

# A FARM BIOSECURITY SURVEY REPORT

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## Foreword

I take immense pleasure in presenting the Report on “Baseline information of on-farm biosecurity measure in commercial livestock farms in Bhutan” and “Knowledge and Attitude of commercial livestock farmers towards National Animal Biosecurity System”. It is the first in a series of publications to be released. The Report contains information on the biosecurity measures implemented by different commercial farms at dzongkhag levels and knowledge and attitude of livestock farmers towards national animal biosecurity system. The On-farm biosecurity survey in commercial livestock farms was conducted from December 2018 to January 2017 using questionnaire survey with funding support from European Union Rural Development Climate Change program. Extensive efforts have been made to successfully undertake this nationwide survey. It involved meticulous planning and systematic preparation in all stages, from stakeholder meetings, questionnaire design, testing of questionnaire, data entry and processing, and analysis and report writing. I commend the hard work and persistent efforts put in by the Livestock section, BAFRA in successfully completing these processes. The baseline information on On-farm biosecurity is an important source of information that helps understand changes and trends in biosecurity measures at different district at different commercial farms, which are crucial for informed decision-making at all levels, both in the public and private sectors.

I am hopeful that the information in this Report would be very useful for evidence based decision-making and formulation of policies and plans. Further, it would serve as the basis for measuring progress towards the strengthening and achievement of key national targets of 12 FYP as well as other time-bound targets of the country associated with livestock production.

I would like to express my sincere gratitude and appreciation to all BAFRA officials in the dzongkhags for their active participation and contributions in successfully conducting the survey.



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## Introduction

The kingdom of Bhutan is a small, landlocked country with an area of 38,394 square kilometers (Bhutan, 2010). The landscape ranges from subtropical plains in the south to the glaciated Himalaya Mountains in the North (Bhutan, 2010; NBC, 2014). As per (NBC, 2014), Bhutan has three global biodiversity hotspots, 330 important bird areas, 60 ecoregions, 53 important plant areas and 29 Ramsar sites. As of date, the country has 71 percent of the total area covered under forest and 42.70 percent of the total area secured as protected areas (DoFPs, 2018). The population and housing census 2017, reported that, more than one-third (36.1%) of households in the country owns livestock of which, 13 % of the households own poultry, followed by thrabam (10.8%), jatsha mixed breed (10.0%), improved breed (jersey, brown swiss) (8.8%), and other cattle (8.8%). In other words, 36.1 % of the households in the country are dependent on livestock farming in supporting their family. Biosecurity is defined as strategic and integrated approach that encompasses the policy and regulatory frameworks for analyzing and managing relevant risk to human, animals, plant life and health, and associated risk to environment” (Bhutan, 2010). Therefore, biosecurity is a holistic concept of direct relevance to the sustainability of agriculture, and wide ranging of public health and protection of environment including biodiversity (FAO, 2007).

The Biosecurity Policy of the Kingdom of Bhutan 2010 designates Bhutan Agriculture & Food Regulatory (BAFRA), MoAF, as the National Competent Authority to coordinate all biosecurity related activities in the country (Bhutan, 2010). In line, BAFRA has been strengthening national biosecurity from the risk of entry, establishment and spread of exotic pests and diseases, and invasive alien species in order to promote and facilitate trade through establishment of biosecurity system across the biosecurity continuum (such as quarantine stations, biosecurity guidelines, standard operating procedures).

Any biosecurity breach has the capacity to disrupt trade at domestic and international level, increase the cost of production and affect our unique and pristine environment (FAO, 2007). Effective biosecurity underpins the country’s reputation as supplier of clean safe, high quality food, which enables access to valuable markets and trade arrangements.

Therefore, it is imperative to understand and assess the biosecurity practices in the livestock commercial farms and evaluate their perception on Bhutan Animal biosecurity system. The information will help BAFRA in identifying biosecurity risks, gaps in biosecurity system and accordingly come up with recommendation in strengthening Bhutan animal biosecurity system.

## Objectives of Farm Biosecurity Survey

The objectives of On-farm Biosecurity Survey 2019 were;

- To train BAFRA staff in establishment of a statistically sound system of data collection, data design and management.
- To meet data requirements of BAFRA, leading to a farm register & covering structural characteristics of operational farming in the country.
- To establish baseline information on On-farm Biosecurity in commercial livestock farms in the country
- To assess current knowledge and attitude of livestock farmers on animal biosecurity system.
- To study the kind of biosecurity practices being used by livestock farmers in the country
- To study the monitoring habits and reporting of pest and diseases in the livestock farms by the livestock owners.

## Outcome:

The On-farm Biosecurity Survey 2019 has provided a wealth of new and reliable information, with open access of the users to non-confidential data, disseminated via BAFRA web-site and printed publications and it includes:

- Spatial data on livestock commercial farms in the country
- Information on access management of people and vehicle in commercial livestock farming
- Information on animal health management in commercial livestock farming
- Information on operational management of commercial livestock farming
- Information on Knowledge and understanding of commercial livestock farmers on animal Biosecurity system.

## Material and Methods:

### Study description

A well structure questionnaire was designed and developed by a core team consisting of experts from Department of Livestock (DoL) and Bhutan Agriculture & Food Regulatory Authority (BAFRA). The experts have rich and diverse knowledge on animal biosecurity measures including experience in inspection and monitoring of livestock farms. The questionnaire were circulated to 20-Dzongkhag field offices for feedback which were reviewed and accordingly incorporated. The questionnaire survey consists of six sections:

- a) Information sheet: This section describes the objective of the survey, inclusion and exclusion

criteria, definitions and seeking consent from participants.

- b) Livestock farm Information: This section covers information on demographic (farmers & farms), spatial distribution and types of livestock farming.
- c) Information on access management: This section covers information on basic biosecurity measures (facility) at the farm gate (functioning gate, disinfection facility, farm map and biosecurity board etc.)
- d) Information on animal health management: The information on vaccination, deworming, treatment, isolation and quarantine are collected in this section
- e) Information on operational management: The information on feeding, watering, cleaning, record keeping and waste disposal are collected in this section
- f) Knowledge, Attitude and Practices of livestock farmers on animal biosecurity system: The section covers information of livestock farmer's knowledge and attitude towards existing national animal biosecurity.

**Type of study:** It is a cross-sectional study.

**Epidemiological unit of interest:** The epidemiological units of interest are poultry, or cattle or pig commercial livestock farms which meets the study definition.

**Study areas/locations:** The study was conducted in all 20 districts.

**Study period:** The study was conducted over a period of two months from December 2018 to January 2019.

### Sampling strategy

**Source Population:** The commercial livestock farms of poultry, cattle and pig in the country

### Study population

The sampling frame consist of all poultry, cattle & pig commercial farms in the source population. For those districts which have less than five commercial farms (i.e. poultry, cattle, pig), all farms are included in the study population. Likewise, for those districts which have more than five commercial farms (poultry, cattle, pig) as per the study definition, a random sampling is used to select the study population (farmers). Subsequently the list of all the farmers in each study population were selected for the study.

***DISTRICT***

Selection method:	<ul style="list-style-type: none"> <li>All districts which meets the livestock farm definition</li> </ul>
Inclusion criteria:	<ul style="list-style-type: none"> <li>Dairy farm which has more than or equal to five milch cattle and has permanent cattle shed at the time of the interview.</li> <li>Piggery commercial farm which has more than or equal to five adult pigs or fattening pigs and has pigsty at the time of interview.</li> <li>Poultry farm which has more than or equal to 500 birds and has permanent poultry shed at the time of interview</li> </ul>
Exclusion criteria:	<ul style="list-style-type: none"> <li>Dairy farm which has has less than five milch cattle or has no permanent cattle shed at the time of the interview.</li> <li>Piggery commercial farm which has less than five adult pigs or fattening pigs and has pigs or has no sty at the time of interview.</li> <li>Poultry farm which has less than 500 birds, or has permanent poultry shed at the time of interview</li> </ul>
Number to sample:	<ul style="list-style-type: none"> <li>Open</li> </ul>

***LIVESTOCK FARMS***

Selection method:	<ul style="list-style-type: none"> <li>All sampling for those districts which has less than or equal to five commercial farms and random sampling in those districts which has more than five commercial farms.</li> </ul>
Inclusion criteria:	<ul style="list-style-type: none"> <li>Dairy farm which has more than or equal to five milch cattle and has permanent cattle shed at the time of the interview.</li> <li>Piggery commercial farm which has more than or equal to five adult pigs or fattening pigs and has pigsty at the time of interview.</li> <li>Poultry farm which has more than or equal to 500 birds and has permanent poultry shed at the time of interview</li> </ul>
Exclusion criteria:	<ul style="list-style-type: none"> <li>Dairy farm which has has less than five milch cattle or has no permanent cattle shed at the time of the interview.</li> <li>Piggery commercial farm which has less than five adult pigs or fattening pigs and has pigs or has no sty at the time of interview.</li> </ul>

	<ul style="list-style-type: none"> <li>• Poultry farm which has less than 500 birds, or has permanent poultry shed at the time of interview</li> </ul>
Number to sample:	<ul style="list-style-type: none"> <li>• Open</li> </ul>

### ***FARMERS***

Selection method:	<ul style="list-style-type: none"> <li>• Commercial livestock owners whose livestock farms are included in the study population</li> </ul>
Inclusion criteria:	<ul style="list-style-type: none"> <li>• Commercial livestock owners raising livestock commercial farms</li> </ul>
Exclusion criteria:	<ul style="list-style-type: none"> <li>• Commercial livestock owners whose livestock farms are not included in the study population</li> </ul>
Number to sample:	<ul style="list-style-type: none"> <li>• open</li> </ul>

## **Data collection**

### **Survey or questionnaire data:**

A well structure questionnaire was designed and developed by a core team consisting of experts from Department of Livestock (DoL) and Bhutan Agriculture & Food Regulatory Authority (BAFRA). The experts have rich and diverse knowledge on animal biosecurity measures including experience in inspection and monitoring of livestock farms. The core team provided insight into opinions, concerns, and experience of different stakeholders. This has helped to clarify objectives, information requirements, address research issue objectives, salient definitions and outcomes. Further, the questionnaires was circulated to the BAFRA field office for their feedback and comments which are accordingly reviewed and incorporated. The pilot testing of questionnaires was conducted in the few selected study population before administering to the study population. The pre-testing of questionnaires had offered investigator to identify questions that are confusing, misleading, problems in layout, problems of the respondent to understand and time required to conduct the questionnaires. The core team evaluated the pre-tested questionnaires to ensure that all important issues are identified and covered. Subsequently, the questionnaire were administered to the study population.



**Picture 1: Training on Database Design, Management & Analyses.**

The data were collected by BAFRA officials who were involved in the pilot testing through in-person interview, observation, verification and validation of biosecurity measures at the farm in the study population. The information on on-farm biosecurity measures in the livestock commercial farms were collected. In addition, the knowledge and attitude of commercial livestock farmers on national animal biosecurity system were collected.

### **Data management:**

A 4-day training on the database design and management in Epiinfo7 on “Designing the customized database for data entry and analyses” were given to field staff who were engaged in data collection and entry. The data were entered by the data collectors in Epiinfo7 database which was designed by the investigators. A separate file was maintained to store duly filled survey questionnaire. This will make ease to retrieve individual sheet if needed during the analysis.

### **Data coding**

The specific numbers were assigned for the missing values. Eg, 999 for no data, 998- for invalid entry, 997- for not applicable. The master list of all codes assigned were maintained. For all data, the obvious outliers were noted.

### **Data analysis and interpretation:**

Epi info7 was used as software for data entry. There were in total 560 questionnaires collected by the interviewer. At the time of data cleaning, verification and validation, 28 questionnaires were excluded from analyses because, 16 questionnaire did not meet the inclusion criteria of study population and remaining 12 questionnaires have most of its variable inputs missing. For analyses, only 532 observations were considered.

