ICAR - National Institute of Veterinary Epidemiology and Disease Informatics

(ICAR - NIVEDI)

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May

# LIVESTOCK DISEASE FOREWARNING REPORT

**Powered by Artificial Intelligence**

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# Disclaimer

The forewarnings are based on the retrospective disease data available in the NADRES database. Hence, for those states wherein data is limited/less, the forewarning may not be realistic. Further the forewarning will not take into consideration the control measures that are *in situ*.

# Acknowledgement

I would like to acknowledge the constant support and inspiration from Hon'ble Secretary, DARE and Director General, ICAR, Government of India, New Delhi.

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Director (Acting)

ICAR- NIVEDI

# Contents

## 1. About the Bulletin…

Livestock sector plays a crucial role in the rural economy of India as around 20.5 million people depend upon livestock for their livelihood. Even though the investment in the livestock sector is meagre, tremendous achievements have been observed in the sector during the last decade. As it is an important component in poverty alleviation programmes, continuous emphasis is being laid on this sector for enhancing the quality of the primary and secondary products in the international market, which in turn demands improved animal health. Therefore, livestock development programmes cannot succeed unless a well-organized animal health service is built up and in place for safeguarding the livestock against economically important diseases.

India has made a noteworthy success in the eradication of Rinderpest (RP), CBPP, AHS and Dourine. However, there are several other infectious and non-infectious diseases prevailing in the country causing huge annual economic loss. Prevention, control and eradication of the animal diseases need a thorough understanding of the epidemiology as well their economic impact.

National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) has the mandate to carry out research activities in the area of veterinary epidemiology and disease informatics. With the eradication of RP successfully, India has not only proved its ability to face the challenges but also to succeed, despite various limitations. Similar efforts are needed to control and eradicate diseases like FMD, PPR, Brucellosis, CSF, HS etc., which cause huge economic loss annually to the livestock industry. To this end, ICAR-NIVEDI has identified 13 priority diseases, based on the past incidence patterns and has built a strong database of these diseases. The database, which is the backbone of the National Animal Disease Referral Expert System ($NADRES_{v2}$), is used for providing monthly livestock disease forewarning, which is compiled in this monthly bulletin to alert the animal husbandry departments, both at the National/state level, to take appropriate control measures. We hope users/stakeholders find this bulletin useful in their quest to control livestock diseases. This forewarning bulletin will assist the field Veterinarians in adopting appropriate preventive and control measures, thereby reducing the occurrence of livestock disease outbreaks. This will help the farmers to fulfil the dream of doubling the farmer's income by 2020.

## 2. SUMMARY OF THE FOREWARNING BULLETIN….

The association between infectious diseases and the climate was known from ancient times. Hippocrates observed in the 5$^{th}$ century that epidemics were associated with natural phenomenon rather than divinities or demons. In modern times, our increasing capabilities to detect and predict climate variations joined with growing evidence for global climate change, have powered interest in understanding the impacts of climate on animal health, particularly the emergence and transmission of infectious disease agents. Simple reasoning suggests that climate can affect infectious disease patterns because disease agents (viruses, bacteria, and parasites) and their vectors are sensitive to temperature, moisture, and other ambient environmental conditions.

India being an agriculture-based country, the livestock sector plays a vital role in contributing to the economy. A robust reporting and forewarning system enables the concerned authorities in disease preparedness and awareness of the risk associated with livestock disease. Therefore, the economic loss due to morbidity and mortality of the animals is reduced thereby helps to increase the productivity in terms of egg, meat, and dairy products. National Animal Disease Referral Expert System database is a weather-based forewarning system enabled with an artificial intelligence system developed by ICAR-National Institute of Veterinary Epidemiology & Disease Informatics Bengaluru, Karnataka state, India that forecast potential threats from pathogens two months in advance to provide the stakeholders with sufficient timeline for awareness and preparedness to act. Artificial Intelligence(AI) and Machine learning (ML) models use the programmed algorithms that receive and analyse input data to predict output (Infectious risk prediction) values within an acceptable range. As new data fed into these algorithms, they learn and optimize their operations to improve performance, developing intelligence over time.

The livestock disease forecasting for May 2021 revealed Jharkhand, Uttar Pradesh, West Bengal, Assam and Karnataka as the top five states with high predicted livestock disease outbreaks.

Among the predicted diseases, control programs are in full swing for FMD and PPR in the country and due attention is demanded by the predicted disease outbreaks of these diseases. Among the expected disease outbreaks, the predicted FMD outbreaks are more in Kerala (11) followed by Jharkhand (10) and West Bengal (9) whereas predicted PPR outbreaks are more in West Bengal (13) and Jharkhand (13). Further the co-occurrence of FMD and HS can be expected in Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Meghalaya, Manipur, Tripura, Odisha, Rajasthan, Nagaland and West Bengal. Among the different diseases in livestock, the predicted outbreaks are expected to be high for BQ (73) and HS (73).

The major challenges for the effective disease control program being the lack of thorough understanding about the complexity of disease dynamics, wide host range of pathogens, widening of niche of pathogens due to climate change etc. The effective control program for major livestock diseases in the country can be efficiently addressed by planning and execution of available control measures in the high risk areas and routine surveillance and monitoring of diseases.

## Table S1. Summary of State wise Livestock Disease forewarning for May 2021

| Sl. No | State Name | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomosis | Total number of disease events likely to occur |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Andaman and Nicobar | 0 | 1 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 05 |
| 2 | Andhra Pradesh | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 07 |
| 3 | Arunachal Pradesh | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 06 |
| 4 | Assam | 0 | 1 | 17 | 0 | 2 | 6 | 0 | 12 | 5 | 3 | 11 | 3 | 1 | 61 |
| 5 | Bihar | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 2 | 11 |
| 6 | Chandigarh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 7 | Chhattisgarh | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 8 | Dadra and Nagar Haveli | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 9 | Daman and Diu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 10 | Goa | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 03 |
| 11 | Gujarat | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 05 |
| 12 | Haryana | 0 | 0 | 1 | 0 | 1 | 0 | 2 | 0 | 2 | 1 | 1 | 1 | 1 | 10 |
| 13 | Himachal Pradesh | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 2 | 0 | 0 | 0 | 05 |
| 14 | Jammu and Kashmir | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 7 | 0 | 0 | 0 | 08 |
| 15 | Jharkhand | 0 | 23 | 7 | 0 | 1 | 22 | 10 | 5 | 13 | 1 | 5 | 22 | 23 | 132 |
| 16 | Karnataka | 3 | 0 | 8 | 0 | 25 | 0 | 7 | 5 | 2 | 7 | 0 | 0 | 0 | 57 |
| 17 | Kerala | 0 | 2 | 0 | 0 | 1 | 0 | 11 | 5 | 10 | 0 | 0 | 6 | 0 | 35 |
| 18 | Lakshadweep | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 19 | Madhya Pradesh | 0 | 0 | 3 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 07 |
| 20 | Maharashtra | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 04 |
| 21 | Manipur | 0 | 0 | 9 | 0 | 0 | 4 | 3 | 2 | 0 | 0 | 3 | 0 | 0 | 21 |
| 22 | Meghalaya | 1 | 0 | 3 | 0 | 0 | 0 | 8 | 8 | 0 | 0 | 7 | 1 | 0 | 28 |
| 23 | Mizoram | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 24 | Nagaland | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | 0 | 0 | 05 |
| 25 | NCT of Delhi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 00 |
| 26 | Odisha | 1 | 0 | 11 | 0 | 0 | 0 | 3 | 6 | 3 | 0 | 0 | 0 | 0 | 24 |
| 27 | Puducherry | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 07 |
| 28 | Punjab | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 2 | 2 | 0 | 06 |
| 29 | Rajasthan | 0 | 1 | 4 | 0 | 2 | 0 | 7 | 6 | 3 | 0 | 2 | 0 | 1 | 26 |
| 30 | Sikkim | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 01 |
| 31 | Tamil Nadu | 3 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 05 |
| 32 | Telangana | 0 | 0 | 0 | 0 | 5 | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 10 |
| 33 | Tripura | 0 | 2 | 2 | 0 | 0 | 3 | 2 | 3 | 0 | 3 | 1 | 0 | 0 | 16 |
| 34 | Uttar Pradesh | 0 | 23 | 0 | 0 | 1 | 3 | 0 | 2 | 6 | 1 | 0 | 23 | 30 | 89 |
| 35 | Uttarakhand | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 02 |
| 36 | West Bengal | 3 | 5 | 6 | 0 | 0 | 0 | 9 | 7 | 13 | 5 | 1 | 10 | 5 | 64 |
| **Total number of districts likely to report** | | 15 | 61 | 73 | 00 | 38 | 46 | 69 | 73 | 64 | 37 | 43 | 77 | 67 | 660 |

*Number of predicted disease incidence was summarised considering only High risk and Very high risk

# 3. INTRODUCTION TO NADRES v2

The geographic and seasonal distribution of many infectious diseases are associated with climate and therefore the possibility of using seasonal climate forecasts as predictive indicators in disease early warning system (EWS) became imminent. In this context, ICAR-NIVEDI, in its quest for achieving better livestock health, had developed an interactive web portal named "National Animal Disease Referral Expert System (NADRES)" during early part of the first decade of the millennium. The web portal which was developed from the financial support of National Agricultural Technology Project was launched in the year 2005. The portal which is interactive, allows the user/stakeholder to access livestock disease forewarning (n=13) at the district level for entire country two months in advance. The portal which was initially built on oracle platform was later changed to MySQL platform to store the administrator provided disease information and other relevant meteorological and risk factor information. However, with the availability of remote sensed satellite images and the advancement in information technology and statistical algorithms, the upgradation of NADRES became inevitable. To this end, a newer version of NADRES (NADRES *V2*) has been developed and is ready for release.

**How it is different from previous version?**

In brief, it can be said that NADRES $_{V2}$ underwent a sea change not only in its internal structure but also in its physical design. As a result, now the central menu bar consists of Home, About us, Risk factors, Analysis, Livestock disease, post prediction validation and contact details. Risk factors menu comprises of details on resolution, time interval, units and source of 11 meteorological and 5 remote sensing parameters. Analytics menu has various analysis options. The newly created livestock disease menu has the details regarding species affected, clinical signs and preventive measures to be adopted for the 13 economically important diseases. Post prediction validation menu contains the outbreak reports vs prediction. The menu bar on the RHS tabs include online GIS, state wise Livestock disease forecast, district wise Livestock disease forecast, Epi-calculator, download links for mobile app, etc. The website now hosts, disease maps in the form of choropleth maps for 13 diseases in two time periods (1990-2000 and 2000-2018). Similarly, disease trends plots exhibit periodic regression plots providing future trend for the disease. On the LHS, Login menu is provided for authorized persons to login and enter disease details and other related parameters. Disease maps provide choropleth maps for 13 diseases in two time periods (1990-2000 and 2000-2018) is presented. Disease trends- Periodic regression plots are exhibited for prediction of the diseases. Auto-messaging option has been created to send the reminders in the form of text messages to concerned PI's and Co-PI's of AICRP centers for submission of outbreak reports. This message is sent weekly to all the concerned officials. Additionally, a message is sent to the concerned veterinary officers in Karnataka for initiation of preventive measures for the forewarned diseases at the block level. Plans are in place to incorporate farmers' and local vets' mobile numbers in to the list so that they may be asked to initiate preventive measures for the forewarned diseases.


Fig 3.1. NADRES V2 Home page

The forewarning methodology used is unique and has not been used earlier for livestock disease forewarning in India. Following few paragraphs describe about the forewarning methodology used. It is a well-known fact that weather plays an important role in the precipitation of many diseases and therefore, the climatic parameters such as land surface temperature (LST), precipitation, wind velocity, humidity etc are considered as risk parameters. These parameters along with other non-climatic parameters such as livestock population, density, Normalized Differential Vegetation Index (NDVI), soil moisture constitute the overall risk parameters. A total of 24 such parameters are collected/generated at village level and then aggregated to district level before these are used for analysis.

In addition to the output provided at interactive web portal, the NADRES output are also published in the form of monthly livestock disease forewarning bulletins. The prediction results come with a disclaimer that forewarnings do not take into account of the control measures that already in situ and also may not be realistic for those regions where the data is either unavailable or limited. This bulletin provides the likely occurrence of the 13 shortlisted diseases two months in advance at the district level, disease forewarning maps, prediction accuracy, details on diseases, species affected, clinical signs and its preventive measures.

In summary, it can be said that NADRES $_{V2}$ has underwent substantial changes not only in its internal structure but also in its physical design and can be a useful tool for visitors of the website, farmers, vets, policy makers etc.

## 4. Forewarning Methodology

### I.Materials

**Livestock disease data**

Previous 10 years' livestock disease outbreak data retrieved from the NADRES database linked with Risk factors data.

**Livestock population data**

The population data at village level for five major livestock species viz., cattle, buffalo, sheep, goat and pigs were obtained from 20th Livestock census (2019) fromDepartment of statistics, DAHD, GOI.

**Species-wise & Category-wise Livestock Population (in thousands)**

| Sl No | Species | Category | Population in 2012 | Population in 2019 | % Change |
|---|---|---|---|---|---|
| 1 | Cattle | Exotic | 39732 | 51356 | 29.3 |
| | | Indigenous | 151172 | 142106 | -6 |
| | | Total | 190904 | 193462 | 1.3 |
| 2 | Buffalo | Total | 108702 | 109852 | 1.1 |
| 3 | Sheep | Exotic | 3781 | 4088 | 8.1 |
| | | Indigenous | 61288 | 70172 | 14.5 |
| | | Total | 65069 | 74260 | 14.1 |
| 4 | Goat | Total | 135173 | 148885 | 10.1 |
| 5 | Pig | Exotic | 2456 | 1897 | -22.8 |
| | | Indigenous | 7837 | 7159 | -8.7 |
| | | Total | 10293 | 9056 | -12 |
| 6 | Yaks | Total | 77 | 58 | -24.7 |
| 7 | Mithuns | Total | 298 | 386 | 29.5 |
| 8 | Horses & Ponies | Total | 625 | 342 | -45.3 |
| 9 | Mules | Total | 196 | 84 | -57.1 |
| 10 | Donkeys | Total | 319 | 124 | -61.1 |
| 11 | Camels | Total | 400 | 252 | -37 |
| Total Livestock | | | **512056** | **536761** | **4.8** |

**Meteorological and Remotely sensed data:**

The parameters such as air temperature ($^0$C), perceptible water (mm), pressure (millibar), relative humidity (%) and sea level pressure (millibar) were extracted from National Centre for environmental prediction (NCEP). The parameters such as potential evapotranspiration (PET), Enhanced Vegetation Index (EVI), Leaf Area Index (LAI), Land Surface Temperature (LST), Normalised Difference Vegetation Index (NDVI) were extracted from remote sensed images from MODIS website **(**https://modis.gsfc.nasa.gov/). In brief, the MODIS products from NASA-TERRA satellite was downloaded for the Indian locations by specifying the tiles (H24V5, H25V6, H24V6, H24V7, H25V7, H25V8, H26V7, H26V6) from 2001 to till date.

The details are given below;

| PRODUCT | Science Data Sets (HDF Layers) |
|---|---|
| **MOD15A2H** | Lai_500m(Leaf area index) 8 days average |
| **MOD16A2** | PET_500m (Total Potential Evapotranspiration) 8 days average |
| **MOD11A2** | LST_Day_1km (Daytime Land Surface Temperature) 8 days average |
| **MOD13A1** | i. 500m 16 days NDVI (Normalized Difference Vegetation Index)<br>ii. Enhanced Vegetation Index (EVI) 16 days average |

The downloaded HDF files (Datasets, which are multidimensional arrays (layers) of a homogeneous type) were converted to GeoTIFF files (single layer data) using R packages, which were later used to extract the parameters by linking it with the sinusoidal values of the Indian villages. The scale factors were multiplied for the extracted values as specified by the MODIS data products to get the values of the parameters. As shown above, the atmospherically corrected NDVI was collected on 16-day interval at 250-meter resolution using MODIS product MOD13A1 and LST was collected on 8-day interval using MOD11A2 at 1 KM resolution.

The parameters such as rainfall, soil moisture and wind speed were obtained from Global Land Data Assimilation System of NASA (https://disc.gsfc.nasa.gov). The remaining parameters were downloaded from climatic research unit (CRU) of University of East Anglia website. It is worth mentioning that the entire process of extraction, assimilation, processing and aligning have been done using R programming language and R environment. After aligning the climatic and non-climatic data with the disease and the livestock population data (aggregated at the district level), the statistical analysis was performed in the R environment.

Initially, two regression models and six machine learning models were applied to test their suitability to fit the data and in all, three models; one regression model (Generalized Linear Model (GLM) and two machine learning models, *viz.,* Gradient Boosting Machine Learning Algorithm (GBM) and Random Forest (RF), which fitted to data well were incorporated for the purpose of disease prediction. The models were trained using the case and control data available at ICAR-NIVEDI. Validation of the models were done by dividing the total observations for a particular disease into marker samples and validation samples and accuracy was tested in terms of discrimination power, which was done using Receiving Operating Characteristics (ROC), Cohen Kappa (Heildke Skill Score) and True Skill statistics (TSS). Once the models produce the probability value, it was used for categorizing the risk. Briefly, when all the models produce the p value of more than 0.5, then the highest p value is used for determining the high-risk category. If all the models or any one model produces the p value of less than 0.5, then the lowest p value was used for categorizing lower risk. This was done to minimize the false alert. Thus the risk predictions based on the probability values ranging from 0-1 are made as follows; Very High Risk (p=0.81-1.0), High Risk (p=0.61-0.80), Moderate Risk (p=0.41-0.60), Low Risk (p=0.21-0.40), Very Low Risk (p=0.0-0.20) and No Risk (p=0.0) for the occurrence of a said disease. It is believed that categorizing districts in to various risk categories will help the stake holders to effectively utilize the available resources (money and manpower).

## II.NADRES v2 Data Flow and Data Processing Diagram

### A) Data Flow Diagram:

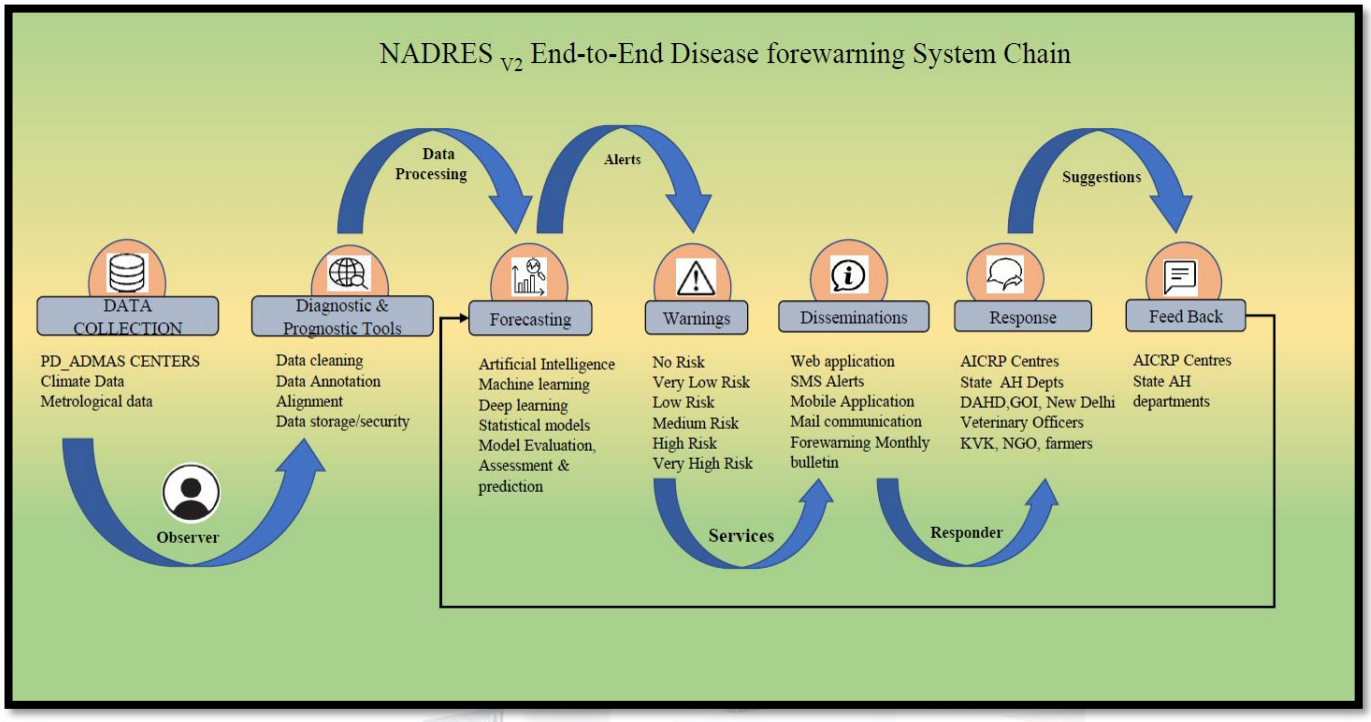


Fig 4.1). NADRES V2 Data Flow Diagram.

### B) Artificial Intelligence enabled Data Processing Diagram:

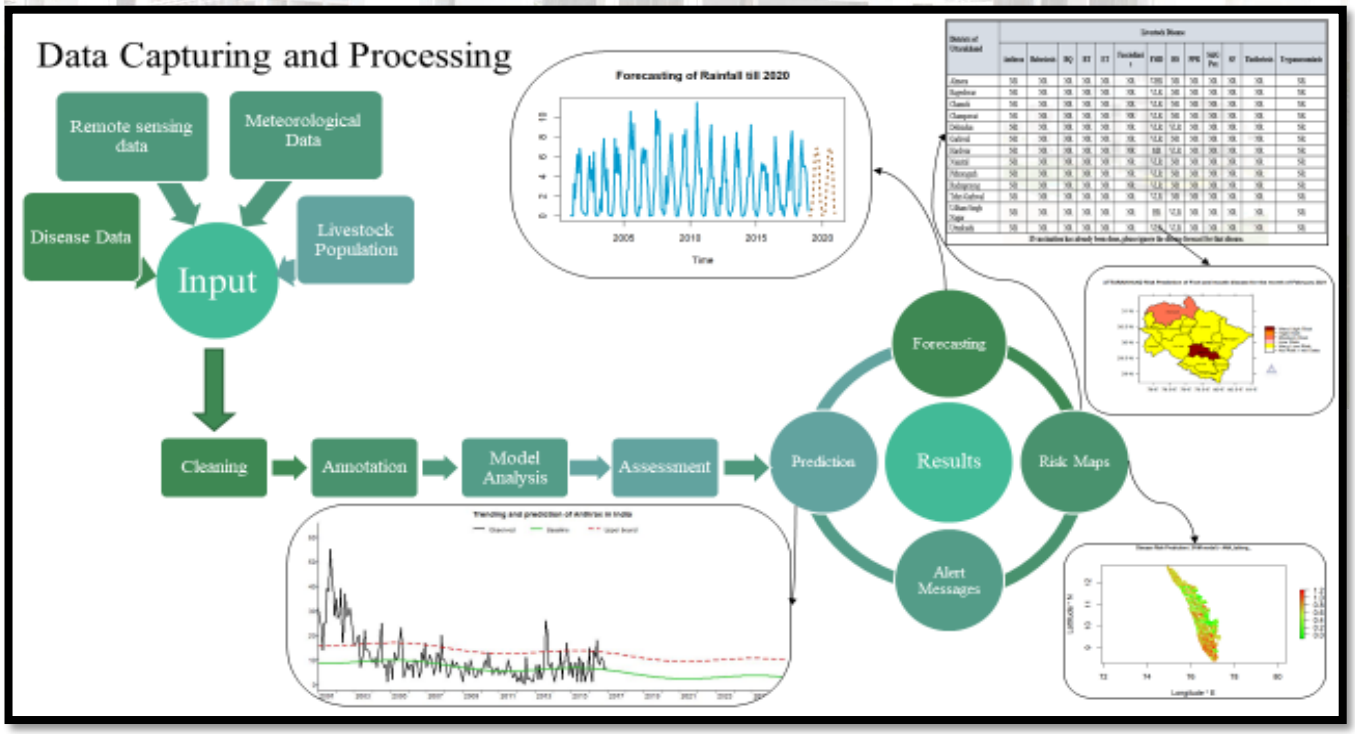


Fig 4.2). Data Processing Diagram Using Artificial Intelligence.

## III. Weighted outbreak score

The outbreak data for the month of forecasting is extracted from NADRES database for the period of 10 years from current year. Outbreak data of 13 important livestock diseases are considered. The data is aggregated at district level and the weighted score is defined based on the number of outbreaks for each district in each month considering last 10 years. The weightage score was assigned as 0 for less than three number of outbreaks in the last 10 years for selected month, score 1 for 3–6 number of outbreaks and 2 for more than 6 outbreaks. This weightage score for each district is labelled as risk variable in building the models and risk maps.

**Anthrax Livestock Disease Forecast of May month in KARNATAKA**

| District Name | Cattle | Goat | Sheep | Pig | Month | Result |
|---|---|---|---|---|---|---|
| Bellary | 325054 | 175849 | 732810 | 8969 | May | Very High Risk |
| Davanagere | 318204 | 99155 | 327631 | 782 | May | Medium Risk |
| Koppal | 256060 | 153857 | 539842 | 9008 | May | Very High Risk |
| Mysore | 532286 | 164076 | 212919 | 4598 | May | Medium Risk |
| Tumkur | 515530 | 319156 | 1049268 | 5392 | May | Very High Risk |

**Preventive Measures:**

**Ring vaccination and report of disease is advised . Vaccination to be done in consultation with the veterinarians and as decided by state animal husbandry authorities. Strict biosecurity measures May be followed. Carcass May be disposed by deep burying covered with lime powder. Contaminated area May be disinfected with 4% formalin or 10% caustic soda. Grazing area May be restricted.**

Back

**KARNATAKA Risk Prediction of Anthrax for the month of May 2021**

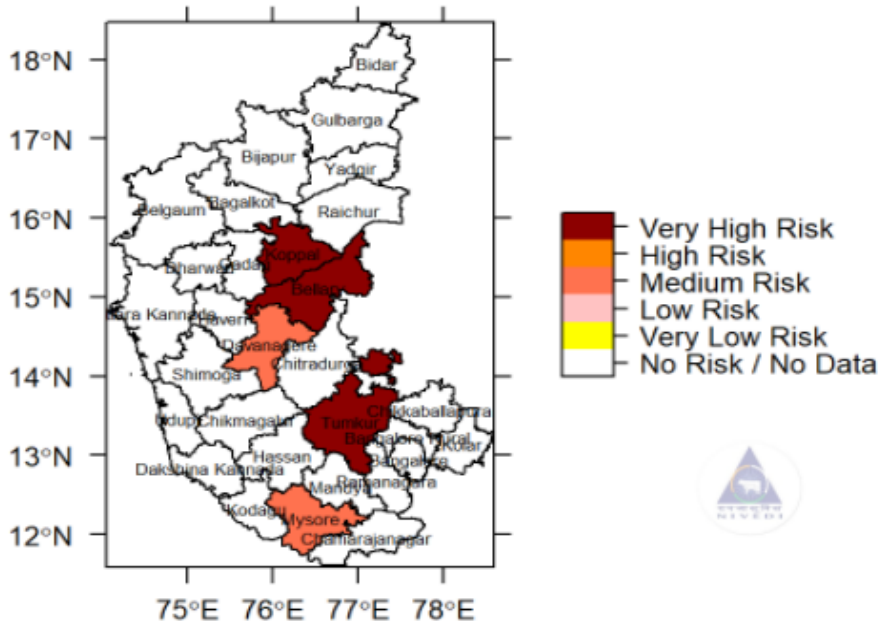


Fig 4.3. Livestock disease forecast state wise (EX. Karnataka)

## IV. Forecasting of weather parameters

Weather forecasting has been one of the most challenging problems around the world because of both its practical value in meteorology and popular sphere for scientific research. Weather forecast systems are among the most complex equation systems that computer has to solve. A great quantity of data, coming from satellites, ground stations and sensors located around our planet send daily information that must be used to foresee the weather situation in next hours and days all around. Weather forecasts provide critical information about future weather. There are various techniques involved in weather forecasting, from relatively simple observation of the sky to highly complex computerized mathematical models. Further, forecast products by Indian Metrological department were used for validationof our forecasts (https://mausam.imd.gov.in/imd_latest/contents/extendedrangeforecast.php).

Following are the basic steps of forecasting process:

1. Determine the forecast's purpose
2. Establish a time horizon
3. Select a forecasting technique
4. Gather and analyse data
5. Perform the forecast
6. Monitor the forecast and use it in prediction of disease

Statistical Models used for forecasting of weather and remotely sensed variables

ARIMA stands for Autoregressive Integrated Moving Average. ARIMA is also known as Box-Jenkins approach. Box and Jenkins claimed that non-stationary data can be made stationary by differencing the series, $Y_t$. The general model for $Y_t$ is written as,

$$\mathbf{Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} \ldots \phi_p Y_{t-p} + \epsilon_t + \theta_1 \epsilon_{t-1} + \theta_2 \epsilon_{t-2} + \ldots \theta_q \epsilon_{t-q}}$$

Where, $Y_t$ is the differenced time series value, $\phi$ and $\theta$ are unknown parameters and $\epsilon$ are independent identically distributed error terms with zero mean. Here, $Y_t$ is expressed in terms of its past values and the current and past values of error terms.

