

# LUMPY SKIN DISEASE VACCINATION

## *STRATEGY AND THE IMPLEMENTATION PLAN*



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## **1. OVERVIEW**

### **1.1. Purpose**

This document outlines the comprehensive strategy and implementation plan for the mass vaccination of domestic bovines against the lumpy skin disease (LSD) virus in Bhutan. It is designed to offer clear guidance to field officials and relevant stakeholders involved in the nationwide vaccination initiative.

### **1.2. Aim and Objectives**

The overarching goal of the mass vaccination program against LSD is to curtail and halt the transmission of the LSD virus within Bhutan.

The following are the specific objectives:

- To reduce the frequency of LSD outbreaks and minimize spread
- Minimize economic losses to the farming community and ensure food security
- Target LSD elimination by vaccination in the long run

### **1.3. The Strategy: Mass vaccination with Homologous Vaccine**

The strategy involves mass vaccination utilizing the homologous vaccine. The strategy encompasses all susceptible bovine populations: cattle (all breeds), mithun, buffalo, yak and zozom.

The strategy is to vaccinate animals of all age groups and physiological status, however, following categories of animals are not eligible for vaccination:

- Calves below one month of age\*
- Animal currently infected or showing clinical signs and symptoms of LSD
- Clinically sick animals due to any other disease\*\*

*\* Calves below one month of age at the time of mass vaccination must be vaccinated once they attain the age of one month.*

*\*\*Clinically sick animals due to other diseases must be vaccinated after their recovery from the illness.*

The goal is to attain a vaccination coverage of at least 80 percent in all susceptible populations within a period of one month or less.

Administering vaccines to all susceptible animals within a one-month time frame ensures uniform and swift vaccine-induced protection. The approach prevents immunity disparities, accelerates immune responses, and aids in timely disease control. By synchronizing vaccinations, the risk of disease spread is minimized, preventing localized outbreaks. A defined timeframe simplifies

monitoring, enhances community engagement, and ensures comprehensive protection, strengthening overall disease management efforts.

Vaccination must be initiated from the non-infected gewogs, villages or farms first and then move to the infected locations or farms so that mechanical transmission of LSDv to clean farm is prevented.

#### **1.4. Rationale for Adoption of the Strategy**

In response to the initial emergence of Lumpy Skin Disease (LSD) in Bhutan during 2020, the Department has diligently explored various strategies to effectively prevent and manage subsequent LSD outbreaks within the country. Among the available strategies, vaccination has emerged as a promising and proven option to safeguard Bhutanese livestock populations. Following extensive analysis and literature review, the Department opted to use homologous vaccines. Subsequently, the Department and the Ministry sought approval from the Cabinet and initiated emergency procurement of LSD homologous vaccines.

The decision to procure and implement mass vaccination with the homologous strain of the LSDv is underpinned by several key factors:

- *Proven Effectiveness:* Extensive evidence supports the homologous vaccine as the most effective tool in controlling, preventing, and potentially eradicating LSD.
- *Ease of Implementation and Effectiveness:* Compared to alternative measures like stamping out and vector control, mass vaccination with the homologous vaccine offers a simpler and more efficient approach.
- *Reduction of Susceptible Animals:* By vaccinating a significant portion of the livestock population, a substantial decrease in the number of susceptible animals can be achieved. This reduction directly combats the incursion and dissemination of the LSD virus, contributing to the overall containment effort.

#### **1.5. Current Situation of LSD in Bhutan**

Following table shows the summary of the LSD outbreak in the country between 1 January to 11 August 2023. A total of 13,875 cattle and yaks in 176 Gewogs of 20 Dzongkhags have been affected and 1,339 died.

*Table 1: The current LSD outbreak status in Bhutan*

Sl. No	Dzongkhag Name	No. of animals on farm	Total Live Cases	Total Death Cases	No. of Gewogs Affected
1	Bumthang	486	94	30	2
2	Chhukha	1484	509	43	8
3	Dagana	821	977	59	14
4	Gasa	240	40	3	1

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5	Haa	1586	426	27	6
6	Lhuentse	1271	312	16	8
7	Monggar	2971	1,018	104	17
8	Paro	4377	1,497	202	10
9	Pema Gatshel	1179	537	32	11
10	Punakha	2038	730	29	10
11	Samdrup Jongkhar	1089	558	59	8
12	Samtse	2366	1,076	69	13
13	Sarpang	1455	1,074	135	11
14	Thimphu	4392	1,063	208	5
15	Trashigang	2119	672	57	11
16	Trashy Yangtse	645	193	6	6
17	Trongsa	1564	386	10	5
18	Tsirang	3279	1,989	203	11
19	Wangdue Phodrang	2662	551	44	14
20	Zhemgang	685	173	3	5
	Total	36709	13875	1339	176

## 2. PRE-VACCINATION OPERATIONS

### 2.1. Vaccine Procurement

#### 2.1.1. Identification of the vaccine candidate

Considering the factors such as the existing inventory, formulation, affordability, and logistical feasibility, several vaccine options were evaluated from international markets, primarily originating from Western and European nations. After thorough evaluation of these factors, Lumpyvac, developed by Vetel Animal Health Products Inc. Turkey, was chosen for procurement and utilization.