The descriptive analysis outcomes were level of Knowledge, attitude and practice of farmers on Animal Biosecurity system were analyzed in licensed STATA12. The map s were prepared in QGIS 2.18.0

## Results and Discussions:

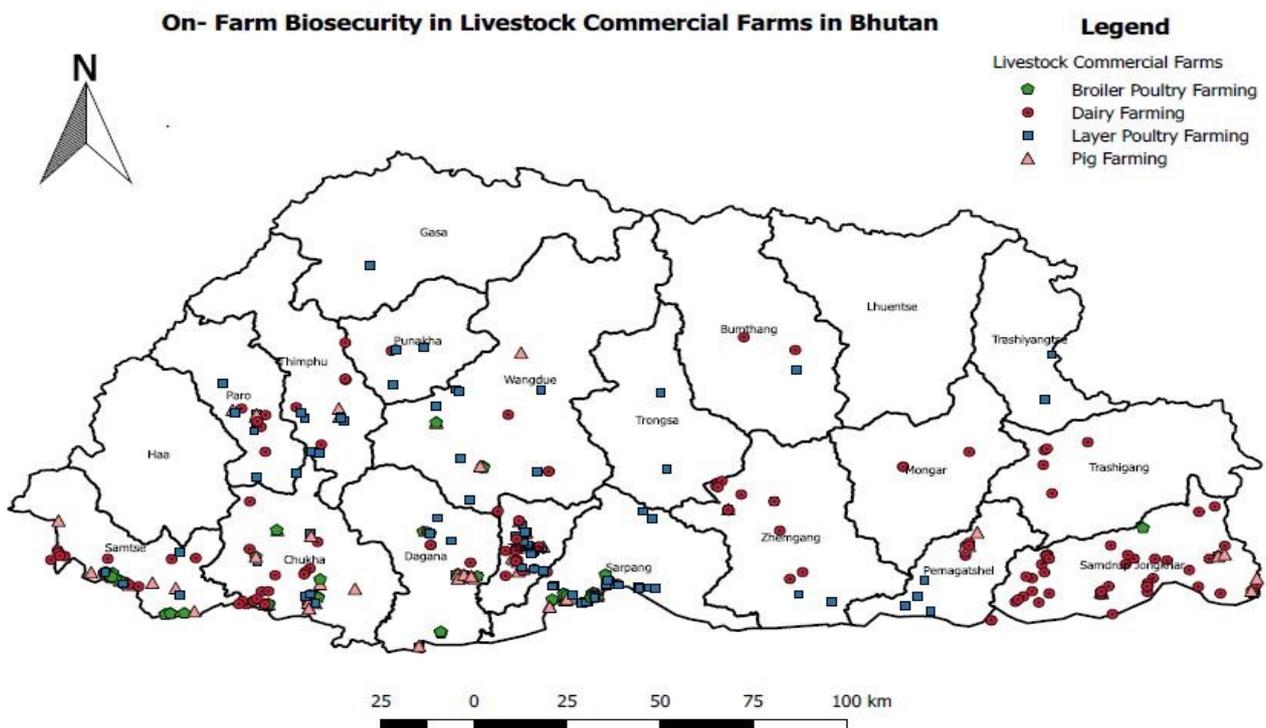
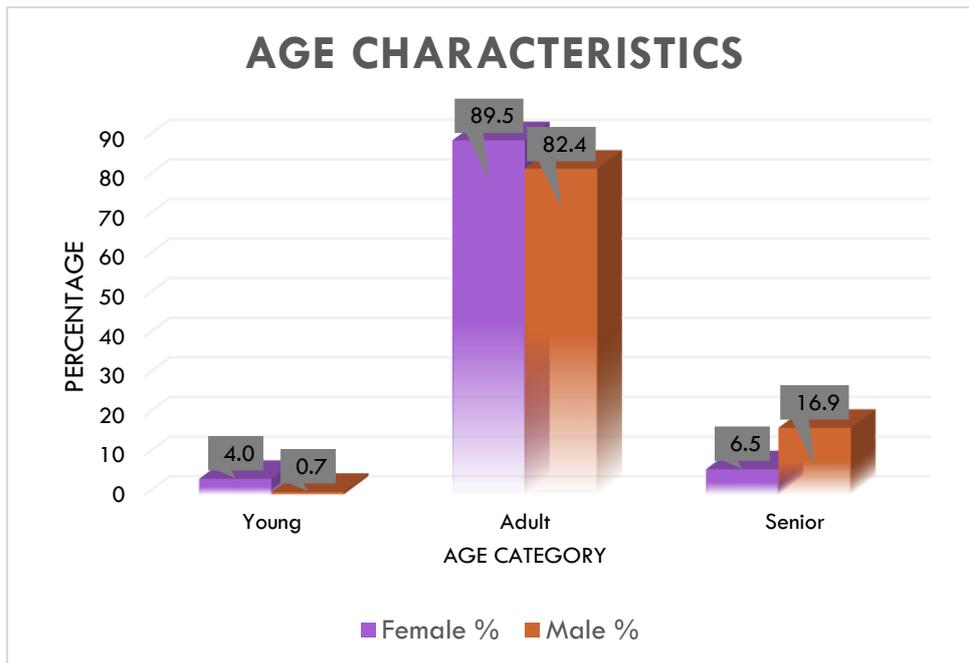


Figure: Map showing study population sites.

## Demography Characteristics:



Graph 1: Graph showing age characteristics of participants.

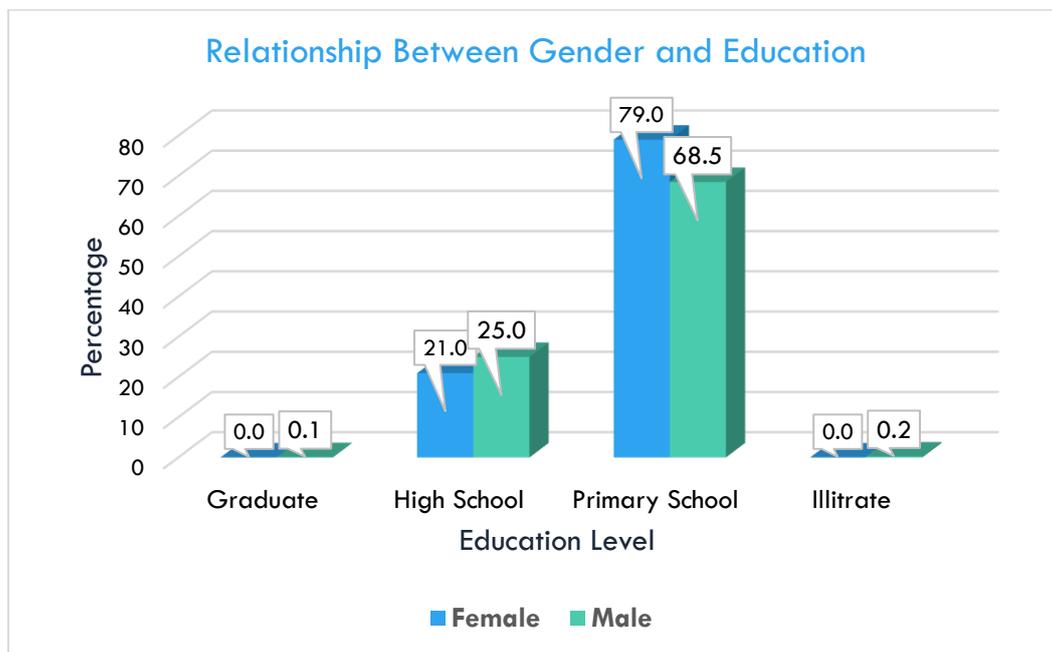
A total of 532 commercial livestock farmers across the country participated in the on-farm biosecurity survey. The male participants constitutes about two third (76.69% - 408/532) and rest were female (23.31% - 124/532). The average age of the participants was 44 years and seven months old and youngest participants of 15 years old and the oldest being 79 years old (refer table 1). When participants were classified into age category, the majority of the livestock farmers/owners in the study were adults with 84.02% (447/532) and about 89% of the female livestock farmers were in adult age group. The adult age range between 25 years to 59 years old. This is followed by senior group with 14.47% (77/532) of which more than two thirds (75.17 %) are male. In other words, more senior males are more likely to work as livestock farmers than female. The young group of farmers was made of just 1.50% (8/532) indicating less youths taking up the livestock farming (refer graph1).

Regarding education level of the livestock farmer in Bhutan, majority of the farmers have attended primary education (71.62% 381/532), followed by high school 24.06% (128/532) and graduate 4.14% (22/532). The illiterate livestock farmer was made up of just 0.19% (1/532) of the total participants. There was no difference in level of education between male and female. Overall, the literacy rate of the livestock farmers in Bhutan was 99.81% (531/532). In other words, 531 livestock owners have attended either primary school or higher level of education. Therefore, the owners were in the position

to read, write and understand any policy, plans, SOPs, manuals etc. related to farm biosecurity (refer graph 2). Between the farms, poultry farmers were more qualified with 86.36% (19/22) farmers with graduate level of education and 45.31% (58/128) farmers with high school education. It is followed by dairy farmers and then pig farmers.

Variable	Observation	Mean	Std. Dev.	Min	Max	%
Age (years)	532	44.7	11.9	15.0	79.0	
Farm operation (years)	532	5.2	5.1	0.1	31.0	
Dairy Farm	209	8.1	5.5	5.0	50.0	39.3
Dairy Farm Operation	209	7.2	6.2	0.2	31.0	
Pig farm	118	18.4	17.1	5.0	80.0	22.2
Piggery Farm Operation	118	2.7	2.3	0.1	12.0	
Poultry Farm	205	1454.1	1277.6	500.0	8000.0	38.5
Poultry Farm Operation	205	4.6	4.1	0.1	30.0	

**Table (1): Summary of livestock farm variables**



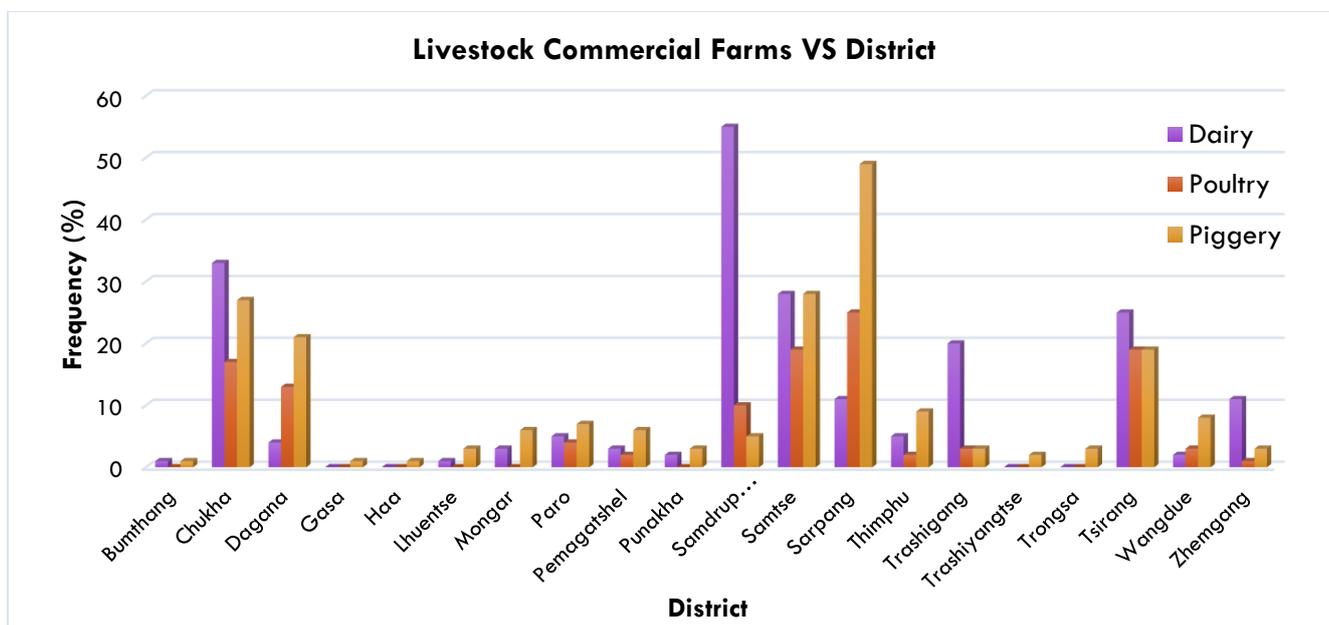
Graph (2): Graph showing Relationship between Gender and Education Level

### Farm Characteristics:

As per the inclusion criteria of the study, a survey was undertaken in 532 commercial livestock farms. For this study, the commercial livestock farms includes dairy, piggery and poultry farming (duck, quail and turkey bird are excluded) qualifying the commercial farm definition. The other livestock farms

such as aquaculture, apiculture, sheep and goat farms were excluded from the study as, these livestock were reared by few marginalized farmers in few districts as per the livestock statistic 2017. Further, the on-farm biosecurity requirement of aquaculture and apiculture differs greatly from poultry, dairy and piggery livestock farms.

Out of 532 livestock farms, 39.29% (209/532) were dairy farms, 38.33% (205/532) were poultry farms and remaining 22.2% (118/532) were piggery farms. Samdrup Jongkhar had the highest dairy farms with 26.3% (56/209), followed by Chukha with 15.4% (33/209) and Tsirang with 11.7% (25/209). The districts like Gasa, Haa, Trongsa and Trashiyangtse did not have single dairy farm with equal to or more than five milch animals with permanent cattle shed. Likewise, Sarpang district had the highest poultry farms with 24.2% (50/205), followed by Samtse and Chukha with 13.5% (28/205) and 13% (27/205) respectively. Haa, Gasa and Bumthang had only one poultry farms each with more than or equal to 500 birds. Likewise, Sarpang district had the highest piggery farms with 21% (25/118) followed by Samtse and Tsirang with 16% (19/118) farms each. Bumthang, Lhuentse, Punakha, Haa, Gasa, Trashiyangtse and Trongsa had no single piggery farms with more than 5 or equal to 5 pigs (refer graph 3)



Graph (3): Graph showing frequency of livestock farms Vs Districts

The average cattle holding of each commercial dairy farmers in Bhutan was 8 cattle with standard deviation of 5.5. The lowest cattle holding of dairy farmer was 5 cattle and highest holding of 50 cattle with range of holding of 45 cattle. The average years of operation of dairy farms in the country was 7.1 years with oldest farm of 50 years and newest farm of 6.2 years. For poultry farms, the mean

poultry birds in each poultry farm was 1454 birds. The range of poultry bird holding was 1277.6 birds with highest holding of 8000 birds and lowest holding of 500 birds. The average years of poultry farm in operation in the country was 4 years with oldest farm of 30 years and newest farm of one month. For piggery industry, each pig farmers owns an average of 7.2 pigs. The range of pig holding was 75 pigs with lowest holding of 5 pigs and highest holding of 80 pigs. The average years of pig farms in operation in the country was 2.7 years with oldest farm of 12 years and newest farm of one month. Overall, the dairy farmers in the country were into livestock farming practices compared to other livestock farms.