The ARIMA Model combines three basic Methods:

- Auto Regression (AR) – In auto-regression the values of a given time series data are regressed on their own lagged values, which is indicated by the "p" value in the model.
- Differencing (I-for Integrated) – This involves differencing the time series data to remove the trend and convert a non-stationary time series to a stationary one. This is indicated by the "d" value in the model. If d = 1, it looks at the difference between two-time series entries, if d = 2 it looks at the differences of the differences obtained at d =1, and so forth.
- Moving Average (MA) – The moving average nature of the model is represented by the "q" value which is the number of lagged values of the error term.

This model is called Autoregressive Integrated Moving Average or ARIMA(p, d,q) of $Y_t$. We will follow the steps enumerated below to build our model. ARIMA models were run in 18 combinations of p, d, q. Based on the minimum AIC value, the order of ARIMA model was selected. This order was used for the prediction of all the weather parameters used in developing disease forewarning models.

## V. Implementation of Principal Component Analysis

Large datasets are gradually common and are often difficult to interpret. Principal Component Analysis (PCA) is a technique for reducing the dimensionality of such datasets, increasing the interpretability but at the same time, minimizing the information loss. The PCA is employed in NADRES v2 by creating new uncorrelated variables that successively maximize the variance. This means that ` preserving as much variability as possible` translates into finding new variables that are linear functions of those in the original dataset, that successively maximize variance and that are uncorrelated with each other. Determining such new variables, the principal components (PCs) reduces to solve an eigenvalue/eigenvector problem. PCA can be based on either covariance matrix or the correlation matrix and the main use of PCA are descriptive.

In the present study, all the meteorological and remote sensing variables are considering for PCA, with correlation matrix, the final output of principal components which are independent of each were considered for further ML modelling and risk estimation.

## VI. Machine Learning Models

Disease outbreak data were aligned with generated risk variables to the respective latitude and longitude, which were subjected to climate-disease modelling. A number of models were fit to aligned data and tested for accuracy in terms of discrimination power. Two regression models, Generalized Linear Models (GLM) and Generalized Additive Models (GAM) and six machine learning algorithms, i.e. Random Forest (RF), Boosted Regression Tree (BRT), Artificial Neural Network (ANN), Multiple Adaptive Regression Spline (MARS), Flexible Discriminant Analysis (FDA) and Classification Tree Analysis (CTA) were employed for disease modelling. Different modelling methods return different types of 'model object' and all these model objects could be used for the predict function to make predictions for any combinations of values of independent variables. Response plots were created to explore and understand model predictions.

The fitted models were assessed for their discriminating power using Receiving Operating Characteristic (ROC) curve, Cohen's Kappa (Heildke Skill Score) and True Skill Statistics (TSS). These measures were used to evaluate the quality of predictions based on presence-absence data. Raster Stack was used to combine the results of individual predictions by different model methods. All the models were assessed for overfitting.

The outcome of best fitted models was in probability of disease occurrence and was categorised into 6 risk levels as No risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR) and Very high risk (VHR) for enabling the stakeholders to take appropriate control measures by suitably allocating available resources.

## 5. Accuracy of Prediction

| Serial No. | Diseases | Accuracy (%) |
|---|---|---|
| 1. | Anthrax | 100.00 |
| 2. | Babesiosis | 99.07 |
| 3. | Black Quarter | 96.45 |
| 4. | Blue Tongue | 99.38 |
| 5. | Enterotoxaemia | 96.91 |
| 6. | Fasciolosis | 99.54 |
| 7. | Foot and mouth disease | 96.45 |
| 8. | Haemorrhagic septicaemia | 94.29 |
| 9. | Peste des Petits Ruminants | 96.30 |
| 10. | Sheep & Goat pox | 99.07 |
| 11. | Swine fever | 99.38 |
| 12. | Theileriosis | 96.91 |
| 13. | Trypanosomosis | 96.91 |

**Aggregation and prediction of livestock diseases at district level leading to higher accuracy.**

- **Formula Used:** The **Accuracy** of disease prediction was calculated using the following formula.

$$\frac{\text{TP} + \text{TN}}{\text{Total}} * 100$$

TP-True Positive Observations, TN-True Negative Observations, Total- Total observations.

- Internal Accuracy was performed using 10 years of data. Accuracy obtained was >90% for all the diseases predicted.
- Despite the power of climate and disease risk models, considerable uncertainties remain, identifying these uncertainties, highlighting importance of improved data may improve the model accuracy, realism, confidence, together with translating uncertainties in model inputs into uncertainties in model outputs, are important benefits of modelling.

## 6. Moran’s I for clustering of Livestock diseases

Moran's I is a tool that measures spatial autocorrelation (feature similarity) based on both feature locations and feature values simultaneously. Given a set of features and an associated attribute, it evaluates whether the pattern expressed is clustered, dispersed, or random. The tool calculates the Moran's I Index value and both a Z score and p-value evaluating the significance of that index. In general, a Moran's Index value near +1.0 indicates clustering while an index value near -1.0 indicates dispersion.

Autocorrelation tool, the null hypothesis states that "there is no spatial clustering of the values associated with the geographic features in the study area ."When the p-value is small and the absolute value of the Z score is large enough that it falls outside of the desired confidence level, the null hypothesis can be rejected .If the index value is greater than 0, the set of features exhibits a clustered pattern .If the value is less than 0, the set of features exhibits a dispersed pattern.

## 7. R Software

R is a programming language and software environment for statistical analysis, graphics representation and reporting. R is a simple and effective programming language which includes conditionals, loops, user defined recursive functions and input and output facilities. R statistical software version 3.1.3 (version 3.4.3, R Foundation for Statistical Computing, Vienna, Austria. https://www.R-project.org/) was used as an integrated suite for data mining, calculation and graphical display. Several R packages like *openxlx, raster, RMySQL, rgdal, RColorBrewer, sqldf, sp, spdep, xlsx, plyr, randomFores, dismo, SDMTool, dplyr, tmap and data table*were used for data extraction, data alignment, annotation, analysis, modelling and risk mapping.

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## 8. Forewarning of livestock disease for the month of May 2021

i). District wise Livestock Disease forewarning:

### District wise Livestock Disease Risk Forewarning for May 2021: Andaman and Nicobar

| Districts of Andaman and Nicobar | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Nicobars | NR | MR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| North & Middle Andaman | NR | NR | NR | NR | NR | ***VHR*** | VLR | NR | VLR | NR | NR | NR | NR |
| South Andaman | NR | ***HR*** | MR | NR | NR | ***VHR*** | VLR | NR | VLR | ***VHR*** | NR | NR | NR |

**If vaccination is already been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Andhra Pradesh

| Districts of Andhra Pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Anantapur | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR |
| Chittoor | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| East Godavari | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Guntur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Krishna | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR |
| Kurnool | ***VHR*** | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Prakasam | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sri Potti Sriramulu Nellore | ***VHR*** | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Srikakulam | NR | NR | VLR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Visakhapatnam | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Vizianagaram | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| West Godavari | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Y.S.R. | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |

**If vaccination is already has been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Arunachal Pradesh

| Districts of Arunachal Pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Anjaw | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Changlang | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dibang Valley | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| East Kameng | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| East Siang | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kurung Kumey | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR |
| Lohit | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Lower Dibang Valley | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Lower Subansiri | NR | NR | VLR | VLR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| Papum Pare | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | NR |
| Tawang | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Tirap | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Upper Siang | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Upper Subansiri | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| West Kameng | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| West Siang | NR | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Assam

| Districts of Assam | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Baksa | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | VLR | NR | ***VHR*** | NR | NR |
| Barpeta | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Bongaigaon | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR |
| Cachar | NR | NR | ***VHR*** | NR | NR | NR | VLR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR |
| Chirang | NR | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| Darrang | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR |
| Dhemaji | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | MR | NR | NR |
| Dhubri | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Dibrugarh | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR |
| Dima Hasao | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Goalpara | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Golaghat | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR |
| Hailakandi | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Jorhat | NR | NR | ***VHR*** | NR | NR | ***VHR*** | VLR | ***VHR*** | VLR | NR | NR | NR | NR |
| Kamrup | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | NR | ***HR*** | ***VHR*** | ***VHR*** | ***VHR*** | NR |
| Kamrup Metropolitan | NR | NR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | ***HR*** |
| Karbi Anglong | NR | NR | ***VHR*** | NR | NR | NR | VLR | ***VHR*** | VLR | ***VHR*** | ***VHR*** | NR | NR |
| Karimganj | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | ***VHR*** | NR | NR |
| Kokrajhar | NR | NR | ***VHR*** | NR | ***VHR*** | NR | VLR | ***VHR*** | VLR | NR | ***VHR*** | NR | NR |
| Lakhimpur | NR | NR | ***VHR*** | NR | NR | MR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| Morigaon | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR |

**Continue**

| Districts of Assam | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Nagaon | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Nalbari | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Sivasagar | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | ***VHR*** | ***HR*** | NR | ***VHR*** | NR | NR |
| Sonitpur | NR | NR | **HR** | NR | NR | NR | VLR | MR | VLR | NR | MR | NR | NR |
| Tinsukia | NR | ***VHR*** | VLR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR |
| Udalguri | NR | NR | VLR | NR | NR | NR | VLR | NR | ***HR*** | NR | NR | NR | NR |

**If vaccination has already been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Bihar

| Districts of Bihar | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Araria | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Arwal | NR | NR | NR | NR | NR | NR | VLR | NR | MR | NR | NR | NR | NR |
| Aurangabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Banka | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Begusarai | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhagalpur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Bhojpur | NR | NR | NR | NR | NR | NR | VLR | NR | ***HR*** | NR | NR | ***VHR*** | ***HR*** |
| Buxar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Darbhanga | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gaya | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Gopalganj | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jamui | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jehanabad | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | NR |
| Kaimur (Bhabua) | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Katihar | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Khagaria | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Kishanganj | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Lakhisarai | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Madhepura | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Madhubani | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Munger | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Muzaffarpur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**Continue**

| Districts of Bihar | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Nalanda | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Nawada | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Pashchim Champaran | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Patna | NR | NR | ***HR*** | NR | NR | NR | NR | NR | VLR | NR | **VHR** | ***VHR*** | NR |
| Purba Champaran | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Purnia | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Rohtas | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Saharsa | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Samastipur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Saran | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Sheikhpura | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Sheohar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sitamarhi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Siwan | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Supaul | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Vaishali | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Chandigarh

| Districts of Chandigarh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Chandigarh | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Chhattisgarh

| Districts of Chhattisgarh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Bastar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bijapur | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bilaspur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dakshin Bastar Dantewada | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dhamtari | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Durg | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Janjgir-champa | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jashpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kabeerdham | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Korba | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Koriya | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mahasamund | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Narayanpur | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Raigarhh | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Raipur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rajnandgaon | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Surguja | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Uttar Bastar Kanker | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

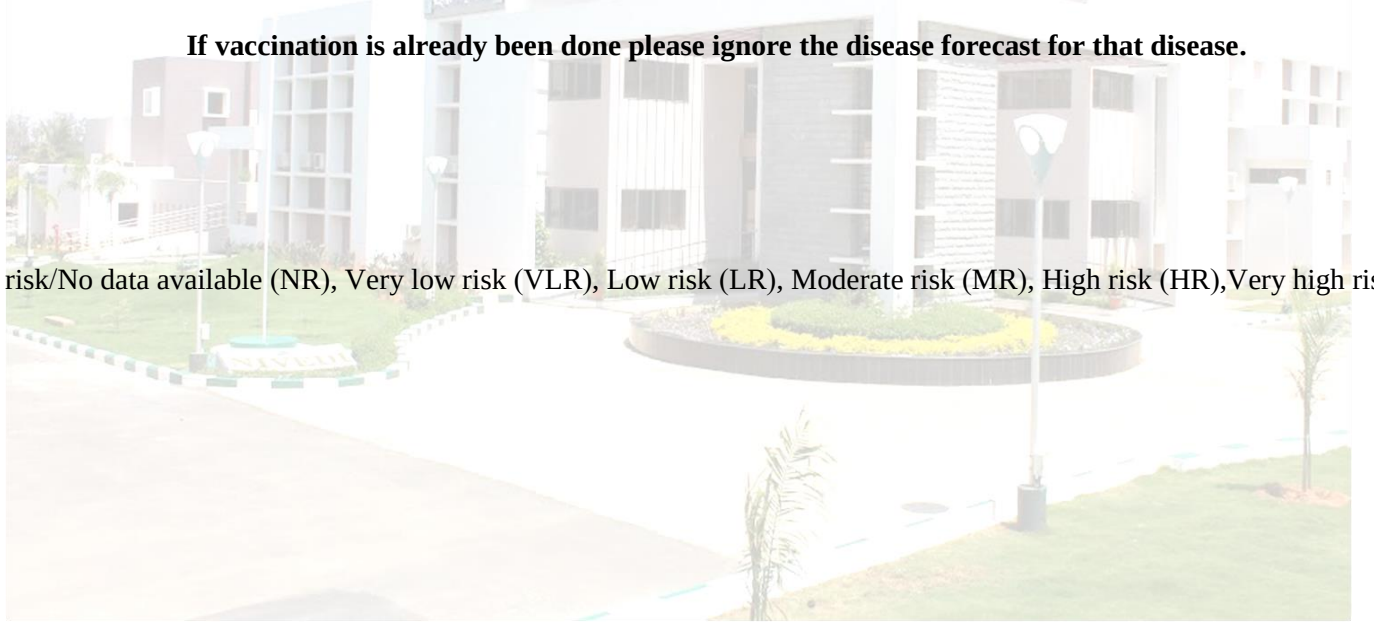
**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Dadra and Nagar Haveli

| Districts of Dadra and Nagar Haveli | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Dadra and Nagar Haveli | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination is already been done please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Daman and Diu

| Districts of Daman and Diu | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Daman | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Diu | NR | NR | VLR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination is already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Goa

| Districts of Goa | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| North Goa | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | ***VHR*** | NR | NR |
| South Goa | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | ***VHR*** | NR | ***VHR*** |

**If vaccination is already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Gujarat

| Districts of Gujarat | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Ahmadabad | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Amreli | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Anand | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Banas Kantha | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Bharuch | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhavnagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dohad | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Gandhinagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jamnagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Junagadh | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kachchh | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kheda | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Mahesana | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Narmada | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Navsari | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Panch Mahals | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Patan | NR | NR | NR | VLR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Porbandar | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rajkot | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Sabar Kantha | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Surat | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Surendranagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Tapi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| The Dangs | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Vadodara | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Valsad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Haryana

| Districts of Haryana | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Ambala | NR | NR | ***HR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhiwani | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | NR | NR | NR |
| Faridabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Fatehabad | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR |
| Gurgaon | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Hisar | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | ***HR*** |
| Jhajjar | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR |
| Jind | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kaithal | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Karnal | NR | NR | VLR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kurukshetra | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mahendragarh | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Mewat | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Palwal | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Panchkula | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Panipat | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Rewari | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Rohtak | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sirsa | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sonipat | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Yamunanagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Himachal Pradesh

| Districts of Himachal Pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Bilaspur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Chamba | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Hamirpur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Kangra | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR |
| Kinnaur | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Kullu | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Lahul & Spiti | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mandi | NR | NR | VLR | VLR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Shimla | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR |
| Sirmaur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Solan | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Una | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Jammu and Kashmir

| Districts of Jammu and Kashmir | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Anantnag | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR |
| Badgam | NR | NR | VLR | NR | NR | NR | ***HR*** | NR | NR | ***VHR*** | NR | NR | NR |
| Bandipore | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Baramula | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Doda | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ganderbal | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Jammu | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kargil | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kathua | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kishtwar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kulgam | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Kupwara | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | ***HR*** | NR | NR | NR |
| Leh(Ladakh) | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Pulwama | NR | NR | NR | VLR | NR | NR | LR | NR | NR | ***VHR*** | NR | NR | NR |
| Punch | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rajouri | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ramban | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Reasi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Samba | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shupiyan | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Srinagar | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | ***VHR*** | NR | NR | NR |
| Udhampur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Jharkhand

| Districts of Jharkhand | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Bokaro | NR | ***VHR*** | ***HR*** | VLR | NR | ***VHR*** | ***HR*** | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Chatra | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR | NR | MR | NR | ***VHR*** | ***VHR*** | ***VHR*** |
| Deoghar | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | ***VHR*** | NR | ***HR*** | NR | NR | ***VHR*** | ***VHR*** |
| Dhanbad | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | ***HR*** | ***VHR*** | ***VHR*** | NR | ***VHR*** | ***VHR*** | ***VHR*** |
| Dumka | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | NR | ***VHR*** | ***VHR*** | ***VHR*** |
| Garhwa | NR | ***VHR*** | NR | NR | NR | ***VHR*** | NR | MR | VLR | NR | NR | ***VHR*** | ***VHR*** |
| Giridih | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR | MR | ***VHR*** |
| Godda | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | MR | NR | NR | ***VHR*** | ***VHR*** |
| Gumla | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | MR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Hazaribagh | NR | ***VHR*** | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Jamtara | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | VLR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Khunti | NR | ***VHR*** | NR | NR | NR | ***VHR*** | ***VHR*** | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Koderma | NR | ***VHR*** | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| Latehar | NR | ***VHR*** | NR | NR | NR | ***VHR*** | VLR | NR | VLR | NR | NR | ***VHR*** | ***VHR*** |
| Lohardaga | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | ***VHR*** | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Pakur | NR | ***VHR*** | ***HR*** | VLR | NR | ***VHR*** | MR | MR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Palamu | NR | ***VHR*** | ***HR*** | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Pashchimi Singhbhum | NR | ***VHR*** | ***HR*** | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Purbi Singhbhum | NR | ***VHR*** | ***HR*** | NR | NR | ***VHR*** | MR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Ramgarh | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Ranchi | NR | **VHR** | NR | VLR | NR | ***VHR*** | ***VHR*** | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Sahibganj | NR | **VHR** | ***VHR*** | VLR | ***VHR*** | ***VHR*** | ***HR*** | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** | ***VHR*** |
| Seraikela - Kharsawan | NR | **VHR** | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | ***HR*** | ***HR*** |
| Simdega | NR | **VHR** | NR | NR | NR | ***VHR*** | VLR | NR | LR | NR | ***HR*** | ***VHR*** | ***VHR*** |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Karnataka

| Districts of Karnataka | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Bagalkot | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | ***HR*** | NR | NR | NR |
| Bangalore | NR | NR | NR | VLR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Bangalore Rural | NR | NR | NR | NR | ***VHR*** | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Belgaum | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | ***HR*** | NR | NR | NR | NR |
| Bellary | ***VHR*** | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Bidar | NR | NR | MR | NR | NR | NR | MR | NR | VLR | NR | NR | NR | NR |
| Bijapur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Chamarajanagar | NR | NR | NR | NR | ***VHR*** | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Chikkaballapura | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | MR | ***VHR*** | NR | NR | NR |
| Chikmagalur | NR | NR | MR | VLR | ***VHR*** | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Chitradurga | NR | NR | VLR | VLR | ***VHR*** | NR | VLR | ***VHR*** | VLR | NR | NR | NR | NR |
| Dakshina Kannada | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***HR*** | NR | NR | NR | NR |
| Davanagere | MR | NR | ***HR*** | MR | ***VHR*** | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR |
| Dharwad | NR | NR | ***VHR*** | NR | ***VHR*** | NR | VLR | NR | NR | NR | NR | NR | NR |
| Gadag | NR | NR | NR | NR | ***VHR*** | NR | VLR | NR | NR | NR | NR | NR | NR |

**Continue**

| Districts of Karnataka | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Gulbarga | NR | NR | ***HR*** | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR |
| Hassan | NR | NR | ***HR*** | VLR | ***VHR*** | NR | VLR | ***VHR*** | MR | NR | NR | NR | NR |
| Haveri | NR | NR | MR | NR | ***VHR*** | NR | NR | NR | MR | NR | NR | NR | NR |
| Kodagu | NR | NR | VLR | NR | ***VHR*** | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Kolar | NR | NR | NR | MR | ***VHR*** | NR | ***VHR*** | NR | NR | MR | NR | NR | NR |
| Koppal | ***VHR*** | NR | VLR | VLR | ***VHR*** | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR |
| Mandya | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | NR | NR | NR |
| Mysore | MR | NR | ***VHR*** | NR | ***VHR*** | NR | VLR | ***VHR*** | VLR | NR | NR | NR | NR |
| Raichur | NR | NR | ***HR*** | NR | ***VHR*** | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR |
| Ramanagara | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Shimoga | NR | NR | ***VHR*** | VLR | ***VHR*** | NR | VLR | ***VHR*** | NR | NR | NR | NR | NR |
| Tumkur | ***VHR*** | NR | VLR | MR | ***VHR*** | NR | VLR | ***VHR*** | VLR | ***VHR*** | NR | NR | NR |
| Udupi | NR | NR | VLR | NR | NR | NR | MR | NR | VLR | NR | NR | NR | NR |
| Uttara Kannada | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Yadgir | NR | NR | VLR | VLR | ***VHR*** | NR | NR | NR | VLR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Kerala

| Districts of Kerala | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Alappuzha | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR |
| Ernakulum | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR |
| Idukki | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***HR*** | NR | NR | ***VHR*** | NR |
| Kannur | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***HR*** | NR | NR | NR | NR |
| Kasaragod | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Kollam | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR |
| Kottayam | NR | NR | NR | NR | NR | NR | ***VHR*** | ***HR*** | ***VHR*** | NR | NR | ***VHR*** | NR |
| Kozhikode | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR | NR | NR | NR |
| Malappuram | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR |
| Palakkad | NR | ***VHR*** | NR | NR | ***VHR*** | NR | VLR | MR | MR | NR | NR | ***VHR*** | NR |
| Pathanamthitta | NR | NR | NR | VLR | NR | NR | ***VHR*** | ***VHR*** | VLR | NR | NR | NR | NR |
| Thiruvananthapuram | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR |
| Thrissur | NR | NR | VLR | NR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | NR | NR |
| Wayanad | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR | NR | NR |

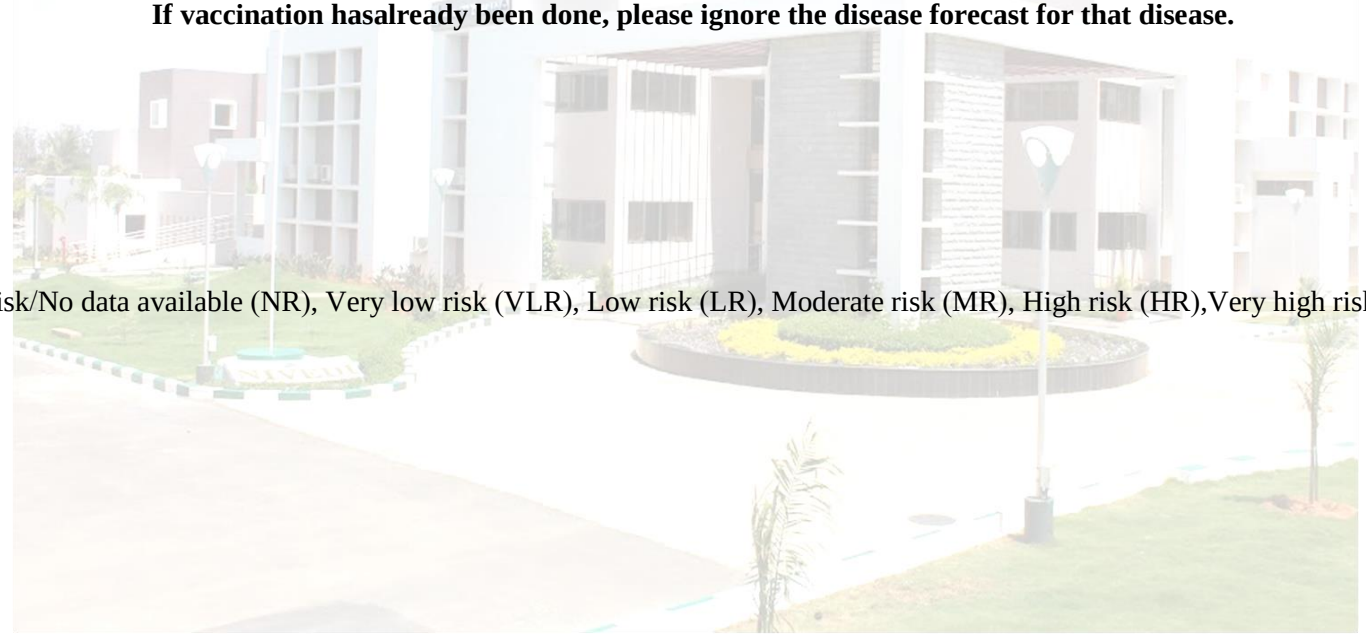
**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Lakshadweep

| Districts of Lakshadweep | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Lakshadweep | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Madhya Pradesh

| Districts of Madhya Pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Alirajpur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Anuppur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ashoknagar | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Balaghat | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Barwani | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Betul | NR | NR | MR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhind | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhopal | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Burhanpur | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Chhatarpur | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Chhindwara | NR | NR | ***VHR*** | NR | NR | NR | MR | NR | VLR | NR | NR | NR | NR |
| Damoh | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Datia | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dewas | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dhar | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Dindori | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| East Nimar | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Guna | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gwalior | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Harda | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Hoshangabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Indore | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jabalpur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Jhabua | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Katni | NR | NR | ***HR*** | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR | NR | NR |

**Continue**

| Districts of Madhya Pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Khargone(West Nimar) | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Mandla | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Mandsaur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Morena | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Narsimhapur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Neemuch | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Panna | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Raisen | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR |
| Rajgarh | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Ratlam | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Rewa | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sagar | NR | NR | ***VHR*** | NR | NR | NR | NR | MR | VLR | NR | NR | NR | NR |
| Satna | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sehore | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Seoni | NR | NR | VLR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Shahdol | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shajapur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sheopur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shivpuri | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Sidhi | NR | NR | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR |
| Singrauli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Tikamgarh | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Ujjain | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Umaria | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Vidisha | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Maharashtra

| Districts of Maharashtra | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Ahmadnagar | NR | NR | VLR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR |
| Akola | MR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Amravati | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Aurangabad | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhandara | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Bid | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Buldana | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Chandrapur | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Dhule | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gadchiroli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gondiya | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Hingoli | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR |
| Jalgaon | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jalna | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kolhapur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Latur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mumbai | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Mumbai Suburban | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Nagpur | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Nanded | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Nandurbar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Nashik | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Osmanabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**Continue**

| Districts of Maharashtra | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Parbhani | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Pune | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Raigarh | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ratnagiri | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sangli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Satara | NR | NR | VLR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Sindhudurg | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Solapur | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Thane | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Wardha | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Washim | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Yavatmal | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Manipur

| Districts of Manipur | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Bishnupur | NR | NR | ***VHR*** | VLR | NR | ***VHR*** | ***HR*** | MR | NR | NR | NR | NR | NR |
| Chandel | NR | NR | ***HR*** | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Churachandpur | NR | NR | ***VHR*** | VLR | NR | NR | VLR | NR | NR | NR | ***VHR*** | NR | NR |
| Imphal East | NR | NR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR | NR | NR |
| Imphal West | NR | NR | ***VHR*** | VLR | NR | ***VHR*** | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Senapati | NR | NR | ***HR*** | LR | NR | NR | VLR | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| Tamenglong | NR | NR | ***HR*** | VLR | NR | NR | ***HR*** | NR | VLR | NR | ***VHR*** | NR | NR |
| Thoubal | NR | NR | ***HR*** | NR | NR | ***VHR*** | VLR | ***HR*** | NR | NR | NR | NR | NR |
| Ukhrul | NR | NR | ***HR*** | VLR | NR | NR | VLR | NR | NR | NR | MR | NR | NR |

***If vaccination hasalready been done please ignore the disease forecast for that disease.***

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Meghalaya

| Districts of Meghalaya | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| East Garo Hills | NR | NR | VLR | NR | NR | NR | ***HR*** | ***VHR*** | NR | NR | ***HR*** | NR | NR |
| East Jaintia Hills | NR | NR | VLR | NR | NR | NR | MR | ***VHR*** | VLR | NR | ***VHR*** | NR | NR |
| East Khasi Hills | ***VHR*** | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** | NR | NR |
| Jaintia Hills | NR | NR | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| North Garo Hills | NR | NR | NR | VLR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Ribhoi | NR | NR | VLR | NR | NR | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| South Garo Hills | NR | NR | VLR | NR | NR | NR | MR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR |
| Southwest Garo Hills | NR | NR | VLR | NR | NR | NR | ***HR*** | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| Southwest Khasi Hills | NR | NR | VLR | VLR | NR | NR | MR | ***VHR*** | VLR | NR | MR | NR | NR |
| West Garo Hills | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| West Khasi Hills | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Mizoram

| Districts of Mizoram | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Aizawl | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Champhai | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Kolasib | NR | NR | VLR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Lawngtlai | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Lunglei | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Mamit | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Saiha | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Serchhip | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Nagaland

| Districts of Nagaland | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Dimapur | NR | NR | VLR | VLR | NR | NR | ***HR*** | NR | NR | NR | ***VHR*** | NR | NR |
| Kiphire | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Kohima | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Longleng | NR | NR | NR | VLR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| Mokokchung | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Mon | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Peren | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Phek | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Tuensang | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | ***VHR*** | NR | NR |
| Wokha | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Zunheboto | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: NCT of Delhi

| Districts of NCT of Delhi | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Central | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| East | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| New Delhi | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| North | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| North East | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| North West | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| South | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| South West | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| West | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Odisha

| Districts of Odisha | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Anugul | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR |
| Balangir | NR | NR | VLR | VLR | NR | NR | VLR | NR | VHR | NR | NR | NR | NR |
| Baleshwar | NR | NR | VLR | VLR | NR | NR | VLR | ***VHR*** | VLR | NR | NR | NR | NR |
| Bargarh | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Baudh | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bhadrak | NR | NR | ***HR*** | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Cuttack | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** | ***VHR*** | VLR | NR | NR | NR | NR |
| Debagarh | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dhenkanal | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gajapati | NR | NR | VLR | VLR | NR | NR | VLR | NR | HR | NR | NR | NR | NR |
| Ganjam | NR | NR | ***HR*** | VLR | NR | NR | VLR | ***VHR*** | VHR | NR | NR | NR | NR |
| Jagatsinghapur | NR | NR | ***VHR*** | NR | NR | NR | ***HR*** | ***HR*** | VLR | NR | NR | NR | NR |
| Jajapur | NR | NR | ***HR*** | NR | NR | NR | VLR | ***HR*** | VLR | NR | NR | NR | NR |
| Jharsuguda | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kalahandi | NR | NR | VLR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Kandhamal | NR | NR | VLR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Kendrapara | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Kendujhar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Khordha | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Koraput | ***VHR*** | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Malkangiri | NR | NR | VLR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |

