potential to spread rapidly through the movement of infected livestock and this spread could occur before an investigation has the opportunity to confirm its presence. A provisional ban order, recommended by a Livestock Extension Centre or District Livestock Officer, and issued by the Dzongkhag administration on the suspicion of a notifiable disease outbreak, provides the opportunity to restrict the movement of livestock at the earliest possible time. A provisional ban order is issued to all relevant stakeholders and it is BAFRA's responsibility to ensure that the ban order is adhered to. To enforce the ban order BAFRA should ensure border/control point biosecurity sign boards (Figure 6, Appendix A: Biosecurity Sign Boards) are prominently displayed and conduct routine and random inspection / discussion of vehicles/passengers passing at control points.

In addition, for timely implementation of biosecurity regulatory measures, it is important that disease investigations are conducted jointly by the officials of BAFRA and DoL. BAFRA, not the DoL, is the authority for ensuring biosecurity measures are applied and hence a BAFRA officer must be present at an investigation to oversee and ensure early, pre-emptive biosecurity measures (e.g. correct disposal of diseased carcasses, discussion on movement bans) are implemented prior to laboratory advice.

### 4.6.2 Control zones

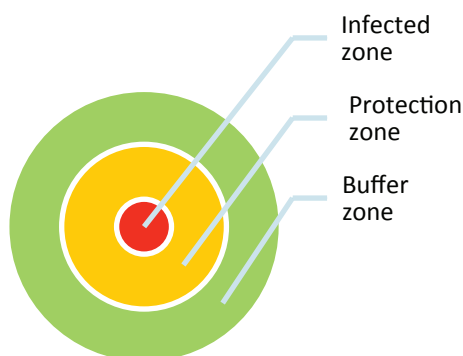
Control zones are necessary in an outbreak to facilitate an effective response. The objectives of a response are to find all infection quickly, eliminate it and stop it spreading. Hence control zones in Bhutan include the infected zone where disease is known to occur, the protection zone where contact with infected animals (directly or indirectly) is known to have occurred, and the buffer zone. Biosecurity is critical to disease control during an outbreak because disease will spread through animal to animal contact and through fomite-mediated routes. The highest risk exists where disease is occurring (infected zone) and reduces toward

where neither disease nor contact has been known to occur. In general, good biosecurity during an outbreak includes movement bans on potentially infected animals and potentially contaminated animal products and/or other risk goods out of the outbreak area.

The Regional Livestock Development Centre will recommend the control zones if necessary. The geographic limits of control zones are set with consideration of the epidemiology of the outbreak, practical constraints, and the need to limit disruption to the community. BAFRA is responsible for implementing control zones and related movement bans with support from the DOL, the Geog and Dzongkhag administrations, and the police. Full implementation of control zones is generally only applied to outbreaks of highly pathogenic avian influenza; however it may be applied to other exotic diseases as well. Surveillance, movement restriction and vaccination in a protection zone are generally undertaken for outbreaks of FMD, black quarter and anthrax. In addition for anthrax, proper disposal of carcass, disinfection of the premises and sanitary measures is undertaken on all farms which had direct or indirect contact with the infected materials and animals – the infected zone.

Despite control zoning a significant risk of spread will still exist if restricted movements occur before or despite a movement ban or if control zones are insufficient in area. It is therefore important and opportune, that especially during an outbreak; good farm biosecurity is promoted particularly to farmers with susceptible livestock within the affected Dzongkhag. Opportunities for promoting farm biosecurity are described at 4.4.

Controls zones and the actions generally undertaken in each zone are shown in Figure 4 and Figure 5.



**Figure 4 Control zones to facilitate movement bans during a livestock disease outbreak**

Control Zone	Description	Priority Actions			
		Stamping out <sup>11</sup>	Movement restrictions on livestock, livestock products and/or other at risk goods	Immediate Vaccination	Surveillance and biosecurity promotion
Infected zone	Infected premises/farm/place/places/area	✓	✓	✓	
Protection zone	An area in which livestock has had direct or indirect contact with known infected premises	✓	✓	✓	✓
Buffer zone	An area around the protection zone with no known direct or indirect contact with infected premises.				✓

**Figure 5 Livestock disease outbreak control zones and possible actions taken within each zone**

<sup>11</sup> Stamping out will be applied to only selected diseases, e.g., HPAI and not for FMD.