## What the study recommends:



1. The literacy rate of livestock farmers was 99.81%. In other words, 531 livestock farmers out of 532 have attended primary or above level of education. Therefore, the future biosecurity communication and information exchange mediums (biosecurity gude for farmers, advocacy materials etc.) can be prepared by wide range of national stakeholders including government agencies (BAFRA, DoL), private sectors (producers, processors, importer, exporter) and scientific and research communities can be understood by the livestock farmers.
2. More than 90% of livestock farms were in Southern districts of which Sarpang district had the highest number of poultry and piggery farms. The majority of dairy farms were in SamdrupJongkhar. Therefore, the advocacy coupled with inspection and monitoring of on-farm biosecurity must be targeted in Southern districts followed by western and eastern districts. Similarly, more livestock inspectors must be deployed in Southern district to effect the inspection and monitoring

## Information on access management (vehicle and people)

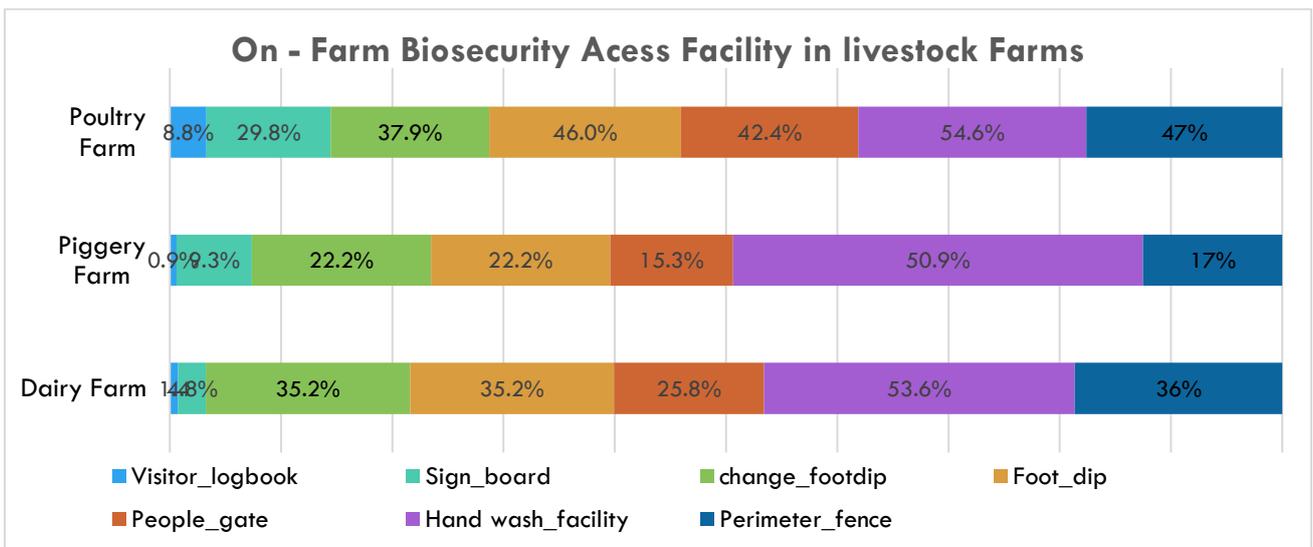
### Farm Access Facility

The management of access to and within a farm is important for managing direct and indirect contact with livestock diseases. Managing access require perimeter fence, functional gate for people and vehicle, disinfection facility for vehicle and people, biosecurity signboard, visitor log book and hand washing facilities.

The average distance of commercial livestock farms from the accessible motor able road was 700 meters with furthest farm of 11 kilometers and the nearest farm with 10 meters. As per the study, dairy farms were more accessible to motorable roads with an average of 510 meters compared to poultry and pig farms in the country. In other words, dairy farmers have better access to livestock inputs (viz: animals, feed, medicines, vaccines, and farm equipments) and livestock produce to market compared to other livestock farms. On the contrarily from the biosecurity risk lens, the dairy farms are at higher risk of biosecurity threat compared to other farms (refer table 2).

Farm distance from vehicle road (kilometers)	Observation	Mean	Std. Dev.	Min	Max
Dairy Farm	209	0.51	1.15	0.01	10.00
Pig farm	118	0.86	1.70	0.01	11.00
Poultry Farm	205	0.81	1.51	0.01	10.00
Overall	532	0.70	1.43	0.01	11.00

**Table (2): Summary of livestock farm variables**



**Graph (4): Graph showing Farm Biosecurity access facility**

As per the survey, 40.23% (214/532) of commercial livestock farm have perimeter fence or geographic features acting as a fence of which, 47% were poultry farm and 36% were poultry farms (refer graph 4). These perimeter fencing are important biosecurity measures to minimize the trespassing and preventing entry of stray animals(BAFRA, 2015). In addition, visitors (veterinarians, livestock extension officials, workers, feed suppliers, etc.) who visits different farms can easily carry and spread diseases from one farm to another through their contaminated shoes, hands and cloths. The visitor must declare personal biosecurity declaration in visitor’s log book that they are clean and abide by the farm

biosecurity rules(BAFRA, 2015). Furthermore, the visitors have to dip their shoes in the foot disinfection facility and wash hand and other contaminated wear at the time of entry and exit from the farm to minimize the biosecurity risk. In addition, the farm should also have farm biosecurity signboard containing information on farms, contacts and certain messages on DON'T'S in line with In-country livestock biosecurity guideline(BAFRA, 2015).

When we compare the compliance of farm biosecurity facilities at farm access point, 58.4% of the livestock farms have hand washing facility (water and soap), 39.6% have foot disinfection facility, 15.4% of the farm have biosecurity sign board, and 4.1% of the farms have visitor log book at the farm access point. An ideally, the farm should have functional gate for people or vehicle (if farm has vehicle access at animal shelter), foot/vehicle disinfection facility, hand wash facility (soap and water), biosecurity sign board and farm layout map at the farm access point as per the in-country livestock biosecurity guideline 2015. Only one poultry farm in Pemagatshel district out of 532 livestock commercials farms in the country have an ideal situation of biosecurity facilities at the farm access gate. When the farm layout map is excluded from the farm access biosecurity facility, the number of farms meeting the requirement increased from one poultry farm to 6 livestock farms (5 poultry farms and one dairy farm). Similarly, when requirement of visitor's log book at farm access gate is excluded in addition to farm map, the compliance level increased from 6 farms to 22 farms (1 pig farm, 7 dairy farms and 14 poultry farms). Overall, between the livestock farms in the country in regards to access management, poultry farms (14 farms) are doing comparatively better than dairy farms (7 farms) and pig farms (1 farm). Similarly, between the districts, Samtse district (7 farms) leading followed by Samdrup Jongkhar (6 farms) and Sarpang (5 farms).

## What the study recommends:

**Overall, the biosecurity facility at access point of livestock farms was very poor (<5%). Comparatively, poultry farms had better biosecurity facility at access point than other type of farms. The BAFRA should implore livestock farmers to mandatorily have Biosecurity sign board, logbook for visitors, disinfection facility (people & vehicle) and hand wash facility for all commercial livestock farms.**

## Information on Animal Health Management

### Management of Animal Health:

Livestock industry plays a vital role for many rural farmers in the country as it is a major income source for majority of the farmer families. Animal diseases definitely have an impact on the production of the animals. It can reduce the quantity and quality of animals and their products that are available for sale by effects that range from catastrophic mortality to erosion of productivity. In addition, controlling diseases in animals will also ensure health of the people. For example controlling diseases like salmonella in poultry prevents food borne illness in humans. Therefore, good health management in animal is key in achieving optimum production and preventing diseases spread to humans. The Health management services may range from primary animal health care such as vaccination, deworming, timely treatment etc. to routine surveillance for controlled diseases to herd health programme.

Adding new animals onto a farm could compromise the biosecurity of the farm and may bring new diseases. It is important to carryout biosecurity check such as health status of the animals before and immediately after purchasing new animals.

#### Practices of livestock farmers in sourcing farms animals

- Overall, 88.16% (469/532) of the livestock farms in the country purchase livestock animals outside their farms and remaining livestock farms produce their own farm animals.
- Between the livestock farms, 97.56% (200/205) of the poultry farms and 94.92% (112/118) of the pig farms in the country source their animals outside their farms
- On the contrary, dairy farmers are more likely to source their farms animals within their farms.

#### Source of animals for livestock farms in the country

- Out of 88.16% of the livestock farms which purchase livestock animals outside their farms, majority of the farms source their animals within the country which make up to 65.60% (349/532) of the farms. Almost 100% of the pig farms source pigs within the Bhutan.
- About 12.6% (67/532) of the livestock farms source their animals outside Bhutan through import which compose of 68.6% (46/205) of the poultry farms and 31.4% (21/209) dairy farms.
- However, 9.77% (52/532) farms/farmers source farm animals from both within and outside Bhutan.

The post purchase management of incoming animals, as well as management of the home herd, are important control points of biosecurity checks. Ideally, a farm should have separate shed/isolation shed with required facilities such as feeding and watering trough, separate manure collection and equipments (milking utensils) for the animals. Addition of new animals should be observed and monitored in the isolation shed for certain number of days depending on the species.

### Isolation of new animals

As per the survey, 37.9% (202/532) of livestock farms carry out isolation of new animals before adding to the herd basically to observe and monitor for suspect of diseases.

More than half of the poultry farms carry out isolation of birds before adding to the flock followed by dairy farms with 29.67% (62/209). Pig farms in Bhutan are less likely to isolate animals before adding to the herd.

### Duration of Animal Isolation

The average days of isolation period observed by the livestock farms in the country for new animals is 22 days with maximum of 90 days and minimum of 5 days.

For dairy farms, they observe isolation period of 16 days with range of 53 days. Similarly, the average isolation period observed by poultry farms is 27 days and 14 days by the pig farms.

From the survey, poultry farms are more likely to observe double the isolation period of pig and dairy farms in the country. The isolation period observed by pig and dairy farms are in line with quarantine period observed for import of livestock animals at the border entry points as required by the Livestock Rules and Regulation 2017.

Vaccines have a major role in protecting animal health and public health, contributing to animal welfare, enabling efficient production of food, and greatly reducing the need for antibiotics to treat food animals. The vaccines for notifiable diseases (FMD, hemorrhagic septicemia, fowl pox etc.) are provided free of cost by the governments to the livestock farms in the country. The livestock Rules and Regulation 2017 also requires all livestock farmers to vaccinate their animals mandatorily annually for the reason mentioned above. However, because of poor knowledge of livestock farmers on the benefits of vaccination of animals coupled with strong myth that vaccination reduces the production of animals for few weeks, the livestock farmers do not voluntarily come forward for vaccination

especially by the backyard farmers. On the contrary, the commercial livestock farmers are much better in understanding the benefits of vaccination as reported in the survey. About 93.23% (496/532) of the livestock farms reported compliant to vaccination for notifiable diseases requirement and there is no difference between the types of livestock farms. Similarly, 88.53% (471/532) of the livestock farms deworm their animals regularly with no differences between the types of livestock farms.

### Record keeping in the farm

Record keeping in livestock farms is an indispensable element for good management of livestock biosecurity and making decisions regarding their farm practices. In the absence of records, farmers have to depend on their memory for traceability in the event of disease outbreaks and product recall. Further, record keeping can figure out the strengths and weakness in their farm operation. Thus, recording of the production of the animals, vaccination and deworming, disease treatment, animal morbidity and mortality must be maintained by all livestock farmers.



The dairy farmers are more likely to maintain record on animal produce 36.4% (76/209) followed by vaccination 16.75% and deworming 11.48% .



Similarly, for pig farmers, the record keeping is highest on animal produce 38% (45/118) followed by vaccination (12.7%).



The poultry farmers are also more likely to keep records on poultry produce compared to other records.