#### 2.1.2. Vaccine information

The following table shows a brief description about the vaccine.

*Table 2: About Lumpyvac*

Parameter	Description/ Value
Name of the product	LUMPYVAC®, (Lumpy Skin Disease Virus Vaccine)
Pharmaceutical Form	Attenuated live vaccine in lyophilized form
Volume for 1 dose	2 ml
Amount of virus contained in one dose	At least 104 TCID50
Quantitative Composition	Neethling virus strain, not less than 104 TCID50 / dose Lactalbumin hydrolyzate - 0.25 mg Sucrose - 0.50 mg
Presentation	50 doses per vial
Storage temperature	+2 to +8°C
Recommended dose per animal	2ml
Duration of immunity	At least 1 year
Duration for vaccine utilization after opening the vial	Recommended to use the opened vial 2 - 6 hours after opening the vial, however, it can be used afterwards if proper cold chain is strictly maintained.

#### 2.1.3. Vaccine quantity

According to the Integrated Agriculture and Livestock Census of Bhutan 2022, National Statistics Bureau, the country's domestic bovine population, including cattle, mithuns, buffaloes, yaks, and zo-zoms, is approximately 293,291 animals. Maintaining a buffer supply equivalent to 15.5

percent of the total eligible population, a total of 338,750 vaccine doses or 6,775 vials (each containing 50 doses) was procured.

*Table 3: Summary of cost incurred in vaccine procurement*

Particulars	Value (Nos.)	Remarks
Total eligible population	293291	Cattle - 254897, Mithun - 300, Yak - 30328, Zozom - 7435, Buffalo - 331
Buffer stock	45460	15.5 % of the total population
Total no. of doses required	338751	
No. of doses per vial	50	50 doses per vial preferred over other presentations
Total no. of vials required	6775	

#### 2.1.4. Vaccine procurement cost

The process of procuring and transporting the vaccine from Turkey to Bhutan has incurred a total expense of Nu. 20,535,495.00 (Twenty Million, Five Hundred Thirty-Five Thousand, Four Hundred Ninety-Five Ngultrum Only).

*Table 4: Summary of cost incursion in vaccine procurement*

Particulars	USD	BTN @ 83.23 per USD (9 Aug 2023)
Total cost for vaccine	237125	19735913.75
Total cost for transshipping	9056.92	753807.4516
Bank charges (BoB) for vaccine purchase	-	41220.45
Bank charges (BoB) for transshipping	-	3253.45
Import Authorization	-	300
Total Cost (BTN)	-	20534495

#### 2.1.5. Storage and Distribution

The supplier ensured necessary cold chain maintenance during the transportation of vaccines from the production plant in Turkey to Paro International Airport. Once at the airport, the National Centre for Animal Health shall use freeze vans to transport the vaccines. The vaccines shall be stored at the required temperature of +2 to +8°C in the Biological Production Unit's (BPU) vaccine store.

Before starting the mass vaccination program, the Biological Production Unit of NCAH shall develop a vaccine distribution schedule. The schedule shall be based on the specific vaccine requirements of each dzongkhag (Table 5), calculated according to the eligible livestock population for LSD vaccination as per the Integrated Agriculture and Livestock Census of Bhutan 2022. Simultaneously, Dzongkhags shall be informed on the quantity of vaccines slated for distribution. In-turn, the Dzongkhags shall develop a distribution plan to ensure the vaccines reach the Livestock Extension Centers in their respective areas before the scheduled mass vaccination program. The distribution of vaccine quantities at the gewog level is detailed in annexure 1.

For government farms, an updated inventory must be taken before the delivery to ensure that the required number of vaccine doses reaches these farms.