**Continue**

| Districts of Odisha | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Mayurbhanj | NR | NR | NR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Nabarangapur | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Nayagarh | NR | NR | MR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Nuapada | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Puri | NR | NR | ***HR*** | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Rayagada | NR | NR | ***VHR*** | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Sambalpur | NR | NR | VLR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Subarnapur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sundargarh | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

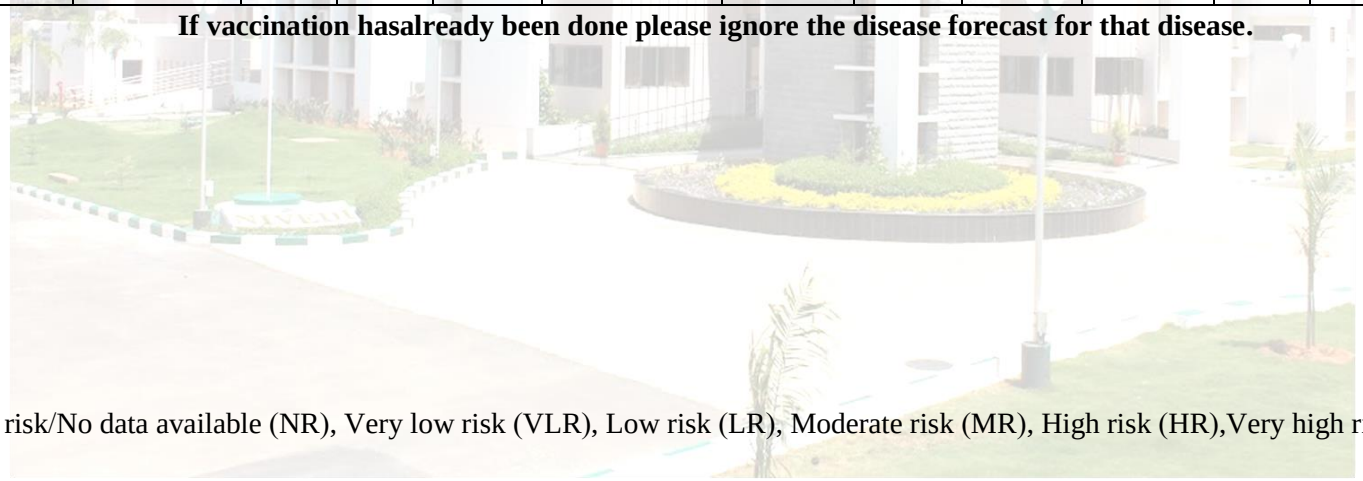
**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Puducherry

| Districts of Puducherry | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Karaikal | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR |
| Mahe | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Puducherry | ***VHR*** | ***VHR*** | NR | VLR | NR | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | NR |
| Yanam | NR | NR | VLR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Punjab

| Districts of Punjab | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Amritsar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Barnala | NR | NR | NR | NR | NR | NR | NR | NR | ***HR*** | NR | NR | NR | NR |
| Bathinda | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR |
| Faridkot | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Fatehgarh Sahib | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Firozpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Gurdaspur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Hoshiarpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jalandhar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kapurthala | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ludhiana | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Mansa | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Moga | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Muktsar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Patiala | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rupnagar | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | NR | NR |
| Sahibzada Ajit Singh Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sangrur | NR | NR | NR | NR | NR | NR | NR | MR | NR | NR | NR | NR | NR |
| Shahid Bhagat Singh Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Tarn Taran | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Rajasthan

| Districts of Rajasthan | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Ajmer | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Alwar | NR | NR | MR | NR | NR | NR | ***HR*** | ***VHR*** | VLR | NR | NR | NR | NR |
| Banswara | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Baran | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Barmer | NR | NR | VLR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Bharatpur | NR | NR | VLR | NR | ***VHR*** | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Bhilwara | NR | NR | VLR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Bikaner | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Bundi | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Chittaurgarh | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Churu | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR |
| Dausa | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Dhaulpur | NR | NR | NR | NR | NR | NR | NR | NR | MR | NR | NR | NR | NR |
| Dungarpur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Ganganagar | NR | NR | VLR | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR | NR | NR |
| Hanumangarh | NR | NR | ***HR*** | NR | ***VHR*** | NR | ***HR*** | NR | NR | NR | NR | NR | NR |
| Jaipur | NR | NR | VLR | VLR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | ***VHR*** | NR | NR |
| Jaisalmer | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jalor | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Jhalawar | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Jhunjhunun | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Jodhpur | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Karauli | NR | NR | NR | NR | NR | NR | VLR | ***VHR*** | VLR | NR | NR | NR | NR |

**Continue**

| Districts of Rajasthan | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Kota | NR | NR | NR | NR | NR | NR | ***HR*** | ***VHR*** | VLR | NR | ***VHR*** | NR | NR |
| Nagaur | NR | NR | VLR | VLR | NR | NR | ***VHR*** | NR | VLR | NR | NR | NR | NR |
| Pali | NR | NR | NR | VLR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Pratapgarh | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rajsamand | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Sawai Madhopur | NR | NR | NR | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR | NR | NR |
| Sikar | NR | ***VHR*** | ***HR*** | NR | NR | NR | ***VHR*** | MR | VLR | NR | NR | NR | ***VHR*** |
| Sirohi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Tonk | NR | NR | NR | NR | NR | NR | VLR | ***VHR*** | NR | NR | NR | NR | NR |
| Udaipur | NR | NR | VLR | VLR | NR | NR | VLR | NR | ***VHR*** | NR | NR | NR | NR |

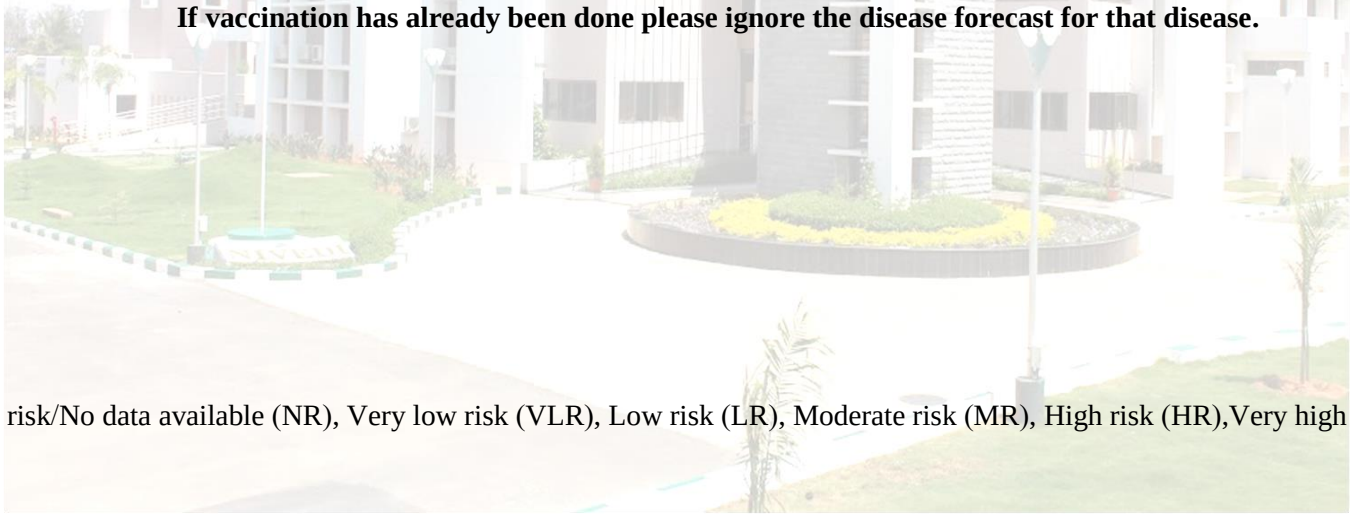
**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Sikkim

| Districts of Sikkim | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| East District | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| North District | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR |
| South District | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| West District | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination has already been done please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

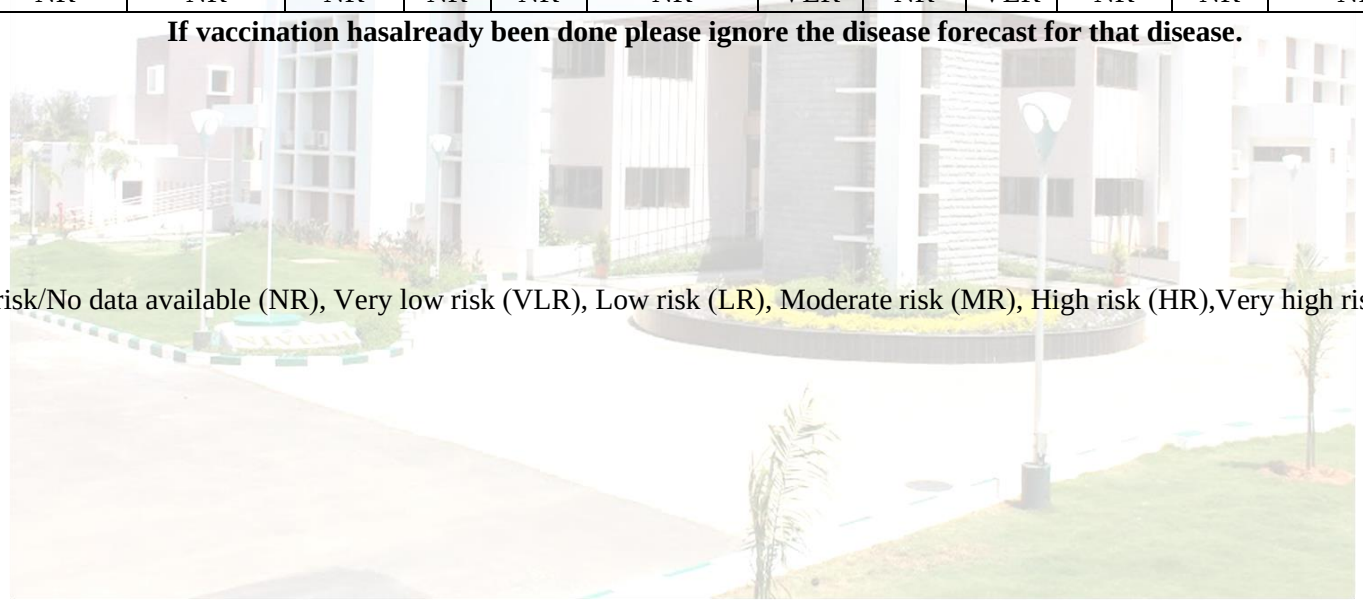
# District wise Livestock Disease Risk Forewarning for May 2021: Tamil Nadu

| Districts of Tamil Nadu | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Ariyalur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Chennai | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Coimbatore | NR | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Cuddalore | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR |
| Dharmapuri | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Dindigul | NR | NR | NR | VLR | NR | NR | VLR | NR | MR | NR | NR | NR | NR |
| Erode | NR | NR | MR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kancheepuram | ***VHR*** | NR | ***HR*** | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kanniyakumari | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Karur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Krishnagiri | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Madurai | ***VHR*** | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Nagapattinam | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Namakkal | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Perambalur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Pudukkottai | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Ramanathapuram | NR | NR | VLR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Salem | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sivaganga | NR | NR | NR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Thanjavur | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| The Nilgiris | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Theni | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Thiruvallur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Thiruvarur | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Thoothukkudi | NR | NR | NR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |

**Continue**

| Districts of Tamil Nadu | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Tiruchirappalli | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Tirunelveli | NR | NR | NR | VLR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Tiruppur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Tiruvannamalai | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Vellore | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Viluppuram | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Virudhunagar | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Telangana

| Districts of Telangana | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Adilabad | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Hyderabad | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Karimnagar | NR | NR | NR | VLR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Khammam | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Mahbubnagar | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR |
| Medak | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Nalgonda | NR | NR | NR | VLR | ***VHR*** | NR | NR | ***VHR*** | MR | NR | NR | NR | NR |
| Nizamabad | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Rangareddy | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Warangal | NR | NR | NR | VLR | ***VHR*** | NR | NR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR |

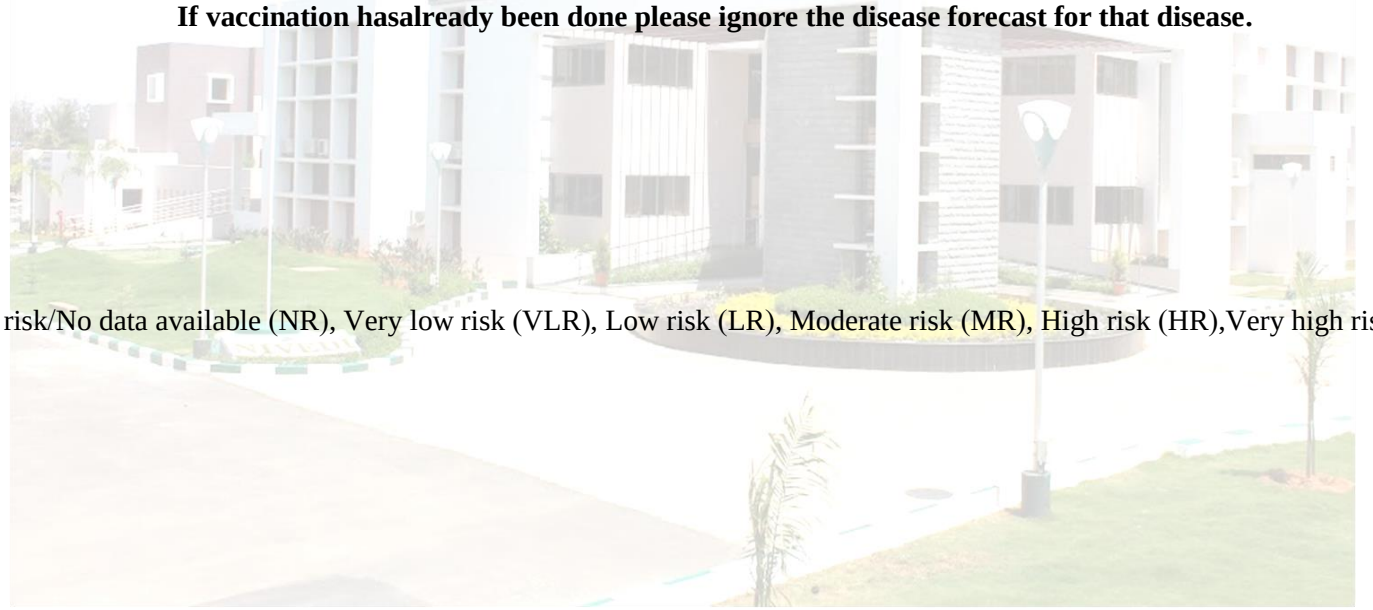
**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease forewarning for February2020: Tripura

| Districts of Tripura | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Dhalai | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | ***VHR*** | NR | NR | NR |
| North Tripura | NR | NR | VLR | NR | NR | ***VHR*** | VLR | ***VHR*** | VLR | NR | NR | NR | NR |
| South Tripura | NR | ***VHR*** | ***HR*** | NR | NR | ***VHR*** | ***HR*** | ***VHR*** | VLR | ***VHR*** | MR | NR | NR |
| West Tripura | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | VLR | ***VHR*** | ***VHR*** | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**



*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

# District wise Livestock Disease Risk Forewarning for May 2021: Uttar Pradesh

| Districts of Uttar Pradesh | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Agra | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | VLR | NR | NR | ***VHR*** | ***VHR*** |
| Aligarh | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Allahabad | NR | MR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | ***HR*** |
| Ambedkar Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Amethi | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Auraiya | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Azamgarh | NR | ***VHR*** | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | ***HR*** |
| Baghpat | NR | MR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Bahraich | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Ballia | NR | ***VHR*** | NR | NR | NR | ***VHR*** | VLR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Balrampur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Banda | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | ***VHR*** |
| Bara Banki | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | **VHR** | NR | NR | ***VHR*** | ***VHR*** |
| Bareilly | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Basti | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Bijnor | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Budaun | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Bulandshahr | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | ***VHR*** | NR |
| Chandauli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***HR*** |
| Chitrakoot | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | MR |
| Deoria | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Etah | NR | ***VHR*** | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | ***VHR*** | ***VHR*** |
| Etawah | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Faizabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Farrukhabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**Continue**

| Districts of Uttar Pradesh | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Fatehpur | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Firozabad | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Gautam Buddha Nagar | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Ghaziabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Ghazipur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Gonda | NR | ***VHR*** | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | ***HR*** |
| Gorakhpur | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | ***VHR*** | ***HR*** | NR | ***VHR*** | ***VHR*** |
| Hamirpur | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Hapur | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Hardoi | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Jalaun | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Jaunpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | MR |
| Jhansi | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Jyotiba Phule Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kannauj | NR | ***HR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Kanpur Dehat | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | MR |
| Kanpur Nagar | NR | ***HR*** | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Kanshiram Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kaushambi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kheri | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | MR |
| Kushinagar | NR | HR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Lalitpur | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | ***VHR*** | NR |
| Lucknow | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***HR*** |
| MahaJanuarya Nagar | NR | NR | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR |
| Mahoba | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |

**Continue**

| Districts of Uttar Pradesh | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Mahrajganj | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | MR | ***HR*** |
| Mainpuri | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mathura | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mau | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Meerut | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| Mirzapur | NR | ***VHR*** | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | MR |
| Moradabad | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR |
| Muzaffarnagar | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***HR*** |
| Pilibhit | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Pratapgarh | NR | ***HR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***HR*** |
| Rae Bareli | NR | ***VHR*** | NR | NR | NR | NR | VLR | NR | NR | NR | NR | ***HR*** | ***VHR*** |
| Rampur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Saharanpur | NR | ***HR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Sambhal | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sant Kabir Nagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sant Ravidas Nagar | NR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR |
| Shahjahanpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shamli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shrawasti | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Siddharthnagar | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sitapur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Sonbhadra | NR | ***VHR*** | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** |
| Sultanpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Unnao | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | ***VHR*** |
| Varanasi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

**If vaccination is already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: Uttarakhand

| Districts of Uttarakhand | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Anthrax** | **Babesiosis** | **BQ** | **BT** | **ET** | **Fascioliasis** | **FMD** | **HS** | **PPR** | **S&G Pox** | **SF** | **Theileriosis** | **Trypanosomiasis** |
| Almora | NR | NR | NR | VLR | NR | NR | VLR | NR | ***VHR*** | NR | NR | NR | NR |
| Bageshwar | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Chamoli | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Champawat | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Dehradun | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Garhwal | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Hardwar | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Nainital | NR | NR | NR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Pithoragarh | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Rudraprayag | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Tehri Garhwal | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Udham Singh Nagar | NR | NR | VLR | NR | NR | NR | VLR | NR | VLR | NR | NR | NR | NR |
| Uttarkashi | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | ***HR*** | NR | NR |

**If vaccination hasalready been done, please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

## District wise Livestock Disease Risk Forewarning for May 2021: West Bengal

| Districts of West Bengal | Livestock Disease | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fascioliasis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Bankura | ***VHR*** | NR | ***VHR*** | NR | NR | NR | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | ***HR*** | NR |
| Bardhhaman | ***VHR*** | NR | VLR | VLR | NR | NR | ***HR*** | ***VHR*** | ***VHR*** | ***VHR*** | NR | NR | NR |
| Birbhum | NR | ***VHR*** | ***VHR*** | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR | ***VHR*** | ***VHR*** |
| Dakshin Dinajpur | NR | NR | ***VHR*** | NR | NR | NR | MR | NR | VLR | NR | NR | NR | MR |
| Darjiling | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | ***VHR*** | NR | NR |
| Haora | NR | ***VHR*** | NR | NR | NR | NR | ***VHR*** | NR | ***VHR*** | ***VHR*** | NR | ***VHR*** | NR |
| Hugli | NR | ***VHR*** | VLR | NR | NR | NR | ***VHR*** | ***HR*** | ***VHR*** | ***VHR*** | NR | ***VHR*** | ***VHR*** |
| Jalpaiguri | NR | NR | MR | NR | NR | NR | ***HR*** | ***VHR*** | MR | NR | NR | NR | NR |
| Koch Bihar | NR | NR | VLR | NR | NR | NR | VLR | ***VHR*** | VLR | NR | NR | ***VHR*** | NR |
| Kolkata | NR | NR | VLR | VLR | NR | NR | NR | NR | ***VHR*** | NR | NR | NR | ***VHR*** |
| Maldah | NR | NR | VLR | VLR | NR | NR | VLR | NR | ***VHR*** | NR | NR | MR | MR |
| Murshidabad | ***VHR*** | NR | VLR | NR | NR | NR | LR | NR | ***VHR*** | NR | NR | ***VHR*** | NR |
| Nadia | NR | NR | VLR | NR | NR | NR | ***HR*** | NR | ***VHR*** | ***VHR*** | NR | NR | NR |
| North Twenty-Four Parganas | NR | NR | VLR | NR | NR | NR | MR | NR | ***HR*** | ***VHR*** | NR | ***VHR*** | ***VHR*** |
| Paschim Medinipur | NR | ***VHR*** | ***VHR*** | VLR | NR | NR | ***HR*** | ***VHR*** | ***VHR*** | NR | NR | ***VHR*** | NR |
| Purba Medinipur | NR | ***VHR*** | ***VHR*** | NR | NR | NR | LR | NR | VLR | NR | NR | ***VHR*** | NR |
| Puruliya | NR | NR | VLR | NR | NR | NR | ***HR*** | ***VHR*** | ***VHR*** | NR | NR | NR | ***HR*** |
| South Twenty Four Parganas | NR | NR | VLR | VLR | NR | NR | ***VHR*** | NR | LR | NR | NR | ***VHR*** | NR |
| Uttar Dinajpur | NR | NR | ***VHR*** | NR | NR | NR | VLR | NR | ***VHR*** | NR | NR | NR | NR |

**If vaccination hasalready been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

**II) Glimpse about the risk of predicted diseases:**

**The Livestock disease risk obtained based on the Machine Learningalgorithm were further categorized into risk events using High Risk and Very High Risk.**

**1. Andaman and Nicobar**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | South Andaman | One | Babesiosis |
| 2. | Nicobars,North & Middle Andaman and South Andaman | Three | Fasciolosis |
| 3. | South Andaman | One | Swine Fever |

**2. Andhra Pradesh**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Kurnool, Sri Potti Sriramulu Nellore and Visakhapatnam | Three | Anthrax |
| 2. | Anantapur | One | Enterotoxaemia |
| 3. | Anantapur | One | Haemorrhagic Septicaemia |
| 4. | Krishna | One | Peste des Petits Ruminants |
| 5. | Anantapur | One | Theileriosis |

**3. Arunachal Pradesh**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Lower Subansiri, Papum Pare, Upper Subansiri | Four | Fasciolosis |
| 2. | Papum Pare | One | Peste des Petits Ruminants |
| 3. | East Siang, Lower Dibang Valley and Papum Pare | Three | Swine Fever |

**4. Assam**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Tinsukia | One | Babesiosis |
| 2. | Barpeta, Cachar, Darrang, Dhemaji, Dhubri, Dibrugarh, Golaghat, Jorhat, Kamrup, Kamrup Metropolitan, Karbi Anglong, Kokrajhar, Lakhimpur, Morigaon, Nalbari, Sivasagar and Sonitpur | Seventeen | Black Quarter |
| 3. | Kokrajhar and Sivasagar | Two | Enterotoxaemia |
| 4. | Barpeta, Chirang, Dhemaji , Jorhat, Kamrup and Kamrup Metropolitan | Six | Fasciolosis |
| 5. | Baksa, Barpeta, Cachar, Darrang, Dhemaji, Jorhat, Karbi Anglong, Kokrajhar,Lakhimpur, Morigaon, Nalbari and sivasagar | Twelve | Haemorrhagic Septicaemia |
| 6. | Kamrup, Kamrup Metropolitan, Sivasagar, Tinsukia and Udalguri | Five | Peste des Petits Ruminants |
| 7. | Kamrup, Kamrup Metropolitan and Karbi Anglong | Three | Sheep & Goat pox |
| 8. | Baksa, Bongaigaon, Dibrugarh, Golaghat, Kamrup, Kamrup Metropolitan, Karbi Anglong, Karimganj, Kokrajhar, Lakhimpur and Sivasagar | Eleven | Swine Fever |
| 9. | Cachar, Kamrup and Kamrup Metropolitan | Three | Theileriosis |
| 10. | Kamrup Metropolitan | one | Trypanosomiasis |

**5. Bihar**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Khagaria | One | Babesiosis |
| 2. | Patna | One | Black Quarter |
| 2. | Bhojpur | One | Peste des Petits Ruminants |
| 3. | Patna | Two | Swine Fever |
| 4. | Bhojpur, Jehanabad, Madhepura, Nalanda and Patna | Five | Theileriosis |
| 5. | Bhojpur and Khagaria | Two | Trypanosomiasis |

**6. Goa**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | North Goa and South Goa | Two | Swine Fever |
| 2. | South Goa | One | Trypanosomiasis |

**7. Gujarat**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Ahmadabad and Kheda | Two | Foot and Mouth Disease |
| 2. | Banas Kantha | One | Haemorrhagic Septicaemia |
| 3. | Patna and Rajkot | Two | Peste des Petits Ruminants |

**8. Haryana**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Ambala | One | Black Quarter |
| 2. | Bhiwani | One | Enterotoxaemia |
| 3. | Fatehabad and Sonipat | Two | Foot and Mouth Disease |
| 4. | Hisar and Jhajjar | Two | Peste des Petits Ruminants |
| 5. | Hisar | One | Sheep & Goat pox |
| | | | Swine Fever |
| 6. | Fatehabad | one | Theileriosis |
| 7. | Hisar | One | Trypanosomiasis |

**9. Himachal Pradesh**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Kangra and Mandi | Two | Foot and Mouth Disease |
| 2. | Kangra | One | Peste des Petits Ruminants |
| 3. | Kinnaur and Shimla | Two | Sheep & Goat pox |

**10. Jammu & Kashmir**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Badgam | One | Foot and Mouth Disease |
| 2. | Anantnag, Badgam, Kulgam, Kupwara, Pulwama, Shupiyan and Srinagar | Seven | Sheep & Goat pox |

**11. Jharkhand**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Except one district ( Ramgarh) remaining all twenty-three districts are reported. | Twenty-three | Babesiosis |
| 2. | Bokaro, Dumka,Pakur, Palamu, Pashchimi Singhbhum, Purbi Singhbhum and Sahibganj | Seven | Black Quarter |
| 3. | Sahibganj | One | Enterotoxaemia |
| 4. | Except two districts (Godda and Ramgarh) remaining all twenty-two districts are reported. | Twenty-two | Fasciolosis |
| 5. | Bokaro, Deoghar, Dhanbad, Dumka, Khunti, Lohardaga, Palamu, Pashchimi Singhbhum, Ramgarh and Ranchi | Ten | Foot and Mouth Disease |
| 6. | Dhanbad , Dumka,Palamu, Pashchimi Singhbhum and Sahibganj | Five | Haemorrhagic Septicaemia |
| 7. | Bokaro,Deoghar,Dhanbad,Dumka,Gumla,Jamtara, Lohardaga, Pakur,Palamu, Pashchimi Singhbhum, Purbi Singhbhum, Ranchi and Sahibganj. | Thirteen | Peste des Petits Ruminants |
| 8. | Sahibganj | One | Sheep & Goat pox |
| 8. | Chatra, Dhanbad, Dumka, Sahibganj and Simdega. | Five | Swine Fever |
| 9. | Except two districts (Giridih and Koderma) remaining all twenty-two districts are reported. | Twenty-two | Theileriosis |
| 10. | Except one district (Koderma) remaining all twenty-three districts are reported. | Twenty-three | Trypanosomiasis |