- **Comparatively, the record keeping is much better in poultry farms than dairy and pig farms.**
- **Farmers are more likely to keep records on animal produce than on other records such as treatment applied, vaccination, mortality and animal stock.**
- **The record keeping complaint is highest in Sarpang district followed by Chukha.**

### Disease Reporting

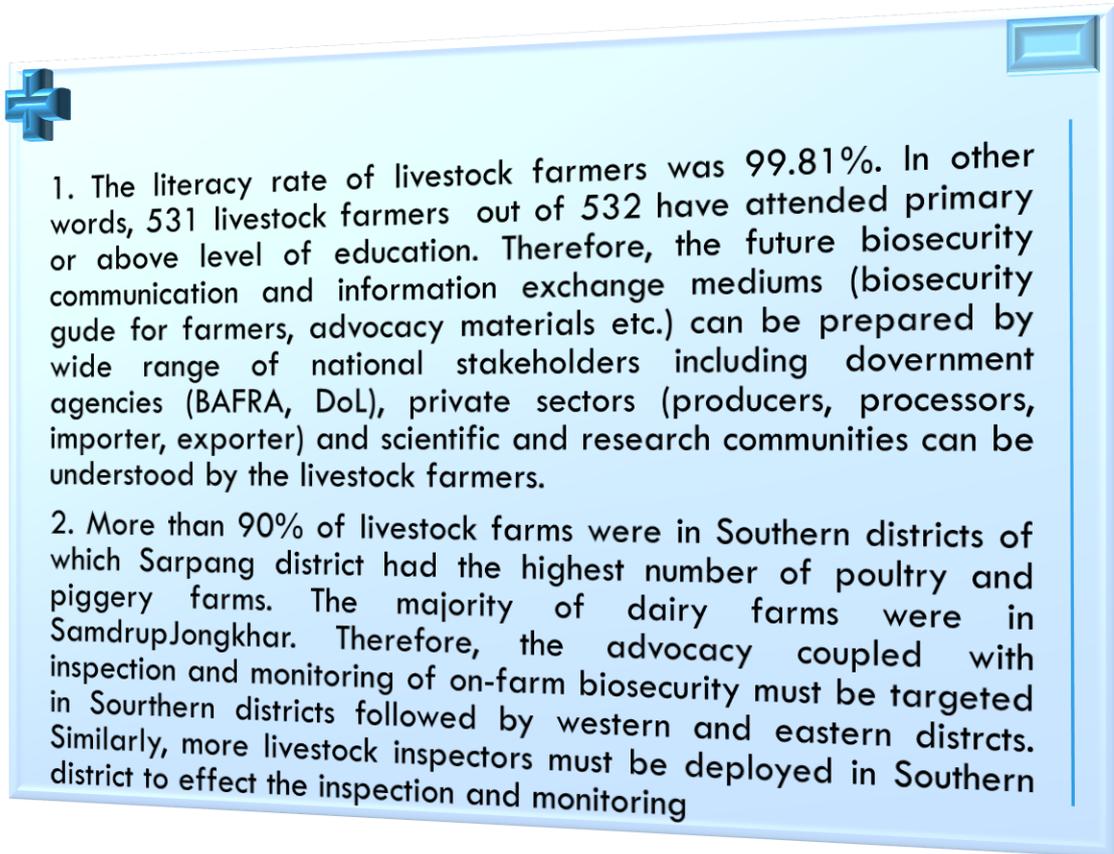
As per the Livestock Rules and Regulation 2017, livestock farmers are mandated to report any events or reporting triggers of suspected or confirmed diseases, unusual death of animals, and any diseases listed as notifiable diseases in the country to nearest livestock center or BAFRA. The reporting can be done through toll free numbers or visit to the centers. As per the survey, 29.5% (157/532) livestock farmers have experienced disease outbreaks in their farm in 2018. Out of which, 89.80% of the farms

have experienced at least one outbreaks in the farms. Between the livestock farms, dairy farmers have experienced more outbreaks 53.50% (84/157, that is about 40.29% (84/209) followed by poultry farm with 30.57% (48/157). When asked to name the disease outbreak experienced by the farms in 2018, 42.9% (36/84) of the dairy farmers have no idea about the disease, 28.8% (25/84) dairy farmers reported Foot and Mouth diseases outbreaks in the farm followed by mastitis 13% (11/84). The other disease outbreaks experienced by the dairy farmers were diarrheal disease, wound, black quarter, blue tongue and babesiosis. For pig farms, the disease outbreaks experienced by the farmers in 2018 are swine fever, FMD, wound and diarrhea. Similarly, poultry farmers experienced highest cases of coccidiosis followed by aflatoxin infection, IBD, and fowl cholera.

A total of 50% (256/532) of livestock farmers report animal sickness to nearest livestock centers or BAFRA office within 24 hours. However, the livestock farmers are less likely to report on animal mortality (39.6%) compared to animal morbidity.

As per the population and housing census of Bhutan 2017 report, agriculture sector provided about 43.9% of total employment in the country of which majority were taking up livestock farming. As per the survey report, more than 30.24% and 14.63% of the commercial poultry farmers rear cattle and pig respectively. Few of the poultry farmers also rear other livestock animals like goat, sheep, horse and fish in addition to cattle and pigs. Similarly, 22.9% of the commercial cattle farmers rear poultry birds at the farm. Likewise, more than half of the commercial pig farmers rear cattle. It is very evident from the survey that the practices of livestock farmers in the country to rear more than one livestock animals is very common.

## What the study recommends:

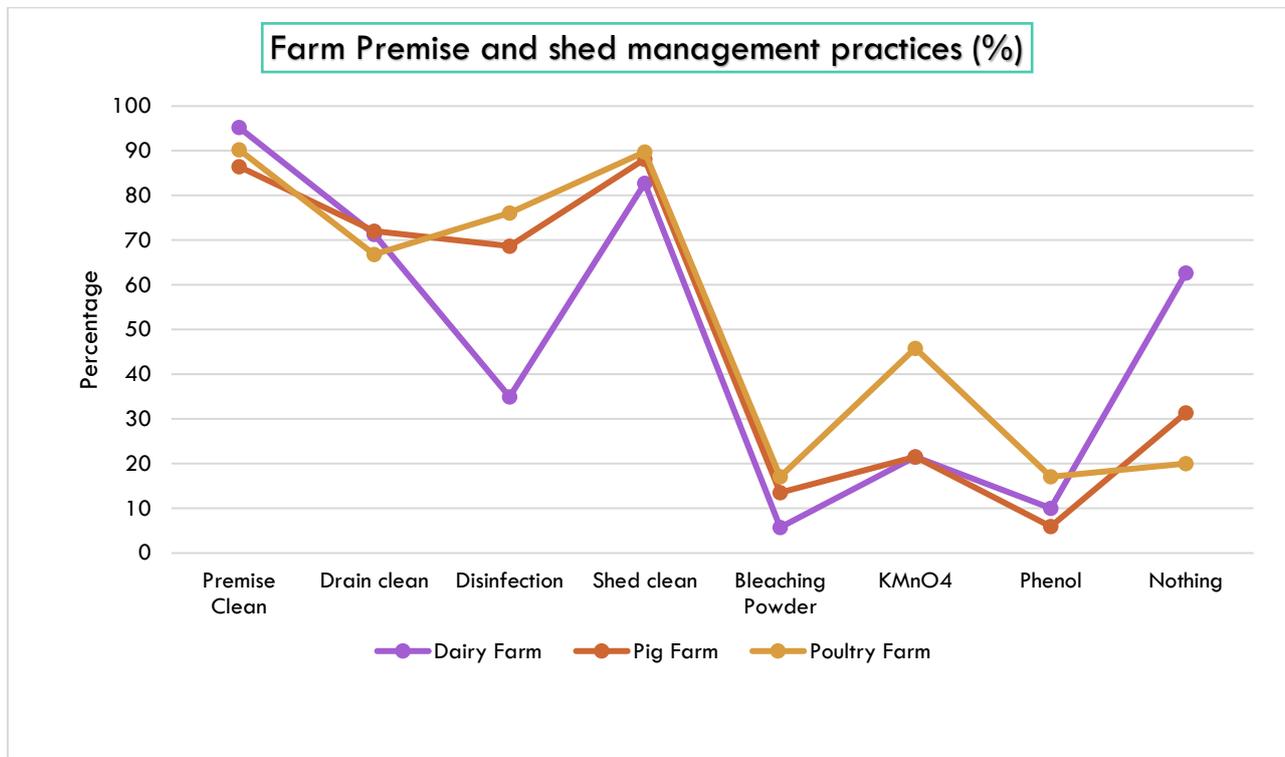


1. The literacy rate of livestock farmers was 99.81%. In other words, 531 livestock farmers out of 532 have attended primary or above level of education. Therefore, the future biosecurity communication and information exchange mediums (biosecurity guide for farmers, advocacy materials etc.) can be prepared by wide range of national stakeholders including government agencies (BAFRA, DoL), private sectors (producers, processors, importer, exporter) and scientific and research communities can be understood by the livestock farmers.
2. More than 90% of livestock farms were in Southern districts of which Sarpang district had the highest number of poultry and piggery farms. The majority of dairy farms were in SamdrupJongkhar. Therefore, the advocacy coupled with inspection and monitoring of on-farm biosecurity must be targeted in Southern districts followed by western and eastern districts. Similarly, more livestock inspectors must be deployed in Southern district to effect the inspection and monitoring

## Information on Operational Management of Livestock Farms

The operational management of livestock farms involves managing farm animals and supervising farm workers. The objective is to reduce or prevent disease incursion to the farm, optimize profit and sustainability of the farm. For a good livestock management, it requires knowledge of animal science and animal husbandry, as well as following best practices. The best practices in the farms includes caring of animal health, nutrition, reproduction, and hygienic practices in the farm. The knowledge on operation management of livestock farm in the country is important for regulatory authority to understand the level of best practices and accordingly devise frequency of inspection and monitoring visit to the farms.

## Farm Premise and Shed Management:



Graph (5): Graph showing Frequency of farm premise and shed management practices

As per the survey, More than 85% of the livestock farms have kept their animal shed premise and animal shed neat and clean during the survey period. The cleanliness of livestock farm premise was comparatively better in dairy farms followed by poultry farms. On the contrary, the cleanliness of the animal shed was observed better in poultry farms followed by pig farms. About 76% of the poultry and 68.6% of the pig farms carry out disinfection of shed and surrounding after cleaning. The practices of carrying out disinfection of shed and surrounding is below 40% in dairy farms which correlates to higher disease outbreaks reported in the dairy farms. The common disinfectant used in the livestock farms were phenol, bleaching powder and potassium permanganate. Usually, the choice of disinfectant by livestock farmers is potassium permanganate. About 45.9% of the poultry farmers and 21.53% of the dairy and pig farmers used potassium permanganate.

## Management of feed and water in the farm



Overall, 90.4% (481/532) of the livestock farms use commercial feed as source of feed for the animals. Between livestock farms, 98.1% (201/205) of the poultry farms use commercial feed followed by pig farms (88.14%).

When asked about the mode of purchase, majority of the livestock farms buy commercial feed from retailers (55.3%) and 25.1% of the livestock farms buy commercial feed from wholesales. About 8% of the livestock farms purchase feed directly from feed plant and remaining livestock farms produce their own feed.

In addition to commercial feed, pig farms also feed kitchen waste to the pigs. About 81.4% (96/118) of pig farms feed kitchen waste to pigs. When asked whether they cook kitchen waste to boiling temperature before feeding pigs, majority of the pig farmers (89.6%) cook and feed animals.

About 66.7% (355/532) livestock farms have separate room to store animal feed of which 77.4% of the farms have properly maintained the feed store (neat and clean).

When feed records were examined, only 43.2% of the livestock farms have maintained the records. Again, poultry farms (57.1%) were better in keeping the feed record followed by pig farms (41.5%).

In addition to feed, the livestock animals should have ad libitum access to portable water. The water storage tank should be protected from other domestic and wild animals particularly for poultry farms as fecal contamination from wild birds may introduce disease such as avian influenza in the farm. As per the survey, only 26.88% (143/532) of the livestock farms have access to portable water (water source treated) and these livestock farms were located in municipality areas. The regulatory staff during the inspection and monitoring visits to farms must encourage the farms to give portable water to animals. Further, the feed and water trough should also be cleaned regularly before and after feeding animals. As per the survey, about 88.2% (469/532) of the livestock farms have maintained feed and water trough cleaned.

### Management of waste in the farm:

The waste from the livestock farm can be broadly classified into two (liquid and solid waste). The liquid waste comprises of animal urine, excretion and secretion from the animals and used water from the farm. The solid waste in livestock comprises of bedding materials, animal feces and feed waste. The livestock farm should have plan and facilities to manage farm waste. The waste from the farms

when managed properly, it can be used as fertilizers and source of biogas contributing to income generation. On other hand, the improper management of farm waste can be source of disease outbreak and spread to the farm and other farms. Ideally, every livestock farms should have biological pit with adequate capacity based on the size of the farm and it should be properly fenced to keep away other livestock animals and with proper signage.

### Biological Pit

- Only 33.8% (180/532) of the livestock farms have biological pit for management of farm waste
- The poultry farms (47.3%) are more likely to have biological pit compared to pig farm (30.51%) and dairy farms (22.5%).

### Fencing of biological pit

- When surveyer inspected the biological pit, only 11.1% of the livestock farm have fenced biological pits.
- Comparatively, poultry farms were better complaint with 17% followed by pig farms (11.9%).

