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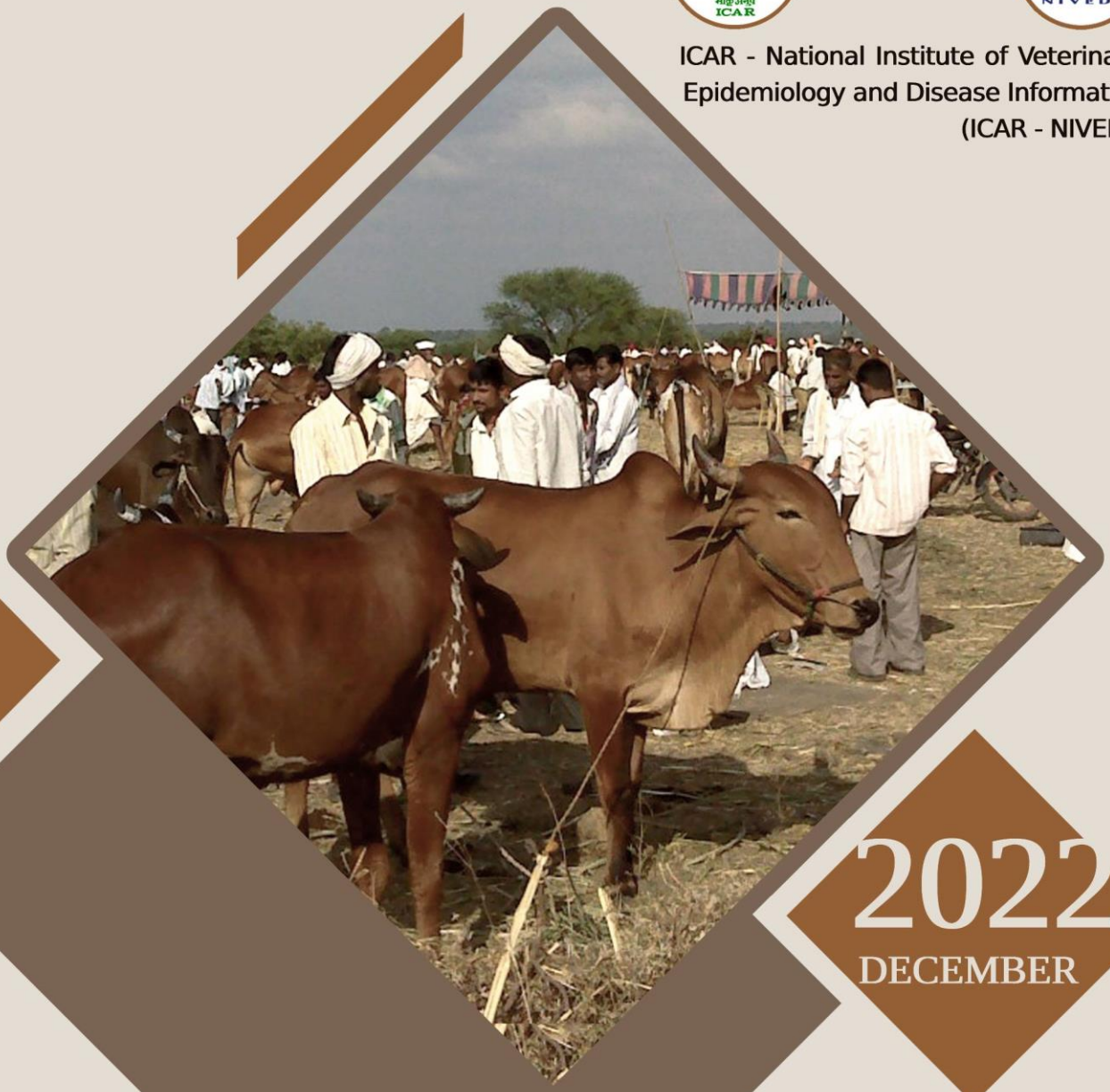

2022
DECEMBER

LIVESTOCK DISEASE RISK FOREWARNING BULLETIN

Powered by Artificial Intelligence

PUBLISHED BY:
DIRECTOR
ICAR-NIVEDI

NOW LINKED WITH
FARMER REGISTRATION AND UNIFIED BENEFICIARY INFORMATION SYSTEM
(FRUITS)

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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.

I would like to express sincere everlasting gratitude to Hon'ble Deputy Director General (Animal Science) for his constant encouragement, support and guidance.

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Director (Acting)
ICAR- NIVEDI

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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 livestock 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 (NADRESv2), 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.

2. SUMMARY OF THE FOREWARNING BULLETIN….

The association between infectious diseases and the climate was known from ancient times. Hippocrates observed in the 5th century that epidemics were associated with natural phenomena 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 the pathogens (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 enable the concerned authorities in disease preparedness and awareness of the risk associated with livestock diseases. 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 forewarning for December 2022 revealed Jharkhand, Uttar Pradesh, Karnataka, Kerala Assam and West Bengal as the top states with high predicted livestock disease outbreaks.

Among the predicted diseases, control programmes 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 and PPR outbreaks are high in Jharkhand, 21 and 17 respectively. Further the co-occurrence of FMD and HS can be expected in Andhra Pradesh, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Odisha, Rajasthan, Tamil Nadu, Tripura and West Bengal. Among the different diseases in livestock, the predicted outbreaks are expected to be high for Fasciolosis (96), Trypanosomosis (74) and Theileriosis (70).

The major challenges for the effective disease control programme 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 programme 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 Statewise Livestock Disease forewarning for December- 2022

Sl. No	State Name	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis	Total number of districts predicted for risk of disease
1	Andaman & Nicobar Islands	0	3	0	0	0	3	0	0	0	0	0	1	0	7
2	Andhra Pradesh	2	0	0	1	1	0	1	3	1	2	0	0	0	11
3	Arunachal Pradesh	0	0	0	0	0	1	0	0	0	0	1	0	0	2
4	Assam	0	5	6	0	3	11	0	1	2	1	17	1	0	47
5	Bihar	0	2	0	0	0	1	4	0	1	0	1	0	3	12
6	Chattisgarh	1	0	0	0	0	0	0	0	0	0	0	0	0	1
7	Goa	0	1	0	0	0	0	0	0	0	0	0	0	0	1
8	Gujarat	0	0	0	0	0	0	1	3	2	2	0	1	1	10
9	Haryana	0	0	0	0	1	0	1	0	1	0	1	1	0	5
10	Himachal Pradesh	0	0	0	0	0	0	2	0	1	1	0	0	0	4
11	Jammu & Kashmir	0	0	0	0	0	0	0	0	0	8	0	0	0	8
12	Jharkhand	3	24	18	0	11	22	21	12	17	4	8	24	24	188
13	Karnataka	9	0	14	8	8	0	11	5	2	9	3	0	0	69
14	Kerala	1	4	0	0	1	0	13	3	6	0	1	12	9	50
15	Madhya Pradesh	0	0	0	0	0	0	4	2	0	0	0	0	1	7
16	Maharashtra	0	0	1	0	0	0	0	1	5	1	0	1	0	9
17	Manipur	0	0	2	0	0	2	3	0	0	0	1	0	0	8
18	Meghalaya	0	0	3	0	0	0	2	0	0	0	1	0	0	6
19	Mizoram	0	0	1	0	0	0	0	0	0	0	2	0	0	3
20	Nagaland	0	0	0	0	0	0	0	0	0	0	2	0	0	2
21	Odisha	1	0	5	0	2	0	9	4	2	5	0	0	0	28
22	Puducherry	0	3	0	0	0	2	1	0	0	1	0	0	0	7
23	Punjab	0	0	0	0	0	1	0	1	1	0	1	0	0	4
24	Rajasthan	0	0	2	0	0	1	6	2	2	0	0	0	0	13
25	Sikkim	0	0	0	0	0	0	0	0	0	0	0	1	0	1
26	Tamil Nadu	5	0	0	0	0	0	4	1	2	3	0	0	0	15
27	Tripura	0	3	3	0	0	3	2	2	1	3	3	0	0	20
28	Uttar Pradesh	0	14	0	0	1	6	1	0	8	0	0	17	36	83
29	Uttarakhand	0	0	0	0	0	0	3	0	0	0	0	0	0	3
30	West Bengal	2	4	8	0	0	1	7	2	8	4	0	11	0	47
Total number of districts likely for risk of disease		**24**	**63**	**63**	**9**	**28**	**54**	**96**	**42**	**62**	**44**	**42**	**70**	**74**	**671**

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 ofNADRES 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 NADEN 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.

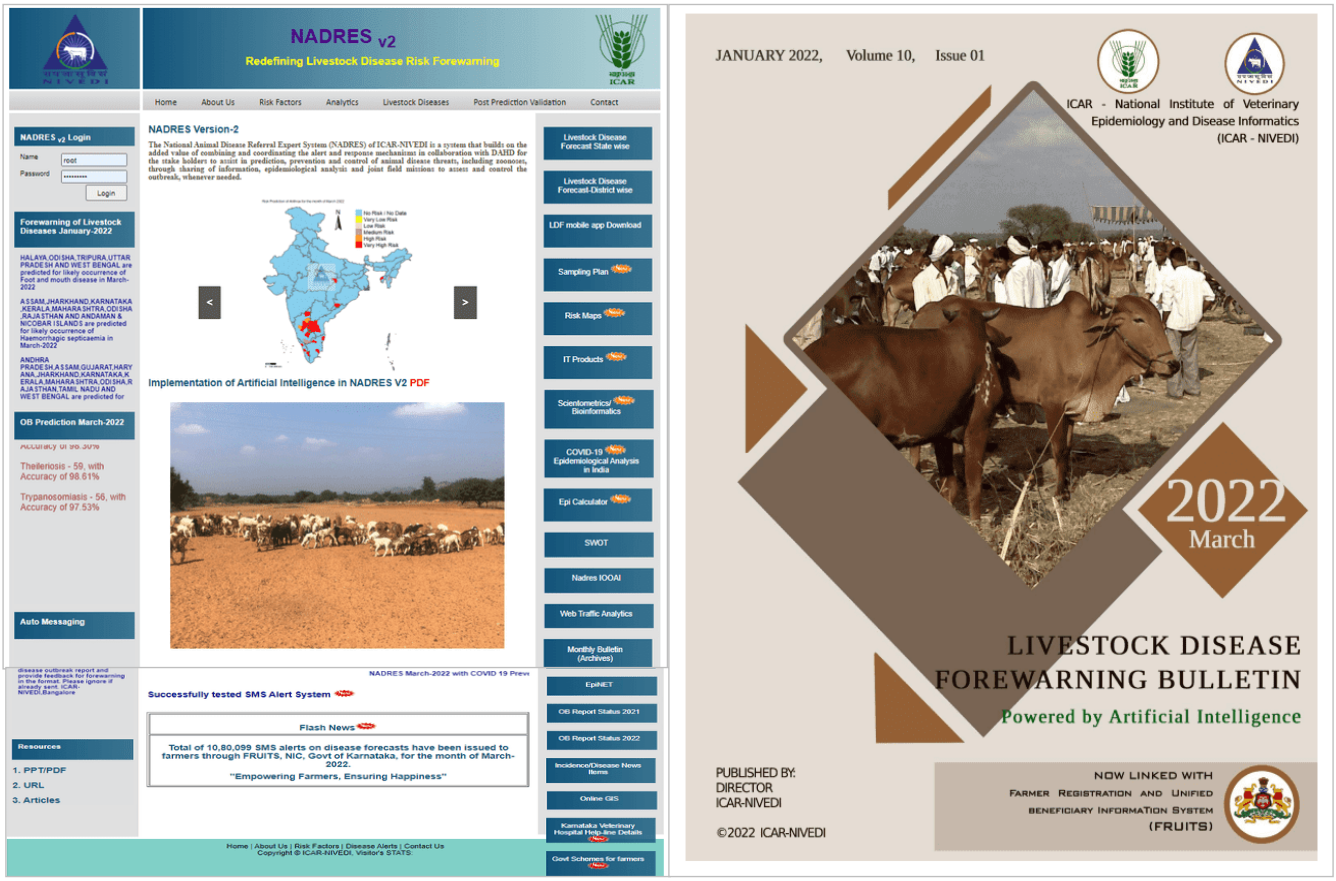


Fig 3.1.NADRES V_2 Home page

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

Preamble

NADRES v2 is an early warning system powered by Artificial Intelligence with set of capacities needed to generate and disseminate timely and meaningful warning information that enables at-risk livestock population, farmers and organizations to prepare and act appropriately and in sufficient time to reduce the livestock disease incidence.

Objectives

- Development of forecasting model for the major livestock diseases and predicting the risk of livestock diseases in advance of two months.
- Development of state of art of communication models to communicate risk of livestock diseasesto the stake holders.

I. Materials and data aquisition

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) from Department 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) 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 DataAssimilation 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:

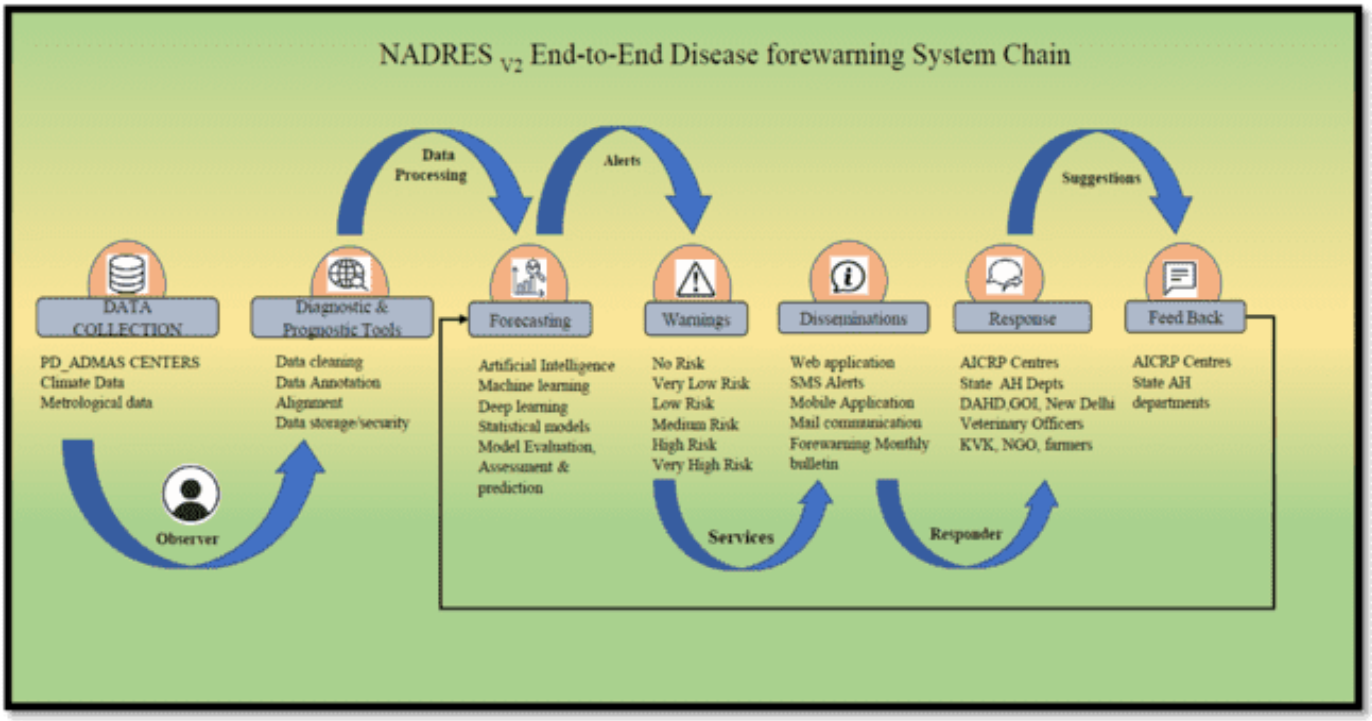


Fig 4.1. NADRES V2 Data Flow Diagram.

B) Artificial Intelligence enabled Data Capturing and Forewarning System:

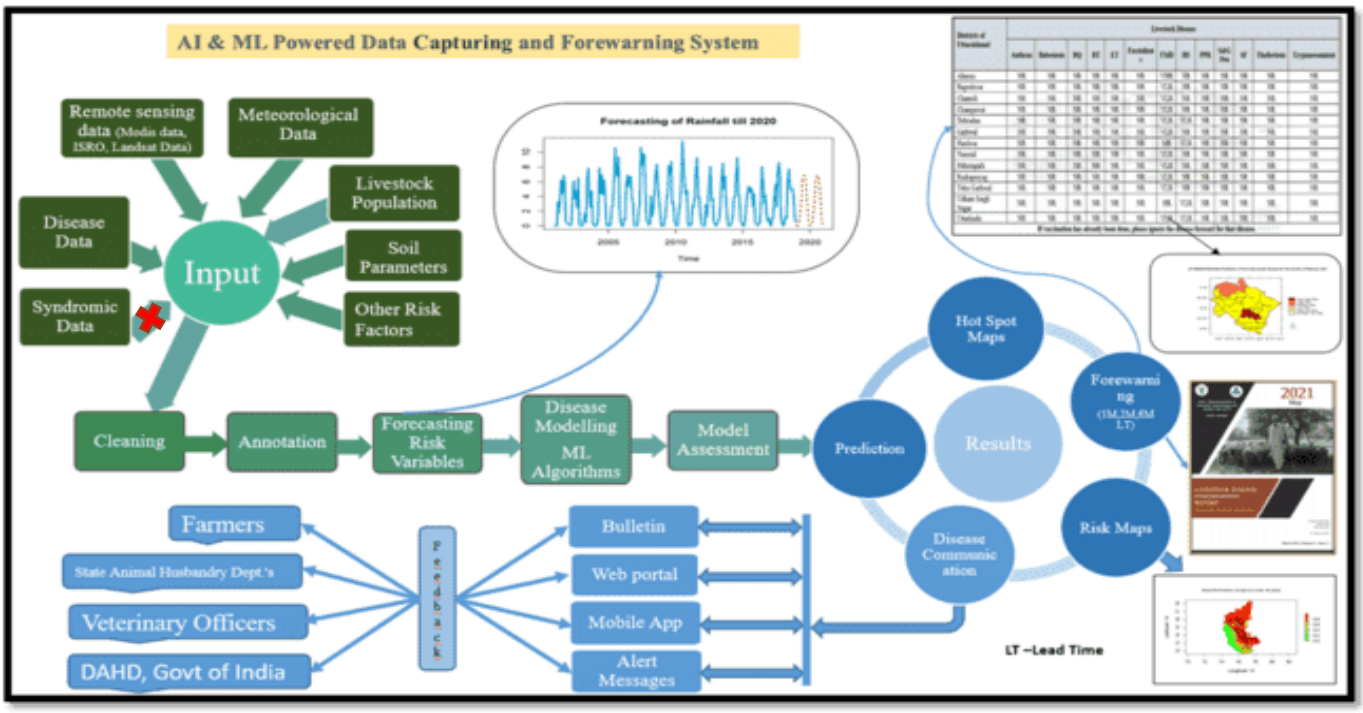


Fig 4.2. Data Capturing and Forewarning system

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.

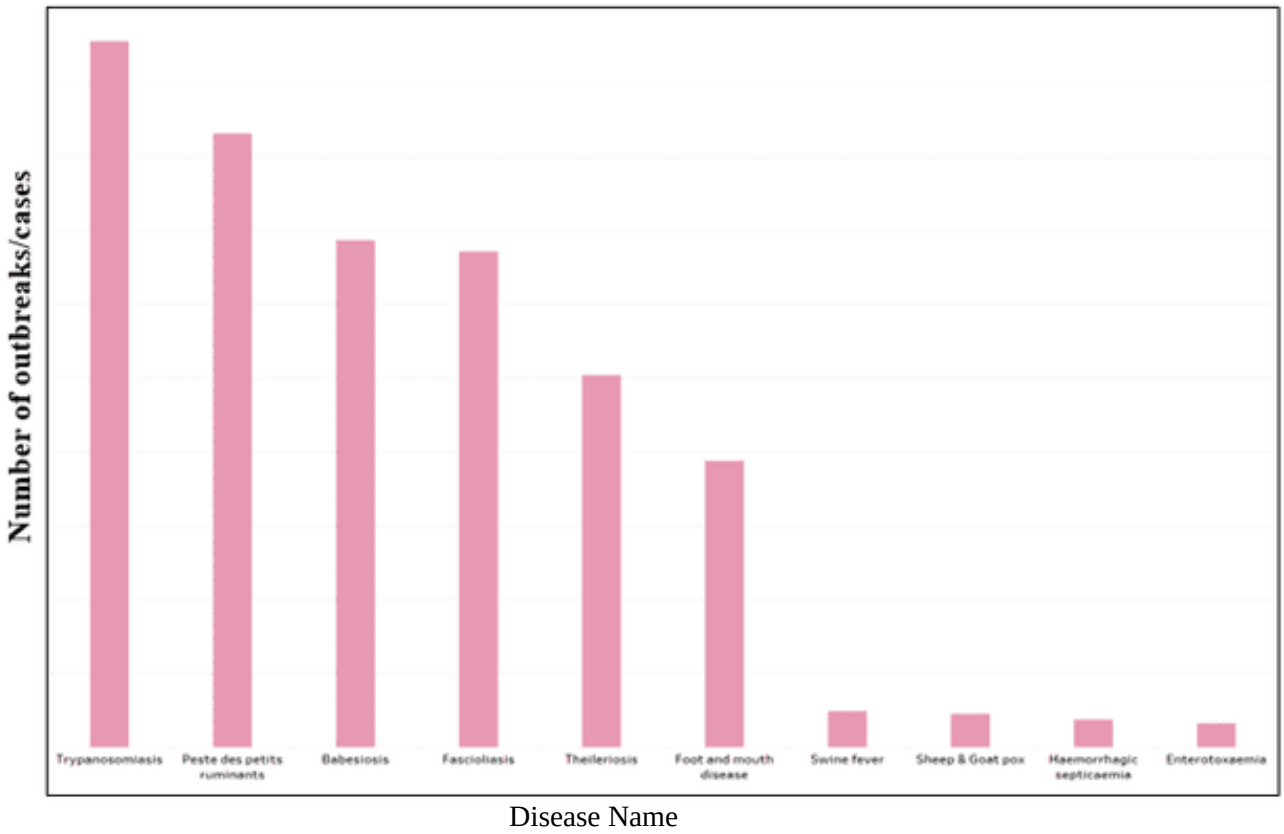


Fig 4.3. Top ten livestock diseases (2021)

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 the 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 situationin 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, ϕ and θ are unknown parameters and ϵ 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) reduce 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**	**99.38**
2.	**Babesiosis**	**97.84**
3.	**Black quarter**	**95.83**
4.	**Bluetongue**	**98.77**
5.	**Enterotoxaemia**	**99.69**
6.	**Fasciolosis**	**97.84**
7.	**Foot and mouth disease**	**94.91**
8.	**Haemorrhagicsepticaemia**	**95.22**
9.	**Peste des petits ruminants**	**96.91**
10.	**Sheep & Goat pox**	**99.07**
11.	**Classical Swine fever**	**99.07**
12.	**Theileriosis**	**98.92**
13.	**Trypanosomosis**	**99.69**

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.

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

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.