**12. Karnataka**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Bellary,Koppal and Tumkur | Three | Anthrax |
| 2. | Davanagere, Dharwad, Gulbarga, Hassan, Mysore, Raichur,Shimoga and Uttara Kannada. | Eight | Black Quarter |
| 3. | Except five districts (Bidar, Bijapur, Dakshina Kannada, Udupi and Uttara Kannada) remaining all twenty-five districts are reported. | Twenty-five | Enterotoxaemia |
| 4. | Bangalore, Bangalore Rural, chikkaballapur, Dakshina Kannada, Kodagu, kolar and Ramanagara | Seven | Foot and Mouth Disease |
| 5. | Belgaum, Hassan, Mysore, Shimoga and Tumkur | Five | Haemorrhagic Septicaemia |
| 6. | Belgaum and Dakshina Kannada | Two | Peste des Petits Ruminants |
| 7. | Bagalkot,Bellary, Chikkaballapura, Davanagere, Koppal, Raichur and Tumkur | Seven | Sheep & Goat pox |

**13. Kerala**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Ernakulam and Palakkad | Two | Babesiosis |
| 2. | Palakkad | One | Enterotoxaemia |
| 3. | Alappuzha, Ernakulam, Idukki, Kannur, Kollam, Kottayam, Kozhikode, Pathanamthitta, Thiruvananthapuram, Thrissur and Wayanad | Eleven | Foot and Mouth Disease |
| 4. | Kollam, Kottayam, Pathanamthitta,Thiruvananthapuram and Thrissur | Five | Haemorrhagic Septicaemia |
| 5. | Alappuzha, Ernakulam, Idukki, Kannur, Kollam, Kottayam, Kozhikode, Malappuram, Thiruvananthapuram and Thrissur. | Ten | Peste des Petits Ruminants |
| 6. | Idukki, Kollam, Kottayam, Malappuram, Palakkad and Thiruvananthapuram | Six | Theileriosis |

**14. Madhya Pradesh**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Chhindwara, Katni and Sagar | Three | Black Quarter |
| 2. | Bhopal | One | Foot and Mouth Disease |
| 3. | Katni and Raisen | Two | Haemorrhagic Septicaemia |
| 4. | Sidhi | One | Peste des Petits Ruminants |

**15. Maharashtra**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Hingoli | One | Haemorrhagic Septicaemia |
| 2. | Ahmadnagar | One | Peste des Petits Ruminants |
| 3. | Satara | One | Sheep & Goat pox |
| 4. | Mumbai | One | Theileriosis |

**16. Manipur**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Bishnupur, Chandel, Churachandpur, Imphal East, Imphal West, Senapati, Tamenglong, Thoubal and Ukhrul. | Nine | Black Quarter |
| 2. | Bishnupur, Imphal East, Imphal West and Thoubal. | Four | Fascioliasis |
| 3. | Bishnupur, Imphal East and Tamenglong | Three | Foot and Mouth Disease |
| 4. | Senapati and Thoubal | Two | Haemorrhagic Septicaemia |
| 5. | Churachandpur, Senapati and Tamenglong | Three | Swine fever |

**17. Meghalaya**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | East Khasi Hills | one | Anthrax |
| 2. | East Khasi Hills, West Garo Hills and West Khasi Hills | Three | Black Quarter |
| 3. | East Garo Hills, East Khasi Hills, Jaintia Hills, North Garo | Eight | Foot and Mouth Disease |

| | | | |
|---|---|---|---|
| | Hills, Ribhoi, Southwest Garo Hills, West Garo Hills and West Khasi Hills | | |
| 4. | East Garo Hills, East Jaintia Hills, Ribhoi, South Garo Hills, Southwest Garo Hills, Southwest Khasi Hills, West Garo Hills and West Khasi Hills | Eight | Haemorrhagic Septicaemia |
| 5. | East Garo Hills, East Jaintia Hills, East Khasi Hills, Ribhoi, Southwest Garo Hills, West Garo Hills and West Khasi Hills | Seven | Swine Fever |
| 6. | South Garo Hills | One | Theileriosis |

**18. Nagaland**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Dimapur | One | Foot and Mouth Disease |
| 2. | Longleng | One | Haemorrhagic Septicaemia |
| 3. | Dimapur, Longleng and Tuensang | Three | Swine Fever |

**19. Odisha**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Koraput | One | Anthrax |
| 2. | Koraput, Bhadrak, Cuttack, Ganjam, Jagatsinghapur, Jajapur, Kendrapara, Khordha, Nuapada, Puri and Rayagada | Eleven | Black Quarter |
| 3. | Cuttack,Jagatsinghapur and Khordha | Three | Foot and Mouth Disease |

| | | | |
|---|---|---|---|
| 4. | Anugul,Baleshwar,Cuttack, Ganjam, Jagatsinghapur and Jajapur | Six | Haemorrhagic Septicaemia |
| 5. | Balangir, Gajapati and Ganjam | Three | Peste des Petits Ruminants |

**20. Puducherry**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Puducherry | One | Anthrax |
| 2. | Karaikal and Puducherry | Two | Babesiosis |
| 3. | Yanam | One | Fascioliasis |
| 4. | Karaikal and Puducherry | Two | Sheep & Goat pox |
| 5. | Puducherry | One | Theileriosis |

**21. Punjab**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Rupnaga | One | Haemorrhagic Septicaemia |
| 2. | Barnala | One | Peste des Petits Ruminants |
| 3. | Bathinda and Rupnagar | Two | Swine Fever |
| 4. | Firozpur and Ludhiana | Two | Theileriosis |

**22. Rajasthan**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Sikar | One | Babesiosis |
| 2. | Hanumangarh, Jhunjhunun, Jodhpur and Sikar | Four | Black Quarter |
| 3. | Bharatpur and Hanumangarh | Two | Enterotoxaemia |
| 4. | Alwar,Churu, Hanumangarh, Jaipur, Kota, Nagaur and Sikar | Seven | Foot and Mouth Disease |
| 5. | Alwar, Ganganagar, Jaipur, Karauli, Kota and Sikar | six | Haemorrhagic Septicaemia |
| 6. | Jaipur, Sawai Madhopur and Udaipur | Three | Peste des Petits Ruminants |
| 7. | Jaipur and Kota | Two | Swine Fever |
| 8. | Sikar | One | Trypanosomiasis |

**23. Sikkim**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Sikkim North District | One | Swine Fever |

**24. Tamil Nadu**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Dharmapuri, Kancheepuram and Madurai | Three | Anthrax |
| 2. | Kancheepuram | One | Black Quarter |
| 3. | Cuddalore | One | Sheep & Goat pox |

**25. Telangana**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Karimnagar, Mahbubnagar, Nalgonda and Warangal | Four | Enterotoxaemia |
| 2. | Adilabad, Karimnagar, Mahbubnagar, Nalgonda and Warangal | Five | Haemorrhagic Septicaemia |
| 3. | Warangal | One | Theileriosis |

**26. Tripura**

| Sl. No | Disease prone districts | Number of disease prone for districts | Disease Name |
|---|---|---|---|
| 1. | South Tripura and West Tripura | Two | Babesiosis |
| | | | Black Quarter |
| 2. | North Tripura, South Tripura and West Tripura | Three | Fascioliasis |
| 3. | South Tripura and West Tripura | Two | Foot and Mouth Disease |
| 4. | North Tripura, South Tripura and West Tripura | Three | Haemorrhagic Septicaemia |
| 5. | Dhalai,South Tripura and West Tripura | Three | Sheep & Goat pox |
| 6. | West Tripura | One | Swine Fever |

**27. Uttar Pradesh**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Agra, Azamgarh, Ballia, Bara Banki, Bareilly, Bijnor, Budaun, Chitrakoot, Etah, Etawah,Fatehpur, Gonda, Gorakhpur, Hardoi, Kannauj, Kanpur Nagar, Kushinagar,Mirzapur, Muzaffarnagar, Pratapgarh, Rae BareliSaharanpur and Sonbhadra | Twenty-three | Babesiosis |
| 2. | Baghpat | One | Enterotoxaemia |
| 3. | Ballia, Meerut and Sant Ravidas Nagar (Bhadohi) | Three | Fascioliasis |
| 4. | Gondaa and Mirzapur | Two | Haemorrhagic Septicaemia |
| 5. | Bara Banki, Fatehpur, Gonda, Gorakhpur, Hardoi and Kanpur Nagar | Six | Peste des Petits Ruminants |
| 6. | Gorakhpur | One | Sheep & Goat pox |
| 7. | Agra, Baghpat, Ballia, Bara Banki, Bareilly, Budaun, Bulandshahr, Chandauli, Etah, Fatehpur, Gonda, Gorakhpur,Hardoi, Jalaun, Kanpur Dehat, Kanpur Nagar, Lalitpur, Moradabad, Muzaffarnagar, Pratapgarh,Rae Bareli, Saharanpur and Unnao | Twenty-three | Theileriosis |
| 8. | Agra, Allahabad, Ambedkar Nagar, Azamgarh, Baghpat, Bahraich, Ballia, Banda, Bara Banki, Bareilly, Bijnor, Budaun, Chandauli, Etah, Fatehpur, Gonda, Gorakhpur, Hardoi, Jalaun, Kannauj, Kanpur Nagar, Kushinagar, Lucknow, Mahrajganj, Muzaffarnagar,Pratapgarh,Rae Bareli, Saharanpur, Sonbhadra and Unnao | Thirty | Trypanosomiasis |

**28. Uttarakhand**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Almora | One | Peste des Petits Ruminants |
| 2. | Uttarkashi | One | Swine Fever |

**29. West Bengal**

| Sl. No | Disease prone districts | Number of districts prone for disease | Disease Name |
|---|---|---|---|
| 1. | Bankura, Barddhaman and Murshidabad | Three | Anthrax |
| 2. | Birbhum , Haora, Hugli, Paschim Medinipur and Purba Medinipur | Five | Babesiosis |
| 3. | Bankura, Birbhum, Dakshin Dinajpur, Paschim Medinipur, Purba Medinipur and Uttar Dinajpur | Six | Black Quarter |
| 4. | Bankura, Barddhaman, Haora, Hugli, Jalpaiguri, Nadia, Paschim Medinipur, Puruliya and South Twenty Four Parganas | Nine | Foot and Mouth Disease |
| 5. | Bankura, Barddhaman, Hugli,Jalpaiguri, Koch Bihar, Nadia, Paschim Medinipur and Puruliya | Seven | Haemorrhagic Septicaemia |
| 6. | Bankura, Barddhaman, Birbhum, Haora, Hugli, Kolkata, Maldah, Murshidabad, Nadia, North Twenty Four Parganas, Paschim Medinipur, Puruliya and Uttar Dinajpur | Thirteen | Peste des Petits Ruminants |

| | | | |
|---|---|---|---|
| 7. | Barddhaman, Haora, Hugli, Nadia and North Twenty Four Parganas | Five | Sheep & Goat pox |
| 8. | Darjiling | One | Swine Fever |
| 9. | Bankura, Birbhum, Haora, Hugli, Koch Bihar, Murshidabad, North Twenty Four Parganas, Paschim Medinipur, Purba Medinipur and South Twenty Four Parganas | Ten | Theileriosis |
| 10. | Birbhum, Hugli, Kolkata, North Twenty-Four Parganas and Puruliya, | Five | Trypanosomiasis |

**iii) Diseases, Species affected, clinical signs and its preventive measures.**

| Sl No. | Disease | Species Affected | Clinical Signs | Preventive Measures |
|---|---|---|---|---|
| 1 | Anthrax (AX) | Most of the mammals and ruminants are highly susceptible. Pigs and Horses are moderately susceptible. Carnivores are relatively resistant. | Convulsion and sudden death with oozing of blood from natural orifices such as rectum and nose prior to death. Occasionally oedema develops in the throat and shoulder over a period of one week before death. | Ring vaccination and reporting of the disease is advised. Vaccination to be done in consultation with the veterinarians and as decided by state animal husbandry authorities. Strict biosecurity measures may be followed. Carcass may be disposed by deep burying covered with lime powder. Contaminated area may be disinfected with 4% formalin or 10% caustic soda. Grazing area may be restricted. |
| 2 | Babesiosis (BA) | Cattle. Cross breeds are more susceptible. | High temperature, jaundice like symptoms, yellowish mucosal membrane of eye, rectum and coffee colour urine. | Periodical application of acaricides in and around the animal shed and on the animals. For therapeutic application, Diaminazine or Imidocarb can be useful. |
| 3. | Black Quarter (BQ) | Common disease of cattle and sheep, but occasionally goats and pigs also suffer from the disease. | High fever and lameness followed by swelling in the neck, shoulder, lumbar, gluteal and sacral regions. Skin over the affected area become dark and crepitate on palpation. Loss of feed intake, colic, lateral recumbency, dyspnoea and death. | Affected animals may be treated with suitable antibiotics. Vaccination to be done in consultation with the veterinarians and as decided by state animal husbandry authorities. Strict biosecurity measures may be followed. Grazing area may be restricted. Carcass may be disposed hygienically. |

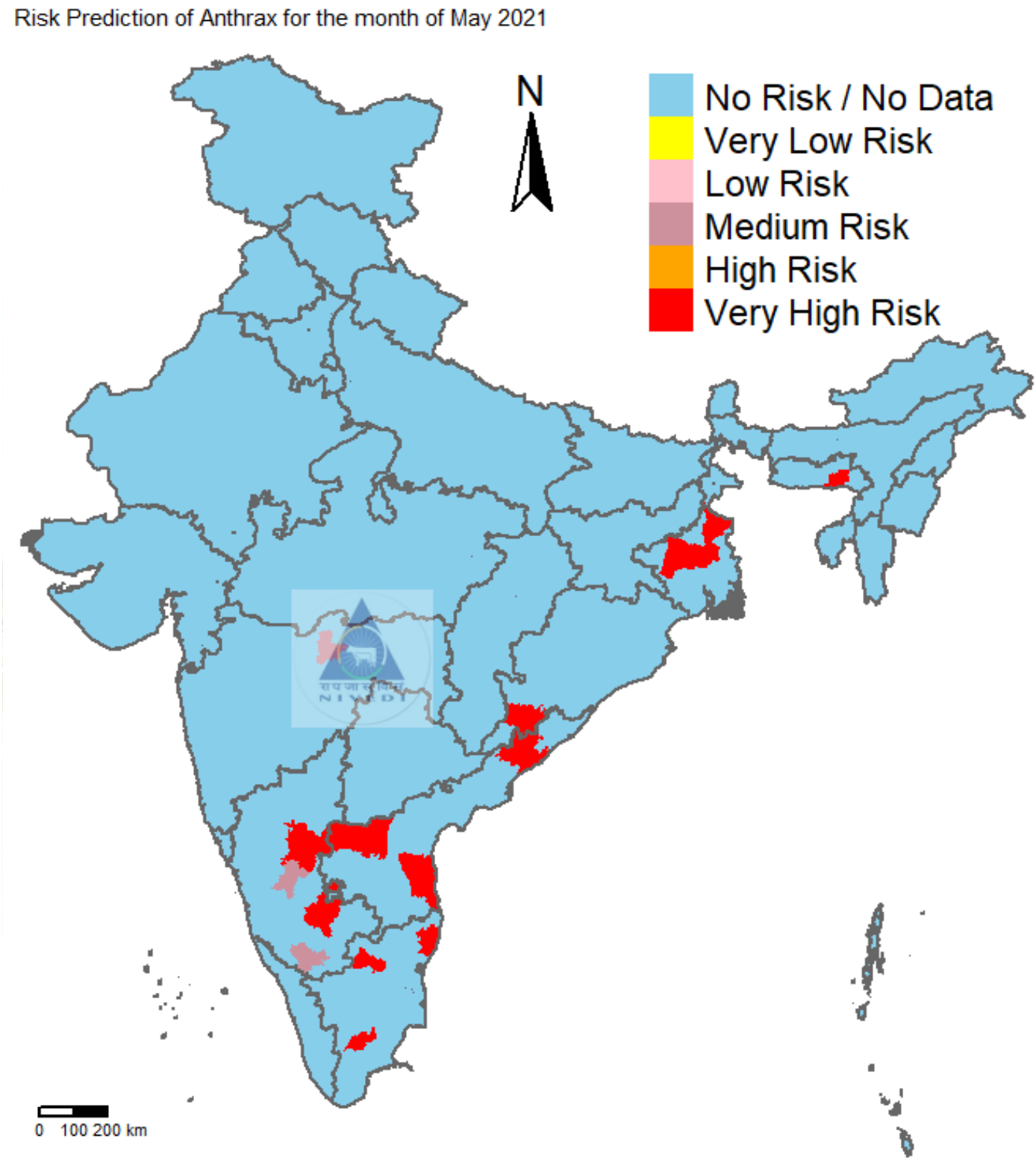
| | | | | |
|---|---|---|---|---|
| 4. | Bluetongue (BT) | Sheep are more susceptible than goats. | Fever, swelling of face, neck, eyelids respiratory distress, nasal discharge, Salivation, necrotic ulcers on tongue, dental pad, gum, lips hyperaemia of muzzle and may bleed at muco-cutaneous junction. Affected tongue may become swollen, cyanotic and purple blue in colour – 'bluetongue'. | Vector control using insecticides and good water management. Vaccination of susceptible animals preferably in the month of May. Do not shear sheep during winter months. Restriction in animal movement, segregation of affected animals and symptomatic treatment. Strict biosecurity measures. |
| 5. | Enterotoxaemia (ET) | Common disease of sheep and goats especially among the young animals. | Dullness, opisthosomas, convulsions, coma and sudden death. Affected adult sheep, which survive for several days May show diarrhoea and staggering. | Affected animals may be treated with suitable antibiotics. Vaccination to be done in consultation with the veterinarians and as decided by State Animal Husbandry Authorities. Strict biosecurity measures may be followed. Carcass may be disposed hygienically. Grazing area to be restricted, stall fed, vitamins and probiotics may be provided. |
| 6. | Fasciolosis (FA) | Cattle, buffalo, sheep and goats. | Progressive anaemia, pale mucous membrane, sub-mandibular oedema (Bottle jaw), loss of appetite, weakness, isolated from flock while grazing, loss in production. | The animal should not be allowed to graze in water stagnant fields or submerged fodder should not be given directly to the animals. The submerged fodder can be processed through hay/silage preparationin order to destroy the metacercariae. The affected animals can be treated with Carbon tetrachloride/ Rafoxanide/Nitroxynil/ Niclofolan /Closantel/Oxyclozanide, under the strict supervision of veterinarian. |

| | | | | |
|---|---|---|---|---|
| 7. | Foot and Mouth Disease (FMD) | Cattle, buffalo, sheep, goats and pigs are often affected domesticated species, but the disease is more severe in cattle and pigs. | Fever, loss of feed intake, drop in milk production, drooling of saliva like ropey string, vesicles develop on the tongue, lips, gums, and palate and eventually rupture. Concurrent to oral lesions, vesicles also appear in inter digital skin and coronary band of the feet. The animal may open and close its mouth with a characteristic smacking sound. Sheep and goats may show lameness. In pigs, lesions may be seen on snout and also on the feet. | Regular vaccination and seromonitoring. Disinfection with sodium carbonate (4%) or 10% washing soda and strict biosecurity measures to be followed and animal movement may be controlled. |
| 8. | Haemorrhagic septicaemia (HS) | Common disease for cattle and buffaloes, but can also occur among other species such as pigs, sheep, goats and many wild animals. | The disease starts with high fever, respiratory distress and haemorrhages maybe seen on the mucous membranes. There is lacrymation, nasal discharge, drop in milk production and anorexia. As the disease progress ear droops and the animals will be prostrated with cyanosis of mucous membranes. There may be oedema along the head, neck, thorax, vulva and anal areas. Sudden death occurs within few hours of clinical signs. | Affected animals may be treated with suitable antibiotics. Vaccination to be done in consultation with the veterinarians and as decided by state animal husbandry authorities. Strict biosecurity measures may be followed. Carcass may be disposed hygienically and stress factors may be reduced by following good animal husbandrypractices. |

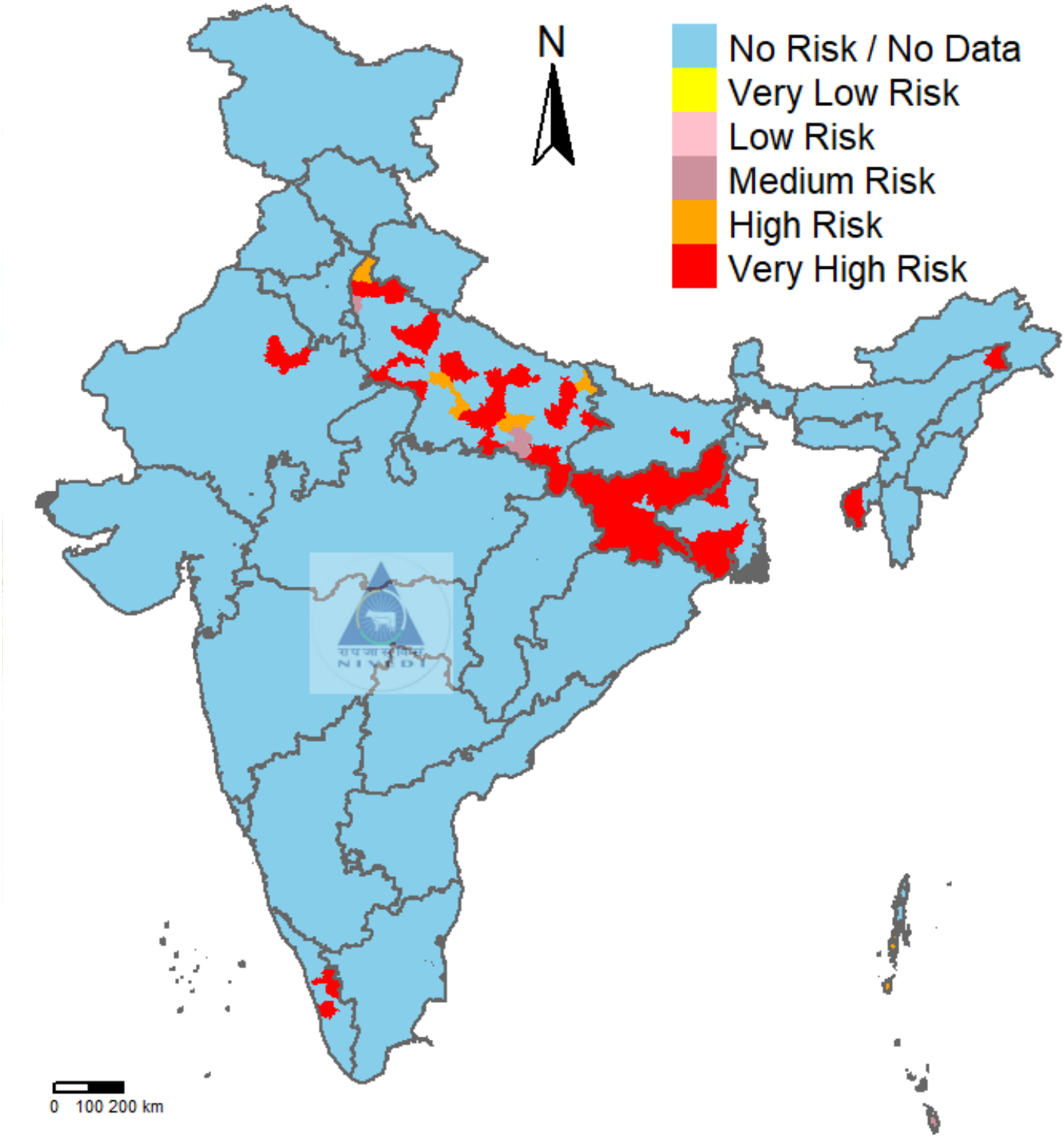
| | | | | |
|---|---|---|---|---|
| 9. | Peste desPetits Ruminants*(*PPR*)* | Goats and sheep are most affected domestic animals. | Fever, nasal and ocular discharge, respiratory distress, necrotic lesions in buccal mucosa, gum, dental pad, palate, tongue and diarrhoea. Animals may die because of dehydration and pneumonia. | Vaccination of susceptible animals of above 3 months old age. Restriction on animal movement, strict biosecurity measures and proper disposal of carcass. |
| 10. | Sheep and Goat pox (SGP) | Sheep and Goats | Respiratory distress and pock lesions over the non-hairy parts of body, more common in teat, udder, scortum, head, neck, ear, perineum, inner aspect of thighs and under tail. | Vaccination of susceptible animals of above 3 months old age. Symptomatic treatment of affected animals. Restriction on animal movement, strict biosecurity measures and proper disposal of carcass. |
| 11. | Swine Fever (SF) | Pigs | Fever, Conjunctivitis, purplish discolouration of snout, ears, abdomen, inner side of the legs and staggering gait. | Vaccination of susceptible animals. Restriction on animal movement, strict biosecurity measures and proper disposal of carcass. |
| 12. | Theileriosis (TE) | Large Ruminants. Cross bred cattle are more vulnerable. | High temperature, yellowish eye, sometime eye maybe heavily swollen, icteric mucosal membrane of rectum, dark yellowish urine, sometime may reach to coffee colour. Antibiotic is of no use to check the fever. | Periodical application of acaricides in and around the animal shed and on the animals. Therapeutic treatment with Buparvaquone can be useful in both early and advanced stages of the infection. |

| | | | | |
|---|---|---|---|---|
| 13. | Trypanosomiasis (TR) | Domestic and wild carnivores and herbivores including cattle, buffalo, horse, donkey, camel, dog and cats. Buffaloes are known as carriers. | Fluctuating high fever which is not responded by antibiotics, swollen lymph gland, chronic emaciation and weakness, loss of appetite, gradual loss of production. | The affected animal should be treated with Diaminazine compounds or chloride and sulphate salts of Quinapyramine. Periodical spray of insecticide in and around animal shed to remove the flies. |

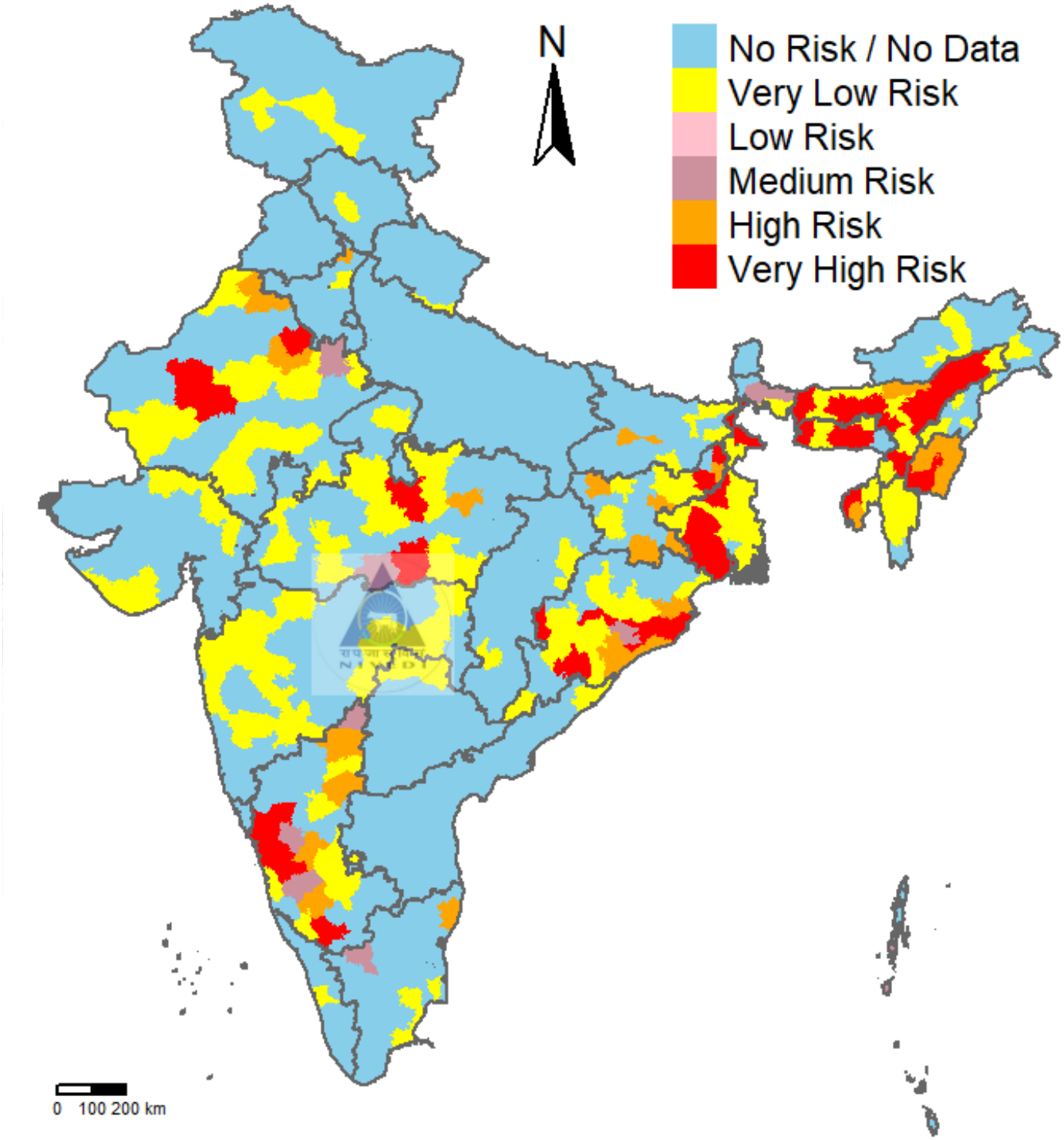
## iv) Risk Prediction - Livestock Disease Forewarning Maps