### Animal Processing facility

- Overall, 44.6% of the poultry and pig farms process animal at the farms. Majority of the pig farms (63.6%) process animal at farm out of which only 18.7 % of the farms have basic facility for porcessing animals. On the contrary, 33.7% of poultry farms process birds at farm of which 47.8% have basic facility.

## Personal Protective Equipment at Farm

All livestock farms should have basic personal protective equipment at farms for the farm workers and visitors. The correct use of personal protective equipment for correct activities will prevents accidents and ensure workers and animal safety. The components of PPE includes eye google, hand gloves, head gear, gumboot and apron. The eye google and gloves are required at the farm during mixing of chemicals for disinfection.

Personal protective Equipments	Types of Farm	% of farms with PPE
Gloves (25.7%)	Dairy Farms	16.3
	Pig Farms	29.7
	Poultry Farms	33.2
Face mask (34.1%)	Dairy Farms	14.8
	Pig Farms	32.5
	Poultry Farms	54.6
Farm Boot (72.6%)	Dairy Farms	65.5
	Pig Farms	73.7
	Poultry Farms	79
Farm Coat/Apron (17.7%)	Dairy Farms	11
	Pig Farms	13.6
	Poultry Farms	26.8
Head Gear (4.5%)	Dairy Farms	1.4
	Pig Farms	2.5
	Poultry Farms	8.8

**Table (3): Summary of PPE use in livestock farm**

As per the survey, majority of the livestock farms have farm boot (72.6%). About 34.1% of the farm have face mask and 25.7% have hand gloves. The livestock farms are less likely to use apron and head gear at the farm as part of PPE. Overall, poultry farms are more likely to have farm PPE compared to other livestock farms.

## Knowledge and Understanding of Livestock Commercial Farmers on National Animal Biosecurity System.

The survey was conducted to evaluate the knowledge and understanding of commercial livestock farmers on national animal biosecurity system in the country. The participants were assessed on the knowledge on the elements of national animal biosecurity system such as surveillance, specific import requirements for livestock and their products, animal quarantine, inspection and monitoring of livestock and their produce, and regulation on their movement in the country. The participants were asked to rate their understanding and caste opinion on the elements of national animal biosecurity system in the country. Furthermore, the participants were asked on the economic impact of animal biosecurity breach on social, economic, environments and health of humans.

### Importance and Understanding of Animal Biosecurity

#### Understanding of Biosecurity



- About 67.6 % of the commercial livestock farmers have fair understanding of animal biosecurity system in the country (rating '4' to '6' on the scale of 0-10) and 20 % of the farmers have good knowledge on biosecurity (rating 7-10).
- On the contrary, 15.2 % have poor understanding rating 0-3 on the scale of 0-10.
- Farmer with higher education level are more likely to rate their understanding on biosecurity as good.
- Young farmers are more likely to rate their understanding highly on biosecurity (7-10).
- However, between the farms, there is no difference in understanding level of biosecurity.

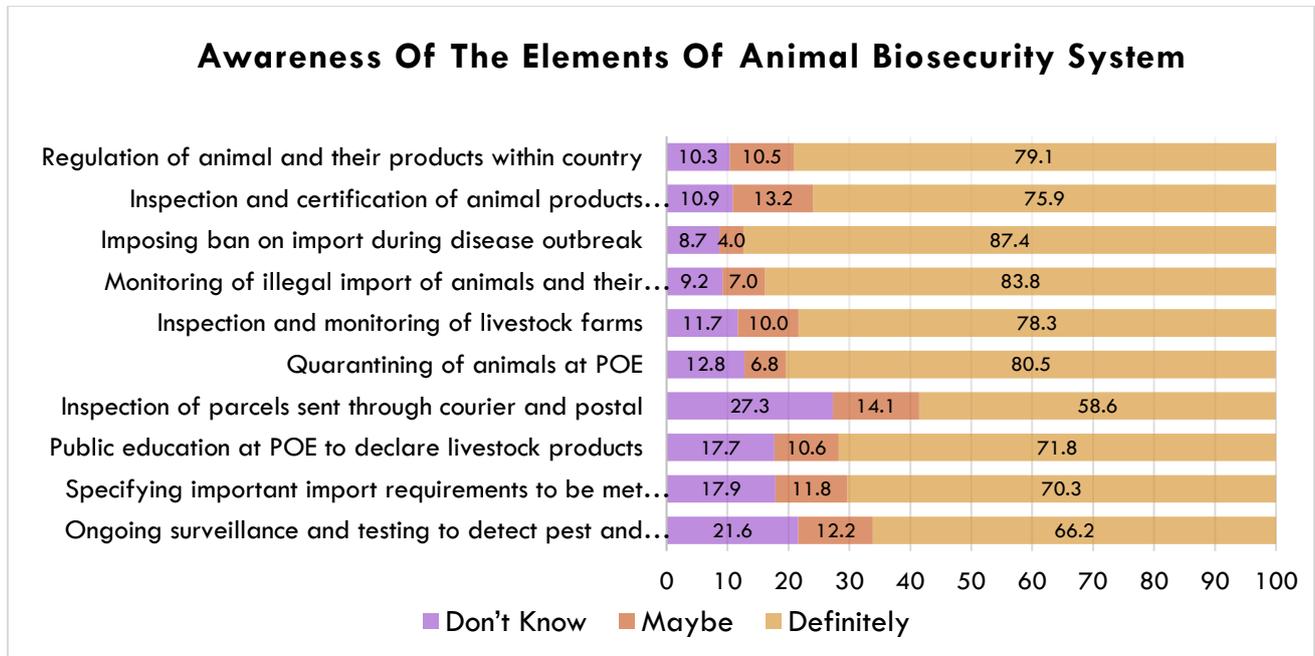
#### Importance of Biosecurity



- The majority of the farmers generally feels biosecurity is important. About 90.8% of the farmers acknowledge that biosecurity is extremely/highly important. When probed, more than 75% of the farmers mention impact a biosecurity have on environment, food source, disease elimination and control, trade, economy and spread to human.
- There is strong agreement between the farmers on the importance of biosecurity. There is no difference between level of education and age category of farmers on importance of biosecurity.

## Awareness of Livestock farmers on the Elements of the Animal Biosecurity system

To understand the knowledge of livestock farmers on the elements of national animal biosecurity system, participants were interviewed on the essential biosecurity elements which are daily to strengthen the national biosecurity system.



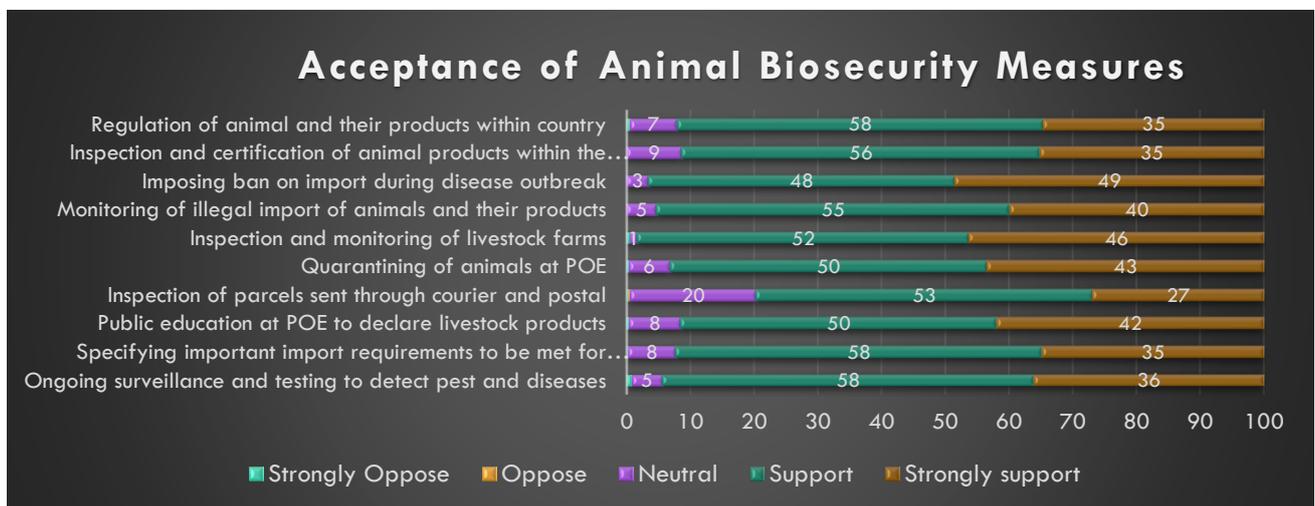
Graph (6): Graph showing Frequency of Farmers understanding on Elements of animal biosecurity

As per the survey, majority of the farmers are familiar with the elements of animal biosecurity system of the country. However, on average, less than 25% of the farmers are still not sure or do not know about the animal biosecurity system in the country when probed further. More than 75% of the respondent are confident that the national animal biosecurity system involves imposing ban on import of animals and their products when there is outbreak of diseases in the country; monitoring of illegal movement of animals and their products at the border; there are regulation of animal and their products within the country; inspection and certification of animal products and animal farms; and quarantining of animals at the point of entry during the import. The reason could be because, these elements of biosecurity system are directly related to livestock farming and which they have undertaken during the farming. For the biosecurity elements such as ongoing surveillance and testing for detection of pest and diseases; specifying specific import requirements; public education at point of entry on declaration of livestock products and inspection of parcels sent through courier, the understanding rating of the farmers are between 58-62% and may be contributed by the fact that these elements of the biosecurity

are usually not directly executed by farmers at the farms and are therefore, taken up by only specific section of the respondents such as importers, exporters and travelers etc.

### Social acceptance of biosecurity measures

Currently, there is colossal support from the farmers on the elements of animal biosecurity system in the country. More than 90% of the farmers strongly supports existing biosecurity measure and activities implemented by government in managing or controlling biosecurity risk. A minority (<10%) of the farmers choose to remains neutral on the biosecurity measures implemented by government. The farmers who remain neutral are either not aware about the biosecurity measures or choose not to express their opinion. Across the biosecurity measures included in the survey, the support is strongest for inspection and monitoring of livestock farms (98%). The support is lowest for inspection of parcels sent through couriers services by BAFRA officials (80%).



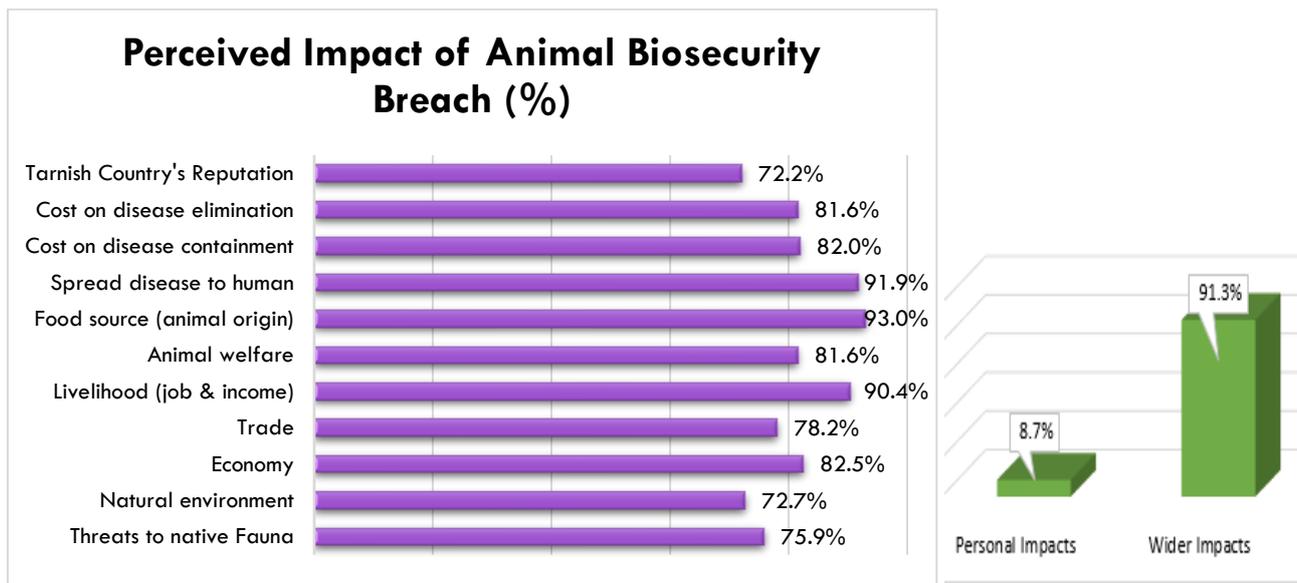
Graph (7): Graph showing percentage of Acceptance of animal biosecurity measures.

### Perception on Impact from biosecurity Breach

To understand the perceived impacts of the consequence of animal biosecurity breach in the country, the participants were asked to rate their opinion on how a biosecurity breach would directly or indirectly affect their lives (personal relevance versus wider relevance). The response reveals that 91.3% of the respondents perceived that there will be wider impacts should there be a breach of animal biosecurity system. However, minority (8.7%) of the respondents mention personal impacts suggesting that personal relevance is lacking for many commercial livestock farmers.