*Table 5: Quantity of vaccines to be distributed to the dzongkhags*

Dzongkhag	Cattle	Mithun	Yak	Zo-Zom	Buffalo	Total Eligible Population	No. of vaccine doses	No. of vaccine vials
Bumthang	8,855	0	2,784	0	0	11,639	11,639	233
Chhukha	16,153	2	0	0	0	16,155	16,155	323
Dagana	18,309	13	0	0	25	18,347	18,347	367
Gasa	588	1	5,097	0	0	5686	5686	114
Haa	5,646	1	2,295	0	0	7,942	7,942	159
Lhuentse	9,757	7	261	116	0	10,141	10,141	203
Monggar	23,045	17	0	0	0	23,062	23,062	461
Paro	8,315	2	2,403	0	0	10,720	10,720	214
Pema Gatsel	6,799	1	0	0	0	6,800	6,800	136
Punakha	8,363	5	0	0	0	8,368	8,368	167
Samdrup Jongkhar	12,910	25	8	79	0	13,022	13,022	260
Samtse	37,376	4	0	0	180	37,560	37,560	751
Sarpang	16,309	6	0	0	27	16,342	16,342	327
Thimphu	2,435	0	10,523	0	0	12,958	12,958	259
Trashigang	22,247	34	3,951	7,109	0	33,341	33,341	667
Trashie Yangtse	8,222	4	253	105	0	8,584	8,584	172
Trongsa	8,069	1	148	0	0	8,218	8,218	164
Tsirang	12,243	6	0	0	99	12,348	12,348	247
Wangdue Phodrang	19,768	11	2,518	26	0	22,323	22,323	446



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Zhemgang	8,973	9	0	0	0	8,982	8,982	180
Govt. Farms	515	151	87	0	0	753	753	15
Total	254,897	300	30,328	7,435	331	293,291	293,291	5866

### 2.2. Reference Materials

To provide accessible resources for field officials, NCAH shall develop the following documents. These documents shall be shared with regional and dzongkhag field officials, for distribution to all vaccinators:

- *Standard Operating Procedure (SOP) for vaccination of livestock against LSD:*

A detailed guide outlining the step-by-step procedures for the vaccination of livestock against Lumpy Skin Disease (LSD). This document ensures that consistent and accurate vaccination practices are followed.

- *Infographic on LSD and clinical diagnosis:*

An informative visual representation illustrating key aspects of LSD, including its nature and clinical manifestations. This infographic shall aid in quick and easy understanding of the disease and its identification.

- *Frequently Asked Questions (FAQs) on LSD Vaccination:*

A compilation of commonly asked questions related to LSD vaccination, along with informative answers. This resource shall address common queries and concerns, ensuring vaccinators have a clear understanding of the vaccination process.

By distributing these documents, the Department aims to empower field officials with the knowledge and tools necessary to conduct effective LSD vaccination campaigns and enhance overall disease management efforts.

### **3. VACCINATION OPERATIONS**

#### **3.1. Implementation modality: HR deployment**

In order to achieve a vaccination coverage of at least 80 percent within the recommended time frame, comprehensive HR capacity assessment and mobilization planning must be undertaken by the regions and dzongkhags. This involves a systematic evaluation of the human resource capacity specific to their regions and dzongkhags. This assessment will be steered by the current personnel capacity within their specific agencies, in conjunction with the human resource capabilities found across various central agencies operating under the Department and situated within their respective dzongkhags.

The following are key agencies within the Department from which human resource mobilization could be effectively initiated:

- National Centre for Animal Health
- Regional Livestock Development Centre
- Regional Veterinary Hospital and Epidemiology Centres
- Satellite Veterinary Laboratory
- Dzongkhag Livestock Sector (DVHs and LECs)
- Government Farms (other than cattle farms)
- Other Central Agencies

To ensure streamlined coordination, the Department will engage in formal communication with these identified agencies. This correspondence will serve the purpose of soliciting human resource support, as well as any other required assistance. This collaborative approach emphasizes the shared commitment towards the successful execution of the mass LSD vaccination program.

HR deployment for the mass vaccination initiative could be formulated based on factors including human resource capacity, the distribution pattern of the livestock population, geographical accessibility, and other relevant considerations. Several HR deployment strategies are available for implementation, each catering to specific circumstances:

- HR resources pooled and a focused approach taken to vaccinate each gewog individually. This strategy allows for concentrated efforts in each area, ensuring comprehensive coverage.
- HR resources pooled and the vaccination campaign conducted in a phased manner, targeting a few gewogs at a time. This approach optimizes HR utilization while maintaining an efficient coverage pace.
- Available vaccinators will be distributed across all gewogs, and simultaneous vaccination will occur across all areas. This strategy aims to achieve widespread coverage quickly by vaccinating multiple locations simultaneously.

The selection of the most appropriate HR deployment strategy will be influenced by specific regional and dzongkhag dynamics.

### **3.2. Virtual meetings**

NCAH shall organize a consultative meeting with Regional Veterinary Officers, Dzongkhag Livestock Officers, Veterinary Officers, Program Directors and Farm Managers to advocate on the vaccination strategy adopted and the implementation plan.