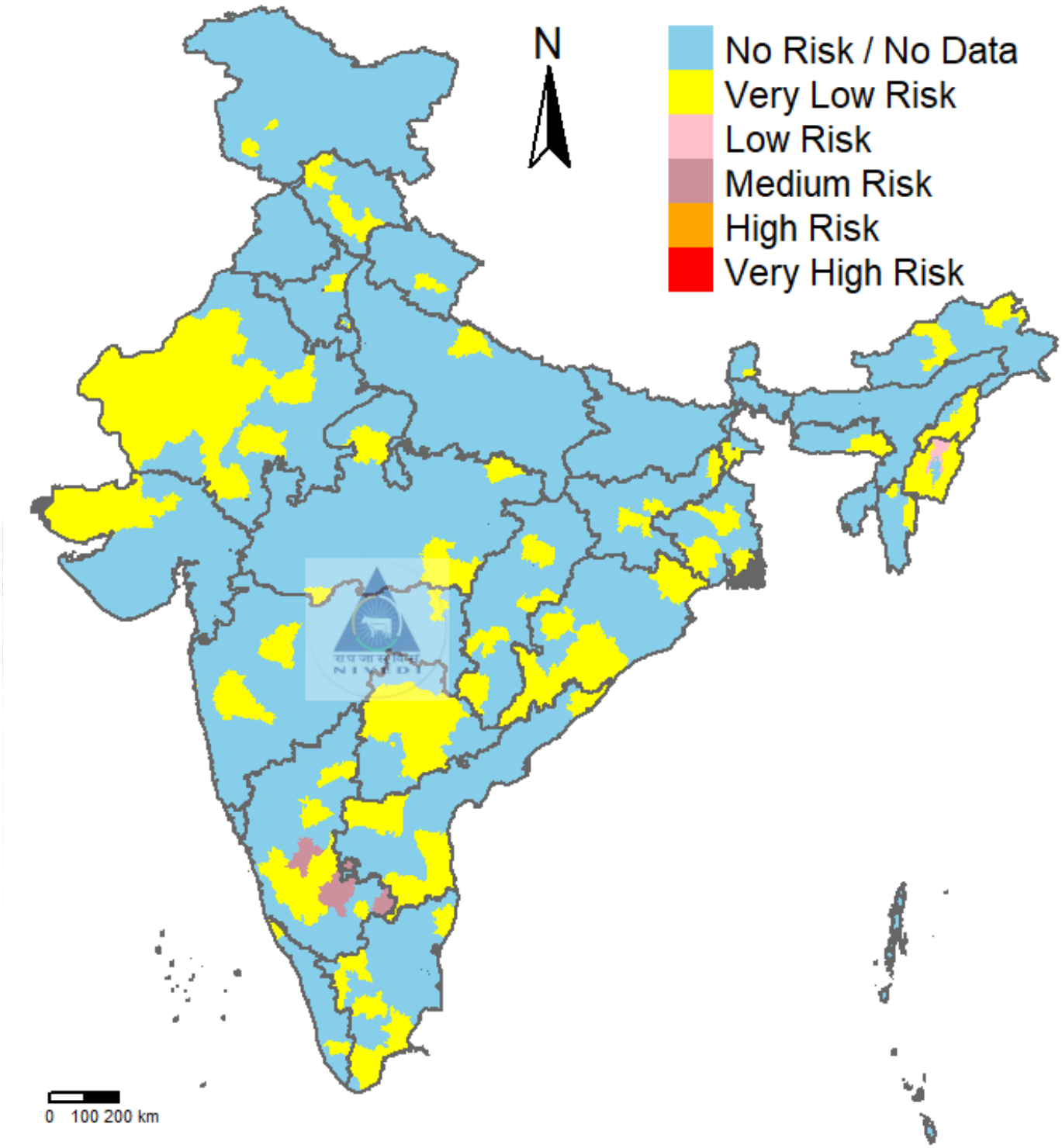
Risk Prediction of Babesiosis for the month of May 2021



Risk Prediction of Black quarter for the month of May 2021



Risk Prediction of Bluetongue for the month of May 2021

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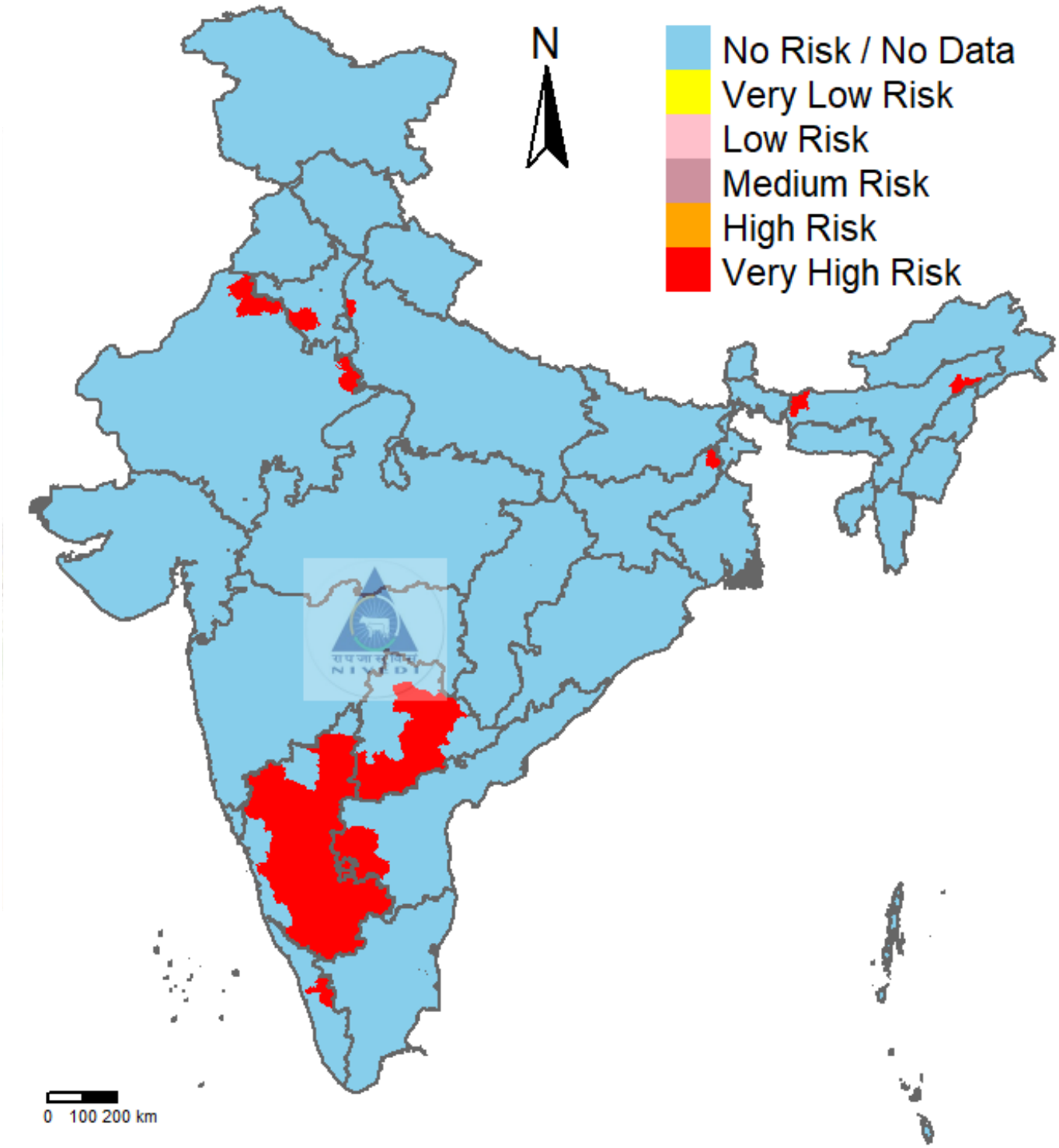
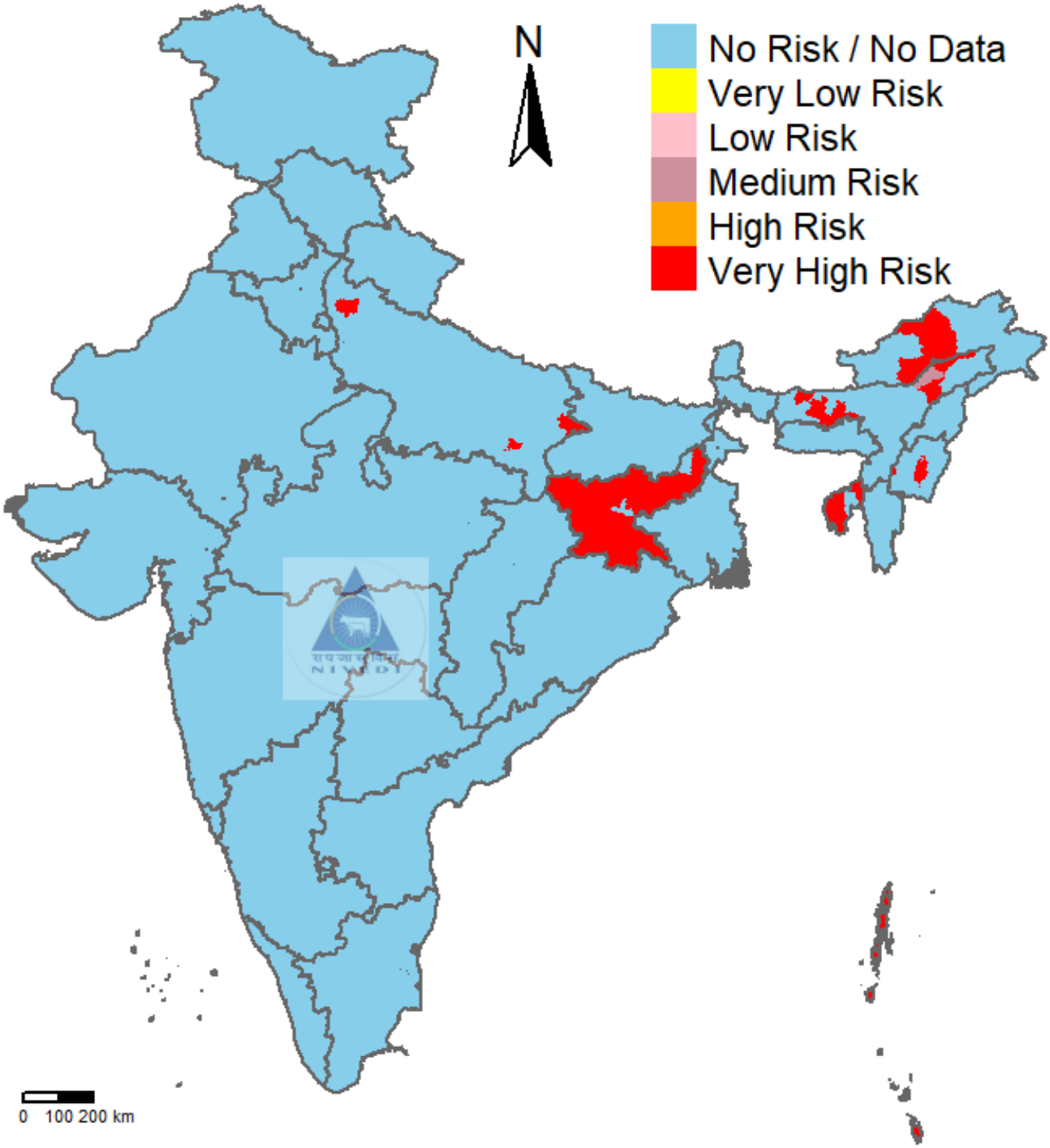
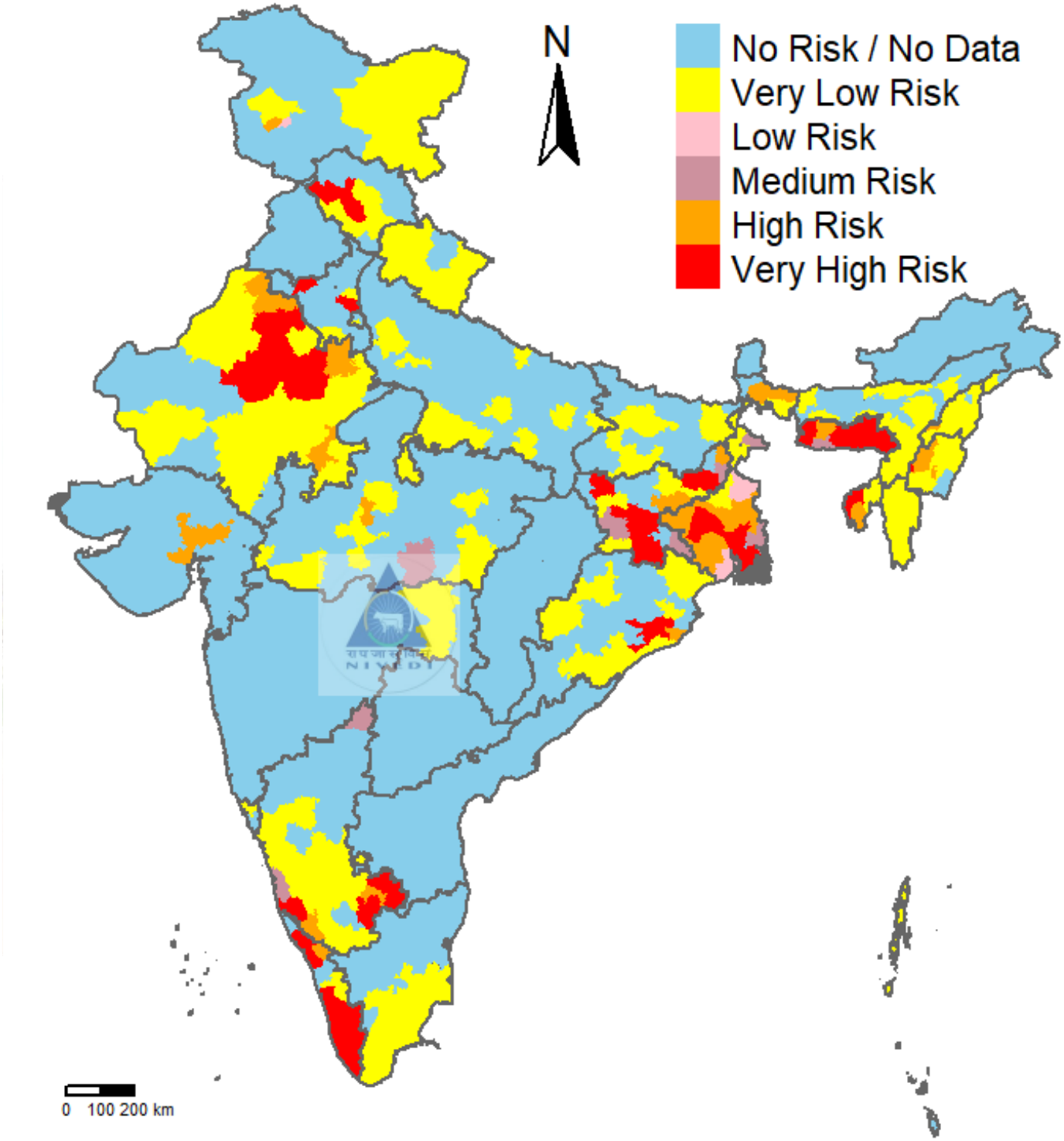
Risk Prediction of Enterotoxemia for the month of May 2021



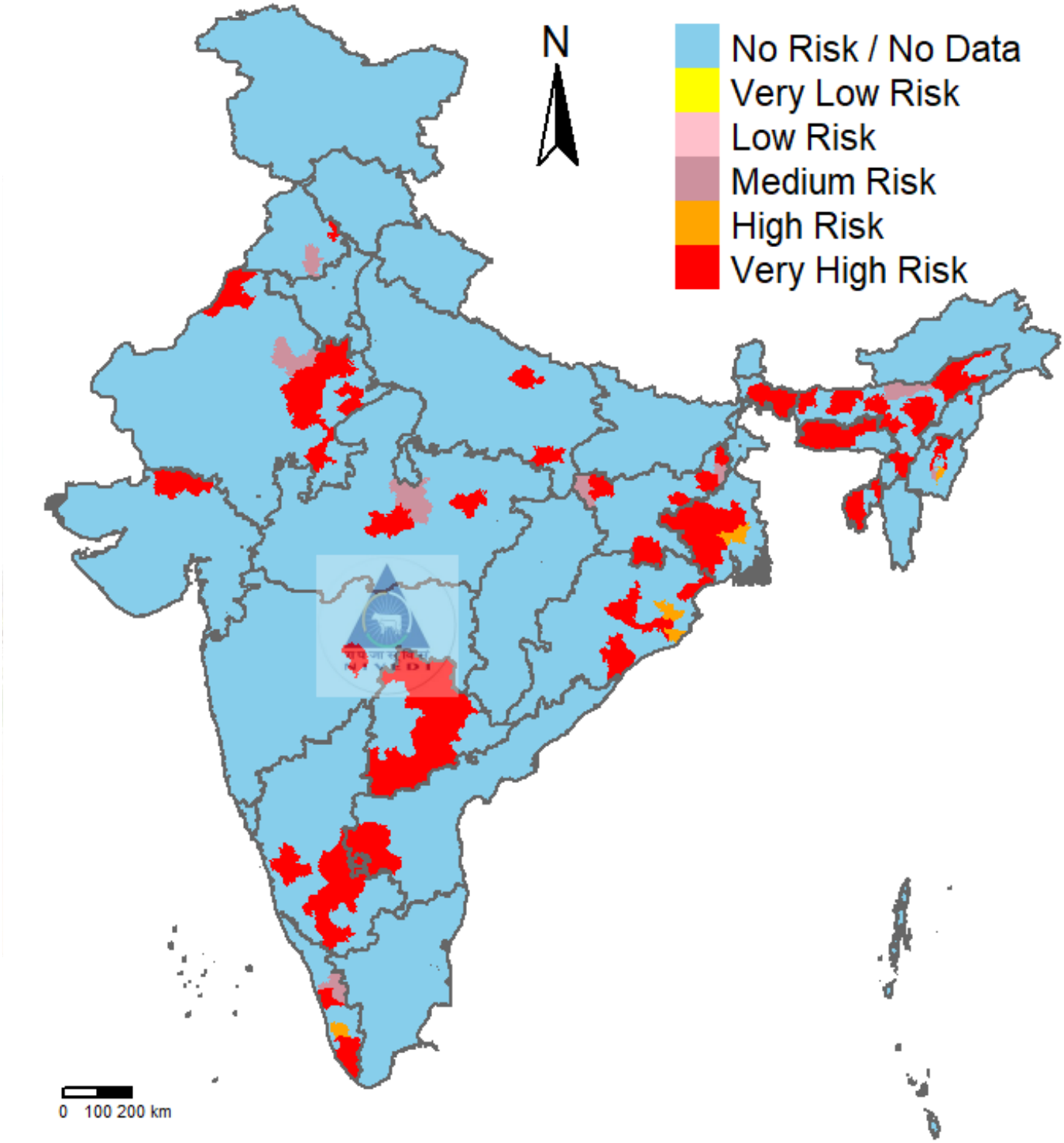
Risk Prediction of Fascioliasis for the month of May 2021



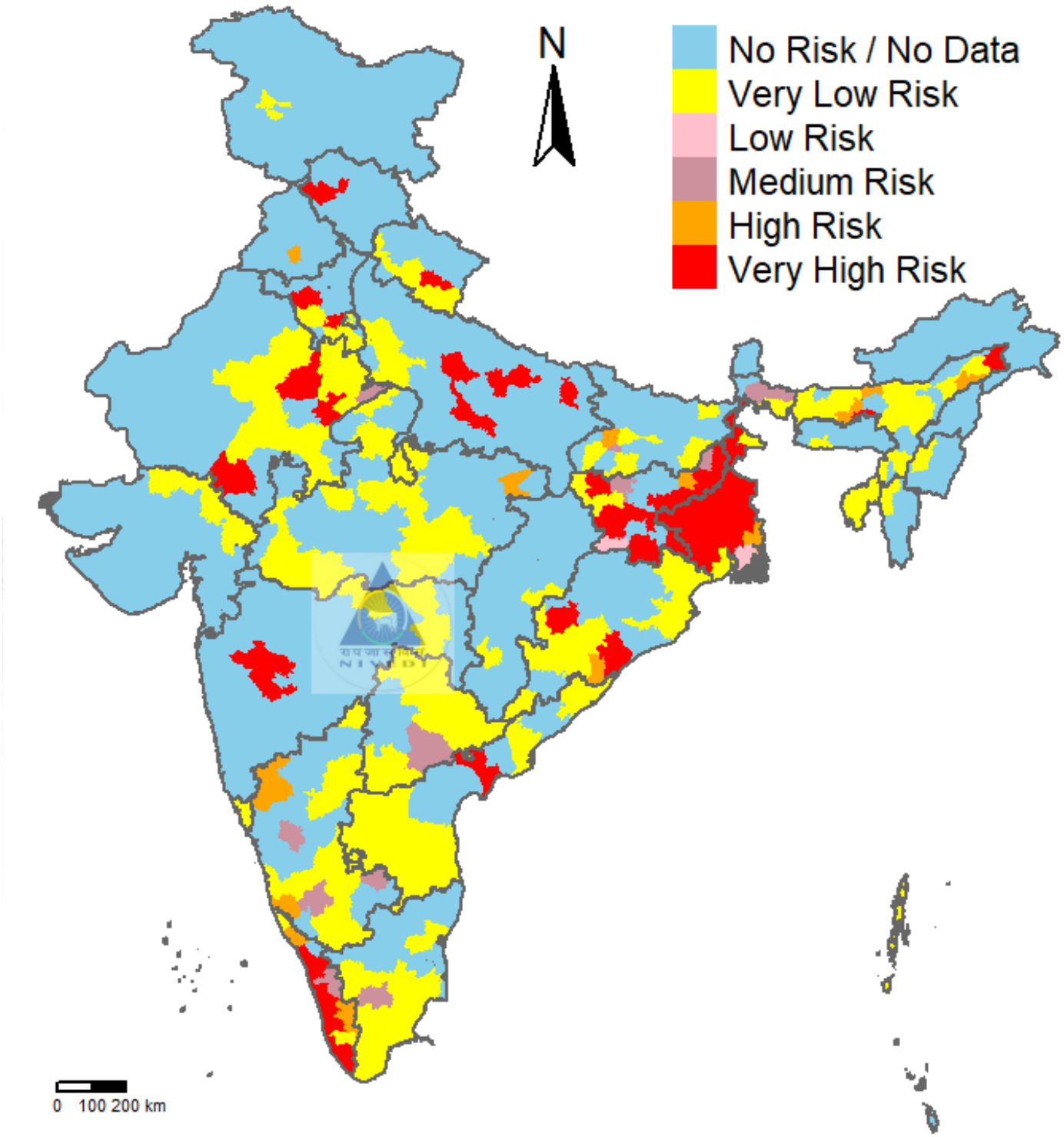
Risk Prediction of Foot and mouth disease for the month of May 2021



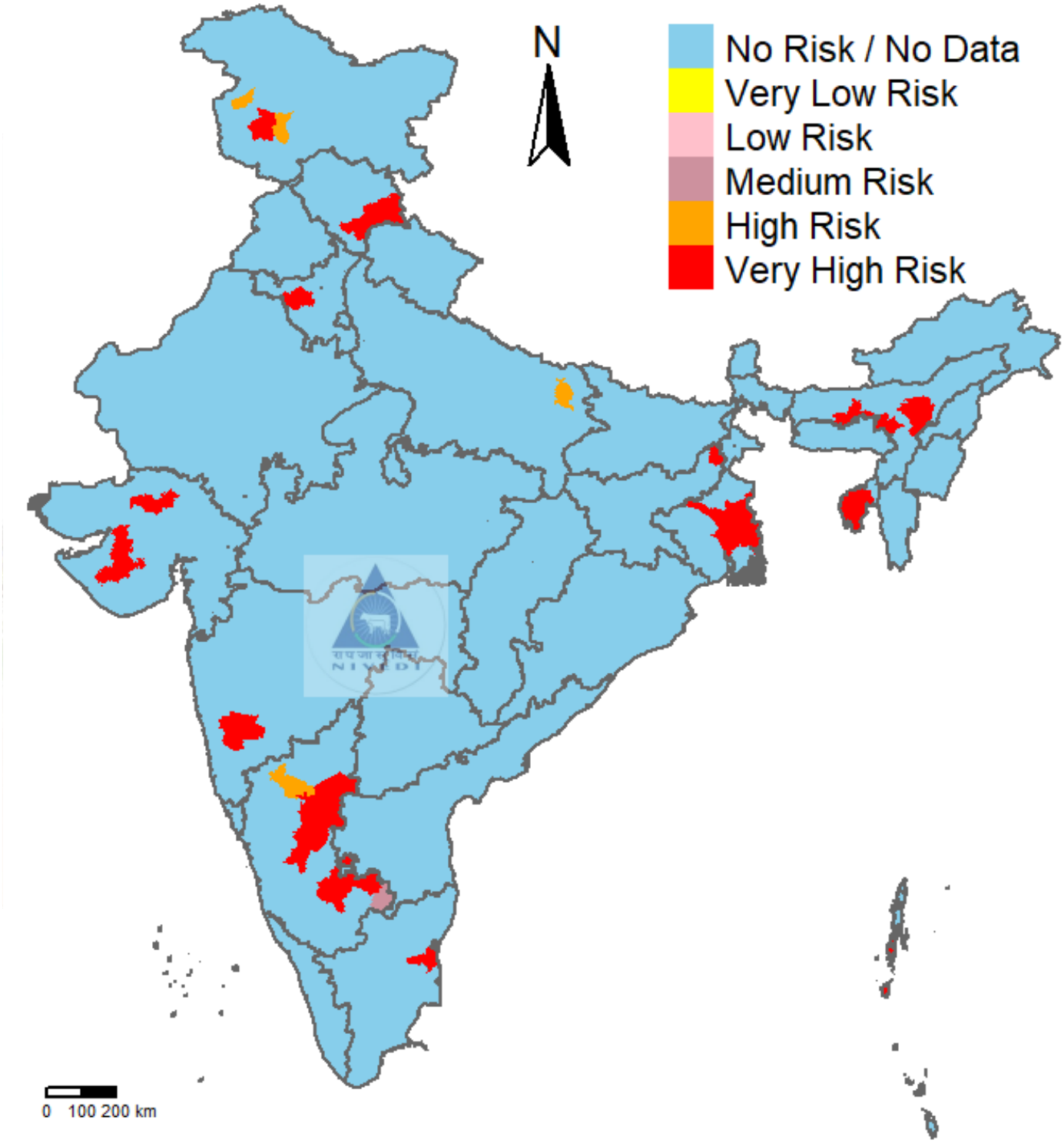
Risk Prediction of Haemorrhagic septicaemia for the month of May 2021



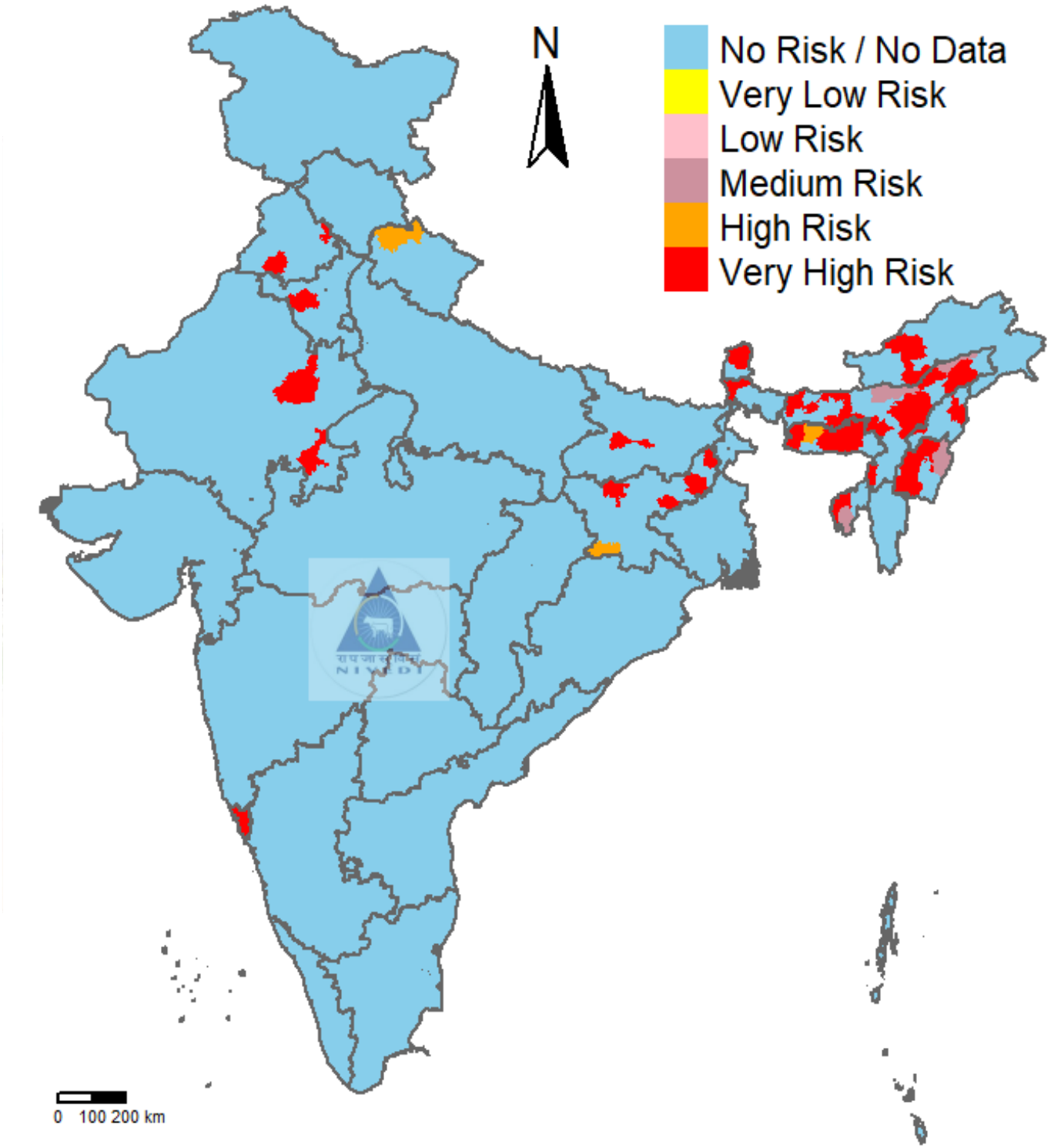
Risk Prediction of Peste des petits ruminants for the month of May 2021