Further analyses of verbatim response revealed that the impact on food source (93%); spread of diseases to human - Impact human health (91.9%) and impact on livelihood - Jobs & income (90.4%) looms largest in the mind of commercial livestock farmers should there be breach of animal biosecurity

system. Overall, more than 70% of the livestock farmers feels the diverse impact of animal biosecurity breach includes; impact on food source of animal origin; disruption of economy and trade; threats to environments and native fauna; compromise the welfare of animals; threat of disease transmission to humans, affect the livelihood of farmers through loss of income and jobs; loss to the economy of the country through expenses on disease outbreak containment and elimination; and tarnish the image of country.



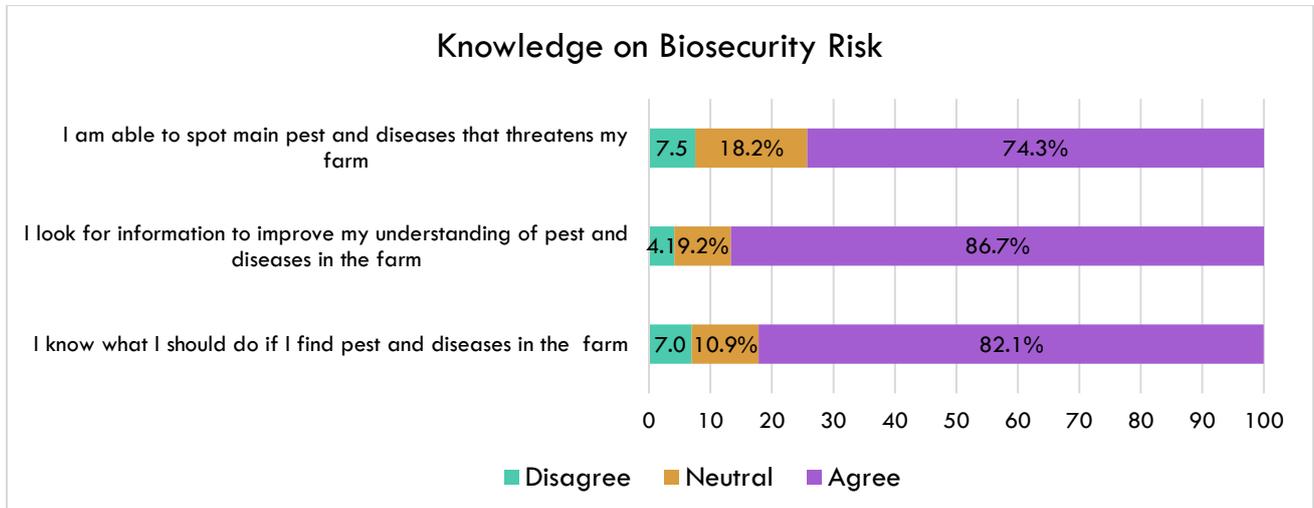
Graph (8): Graph showing percentage of perceived impacts of consequence of animal biosecurity breach.

### Knowledge of Animal Biosecurity risks and perception of information available on the risks

The respondents were asked whether they could able to identify or spot pests and diseases in the farms and what they do if they find unwanted pests and diseases in the farms. About 74.3% of the farmers responded that they are able to identify pests and diseases in their farms. Similarly, 7.5% of the respondents do not know what to do – either disagreeing or saying don't know. The remaining 18.2% neither agree nor disagree with the statement indicating they are uncertain about what they should do. Between the farms, the poultry farmers (80.5%) are in better position to identify the biosecurity risk to their farms. The level of education is directly correlated to identifying biosecurity risk to their farms (i.e. higher the level of education of the farmers, better is their ability to identify biosecurity risk.

Similarly, 82.1% of the livestock farmers are confident that they are able to take right action if they spot or identify pests and diseases in the farms. Between the farms, the poultry and piggery farmers (87%) are more confident in taking action against pests and diseases in the farms compared to dairy farms (73.95). The young farmers (88%) (15 -24 years) are more confident than adult (82%) and senior

(84%) in taking action against identified biosecurity risks. About 86.7% of the livestock farmers say they look for information to improve their knowledge and understanding on biosecurity risks. Whilst, minority of the farmers (4.1%) do not look for information on biosecurity risks at all (graph 9).

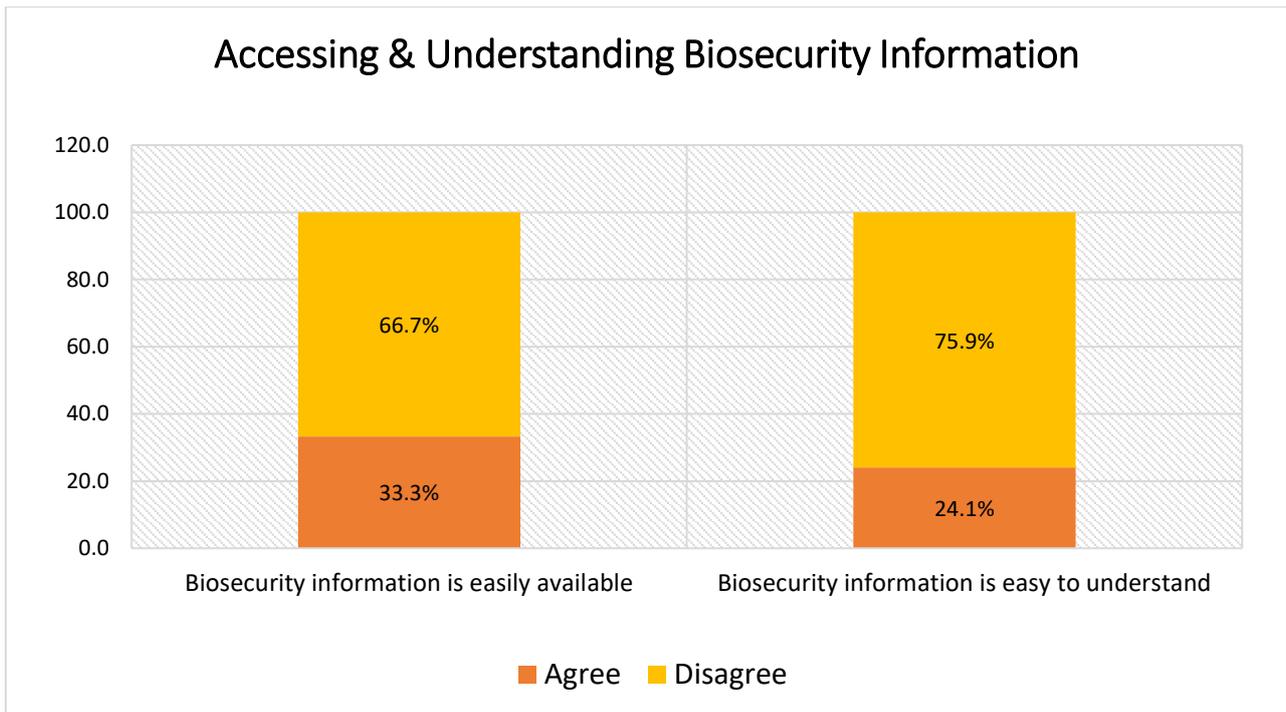


Graph (8): Graph showing percentage of farmer’s knowledge on biosecurity risk.

The farmers are more likely to contact authorities (91.54%) if they notice pests and diseases in their farms. About 5.56% of the respondents would do something, 1.9% contact people they trust and 1% would do their own research online on the pests and diseases. When asked about the contact point of authorities, about 78.9% of the respondents contact department of livestock, followed by local government (7.52%), and BAFRA (6.76%). Furthermore, farmers also contact knowledgeable person in their family circle (5.83%) and local cooperatives (0.94%).

Bhutan Agriculture and Food Regulatory Authority has developed many biosecurity materials for the general public and livestock farmers. The biosecurity materials were made accessible through BAFRA web, social media, and printed forms. To assess the effectiveness of the reach of biosecurity information materials and understanding of the content, the respondents were asked to rate their opinion on the same. More than half of the respondents (66.7%) strongly disagree that the biosecurity information materials are accessible to them and almost two third of respondents are dairy and piggery farmers. Only one in three (33.3%) of the farmers/respondents agree that the biosecurity information materials are easily accessible and about 87.50% of the respondents are young farmers.

When it comes to the understanding of the available biosecurity information materials, more than 75% of the farmers disagree and there is no difference between the livestock farmers, age group and qualification.

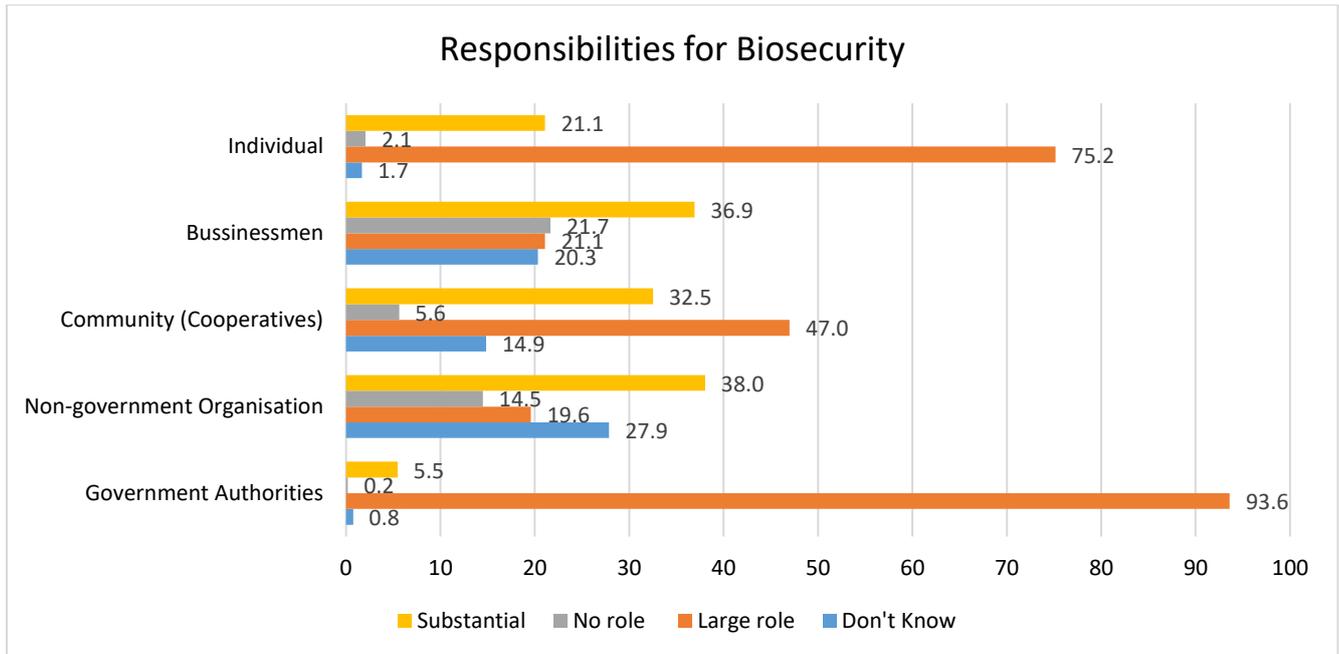


Graph (9): Graph showing percentage of farmer's perception on access and understanding of biosecurity information materials.

### Biosecurity Responsibility

Biosecurity is a shared responsibility meaning everyone takes responsibility for biosecurity matters under their control. The competent authority play the primary role in a contemporary integrated approach to biosecurity and other government agencies such as trade, customs, tourism, and specialist interest groups like livestock producers, non-governmental organizations and general public can also play vital role in areas of surveillance and incursion response activities.

As per the survey, more than 75% of the respondents feel, the government agencies and individual have larger roles in strengthening national biosecurity. Almost 94% of the respondents are in the opinion that government has larger role in national biosecurity. The response is in tandem to respondents contacting government authorities (92%) should they notice pests and diseases. Similarly, the respondents were I the opinion that other stakeholders' such as businessmen, cooperatives and communities and non-governmental organization have substantial roles (32-38%) for national biosecurity. Among the stakeholders, the respondents were in the opinion that the businessmen and NGOs have the least role in Biosecurity. Overall, the survey has well established that the biosecurity is shared responsibility.



Graph (10): Graph showing the roles of stakeholders in national biosecurity (%).

## What the Survey Recommends:

1. Considering the low compliance of farm access facility at livestock farms, there is high probability of disease spread to the farm through free access of people, vehicle and animals. Therefore, the concerned authority should conduct regular inspection and monitoring of farms and advice the farms to establish basic farm access facility. These basic access facility should be included in the farm biosecurity checklist. The inspector during the inspection must involve farm owner/manager and make them understand about the need and benefits of such facility in place.
2. The livestock farmers in general have high compliance to vaccination and deworming as required by the livestock rules and regulation 2017. However, the record keeping of the farmers are very poor. The livestock farmers are more compliant to record keeping on livestock produce and least complaint on maintaining records on treatment, vaccination, deworming, mortality

and feed stock. From the biosecurity lens, the record keeping is imperative element for traceability, recall and pinning the source of disease outbreak in the farm. A separate training for livestock farmers needs to be conducted on record keeping.