NCAH shall organize another virtual training session to brief regional, dzongkhag, and gewog officials on various aspects, including:

- *Vaccination Strategy, Implementation Plan, and Timeline:*

The LSD vaccination strategy shall be presented to the Dzongkhag, regional and gewog colleagues including the vaccination approach and associated timeline. This encompasses the overarching strategy and specific plans for effective implementation.

- *Standard Operating Procedures (SOPs):*

Technical officials (vaccinators) shall be trained on LSD vaccination procedures, including assessment of animals for vaccination eligibility, and data management.

- *Information Sharing Mechanisms and Troubleshooting:*

The arrangement for information sharing and protocol for addressing issues that might arise during vaccination campaigns shall be shared with the field colleagues.

This virtual meeting shall serve as a platform for open discussions regarding potential challenges in the field. The session shall allow collective examination of the issues and a collaborative effort to devise effective solutions, thereby charting a clear path forward for successful implementation of the vaccination program.

### **3.3. SOP for vaccination against LSD and LSD-FMD combined**

For in-depth insights into the technicalities of the vaccination process, including aspects such as reconstitution of the LSD vaccine, criteria for identifying eligible animals for vaccination, potential adverse reactions, and data management procedures, refer to the enclosed Standard Operating Procedure (SOP) for LSD vaccination and simultaneous vaccination against LSD and FMD.

These documents are designed to provide a comprehensive resource that outlines the precise steps and protocols to be followed during various stages of the vaccination campaign. It offers detailed instructions to ensure that the vaccination process is not only efficient but also adheres to best practices for safety and effectiveness.

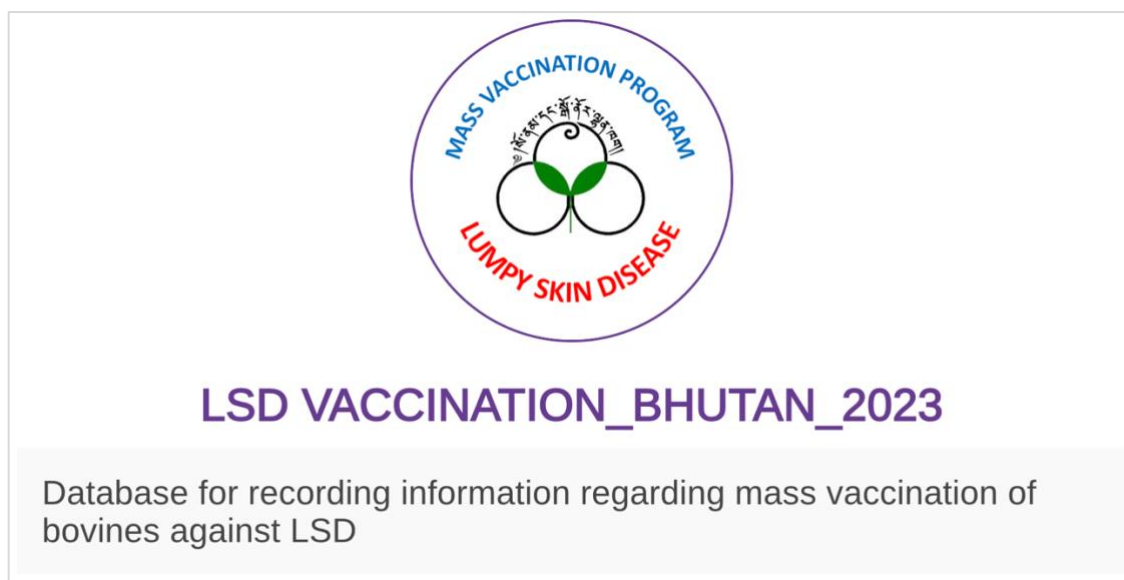
By referring to the enclosed SOPs, the vaccinators shall be equipped with a robust framework that addresses a wide spectrum of technical aspects of LSD vaccination and simultaneous

vaccination against LSD and FMD. This shall contribute to the smooth execution of the vaccination campaign and promote successful outcomes across all stages of the program.