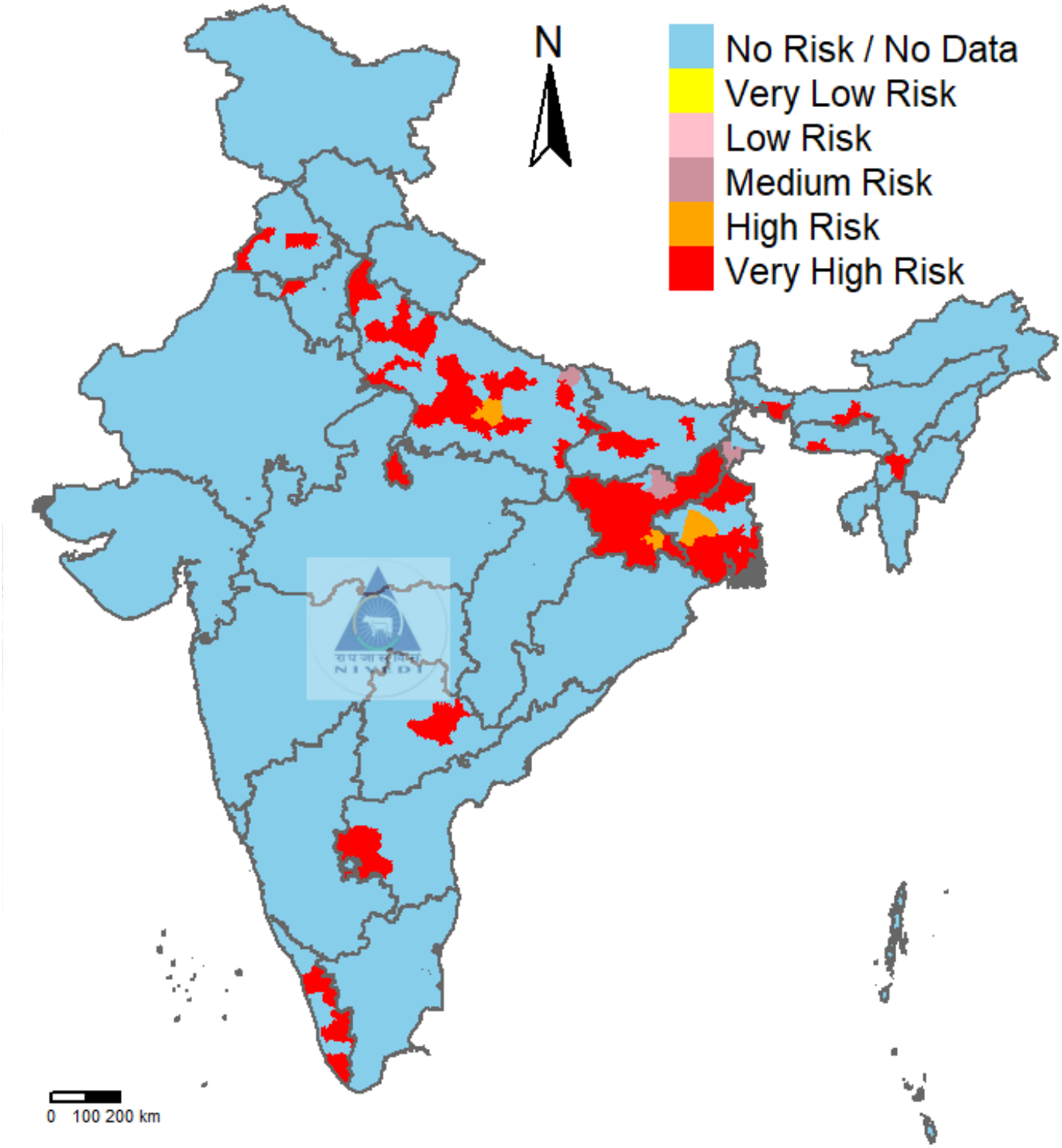
Risk Prediction of Sheep and Goat pox for the month of May 2021



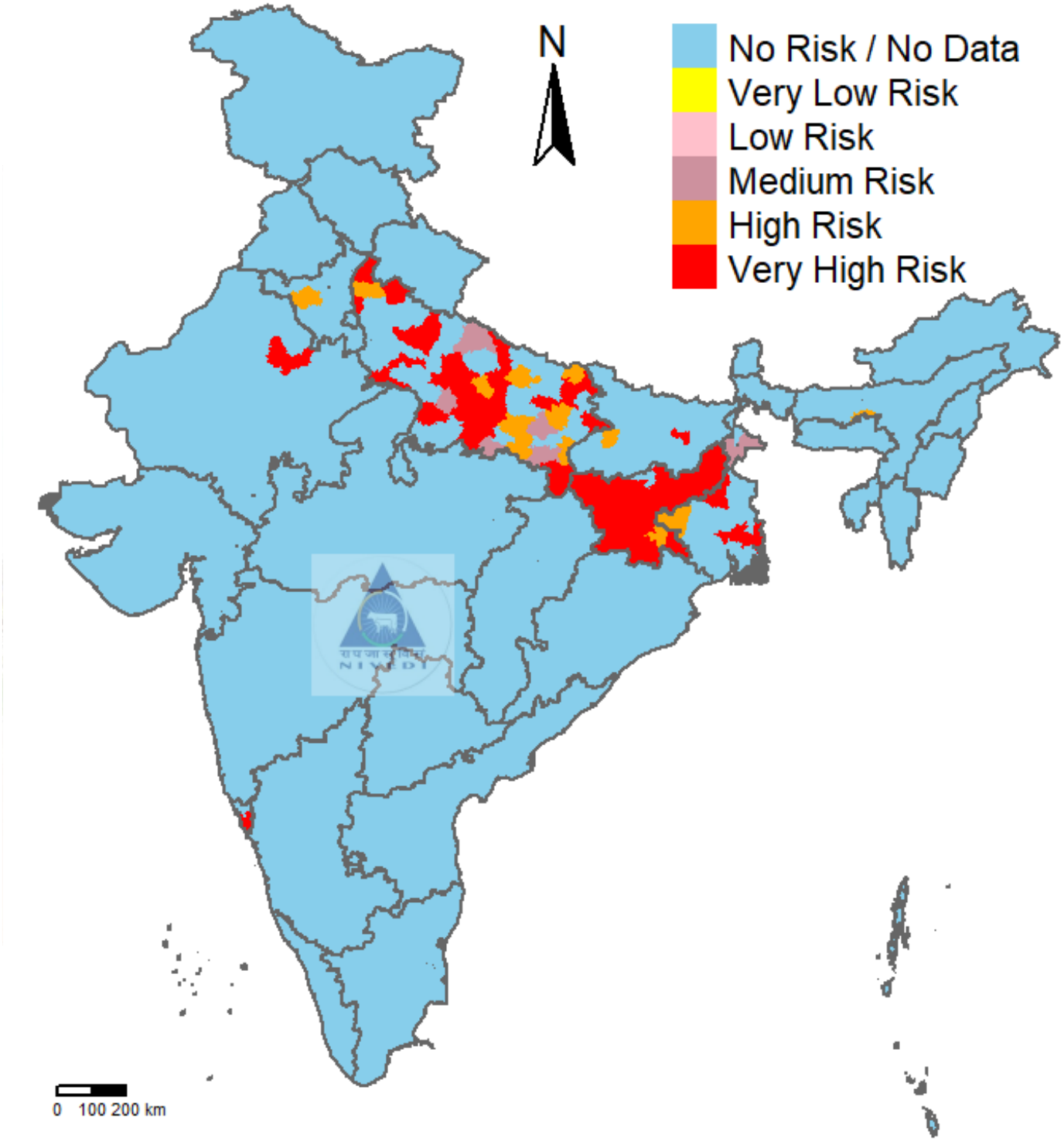
Risk Prediction of Swine fever for the month of May 2021



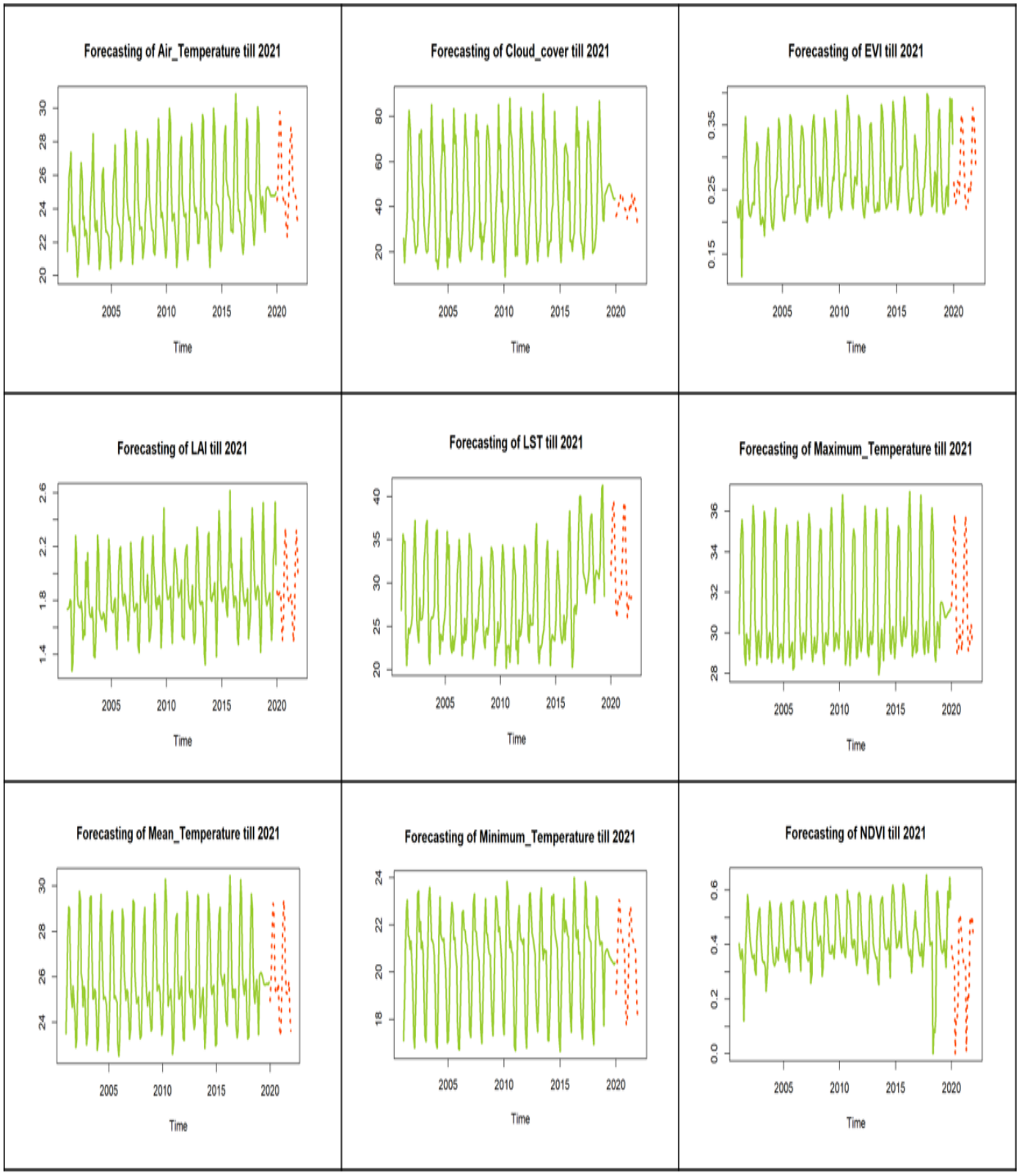
Risk Prediction of Theileriosis for the month of May 2021

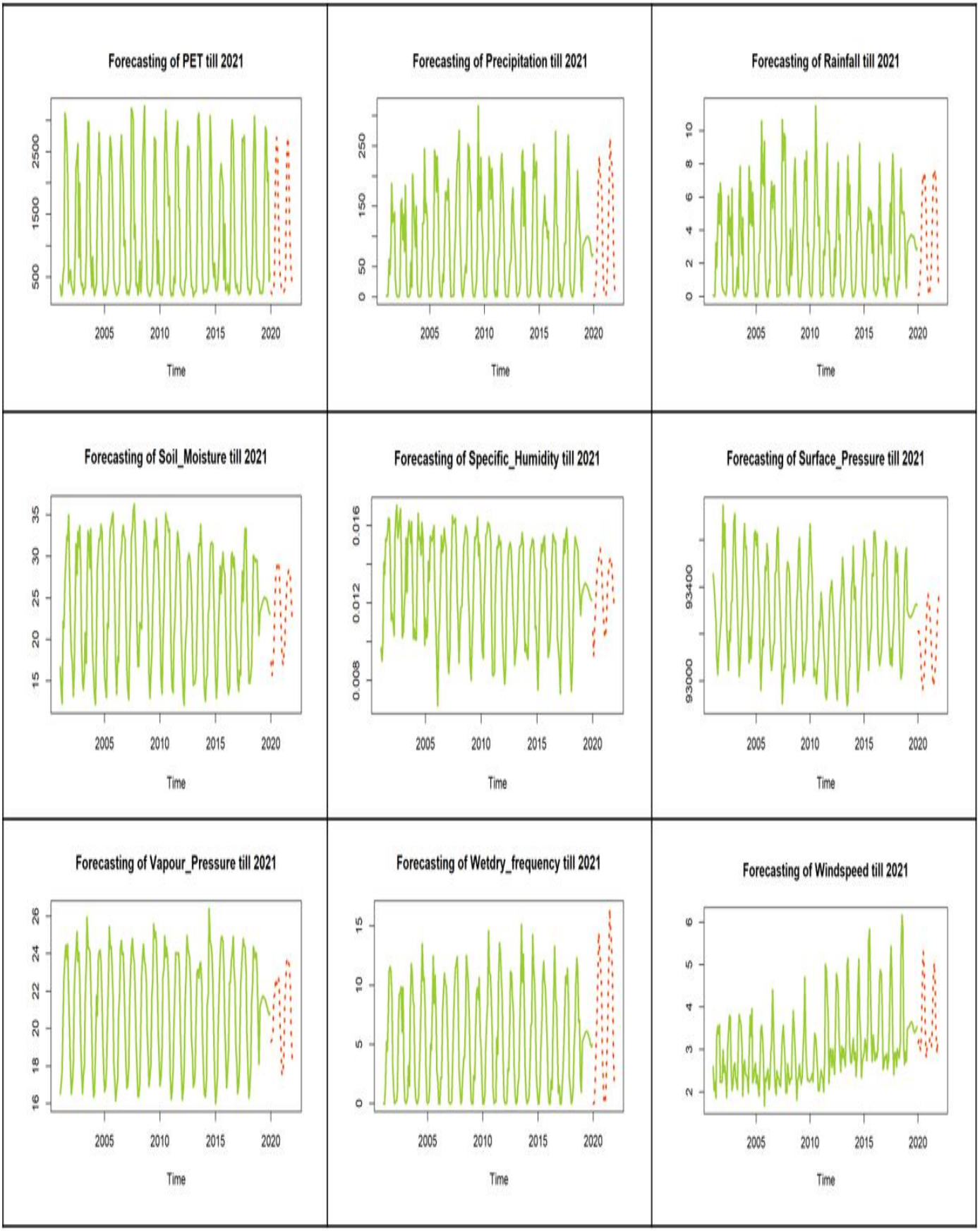


Risk Prediction of Trypanosomiasis for the month of May 2021



## V. Forecasting of remote sensing and meteorological parameters till December 2021 (Ex. Karnataka)




Forecasting of PET till 2021
Forecasting of Precipitation till 2021
Forecasting of Rainfall till 2021
Forecasting of Soil_Moisture till 2021
Forecasting of Specific_Humidity till 2021
Forecasting of Surface_Pressure till 2021
Forecasting of Vapour_Pressure till 2021
Forecasting of Wetdry_frequency till 2021
Forecasting of Windspeed till 2021
Time

# VI. SIGNIFICANT WEATHER PARAMETERS TABLE

| Disease Names | Significant Parameters |
|---|---|
| **Anthrax** | Precipitable Water, Surface Pressure |
| **Babesiosis** | Air Temperature, Precipitation, Surface Pressure, Minimum Temperature, Vapour Pressure, Dew Point Temperature, Wind Speed, NDVI and LST Night |
| **Black quarter** | Precipitable Water, Precipitation, Surface Pressure, Sea Level Pressure and Vapour Pressure |
| **Bluetongue** | Air Temperature, Cloud, Precipitable Water, Precipitation, Surface Pressure, Uwind, Vwind, Vapour Pressure, Elevation, NDVI and PET |
| **Classical Swine Fever** | Cloud, Precipitation, relative humidityMinimum Temperature, Vapour Pressure and Rainfall |
| **Enterotoxaemia** | Surface Pressure, NDVI and PET |
| **Fascioliasis** | Air Temperature, Precipitation, relative humidity, Temperature, Maximum Temperature, Vapour Pressure, Vwind, Rainfall, Soil Moisture, NDVI and EVI |
| **Foot and Mouth Disease** | Precipitable Water, Uwind, Vwind, wet_dry frequency, LST Night and EVI |
| **Haemorrhagic Septicaemia** | Cloud, Precipitation and Vwind |
| **Peste des Petits Ruminants** | Cloud, Precipitable Water, Surface Pressure, Sea Level Pressure, Maximum Temperature, Vwind and NDVI |
| **Sheep & Goat pox** | Cloud, Surface Pressure, Maximum Temperature, Vwind, DTP, NDVI and PET |
| **Theileriosis** | Air Temperature, Precipitation, Vapour Pressure, NDVI and LST Night |
| **Trypanosomiasis** | Air Temperature, Precipitation, Surface Pressure, Vapour Pressure, NDVI and LST Night |

Table 7.1: Significant weather parameters govern the Livestock disease incidence (forecast).

# 9. Post prediction Validation

**DIMAPUR | Publish Date: 4/14/2019 AH&VS TEAM VISITS AFFECTED AREAS UNDER MEDZIPHEMA,**
**Source:** http://www.nagalandpost.com

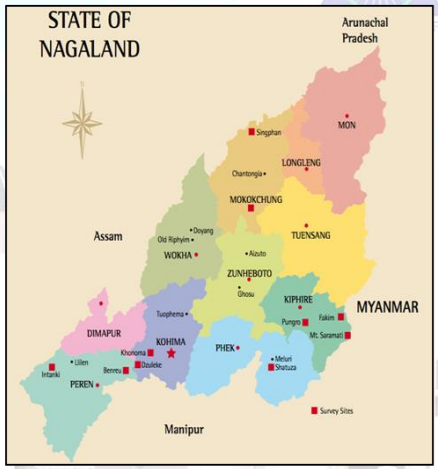
Following reports of a good number of buffaloes dying in a recent outbreak of suspected Haemorrhagic septicaemia (HS), a team from Animal Husbandry and Veterinary Services (AH&VS) department visited the affected areas under Medziphema on April 12. (Haemorrhagic septicaemia is a contagious bacterial disease that affects cattle and water buffaloes with a high mortality rate in infected animals).

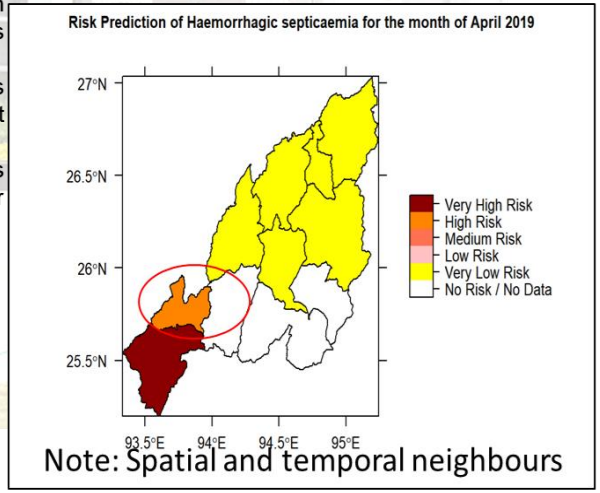
AH&VS, deputy director & principal investigator, AICRP-ADMAS, Dr S. Amenla Walling, in a press release reported that the team consisted of the department's director, Dr Temsumeren, along with additional director, Dr. Budhi Lama, and other officials from the department. The press release added that the area is prone to such kind of disease outbreaks and the department officials reminded villagers to cooperate with the department and vaccinate their animals against such outbreaks. The team told the villagers that even an outbreak can be contained more effectively if villagers report the matter on time to the nearest Veterinary Health Centre.

The villagers admitted in the meeting that they had not reported the recent outbreak to the department initially. The director appreciated the CVO Dimapur and his Rapid Response Team for their quick action after receiving information and for remaining stationed in the outbreak area to date. Free medicine was also distributed among the villagers. The department, through the press release also appealed to everyone to report such matters to the nearest Veterinary Health Centre (so that qualified staff may intervene quickly), instead of publicizing it in other ways. It stated that the department is prepared to extend services to any outbreak of diseases in animals to control such things.

The press release also pointed out that to control the recent outbreak, the department had to direct its officials to make their own transport arrangements to go to the affected areas because the State Election department did not consider an appeal to exempt the department's emergency duty vehicle from election duty.

Meanwhile, when contacted, Dr S. Amenla Walling told Nagaland Post that it is difficult to say if the disease has been fully contained since its free grazing season for the animals, but the department is doing its best under the circumstances.




## NIVEDI PREDICITONS

| Districts of Nagaland | HS prediction for February 2019 | HS prediction for March 2019 | HS prediction for April 2019 |
|---|---|---|---|
| Peren | VLR | VLR | VHR |
| Dimapur | VLR | NR | HR |
| | | | |
| Kohima | VLR | VLR | NR |
| Wokha | VLR | NR | VLR |

**ANDAMAN AND NICOBAR REPORTJUNE-2020**

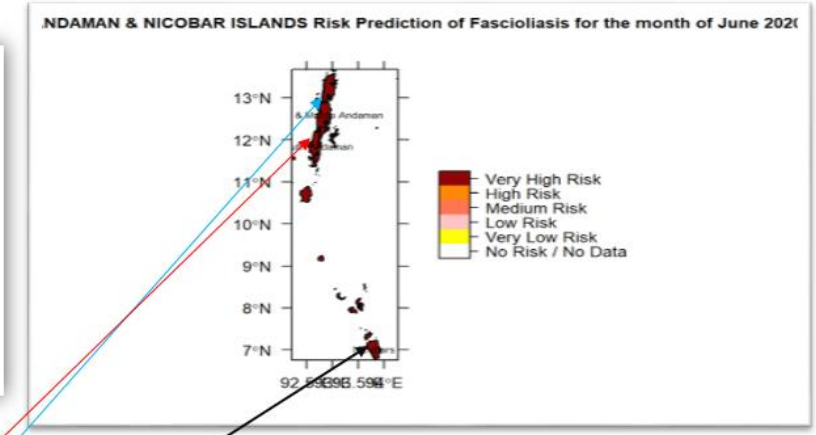
NIVEDI Prediction

**District wise Livestock Disease forewarning for June 2020: Andaman and Nicobar**

| Districts of Andaman and Nicobar | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fasciolosis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Nicobars | NR | MR | NR | NR | NR | VHR | NR | NR | NR | NR | NR | NR | NR |
| North & Middle Andaman | NR | NR | NR | NR | NR | VHR | NR | NR | NR | NR | NR | NR | NR |
| South Andaman | NR | MR | MR | NR | NR | VHR | NR | NR | NR | MR | NR | NR | NR |

**If vaccination is already been done please ignore the disease forecast for that disease.**

*No risk/No data available (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)




Andaman and Nicobar Report June-2020

monthly report June 2020

1 message

Jai Sunder <jaisunder@rediffmail.com> Wed, Jul 8, 2020 at 10:53 PM
To: Rahman Hbabur <pcadmas@gmail.com>, Director NIVEDI <director.nivedi@icar.gov.in>
Cc: sharan patil <sharanspin123@rediffmail.com>, Divakar Hemadri <divakar.hemadri@gmail.com>

Sir,
Please find attached herewith monthly report for the month of June 2020.

Regards

Dr. Jai Sunder, ARS, FASA
Pr. Scientist (Veterinary Microbiology)
Division of Animal Sciences
ICAR-CIARI, Port Blair- 744 101
A&N Islands
09434281840
03192-245983

June_20.docx
29K

**Number of cases of of parasitic cases and other diseases reported from A & N Islands during the month of June 2020**

| CASES | FASCIOLIASIS | ASCARIASIS | AMPHISTOME | STRONGYLOIDS | COCCIDIOSIS | MASTITIS | TOTAL |
|---|---|---|---|---|---|---|---|
| South Andaman | 24 | 48 | 192 | 34 | 2 | 7 | 307 |
| N&M Andaman | 258 | 43 | 14 | 5 | 3 | 10 | 333 |
| Nicobar | 79 | 31 | 0 | 0 | 0 | 0 | 110 |
| **TOTAL** | **361** | **122** | **206** | **39** | **5** | **17** | **750** |

**Dr. Jai Sunder**
**PI, AICRP-ADMAS**
**Port Blair**

## HIMACHAL PRADESH REPORT JULY-2020

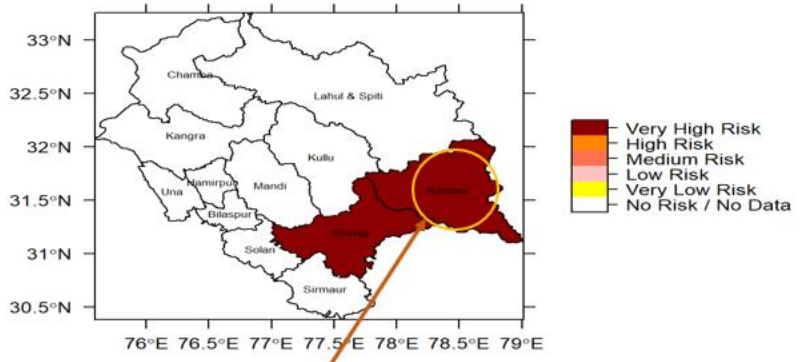
### NIVEDI Prediction

**District wise Livestock Disease forewarning for July 2020: Himachal Pradesh**

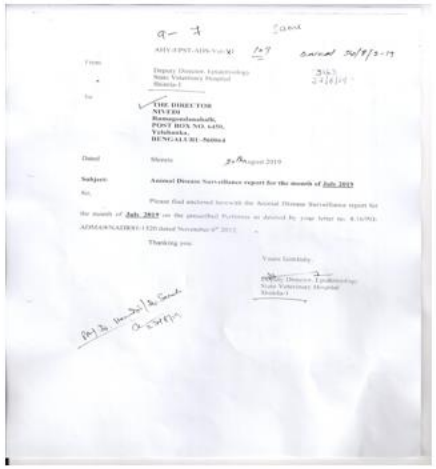
| Districts of Himachal pradesh | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fasciolosis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Bilaspur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Chamba | NR | NR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR |
| Hamirpur | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kangra | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Kinnaur | NR | NR | NR | VLR | NR | NR | NR | NR | NR | VHR | NR | NR | NR |
| Kullu | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Lahul & Spiti | NR | NR | NR | VLR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Mandi | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Shimla | NR | NR | NR | NR | NR | NR | NR | NR | NR | VHR | NR | NR | NR |
| Sirmaur | NR | NR | NR | NR | NR | NR | NR | MR | NR | NR | NR | NR | NR |
| Solan | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |
| Una | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR | NR |

If vaccination has already been done please ignore the disease forecast for that disease.

**HIMACHAL PRADESH Risk Prediction of Sheep and Goat pox for the month of July 2020**




### HINACHAL PRADESH Report July-2020



FORMAT FOR SUBMITTING LIVESTOCK DISEASE OUTBREAK DATA TO NIVEDI. (REVISED REPORT-11/07/2018)

NAME OF THE COLLABORATING UNIT : AICRP-ADMAS of NIVEDI SHIMLA, HIMACHAL PRADESH
ADDRESS OF THE COLLABORATING UNIT : PI-AICRP-ADMAS of NIVEDI-cum-Deputy Director Epidemiology, State Veterinary Hospital Complex Cart Road Shimla-171001, Phone: 0177-2650938, 94180-61810 Email: munish_batta@hotmail.com; greckchitender@yahoo.com
REPORT FOR THE MONTH OF : July 2019
DATE OF REPORT : 20.08.2019

| Name of the village* | Latitude and longitude of the village | Postal pin code of the village | Name of the district | Name of the disease | Species affected* | Year | Month | Number of outbreaks | Number susceptible | Number attacked | Number of deaths | Number of vaccination |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Jurej | 30.6458° N 77.4768° E | 173022 | Sirmaur | Sheep Pox | Sheep | 2019 | July | 1 | 300 | 41 | 0 | 259 |
| Chaura | 31.5581475° N 77.9467311° E | 172101 | Kinnaur | Sheep Pox | Sheep | 2019 | July | 1 | 200 | 40 | 5 | 160 |

*If you know the exact place of the outbreak, please indicate it.
* Kindly specify the species i.e., cattle, buffalo and not bovines and similarly write individually for goats and sheep.