### 4.6.3 Stamping out

'Stamping out' is defined<sup>12</sup> as the slaughter of all infected and in-contact animals, together with disposal, cleaning and disinfection. The Regional Livestock Development Centre or NCAH will recommend stamping out in an outbreak if the disease poses a considerable risk to the health of people and/or if depopulation of livestock is essential to contain the outbreak. Slaughter of infected and in-contact animals is generally only applied to outbreaks of highly pathogenic avian influenza however may be applied to other exotic diseases. Proper disposal as described below is undertaken for livestock which die in anthrax outbreaks.

If a disease outbreak response requires stamping out it is BAFRA's responsibility to oversee or conduct this directly. To be effective, stamping out must be conducted under strict quarantine of the infected premises or area. Slaughter of livestock must be swift, followed by secure disposal of carcasses and potentially contaminated material, and thorough decontamination of the premises and equipment.

A stamping out plan must be prepared by BAFRA such that the following principles are applied and by everyone involved (4.6.3.1 to 4.6.3.4).

#### 4.6.3.1 *Biosecurity of the stamping out team*

Persons leaving an infected premises or area, particularly those in contact with other farms or susceptible livestock, are a high risk for spreading a disease outbreak. Therefore it is essential that the number of persons involved with stamping out should be kept to a minimum and that all persons conducting stamping out practice good biosecurity in their work:

- a. Wear a disposable coverall gown (with hood and boots) and dispose of it securely before leaving the infected premises or area, OR completely change clothing and wash and disinfect used clothing before removing from the infected premises or area. Protective goggles should also be worn for stamping out of HPAI.
- b. Do not visit farms or have contact with susceptible livestock species (susceptible to the outbreak disease) for 3 days after leaving the infected premises or area. This includes conducting surveillance during an outbreak response.

#### 4.6.3.2 *Slaughter method must be humane, safe and efficient*

Any slaughter required for stamping out is BAFRA's responsibility and the BAFRA officer in charge of stamping out must plan or confirm the appropriate slaughter method with the Regional Livestock Development Centre.

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<sup>12</sup> World Organisation for Animal Health

Regardless of the number of animals to be slaughtered, the slaughter method requires careful planning to ensure it is conducted humanely for the animal (inflicting as little pain or distress as possible), is safe for the persons involved in slaughtering and bystanders, and ensures large numbers of animals are slaughtered swiftly (limiting the risk of disease spread).

#### 4.6.3.3 Disposal

Slaughtered livestock, their products, waste, bedding, feed and water are a high risk for disease spread because they are potentially contaminated with the disease agent and the agent may survive for many days, weeks or months. To be effective, stamping out requires that all slaughtered livestock, their products and wastes, and potentially contaminated materials, are disposed of thoroughly and securely.

Burial or incineration can be used for disposal and the choice will depend upon the circumstances of the stamping out. Burial must be conducted with a soil coverage depth of at least 1 meter, preferably 2 meters. Carcasses to be buried must be first covered with a layer of calcium hydroxide (lime powder).

If incineration is used for disposal of carcasses the carcasses must be completely incinerated. Appropriate fencing and signage must be used to manage access to the disposal area until the disposed animals are secure and no longer considered a risk.

For disposal to be effective, incineration or burial must ensure that:

- a. Slaughtered livestock are not available for human consumption;
- b. Slaughtered livestock cannot be scavenged by wildlife;
- c. Disposed materials are not accessible to susceptible livestock species;
- d. Slaughtered livestock and all disposed materials are not available to be moved from the place of disposal.

**Table 11 Disposal and decontamination for anthrax**

*Disposal of animals that have died from anthrax<sup>13</sup> requires special attention because of the potential for anthrax bacteria in the blood to form spores that can remain viable in soil for many years.*

1. Do not open the carcass as exposure to air will cause anthrax bacteria to form

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13 For further information see Guidelines for Preparedness, Surveillance and Control of Anthrax in Human and Animals in Bhutan, Ministry of Health, Ministry of Agriculture and Forests, 2013.

spores;

2. Plug anus, mouth, nose with cloth to prevent leakage;
3. Burial of the carcass is recommended if a minimum cover of 1 metre of soil (minimum pit depth 1.5 metres) can be achieved. Shallow burial of anthrax-infected carcasses will lead to long-term survival of anthrax spores;
4. Alternatively, burning is recommended for disposing of anthrax carcasses and should always be used if carcasses have been opened or already processed (e.g. meat, hides) for human consumption (burning prevents exhumation for consumption);
5. Decontamination of contaminated sites is an essential part of the control program and must be rigorously applied (4.6.3.4).