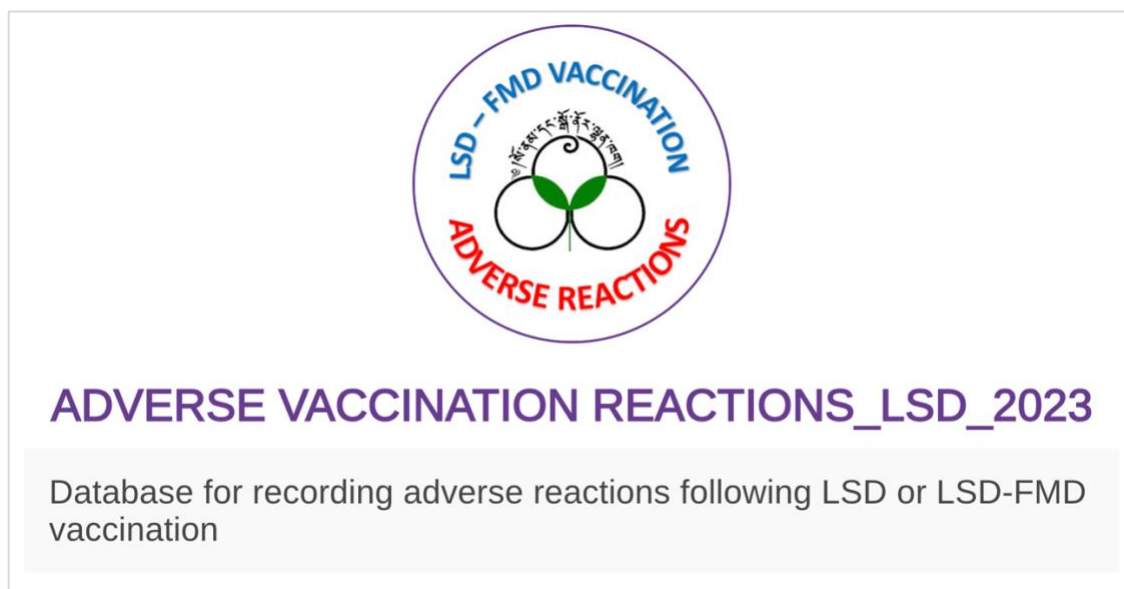
### **3.4. Data management**

For efficient data management, Epicollect5 software shall be used for recording of LSD vaccination data, and it shall be migrated to the VIS later. NCAH shall create the following projects and give the viewer role to the Dzongkhag and Regional focal points for regular monitoring and progress assessment:

- Epicollect5 project for vaccination data recording



- Epicollect5 project for adverse reaction recording



For FMD vaccination, data must be recorded in a paper-based data recording form, which NCAH will share, and it must be entered into the VIS later when the mass vaccination program is completed.

### **3.5. Monitoring**

In their respective regions and dzongkhags, the Regional Veterinary Officers and Dzongkhag Livestock Officers, or their designated representatives, are entrusted with the crucial responsibility of consistently overseeing the execution of the vaccination program. To ensure the successful sustenance of LSD vaccine efficacy, it is recommended that periodic on-site visits are conducted to evaluate field implementation based on the SOP for LSD vaccination. A particular emphasis should be placed on monitoring the maintenance of the cold chain, a critical factor in upholding the effectiveness of the vaccination process.

A proactive approach to monitoring the progress of the vaccination initiative is essential. This entails regular assessments of the vaccination program's advancement, with reference to the data documented within the Epicollect5 software. This monitoring mechanism enables prompt identification of any deviations from the intended trajectory, facilitating timely corrective measures and contributing to the overall achievement of vaccination goals and objectives.

Daily progress assessment and evaluation in reference to the Epicollect5 data will be conducted by the National Centre for Animal Health and submitted to the Department and the Ministry.

At the end of the vaccination program, if vaccines are left unused at gewog and farm level, the DVH must collect these vaccines and store them at +2 to +8°C for future use.

## 4. POST-VACCINATION OPERATIONS

### 4.1. Vaccination coverage evaluation

The responsibility for monitoring and evaluation to ensure vaccination coverage of at least 80% lies with the Regional Veterinary Officer, Dzongkhag Livestock Officer, and Dzongkhag Veterinary Officer in their respective areas. Monitoring and coverage assessment on a national scale will be undertaken by the Disease Prevention & Control Unit at NCAH.

The evaluation of vaccination coverage for a gewog will adhere to the following formula:

**Vaccination coverage of a gewog (%)** = (Number of animals vaccinated in that gewog / Total eligible\* livestock population in that gewog) x 100.

The eligible population is determined by subtracting the following categories from the total number of susceptible animals:

- Animals clinically confirmed as having LSD
- Calves below 1 month of age
- Clinically ill (from other diseases) animals

This approach ensures meticulous monitoring and evaluation at both local and national levels, guaranteeing that vaccination goals are met while considering specific population dynamics and disease statuses within each gewog.

### 4.2. Adverse vaccine reaction recording

Following are some of the temporary probable adverse reactions observed following LSD vaccine administration:

- *Slight fever:*

Slight fever is a common adverse reaction to LSD vaccination. It is characterized by a slight increase in body temperature (usually up to 102°F) and a decreased appetite. It usually resolves within 2-3 days.