8. FOREWARNING OF LIVESTOCK DISEASE FOR THE MONTH OF DECEMBER, 2022

i). District wise Livestock Disease forewarning:

District wise Livestock Disease Risk Forewarning for December, 2022: Andaman and Nicobar

Districts of Andaman and Nicobar	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Nicobars	NR	***VHR***	NR	VLR	NR	***VHR***	NR	NR	VLR	NR	NR	NR	NR
North & Middle Andaman	NR	***VHR***	NR	VLR	NR	***VHR***	VLR	NR	NR	NR	NR	NR	NR
South Andaman	NR	***HR***	NR	VLR	NR	***VHR***	MR	NR	NR	NR	NR	***VHR***	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Andhra Pradesh

Districts of Andhra Pradesh	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Anantapur	NR	NR	NR	***HR***	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Chittoor	NR	NR	NR	VLR	NR	NR	***HR***	VLR	VLR	NR	NR	NR	NR
East Godavari	NR	NR	NR	VLR	NR	NR	VLR	***HR***	NR	NR	NR	NR	NR
Guntur	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Krishna	NR	NR	NR	VLR	NR	NR	VLR	VLR	***VHR***	***VHR***	NR	NR	NR
Kurnool	***VHR***	NR	NR	VLR	NR	NR	VLR	***VHR***	NR	NR	NR	NR	NR
Prakasam	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Sri PottiSriramulu Nellore	***VHR***	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Srikakulam	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Visakhapatnam	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Vizianagaram	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
West Godavari	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Y.S.R.	NR	NR	NR	VLR	NR	NR	VLR	***VHR***	NR	***VHR***	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Arunachal Pradesh

Districts of Arunachal Pradesh	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Anjaw	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Changlang	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	***VHR***	NR	NR
Dibang Valley	NR	NR	NR	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
East Kameng	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
East Siang	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
KurungKumey	NR	NR	NR	NR	NR	***VHR***	NR	VLR	NR	NR	NR	NR	NR
Lohit	NR	NR	NR	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	VLR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Papum Pare	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	NR	NR	NR
Tawang	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Tirap	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Upper Siang	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Upper Subansiri	NR	NR	NR	NR	NR	NR	VLR	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	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease Risk Forewarning forDecember, 2022: Assam

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

Continued

Districts of Assam	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Nagaon	NR	NR	NR	NR	NR	***VHR***	VLR	NR	NR	NR	NR	NR	NR
Nalbari	NR	VLR	NR	VLR	***VHR***	NR	NR	NR	NR	NR	***VHR***	NR	NR
Sivasagar	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	NR	***VHR***	NR	NR
Sonitpur	NR	***VHR***	***VHR***	NR	NR	***VHR***	VLR	***HR***	VLR	NR	***VHR***	NR	NR
Tinsukia	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR
Udalguri	NR	NR	NR	NR	***VHR***	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Bihar

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

Continued

Districts of Bihar	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Nalanda	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Nawada	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
PashchimChamparan	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Patna	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	***VHR***	NR	NR
PurbaChamparan	NR	NR	NR	NR	NR	NR	MR	NR	VLR	NR	NR	NR	NR
Purnia	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Rohtas	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Saharsa	NR	VLR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Samastipur	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	NR	NR	NR
Saran	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Sheikhpura	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Sheohar	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Sitamarhi	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Siwan	NR	NR	NR	NR	NR	NR	VLR	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	***HR***	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Chandigarh

Districts of Chandigarh	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Chandigarh	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Chhattisgarh

Districts of Chhattisgarh	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Bastar	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Bijapur	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Bilaspur	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DakshinBastar Dantewada	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Dhamtari	NR	NR	NR	NR	NR	NR	NR	VLR	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	VLR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR
Kabeerdham	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Korba	NR	NR	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR
Koriya	***VHR***	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR
Mahasamund	NR	VLR	NR	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Narayanpur	NR	NR	NR	NR	NR	NR	VLR	MR	VLR	NR	NR	NR	NR
Raigarhh	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Raipur	NR	NR	NR	NR	NR	NR	NR	MR	VLR	NR	NR	NR	NR
Rajnandgaon	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Surguja	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Uttar BastarKanker	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Dadra and Nagar Haveli

Districts of Dadra and Nagar Haveli	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Dadra and Nagar Haveli	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Daman and Diu

Districts of Daman and Diu	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Daman	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Diu	NR	VLR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Goa

Districts of Goa	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
North Goa	NR	***VHR***	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
South Goa	NR	NR	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Gujarat

Districts of Gujarat	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Ahmadabad	NR	NR	NR	VLR	NR	NR	VLR	MR	***VHR***	NR	NR	NR	NR
Amreli	NR	NR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	***VHR***	NR
Anand	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Banas Kantha	NR	NR	NR	VLR	NR	NR	VLR	***VHR***	NR	NR	NR	NR	NR
Bharuch	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Bhavnagar	NR	NR	NR	NR	NR	NR	VLR	***VHR***	VLR	***VHR***	NR	NR	NR
Dohad	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Gandhinagar	NR	NR	NR	NR	NR	NR	VLR	***HR***	NR	NR	NR	NR	NR
Jamnagar	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Junagadh	NR	NR	NR	NR	NR	NR	***VHR***	VLR	VLR	NR	NR	NR	NR
Kachchh	NR	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Kheda	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Mahesana	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Narmada	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Navsari	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
PanchMahals	NR	NR	NR	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Patan	NR	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	***VHR***
Porbandar	NR	NR	NR	NR	NR	NR	VLR	VLR	***VHR***	NR	NR	NR	NR
Rajkot	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	***VHR***	NR	NR	NR
SabarKantha	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Surat	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Surendranagar	NR	NR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Tapi	NR	NR	NR	VLR	NR	NR	MR	VLR	NR	NR	NR	NR	NR
The Dangs	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Vadodara	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Valsad	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Haryana

Districts of Haryana	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Ambala	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bhiwani	NR	NR	NR	NR	NR	NR	VLR	NR	***VHR***	NR	NR	NR	NR
Faridabad	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	NR	NR	NR
Fatehabad	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Gurgaon	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Hisar	NR	NR	NR	VLR	***VHR***	NR	***VHR***	NR	NR	NR	NR	***VHR***	NR
Jhajjar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Jind	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kaithal	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Karnal	NR	NR	NR	NR	NR	NR	VLR	VLR	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	VLR	NR	NR	NR	NR	NR
Mewat	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Palwal	NR	NR	NR	NR	NR	NR	NR	NR	NR	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	NR	NR	NR	NR	***VHR***	NR	NR
Rewari	NR	NR	NR	NR	NR	NR	NR	NR	NR	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	VLR	NR	VLR	NR	NR	NR	NR
Sonipat	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Yamunanagar	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Himachal Pradesh

Districts of Himachal Pradesh	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
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	NR	NR	***HR***	NR	NR	NR	NR
Kangra	NR	NR	NR	NR	NR	NR	***VHR***	VLR	NR	NR	NR	NR	NR
Kinnaur	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Kullu	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Lahul&Spiti	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Mandi	NR	NR	NR	NR	NR	NR	***VHR***	VLR	NR	***VHR***	NR	NR	NR
Shimla	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sirmaur	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Solan	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR
Una	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Jammu and Kashmir

Districts of Jammu and Kashmir	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Anantnag	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR
Badgam	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR
Bandipore	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR
Baramula	NR	NR	NR	VLR	NR	NR	NR	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	NR	NR	NR	***VHR***	NR	NR	NR
Jammu	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kargil	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kathua	NR	NR	NR	VLR	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	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR
Leh(Ladakh)	NR	VLR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Pulwama	NR	NR	NR	VLR	NR	NR	NR	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	VLR	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	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Shupiyan	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Srinagar	NR	NR	NR	NR	NR	NR	VLR	NR	NR	***VHR***	NR	NR	NR
Udhampur	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Jharkhand

Districts of Jharkhand	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Bokaro	NR	***VHR***	***VHR***	NR	NR	***VHR***	***HR***	NR	***VHR***	NR	***VHR***	***VHR***	***VHR***
Chatra	NR	***VHR***	***VHR***	NR	NR	***HR***	***VHR***	***HR***	***HR***	NR	NR	***VHR***	***VHR***
Deoghar	NR	***VHR***	***VHR***	NR	***VHR***	***VHR***	***VHR***	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***
Dhanbad	NR	***VHR***	***VHR***	NR	***VHR***	***VHR***	***VHR***	***HR***	***VHR***	NR	***HR***	***VHR***	***VHR***
Dumka	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	NR	***VHR***	***VHR***	***VHR***
Garhwa	NR	***VHR***	NR	NR	NR	***VHR***	VLR	VLR	NR	NR	NR	***VHR***	***VHR***
Giridih	NR	***VHR***	***VHR***	NR	***VHR***	***VHR***	***VHR***	***HR***	VLR	NR	NR	***VHR***	***VHR***
Godda	NR	***VHR***	NR	NR	NR	***VHR***	***HR***	MR	MR	NR	NR	***VHR***	***VHR***
Gumla	NR	***VHR***	***VHR***	NR	***VHR***	***VHR***	***HR***	MR	***VHR***	NR	***VHR***	***VHR***	***VHR***
Hazaribagh	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	NR	MR	***VHR***	***VHR***
Jamtara	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***
Khunti	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	***VHR***	***VHR***	NR	***VHR***	***VHR***
Koderma	NR	***HR***	***VHR***	NR	***VHR***	NR	VLR	VLR	MR	NR	NR	***VHR***	***VHR***
Latehar	NR	***VHR***	***VHR***	NR	NR	***VHR***	***HR***	VLR	***HR***	NR	NR	***VHR***	***VHR***
Lohardaga	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	VLR	***VHR***	NR	***VHR***	***VHR***	***VHR***
Pakur	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	NR	***HR***	***VHR***	***VHR***
Palamu	NR	***VHR***	NR	NR	***VHR***	***VHR***	***VHR***	***VHR***	VLR	NR	NR	***VHR***	***VHR***
PashchimiSinghbhum	***VHR***	***VHR***	***VHR***	NR	***VHR***	***VHR***	***VHR***	MR	***VHR***	***HR***	***HR***	***VHR***	***VHR***
PurbiSinghbhum	***VHR***	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	***HR***	***VHR***	NR	NR	***VHR***	***VHR***
Ramgarh	NR	***VHR***	NR	NR	***HR***	***VHR***	***VHR***	VLR	VLR	NR	NR	***VHR***	***VHR***
Ranchi	NR	***VHR***	***VHR***	NR	NR	***VHR***	***VHR***	VLR	***VHR***	***VHR***	***HR***	***VHR***	***VHR***
Sahibganj	NR	***VHR***	***VHR***	VLR	***VHR***	***VHR***	***VHR***	***VHR***	***VHR***	***VHR***	NR	***VHR***	***VHR***
Seraikela - Kharsawan	NR	***VHR***	***VHR***	NR	***VHR***	NR	VLR	VLR	MR	NR	NR	***VHR***	***VHR***
Simdega	NR	***VHR***	NR	NR	NR	***VHR***	***VHR***	VLR	***VHR***	NR	NR	***VHR***	***VHR***

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Karnataka

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

Continued

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

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Kerala

Districts of Kerala	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Alappuzha	NR	NR	NR	NR	NR	NR	***VHR***	NR	***VHR***	NR	NR	NR	***VHR***
Ernakulam	NR	***VHR***	NR	NR	NR	NR	***VHR***	VLR	***VHR***	NR	NR	***VHR***	***VHR***
Idukki	NR	NR	NR	NR	NR	NR	***VHR***	VLR	***VHR***	NR	***VHR***	NR	NR
Kannur	NR	NR	NR	NR	NR	NR	***HR***	VLR	***VHR***	NR	NR	***VHR***	***VHR***
Kasaragod	NR	VLR	NR	NR	NR	NR	MR	NR	NR	NR	NR	***HR***	NR
Kollam	NR	NR	NR	NR	NR	NR	***VHR***	***HR***	VLR	NR	NR	***VHR***	NR
Kottayam	NR	NR	NR	VLR	NR	NR	***VHR***	***HR***	NR	NR	NR	***VHR***	NR
Kozhikode	***VHR***	NR	NR	NR	NR	NR	***VHR***	VLR	NR	NR	NR	***VHR***	***VHR***
Malappuram	NR	***VHR***	NR	NR	NR	NR	***VHR***	VLR	VLR	NR	NR	***VHR***	***VHR***
Palakkad	NR	VLR	NR	NR	NR	NR	***VHR***	VLR	***VHR***	NR	NR	***VHR***	***VHR***
Pathanamthitta	NR	NR	NR	VLR	NR	NR	***VHR***	VLR	VLR	NR	NR	***VHR***	NR
Thiruvananthapuram	NR	***VHR***	NR	VLR	***VHR***	NR	***VHR***	VLR	***VHR***	NR	NR	***VHR***	***VHR***
Thrissur	NR	***VHR***	NR	VLR	NR	NR	***VHR***	MR	MR	NR	NR	***VHR***	***VHR***
Wayanad	NR	NR	NR	NR	NR	NR	***VHR***	***VHR***	NR	NR	NR	***VHR***	***VHR***

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Lakshadweep

Districts of Lakshadweep	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Lakshadweep	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Madhya Pradesh

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

Continued

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

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Maharashtra

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

Continued

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

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Manipur

Districts of Manipur	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Bishnupur	NR	NR	NR	NR	NR	NR	***HR***	NR	NR	NR	NR	NR	NR
Chandel	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Churachandpur	NR	NR	***HR***	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Imphal East	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Imphal West	NR	NR	NR	NR	NR	***VHR***	***HR***	NR	NR	NR	***VHR***	NR	NR
Senapati	NR	NR	NR	NR	NR	NR	***HR***	NR	NR	NR	NR	NR	NR
Tamenglong	NR	NR	***VHR***	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Thoubal	NR	NR	NR	VLR	NR	***VHR***	VLR	NR	NR	NR	NR	NR	NR
Ukhrul	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease Risk Forewarning forDecember, 2022: Meghalaya

Districts of Meghalaya	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
East Garo Hills	NR	VLR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
East Jaintia Hills	NR	VLR	***VHR***	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
East Khasi Hills	NR	VLR	NR	VLR	NR	NR	***VHR***	VLR	NR	NR	NR	NR	NR
Jaintia Hills	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
North Garo Hills	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Ribhoi	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
South Garo Hills	NR	VLR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Southwest Garo Hills	NR	VLR	***VHR***	VLR	NR	NR	VLR	VLR	NR	NR	***VHR***	NR	NR
Southwest Khasi Hills	NR	VLR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
West Garo Hills	NR	VLR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
West Khasi Hills	NR	VLR	***VHR***	NR	NR	NR	***HR***	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Mizoram

Districts of Mizoram	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Aizawl	NR	NR	***VHR***	NR	NR	NR	VLR	NR	NR	NR	***VHR***	NR	NR
Champhai	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kolasib	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Lawngtlai	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Lunglei	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Mamit	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	***VHR***	NR	NR
Saiha	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Serchhip	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Nagaland

Districts of Nagaland	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Dimapur	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Kiphire	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kohima	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Longleng	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Mokokchung	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Mon	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR
Peren	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Phek	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	***VHR***	NR	NR
Tuensang	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Wokha	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Zunheboto	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: NCT of Delhi

Districts of NCT of Delhi	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Central	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
East	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
New Delhi	NR	NR	NR	NR	NR	NR	VLR	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	NR	NR	NR	NR	NR	NR	NR
North West	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
South	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
South West	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
West	NR	NR	NR	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Odisha

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

Continued

Districts of Odisha	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Mayurbhanj	***VHR***	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Nabarangapur	NR	NR	NR	NR	NR	NR	***HR***	VLR	VLR	NR	NR	NR	NR
Nayagarh	NR	VLR	***VHR***	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Nuapada	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Puri	NR	VLR	NR	VLR	NR	NR	NR	***HR***	NR	NR	NR	NR	NR
Rayagada	NR	VLR	***VHR***	VLR	NR	NR	VLR	***VHR***	NR	NR	NR	NR	NR
Sambalpur	NR	VLR	NR	NR	NR	NR	***VHR***	VLR	VLR	NR	NR	NR	NR
Subarnapur	NR	VLR	NR	VLR	NR	NR	VLR	VLR	VLR	***HR***	NR	NR	NR
Sundargarh	NR	VLR	NR	NR	NR	NR	***HR***	VLR	NR	***VHR***	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease Risk Forewarning forDecember, 2022: Puducherry

Districts of Puducherry	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Karaikal	NR	***VHR***	NR	VLR	NR	NR	***HR***	VLR	VLR	NR	NR	NR	NR
Mahe	NR	***HR***	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Puducherry	NR	***VHR***	NR	VLR	NR	***VHR***	NR	NR	NR	***VHR***	NR	NR	NR
Yanam	NR	NR	NR	VLR	NR	***VHR***	VLR	MR	VLR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Punjab

Districts of Punjab	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Amritsar	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Barnala	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Bathinda	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Faridkot	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Fatehgarh Sahib	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Firozpur	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Gurdaspur	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Hoshiarpur	NR	NR	NR	NR	NR	***VHR***	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	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Ludhiana	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Mansa	NR	NR	NR	VLR	NR	NR	NR	VLR	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	VLR	NR	NR	NR	NR	NR	NR
Patiala	NR	NR	NR	NR	NR	NR	VLR	VLR	***VHR***	NR	***VHR***	NR	NR
Rupnagar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
SahibzadaAjit Singh Nagar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sangrur	NR	NR	NR	NR	NR	NR	VLR	***VHR***	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	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Rajasthan

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

Continued

Districts of Rajasthan	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Kota	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Nagaur	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Pali	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Pratapgarh	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Rajsamand	NR	NR	NR	NR	NR	NR	VLR	***HR***	NR	NR	NR	NR	NR
Sawai Madhopur	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Sikar	NR	NR	NR	NR	NR	NR	***HR***	VLR	NR	NR	NR	NR	NR
Sirohi	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Tonk	NR	NR	NR	NR	NR	NR	***HR***	VLR	NR	NR	NR	NR	NR
Udaipur	NR	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Sikkim

Districts of Sikkim	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
East District	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR
North District	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	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 vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Tamil Nadu

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

Continued

Districts of Tamil Nadu	Livestock Disease												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Tiruchirappalli	NR	NR	NR	VLR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Tirunelveli	NR	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Tiruppur	NR	NR	NR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Tiruvannamalai	***VHR***	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Vellore	***VHR***	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Viluppuram	***VHR***	NR	NR	NR	NR	NR	***HR***	VLR	MR	NR	NR	NR	NR
Virudhunagar	NR	NR	NR	VLR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease Risk Forewarning forDecember, 2022: Telangana

Districts of Telangana	Livestock Diseases												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Adilabad	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Hyderabad	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Karimnagar	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Khammam	NR	NR	NR	NR	***VHR***	NR	VLR	VLR	NR	NR	NR	NR	NR
Mahbubnagar	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Medak	NR	NR	NR	VLR	NR	NR	NR	VLR	NR	NR	NR	NR	NR
Nalgonda	NR	NR	NR	VLR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Nizamabad	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Rangareddy	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Warangal	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease forewarning for December, 2022: Tripura

Districts of Tripura	Livestock Disease												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Dhalai	NR	VLR	NR	NR	NR	***VHR***	VLR	VLR	NR	***VHR***	NR	NR	NR
North Tripura	NR	***HR***	***VHR***	NR	NR	NR	VLR	VLR	NR	***VHR***	***VHR***	NR	NR
South Tripura	NR	***VHR***	***VHR***	NR	NR	***HR***	***HR***	***HR***	***VHR***	***VHR***	***VHR***	NR	NR
West Tripura	NR	***VHR***	***VHR***	NR	NR	***VHR***	***HR***	***VHR***	NR	NR	***VHR***	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR),Very high risk (VHR)

District wise Livestock Disease forewarning for December, 2022: Uttar Pradesh

Districts of Tripura	Livestock Disease												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Agra	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Aligarh	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	***VHR***
Allahabad	NR	***VHR***	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	***VHR***	***VHR***
Ambedkar Nagar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***
Amethi	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Auraiya	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Azamgarh	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Baghpat	NR	MR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	MR
Bahraich	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	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	VLR	NR	NR	NR	NR
Banda	NR	***VHR***	NR	NR	***HR***	NR	VLR	VLR	NR	NR	NR	***VHR***	***VHR***
Bara Banki	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***
Bareilly	NR	NR	NR	NR	NR	NR	VLR	NR	***HR***	NR	NR	NR	***VHR***
Basti	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	NR
Bijnor	NR	MR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	***VHR***
Budaun	NR	***HR***	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***
Bulandshahr	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Chandauli	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chitrakoot	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Deoria	NR	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	NR	NR
Etah	NR	***VHR***	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	***VHR***
Etawah	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Faizabad	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	MR

Continued

Districts of Uttar Pradesh	Livestock Disease												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Farrukhabad	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	***VHR***
Fatehpur	NR	***VHR***	NR	NR	NR	NR	VLR	VLR	***VHR***	NR	NR	***VHR***	***VHR***
Firozabad	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Gautam Buddha Nagar	NR	NR	NR	NR	NR	NR	VLR	NR	NR	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	VLR	NR	NR	NR	NR	NR	NR
Gonda	NR	***VHR***	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	***HR***	***VHR***
Gorakhpur	NR	***VHR***	NR	NR	NR	NR	NR	NR	***VHR***	NR	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	NR	NR	NR	NR	NR
Hardoi	NR	MR	NR	NR	NR	NR	VLR	MR	***VHR***	NR	NR	NR	***VHR***
Jalaun	NR	***VHR***	NR	NR	NR	NR	VLR	NR	NR	NR	NR	MR	***VHR***
Jaunpur	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	NR	NR	NR	***VHR***
Jhansi	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
JyotibaPhule Nagar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kannauj	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kanpur Dehat	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kanpur Nagar	NR	***HR***	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	***VHR***
Kanshiram Nagar	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kaushambi	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kheri	NR	***VHR***	NR	NR	NR	***VHR***	VLR	NR	VLR	NR	NR	NR	***VHR***
Kushinagar	NR	***HR***	NR	NR	NR	NR	VLR	NR	NR	NR	NR	***VHR***	***VHR***
Lalitpur	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	***VHR***	***VHR***
Lucknow	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR
Mahamaya Nagar	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Mahoba	NR	VLR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR

Continued

Districts of Uttar Pradesh	Livestock Disease												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Mahrajganj	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	***VHR***
Mainpuri	NR	MR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	***VHR***
Mathura	NR	MR	NR	NR	NR	NR	NR	NR	NR	NR	NR	***VHR***	***VHR***
Mau	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Meerut	NR	MR	NR	NR	NR	***HR***	VLR	NR	NR	NR	NR	***VHR***	***VHR***
Mirzapur	NR	***HR***	NR	NR	NR	NR	NR	NR	NR	NR	NR	***HR***	***VHR***
Moradabad	NR	MR	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	***HR***	***VHR***
Muzaffarnagar	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	NR	NR	NR	NR
Pilibhit	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Pratapgarh	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	***VHR***
Rae Bareli	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	***HR***	***VHR***
Rampur	NR	VLR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Saharanpur	NR	MR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	***HR***	MR
Sambhal	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Sant Kabir Nagar	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
SantRavidas Nagar (Bhadohi)	NR	NR	NR	NR	NR	***VHR***	NR	NR	VLR	NR	NR	NR	***VHR***
Shahjahanpur	NR	NR	NR	NR	NR	NR	NR	NR	VLR	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	NR	NR	VLR	NR	NR	NR	NR
Siddharthnagar	NR	VLR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Sitapur	NR	VLR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	***VHR***	***VHR***
Sonbhadra	NR	***HR***	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	***VHR***
Sultanpur	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	***VHR***
Unnao	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	***HR***
Varanasi	NR	MR	NR	NR	NR	***VHR***	NR	NR	NR	NR	NR	NR	***VHR***

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: Uttarakhand

Districts of Uttarakhand	Livestock Disease												
	Anthrax	**Babesiosis**	**BQ**	**BT**	**ET**	**Fasciolosis**	**FMD**	**HS**	**PPR**	**S&G Pox**	**CSF**	**Theileriosis**	**Trypanosomosis**
Almora	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	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	VLR	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	NR	NR	NR	NR	NR
Garhwal	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Hardwar	NR	NR	NR	NR	NR	NR	***VHR***	VLR	NR	NR	NR	NR	NR
Nainital	NR	NR	NR	NR	NR	NR	***VHR***	NR	NR	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	VLR	NR	NR	NR	NR	NR
Tehri Garhwal	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Udham Singh Nagar	NR	NR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Uttarkashi	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 December, 2022: West Bengal

Districts of West Bengal	Livestock Disease												
	Anthrax	Babesiosis	BQ	BT	ET	Fasciolosis	FMD	HS	PPR	S&G Pox	CSF	Theileriosis	Trypanosomosis
Bankura	***VHR***	***VHR***	***VHR***	VLR	NR	NR	***VHR***	LR	***VHR***	NR	NR	***VHR***	NR
Barddhaman	NR	VLR	***VHR***	NR	NR	NR	VLR	VLR	***VHR***	***VHR***	NR	***VHR***	NR
Birbhum	NR	***HR***	NR	NR	NR	NR	***VHR***	VLR	***HR***	NR	NR	***VHR***	NR
Dakshin Dinajpur	NR	NR	***VHR***	NR	NR	NR	VLR	VLR	***VHR***	NR	NR	NR	NR
Darjiling	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Haora	NR	***VHR***	***VHR***	NR	NR	NR	VLR	VLR	VLR	NR	NR	***VHR***	NR
Hugli	NR	***VHR***	NR	NR	NR	NR	VLR	***VHR***	***VHR***	NR	NR	***VHR***	NR
Jalpaiguri	NR	NR	***VHR***	VLR	NR	NR	***VHR***	VLR	VLR	NR	NR	NR	NR
Koch Bihar	NR	NR	***VHR***	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Kolkata	NR	VLR	NR	NR	NR	NR	VLR	VLR	NR	NR	NR	NR	NR
Maldah	NR	NR	NR	NR	NR	NR	VLR	VLR	***VHR***	NR	NR	***VHR***	NR
Murshidabad	***VHR***	VLR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Nadia	NR	VLR	NR	NR	NR	NR	***VHR***	VLR	NR	***VHR***	NR	***VHR***	NR
North Twenty Four Parganas	NR	VLR	NR	NR	NR	NR	VLR	NR	VLR	***VHR***	NR	***VHR***	NR
Paschim Medinipur	NR	NR	NR	NR	NR	NR	***VHR***	VLR	***HR***	NR	NR	***HR***	NR
PurbaMedinipur	NR	NR	***VHR***	NR	NR	***VHR***	***VHR***	VLR	NR	***VHR***	NR	***VHR***	NR
Puruliya	NR	NR	NR	VLR	NR	NR	VLR	***HR***	***HR***	NR	NR	NR	NR
South Twenty Four Parganas	NR	VLR	***VHR***	NR	NR	NR	VLR	VLR	VLR	NR	NR	***VHR***	NR
Uttar Dinajpur	NR	NR	NR	NR	NR	NR	***VHR***	VLR	NR	NR	NR	NR	NR

If vaccinated, please ignore the disease forecast.