#### **4.6.3.4 Decontamination**

The buildings and equipment of infected premises are a high risk for disease spread because they are likely to be contaminated with the disease outbreak pathogen, which may survive for many days, weeks, or months. Decontamination should be conducted to effectively control notifiable disease outbreaks, irrespective of whether stamping out is conducted.

Decontamination begins with removal and disposal of contaminated bedding, feed and manure. Disposal has been described above (4.6.3.3). The next step requires cleaning and disinfecting livestock housing, vehicles and equipment to remove and destroy the pathogens of animal disease. These include all rooms, cages, and concrete yards used to house livestock, food and water troughs and drinkers, food hoppers and water reservoirs, and all equipment used to handle livestock, their products, and waste or bedding material. The aim of decontamination for a livestock disease outbreak is neither sterilization nor complete disinfection. Rather, the thoroughness of cleaning and disinfection in particular, should account for the role of time, dehydration, and solar radiation in destroying pathogens and aim to reduce contamination to prevent inadvertent spread or infection. The longer the period between slaughter and restocking, the less reliance is needed on cleaning and chemical disinfection.

Mechanical cleaning of surfaces is critical to the effectiveness of subsequent use of disinfectants, and the choice of the latter depends upon properties of the disease pathogen.

A suitable disinfectant for use on contaminated livestock housing and farm equipment is sodium hypochlorite (household bleach) at a 1% solution. Non-porous farm tools,

equipment and surfaces can be disinfected by spraying thoroughly (1litre per sq. metre and leave for 2-3 hours) or immersing them in solution (30 minutes).

The decontamination procedure for HPAI is outlined in the National Influenza Pandemic Preparedness Plan and Standard Operating Procedures, 2011 (NCAH).

Reoccurrence of anthrax infection is generated by infectious anthrax bacteria spilt from carcasses and/or spread from the site of infection at the time of death. Decontamination of contaminated sites is therefore an essential part of the anthrax control program. Decontamination of anthrax sites can be achieved by the same method as chosen for carcass disposal, i.e., deep burial, after first covering with a layer of calcium hydroxide (lime powder), or burning. The contaminated ground area should be liberally treated with lime powder and left exposed to the environmental condition and not covered with a shallow layer of soil (for dispersal and inactivation of spores).

#### **4.6.4 Vaccination**

Vaccination is a control measure that may be applied to all susceptible livestock potentially exposed to infected livestock ('at risk' livestock). This includes animals farmed on or near the farm affected by the disease outbreak, i.e., in the protection zone (4.6.2). Vaccination is generally applied in outbreaks of FMD, rabies, anthrax, black quarter and haemorrhagic septicaemia. In an anthrax outbreak, vaccination of susceptible animals (usually cattle, sheep and goats) may be recommended up to 1km from the infected property and continued annually for three years<sup>14</sup>.

Vaccinated animals are still subject to movement controls applied to the outbreak farms or district.

#### **4.6.5 Live animal movement applications**

Live animal movements may be permissible from within Dzongkahags affected by notifiable disease outbreaks if the area of livestock origin is not a controlled zone. Live animal movement applications should be initiated and assessed using the prescribed application form completed by the applicant and concerned livestock extension officer (4.3).

#### **4.6.6 Resolution of outbreak and withdrawal of controls**

When a notifiable disease outbreak has resolved the Regional Livestock Development Centre will recommend to the Dzongkhag Livestock Office and Dzongkhag Administration that control zones are removed and movement bans lifted. If stamping out has occurred any restocking should be undertaken with a small number of animals first, monitoring daily for three weeks for signs of disease.

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<sup>14</sup> Guidelines for Preparedness, Surveillance and Control of Anthrax in Human and Animals in Bhutan, Ministry of Health and Ministry of Agriculture and Forests, 2013.

There is no additional role for BAFRA during withdrawal of outbreak controls other than ceasing to enforce controls. The DoL is responsible for farmer support to restock livestock.