- *Decreased feed intake:*

A temporary decrease in feed intake is also a common adverse reaction to LSD vaccination. This is usually due to the slight fever, but it can also be due to the local skin reaction or the nodular lesions. The decreased feed intake usually resolves within 1-2 weeks.

- *Temporary decrease in milk production:*

A temporary decrease in milk production is also a common adverse reaction to LSD vaccination. This is usually due to the slight fever, but it can also be due to the local skin reaction or the nodular lesions. The decreased milk production usually resolves within 2-3 weeks.

- *Local skin reaction and nodular lesions (neethling response):*

A local skin reaction and nodular lesions (neethling response) is a rare adverse reaction to LSD vaccination. It is characterized by the formation of small, raised nodules on the skin. The nodules usually appear 7-10 days after vaccination and resolve within 2-3 weeks.

These reactions are usually mild and resolve within a few days to a few weeks. However, farmers should be advised to contact the nearest livestock extension office if they notice any adverse reactions in their animals after vaccination, especially if the reactions are severe or do not resolve within a few days.

The adverse reactions when reported by the farmers must be recorded in the EpiCollect project, and symptomatically treated if reported to be severe.

#### **4.3. Post-vaccination monitoring**

Active clinical surveillance is a very effective tool for assessing the efficacy of vaccination campaigns. This is because LSD has a characteristic clinical presentation, which makes it relatively easy to diagnose. A thorough physical examination carried out by field livestock officials is enough for diagnosing LSD.

Passive surveillance can also be an effective tool for monitoring LSD, but it is important to have a high level of awareness of the disease among farmers and other stakeholders. If people are not aware of the signs of LSD, they may be less likely to report suspected cases.

The best approach to LSD surveillance is to use a combination of active and passive surveillance. This will help to ensure that all cases of LSD are detected, regardless of how mild or severe they may be.

## 5. ANNEXURE

### 5.1. Quantity of LSD vaccine vials to be distributed till gewog level

S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
1	Bumthang	Chhoekhor	5,467	5,467	109
2	Bumthang	Tang	2,224	2,224	44
3	Bumthang	Chummig	1,751	1,751	35
4	Bumthang	Ura	2,197	2,197	44
5	Chukha	Bjagchhog	529	529	11
6	Chukha	Bongo	1,568	1,568	31
7	Chukha	Chapchha	753	753	15
8	Chukha	Darla	2,195	2,195	44
9	Chukha	Getana	992	992	20
10	Chukha	Doongna	851	851	17
11	Chukha	Geling	1,099	1,099	22
12	Chukha	Loggchina	2,186	2,186	44
13	Chukha	Maedtabkha	995	995	20
14	Chukha	Phuentshogling	3,138	3,138	63
15	Chukha	Samphelling	1,849	1,849	37
16	Dagana	Drukjeygang	1,534	1,534	31
17	Dagana	Gozhi	1,355	1,355	27
18	Dagana	Karna	2,438	2,438	49
19	Dagana	Khebisa	2,179	2,179	44
20	Dagana	Largyab	1,358	1,358	27
21	Dagana	Tseza	724	724	14
22	Dagana	Tsangkha	1,378	1,378	28
23	Dagana	Karmaling	1,380	1,380	28
24	Dagana	Dorona	648	648	13
25	Dagana	Gesarling	689	689	14
26	Dagana	Lhamoi Dzingkha	1,381	1,381	28
27	Dagana	Nichula	751	751	15
28	Dagana	Tashiding	1,435	1,435	29
29	Dagana	Tsenda-Gang	1,097	1,097	22
30	Gasa	Khamaed	294	294	6
31	Gasa	Lunana	2,787	2,787	56
32	Gasa	Khatoed	206	206	4
33	Gasa	Laya	2,399	2,399	48
34	Haa	Bji	2,300	2,300	46
35	Haa	Kar-tshog	959	959	19