*Negligible risk (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 furthercategorized 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.	Nicobars, North & Middle Andaman and South Andaman	Three	Babesiosis
2.	Nicobarsand South Andaman	Two	Fasciolosis

2. Andhra Pradesh

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Kurnool and Sri Potti Sriramulu Nellore	Two	Antrax
2.	Anantapur	One	Blue Tongue
3.	Chittoor	One	Foot and Mouth Disease
4.	East Godavari, Kurnool and Y.S.R.	Three	Haemorrhagic Septicaemia
5.	Krishna	One	Peste des Petits Ruminants
6.	Krishn and aY.S.R.	Two	Sheep & Goat pox

3. Arunachal Pradesh

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	KurungKumey	One	Fasciolosis
2.	Changlang	One	Classical Swine fever

4. Assam

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Cachar, Dhemaji, Dhubri, Kamrup Metropolitan and Sonitpur	Five	Babesiosis
2.	Dhemaji, Dhubri, Dibrugarh, Golaghat, Karbi Anglong and Sonitpur	Six	Black Quarter
3.	Darrang, Nalbari and Udalguri	Three	Enterotoxaemia

4.	Chirang, Dhemaji, Dhubri, Dibrugarh, Golaghat, Jorhat, Kamrup, Lakhimpur, Nagaon, Sivasagar and Sonitpur	Eleven	Fasciolosis
5.	Sonitpur	One	Haemorrhagic Septicaemia
6.	Baksa and Kamrup	Two	Peste des Petits Ruminants
7.	Darrang	One	Sheep & Goat pox
8.	Baksa, Cachar, Darrang, Dhemaji, Dibrugarh, Dima Hasao, Goalpara, Golaghat, Hailakandi, Jorhat, Kamrup, Kamrup Metropolitan, Karbi Anglong, Lakhimpur, Nalbari, Sivasagar and Sonitpur	Seventeen	Classical Swine fever
9.	Tinsukia	One	Theileriosis

5. Bihar

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Bhojpur and Khagaria	Two	Babesiosis
2.	Bhojpur	One	FasciolosisFasciolosis
3.	Gaya, Muzaffarpur, Samastipur and Vaishali	Four	Foot and Mouth Disease
4.	Gaya	One	Peste des Petits Ruminants
5.	Patna	One	Classical Swine fever
6.	Bhojpur, Buxar and Khagaria	Three	Trypanosomiasis

6.Chattisgarh

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Koriya	One	Anthrax

7. Goa

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	North Goa	One	Babesiosis

8. Gujarat

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Junagadh	One	Foot and Mouth Disease
2.	Banas Kantha, Bhavnagar and Gandhinagar	Three	Haemorrhagic Septicaemia
3.	Ahmadabad and Porbandar	Two	Peste des Petits Ruminants
4.	Bhavnagar and Rajkot	Two	Sheep and goat pox
5.	Amreli	One	Theileriosis
6.	Patan	One	Trypanosomiasis

9. Haryana

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Hisar	One	Enterotoxaemia
2.	Hisar	One	Foot and Mouth Disease
3.	Bhiwani	One	Peste des Petits Ruminants
4.	Panipat	One	Classical Swine fever
5.	Hisar	One	Theileriosis

10.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.	Hamirpur	One	Peste des Petits Ruminants
3.	Mandi	One	Sheep & Goat pox

11.Jammu & Kashmir

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Anantnag, Badgam, Bandipore, Ganderbal, Kulgam, Kupwara, Pulwama and Srinagar	Eight	Sheep & Goat pox

12.Jharkhand

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Khunti, PashchimiSinghbhum and PurbiSinghbhum	Three	Anthrax
2.	All districts	Twenty-four	Babesiosis
3.	Bokaro, Chatra, Deoghar, Dhanbad, Dumka, Giridih, Gumla, Hazaribagh, Jamtara, Koderma, Latehar, Lohardaga, Pakur, PashchimiSinghbhum, PurbiSinghbhum, Ranchi, Sahibganj, Seraikela - Kharsawan	Eighteen	Black Quarter
4.	Deoghar, Dhanbad, Giridih, Gumla, Khunti, Koderma, Palamu, PashchimiSinghbhum, Ramgarh, Sahibganj and Seraikela - Kharsawan	Eleven	Enterotoxaemia
5.	All districts except Koderma and Seraikela - Kharsawan	Twenty-two	Fasciolosis
6.	All the districts except Garhwa, Koderma and Seraikela - Kharsawan	Nineteen	Foot and Mouth Disease
7.	Chatra, Deoghar, Dhanbad, Dumka, Giridih, Hazaribagh, Jamtara, Khunti, Pakur, Palamu, PurbiSinghbhum and Sahibganj	Twelve	Haemorrhagic Septicaemia
8.	Bokaro, Chatra, Deoghar, Dhanbad, Dumka, Gumla, Hazaribagh, Jamtara, Khunti, Latehar, Lohardaga, Pakur, PashchimiSinghbhum, PurbiSinghbhum, Ranchi, Sahibganj and Simdega	Seventeen	Peste des Petits Ruminants
9.	Khunti, PashchimiSinghbhum, Ranchi and Sahibganj	Four	Sheep & Goat pox
10.	Bokaro, Dhanbad, Dumka, Gumla, Lohardaga, Pakur, PashchimiSinghbhum and Ranchi	Eight	Classical Swine fever
11.	All the districts	Twenty-four	Theileriosis
12.	All the districts	Twenty-four	Trypanosomosis

13. Karnataka

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Bangalore Rural, Bellary, Chamarajanagar, Chikkaballapura, Davanagere, Koppal, Mandya, Ramanagara and Tumkur	Nine	Anthrax
2.	Bangalore, Bangalore Rural, Bellary, Bidar, Chamarajanagar, Chikmagalur, Chitradurga, Gulbarga, Hassan, Mandya, Mysore, Shimoga, Tumkur and Yadgir	Forteen	Black Quarter
3.	Bellary, Chitradurga, Davanagere, Kolar, Koppal, Mysore, Ramanagara and Tumkur	Eight	Blue Tongue
4.	Bidar, Chikkaballapura, Gadag, Haveri, Kolar, Koppal, Shimoga and Tumkur	Eight	Enterotoxaemia
5.	Bangalore, Bangalore Rural, Chamarajanagar, Chikkaballapura, Chikmagalur, Dakshina Kannada, Hassan, Kodagu, Mandya, Ramanagara and Tumkur	Eleven	Foot and Mouth Disease
6.	Chamarajanagar, Chikmagalur, Hassan, Mandya and Yadgir	Five	Haemorrhagic Septicaemia
7.	Kolar and Tumkur	Two	PestedesPetits Ruminants
8.	Bangalore, Chikmagalur, Chitradurga, Davanagere, Gadag, Haveri, Koppal, Shimoga and Tumkur	Nine	Sheep & Goat pox
9.	Bangalore, Bangalore Rural and Bidar	One	Classical Swine fever

14. Kerala

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Kozhikode	Two	Anthrax
2.	Ernakulam, Malappuram, Thiruvananthapuram and Thrissur	Four	Babesiosis
3.	Thiruvananthapuram	One	Enterotoxaemia
4.	All the districts except Kasaragod	Thirteen	Foot and Mouth Disease
5.	Kollam, Kottayam and Wayanad	Three	Haemorrhagic Septicaemia
6.	Alappuzha,Ernakulam, Idukki, Kannur, Palakkad and Thiruvananthapuram	Six	PestedesPetits Ruminants
7.	Idukki	One	Classical Swine fever
8.	All the districts except Alappuzha and Idukki	Twelve	Theileriosis
9.	Alappuzha, Ernakulam, Kannur, Kozhikode, Malappuram, Palakkad, Thiruvananthapuram, Thrissur and Wayanad	Nine	Trypanosomiasis

15. Madhya Pradesh

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Barwani, Bhopal, Raisen and Shivpuri	Four	Foot and Mouth Disease
2.	Bhopal and Sagar	Two	Haemorrhagic Septicaemia
3.	Narsimhapur	One	Trypanosomiasis

16. Maharashtra

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Ahmadnagar	One	Black Quarter
2.	Dhule	One	HaemorrhagicSepticaemia
3.	Ahmadnagar, Aurangabad, Jalgaon, Nashik and Pune	Five	Peste des Petits Ruminants
4.	Ahmadnagar	One	Sheep & goat pox
5.	Akola	One	Theileriosis

17. Manipur

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Churachandpur and Tamenglong	Two	Black Quarter
2.	Imphal West and Thoubal	Two	Fasciolosis
3.	Bishnupur, Imphal West and Senapati	Three	Foot and Mouth Disease
4.	Imphal West	One	Classical Swine fever

18. Meghalaya

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	East Jaintia Hills, Southwest Garo Hills and West Khasi Hills	Three	Black Quarter
2.	East Khasi Hills and West Khasi Hills	Two	Foot and Mouth Disease
3.	Southwest Garo Hills	One	Classical Swine fever

19. Mizoram

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Aizawl	One	Black Quarter
2.	Aizawl and Mamit	Two	Classical Swine fever

20.Nagaland

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Mon and Phek	Two	Classical Swine fever

21.Odisha

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Mayurbhanj	One	Anthrax
2.	Ganjam, Khordha, Malkangiri, Nayagarh and Rayagada	Five	Black Quarter
3.	Jagatsinghapur and Khordha	Two	Enterotoxaemia
4.	Cuttack, Dhenkanal, Ganjam, Jagatsinghapur, Jajapur, Nabarangapur, Sambalpur and Sundargarh	Eight	Foot and Mouth Disease
5.	Jajapur, Khordha, Puri and Rayagada	Four	Haemorrhagic Septicaemia
6.	Baudh and Khordha	Two	Peste des Petits Ruminants
7.	Ganjam, Kendujhar, Khordha, Subarnapur and Sundargarh	Five	Sheep & Goat pox

22. Puducherry

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Karaikal, Mahe and Puducherry	Three	Babesiosis
2.	Puducherry and Yanam	Two	Fasciolosis
3.	Karaikal	One	Foot and Mouth Disease
4.	Puducherry	One	Sheep & Goat pox

23. Punjab

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Hoshiarpur	One	Fasciolosis
2.	Sangrur	One	HaemorrhagicSepticaemia
3.	Patiala	One	Peste des Petits Ruminants
4.	Patiala	One	Classical Swine fever

24. Rajasthan

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Ganganagar and Jodhpur	Two	Black Quarter
2.	Banswara	One	Fasciolosis
3.	Alwar, Ganganagar, Jaipur, Jhunjhunun, Sikar and Tonk	Six	Foot and Mouth Disease
4.	Jaipur and Rajsamand	Two	Haemorrhagic Septicaemia
5.	Jaisalmer and Jhalawar	Two	Peste des Petits Ruminants

25. Sikkim

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	East District	One	Theileriosis

26. Tamil Nadu

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Coimbatore, Ramanathapuram, Tiruvannamalai, Vellore and Viluppuram	Five	Anthrax
2.	Dindigul, Kancheepuram, Ramanathapuram and Viluppuram	Four	Foot and Mouth Disease
3.	Thiruvallur	One	Haemorrhagic Septicaemia
4.	Thiruvallur and Thoothukkudi	Two	Peste des Petits Ruminants
5.	Ramanathapuram, Salem and Sivaganga	Three	Sheep & Goat pox

27. Tripura

Sl. No	Disease prone districts	Number of disease prone for districts	Disease Name
1.	North Tripura, South Tripura and West Tripura	Three	Babesiosis
2.	North Tripura, South Tripura and West Tripura	One	Blue Quarter
3.	Dhalai, South Tripura and West Tripura	Three	Fasciolosis

4.	South Tripura and West Tripura	Two	Foot and Mouth Disease
5.	South Tripura and West Tripura	Two	Haemorrhagic Septicaemia
6.	South Tripura	One	Peste des Petits Ruminants
7.	Dhalai, North Tripura and South Tripura	Three	Sheep & Goat pox
8.	North Tripura, South Tripura and West Tripura	Two	Classical Swine fever

28. Uttar Pradesh

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Allahabad, Ballia, Banda, Budaun, Etah, Fatehpur, Gonda, Gorakhpur, Jalaun, Kanpur Nagar, Kheri, Kushinagar, Mirzapur and onbhadra	Forteen	Babesiosis
2.	Banda	One	Enterotoxaemia
3.	Ballia, Jaunpur, Kheri, Meerut, Sant Ravidas Nagar (Bhadohi) and Varanasi	Six	Fasciolosis
4.	Muzaffarnagar	One	Foot and mouth disease
5.	Bareilly, Basti, Fatehpur, Gonda, Gorakhpur, Hardoi, Kanpur Nagar and Moradabad	Eight	Peste des Petits Ruminants
6.	Allahabad, Ballia, Banda, Etah, Fatehpur, Gonda, Gorakhpur, Kushinagar, Lalitpur, Mahrajganj, Mathura, Meerut, Mirzapur, Moradabad, Rae Bareli, Saharanpur and Sitapur	Seventeen	Theileriosis
7.	Aligarh, Allahabad, Ambedkar Nagar, Bahraich, Ballia, Banda, Bara Banki, Bareilly, Bijnor, Budaun, Etah, Farrukhabad, Fatehpur, Gonda, Gorakhpur, Hardoi, Jalaun, Jaunpur, Kanpur Nagar, Kheri, Kushinagar, Lalitpur, Mahrajganj, Mainpuri, Mathura, Meerut, Mirzapur, Moradabad, Pratapgarh, Rae Bareli, Sant Ravidas Nagar (Bhadohi), Sitapur, Sonbhadra, Sultanpur, Unnao and Varanasi	Thirt-six	Trypanosomosis

29. Uttarakhand

Sl. No	Disease prone districts	Number of disease prone for districts	Disease Name
1.	Almora, Hardwar and Nainital	Three	Foot and Mouth disease

30.West Bengal

Sl. No	Disease prone districts	Number of districts prone for disease	Disease Name
1.	Bankura and Murshidabad	Two	Anthrax
2.	Bankura, Barddhaman, Dakshin Dinajpur, Haora, Jalpaiguri, Koch Bihar, Purba Medinipur and South Twenty Four Parganas	Eight	Black quarter
3.	Purba Medinipur	One	Fasciolosis
4.	Bankura, Birbhum, Jalpaiguri, Nadia, Paschim Medinipur, Purba Medinipur andUttar Dinajpur	Seven	Foot and Mouth Disease
5.	Bankura, Barddhaman, Birbhum, Dakshin Dinajpur, Hugli, Maldah, Paschim Medinipur and Puruliya	Eight	Peste des Petits Ruminants
6.	Hugli and Puruliya	Two	Haemorrhagic Septicaemia
7.	Barddhaman, Nadia, North Twenty Four Parganas and Purba Medinipur	Four	Sheep & Goat pox
8.	Bankura, Barddhaman, Birbhum, Haora, Hugli, Maldah, Nadia, North Twenty Four Parganas, Paschim Medinipur, Purba Medinipur and South Twenty Four Parganas	Eleven	Theileriosis

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 preparation in order to destroy the metacercariae. The affected animals can be treatedwith Carbon tetrachloride/ Rafoxanide/Nitroxynil/ Niclofolan/Closantel/Oxyclozanide, under the strict supervision of veterinarian.

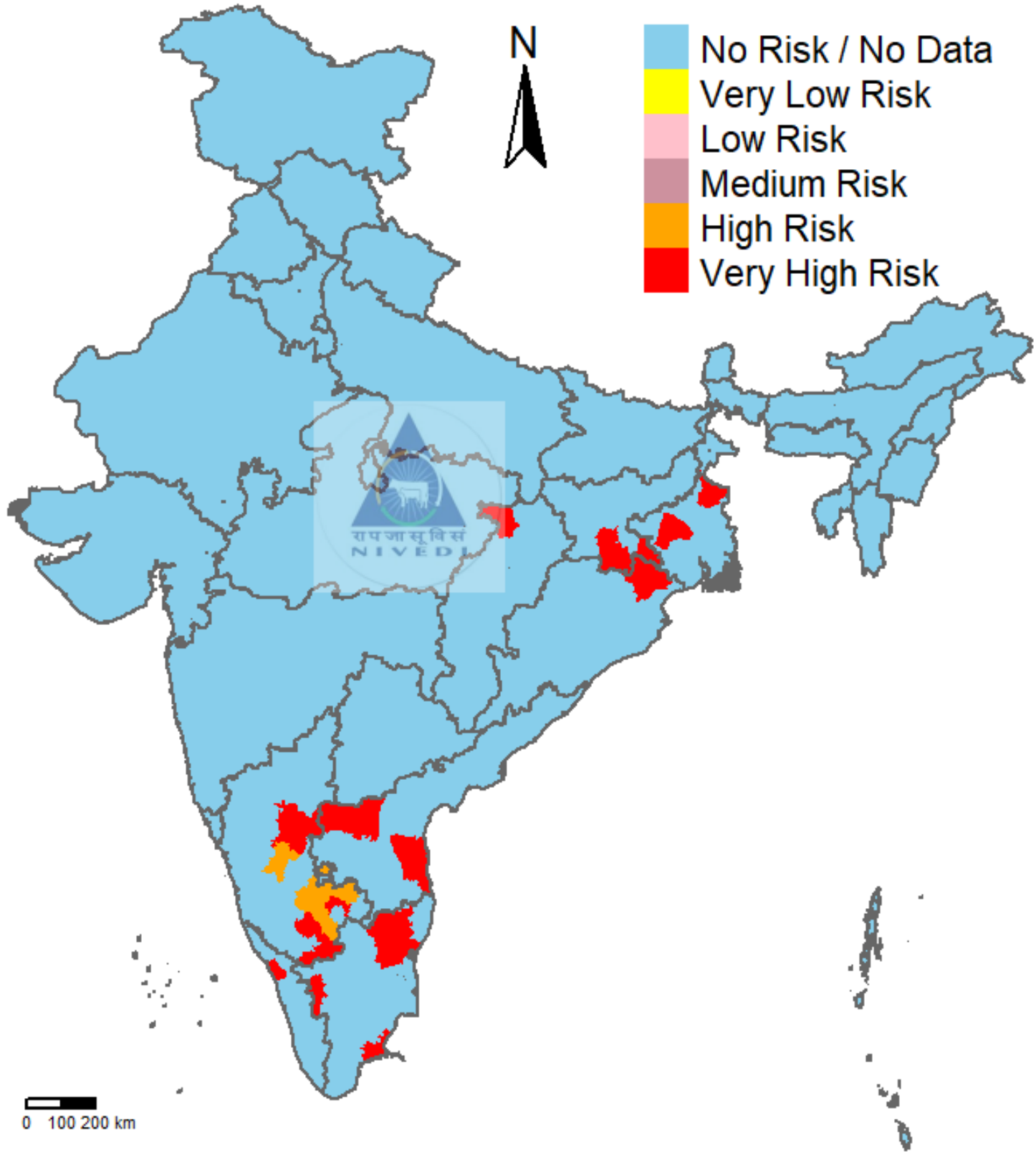
7.	Foot and Mouth Disease (FMD)	Cattle, buffalo, sheep, goats and pigs are often affected domesticated species, but the disease is more severe in cattle and pigs.	Fever, loss of feed intake, drop in milk production, drooling of saliva like ropey string, vesicles develop on the tongue, lips, gums, and 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	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 husbandry practices.

			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.	
9.	PestedesPetitsRuminants (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.

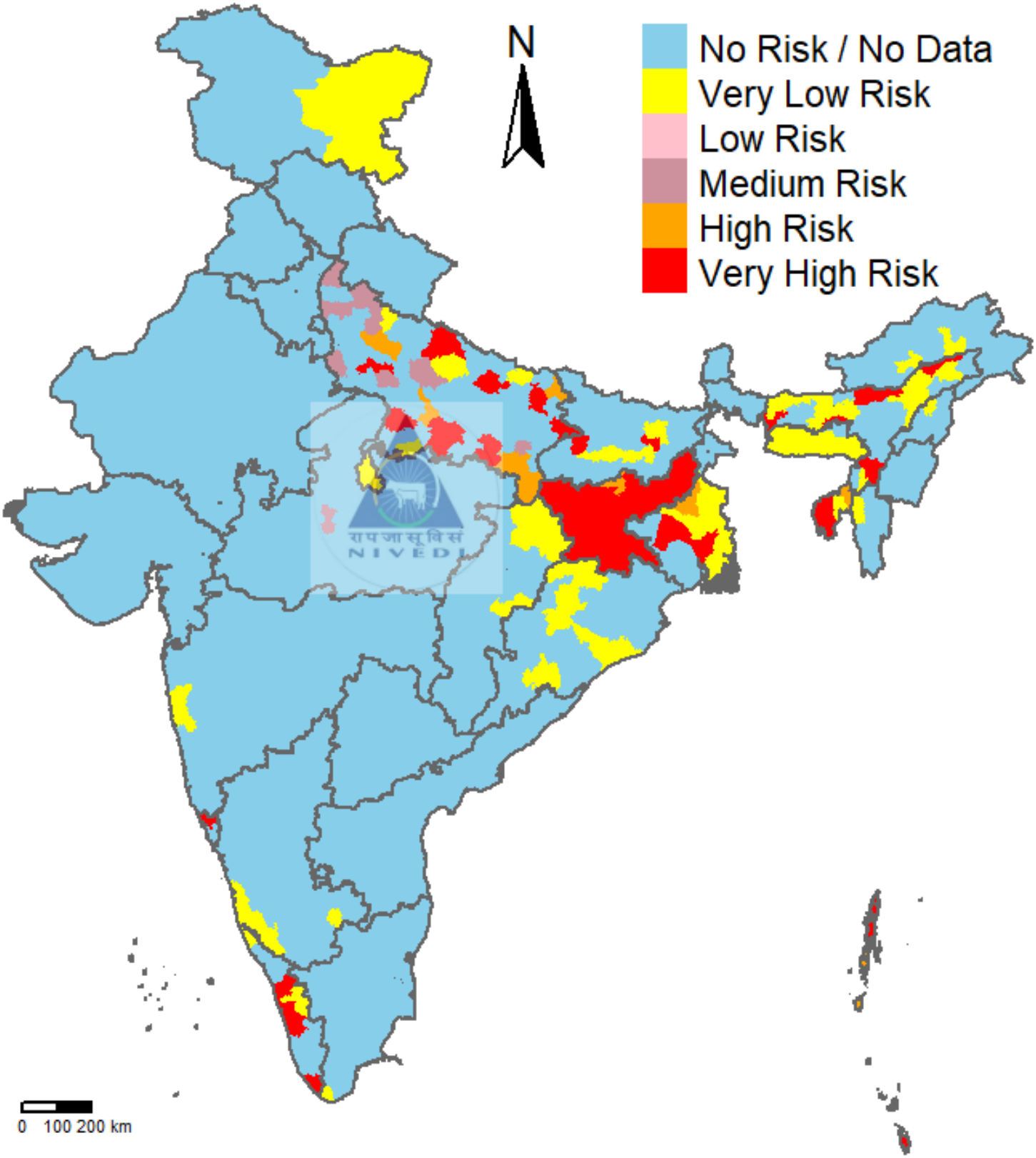
11.	Classical Swine Fever (CSF)	Pigs	Fever, Conjunctivitis, purplish discolouration of snout, ears, abdomen, inner side of the legs and staggering gait.	Vaccination of susceptible animals. Restriction on animal movement, strict biosecurity measures and proper disposal of carcass.
12.	Theileriosis (TE)	Large Ruminants. Cross bred cattle are more vulnerable.	High temperature, yellowish eye, sometime eyesmaybe 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.	Trypanosomosis (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

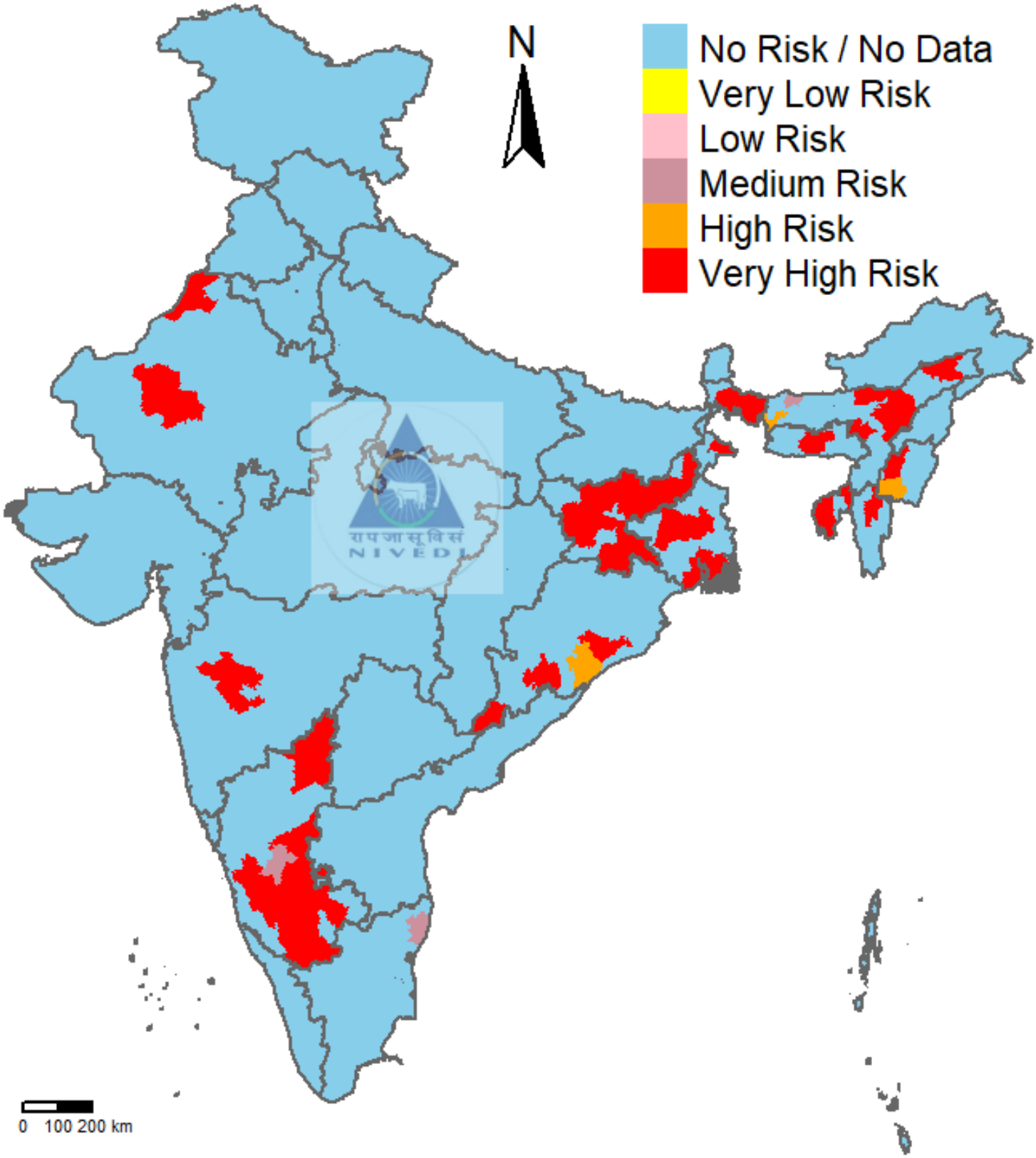
Risk Prediction of Anthrax for the month of December 2022