3. The majority of the farmers have no waste management plan of facility as per the survey. The waste from the farms must be properly managed to reduce the biosecurity risk (disease spread to farms and people) and also from food safety perspective. All farmers should have biological pit with proper signage and it should be fenced to prevent from wild animals. The inspector during the inspection should incorporate the mandatorily need of biological pit for each commercial farms.
4. For poultry and pig farms, the animals were processed at the farm. However, as per the survey, less than 20% of the farms have basic animal processing facility. This could significantly compromise the good hygienic practices contributing to food safety issues. The regulators should encourage the livestock farmers especially pig and poultry farmers to come up with slaughter house for their locality wherein the inspectors and carry out Ante-mortem and Post-mortem inspection regularly to ensure the food safety.

## References

- BAFRA, 2015. In-country livestock biosecurity guideline. 1, 49.
- Bhutan, 2010. Biosecurity policy of the kingdom of Bhutan. 6.
- DoFPs, 2018. Forests facts and figures. 1, 34.
- FAO, 2007. FAO biosecurity toolkit. Food & Agriculture Org.
- NBC, 2014. National biodiversity strategies and action plan. 1, 173.

## Annexure: Questionnaire

### Study: A Cross-sectional survey on “On-farm Biosecurity in commercial farms in the country”

#### Information Sheet:

The Biosecurity Policy of the Kingdom of Bhutan 2010 designates Bhutan Agriculture & Food Regulatory (BAFRA), MoAF, as the National Competent Authority to coordinate all biosecurity related activities in the country. As per the Biosecurity Policy, one of the main mandates of BAFRA is to implement sanitary and phytosanitary measure effectively to protect the health and life of humans, animal, and environment including the national biosecurity from the risk of entry, establishment and spread of exotic pests and diseases, and invasive alien species to promote and facilitate international trade. In line to the Biosecurity Policy, BAFRA has established Biosecurity system such as, quarantine stations, biosecurity guidelines, standard operating procedures, etc. to strengthen the implementation of animal biosecurity in the country. Therefore, it is imperative to understand and assess the biosecurity practices in the livestock commercial farms and their perception on Bhutan biosecurity system. The information will help BAFRA in identifying biosecurity risks, gaps in biosecurity system and accordingly come up with good recommendation in strengthening Bhutan biosecurity system.

#### Inclusion Criteria:

- ❖ For this study, the questionnaire will be administered to the livestock commercial farms in the country. The livestock commercial farms included for the study are; dairy, piggery and poultry farms. The government farms will also be included in the study.
- ❖ Dairy commercial farm for the study is defined as farm which has more than or equal to five milch animals and has permanent cattle shed at the time of the interview.
- ❖ Piggery commercial farm for the study is defined as farm which has more than or equal to five adult pigs or fattening pigs and has pigsty at the time of interview.
- ❖ Commercial poultry farm for the study is defined as farm which has more than or equal to 500 birds and has permanent poultry shed at the time of interview.

#### Consent

I have been invited to participate in this study on “On farm Biosecurity level in livestock commercial farms in the country”. I have read the participant information sheet. I consent voluntarily to participate in the above study. I understand that my participation is voluntary, and that I can withdraw from this study at any time. This will not affect my relationship with any organization or authorities

Name & Signature:

Date:

**ASSESSMENT OF BIOSECURITY PRACTICES IN LIVESTOCK COMMERCIAL FARMS IN THE COUNTRY****QUESTIONNAIRE FORM****Questionnaire No.:**

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(3 digit for Office code, next 3 digit for type of farm and last 2 digit for questionnaire number)

**A. Interviewer's Information**

<b>Interviewer's name:</b>	
<b>Date of the interview (DD/MM/YY):</b>	

**B. Livestock Farms Information**

<b>B01.</b>	<b>Name of Owner:</b>		
<b>B02.</b>	<b>Gender of the Owner:</b>	<input type="checkbox"/> Male	<input type="checkbox"/> Female
<b>B03.</b>	<b>Age of Owner:</b>	In years:	<input type="text"/> <input type="text"/>
<b>B04.</b>	<b>Highest education qualification attained</b>		
<b>B05.</b>	<b>Location of Farms</b>	Dzongkhag:	
		Dungkhag:	
		Gewog:	
		Village:	
		Mobile Number of the respondent:	+975 -
<b>B06.</b>	<b>Geo Coordinates</b>	X - Coordinates	Y - Coordinates

<b>B07.</b>	<b>Type of Livestock farm:</b>	<p><i>(Please tick ( ) one)</i></p> <p><input type="checkbox"/> Dairy farming      <input type="checkbox"/> Pig farming</p> <p><input type="checkbox"/> Layer farming      <input type="checkbox"/> Broiler farming</p>				
<b>B08.</b>	<b>Size of the farm</b>	<p>Numbers (total heads):</p> <table border="1" data-bbox="786 510 1086 589"> <tr> <td style="width: 25px; height: 25px;"></td> </tr> </table>				
<b>B09.</b>	<b>For how long the farm has been in operation?</b>	<p>Months: <table border="1" data-bbox="978 674 1158 745"> <tr> <td style="width: 25px; height: 25px;"></td> <td style="width: 25px; height: 25px;"></td> </tr> </table></p>				

**C. INFORMATION ON ACCESS MANAGEMENT (People & Vehicle):**

<b>C01.</b>	<b>Does the farm have perimeter fencing or geographical features acting as a fence?</b>	<p><i>(Please tick ( ) one)</i></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No      <input type="checkbox"/> Partially</p>
<b>C02.</b>	<b>Does the farm perimeter have functioning gate for vehicle?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No      <input type="checkbox"/> Partially</p>
<b>C03.</b>	<b>If yes to C02, did the farm close the functioning gate to prevent the entry of vehicles?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No      <input type="checkbox"/> Partially</p>
<b>C04.</b>	<b>If yes to C03, is there a vehicle disinfection point set at the functioning gate for disinfection of vehicles?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No      <input type="checkbox"/> Partially</p>
<b>C05.</b>	<b>If yes to C04, Does the farm change the disinfection point daily?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> Yes      <input type="checkbox"/> No      <input type="checkbox"/> sometimes</p>

<b>C06.</b>	<b>Does the farm perimeter have functioning gate for people?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially			
<b>C07.</b>	<b>If yes to C06, did the farm close the functioning gate to prevent the entry for people?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially			
<b>C08.</b>	<b>If yes to C07, is there disinfection point set at the functioning gate for people (foot dip)?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially			
<b>C09.</b>	<b>If yes to C08, Does the farm change the foot dip daily?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> sometimes			
<b>C10.</b>	<b>Is there biosecurity sign board to inform visitors of the Biosecure Area?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>C11.</b>	<b>If yes to C10, Is there biosecurity sign board as per the In country Livestock Guideline 2014?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>C12.</b>	<b>How far is the farm located from the vehicle road?</b>	<i>Please answer in Km</i>  <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> <td style="width: 30px; height: 20px;"></td> </tr> </table>			
<b>C13.</b>	<b>Did the farm-maintained visitors' log book to record visitors visiting the farm?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially			
<b>C14.</b>	<b>If yes to C13, Does the visitors' log captures basic information as listed in the attached annexure?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>C15.</b>	<b>Is there a change room facility before entering the farms?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No			

<b>C16.</b>	<b>If yes to C15, is there following facilities in the change room</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Farm lab coat/Dangri <input type="checkbox"/> Gumboot <input type="checkbox"/> Foot dip <input type="checkbox"/> Face mask
<b>C17.</b>	<b>Is there foot disinfectant dip available at the entrance for each animal shelter?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>C18.</b>	<b>If yes to C17, Did the farm change the foot dip every day?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>C19.</b>	<b>Is there a hand washing facilities for visitors in the farm?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially
<b>C20.</b>	<b>If yes to C15, is there basic hand washing facilities running water, towel and soap for hand washing?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Running water <input type="checkbox"/> Soap/hand sanitizers <input type="checkbox"/> Towel
<b>C21.</b>	<b>Do the farm have waste bin to collect dirty materials used by the visitors at the exit gate?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially
<b>C22.</b>	<b>Is there outlay/map of the entire farm with clear demarcation of zones with direction displayed at the main entrance gate?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Partially

**D. Information on Animal Health Management:**



<b>D12.</b>	<b>Did the farm maintain animal/poultry mortality records?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D13.</b>	<b>Do the farm maintain animal stock register</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D14.</b>	<b>Were the animals properly identified by identification marks (temporary/permanent)?(skip for poultry)</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D15.</b>	<b>Did the farm maintain animal treatment record?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D16.</b>	<b>Did the farm maintain record on livestock produce from the farm?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D17.</b>	<b>Did the farm experience any disease outbreak in last one year?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D18.</b>	<b>If yes to D18, how many outbreaks in last one year?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> 1 time <input type="checkbox"/> 2 times <input type="checkbox"/> 3 times <input type="checkbox"/> 4 times
<b>D19.</b>	<b>Did the farm report about animal sickness to DoL/BAFRA within 24 hours?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>D20.</b>	<b>Did the farm report about animal death to DoL/BAFRA within 24 hours?</b>	<i>Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No

D21.	If yes to D18, name the disease outbreaks they experience in last one year?	Name:
D22.	Did the farm keep other livestock animals?	Please tick (✓) one <input type="checkbox"/> Yes <input type="checkbox"/> No
D23.	if yes to D23, what are the other livestock animal they keep	(Please tick (✓) one or more)  <input type="checkbox"/> cattle <input type="checkbox"/> pigs <input type="checkbox"/> sheep <input type="checkbox"/> goat <input type="checkbox"/> horse <input type="checkbox"/> poultry

**E. INFORMATION ON OPERATIONAL MANAGEMENT:**

E01.	Did the farm purchase / import, feed?	(Please tick (✓) one) <input type="checkbox"/> Yes <input type="checkbox"/> No
E02.	If yes to E01, from where do they purchase/ Import?	(Please tick (✓) one)  <input type="checkbox"/> Wholesaler <input type="checkbox"/> Retailer  <input type="checkbox"/> Direct purchase from feed Plant

<b>E03.</b>	<b>Is there separate store for animal/poultry feed?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E04.</b>	<b>If yes to E03, Is the feed store clean and properly maintained from rats/insects?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E05.</b>	<b>Do the farm keep record of feed stock?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E06.</b>	<b>Is the water source/ tank for their farm treated?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E07.</b>	<b>Is there separate water and feeding trough for animal/poultry?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E08.</b>	<b>Were the feed and water trough kept clean after feeding?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E09.</b>	<b>Is there a biological Pit in the farm?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E10.</b>	<b>Is the biological pit properly fenced to prevent access from wild animals and dogs?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E11.</b>	<b>Do the farm have their own farm equipment?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E12.</b>	<b>If no to E11, do they borrow/share farm equipment with nearby farms?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E13.</b>	<b>If yes to E12, Do they wash and disinfect the farm equipment before and after use?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No

		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E14.</b>	<b>Do the farm hire labor?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E15.</b>	<b>If yes to E14, do the labor follow basic hygiene practices such as handwashing, change of farm boots, etc. before working and after working in the farm?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E16.</b>	<b>Is there basic Personal Protective equipment in the farms?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Gloves <input type="checkbox"/> Mouth cover <input type="checkbox"/> Farm boots <input type="checkbox"/> Head gear <input type="checkbox"/> Goggles <input type="checkbox"/> Apron
<b>E17.</b>	<b>Do the farm workers wear PPE during farm works?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E18.</b>	<b>If yes to E17, what are the basic PPE they put on for their farm work</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Gloves <input type="checkbox"/> Mouth cover <input type="checkbox"/> Farm boots <input type="checkbox"/> Head gear <input type="checkbox"/> Goggles <input type="checkbox"/> Apron
<b>E19.</b>	<b>For pig &amp; poultry farm, do they process the animal at the farm?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No

<b>E20.</b>	<b>If yes to E20, Do they have separate facility for processing/slaughter?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E21.</b>	<b>If yes to E20, does the farm has facility to manage its by-products (offal, blood, manure, etc.?)</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E22.</b>	<b>For pig farm, do they feed kitchen waste?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E23.</b>	<b>If yes to E22, do they cook kitchen waste (meat) at boiling temperature?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E24.</b>	<b>Do the farm(s) keep the animal/poultry shed neat and clean?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E25.</b>	<b>Does the farm carryout disinfection of animal/poultry shed using disinfectant?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E26.</b>	<b>What is the common disinfectant they use in the farm?</b>	<b>Name:</b>
<b>E27.</b>	<b>Does the farm carryout fumigation of animal/poultry shed at regular interval?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E28.</b>	<b>Did the farm clear off the bushes and shrubs around the animal/poultry shed premise?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E29.</b>	<b>Did the farm maintain the animal shelter drainage system properly?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No
<b>E30.</b>	<b>Did the farm member receive any training on animal farm biosecurity in the past?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No