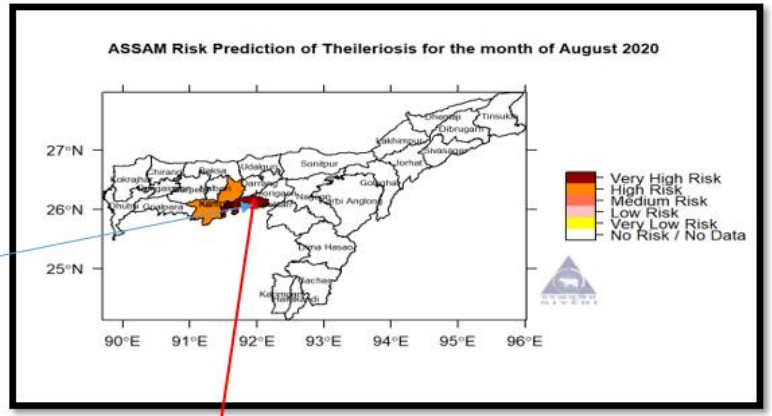
Co-PI-AICRP-ADMAS of NIVEDI
PI-AICRP-ADMAS of NIVEDI

## ASSAM REPORTAUGUST-2020

### NIVEDI Prediction

**District wise Livestock Disease forewarning for August 2020: Assam**

| Districts of Assam | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fasciolosis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Baksa | NR | NR | VHR | NR | NR | NR | NR | VHR | VLR | NR | NR | NR | NR |
| Barpeta | NR | NR | VHR | NR | NR | NR | VLR | VHR | NR | NR | VHR | NR | NR |
| Bongaigaon | NR | NR | VHR | NR | NR | NR | NR | VHR | VHR | NR | VHR | NR | NR |
| Cachar | NR | NR | VHR | NR | NR | VHR | NR | VHR | NR | NR | NR | NR | NR |
| Chirang | NR | NR | VHR | NR | NR | NR | NR | HR | NR | NR | NR | NR | NR |
| Darrang | NR | VHR | VHR | NR | NR | NR | NR | HR | VHR | NR | NR | NR | NR |
| Dhemaji | NR | NR | VHR | NR | NR | VHR | NR | VHR | NR | NR | VHR | NR | NR |
| Dhubri | NR | NR | VHR | NR | NR | VHR | VLR | VHR | HR | NR | NR | NR | NR |
| Dibrugarh | NR | NR | VHR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR |
| Dima Hasao | NR | NR | VLR | NR | NR | NR | VLR | VLR | VLR | NR | NR | NR | NR |
| Goalpara | NR | NR | VHR | NR | VHR | NR | VLR | VHR | VLR | NR | VHR | NR | NR |
| Golaghat | NR | NR | VLR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR |
| Hailakandi | NR | NR | MR | NR | NR | NR | NR | VLR | NR | NR | NR | NR | NR |
| Jorhat | NR | NR | VHR | NR | NR | VHR | NR | VLR | VLR | NR | VHR | NR | NR |
| Kamrup | NR | NR | VLR | NR | NR | VHR | VLR | VLR | HR | NR | VHR | HR | NR |
| Kamrup Metropolitan | NR | NR | VHR | NR | NR | VHR | VLR | VHR | HR | NR | VHR | VHR | NR |
| Karbi Anglong | NR | NR | VLR | NR | VHR | NR | VLR | VLR | NR | VHR | NR | NR | NR |
| Karimganj | NR | NR | VHR | NR | NR | NR | NR | VHR | VLR | NR | NR | NR | NR |
| Kokrajhar | NR | NR | VHR | NR | VHR | NR | VLR | VLR | NR | NR | VHR | NR | NR |
| Lakhimpur | NR | NR | VLR | NR | VHR | VHR | NR | VLR | VLR | NR | VHR | NR | NR |
| Morigaon | NR | NR | VHR | NR | NR | NR | NR | VHR | VLR | NR | VHR | NR | NR |




### Assam Report August-2020

Gmail - Monthly Reports_June_July_August2020_Guwahati Centre

Gmail — Ro-OP Assam — ICAR NIVEDI <pcadmas@gmail.com>

**Monthly Reports_June_July_August2020_Guwahati Centre**

1 message

Dr Durlav Prasad Bora <drdpbora@gmail.com> Mon, Oct 5, 2020 at 4:27 PM
To: pcadmas@gmail.com

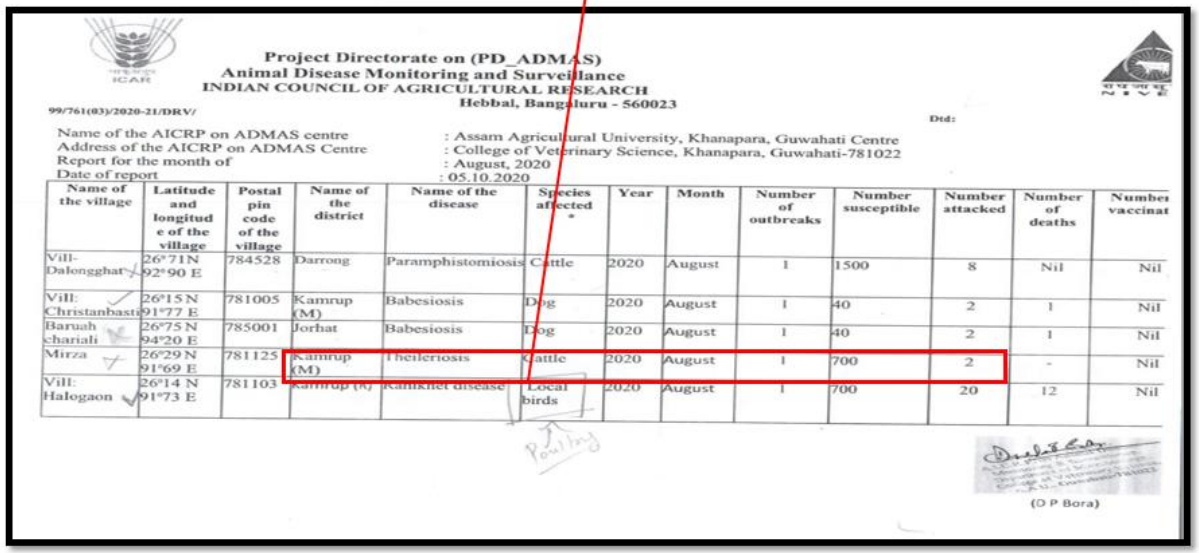
Dear Sir
I am sending herewith the monthly reports for the months of June, July and August, 2020.
Kindly acknowledge the receipt of the same.

Best Regards
Durlav P Bora
PI, AICRP on ADMAS
Guwahati Centre

Dr Durlav Prasad Bora MVSc,PhD [IVRI]
Assistant Professor (Sr. Scale)
Department of Microbiology
College of Veterinary Science
Assam Agricultural University
Khanapara, Guwahati-781022
ASSAM (INDIA)
Ph# +919954533400
+919435594808
Researchgate: https://www.researchgate.net/profile/Durlav_Bora3
ORCID ID: https://orcid.org/0000-0002-5629-7929
Scopus Author ID: 7003809722
Web of Science ResearcherID: AAE-4450-2020

3 attachments

Monthly report_August2020_ICAR-ADMAS.doc 5177K
Monthly report_June2020_ICAR-ADMAS.doc 5178K
Monthly report_July 2020_ICAR-ADMAS.doc 5178K



**Project Directorate on (PD_ADMAS)**
**Animal Disease Monitoring and Surveillance**
**INDIAN COUNCIL OF AGRICULTURAL RESEARCH**
**Hebbal, Bangaluru - 560023**

99/761(03)/2020-21/DRV/ Dtd:

Name of the AICRP on ADMAS centre : Assam Agricultural University, Khanapara, Guwahati Centre
Address of the AICRP on ADMAS Centre : College of Veterinary Science, Khanapara, Guwahati-781022
Report for the month of : August, 2020
Date of report : 05.10.2020

| Name of the village | Latitude and longitude of the village | Postal pin code of the village | Name of the district | Name of the disease | Species affected * | Year | Month | Number of outbreaks | Number susceptible | Number attacked | Number of deaths | Number vaccinat |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vill-Dalongghat | 26°71N 92°90 E | 784528 | Darrong | Paramphistomiosis | Cattle | 2020 | August | 1 | 1500 | 8 | Nil | Nil |
| Vill: Christanbasti | 26°15 N 91°77 E | 781005 | Kamrup (M) | Babesiosis | Dog | 2020 | August | 1 | 40 | 2 | 1 | Nil |
| Baruah chariali | 26°75 N 94°20 E | 785001 | Jorhat | Babesiosis | Dog | 2020 | August | 1 | 40 | 2 | 1 | Nil |
| Mirza | 26°29 N 91°69 E | 781125 | Kamrup (M) | Theileriosis | Cattle | 2020 | August | 1 | 700 | 2 | - | Nil |
| Vill: Halogaon | 26°14 N 91°73 E | 781103 | Kamrup (R) | Ranikhet disease | Local birds | 2020 | August | 1 | 700 | 20 | 12 | Nil |

Poultry

(O P Bora)

# KARNATAKA REPORT SEPTEMBER-2020

## NIVEDI PREDICTION SEPTEMBER TABLE

| Districts of Karnataka | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fasciolosis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Bagalkot | NR | NR | HR | VLR | VHR | NR | VLR | HR | VLR | NR | NR | NR | NR |
| Bangalore | NR | NR | NR | VLR | NR | NR | VHR | LR | MR | NR | NR | NR | NR |
| Bangalore Rural | VHR | NR | NR | VLR | VHR | NR | VHR | VLR | VLR | NR | NR | NR | NR |
| Belgaum | NR | NR | NR | VLR | NR | NR | HR | VHR | NR | NR | NR | NR | NR |
| Bellary | VHR | NR | NR | MR | NR | NR | MR | MR | VHR | NR | NR | NR | NR |
| Bidar | NR | NR | LR | NR | NR | NR | LR | LR | NR | NR | NR | NR | NR |
| Bijapur | NR | NR | NR | VLR | NR | NR | NR | MR | NR | NR | NR | NR | NR |
| Chamarajanagar | HR | NR | HR | VLR | NR | NR | HR | VLR | LR | NR | NR | NR | NR |
| Chikkaballapura | VHR | NR | NR | LR | NR | NR | VHR | VLR | LR | NR | NR | NR | NR |
| Chikmagalur | NR | NR | VHR | NR | NR | NR | VHR | MR | VLR | MR | NR | NR | NR |
| Chitradurga | NR | NR | VHR | VLR | NR | NR | MR | HR | NR | NR | NR | NR | NR |
| Dakshina Kannada | NR | NR | NR | NR | NR | NR | VHR | LR | NR | NR | NR | NR | NR |
| Davanagere | | | | | | | | | | VHR | NR | NR | NR |
| Dharwad | NR | NR | VHR | NR | NR | NR | HR | VHR | VLR | NR | NR | NR | NR |
| Gadag | NR | NR | NR | VLR | NR | NR | MR | HR | NR | NR | NR | NR | NR |

| Districts of Karnataka | Livestock Diseases | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Anthrax | Babesiosis | BQ | BT | ET | Fasciolosis | FMD | HS | PPR | S&G Pox | SF | Theileriosis | Trypanosomiasis |
| Gulbarga | NR | NR | HR | VLR | NR | NR | VLR | MR | NR | VHR | NR | NR | NR |
| Hassan | NR | NR | VHR | VLR | NR | NR | VHR | LR | VLR | VHR | NR | NR | NR |
| Haveri | VHR | NR | HR | NR | NR | NR | HR | VHR | VLR | MR | NR | NR | NR |
| Kodagu | NR | NR | HR | NR | NR | NR | HR | VLR | NR | NR | NR | NR | NR |
| Kolar | NR | NR | NR | VLR | NR | NR | HR | LR | NR | NR | NR | NR | NR |
| Koppal | VHR | NR | MR | VLR | NR | NR | HR | HR | VLR | NR | NR | NR | NR |
| Mandya | NR | NR | NR | VLR | NR | NR | HR | VLR | NR | NR | NR | NR | NR |
| Mysore | | | VHR | NR | NR | NR | VHR | MR | VLR | NR | NR | NR | NR |
| Raichur | VHR | NR | MR | VLR | NR | NR | VLR | MR | NR | NR | NR | NR | NR |
| Ramanagara | NR | NR | NR | VLR | NR | NR | VHR | NR | VHR | NR | NR | NR | NR |
| Shimoga | NR | NR | VHR | NR | VHR | NR | VHR | VHR | NR | NR | NR | NR | NR |
| Tumkur | VHR | NR | VHR | VLR | NR | NR | VHR | VHR | VLR | MR | NR | NR | NR |
| Udupi | NR | NR | NR | NR | NR | NR | HR | NR | NR | NR | NR | NR | NR |
| Uttara Kannada | NR | NR | MR | NR | NR | NR | HR | MR | NR | NR | NR | NR | NR |
| Yadgir | NR | NR | HR | VLR | NR | NR | VLR | VLR | VLR | NR | NR | NR | NR |

## KARNATAKA REPORT SEPTEMBER-2020

GOVERNMENT OF KARNATAKA
DEPARTMENT OF ANIMAL HUSBANDRY AND VETERINARY SERVICES

No:DD(ADSS):MPR:2020-21

Office of the Commissioner
1st Floor, Pashupalana Bhavana,
Bellary Road, Hebbal,
Bangalore-560024.
Date: -10-2020

To
Joint Commissioner(LH),
GOI, Ministry of Agriculture,
Dept.of Animal Husbandry & Dairying,
Krishi Bhavan, New Delhi-110 001

Sir,

Sub: Animal Health information reports on outbreak of contagious diseases & vaccinations in Karnataka State for the month SEPTEMBER-2020

Please find enclosed herewith the statement showing particulars of incidence of the contagious diseases in Karnataka State for the month of SEPTEMBER -2020

Yours faithfully,
Sd/-
DIRECTOR

Copy Submitted for kind information :

1) Commissioner, DAHDF, Krishi Bhavan, New Delhi-110 001.
2) The Assistant Commissioner(LH), GOI, Ministry of Agriculture, Dept.of Animal Husbandry & Dairying, Krishi Bhavan, New Delhi-110 001.
3) The Commissioner / Director, Department of AH & VS, Andhra pradesh / Telangana / Maharashtra / Tamilnadu / Kerala/ Goa.

Copy for information :

1) The Director, Institute of Animal Health & veterinary Biologicals, Hebbal Bangalore-24.
2) The Managing Director, KSWDCL, Hebbal Bangalore for information and necessary action.
3) The Managing Director, KMF, Bangalore for information and necessary action
4) The Project Director, NIVEDI, ICAR Campus, Ramagondanahalli, Yelahanka Doddaballapur Main Road, Bangalore-64 / KLDA, Animal Husbandry & Veterinary Services, Bangalore-01
5) The Additional Director (LH) / Joint Director (Epidemiology), Animal Husbandry & Veterinary Services, Bangalore.
6) The Joint Director, SRDDL, IAH&VB, Hebbal, Bangalore-24.
7) The Deputy Director, PDDL / SCLD, Dept of AH & VS, Hebbal, Bangalore-560024
8) Office Copy.

Director,
Animal Husbandry & Veterinary Services

Status of Specified Livestock and Poultry Diseases in Karnataka During the Month : September Year : 20

| Disease | District | Out Break | Attacks | | | | | | | | Deaths | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cattle | Buffalo | Sheep | Goat | Pig | Dog | Poultry | Others | Total | Cattle | Buffalo | Sheep | Goat | Pig | Dog | Poultry | Others |
| Anthrax | KOPPALA | 1 | | | 6 | | | | | | 6 | | | 6 | | | | | |
| | Total | 1 | | | 6 | | | | | | 6 | | | 6 | | | | | |
| Black Quarter | BALLARY | 1 | 1 | | | | | | | | 1 | 1 | | | | | | | |
| | MYSURU | 1 | 1 | | | | | | | | 1 | | | | | | | | |
| | Total | 2 | 2 | | | | | | | | 2 | 1 | | | | | | | |
| Others | BELAGAVI | 1 | 40 | | | | | | | | 40 | | | | | | | | |
| CLSD | BIDAR | 1 | 1411 | 60 | | | | | | | 1471 | | | | | | | | |
| | DAVANGERE | 1 | 4 | | | | | | | | 4 | | | | | | | | |
| | HAVERI | 1 | 2369 | | | | | | | | 2369 | | | | | | | | |
| | KALABURGI | 1 | 3386 | 6 | | | | | | | 3392 | | | | | | | | |
| | RICHURU | 1 | 865 | | | | | | | | 865 | | | | | | | | |
| | UDUPI | 1 | 137 | | | | | | | | 137 | | | | | | | | |
| | UTTARA KANNADA | 1 | 2604 | 140 | | | | | | | 2744 | | | | | | | | |
| | YADGIRI | 1 | 509 | 21 | | | | | | | 530 | | | | | | | | |
| | Total | 9 | 11325 | 227 | | | | | | | 11552 | | | | | | | | |
| Sheep Pox | BALLARY | 1 | | | 9 | | | | | | 9 | | | | | | | | |
| | DAVANGERE | 1 | | | 22 | | | | | | 22 | | | 5 | | | | | |
| | Total | 2 | | | 31 | | | | | | 31 | | | 5 | | | | | |

JOINT DIRECTOR(LH)

## 9.1 Correlational Assessment

The number of outbreaks predicted and outbreaks actually reported were reported in table 9.1. It has been observed from the table that outbreaks predicted two months in advance and timely alerts were issued that helped the stakeholders to take appropriate preventive measures with in time and accordingly the reported outbreaks were very less. Though the use of artificial intelligence system is more beneficial for accurately predicting the livestock disease outbreaks, there are yet number of limitations, namely, there are expected to be under reporting and also non-reporting cases which created the uncertainties in the model predictions while translating model inputs in to model outputs. However, identifying these uncertainties in the prediction using statistical models and highlighting the importance of quality data may improve the model accuracy and confidence while building the model for livestock disease forecasting.

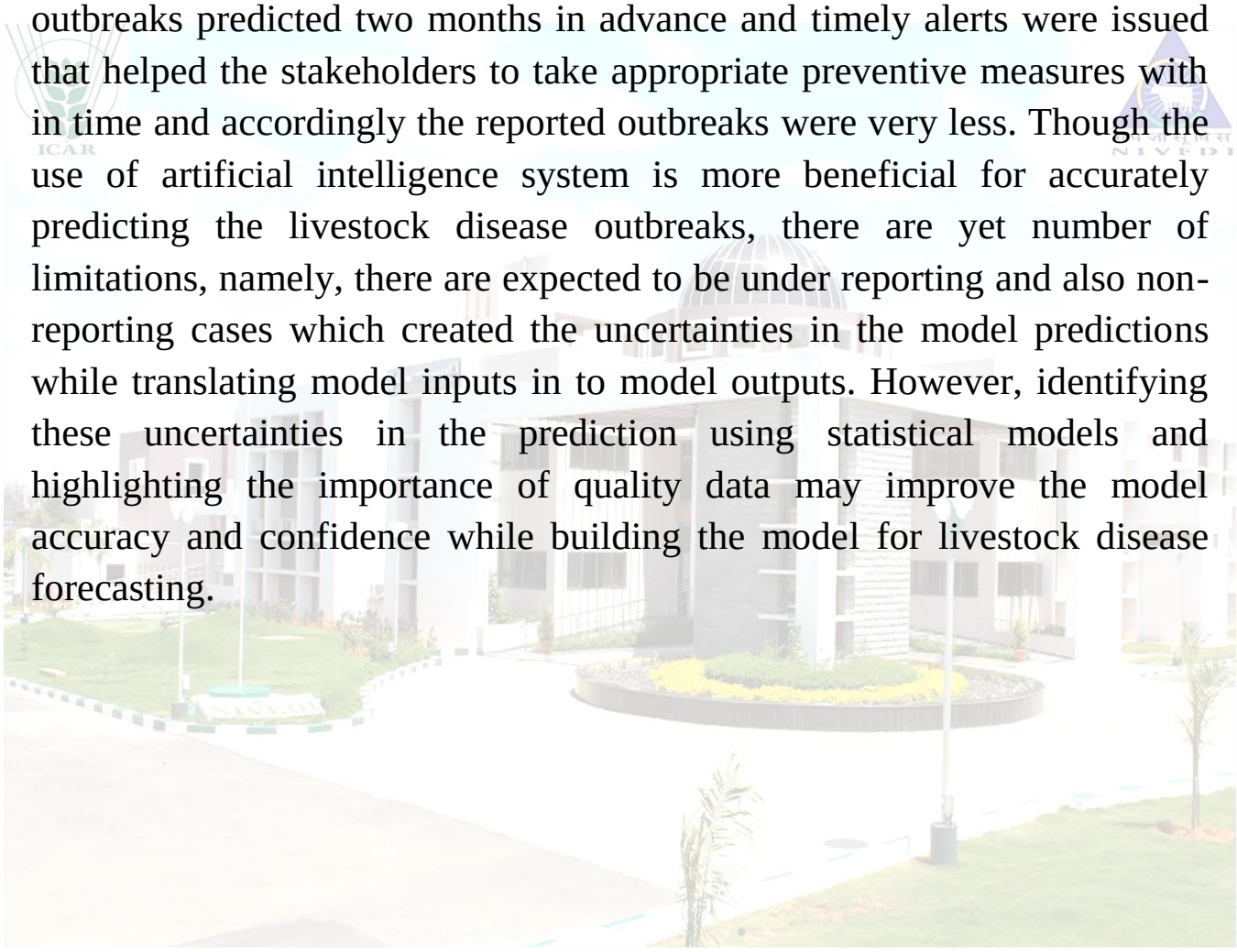


**Table 9.1: Number of districts predicted for livestock diseases and reported**

| Livestock diseases | January-2021 | | February-2021 | |
|---|---|---|---|---|
| | No of Districts predicted for the disease | No of districts reported the disease | No of Districts predicted for the disease | No of districts reported the disease |
| Anthrax | 25 | 1 | 23 | 3 |
| Babesiosis | 65 | 56 | 35 | 11 |
| Black quarter | 54 | 3 | 55 | 1 |
| Bluetongue | 12 | 1 | 10 | NA |
| Enterotoxaemia | 23 | 4 | 17 | 2 |
| Fascioliasis | 54 | 19 | 51 | 13 |
| Foot and mouth disease | 103 | NA | 87 | 5 |
| Haemorrhagic septicaemia | 64 | 6 | 55 | 4 |
| Peste des petits ruminants | 93 | 15 | 50 | 25 |
| Sheep & Goat pox | 47 | 7 | 36 | 3 |
| Swine fever | 53 | 6 | 34 | 5 |
| Theileriosis | 55 | 33 | 29 | 15 |
| Trypanosomiasis | 38 | 20 | 40 | 14 |

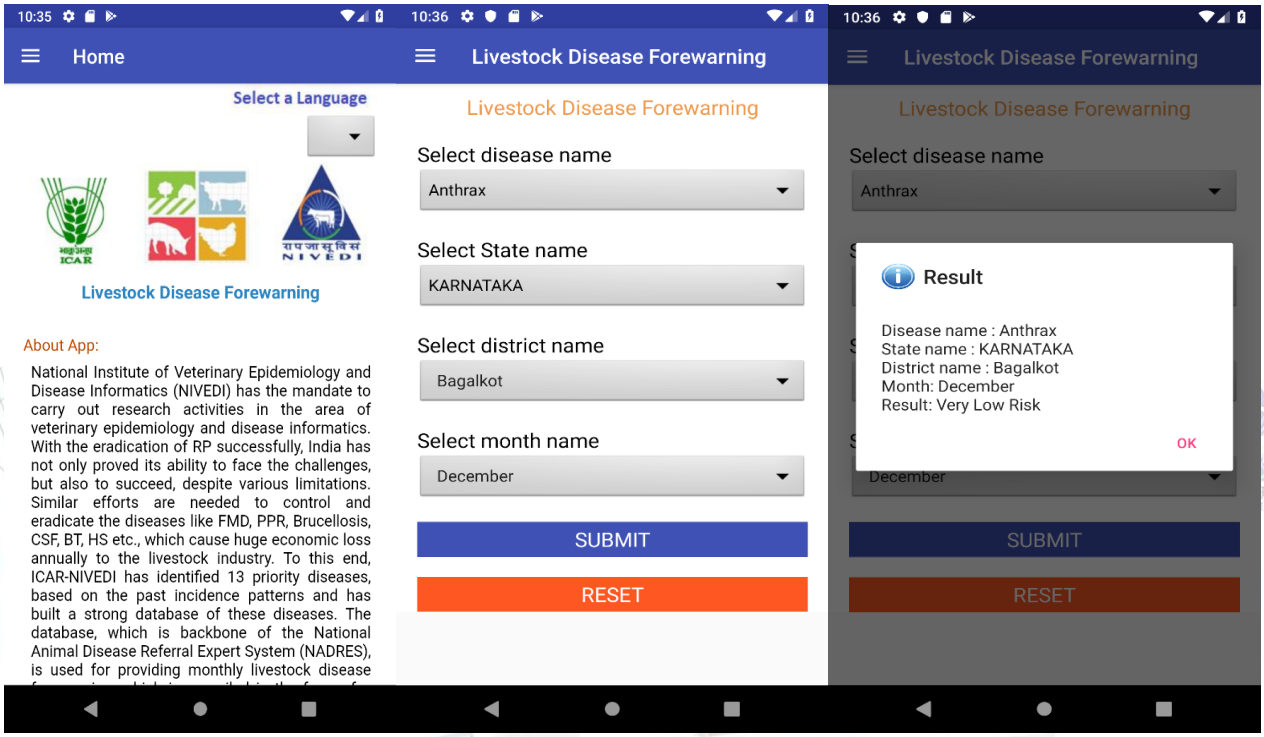
*which takes in to account of action taken for prediction and non-reporting of cases

## 10. Launch of Mobile Android app&link to download

Livestock forewarning application **(**LDF**)** can be downloaded following the link provided**:**http**://**www**.**nivedi**.**res**.**in/android_nadres/LDF**.**apkand google play store linkalso provided https://play.google.com/store/apps/details?id=info.androidhive.ldf

Further launch of LDF application was done, the news provided below**.**

**Livestock Disease Forewarning (LDF Mobile App)**




To extend the reach of the NADRES forewarning bulletin among the various stakeholders, a Mobile Application named Livestock Disease forewarning app "LDF-Mobile *App"* was developed. The forewarning methodology adapted in the "mobile app" remains the same as monthly bulletin; it provides user interface to know the predicted forewarning results stored in NADRES MySQL database. A PHP web-based service is developed in Java to extract the results of forewarning two months in advance by keying state name, district name and disease name and display the same in the mobile app. In addition to forewarning, the LDF-Mobile App also provides the details of clinical samples to be collected in case of outbreaks of the listed diseases for laboratory confirmation. Immediate preventive measures to be taken up in case of positive prediction/disease confirmation. The LDF mobile app is available at ICAR-NIVEDI website. It is available on Google play store.