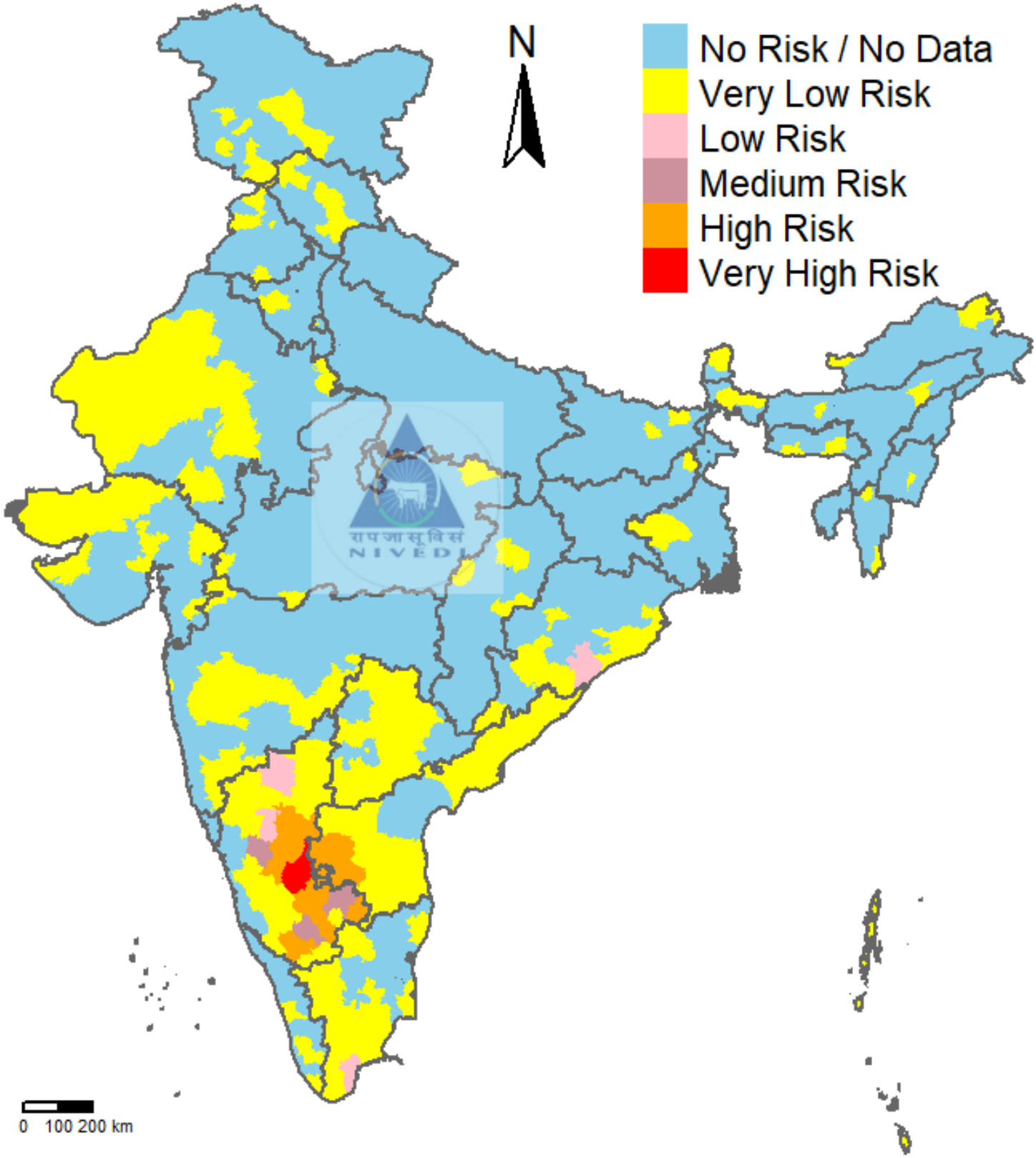
Risk Prediction of Babesiosis for the month of December 2022



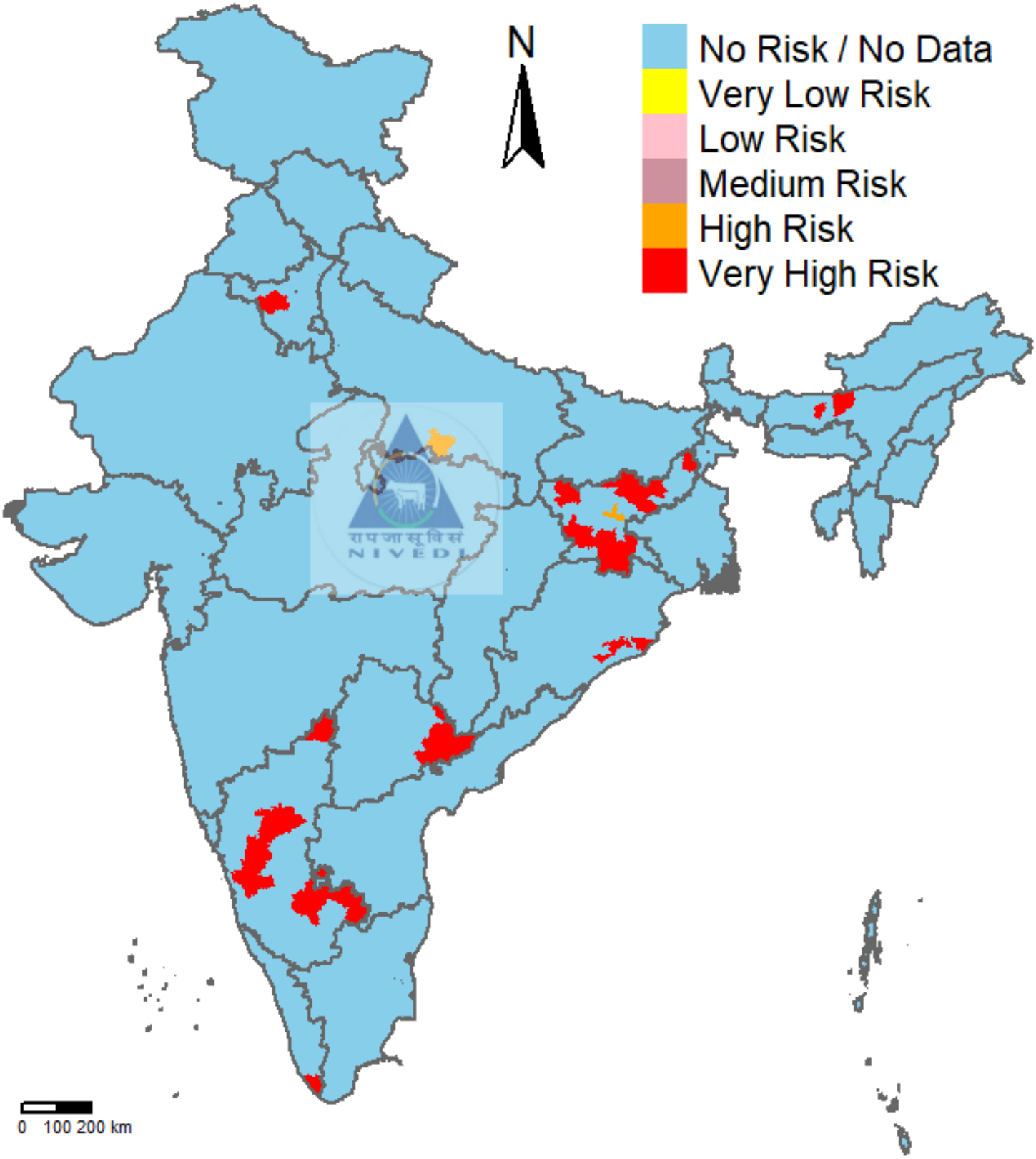
Risk Prediction of Black quarter for the month of December 2022



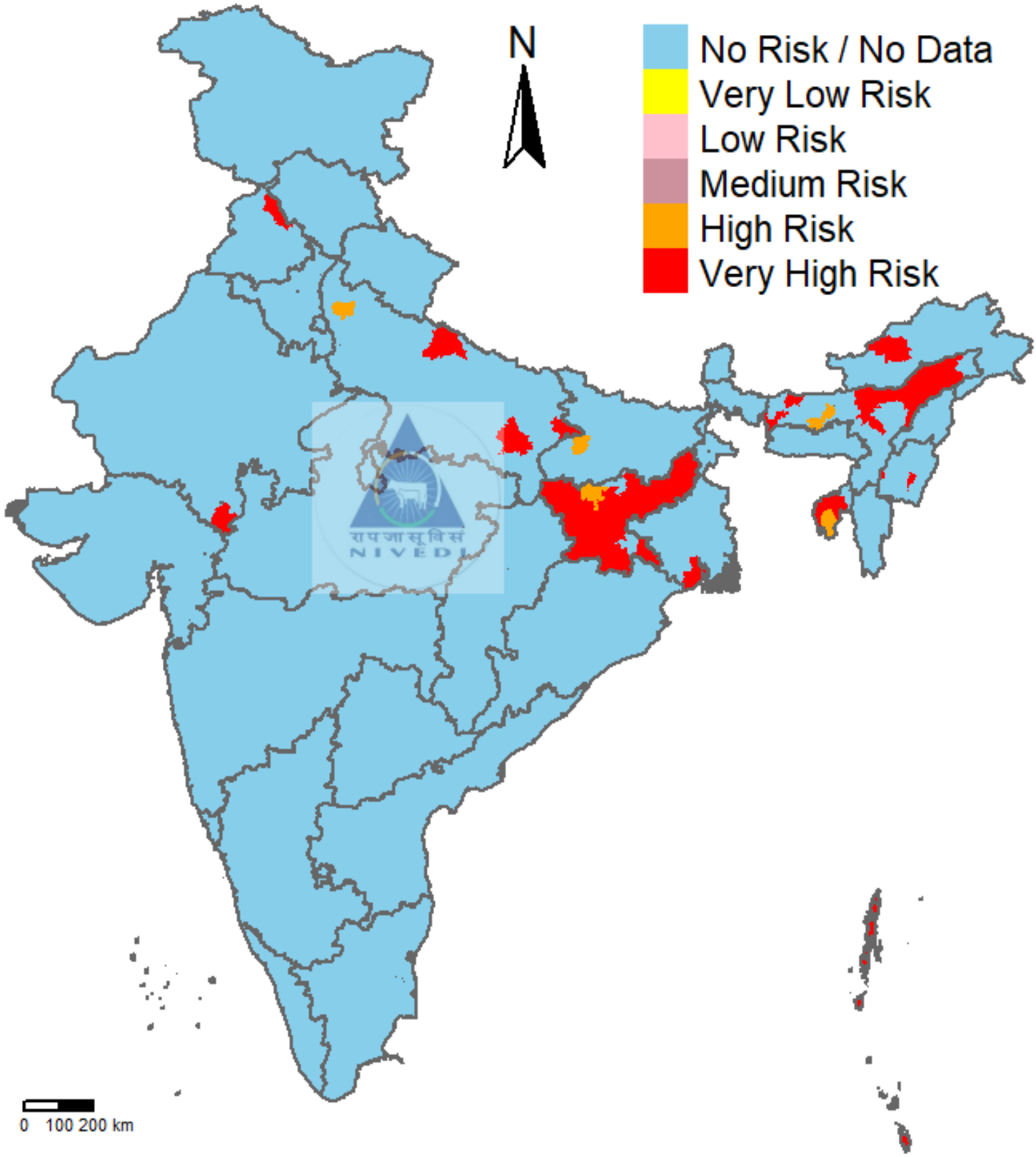
Risk Prediction of Bluetongue for the month of December 2022



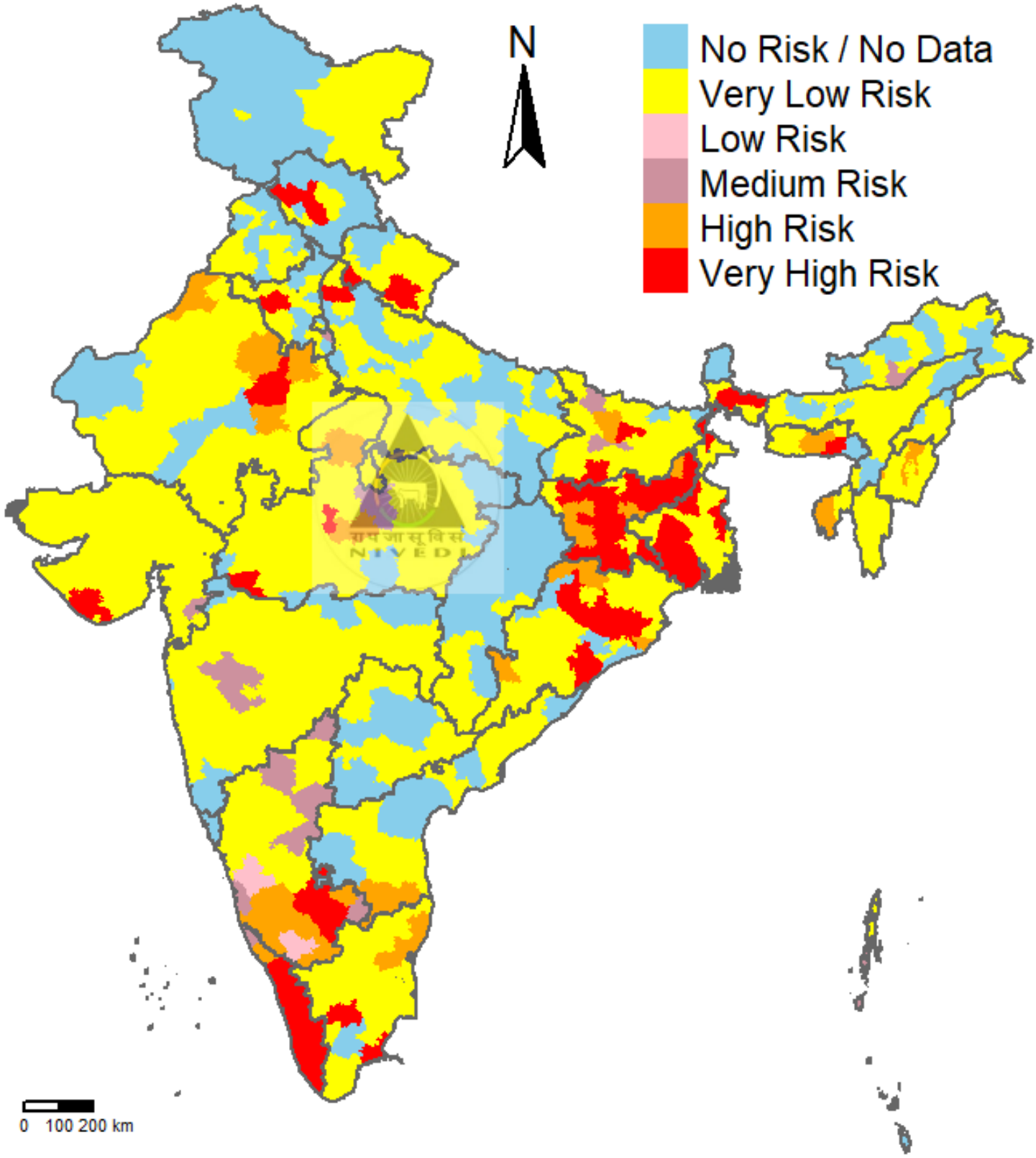
Risk Prediction of Enterotoxemia for the month of December 2022



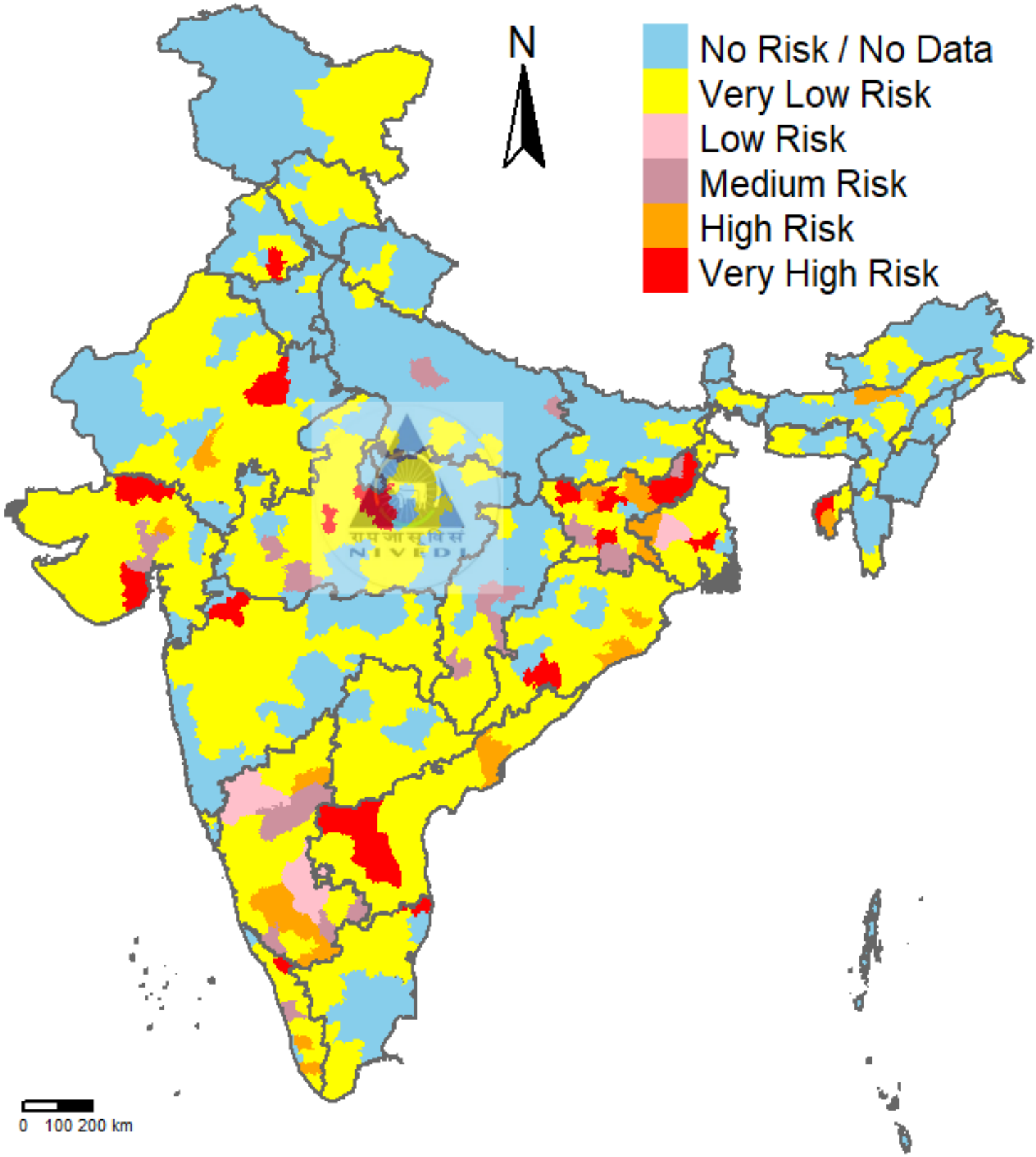
Risk Prediction of Fascioliasis for the month of December 2022



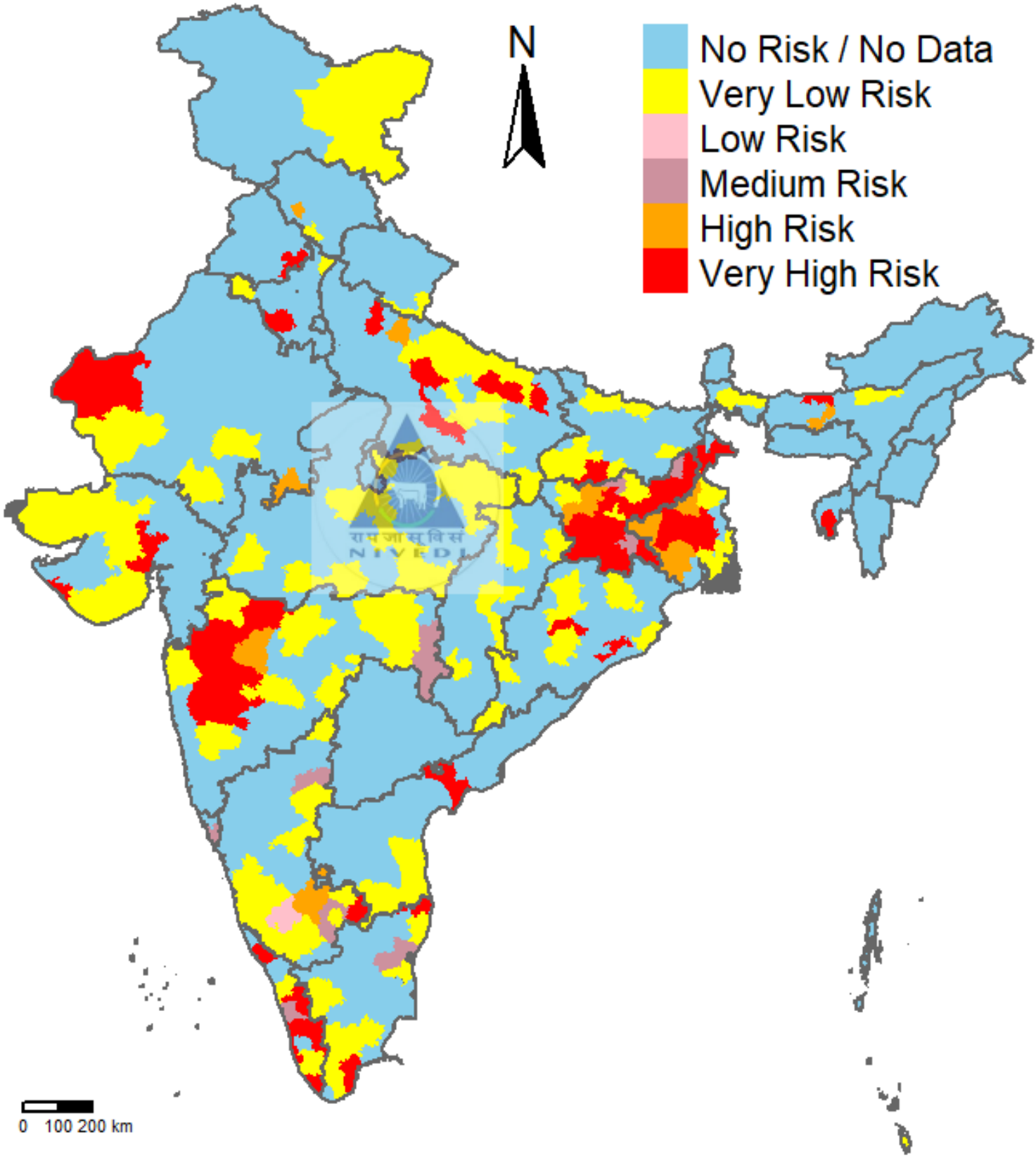
Risk Prediction of Foot and mouth disease for the month of December 2022



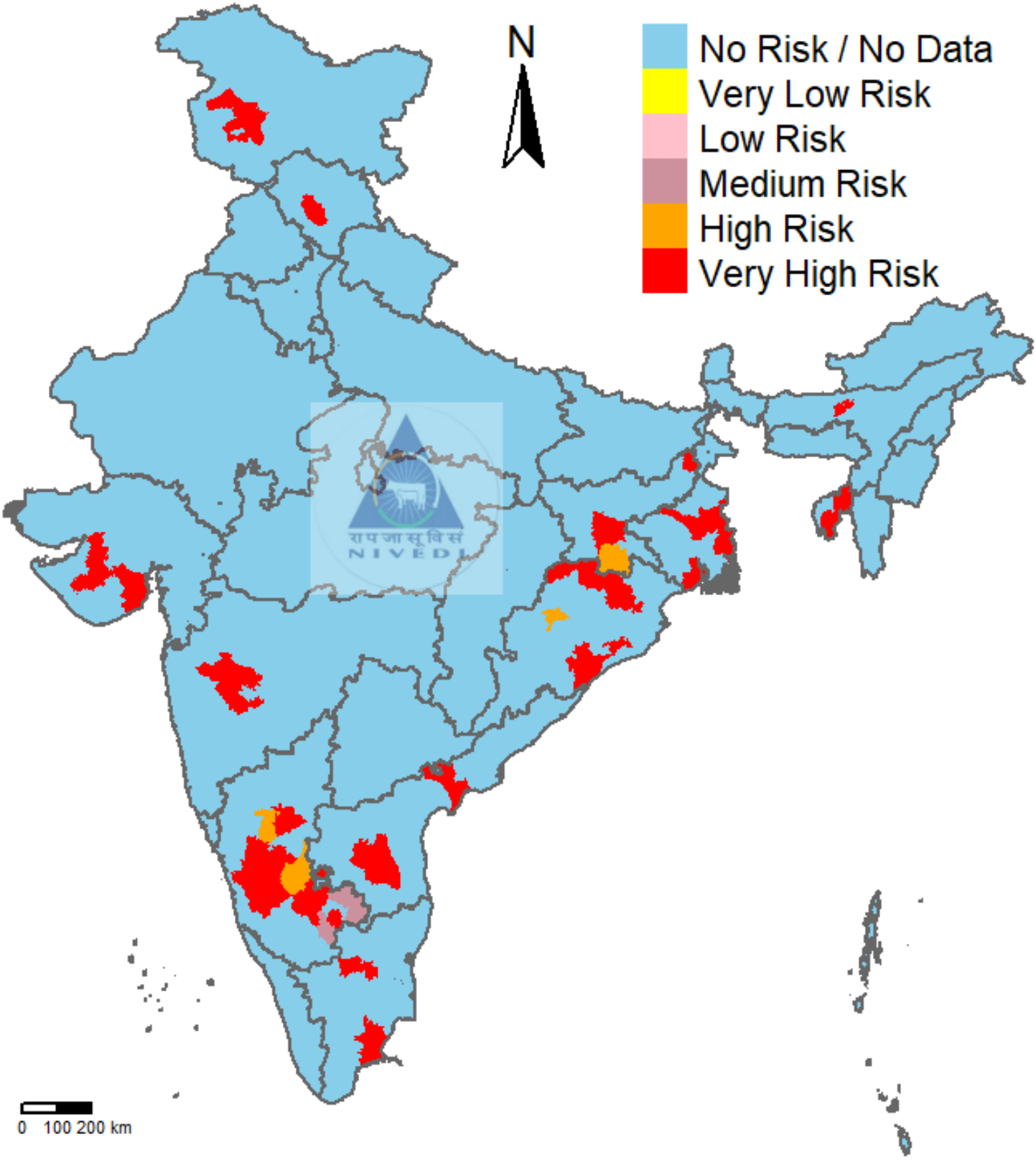
Risk Prediction of Haemorrhagic septicaemia for the month of December 2022