## Appendix A: Biosecurity Sign Boards

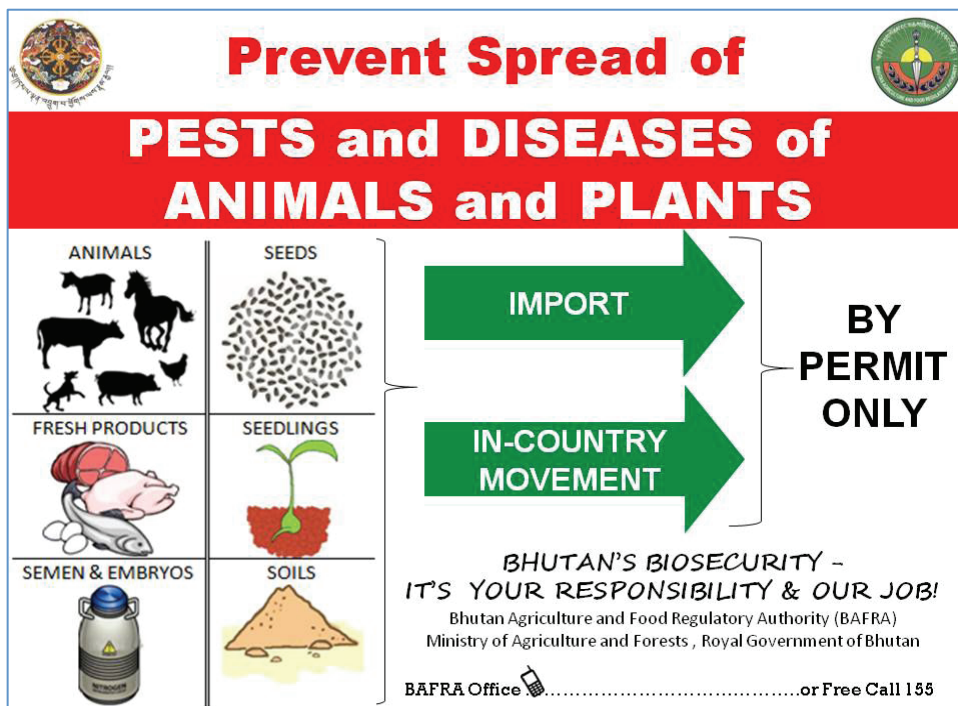


Figure 6 Border/Check Point Biosecurity Sign Board



Figure 7 Farm Gate Biosecurity Sign Board

## Appendix B: Revised Process for Application for Live Animal Movement Permit

The revised process of applying for a live animal movement permit requires the completion and signing of a paper form followed by use of an online form for application processing:

1. Application Form for Live Animal Movement Permit

<https://drive.google.com/file/d/0B1t2NHfYoDOKT2RNcFdoUINUS2c/view?usp=sharing> ;

2. Online Processing of In-Country Movement Permit for Live Animals

[https://docs.google.com/forms/d/1Zk5hWHjEDd6PJ3DIhseUq3i3DvwRHE3XLD26mZSiOoM/viewform?usp=send\\_form](https://docs.google.com/forms/d/1Zk5hWHjEDd6PJ3DIhseUq3i3DvwRHE3XLD26mZSiOoM/viewform?usp=send_form) ;

### Step 1 Movement Permit Application (prescribed paper form)

Applicant and concerned Livestock Extension Officer are required to complete the Application for Live Animal Movement Permit.

Application includes declarations on animal health, vaccinations, and farm biosecurity measures applied.



Once the Application for Live Animal Movement Permit (paper form) has been completed the application is entered online for processing. It can be entered by the concerned Livestock Extension Officer or at the concerned BAFRA office. Online processing provides a simple but rigorous process for checking the required information and will produce a preliminary permit with an assessed level of disease spread risk and conditions of movement (Figure 8). The applicant's responses to the Biosecurity Check should be discussed at this time and recommendations given to the applicant for improving biosecurity standards.

### Step 2 Online Processing (online form)

Concerned BAFRA officer completes the online form and preliminary permit is provided by email .

Livestock Extension Officer completes the online form and a preliminary permit is emailed to concerned BAFRA office.