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S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
36	Haa	Uesu	926	926	19
37	Haa	Gakiling(haa)	1,265	1,265	25
38	Haa	Samar	1,229	1,229	25
39	Haa	Sangbay	1,263	1,263	25
40	Lhuentse	Gangzur	2,136	2,136	43
41	Lhuentse	Khoma	1,297	1,297	26
42	Lhuentse	Kurtoed	633	633	13
43	Lhuentse	Minjey	1,048	1,048	21
44	Lhuentse	Jarey	1,103	1,103	22
45	Lhuentse	Maenbi	1,419	1,419	28
46	Lhuentse	Maedtsho	1,301	1,301	26
47	Lhuentse	Tsaenkhar	1,204	1,204	24
48	Mongar	Balam	720	720	14
49	Mongar	Chagsakhar	2,046	2,046	41
50	Mongar	Dramedtse	1,717	1,717	34
51	Mongar	Na-Rang	970	970	19
52	Mongar	Ngatshang	1,030	1,030	21
53	Mongar	Shermuhoong	1,807	1,807	36
54	Mongar	Thang-Rong	1,785	1,785	36
55	Mongar	Gongdue	842	842	17
56	Mongar	Jurmed	1,208	1,208	24
57	Mongar	Kengkhar	1,274	1,274	25
58	Mongar	Saling	1,673	1,673	33
59	Mongar	Silambi	2,053	2,053	41
60	Mongar	Chhaling	1,270	1,270	25
61	Mongar	Drepoong	1,122	1,122	22
62	Mongar	Monggar	1,629	1,629	33
63	Mongar	Tsakaling	1,130	1,130	23
64	Mongar	Tsamang	786	786	16
65	Paro	Dokar	739	739	15
66	Paro	Loong-nyi	875	875	18
67	Paro	Nagya	2,296	2,296	46
68	Paro	Sharpa	970	970	19
69	Paro	Dopshar-ri	875	875	18
70	Paro	Doteng	667	667	13
71	Paro	Hoongrel	61	61	1
72	Paro	Lamgong	664	664	13
73	Paro	Tsento	3,231	3,231	65

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S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
74	Paro	Wangchang	342	342	7
75	Pema Gatshel	Chhimoong	339	339	7
76	Pema Gatshel	Chongshing	287	287	6
77	Pema Gatshel	Dungmaed	582	582	12
78	Pema Gatshel	Khar	512	512	10
79	Pema Gatshel	Yurung	338	338	7
80	Pema Gatshel	Nanong	1,100	1,100	22
81	Pema Gatshel	Shumar	1,273	1,273	25
82	Pema Gatshel	Zobel	984	984	20
83	Pema Gatshel	Chhoekhorling	289	289	6
84	Pema Gatshel	Dechhenling	352	352	7
85	Pema Gatshel	Norboogang(pgatshel)	744	744	15
86	Punakha	Barp	416	416	8
87	Punakha	Guma	671	671	13
88	Punakha	Goenshari	290	290	6
89	Punakha	Kabisa	871	871	17
90	Punakha	Talog	392	392	8
91	Punakha	Toedpaisa	669	669	13
92	Punakha	Chhubu	1,146	1,146	23
93	Punakha	Dzomi	1,326	1,326	27
94	Punakha	Lingmukha	637	637	13
95	Punakha	Shelnga-Bjemi	728	728	15
96	Punakha	Toedwang	1,222	1,222	24
97	Samdrup Jongkhar	Dewathang	761	761	15
98	Samdrup Jongkhar	Gomdar	2,013	2,013	40
99	Samdrup Jongkhar	Orong	1,452	1,452	29
100	Samdrup Jongkhar	Phuentshogthang	1,744	1,744	35
101	Samdrup Jongkhar	Wangphu	1,702	1,702	34
102	Samdrup Jongkhar	Langchenphu	1,046	1,046	21
103	Samdrup Jongkhar	Lauri	804	804	16
104	Samdrup Jongkhar	Martshala	1,779	1,779	36
105	Samdrup Jongkhar	Pemathang	930	930	19
106	Samdrup Jongkhar	Samrang	89	89	2
107	Samdrup Jongkhar	Serthig	702	702	14
108	Samtse	Duenchhukha	3,192	3,192	64
109	Samtse	Dophuchen	4,174	4,174	83
110	Samtse	Doomtoed	1,323	1,323	26
111	Samtse	Tading	3,689	3,689	74

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S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
112	Samtse	Norboogang	2,817	2,817	56
113	Samtse	Phuentshogpelri	2,556	2,556	51
114	Samtse	Samtse	2,701	2,701	54
115	Samtse	Norgaygang	2,408	2,408	48
116	Samtse	Pemaling	2,056	2,056	41
117	Samtse	Tashichhoeling	1,000	1,000	20
118	Samtse	Tendruk	2,790	2,790	56
119	Samtse	Sang-Ngag-Chhoeling	2,573	2,573	51
120	Samtse	Namgyalchhoeling	2,497	2,497	50
121	Samtse	Ugyentse	1,353	1,353	27
122	Samtse	Yoeseltse	2,431	2,431	49
123	Sarpang	Samtenling	1,402	1,402	28
124	Sarpang	Chhuzanggang	1,225	1,225	25
125	Sarpang	Gelegphu	431	431	9
126	Sarpang	Jigme Chhoeling	3,227	3,227	65
127	Sarpang	Serzhong	871	871	17
128	Sarpang	Tareythang	250	250	5
129	Sarpang	Umling	886	886	18
130	Sarpang	Dekiling	1,749	1,749	35
131	Sarpang	Chhudzom	2,064	2,064	41
132	Sarpang	Gakiling	2,220	2,220	44
133	Sarpang	Senggey	1,081	1,081	22
134	Sarpang	Shompangkha	936	936	19
135	Thimphu	Kawang	333	333	7
136	Thimphu	Lingzhi	2,638	2,638	53
137	Thimphu	Naro	2,215	2,215	44
138	Thimphu	Soe	1,440	1,440	29
139	Thimphu	Chang	295	295	6
140	Thimphu	Darkarla	4,285	4,285	86
141	Thimphu	Ge-nyen	549	549	11
142	Thimphu	Maedwang	1,203	1,203	24
143	Trashigang	Bartsham	861	861	17
144	Trashigang	Bidoong	636	636	13
145	Trashigang	Yangnyer	1,333	1,333	27
146	Trashigang	Shongphu	1,520	1,520	30
147	Trashigang	Kanglung	1,723	1,723	34
148	Trashigang	Samkhar	1,313	1,313	26
149	Trashigang	Udzorong	1,998	1,998	40