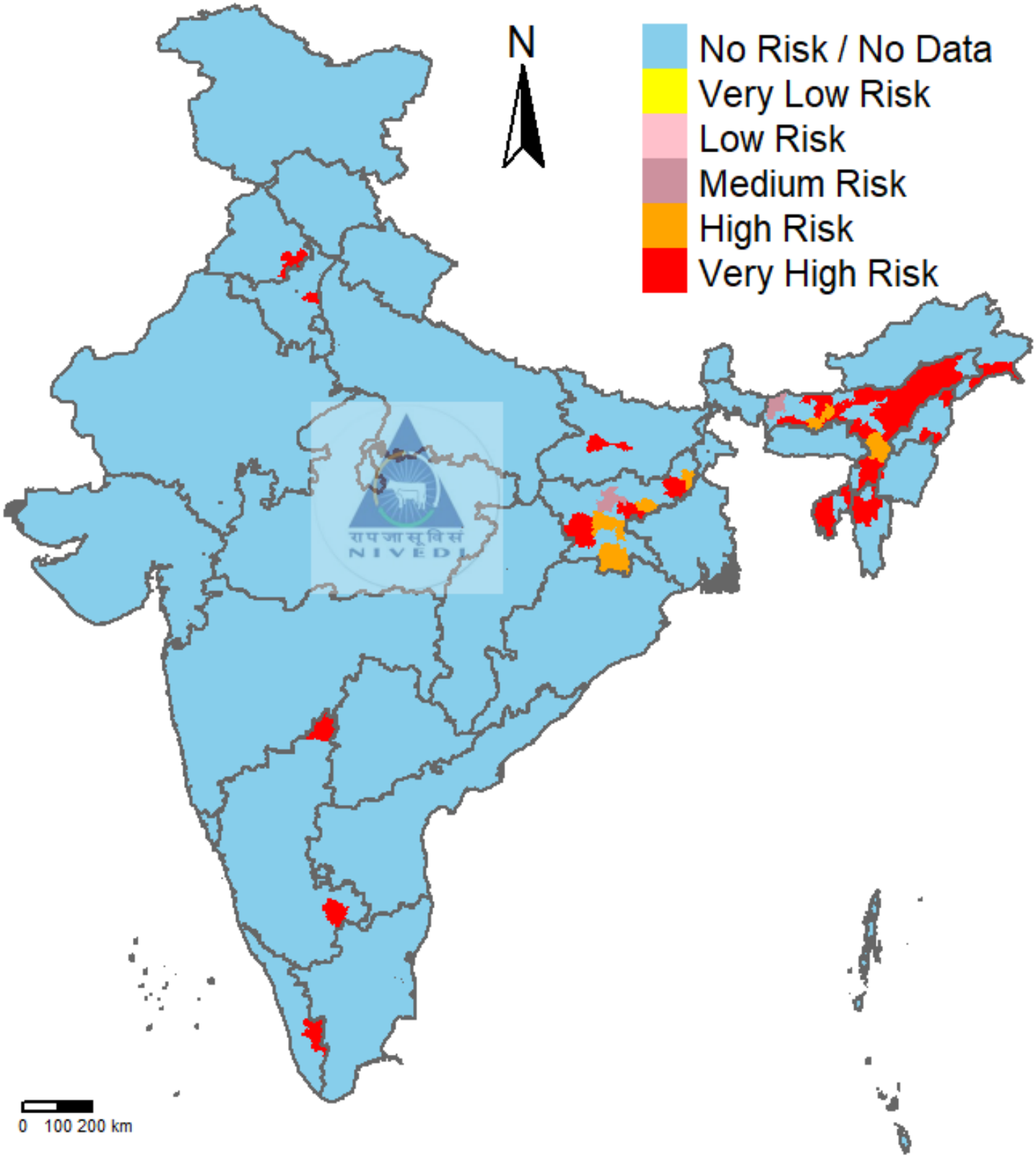
Risk Prediction of Peste des petits ruminants for the month of December 2022



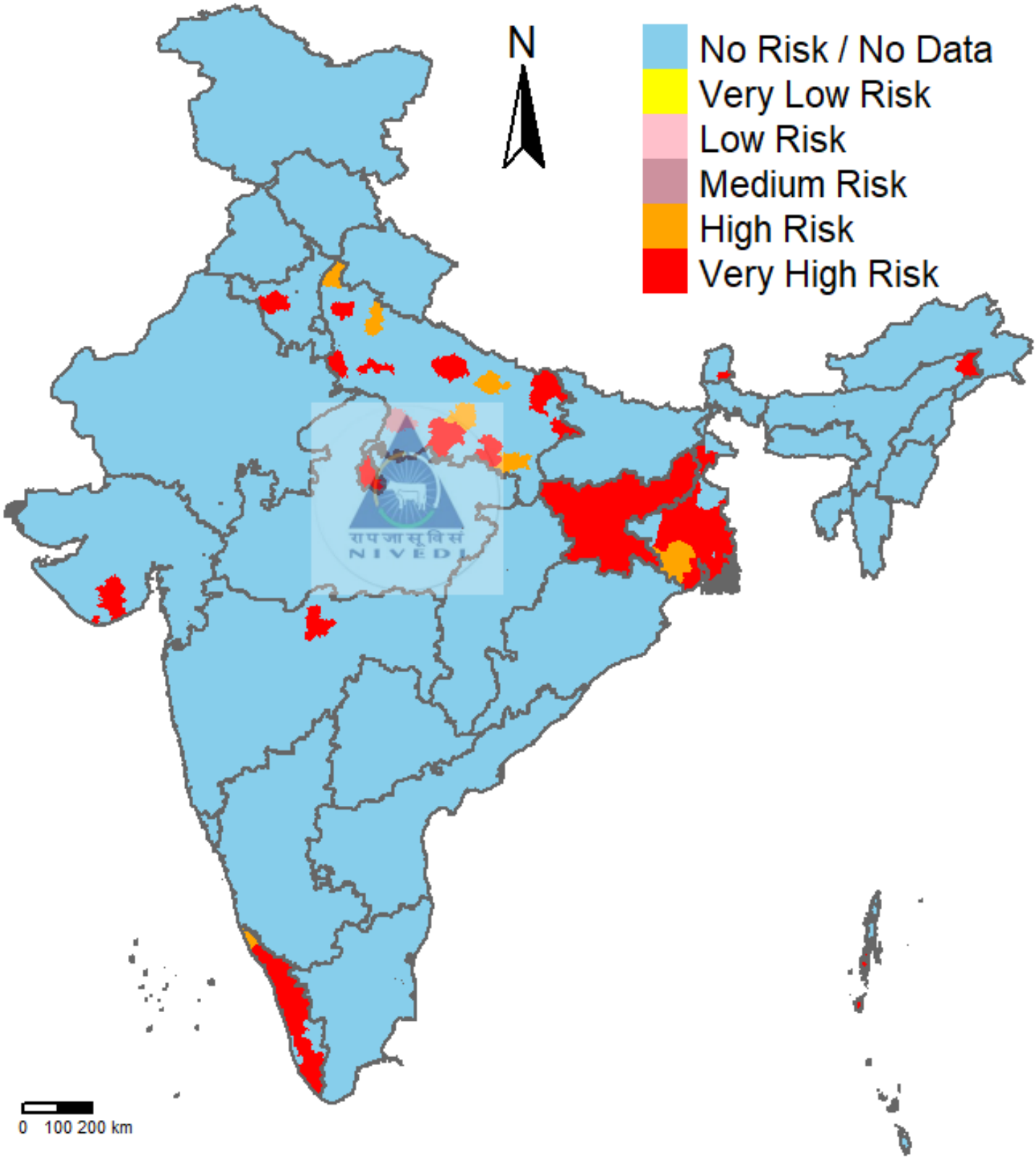
Risk Prediction of Sheep and Goat pox for the month of December 2022



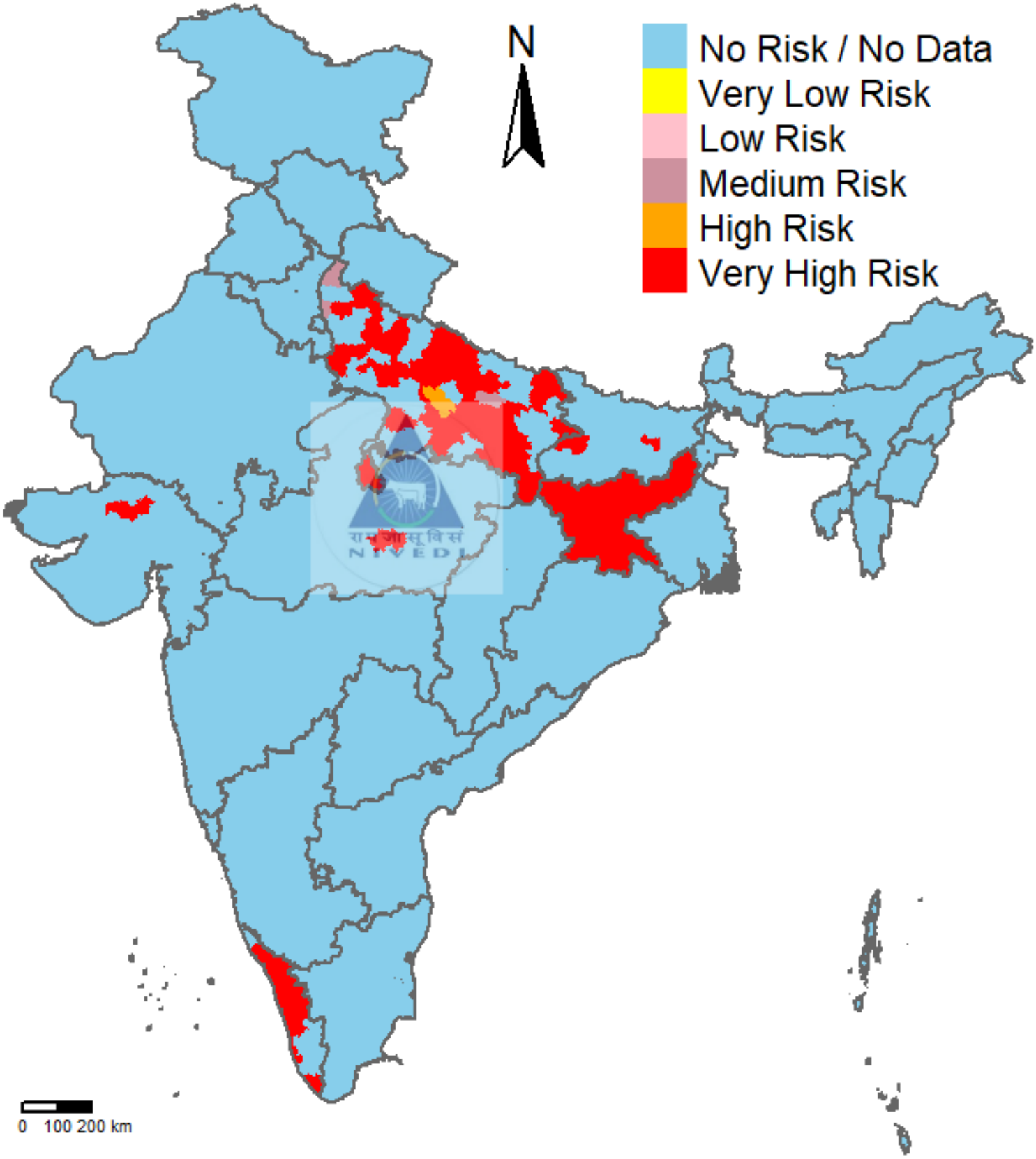
Risk Prediction of Swine fever for the month of December 2022



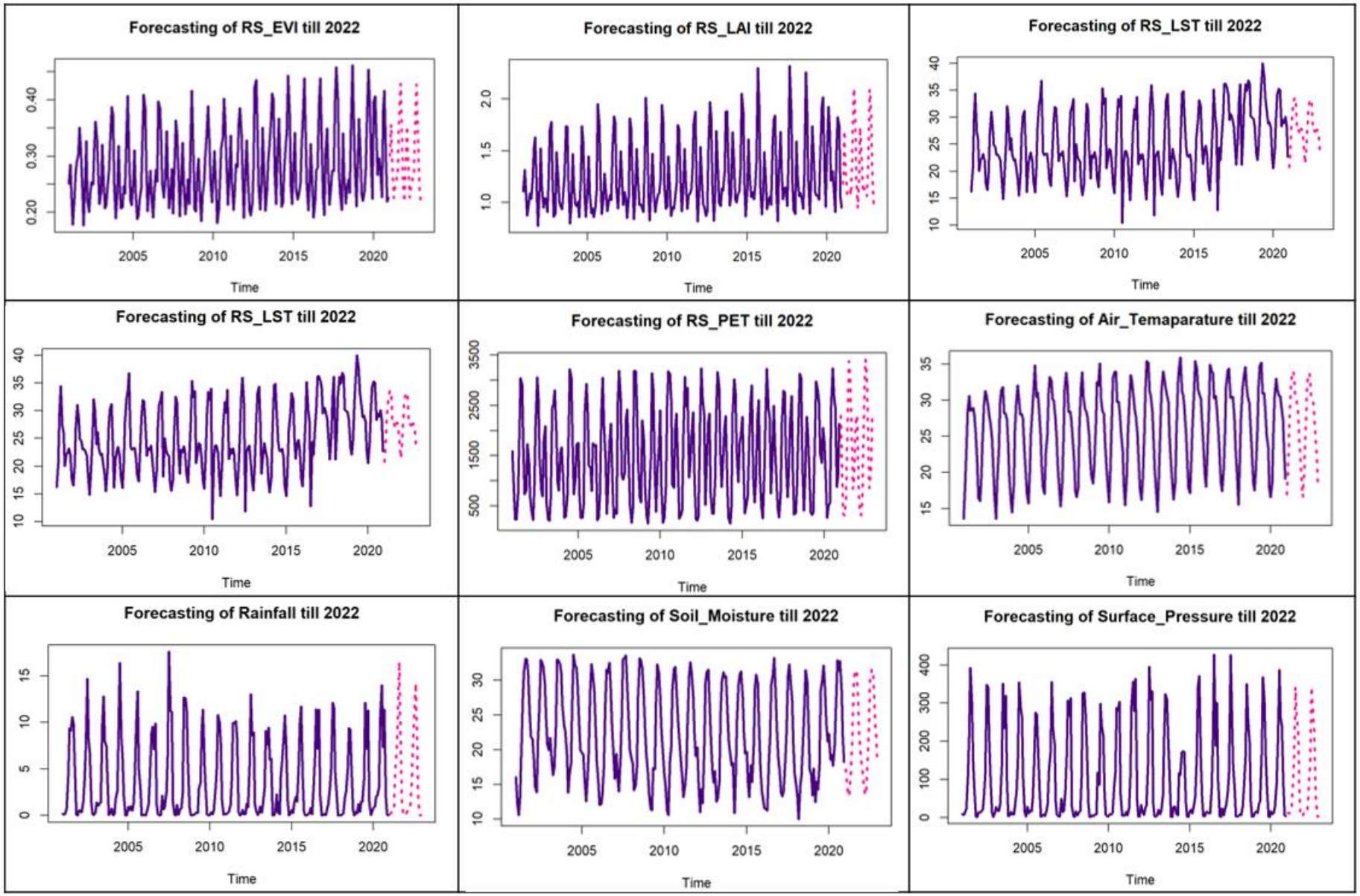
Risk Prediction of Theileriosis for the month of December 2022

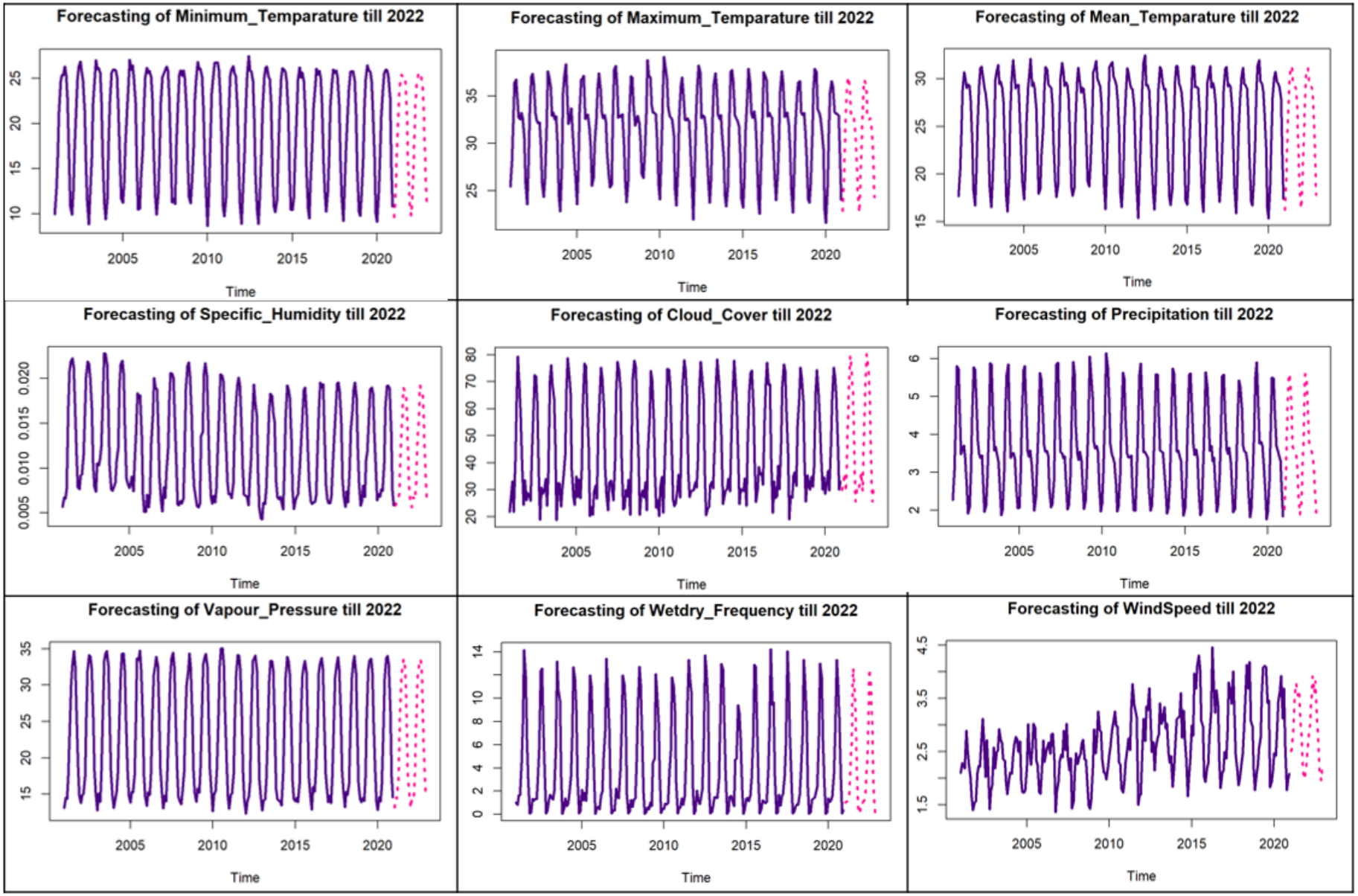


Risk Prediction of Trypanosomiasis for the month of December 2022



V. Forecasting of remote sensing and meteorological parameters till, 2022(*Ex. Karnataka*)




Forecasting of Minimum_Temparature till 2022
Forecasting of Maximum_Temparature till 2022
Forecasting of Mean_Temparature till 2022
Forecasting of Specific_Humidity till 2022
Forecasting of Cloud_Cover till 2022
Forecasting of Precipitation till 2022
Forecasting of Vapour_Pressure till 2022
Forecasting of Wetdry_Frequency till 2022
Forecasting of WindSpeed till 2022
Time
2005
2010
2015
2020

VI. SIGNIFICANT WEATHER PARAMETERS TABLE USING DISCRIMINANT FUNCTION ANALYSIS

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 humidity Minimum Temperature, Vapour Pressure and Rainfall
Enterotoxaemia	Surface Pressure, NDVI and PET
Fasciolosis	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
HaemorrhagicSepticaemia	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
Trypanosomosis	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.

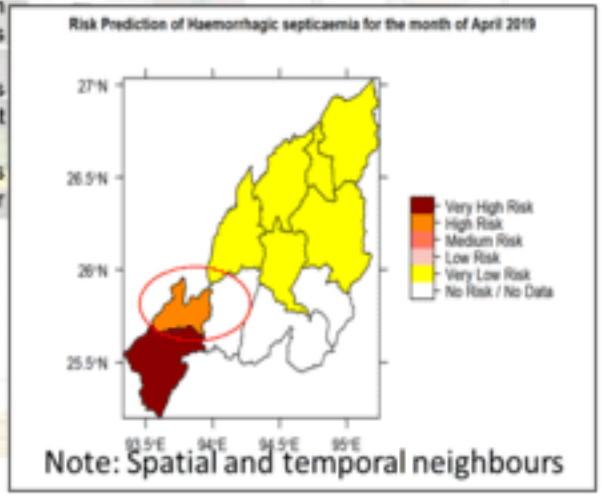
The villagers admitted in the meeting that they had not reported the recent outbreak to the department initially. The director appreciated the CVO Dimapur and his Rapid Response Team for their quick action after receiving information and for remaining stationed in the outbreak area to date. Free medicine 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 Report

June-2020

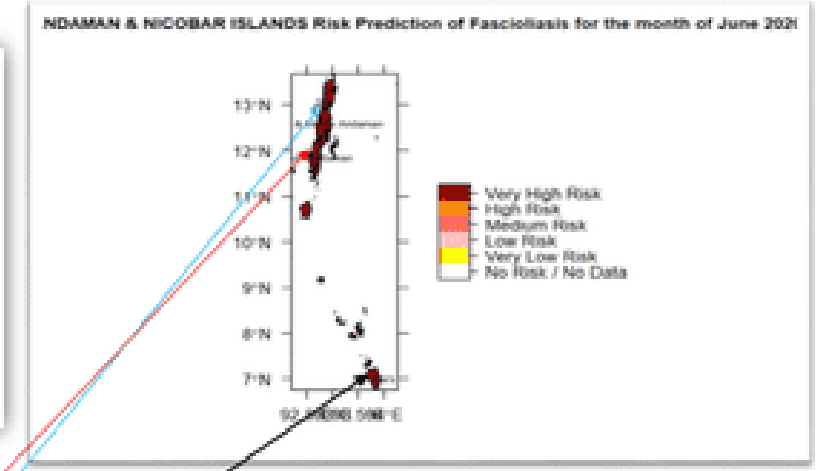
NIVEDI Prediction

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	NR	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	NR	NR	NR	NR	VHR	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)



Andaman and Nicobar Report June-2020

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	STRONGYLOID	COCCIDIOSIS	MASTITI	TOTAL
South Andaman	24	48	192	34	2	7	307
N&M Andaman	56	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

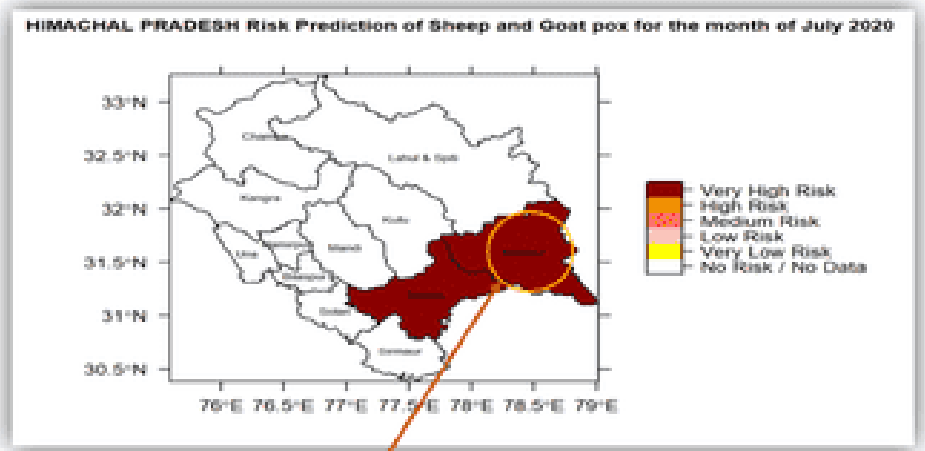
HIMACHAL PRADESH REPORT AUGUST-2020

NIVEDI Prediction

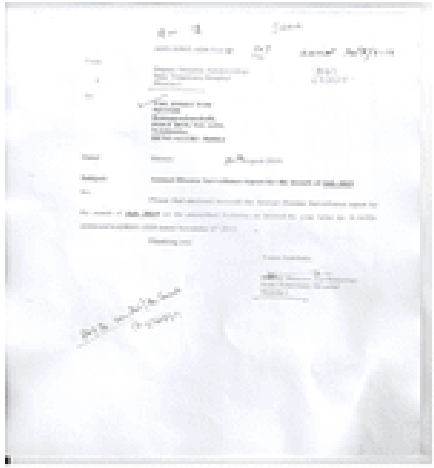
District wise Livestock Disease forewarning for July 2020: Himachal Pradesh

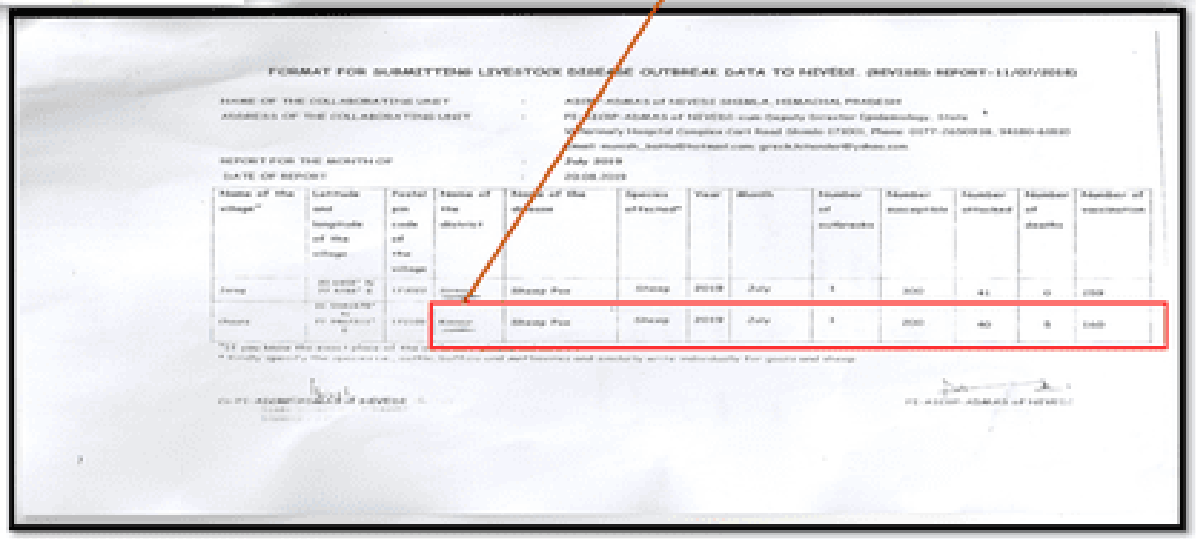
District of Himachal pradesh	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	CT	Fasciolosis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Bilaspur	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chamba	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Hamirpur	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kangra	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.