High risk (of disease spread) livestock movements include those where vaccinations are not current at least two weeks before movement and/or where the livestock are not declared as free of signs or suspicion of controlled/notifiable diseases. In this event online processing will decline the permit and the applicant will be requested to address the reason(s) for the high risk. In the event of medium risk and low risk movements, online processing will provide a preliminary movement permit however the concerned BAFRA office makes the decision on permit issuance and should provide any special movement permit conditions.

### Step 3 BAFRA Decision on Permit Issuance

The preliminary movement permit will show 'permit declined' in the event of a 'high risk' and 'permit granted' for 'medium' and 'low' risk movements.

The concerned BAFRA Office provides a decision on permit issuance and prescribes any special movement conditions.

Serial No. 2

Date: 15/09/2014

**MOVEMENT PERMIT FOR LIVE ANIMAL**

Permission is hereby **GRANTED**.

Disease Spread Risk Rating: **Medium Risk**.

Permit GRANTED with conditions

Permit GRANTED with conditions

Permit DECLINED

Low

Medium

High

**Figure 8 An example showing the top of the revised movement permit**

Standard movement permit conditions on the revised permit are listed below. The administrator with access to the online processing system can change the standard permit conditions as required for the level of risk or movement type (vehicle or by foot).

#### ***Disease Spread Risk Rating High- Permission is DECLINED***

The livestock movement disease spread risk rating is 'High'. A movement permit is NOT granted and BAFRA requires that movement be delayed until the following risks have been resolved:

1. Signs of illness must be reported and investigated by the Department of Livestock, and/or

2. Suspicion of a notifiable disease must be reported and investigated by the Department of Livestock, and/or
3. Relevant vaccinations and treatments for controlled diseases must be complete at least two weeks before the intended movement date.

***Permit conditions for all movements (Disease Spread Risk Rating Low and Medium)***

1. Prior to movement, all livestock will be segregated to avoid contact with other livestock for at least 5 days;
2. After movement, all livestock will be segregated to avoid contact with other livestock for at least 5 days (unless slaughtered earlier);
3. For at least 5 days prior to movement until at least 5 days after movement (unless slaughtered earlier), all livestock will be checked daily for signs of illness and any serious illness reported immediately to the nearest livestock extension office or the regulatory authority office concerned (signs of serious illness include: blisters on/in mouth, muzzle, teats or feet; profuse salivation or nasal discharge; paralysis, seizure, excess salivation, aggression; sudden death; bleeding from nose, ears, mouth or anus; swelling in the heavy muscles; depression, weakness or not eating; gasping or coughing).

***Permit conditions when movement is for livestock slaughter***

1. If livestock are being moved to slaughter BY VEHICLE, they will travel non-stop to their destination (not unloaded) AND if travel is interrupted and livestock are moved from vehicle (e.g. for resting and/or feeding), mixing of the travelling livestock with any other livestock will be prevented;
2. If livestock are being moved to slaughter BY FOOT, mixing of the travelling livestock with any other livestock will be prevented;
3. Livestock will not be handled by people other than the transporter;
4. All manure, bedding and discarded feed from the transport vehicle will be disposed of by burial, or dumped in a fenced pit or compost pile, and any transport vehicle and equipment used will be cleaned before reuse.

***Additional permit conditions for movement by vehicles***

1. All livestock being moved will travel non-stop by vehicle to destination (not unloaded) or if travel is interrupted and livestock moved from vehicle for resting and/or feeding, care will be taken to prevent mixing of the travelling livestock with any other livestock;
2. Livestock will not be handled by people other than the transporter;
3. All manure, bedding and discarded feed from the transport vehicle will be disposed of by burial, or dumped in a fenced pit or compost pile, and vehicles and equipment will be cleaned before reuse.

***Additional permit conditions for movement by foot***

1. Care will be taken to prevent mixing of the travelling livestock with any other livestock.

## Appendix C: Poultry Farm Biosecurity Checklist

Only the biosecurity measures are shown below. A complete version of the document (for field use) can be downloaded as a PDF document from the following link:

[https://docs.google.com/document/d/1ZYkxC65IR51D\\_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing](https://docs.google.com/document/d/1ZYkxC65IR51D_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing)

This checklist is for the officials of BAFRA or the Department of Livestock to guide poultry farmers on good biosecurity practices. For further information on farm biosecurity see the *In-Country Livestock Biosecurity Guidelines* (BAFRA, 2015). The completed checklist should be given to the farmer after a copy is made for BAFRA records (e.g. by photo or scan using a Smartphone).