**F. Knowledge, Attitude & Practices of livestock Commercial owners on Animal Biosecurity:**

F01.	<b>How would you rate your understanding as to what the term biosecurity means?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Not important at all</i></p> <p><input type="checkbox"/> <i>Fairly important</i></p> <p><input type="checkbox"/> <i>Moderately important</i></p> <p><input type="checkbox"/> <i>Highly important</i></p> <p><input type="checkbox"/> <i>Extremely Important</i></p>
F02.	<b>How important is it to protect Bhutan from unwanted pests and diseases of animals?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Not important at all</i></p> <p><input type="checkbox"/> <i>Fairly important</i></p> <p><input type="checkbox"/> <i>Moderately important</i></p> <p><input type="checkbox"/> <i>Highly important</i></p> <p><input type="checkbox"/> <i>Extremely Important</i></p>
F03.	<b>As far as you know, do you think the Bhutan Animal Biosecurity system involves .....</b>	<p><i>(Please tick (✓) one)</i></p>
F03a.	<b>On going surveillance and testing within Bhutan to detect specific pest and diseases by DoL?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Definitely</i>   <input type="checkbox"/> <i>Don't Know</i></p> <p><input type="checkbox"/> <i>Maybe</i></p>
F03b.	<b>Specifying import requirement/conditions that must be met before products are / can be imported?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Definitely</i>   <input type="checkbox"/> <i>Don't Know</i></p>

		<input type="checkbox"/> Maybe
<b>F03c.</b>	<b>Gathering information on pest and diseases that pose risk to Bhutan by BAFRA &amp; DoL?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03d.</b>	<b>Public education campaigns at Entry points (road &amp; airport) to encourage people to declare and dispose of item that may contain pest and diseases?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03e.</b>	<b>Inspection of parcels (courier, postal, etc.) by BAFRA officials</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03f.</b>	<b>Quarantining of animals at the entry points for import of animals?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03g.</b>	<b>Inspection of on farm biosecurity by BAFRA official?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03h.</b>	<b>Monitoring of illegal import of animal and their products?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know  <input type="checkbox"/> Maybe
<b>F03i.</b>	<b>Imposing ban on import of animal &amp; their products during disease outbreaks?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know

		<input type="checkbox"/> Maybe
<b>F03j.</b>	<b>Inspection and certification of animals &amp; their products in the country?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know <input type="checkbox"/> Maybe
<b>F0k.</b>	<b>Regulation of movement of animal &amp; their products within the country?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Definitely <input type="checkbox"/> Don't Know <input type="checkbox"/> Maybe
<b>F04.</b>	<b>How much would you oppose or support the following biosecurity measures to prevent the incursion, spread and establishment of pest and disease in the country?</b>	<p><i>(Please tick (✓) one)</i></p>
<b>F04a.</b>	<b>Ongoing surveillance and testing within Bhutan to detect specific pest and diseases by DoL?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Strongly oppose <input type="checkbox"/> Oppose <input type="checkbox"/> Neutral <input type="checkbox"/> Supports <input type="checkbox"/> Strongly supports
<b>F04b.</b>	<b>Specifying import requirement/conditions that must be met before products can be imported?</b>	<p><i>(Please tick (✓) one)</i></p> <input type="checkbox"/> Strongly oppose <input type="checkbox"/> Oppose <input type="checkbox"/> Neutral <input type="checkbox"/> Supports <input type="checkbox"/> Strongly supports

<b>F04c.</b>	<b>Gathering information on pest and diseases that pose risk to Bhutan by DoL &amp; BAFRA?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Strongly oppose</i></p> <p><input type="checkbox"/> <i>Oppose</i></p> <p><input type="checkbox"/> <i>Neutral</i></p> <p><input type="checkbox"/> <i>Supports</i></p> <p><input type="checkbox"/> <i>Strongly supports</i></p>
<b>F04d.</b>	<b>Public education campaigns at Entry points (road &amp; airport) to encourage people to declare and dispose of item that may contain pest and diseases?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Strongly oppose</i></p> <p><input type="checkbox"/> <i>Oppose</i></p> <p><input type="checkbox"/> <i>Neutral</i></p> <p><input type="checkbox"/> <i>Supports</i></p> <p><input type="checkbox"/> <i>Strongly supports</i></p>
<b>F04e.</b>	<b>Inspection of parcels (courier, postal, etc.) by BAFRA officials at the Entry Points</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Strongly oppose</i></p> <p><input type="checkbox"/> <i>Oppose</i></p> <p><input type="checkbox"/> <i>Neutral</i></p> <p><input type="checkbox"/> <i>Supports</i></p> <p><input type="checkbox"/> <i>Strongly supports</i></p>
<b>F04f.</b>	<b>Quarantine of animals at the entry points for import of an animals?</b>	<p><i>(Please tick (✓) one)</i></p> <p><input type="checkbox"/> <i>Strongly oppose</i></p> <p><input type="checkbox"/> <i>Oppose</i></p> <p><input type="checkbox"/> <i>Neutral</i></p>

		<input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F04g.</b>	<b>Inspection of on farm biosecurity by BAFRA officials ?</b>	<p><b><i>(Please tick (✓) one)</i></b></p> <input type="checkbox"/> <i>Neutral</i> <input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F04h.</b>	<b>Monitoring of illegal import of animal and their products?</b>	<p><b><i>(Please tick (✓) one)</i></b></p> <input type="checkbox"/> <i>Strongly oppose</i> <input type="checkbox"/> <i>Oppose</i> <input type="checkbox"/> <i>Neutral</i> <input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F04i.</b>	<b>Imposing ban on import of animal &amp; their products during disease outbreaks?</b>	<p><b><i>(Please tick (✓) one)</i></b></p> <input type="checkbox"/> <i>Strongly oppose</i> <input type="checkbox"/> <i>Oppose</i> <input type="checkbox"/> <i>Neutral</i> <input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F04j.</b>	<b>Inspection and certification of animals &amp; their products in the country?</b>	<p><b><i>(Please tick (✓) one)</i></b></p> <input type="checkbox"/> <i>Strongly oppose</i> <input type="checkbox"/> <i>Oppose</i> <input type="checkbox"/> <i>Neutral</i>

		<input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F04k.</b>	<b>Regulation of movement of animal &amp; their products within the country?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> <i>Strongly oppose</i> <input type="checkbox"/> <i>Oppose</i> <input type="checkbox"/> <i>Neutral</i> <input type="checkbox"/> <i>Supports</i> <input type="checkbox"/> <i>Strongly supports</i>
<b>F05.</b>	<b>What do you think, are the likely impacts of the introduction of an unwanted pests and diseases into Bhutan?</b>	<i>(Please tick (✓) one)</i>
<b>F05a.</b>	<b>Threats to native fauna?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05b.</b>	<b>Destroy our natural environment?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05c.</b>	<b>Damage/loss of different species (birds, insects, animals, etc.)?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05d.</b>	<b>Watery Fisheries?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05e.</b>	<b>Adversely affect country economy?</b>	<i>(Please tick (✓) one)</i> <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know

<b>F05f.</b>	<b>Affect trade (export &amp; import) with other countries?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05g.</b>	<b>Impact on livelihoods/loss of income/jobs?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05h.</b>	<b>Endanger animals/livestock welfare?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05i.</b>	<b>Affect food source/supplies (meat, milk, fish, etc.)?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05j.</b>	<b>Affect people health/wellbeing?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05k.</b>	<b>Can spread disease to human?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05l.</b>	<b>Incurs Financial cost for containments of disease outbreaks?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05m.</b>	<b>Incurs Financial cost for disease eradication?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05n.</b>	<b>Can tarnish image/reputation of the country?</b>	<i>(Please tick (✓) one)</i>  <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
<b>F05o.</b>	<b>Others</b>	Name:
<b>F06.</b>	<b>What specific pest and disease are you think of that could impose serious implication to Bhutan Biosecurity. Eg. Foot &amp; Mouth Disease, Bird flu, etc.</b>	<b>Name:</b>

<b>F07.</b>	<b>What is your take on the impact of biosecurity breach?</b>	<p><i>(Please tick (✓) one )</i></p> <p><input type="checkbox"/> Personal impact</p> <p><input type="checkbox"/> Wider Impacts</p> <p><input type="checkbox"/> Both personal &amp; Wider Impacts</p>
<b>F07.</b>	<b>How much do you agree or disagree with the following statements</b>	<p><i>(Please tick (✓) one )</i></p>
<b>F07a.</b>	<b>I know what I should do if I find an unwanted pests and disease in the farm</b>	<p><i>(Please tick (✓) one )</i></p> <p><input type="checkbox"/> Strongly disagree</p> <p><input type="checkbox"/> Tend to disagree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Tend to agree</p> <p><input type="checkbox"/> Strongly agree</p>
<b>F07b.</b>	<b>I look for information to improve my understanding of unwanted pests and diseases in the farm</b>	<p><i>(Please tick (✓) one )</i></p> <p><input type="checkbox"/> Strongly disagree</p> <p><input type="checkbox"/> Tend to disagree</p> <p><input type="checkbox"/> Neutral</p> <p><input type="checkbox"/> Tend to agree</p> <p><input type="checkbox"/> Strongly agree</p>
<b>F07c.</b>	<b>I am able to spot the main pest and diseases that threatens my livestock farm</b>	<p><i>(Please tick (✓) one )</i></p> <p><input type="checkbox"/> Strongly disagree</p> <p><input type="checkbox"/> Tend to disagree</p> <p><input type="checkbox"/> Neutral</p>

		<input type="checkbox"/> <i>Tend to agree</i> <input type="checkbox"/> <i>Strongly agree</i>
<b>F08.</b>	<b>If you notice an unwanted pests and diseases tomorrow in your farm, what would your first reaction be to....?</b>	<p><b>(Please tick (✓) one or more)</b></p> <input type="checkbox"/> <i>Contact Authorities</i> <input type="checkbox"/> <i>Research it yourself (online)</i> <input type="checkbox"/> <i>Contact individual you trust</i> <input type="checkbox"/> <i>Do something</i> <input type="checkbox"/> <i>Do nothing</i> <input type="checkbox"/> <i>Don't Know</i>
<b>F09.</b>	<b>If yes to F08, to contact Authorities/individuals you trust, who would it be?</b>	<p><b>(Please tick (✓) one or more)</b></p> <input type="checkbox"/> <i>DoL</i> <input type="checkbox"/> <i>BAFRA</i> <input type="checkbox"/> <i>Local leader</i> <input type="checkbox"/> <i>Cooperative leaders</i> <input type="checkbox"/> <i>Knowledgeable family/friend/neighbours</i> <input type="checkbox"/> <i>Others</i>
<b>F10.</b>	<b>Do you think it is easy to access the biosecurity information developed by BAFRA (Web, social media, offices, etc.)?</b>	<p><b>(Please tick (✓) one)</b></p> <input type="checkbox"/> <i>Definitely</i> <input type="checkbox"/> <i>Don't Know</i> <input type="checkbox"/> <i>Maybe</i>

<b>F11.</b>	<b>How do you rate the understanding of Biosecurity information available?</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> <i>Easy to understand</i></p> <p><input type="checkbox"/> <i>Difficult to Understand</i></p> <p><input type="checkbox"/> <i>Don't Know</i></p>
<b>F12.</b>	<b>How much of the role do you think, each of the following play in helping to protect Bhutan from entry or spread of pests and diseases?</b>	<p><b>(Please tick (✓) one )</b></p>
<b>F12a.</b>	<b>Government Authorities</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> <i>Large role</i></p> <p><input type="checkbox"/> <i>Substantial role</i></p> <p><input type="checkbox"/> <i>No role at all</i></p> <p><input type="checkbox"/> <i>Don't Know</i></p>
<b>F12b.</b>	<b>Non-government organizations</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> <i>Large role</i></p> <p><input type="checkbox"/> <i>Substantial role</i></p> <p><input type="checkbox"/> <i>No role at all</i></p> <p><input type="checkbox"/> <i>Don't Know</i></p>
<b>F12c.</b>	<b>Community/cooperative groups</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> <i>Large role</i></p> <p><input type="checkbox"/> <i>Substantial role</i></p> <p><input type="checkbox"/> <i>No role at all</i></p> <p><input type="checkbox"/> <i>Don't Know</i></p>

<b>F12d.</b>	<b>Businessmen</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> Large role</p> <p><input type="checkbox"/> Substantial role</p> <p><input type="checkbox"/> No role at all</p> <p><input type="checkbox"/> Don't Know</p>
<b>F12e.</b>	<b>You , &amp; Your family and others</b>	<p><b>(Please tick (✓) one )</b></p> <p><input type="checkbox"/> Large role</p> <p><input type="checkbox"/> Substantial role</p> <p><input type="checkbox"/> No role at all</p> <p><input type="checkbox"/> Don't Know</p>

**Annexure 01: Visitor's log book**

<b>Date</b>	<b>Name</b>	<b>Institution</b>	<b>Contact with farm animal in last 36 hours</b>	<b>Purpose of the visit</b>	<b>Time In</b>	<b>Time Out</b>	<b>Signature</b>

**Annexure 02: Farm biosecurity Board (please refer the In-country livestock biosecurity guideline 2014**