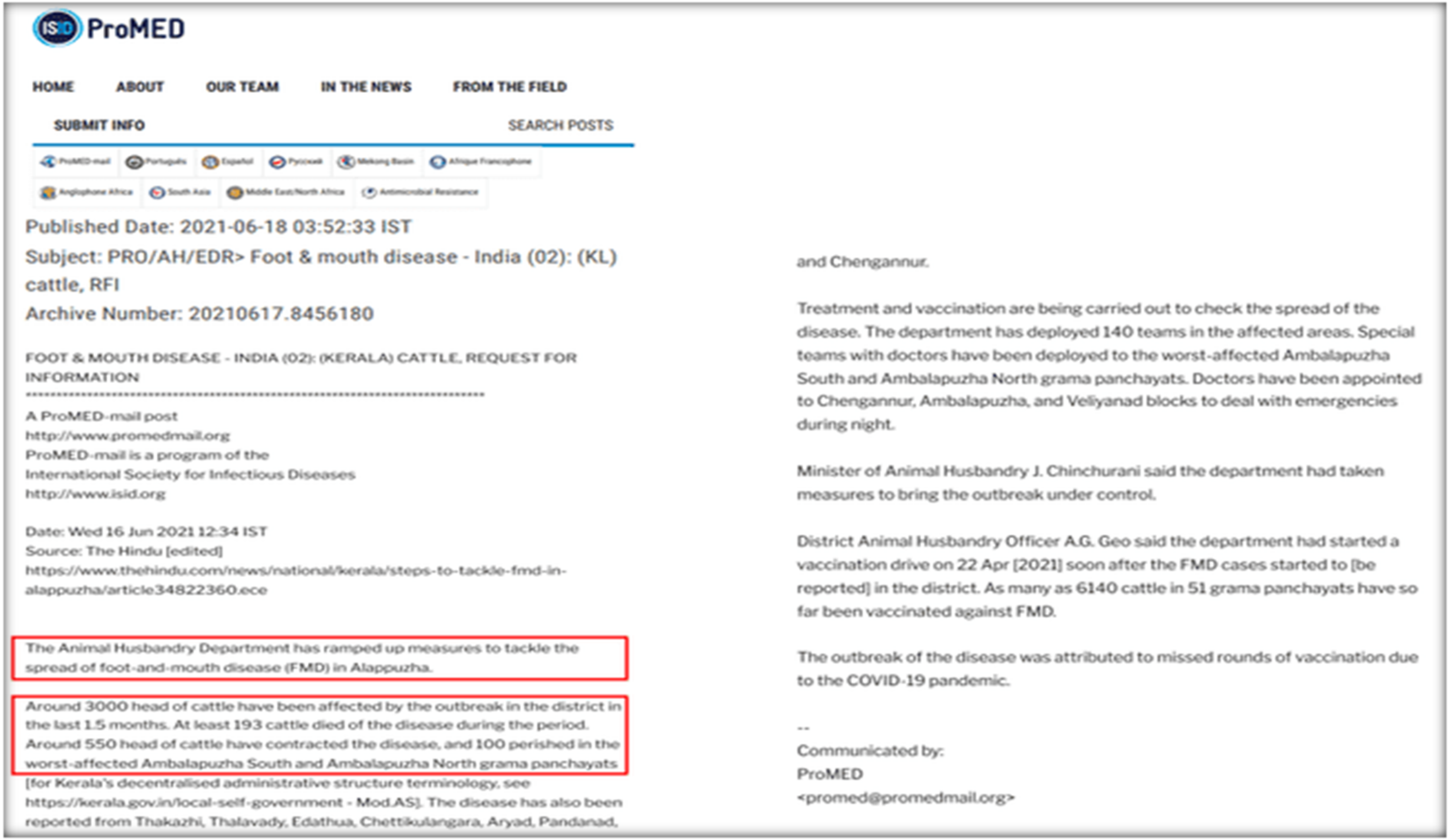


HINACHAL PRADESH Report July-2020





KERALA REPORT JUNE-2021



Published Date: 2021-06-18 03:52:33 IST

Subject: PRO/AH/EDR> Foot & mouth disease - India (02): (KL) cattle, RFI

Archive Number: 20210617.8456180

FOOT & MOUTH DISEASE - INDIA (02): (KERALA) CATTLE, REQUEST FOR INFORMATION
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A ProMED-mail post
http://www.promedmail.org
ProMED-mail is a program of the
International Society for Infectious Diseases
http://www.isid.org

Date: Wed 16 Jun 2021 12:34 IST
Source: The Hindu [edited]
https://www.thehindu.com/news/national/kerala/steps-to-tackle-fmd-in-alappuzha/article34822360.ece

The Animal Husbandry Department has ramped up measures to tackle the spread of foot-and-mouth disease (FMD) in Alappuzha.

Around 3000 head of cattle have been affected by the outbreak in the district in the last 1.5 months. At least 193 cattle died of the disease during the period. Around 550 head of cattle have contracted the disease, and 100 perished in the worst-affected Ambalapuzha South and Ambalapuzha North grama panchayats [for Kerala's decentralised administrative structure terminology, see https://kerala.gov.in/local-self-government - Mod.AS]. The disease has also been reported from Thakazhi, Thalavady, Edathua, Chettikulangara, Aryad, Pandanad, and Chengannur.

Treatment and vaccination are being carried out to check the spread of the disease. The department has deployed 140 teams in the affected areas. Special teams with doctors have been deployed to the worst-affected Ambalapuzha South and Ambalapuzha North grama panchayats. Doctors have been appointed to Chengannur, Ambalapuzha, and Veliyanad blocks to deal with emergencies during night.

Minister of Animal Husbandry J. Chinchurani said the department had taken measures to bring the outbreak under control.

District Animal Husbandry Officer A.G. Geo said the department had started a vaccination drive on 22 Apr [2021] soon after the FMD cases started to [be reported] in the district. As many as 6140 cattle in 51 grama panchayats have so far been vaccinated against FMD.

The outbreak of the disease was attributed to missed rounds of vaccination due to the COVID-19 pandemic.

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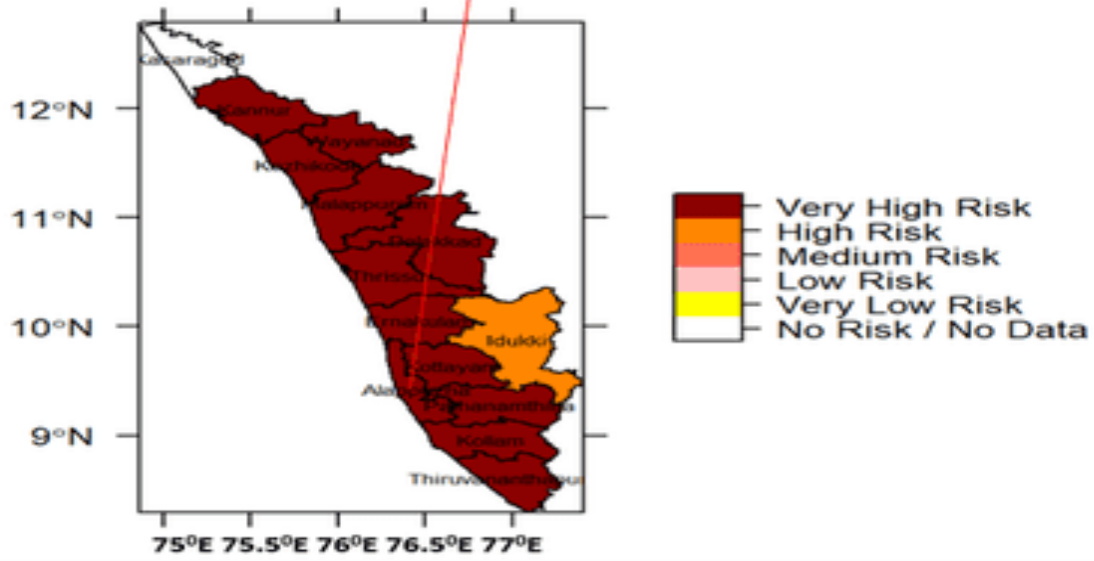
NIVEDI prediction in June 2021

District wise Livestock Disease Risk Forewarning for June 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*	MR	VLR	NR	NR	NR	NR
Ernakulum	NR	NR	NR	NR	NR	NR	*VHR*	*HR*	*HR*	NR	*VHR*	NR	NR
Idukki	*VHR*	VLR	VLR	VLR	NR	NR	*HR*	NR	VLR	NR	NR	NR	NR
Kannur	NR	VLR	NR	NR	NR	NR	*VHR*	*VHR*	VLR	NR	NR	NR	NR
Kasaragod	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR
Kollam	NR	VLR	VLR	NR	NR	NR	*VHR*	*VHR*	*HR*	NR	NR	NR	NR
Kottayam	NR	NR	NR	NR	NR	NR	*VHR*	*VHR*	VLR	NR	NR	NR	NR
Kozhikode	NR	NR	NR	NR	NR	NR	*VHR*	NR	*VHR*	NR	NR	NR	NR
Malappuram	NR	VLR	NR	NR	NR	NR	*VHR*	*VHR*	VLR	NR	NR	NR	NR
Palakkad	NR	VLR	NR	NR	NR	NR	*VHR*	*HR*	*HR*	NR	NR	*VHR*	NR
Pathanamthitta	*VHR*	VLR	NR	NR	NR	NR	*VHR*	VLR	VLR	NR	NR	NR	NR
Thiruvananthapuram	NR	NR	NR	NR	NR	NR	*VHR*	*VHR*	*HR*	NR	NR	NR	*VHR*
Thrissur	NR	VLR	NR	NR	NR	NR	*VHR*	*VHR*	*HR*	NR	NR	NR	NR
Wayanad	NR	VLR	NR	NR	NR	NR	*VHR*	NR	NR	NR	NR	*VHR*	NR

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

KERALA Risk Prediction of Foot and mouth disease for the month of June 2021



KARNATAKA REPORT SEPTEMBER-2021

ProMED
INTERNATIONAL SOCIETY
FOR INFECTIOUS DISEASES

Published Date: 2021-09-30 11:40:53
Subject: PRO/SOAS> Foot & mouth disease - India (10): (Karnataka) cattle
Archive Number: 20210930.8698795

FOOT & MOUTH DISEASE - INDIA (10): (KARNATAKA) CATTLE

A ProMED moderator
https://www.promedmail.org
ProMED-mail is a program of the
International Society for Infectious Diseases
https://www.isid.org

Date: Fri 24 Sep 2021 18:33 IST
Source: The Hindu [edited]
https://www.thehindu.com/news/national/karnataka/foot-and-mouth-disease-reported-in-hassan-lefts/article36537223.ece

District wise Livestock Disease Risk Forewarning for September 2021: Karnataka

District of Karnataka	Livestock Diseases												
	Anthrax	Haemorrhagic	BQ	BT	ET	Pasteurellosis	FMD	HS	PPR	SGG Pox	SF	Theileriosis	Trypanosomosis
Gulbarga	NR	NR	VLR	VLR	NR	NR	VLR	VLR	NR	HRF	NR	NR	NR
Yadgir	NR	NR	HRF	VLR	NR	NR	HRF	VLR	VLR	HRF	NR	NR	NR
Bidar	HRF	NR	VLR	NR	NR	NR	MR	MR	NR	MR	NR	NR	NR
Raichur	NR	NR	MR	NR	NR	NR	HRF	VLR	NR	NR	NR	NR	NR
Koppal	NR	NR	VLR	VLR	NR	NR	MR	VLR	NR	NR	NR	NR	NR
Bellary	HRF	NR	VLR	VLR	NR	NR	LR	MR	VLR	NR	NR	NR	NR
Vijayanagara	NR	NR	NR	VLR	NR	NR	HRF	VLR	NR	NR	NR	NR	NR
Davanagere	NR	NR	HRF	NR	NR	NR	HRF	VLR	VLR	NR	NR	NR	NR
Chitradurga	HRF	NR	VLR	NR	NR	NR	VLR	LR	VLR	NR	NR	NR	NR
Shimoga	NR	NR	NR	VLR	NR	NR	HRF	NR	VLR	NR	NR	NR	NR
Tumkur	NR	NR	HRF	NR	HRF	NR	HRF	MR	VLR	NR	NR	NR	NR
Udupi	HRF	NR	MR	VLR	NR	NR	HRF	HRF	VLR	NR	NR	NR	NR
Uttara Kannada	NR	NR	NR	NR	NR	NR	MR	NR	NR	NR	NR	NR	NR
Yadgir	NR	NR	VLR	VLR	NR	NR	VLR	VLR	VLR	NR	NR	NR	NR

The outbreak of foot-and-mouth disease (FMD) among cattle in Hassan has left both farmers and veterinarians anxious.

Cases have been reported from Arkalgud, Arsikere, Channarayapatna, and Sakleshpur taluks. While the farming community, depending on cattle for regular income, are worried about their livelihood, the veterinarians are struggling hard to provide treatment, amidst a short supply of staff members.

The Department of Veterinary and Animal Husbandry has reported over 100 cases in the district so far. As of [Fri 24 Sep 2020], the animals in 16 villages of the district are being treated. So far the death of one animal had been reported. However, farmers claim more animals have died over the last month. The death of cattle has an impact on milk production, affecting milk producers.

The vaccination for cattle is done once in six months under the National Animal Disease Control Programme. However, the vaccination drive was not done in the last year, owing to the COVID-19 pandemic. "The outbreak of foot and mouth disease is due to the failure of the government in conducting the vaccination. If the vaccination had been done as per the schedule, farmers would not have suffered", H Suja Ramesh, president of Potato Club in Arkalgud, told media.

Following reports of the disease, veterinarians have been treating affected animals. "Against 24 sanctioned posts of veterinary doctors in Arkalgud taluk, we are only five people. Every doctor is in charge of 2 or more hospitals. We are struggling hard to treat animals", said a veterinarian.

Unless the vacancies were filled up the department cannot deliver services fully. There was a shortage of staff members of other cadres as well, he added.

Considering the cases, the department has launched a ring vaccination programme. Under this, the animals in a 5-kilometre (11 km) radius of the village, where the disease breakout was reported, would be vaccinated. "We have sufficient stock for the ring vaccination. We are planning a mass vaccination in October [2021], where we will cover 6.50 lakh (6,50,000) animals," said KR Ramesh, Deputy Director of Veterinary and Animal Husbandry in Hassan.

Communicated by:
ProMED-Suha from WeatherMap [family
<promed@EpiRadar.com>]

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HOME ABOUT OUR TEAM IN THE NEWS FROM THE FIELD

SUBMIT INFO SEARCH POSTS

ProMED-mail Portugues Español Русский Mekong Basin Afrique Francophone

Anglophone Africa South Asia Middle East/North Africa Antimicrobial Resistance

Published Date: 2021-04-14 00:02:23 IST

Subject: PRO/AH/EDR> Foot & mouth disease - India: (AR) mithun, RFI

Archive Number: 20210413.8305677

FOOT AND MOUTH DISEASE - INDIA: (ARUNACHAL PRADESH) MITHUN, REQUEST FOR INFORMATION

A ProMED-mail post
http://www.promedmail.org
ProMED-mail is a program of the
International Society for Infectious Diseases
http://www.isid.org

Date: Tue 13 Apr 2021
Source: Sentinel Assam [abridged, edited]
http://www.sentinelassam.com/north-east-india-news/arunachal-news/many-mithuns-infected-with-fmd-foot-and-mouth-disease-533689

A large number of mithuns have been affected by FMD (foot and mouth disease) in various parts of Arunachal Pradesh, and a few have died, said official sources on Monday (13 Apr 2021).

Animal Husbandry & Veterinary Department Deputy director Dr Taba Heli, a top mithun expert in North Eastern region, reported that the disease has taken a severe form in the entire Siang belt, particularly in East Siang, West Siang, and Upper Siang districts [map at https://tinyurl.com/tft28s3c].

Though the number of deaths is yet to be known, the disease has spread in scattered areas of Papum Pare district also. The Department has allocated district funds for procurement of medicines to take all possible steps to contain the disease, he said. Mithun deaths have been reported also from Itanagar and Jullang area.

Pointing out that mithuns are the pride of indigenous people in the state, Nyishi Elite Society president Bengia Tolum has urged the department to take all possible steps to save them.

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Communicated by:
ProMED from HealthMap Alerts
<promed@promedmail.org>

[Mithun, also known as "Cattle of Mountain," is a bovine species of the northeastern hill region of India. This massive bovine is reared under free-range conditions in the hill forests at an altitude of 1000 to 3000 meters above mean sea level.

It is important to obtain information on the serotype and genotype of the virus strain involved, as well as of the vaccination history of the affected animals.

FMD is a disease of cloven-hoofed animals, including cattle, buffalo, small ruminants, and swine. It is the most contagious disease of mammal animals, having a great potential for causing severe economic loss in susceptible animals. Mortality, generally, is up to 2-3% but may be significantly higher in young stock.

The disease is regarded as endemic in India; effective mass vaccination, applying potent vaccines -- which include matching vaccine strains -- is essential for its control. Continued circulation of the virus may affect India's exports, such as frozen buffalo meat, of which India is the largest producer and exporter, globally. An example of the said export issue is to be found at https://agriculture.govmu.org/Documents/Report/foot%20and%20mouth%20disease.pdf. - Mod.AS

NIVEDI prediction in April 2021

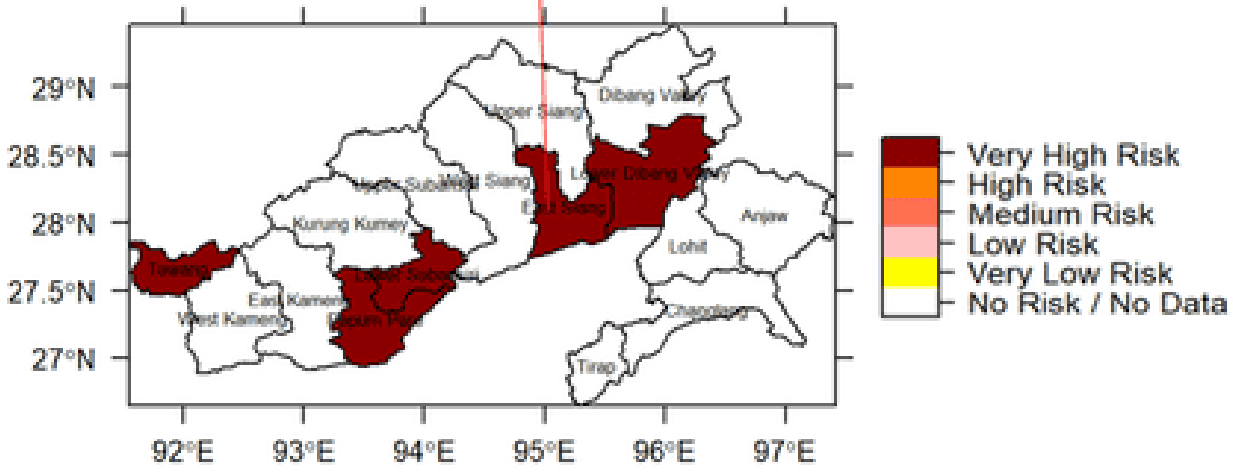
District wise Livestock Disease Risk Forewarning for April 2021: Arunachal Pradesh

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	NR	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	*VHR*	NR	VLR	NR	*VHR*	NR	NR
Kurung Kumey	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lohit	NR	VLR	VLR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lower Dibang Valley	NR	NR	VLR	NR	NR	NR	VLR	VLR	VLR	NR	*VHR*	NR	NR
Lower Subansiri	NR	NR	NR	NR	NR	NR	*VHR*	NR	NR	NR	NR	VLR	NR
Papum Pare	NR	NR	NR	NR	NR	NR	*VHR*	NR	*VHR*	NR	*VHR*	NR	NR
Tawang	NR	NR	NR	NR	NR	NR	*HR*	NR	NR	NR	NR	NR	NR
Tirap	NR	NR	NR	NR	NR	NR	NR	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	NR	NR	NR	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	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)

ARUNACHAL PRADESH Risk Prediction of Foot and mouth disease for the month of April 2021



9.1 Correlational Assessment

The number of outbreaks predicted and outbreaks actually reported were mentioned 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 into 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 risk events and reported outbreaks

Sl No	Livestock diseases	July-2021		August-2021	
		No. of districts predicted for the disease risk events	No. of districts reported the disease outbreaks*	No. of districts predicted for the disease risk events	No. of districts reported the disease outbreaks*
1	Anthrax	35	3	32	7
2	Babesiosis	39	66	60	61
3	Black Quarter (BQ)	48	16	39	8
4	Bluetongue (BT)	0	1	0	0
5	Enterotoxaemia (ET)	18	7	19	6
6	Fasciolosis	56	35	60	28
7	Foot & Mouth Disease (FMD)	90	52	89	64
8	Haemorrhagic Septicaemia (HS)	68	16	44	7
9	Peste des Petits Ruminants (PPR)	57	29	62	22
10	Sheep & Goat Pox	24	7	31	10
11	Classical Swine Fever	37	9	32	15
12	Theileriosis	41	81	70	56
13	Trypanosomosis	56	69	65	65

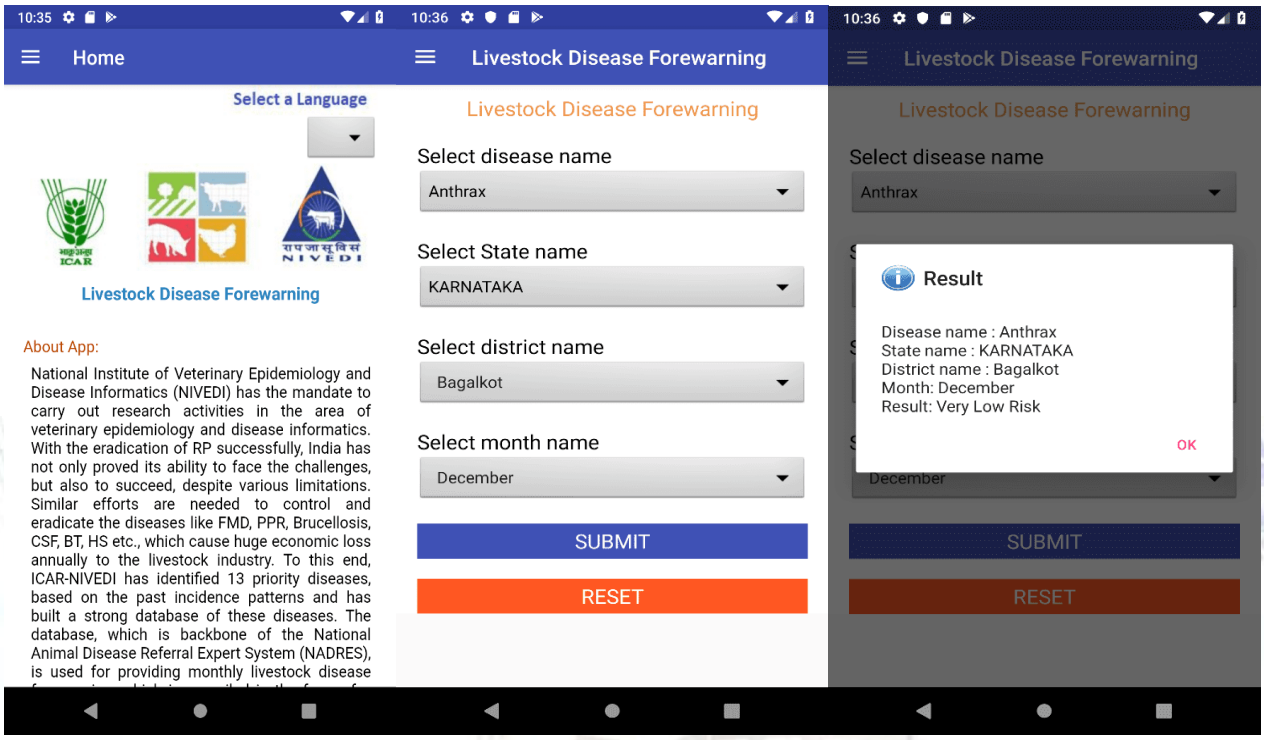
*Which takes in to account of action taken for prediction and non-reporting of cases

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 storelinkalso 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 and 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.FARMERS EMPOWERMENT THROUGH IT: DISEASE RISK COMMUNICATION (COLLABORATION WITH FRUITS, NIC, GOVT. OF KARNATAKA)

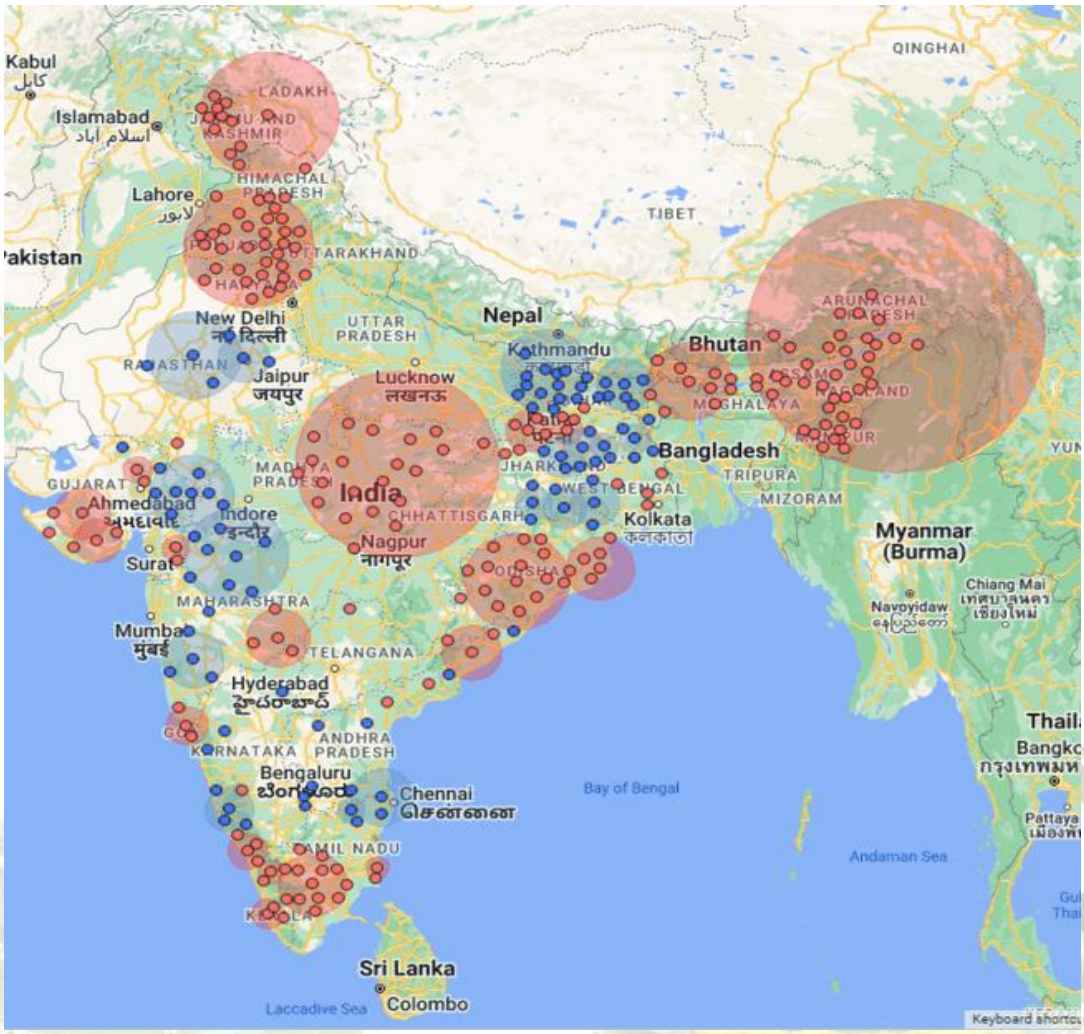
In addition to NADRES V_2 (The National Animal Disease Referral Expert System), ICAR-NIVEDI collaborated with NIC, Govt. of Karnataka, Karnataka State for sending the SMS alerts directly to the farmers who have registered in FRUITS (Farmers Registration and Unified Beneficiary Information System). The information alerts on risk prediction of three livestock diseases (FMD, Anthrax and Black Quarter) were sent through SMS to farmers is presented in Table 11.A. During September 2022, a total of **1579359** SMS alerts were sent to farmers.