### Farm layout and setup

The poultry farm should be managed as TWO ZONES: clean zone and buffer zone. All poultry sheds are in the clean zone. Arriving visitors and vehicles, equipment storage, feed storage, disposed dead poultry and manure, and storage of poultry products are within the buffer zone.

#### **Biosecurity Measures:**

1. Farm should have a perimeter FENCE with GATED entrances to control access by people, stray animals and vehicles. The number of entrances should be minimised.
2. Farm entrances should have a SIGN BOARD requesting visitors to respect farm biosecurity and to phone the farm manager for direction before entering the farm.
3. ACCESS to the clean zone should be separate from the home so that visitors to the home do not enter or pass near the clean zone farm.
4. Farm should have a WASH STATION (tap, concrete floor, scrubbing brush, hand soap and detergent) near each entrance to the farm for all arriving people (visitors and returning workers) to wash hands and footwear AND to wash any equipment arriving on the farm. The wash station should drain away from the farm and livestock and have a clean area for drying equipment in the sun.
5. Poultry sheds should be enclosed and have LOCKABLE gates or doors to control access.
6. Poultry sheds should be signed as a CLEAN ZONE where AUTHORISED WORKERS ONLY are permitted access.
7. Farm should have a SEPARATE SHED which is used for segregation and treatment of diseased poultry?
8. Farm and house should have adequate DRAINAGE so that water flows away from the poultry sheds and does not accumulate?
9. Farm should have a DISPOSAL AREA away from the clean zone where dead birds are

buried deep enough to prevent scavenging.

10. Farm should have a STORE ROOM for livestock feed and products that is closest to the farm entrance and is kept clean, dry and vermin free.

## Visitors and Workers

All farm visitors, workers and residents are a major risk of introducing disease if they have direct or indirect contact with other poultry, wild birds (e.g. pigeons) or pigs. Workers in particular need to be made aware of the risk and be encouraged to shower and change into freshly laundered clothes before commencing work. Requirements for entry of all people to the farm should include clean clothes, footwear and hand washing.

### **Biosecurity Measures:**

11. The number of visitors and workers to the farm should be kept to a minimum.

12. Farm should have a book where farm BIOSECURITY RULES are listed and where all visitors and workers sign a biosecurity declaration that they understand and will follow the farm's biosecurity rules?

13. All VEHICLES should be parked as far from livestock as possible - visitor vehicles should be parked off the farm, and delivery / collection vehicles that need to enter the farm should be parked near the store room which should be away from the clean zone.

14. The number of workers with access to the clean zone should be MINIMISED and workers should avoid contact with other farms and livestock and have good personal hygiene. Ideally, workers on commercial farms should change into clean clothes and footwear which is kept for use only on the farm.

15. Every entrance to the clean zone should have a disinfectant FOOT BATH immediately in front of the entrance. Footbaths should be inspected daily and replenished every 2 days or sooner if visibly dirty or diluted due to rain.

## Farm Maintenance

The area around poultry sheds should be neat and tidy to minimise attraction of vermin, insects and wild birds which can spread disease.

### **Biosecurity Measures:**

16. The area around the poultry sheds should be NEAT AND TIDY with good drainage, no left carcasses, and no spilt feed.

17. Poultry sheds and store rooms should be WILD BIRD PROOF.

18. RODENTS should be prevented from entering the feed store and feed.

19. Farm should cover any WATER STORAGE to stop faecal contamination from wildlife or stray animals.

20. Poultry PRODUCTS from other farms should not be brought onto the farm.

21. All poultry should be CHECKED DAILY for signs of disease and any disease reported immediately to the nearest BAFRA Office or Livestock Extension Office concerned.

## Record Keeping

Record keeping is required to assist a farmer monitor poultry health, check that vaccinations and treatments are up to date and facilitate tracing in case of a bird health or food safety concern.