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S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
150	Trashigang	Merag	8,001	8,001	160
151	Trashigang	Phongmed	1,181	1,181	24
152	Trashigang	Radhi	1,267	1,267	25
153	Trashigang	Sagteng	6,882	6,882	138
154	Trashigang	Kangpar	1,948	1,948	39
155	Trashigang	Thrimshing	925	925	19
156	Trashigang	Khaling	1,750	1,750	35
157	Trashigang	Lumang	2,003	2,003	40
158	Trashigang	Boomdeling	2,103	2,103	42
159	Trashigang	Jamkhar	570	570	11
160	Trashigang	Tongmajangsa	982	982	20
161	Trashigang	Yangtse	1,338	1,338	27
162	Trashigang	Ramjar	772	772	15
163	Trashigang	Khamdang	1,205	1,205	24
164	Trashigang	Toedtsho	1,032	1,032	21
165	Trashigang	Yalang	582	582	12
166	Trongsa	Draagteng	1,488	1,488	30
167	Trongsa	Korphu	337	337	7
168	Trongsa	Langthil	1,752	1,752	35
169	Trongsa	Nubi	3,363	3,363	67
170	Trongsa	Tangsibji	1,278	1,278	26
171	Tsirang	Barshong	1,106	1,106	22
172	Tsirang	Patshaling	841	841	17
173	Tsirang	Kilkhorthang	1,118	1,118	22
174	Tsirang	Mendrelgang	798	798	16
175	Tsirang	Rangthangling	1,216	1,216	24
176	Tsirang	Tsholingkhar	887	887	18
177	Tsirang	Doonglagang	1,255	1,255	25
178	Tsirang	Gosarling	822	822	16
179	Tsirang	Sergithang	1,150	1,150	23
180	Tsirang	Pungtenchhu	986	986	20
181	Tsirang	Semjong	1,231	1,231	25
182	Tsirang	Tsirang Toed	938	938	19
183	Wangdue Phodrang	Athang	1,319	1,319	26
184	Wangdue Phodrang	Bjenag	1,783	1,783	36
185	Wangdue Phodrang	Darkar	974	974	19
186	Wangdue Phodrang	Gase Tshogongm	848	848	17
187	Wangdue Phodrang	Gase Tshowogm	577	577	12

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S.N.	Dzongkhag	Gewog	Total Bovine Population	Total Vaccine Doses	Total Vaccine Vials
188	Wangdue Phodrang	Nahi	438	438	9
189	Wangdue Phodrang	Thedtsho	572	572	11
190	Wangdue Phodrang	Ruebisa	1,512	1,512	30
191	Wangdue Phodrang	Dangchhu	1,593	1,593	32
192	Wangdue Phodrang	Gangteng	2,284	2,284	46
193	Wangdue Phodrang	Kazhi	1,626	1,626	33
194	Wangdue Phodrang	Nyishog	1,237	1,237	25
195	Wangdue Phodrang	Phangyuel	884	884	18
196	Wangdue Phodrang	Phobji	3,728	3,728	75
197	Wangdue Phodrang	Saephu	2,948	2,948	59
198	Zhemgang	Bardo	1,836	1,836	37
199	Zhemgang	Nangkor	1,718	1,718	34
200	Zhemgang	Shingkhar	1,370	1,370	27
201	Zhemgang	Trong	1,073	1,073	21
202	Zhemgang	Bjoka	664	664	13
203	Zhemgang	Goshing	610	610	12
204	Zhemgang	Ngangla	728	728	15
205	Zhemgang	Phangkhar	983	983	20
206	Government Farms	Multiple	753	753	15
	Grand Total		293,291	293,291	5866