Table 11.A: Number of famers received the SMS alert through FRUITS application during Septemberber 2022.

Disease Name	District Name	No. of farmers received SMS	Disease Name	District Name	No. of farmers received SMS
Anthrax	Bellary	3071	FMD	Chamrajnagar	27638
	Chikkaballapur	40099		Chikkaballapur	40067
	Davangere	26785		Chikmagalur	16443
	Haveri	26919		Chitradurga	16413
	Koppal	16308		Dakshina Kannada	38785
	Raichur	6079		Davangere	26747
	Tumkur	94903		Dharwad	18424
Black Quarter	Chikmagalur	16575		Gadag	13940
	Chitradurga	16467		Hassan	85647
	Davangere	26833		Haveri	26890
	Hassan	86233		Kodagu	3124
	Mysore	118404		Kolar	26772
	Shimoga	37239		Koppal	16307
	Tumkur	95069		Mandya	114799
FMD	Bagalkot	22300		Mysore	117902
	Bangalore Urban	26419		Ramnagar	60415
	Bangalore Rural	37773		Shimoga	37123
	Belgaum	52533		Tumkur	94858
	Bellary	3071		Udupi	31240
				Uttar Kannada	12745
Grand Total					**1579359**

12.1 MODEL BASED HOT-SPOT AREA MAPS OF LIVESTOCK INFECTIOUS DISEASES IN INDIA

a) FMD Hotspot by Poisson Model: FMD in India (1989-2022)



Model Specifications

- **Retrospective Analysis: Space-Time**
- **Probability Model: Space-Time Poisson Model**
  - With the Space-Time Poissonmodel, the number of cases in each location is Poisson-distributed.
  - The model requires case and population counts for a set of data locations and geographical coordinates for each of the locations.
  - SaTScan does a linear interpolation based on the population at the census times immediately preceding and following.
- **Advance Analysis Features:**

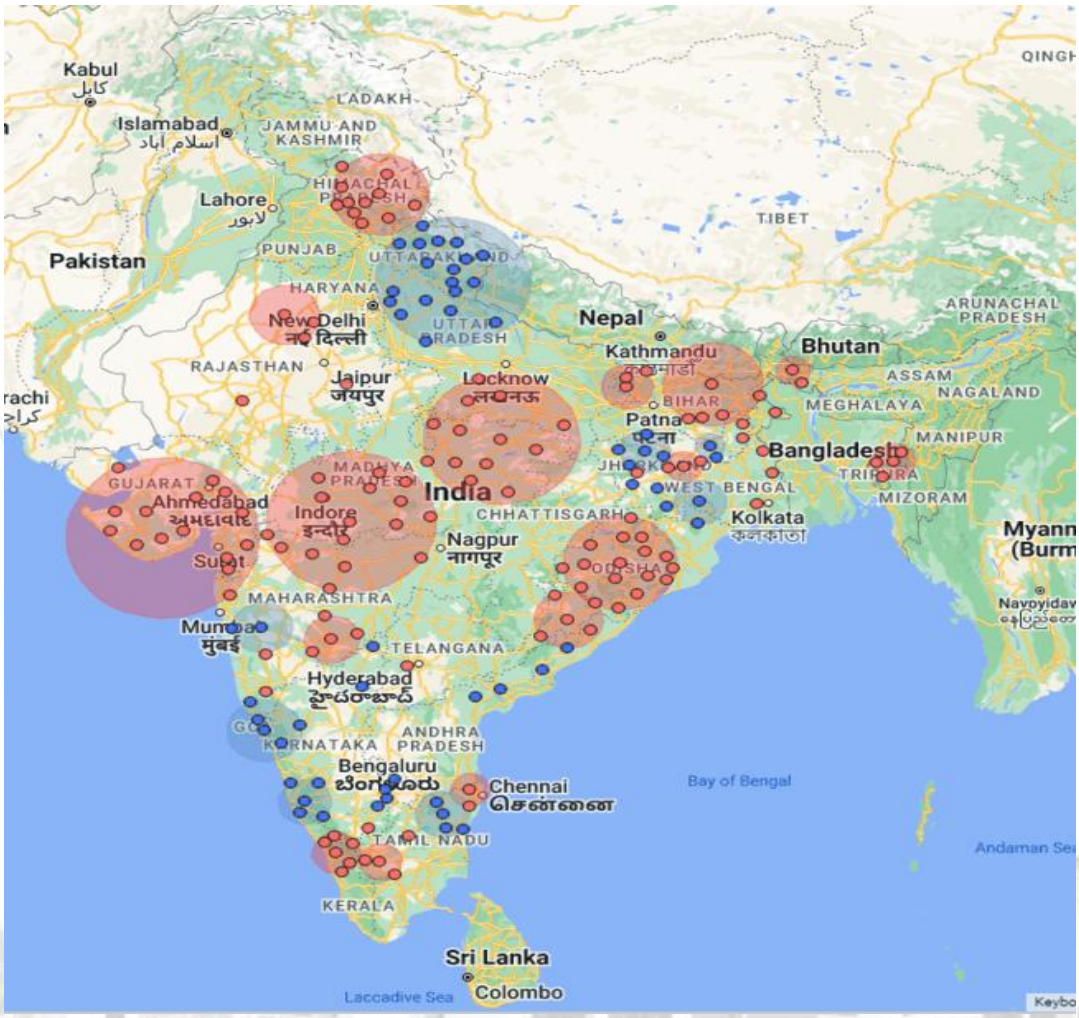
Circle radius:1 km.

- **Time Aggregation:** 1 year.
- **Output obtained with no geographical overlap-** Total hotspots–69 (High- 36, Low- 33).
- The output is generated using **SaTScanv9. 6.**

Note: Red Dot: High Disease Cluster

Blue Dot: Low Disease Cluster

b) PPR Hotspot by Poisson Model: PPR in India (1995-2022)



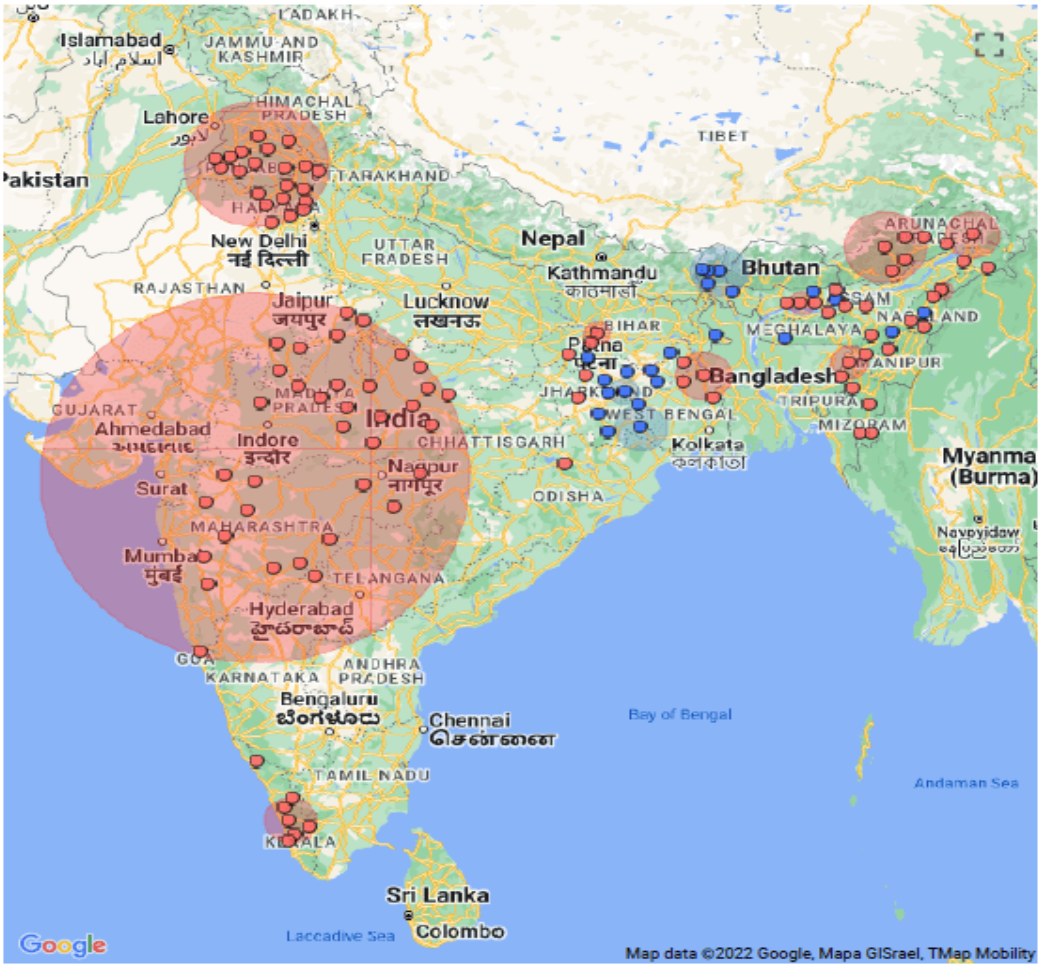
Model Specifications

- **Retrospective Analysis: Space-Time**
- **Probability Model: Space-Time Poisson Model**
  - With the Space-Time Poissonmodel, the number of cases in each location is Poisson-distributed.
  - The model requires case and population counts for a set of data locations and geographical coordinates for each of the locations.
  - SaTScan does a linear interpolation based on the population at the census times immediately preceding and following.
- **Advance Analysis Features:**
  Circle radius:1 km.
- **Time Aggregation:** 1 year.
- **Output obtained with no geographical overlap-** Total hotspots– 51 (High- 30, Low- 21).
- The output is generated using **SaTScanv9. 6.**

Note: Red Dot: High Disease Cluster

Blue Dot: Low Disease Cluster

c) CSF Hotspot by Poisson Model: CSF in India (1992-2022)



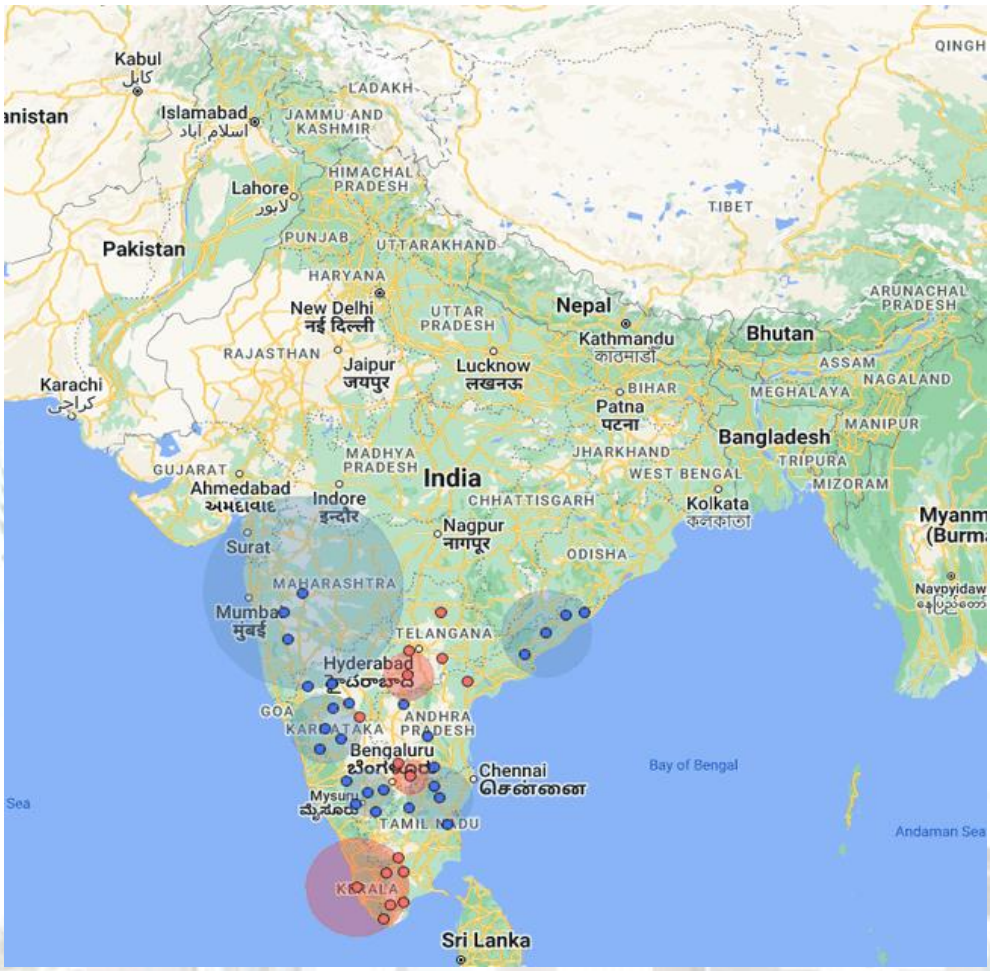
Model Specifications

- **Retrospective Analysis: Space-Time**
- **Probability Model: Space-Time Poisson Model**
  With the Space-Time Poissonmodel, the number of cases in each location is Poisson-distributed.
  - The model requires case and population counts for a set of data locations and geographical coordinates for each of the locations.
  - SaTScan does a linear interpolation based on the population at the census times immediately preceding and following.
- **Advance Analysis Features:**
  Circle radius:1 km.
- **Time Aggregation:** 1 year.
- **Output obtained with no geographical overlap-** Total hotspots– 46 (High- 29, Low- 17).
- The output is generated using **SaTScanv9. 6.**

Note: Red Dot: High Disease Cluster

Blue Dot: Low Disease Cluster

d) Bluetongue Hotspot by Poisson Model: Bluetongue in India (2001-2022)



Model Specifications

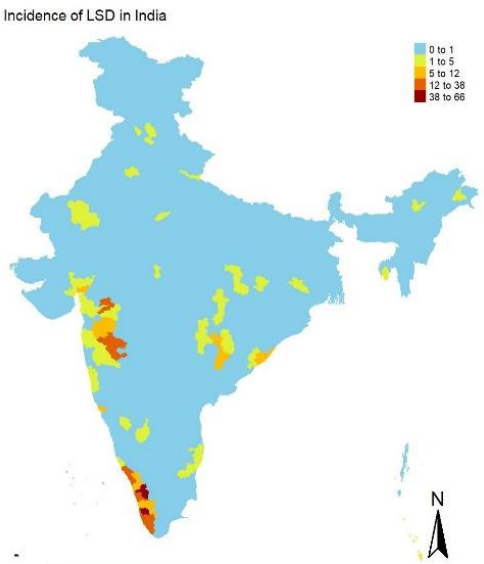
- **Retrospective Analysis: Space-Time**
- **Probability Model: Space-Time Poisson Model**
  - With the Space-Time Poissonmodel, the number of cases in each location is Poisson-distributed.
  - The model requires case and population counts for a set of data locations and geographical coordinates for each of the locations.
  - SaTScan does a linear interpolation based on the population at the census times immediately preceding and following.
- **Advance Analysis Features:**
  Circle radius:1 km.
- **Time Aggregation:** 1 year.
- **Output obtained with no geographical overlap-** Total hotspots– 14 (High- 7, Low- 7).
- The output is generated using **SaTScanv9. 6.**

Note: Red Dot: High Disease Cluster

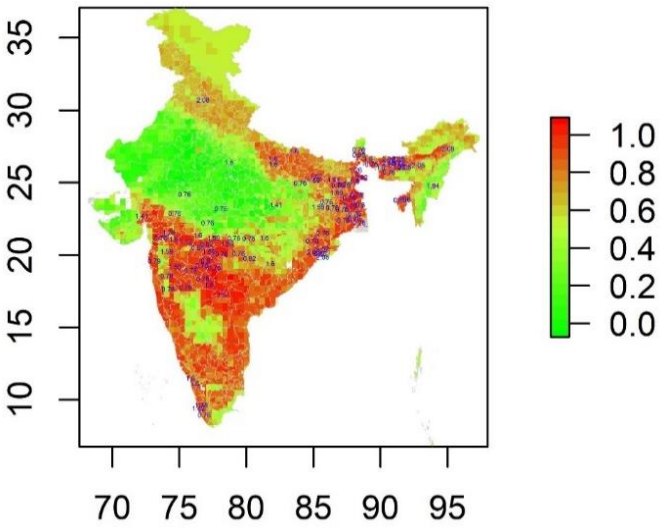
Blue Dot: Low Disease Cluster

12.2. MODEL BASED RISK MAPS OF LIVESTOCK INFECTIOUS DISEASES IN INDIA

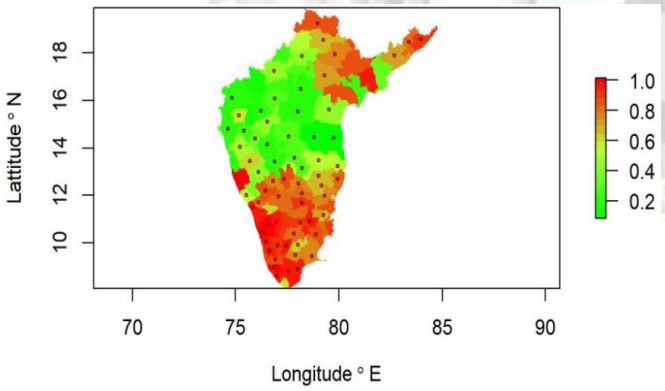
Incidence of LSD in India



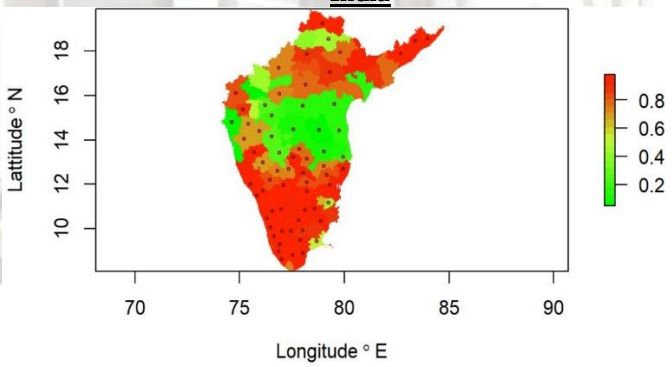
Risk map for Avian Influenza in India



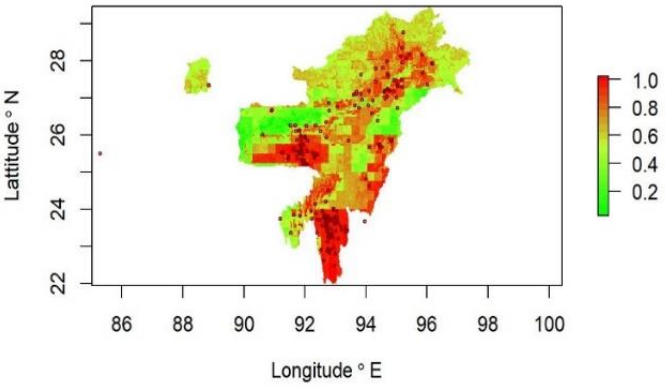
Risk prediction for Anthrax Disease for Southern India



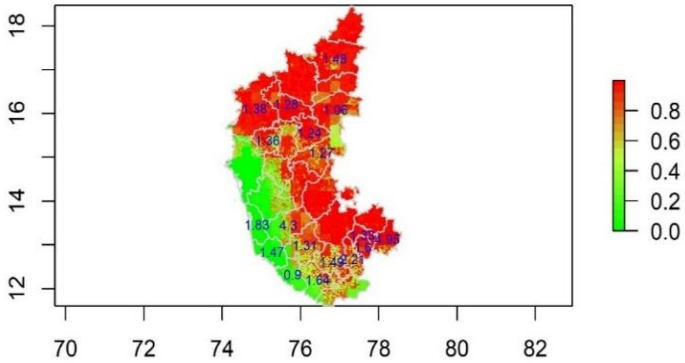
Risk prediction for Enterotoxaemia Disease for Southern India



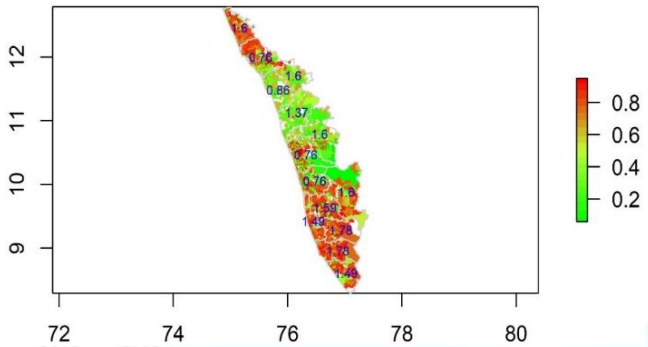
Risk prediction for ASF for North Eastern India



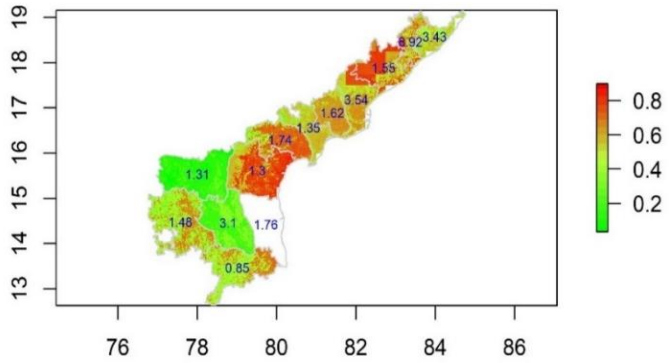
Karnataka Risk map Bluetongue



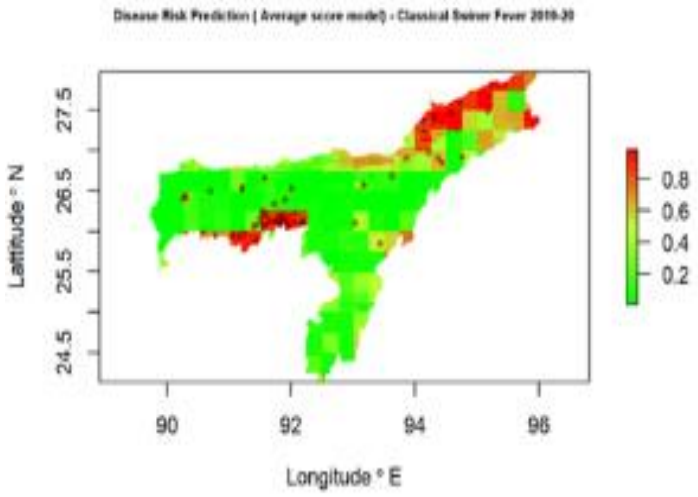
Risk map of Anaplasmosis in Kerala

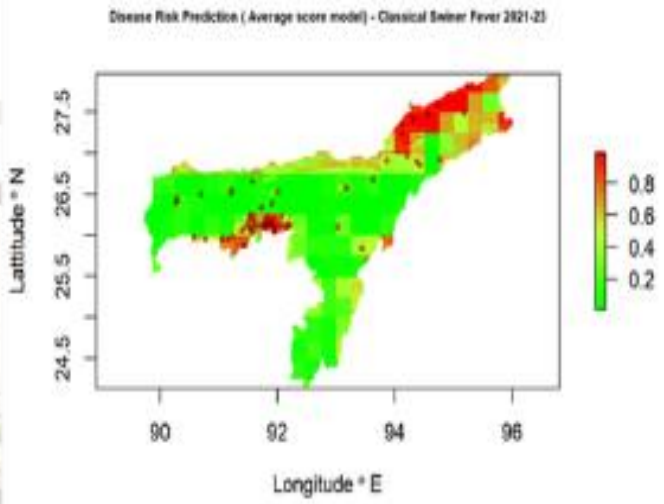


Risk map of Bluetongue in Andhra Pradesh

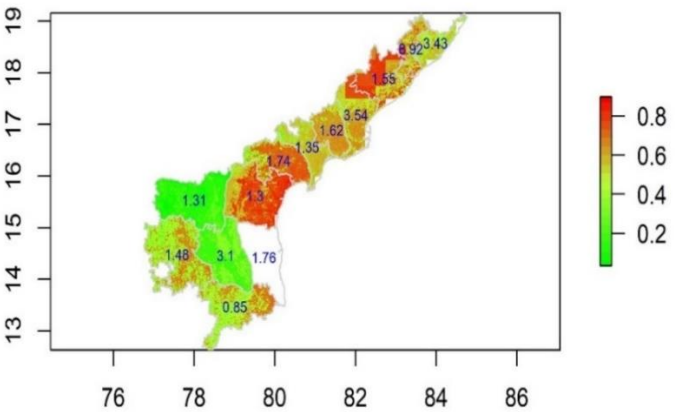


Forecasted risk maps for Classical Swine Fever disease in Assam

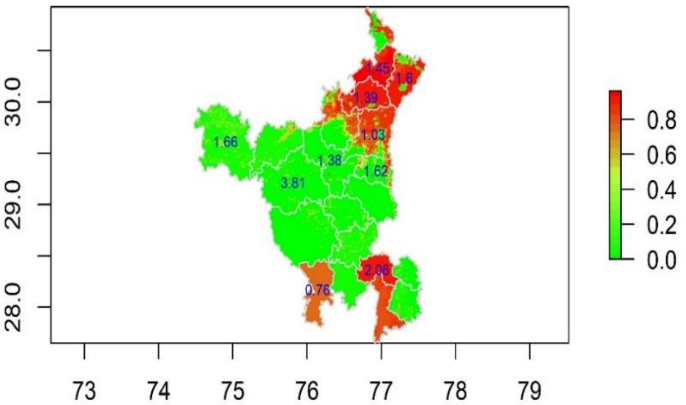




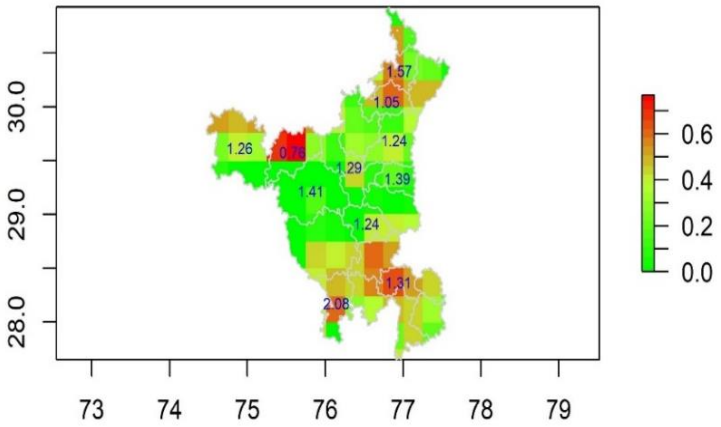
Risk map for Bluetongue in Andhra Pradesh



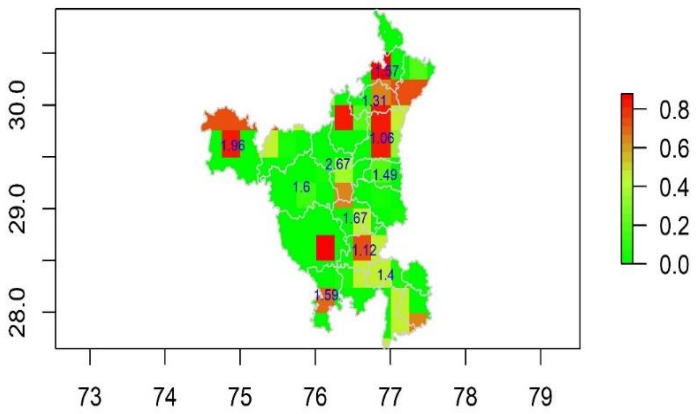
Risk map for Babesiosis in Haryana



Risk map for Theileriosis in Haryana



Risk map for Trypanosomiasis in Haryana



13. APPLICATION OF META ANALYSIS FOR UNDERSTANDING THE DISEASE PREVALENCE

Veterinary World, EISSN: 2231-0916
Available at www.veterinaryworld.org/Vol.11/March-2018/7.pdf

RESEARCH ARTICLE
Open Access

Meta-analysis of classical swine fever prevalence in pigs in India: A 5-year study

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Received: 18-11-2017, **Accepted:** 18-01-2018, **Published online:** 13-03-2018

doi: 10.14202/vetworld.2018.297-303 **How to cite this article:** Patil SS, Suresh KP, Saha S, Prajapati A, Hemadri D, Roy P (2018) Meta-analysis of classical swine fever prevalence in pigs in India: A 5-year study, *Veterinary World*, 11(3): 297-303.