## 11. Appendix

### a) R Code

```
#pars month_number=8; year_number=2006; current_year=2017;

nadres_func=function (current_year, year_number, month_number)

{

args = commandArgs(trailingOnly=TRUE)

if (length(args)<3) {

stop("Correct number of arguments must be supplied", call.=FALSE)

 }

current_year=args[1]

year_number=args[2]

month_number=args[3]

df_total<-NULL

month_name=data.frame(month=c(1:12),

month_names=c("February","February","October","October","May","October","October","October","October","October","January","January")

)

ss<-fread(file="NADRES.csv",header=T,check.names = F)

col_pars=names(ss)

vars= paste(col_pars[7:ncol(ss)],collapse = "+")

options(verbose = F)

for(disease in c(8,10,11,12,24,31,35,37,48,60,62,65,70,72,79))

{

# disease=8

rs<-dbSendQuery(mydb,"SELECT
index_state.state_name,index_state.state_id,index_district.district_id, index_district.district_name,
year_list.year, outbreak_data_final.month, ls_sp_index.species_name,disease_master.disease_id,
disease_master.disease_name, outbreak_data_final.number_of_outbreaks,
```

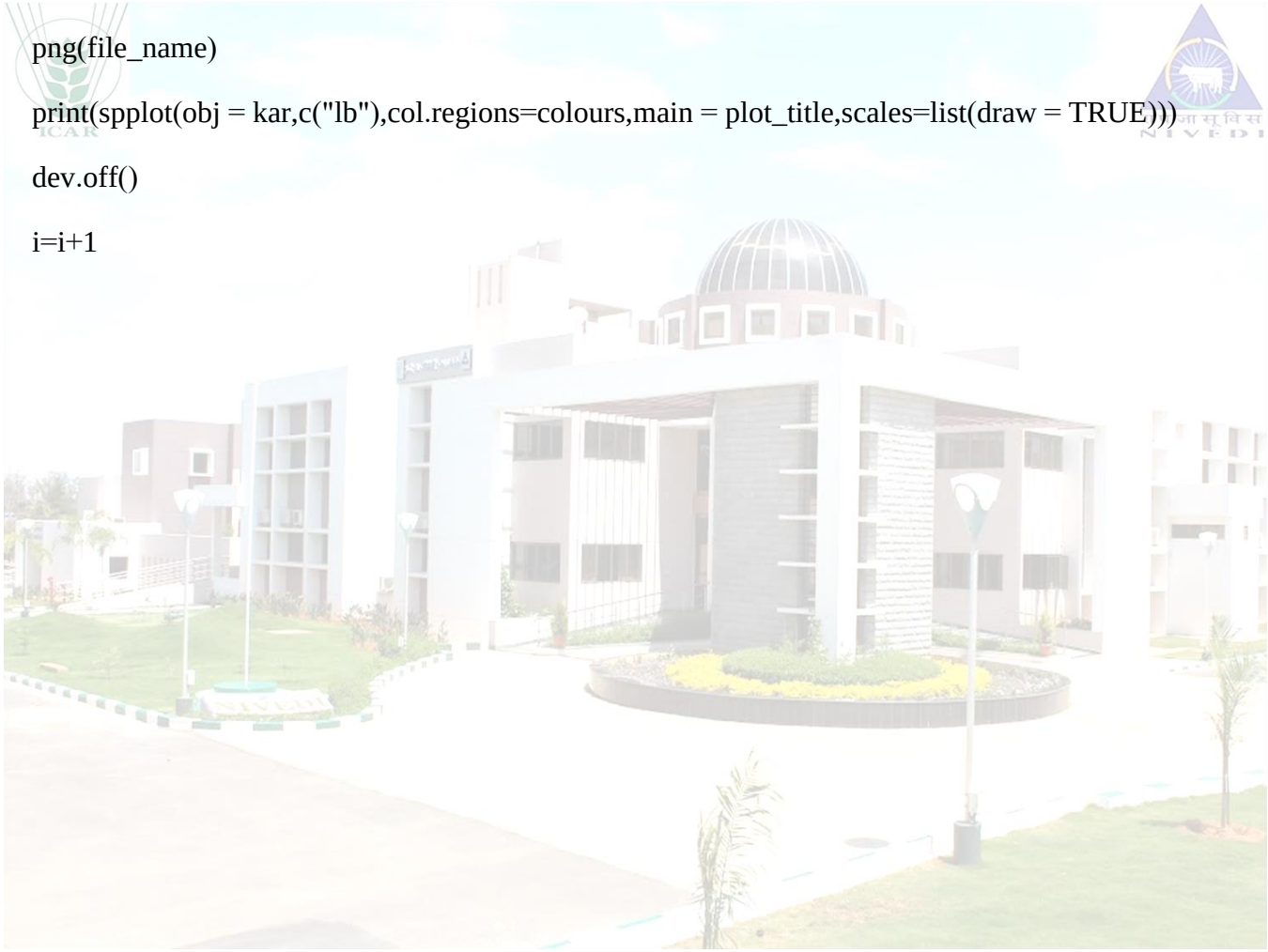
```
outbreak_data_final.number_susceptible, outbreak_data_final.number_of_attacks,
outbreak_data_final.number_of_deaths


  FROM ls_sp_index INNER JOIN (year_list INNER JOIN (disease_master INNER JOIN
(index_district INNER JOIN (index_state INNER JOIN outbreak_data_final ON
index_state.state_id = outbreak_data_final.state_id) ON index_district.district_id =
outbreak_data_final.district_id) ON disease_master.disease_id = outbreak_data_final.disease_id)
ON year_list.year = outbreak_data_final.year) ON ls_sp_index.species_id =
outbreak_data_final.species_id; ")

data = fetch(rs, n=-1)

  # year change

data<-subset(data,data$year>=year_number&data$disease_id==disease)

df<-sqldf("SELECT
state_id,state_name,district_id,district_name,disease_id,disease_name,month,sum(number_of_outbr
eaks)as outbreak FROM data GROUP BY
state_id,district_id,state_name,district_name,month,disease_id,disease_name",drv="SQLite")

ss1<-subset(ss,ss$disease_id==disease)

attach(ss1,warn.conflicts = F)

attach(df,warn.conflicts = F)

dd<-merge(ss1, df, by = c("state_id","district_id","disease_id","month"),all.x=TRUE)

attach(dd,warn.conflicts = F)

out<-data.frame(outbreak)

out<-ifelse(outbreak>=1,1,0)

out[is.na(out)]<-0

final<-cbind(dd,out)

  final1<-final[which(final$disease_id==disease),]

cat("For disease: ",as.character(unique(ss1[,"disease_name"])),"\n")

ncs= ncol(final1)-5

temp = data.frame(final1[,8:ncs])

for(i in 1:ncol(temp)){
```

```
temp[is.na(temp[,i]), i] <- mean(temp[,i], na.rm = TRUE)

  }

 final2<-
cbind(final1$state_id,final1$state_name.x,final1$district_id,final1$district_name.x,final1$disease_id,final1$disease_name.x,final1$out,final1$month,temp)

setnames(final2,old=c("final1$state_id","final1$state_name.x","final1$district_id","final1$district_name.x","final1$disease_id","final1$disease_name.x","final1$out","final1$month"),new=c("state_id","state_name","district_id","district_name","disease_id","disease_name","out","month"))

formula=paste("out ~",vars)

as.formula(formula)

model<-glm(formula,data = final2, family = binomial(link="logit"),maxit=20)

new<-data.frame(final2[,8:ncol(final2)])

prediction<-predict(model,type="response")

n2=randomForest(as.formula(formula),final2)
  prediction_rf<-predict(n2,type="response")

  gbm_model=gbm.step(data=final2, gbm.x = 8:ncol(final2), gbm.y = 7, family = "bernoulli",
tree.complexity = 1, learning.rate = 0.01,
  bag.fraction= 0.5, n.trees = 5,keep.fold.fit=T,tolerance.method="fixed" , step.size= 5,n.folds = 10)
  prediction_gbm<-predict(gbm_model,n.trees=gbm_model$gbm.call$best.trees,type="response")
  prediction=numeric()
  for (i in 1:length(prediction_glm)) {
    # if(prediction_glm[i]>prediction_rf[i])
    # {
    #   if(prediction_glm[i]>prediction_gbm[i])
    #   {
    #     prediction[i]=prediction_glm[i]
    #   }
      if(prediction_glm[i] >= prediction_gbm[i] &&prediction_glm[i] >= prediction_rf[i])
      {
        prediction[i]=prediction_glm[i];
      }

      if(prediction_gbm[i] >= prediction_glm[i] &&prediction_gbm[i] >= prediction_rf[i])
      {
        prediction[i]=prediction_gbm[i];
      }

      if(prediction_rf[i] >= prediction_glm[i] &&prediction_rf[i] >= prediction_gbm[i]) {
        prediction[i]=prediction_rf[i];
```

```
    }

    }
summary(prediction)
vv<-round(prediction,2)

  df1<-cbind(final2,vv)

df_total<-rbind(df_total,df1)

gc()

}

f=function(m){

if(m<=0.0) i=1

else if(m>=0.0 && m<=0.20) i=2

else if(m>=0.21 && m<=0.40) i=3

else if(m>=0.41 && m<=0.60) i=4


else if(m>=0.61 && m<=0.80) i=5

elsei=6

}

df_total$cate=factor(mapply(f,df_total$vv),levels=1:6,labels=c("","","","MR","","HR"))

write.csv(df_total,"nadres_outbreak.csv")

###### ACCURACY

df_total=read.csv("nadres_outbreak.csv",header = T)

dir.create(path = paste(month_name[month_number,2],current_year))

df_poa=df_total

df_poa$cate=factor(mapply(f,df_poa$vv),levels=1:6,labels=c(0,0,0,0,1,1))

df_poa=df_poa[which(df_poa$month==month_name[month_number,1]),]

df_p=df_poa[,c("disease_name","out","cate")]

df_acc=cbind(data.frame(c(1:ow(df_tot_res))),data.frame(df_tp_tn[,1]),(df_tp_tn[,2]/df_tot_res[,2])
*100)
```

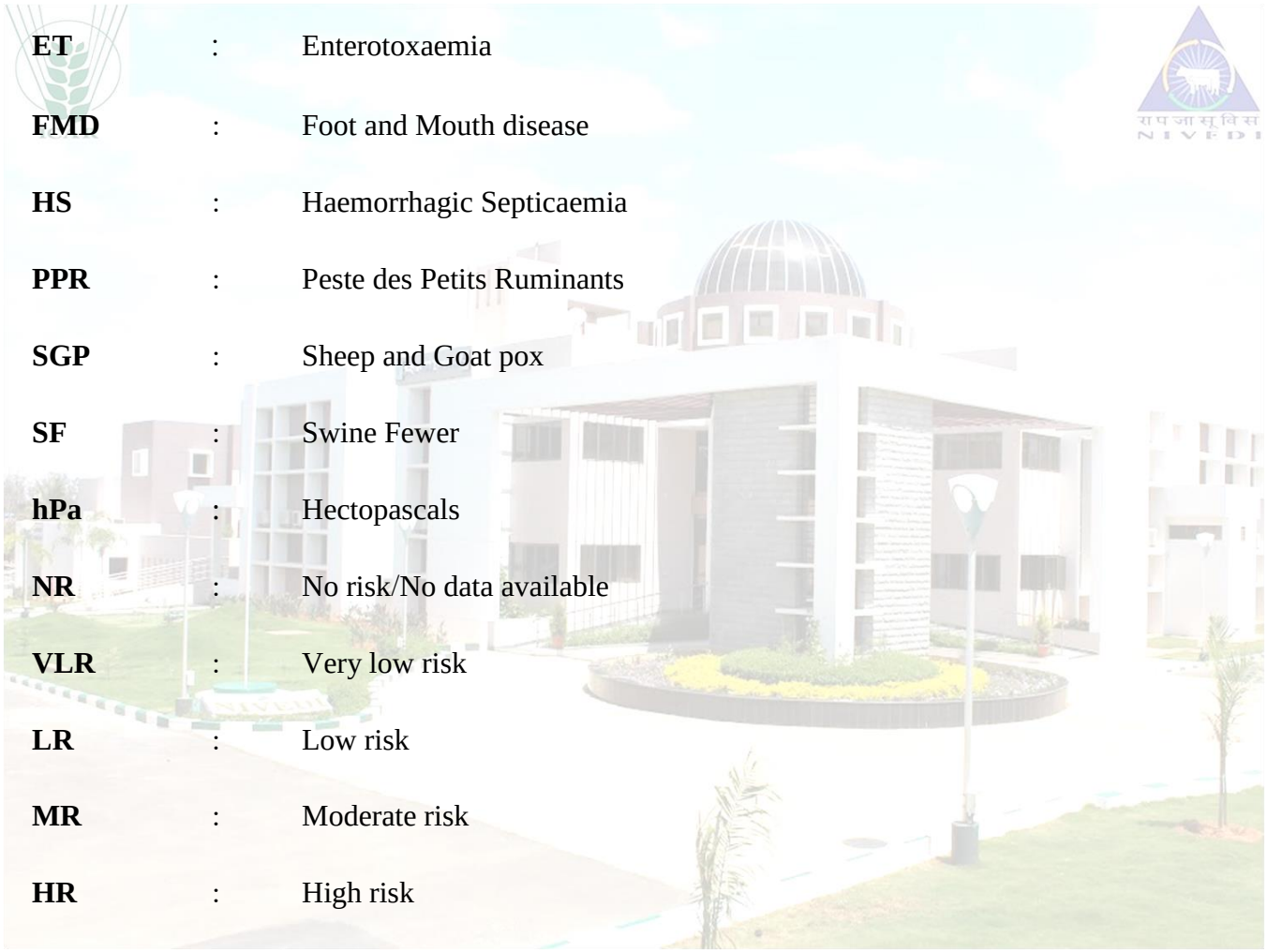
```
df_acc=setNames(df_acc,c("No","Disease","Accuracy"))

print(df_acc)

dis_acc=paste(paste(month_name[month_number,2]," ",current_year,"/",sep = ""),"Disease Accuracy ",month_name[month_number,2]," ",current_year,".csv",sep="")

write.csv(df_acc,dis_acc,row.names = F)

##########PLOT

i=1

plot_dir=paste(paste(month_name[month_number,2]," ",current_year,"/",sep=""),month_name[month_number,2]," ",current_year," N",sep="")

dir.create(path = plot_dir)

disease = c(8,10,11,12,31,35,37,48,60,65,70,72,79)

while(i<=length(disease))

{

kar=readOGR(dsn = "1shp/2011_Dist.shp",verbose = FALSE)

cols=as.character(unique(df_total[df_total$disease_id==disease[i],"disease_name"]))

df_disease=df_total[which(df_total$month==month_name[month_number,1] &df_total$disease_id==disease[i]),]

df_disease=df_disease[,c(2:5,(ncol(df_disease)-1))]


df_disease=setNames(df_disease,c("ST_CEN_CD","state_name","DT_CEN_CD","district_name","vv"))

kar@data=merge(data.frame(kar@data),data.frame(df_disease),by=c("ST_CEN_CD","DT_CEN_CD"),all.x=T)

kar$vv[is.na(kar$vv)]<-0

#View(kar@data)

colours<-c("#FFFFFF","#FFFF00","#FFC1C1","#FF7150","#FF8500","#FF0000")

kar$lb=factor(mapply(f,kar$vv),levels=1:6,labels=c("No Risk / No Data","Very Low Risk","LowRisk","MediumRisk","HighRisk","Very High Risk"))

cols=gsub("&", "and",cols)
```

```
disname= gsub("\\."," ",cols)

cat("Plot for disease:",disname,"\n")

plot_loc=paste(plot_dir,"/",disname,"/",sep="")

dir.create(plot_loc)

file_name=paste(plot_loc,disname,".png",sep="")

plot_title= paste(disname," risk prediction(",month_name[month_number,2],"
",current_year,")",sep="")

png(file_name)

print(spplot(obj = kar,c("lb"),col.regions=colours,main = plot_title,scales=list(draw = TRUE)))

dev.off()

i=i+1
```



## b) Abbreviations

| | | |
|---|---|---|
| **NADRES** | : | National Animal Disease Referral Expert System |
| **R** | : | R environment for statistical computing |
| **BQ** | : | Black Quarter |
| **BT** | : | Bluetongue |
| **ET** | : | Enterotoxaemia |
| **FMD** | : | Foot and Mouth disease |
| **HS** | : | Haemorrhagic Septicaemia |
| **PPR** | : | Peste des Petits Ruminants |
| **SGP** | : | Sheep and Goat pox |
| **SF** | : | Swine Fewer |
| **hPa** | : | Hectopascals |
| **NR** | : | No risk/No data available |
| **VLR** | : | Very low risk |
| **LR** | : | Low risk |
| **MR** | : | Moderate risk |
| **HR** | : | High risk |
| **VHR** | : | Very high risk |



## 12. Questions and Answers on the 2019 Coronavirus Disease (COVID-19)

**What causes COVID-19?**

Coronaviruses (CoV) are a family of RNA (ribonucleic acid) viruses. They are called coronaviruses because the virus particle exhibits a characteristic 'corona' (crown) of spike proteins around its lipid envelope. CoV infections are common in animals and humans. Some strains of CoV are zoonotic, meaning they can be transmitted between animals and humans, but many strains are not zoonotic.

In humans, CoV can cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (caused by MERS-CoV), and Severe Acute Respiratory Syndrome (caused by SARS-CoV). Detailed investigations have demonstrated that SARS-CoV was transmitted from civets to humans, and MERS-CoV from dromedary camels to humans.

InFebruary2019, human cases of pneumonia of unknown origin were reported in Wuhan City, Hubei Province of China (People's Rep. of). A new CoV was identified as the causative agent by Chinese Authorities. Since then, human cases have been reported by almost all countries around the world and the COVID-19 event has been declared by the World Health Organization (WHO) to be a pandemic. For up to date information please consult the WHO website.

The CoV which causes COVID-19 has been named as SARS-CoV-2 by the International Committee on Taxonomy of Viruses (ICTV); this is the scientific name. The virus may also be referred to as "the COVID-19 virus" or "the virus responsible for COVID-19". COVID19 refers to the disease caused by the virus.

- **Are animals responsible for COVID-19 in people?**

The predominant route of transmission of COVID-19 is from human to human.

Current evidence suggests that the COVID-19 virus emerged from an animal source. Genetic sequence data reveals that the COVID-19 virus is a close relative of other CoV found circulating in *Rhinolophus* bat (Horseshoe Bat) populations. However, to date, there is not enough scientific evidence to identify the source of the COVID-19 virus or to explain the original route of transmission to humans (which may have involved an intermediate host).

Investigations are needed to find the source, to determine how the virus entered the human population, and establish the potential role of an animal reservoir in this disease.

Priorities for research to investigate the animal source were discussed by the OIE informal advisory group on COVID-19, now the OIE *ad hoc* Group on COVID-19 and the human-animal Interface, and were presented at the WHO Global Research and Innovation Forum (11-12 February 2020) by the President of the OIE Wildlife Working Group. For more information on the OIE *ad hoc* Group on COVID-19 and the human-animal Interface and the WHOR and D roadmap please see the links under 'more information' at the bottom of this page.

## Can animals be infected with COVID-19 virus?

Now that COVID-19 virus infections are widely distributed in the human population there is a possibility for some animals to become infected through close contact with infected humans. Infection of animals with COVID-19 virus may have implications for animal health and welfare, and for wildlife conservation.

Several dogs and cats (domestic cats and a tiger) have tested positive to COVID-19 virus following close contact with infected humans. Further information reported to the OIE can be found below in the 'more information' section.

Studies are underway to better understand the susceptibility of different animal species to the COVID-19 virus and to assess infection dynamics in susceptible animal species.

Preliminary findings from laboratory studies suggest that, of the animal species investigated so far, cats are the most susceptible species for COVID-19, and cats can be affected with clinical disease. In the laboratory setting cats were able to transmit infection to other cats. Ferrets also appear to be susceptible to infection but less so to disease. In the laboratory setting ferrets were also able to transmit infection to other ferrets. Dogs appear to be susceptible to infection but appear to be less affected than ferrets or cats. Egyptian fruit bats were also infected in the laboratory setting but did not show signs of disease or the ability to transmit infection efficiently to other bats.

To date, preliminary findings from studies suggest that poultry and pigs, are not susceptible to SARS-CoV-2 infection. Currently, there is no evidence to suggest that animals infected by humans are playing a role in the spread of COVID-19. Human outbreaks are driven by person to person contact.

- **What do we know about COVID-19 virus and companion animals?**

  The current spread of COVID-19 is a result of human to human transmission. To date, there is no evidence that companion animals play a significant role in spreading the disease. Therefore, there is no justification in taking measures against companion animals which may compromise their welfare.

  Some examples of animal infections have been reported to the OIE. Further details on these events can be found in the 'more information' section. So far, these appear to be isolated cases, and there is no evidence that companion animals are playing a role in the spread of human disease.

  Preliminary findings from laboratory studies suggest that, of the animal species investigated so far, cats are the most susceptible species for COVID-19, and cats can be affected by clinical disease. In the laboratory setting cats were able to transmit infection to other cats. Ferrets also appear to be susceptible to infection but less so to disease. In the laboratory setting ferrets were able to transmit infection to other ferrets. Dogs appear to be susceptible to infection but appear to be less affected than ferrets or cats. To date, preliminary findings from studies suggest that poultry and pigs, are not susceptible to SARS-CoV-2 infection.

- **What precautionary measures should be taken when companion or other animals have close contact with human's sick or suspected with COVID-19?**

  Currently, there is no evidence that companion animals are playing a significant epidemiological role in this human disease. However, because animals and people can sometimes share diseases (known as zoonotic diseases), it is still recommended that people who are sick with COVID-19) limit contact with companion and other animals.

  When handling and caring for animals, basic hygiene measures should always be implemented. This includes hand washing before and after being around or handling animals, their food, or supplies, as well as avoiding kissing, licking or sharing food.

  When possible, people who are sick with COVID-19 should avoid close contact with their pets and have another member of their household care for their animals. If they must look after their pet, they should maintain good hygiene practices and wear a face mask if possible. Animals belonging to owners infected with COVID-19 should be kept indoors as much as possible and contact with those pets should be avoided as much as possible.

- **What can National Veterinary Services do with regards to companion animals?**

  Public Health and Veterinary Services should work together using a One Health approach to share information and conduct a risk assessment when a person with COVID-19 reports being in contact with companion or other animals.

  If a decision is made as a result of a risk assessment to test a companion animal which has had close contact with a person/owner infected with COVID-19, it is recommended that RT-PCR be used to test oral, nasal and fecal/rectal samples. Care should be taken to avoid contamination of specimens from the environment or by humans. Animals that test positive for COVID-19 should be kept away from unexposed animals and contact with those animals should be avoided as much as possible.

- **Are there any precautions to take with live animals or animal products?**

  Although there is uncertainty about the origin of the COVID-19 virus, in accordance with advice offered by the WHO, as a general precaution, when visiting live animal markets, wet markets or animal product markets, general hygiene measures should be applied. These include regular hand washing with soap and potable water after touching animals and animal products, as well as avoiding touching eyes, nose or mouth, and avoiding contact with sick animals or spoiled animal products. Any contact with other animals possibly living in the market (e.g., stray cats and dogs, rodents, birds, bats) should be avoided. Precaution should be taken to avoid contact with animal waste or fluids on the soil or surfaces of shops and market facilities.

  Standard recommendations issued by WHO to prevent infection spread include regular hand washing, covering mouth and nose with the elbow when coughing and sneezing and avoiding close contact with anyone showing symptoms of respiratory illness such as coughing and sneezing. As per general good food safety practices, raw meat, milk or animal organs should be handled with care, to avoid potential cross-contamination with uncooked foods. Meat from healthy livestock that is prepared and served in accordance with good hygiene and food safety principles remains safe to eat. Further recommendations from WHO can be consulted.

The Codex Alimentarius Commission has adopted several practical guidelines on how to apply and implement best practices to ensure food hygiene (Codex General Principles of Food Hygiene, CXC 1- 1969), handle meats (Codex Code of Hygienic Practice for Meat, CXC 58 – 2005), and control viruses in foods (Guidelines for the Application of General Principles of Food Hygiene to the Control of Viruses in Food (CAC/GL 79-2012) and others which can be consulted on the Codex website.

Based on currently available information, there is no scientific evidence to justify introduction of additional sanitary measures for the international trade of animals or animal products for countries reporting cases of COVID-19 in humans. Similarly, precautions for packaging materials are unnecessary over and above the observation of basic hygiene, such as ensuring it is clean and free of visible contamination.

- **What are the Veterinary Authority's international responsibilities in this event?**

The infection of animals with COVID-19 virus meets the criteria of an emerging disease. Therefore, any (case of) infection of animals with the COVID-19 virus in (including information about the species, diagnostic tests, and relevant epidemiological information) should be reported to the OIE in accordance with the OIE *Terrestrial Animal Health Code*.

It is important for Veterinary Authorities to remain informed and maintain close liaison with public health authorities and those responsible for wildlife, to ensure coherent and appropriate risk communication messages and risk management.

It is important that COVID-19 does not lead to inappropriate measures being taken against domestic or wild animals which might compromise their welfare and health or have a negative impact on biodiversity.

In some countries, National Veterinary Services are supporting core functions of the public health response, such as screening and testing of surveillance and diagnostic samples from humans. Veterinary clinics in some countries are also supporting the public health response by donating essential materials such as personal protective equipment and ventilators.

Guidance on Veterinary Laboratory Support to the Public Health Response for COVID-19 is available at the bottom of this document.

https://www.oie.int/scientific-expertise/specific-information-and-recommendations/questions-and-answers-on-2019novel-coronavirus/

ICAR - National Institute of Veterinary Epidemiology and Disease Informatics

# Customer/Client Feedback Form

**Feedback for the Livestock Diseases forewarning bulletin of March 2021, Volume 9 and Issue 3**

**(Please return this duly fill in after receiving the outbreak report of April -2021)**

1. **Details of the number of districts with diseases reported vs. forecast in your state.**

| Sl. No | Diseases Name | No of districts outbreak occurred but not alerted** | Measure taken in case of disease forecasted: Yes or No** | Any other |
|---|---|---|---|---|
| 1. | Anthrax | | | |
| 2. | Babesiosis | | | |
| 3. | Black Quarter | | | |
| 4. | Bluetongue | | | |
| 5. | Enterotoxaemia | | | |
| 6. | Fascioliasis | | | |
| 7. | Foot and mouth disease | | | |
| 8. | Haemorrhagic septicaemia | | | |
| 9. | Peste des Petits Ruminants | | | |
| 10. | Sheep & Goat pox | | | |
| 11. | Swine fever | | | |
| 12. | Theileriosis | | | |
| 13. | Trypanosomiasis | | | |

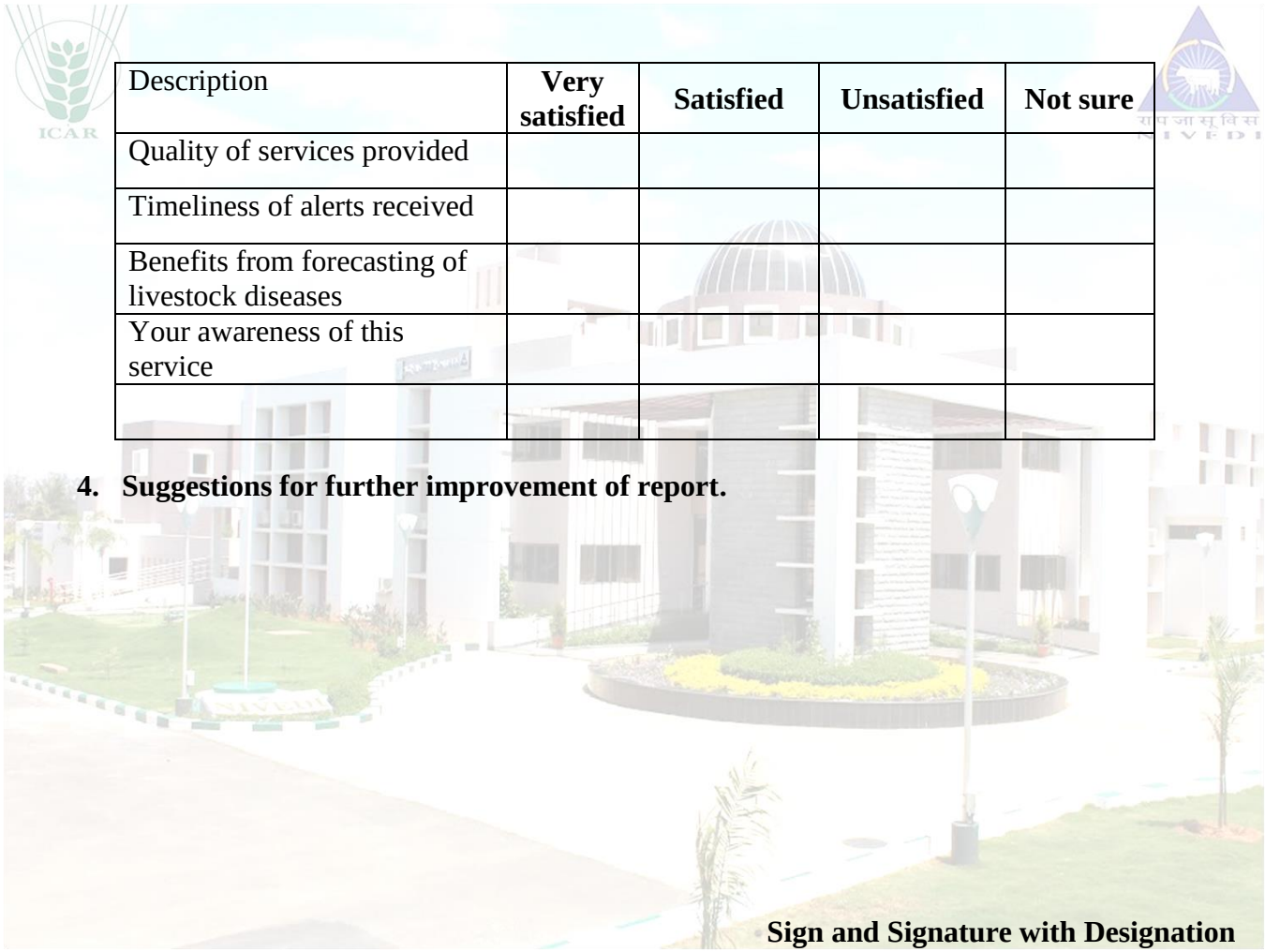
**Details may be written here.

2. **What are the preventive measures taken in case of outbreak predicted?**

3. **How would you rate your satisfaction with the following aspects of the services you have received or accessed?**

| Description | **Very satisfied** | **Satisfied** | **Unsatisfied** | **Not sure** |
|---|---|---|---|---|
| Quality of services provided | | | | |
| Timeliness of alerts received | | | | |
| Benefits from forecasting of livestock diseases | | | | |
| Your awareness of this service | | | | |
| | | | | |

4. **Suggestions for further improvement of report.**



**Sign and Signature with Designation**

**AICRP centre:**

**Dated:**

भाकृअनुप
ICAR

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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