### ***Biosecurity Measures:***

22. Farm should have a record of SICKNESS and DEATHS.

23. Farm should have a record of SOURCES of feed, equipment and poultry.

24. Farm should have an independent record of VACCINATIONS and TREATMENTS.



## Appendix D: Dairy Farm Biosecurity Checklist

Only the biosecurity measures are shown below. A complete version of the document (for field use) can be downloaded as a PDF document from the following link:

[https://docs.google.com/document/d/1ZYkxC65IR51D\\_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing](https://docs.google.com/document/d/1ZYkxC65IR51D_fePFaijMJz-F2X4SIDRt3jOamL9pnA/edit?usp=sharing)

This checklist is for the officials of BAFRA and Department of Livestock to guide dairy farmers on good biosecurity practices. For further information on farm biosecurity see the *In-Country Livestock Biosecurity Guidelines* (BAFRA, 2015). The completed checklist should be given to the farmer after a copy is made for BAFRA records (e.g. by using a Smartphone).

### Farm layout and setup

The dairy farm should be managed as TWO ZONES: clean zone and buffer zone. All cattle sheds and yards are in the clean zone. Arriving visitors and vehicles, equipment storage, feed storage, disposed dead animals and manure, and storage of milk are within the buffer zone.

#### **Biosecurity Measures:**

1. Farm should have a perimeter FENCE with GATED entrances to be able to control access by people, stray animals and vehicles. The number of entrances should be minimised.
2. Farm entrances should have a SIGN BOARD requesting visitors to respect farm biosecurity and to phone the farm manager for direction before entering the farm.
3. ACCESS to the clean zone should be separate from the home so that visitors to the home do not pass through the clean zone.
4. Farm should have a SEPARATE SHED or yard which is used for segregation of sick cattle and arriving/departing cattle.
5. Farm should have a WASH STATION (tap, concrete floor, scrubbing brush, hand soap and detergent) near each entrance to the farm for all arriving people to wash hands and footwear AND to wash any equipment arriving on the farm. The wash station should drain away from the farm and livestock and have a clean area for drying equipment in the sun.
6. Farm and house should have adequate DRAINAGE so that water flows away from the cattle sheds and yards and does not accumulate.
7. Farm should have a DISPOSAL AREA away from the clean zone where dead animals can be buried deep enough to prevent scavenging.
8. Farm should have a STORE ROOM for livestock feed and products that is away from the clean zone and is kept clean, dry and vermin free.

## Visitors and Workers

All farm visitors, workers and residents are a major risk of introducing disease if they have direct or indirect contact with pigs or other cattle. Workers in particular need to be made aware of the risk and be encouraged to shower and change into freshly laundered clothes before commencing work. Requirements for entry of all people to the farm should include clean clothes, footwear and hand washing.

### ***Biosecurity Measures:***

9. The number of VISITORS and workers to the farm area should be kept to a minimum.
10. A commercial farm should have a book where farm BIOSECURITY RULES are listed and where all visitors and workers sign a biosecurity declaration that they understand and will follow the farm's biosecurity rules.
11. All VEHICLES should be parked as far from livestock as possible - visitor vehicles should be parked off the farm, and delivery/collection vehicles that need to enter the farm should be parked near the store room which should be away from the clean zone.
12. The number of workers with access to the clean zone should be MINIMISED and workers should avoid contact with other farms and livestock and have good personal hygiene. Ideally, workers on commercial farms should change into clean clothes and footwear which is kept for use only on the farm.

## Farm Maintenance

### ***Biosecurity Measures:***

13. KITCHEN SCRAPS spread livestock disease. If feeding kitchen scraps, they should be first boiled for 20 minutes. Cattle should be prevented access to kitchen waste water.
14. The area around the cattle sheds and yards should be NEAT AND TIDY with good drainage and no spilt feed.
15. Farm should effectively CONTROL CONTACT between their livestock on the farm and feral or stray animals or wildlife. If open grazing occurs cattle should be brought home at night.
16. RODENTS should be prevented from entering the feed store and feed.
17. All livestock should be CHECKED DAILY for signs of disease and any disease reported immediately to the nearest livestock extension office or the regulatory authority office concerned.

## Record Keeping

Record keeping is required to assist a farmer monitor poultry health check that vaccinations and treatments are up to date and facilitate tracing in case of a bird health or food safety concern.

***Biosecurity Measures:***

18. Farm should have a record of SICKNESS and DEATHS.

19. Farm should have a record of SOURCES of feed, equipment and livestock.

20. Farm should have an independent record of VACCINATIONS to check that vaccinations are current for known diseases of the region.

21. Farm should have a record of each cow's daily milk PRODUCTION. The record should be monitored for a sharp decline in production which is an early indicator of disease and should be reported.