Abstract

Aim: The aim of the study was to determine the overall prevalence of classical swine fever (CSF) in pigs in India, through a systematic review and meta-analysis of published data.

Materials and Methods: Consortium for e-Resources in Agriculture, India, Google Scholar, PubMed, annual reports of All India Coordinated Research Project on Animal Disease Monitoring and Surveillance,and All India Animal Disease database of NIVEDI (NADRES) were used for searching and retrieval of CSF prevalence data (seroprevalence, virus antigen, and virus nucleic acid detection) in India using a search strategy combining keywords and related database-specific subject terms from January 2011 to December 2015 in English only.

Results: A total of 22 data reports containing 6,158 samples size from 18 states of India were used for the quantitative synthesis, and overall 37% (95% confidence interval [CI]=0.24, 0.51) CSF prevalence in India was estimated. The data were classified into 4 different geographical zones of the country: 20% (95% CI=0.05, 0.55), 31% (95% CI=0.18, 0.47), 55% (95% CI=0.32, 0.76), and 34% (95% CI=0.14, 0.62). CSF prevalence was estimated in northern, eastern, western, and southern regions, respectively.

Conclusion: This study indicates that overall prevalence of CSF in India is much lower than individual published reports.

Keywords: Classical swine fever, India, meta-analysis, pigs, prevalence.

Veterinary World, EISSN: 2231-0916
Available at www.veterinaryworld.org/Vol.13/January-2020/12.pdf

RESEARCH ARTICLE
Open Access

Meta-analysis of the prevalence of livestock diseases in North Eastern Region of India

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Received: 26-07-2019, **Accepted:** 22-11-2019, **Published online:** 11-01-2020

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Abstract

Aim: The study aimed to determine the overall prevalence of livestock diseases in North Eastern Region (NER) of India, through a systematic review and meta-analysis of published data.

Materials and Methods: The articles used for the study were retrieved from PubMed, J-Gate Plus, Indian Journals, and Google scholar, R open-source scripting software 3.4.3. Metafor, Meta. The Chi-square test was conducted to assess for the heterogeneity, forest plot (confidence interval [CI] plot) is a method utilized to present the results of meta-analysis, displaying effect estimate and their CIs for each study were used for searching and retrieval of livestock diseases prevalence data in India using a search strategy combining keywords and related database-specific subject terms from 2008 to 2017 in English only.

Results: The prevalence of various livestock diseases are foot-and-mouth disease (21%), bluetongue (28%), brucellosis in bovine (17%), brucellosis in caprine (2%), brucellosis in porcine (18%), brucellosis in sheep and goat (3%), babesiosis (6%), theileriosis (26%), porcine reproductive and respiratory syndrome (1%), porcine cysticercosis (6%), classical swine fever (31%), *Porcine circovirus* (43%), and Peste des petits ruminants (15%). This information helps policymakers to take appropriate measures to reduce the disease burden.

Conclusion: This study indicates that the overall prevalence of various livestock diseases in NER of India.

Keywords: babesiosis, brucellosis, classical swine fever, foot-and-mouth disease, forest plot, livestock, meta-analysis, North Eastern regions, Peste des petits ruminants, *Porcine circovirus*, porcine cysticercosis, porcine reproductive and respiratory syndrome, prevalence, seroprevalence, theileriosis.

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DOI: 10.22092/ari.2021.356900.1939

Review Article

Peste Des Petits Ruminants in Atypical Hosts and Wildlife: Systematic Review and Meta-Analysis of the Prevalence between 2001 and 2021

SowjanyaKumari, S[1,2], Bhavya, A. P[1], Akshata, N[1], Kumar, K, V[1], Bokade, P. P[1], Suresh, K. P[1], Shome, B. R[1], Balamurugan, V[1] *

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Received 18 November 2021; Accepted 14 December 2021
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Abstract

Peste des petits ruminants (PPR) or goat plague is considered a leading, highly contagious, and most lethal infectious viral disease of small ruminants affecting the worldwide livestock economy and international animal trade. Although sheep and goats are the primarily affected, the PPR Virus (PPRV) host range has expanded to other livestock (large ruminants) and wildlife animals over the last few decades, resulting in serious concern to the ongoing PPR global eradication program, which is primarily optimized, designed, and targeted towards accessible sheep and goat population. A systematic review and meta-analysis study was conducted to estimate the prevalence and spill-over infection of PPRV in large ruminants (bovine and camel) and wildlife. Published articles from 2001 to October 2021 on the "PPR" were searched in four electronic databases of PubMed, Scopus, Science direct, and Google Scholars. The articles were then selected using inclusion criteria (detection/prevalence of PPRV in bovine, camel, and wildlife population), exclusion criteria (only sheep or goats, lack of prevalence data, experimental trial, test evaluation, and reviews written in other languages or published before 2001), and the prevalence was estimated by random effect meta-analysis model. In the current study, all published articles belonged to Africa and Asia. The overall pooled prevalence of PPR estimates was 24% (95% CI: 15-33), with 30% in Asia (95% CI: 14-49) and 20% in Africa (95% CI: 11-30). The overall estimated pooled prevalence at an Africa-Asia level in bovine and camel was 13% (95% CI: 8-19), and in wildlife, it was 52% (95% CI: 30-74) with significant heterogeneity (I^2 = 97%) in most pooled estimates with a high prevalence in atypical hosts and wildlife across Asia and Africa. Over the last two decades, the host range has increased drastically in the wildlife population, even for prevalent PPR in the unnatural hosts only for a short time, contributing to virus persistence in multi-host systems with an impact on PPR control and eradication program. This observation on the epidemiology of the PPRV in unnatural hosts demands appropriate intervention strategies, particularly at the livestock-wildlife interface.

Keywords: PPR; Bovine; Camel; Wildlife; Systemic Review; Meta-analysis, Prevalence

Web Linkhttps://nivedi.res.in/Nadres_v2/bioinfo.php

14. APPLICATION OF BIOINFORMATICS FOR UNDERSTANDING THE DYNAMICS OF LIVESTOCK INFECTIOUS DISEASES

a) An extensive analysis of Codon usage pattern, Evolutionary rate and Phylogeographic reconstruction in Foot and mouth disease (FMD) serotypes (A, Asia 1 and O) of six major climatic zones of India: A Comparative study

Abstract

Foot and mouth disease (FMD) is a major economically important viral disease of clovenmhoofed livestock globally. The FMD virus (FMDV) spreads widely in confined, cool and humid climatic conditions. Being an RNA virus, FMDV is genetically unstable, and its genome evolution is highly influenced by the mutational pressure. The climatic and environmental conditions have a significant impact on mutational pressure. The present study is a primary effort to establish a comprehensive relationship between climatic factors and molecular evolutionary pattern of serotypes FMDV circulating in India. In this study, isolates of three serotypes (A, Asia 1 and O) were selected from six major climatic zones of India (Montane, Humid subtropical, Tropical wet and dry, Tropical wet, Semi-arid and Arid). Based on the full genome nucleotide sequence data, the codon usage bias, evolutionary and phylogeographic analysis were carried out. The study revealed that the codon use bias indicators in the FMDV serotypes differed significantly depending on the climatic zones. It implies that the selection and mutational pressure influence the codon usage pattern indices (eNC, CAI, RCDI, GRAVY, Aromo), with mutational pressure taking precedence in determining the codon usage bias of the FMDV genome. The tMRCA was estimated to be 1960, 1956 and 1961 for Indian FMD virus serotype-A, Asia 1 and O respectively, which is around 17, 29 and 36 years before its actual identification in the field. Virus transmission across the region was evident from phylogeographic analysis. The integrated analysis of codon usage bias, evolutionary rate and phylogeography analysis signifies the major role of mutational and selection pressure, implying that the in FMD virus co-evolution and adaptations are highly influenced by the climatic/environmental factors.

b) Relative Analysis of Codon Usage and Nucleotide Bias between Anthrax Toxin Genes Subsist Inpxo1 Plasmid of *Bacillus Anthracis*

Abstract

Anthrax is an ancient and acuteillness that affects alarge quantity of animal species and is caused by a bacterium *Bacillus anthracis*, which is a rod-shaped, gram-positive and spore forming bacterium. Virulent forms of *B.anthracis* has two large pathogenicity related plasmids pXO1 and pXO2. pXO1 has the different anthrax toxin genes *cya*, *lef*, and *pagA*where as pXO2 has the genes accountable for capsule synthesis and degradation, *capA*, *capB*, *capC*, and *capD*. *B. anthracis* express its pathogenic activity mostly over the capsule and the manufacture of a toxic compound involving three proteins known as edema factor (EF), lethal factor (LF) and protective antigen (PA). These two enormous plasmids of *B.anthracis* are crucial for full pathogenicity, exclusion of either of the plasmids extremely weakens the malignity of *B. anthracis.* In the current study we conducted the relative analysis of the codon usage and nucleotide bias of virulent genes subsist in pXO1 plasmid of *B.anthracis*. Codon usage bias not only plays a substantial role at the extent of gene expression, but also supports to improve the efficacy and accurateness of translation. Codon usage pattern analysis of *B.anthracis* genome is essential for understanding the evolutionary characteristicsin the different species. To examine the codon usage arrangement of

the*B.anthracis*genome, Nucleotide sequences of the virulent genes *viz cya, lef and pag* were collected from National Center for Biotechnology Information (NCBI). The correlations between GC3s, whole GC content, Effective No. of Codons (ENC), Codon Adaptation Index (CAI), Codon Bias Index (CBI), Frequency of Optimal Codons (FOP), General average hydropathicity (Gravy) and Aromaticity (Aroma), of the selected genes were determined. The ENC-plot i.e., ENc values vs GC3s, Pr2 plot i.e., relationship between A3 / (A3 +T3) and G3 / (G3 +C3), Neutrality plot i.e., GC12 versus GC3s, and the RSCU of the genes, all shows codon usage bias existence in all the virulent genes subsists in pXO1 plasmid of *B.anthracis* genome. These results expresses the codon usage bias existing in the pXO1 plasmid's virulent genes of *B.anthracis*genome could be utilized for further exploration on their evolutionary analysis as in design of primers, design of transgenes, determine of origin of species as well as prediction of gene expression level and gene function.

c) Reverse vaccinology based *in silico* analysis of Epitope prediction in *cya, lef*and*pagA*genes from *Bacillus anthracis* against Anthrax infected species: An Immunoinformatics approach

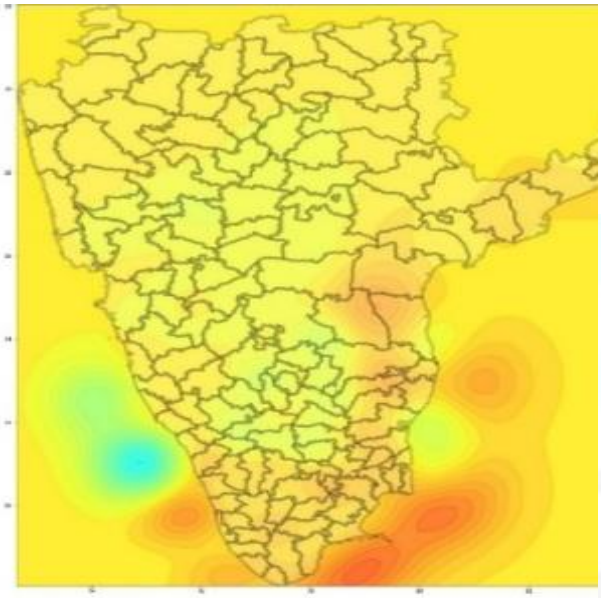
Abstract

Bacillus anthracis is a Gram-positive spore-forming bacterium that causes the zoonotic disease: anthrax, an abrupt illness that disproportionately impacts grazing livestock and wild ruminants. Anthrax's geographical reach despite years of research on anthrax epizootic and epidemics behaviour, to date, remains to be elucidated. Existing therapeutics, however, are ineffective in combating this infectious disease, necessitating the development of a better vaccine to pause the pandemic using immunoinformatics approaches, this study intended to predict an efficient epitope for a vaccine against anthrax in animals and humans of the toxin genes such as cya, lef and pagA of *B.anthracis* against anthrax. The B-cell and T-cell epitopes were predicted utilizing various bioinformatics tools/software and docking analysis was performed. Consequently, it was found that the evaluated epitopes had no allergenicity, no toxicity and had high antigenicity that provides an effectual and most rapid technique to estimate peptide synthetic vaccines to impede anthrax.

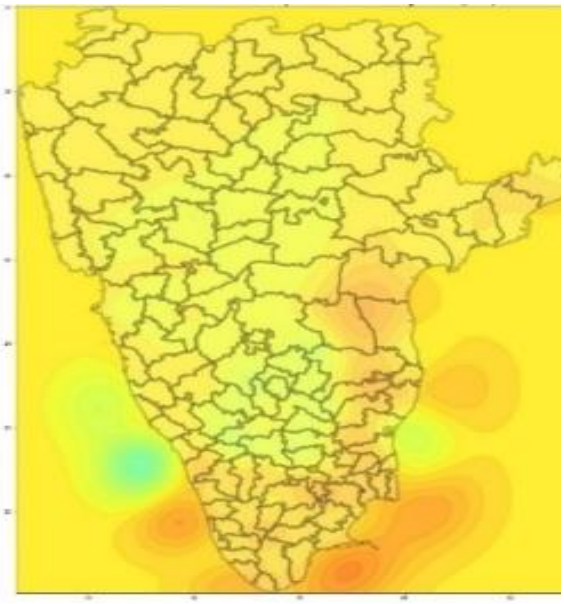
15. IMPACT OF CLIMATE CHANGE ON LIVESTOCK DISEASEINCIDENCE

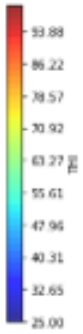
15.1 Southern StatesTemperature Humidity Index (THI) 2001-2021

THI for 2001

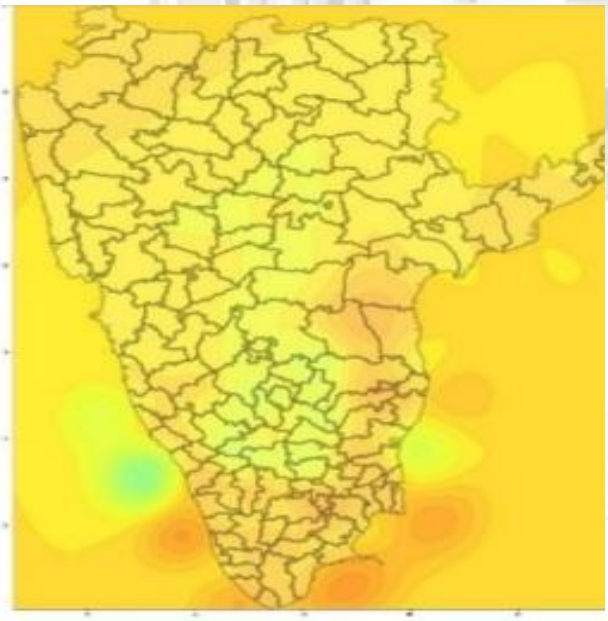


THI for 2011

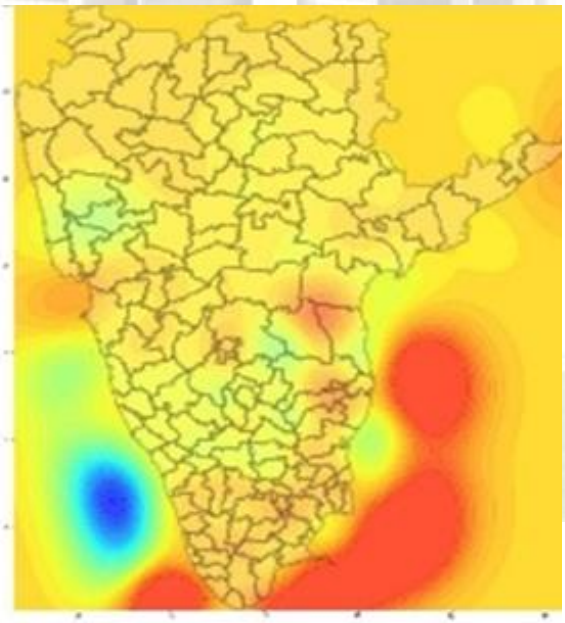




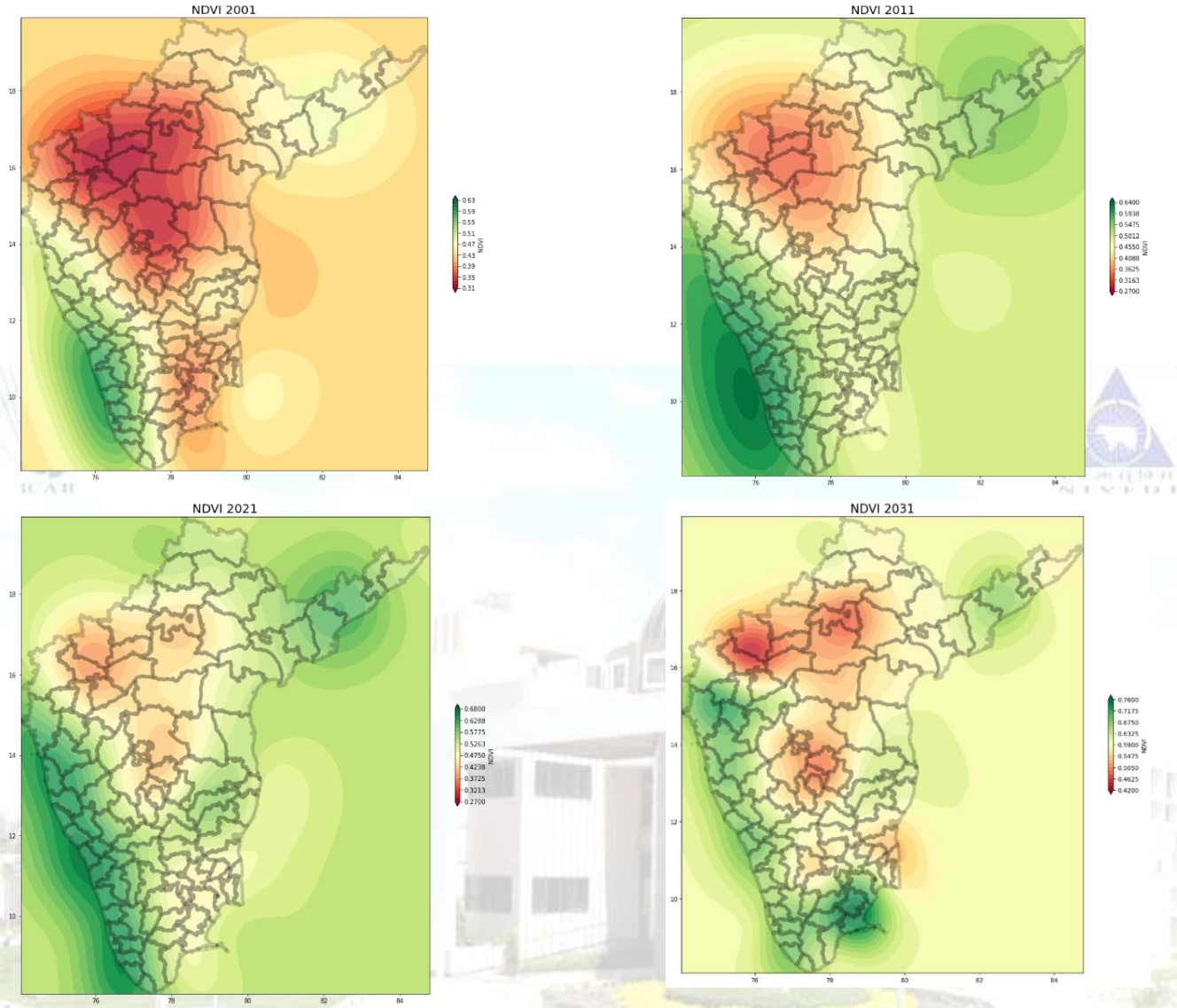
THI for 2021



THI for 2023 (Predicted)

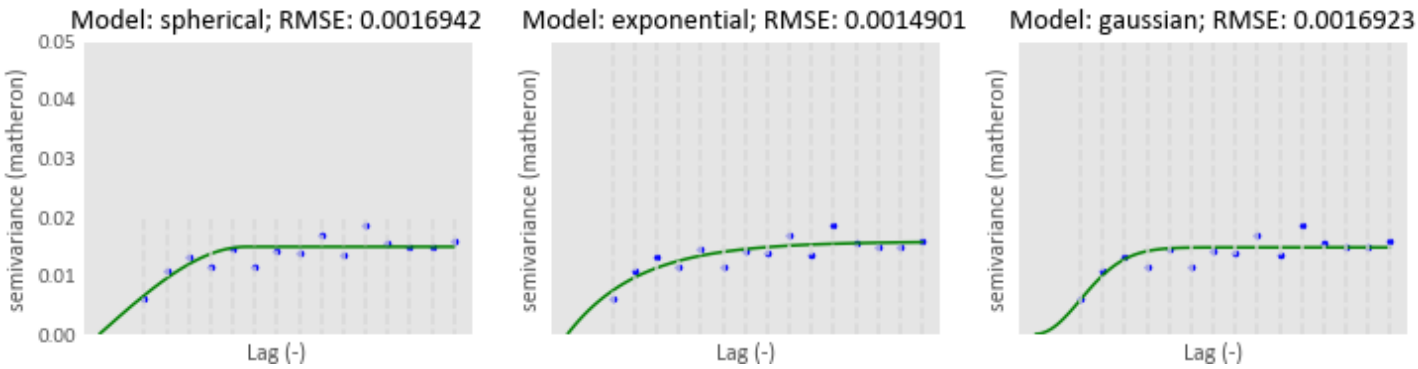


15.2. Southern States Normalized DifferenceVegitation Index (NDVI)



Best fit Variogram model for NDVI:

After comparing various variogram models, we could choose the one that would fit kriging the best based on the RMSE value. Based on the result with the lowest RMSE, we may say that the exponential model was best specified.



Kriging Results

Models:

- **Ordinary Kriging**: Ordinary Kriging is a spatial estimation method where the error variance is minimized
- **variogram_model:** Gaussian Model
  p·(1−e−d2(47r)2)+n

  Variables are defined as:

  dd = distance values at which to calculate the variogram

  pp = partial sill (psill = sill - nugget)

  rr = range

  nn = nugget

  ss = scaling factor or slope

  ee = exponent for power model

- **Spatial data:10km/grid**

- **THI (Temperature Humidity Index) data:** The THI data Generate using Air Temperature and Relative Humidity and the Following equation
  THI= (1.8*AT+32)-[(0.0055-0055*RH)*(1.8*AT-26)]
  AT: Airtemparture
  RH: Relative Humidity

APPENDIX
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	:	HaemorrhagicSepticaemia
PPR	:	Peste des Petits Ruminants
SGP	:	Sheep and Goat pox
CSF	:	Classical 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

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ICAR - National Institute of Veterinary Epidemiology and Disease Informatics

Customer/Client Feedback Form

Feedback for the Livestock Diseases Risk Forewarning Bulletin of October-2022, Volume 10 and Issue 10

(Please return this duly fill in after receiving the outbreak report of December-2022)

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

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

**Details may be written here.

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

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:

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

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