

**ICAR-National Institute of Veterinary Epidemiology and Disease Informatics  
(ICAR-NIVEDI)**

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**LIVESTOCK DISEASE FOREWARNING BULLETIN- September 2017**

**(SIMPLIFIED SOLUTION! MAGNIFIED OPPORTUNITY!)**

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**Prepared By:** Dr. K. P. Suresh  
Dr. Divakar Hemadri  
Dr. S.S. Patil



# Disclaimer

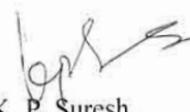
The forewarnings are based on the retrospective disease data available in the NADRES database. Hence, for those states wherein data is limited/less, the forewarning may not be realistic. Further the forewarning will not take into consideration the control measures that are *in situ*.

## Acknowledgement

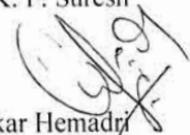
We would like to express sincere everlasting gratitude to honourable Deputy Director-General (Animal Sciences) for his constant encouragement and guidance.

Animal Husbandry Department of various state governments and also AICRP centers of ADMAS are gratefully acknowledged for the timely report of disease outbreak data. We are thankful to all the scientific and technical staff of NIVEDI for their feedback and support.

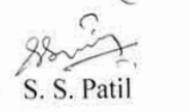
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K. P. Suresh



Divakar Hemadri



S. S. Patil

  
Project Coordinator on ADMAS & Director NIVEDI

निदेशक / Director

राष्ट्रीय पशुरोग जानपदिक एवं सूचना विज्ञान संस्थान

National Institute of Veterinary Epidemiology and Disease Informatics

पोस्ट बाक्स स-६४५० / Post Box No. 6450

रामगोडनहल्लि / Ramagondanahalli

बैंगलुरु-५६० ०६४ / Bengaluru-560 064

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## **1. Introduction**

The National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) is a dedicated institute for veterinary epidemiology and disease informatics. The institute has played vital role in eradication and containment of various livestock diseases in India. With changing national and international scenarios the animal health is a priority for nation's economy and human health.

Livestock sector also plays a critical role in the welfare of India's rural population. This enterprise provides a flow of essential food products, draught power, manure, employment, income and export earnings as it is an important component in poverty alleviation programmes. Livestock development programmes cannot succeed unless a well-organized animal health service is built up and protection of livestock against diseases and pests particularly against the deadly infections is assured. India has achieved eradication of rinderpest (RP), CBPP, AHS and Dourine. However, there are several other infectious and non-infectious diseases prevailing in the country causing huge economic loss annually. Prevention, control and eradication of the animal diseases need a thorough understanding of the epidemiology as well their economic impact. ICAR-NIVEDI has identified priority diseases based on previous 10 year incidence patterns and has built a strong database of these priority diseases starting from 1987. Internal validation was done using 10 years data.

The said database is the backbone of National Animal Disease Referral Expert System (NADRES), the interactive, dynamic, online animal health and disease forewarning system.

## **2. NADRES Forewarning Procedure**

The Planning Commission has categorised 15 agro-climatic zones in India, taking into account the physical attributes and socio-economic conditions prevailing in the regions, it implies a high degree of diversity to support the growth of broad range of organisms.

Automation for Disease prediction was developed using R software (Appendix A). A skeleton code was developed to predict, represent and interpret the disease outbreak. NADRES database was connected to retrieve the previous 10 years outbreak data which was further linked to the master chart consisting of Demographic, Agro-economic, Remote sensing and Meteorological information to update the outbreak status.

Meteorological variables such as precipitation (mm), pressure (millibar), relative humidity(%), sea level pressure(millibar), minimum temperature ( $^{\circ}\text{C}$ ), maximum temperature( $^{\circ}\text{C}$ ), wind speed(m/s), vapour pressure(millibar), soil moisture(%), perceptible water(mm), potential evaporation transpiration(mm) and cloud (okta) extracted from **NCEP**-National centre environmental prediction/**IMD**-Indian Meteorological Database/**NICRA**-National Innovation Climate Resilient Agriculture and other sources while Remote sensing variables such as NDVI-Normalised difference vegetation index and LST-Land surface temperature( $^{\circ}\text{C}$ ) was calculated using MODIS /LANDSAT/IRS satellite images.

Disease outbreak was Predicted by Generalised Linear Model (Logistic Regression) and the probability of disease outbreak was categorised in 6 risk levels- No risk(NR), Very low risk(VLR), Low risk(LR), Moderate risk(MR), High risk(VHR) and Very high risk(HR). The stake holders (DADF and State Animal Husbandry departments) of the country are advised to take appropriate disease control measures.

### 3. Accuracy of Prediction.

Serial No.	Diseases	Accuracy (%)
1.	Anthrax	94.44
2.	Babesiosis	96.91
3.	Black Quarter	92.59
4.	Bluetongue	98.45
5.	Enterotoxaemia	96.91
6.	Fascioliasis	96.91
7.	Foot and mouth disease	87.03
8.	Haemorrhagic septicaemia	88.58
9.	Peste des petits ruminants	91.35
10.	Sheep & Goat pox	95.21
11.	Swine fever	96.29
12.	Theileriosis	94.75
13.	Trypanosomiasis	92.90



- 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% except Foot and mouth disease (87.03%) and Haemorrhagic septicaemia (88.58%).
- Probability distribution of risk prediction.

Serial No.	Probability of risk	Interpretations
1	0	No risk/No or inadequate data
2	0-0.20	Very low risk
3	0.21-0.40	Low risk
4	0.41-0.60	Moderate risk
5	0.61-0.80	High risk
6	0.81-1.00	Very high risk



#### 4. Forewarning of livestock disease for the month of September 2017

##### i) District wise Livestock Disease forewarning:

##### District wise Livestock Disease forewarning for September 2017: Andaman and Nicobar

Districts of Andaman and Nicobar	Livestock Diseases												
	Anthr ax	Babes iosis	BQ	BT	ET	Fascio liasis	FMD	HS	PPR	S&G Pox	SF	Theile riosis	Trypano somiasis
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	VHR	NR

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

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



## District wise Livestock Disease forewarning for September 2017: Andhra Pradesh

Districts of Andhra Pradesh	Livestock Diseases												
	Anthr ax	Babes iosis	BQ	BT	ET	Fascio liasis	FMD	HS	PPR	S&G Pox	SF	Theile riosis	Trypano somiasis
Anantapur	VLR	NR	MR	LR	VHR	NR	VLR	VHR	HR	VHR	NR	NR	NR
Chittoor	VHR	NR	LR	VLR	VHR	NR	LR	MR	MR	VHR	NR	NR	NR
East Godavari	NR	NR	MR	LR	VLR	NR	HR	VHR	VLR	LR	NR	NR	NR
Guntur	VLR	NR	NR	HR	LR	NR	HR	HR	LR	LR	NR	NR	NR
Krishna	NR	NR	NR	LR	MR	NR	LR	HR	MR	HR	NR	NR	NR
Kurnool	HR	NR	LR	LR	VHR	NR	LR	MR	VHR	MR	NR	NR	NR
Prakasam	MR	NR	VLR	MR	HR	NR	VLR	VHR	HR	HR	NR	NR	NR
Sri Potti Sriramulu Nellore	VHR	NR	VLR	VHR	HR	NR	LR	VHR	MR	VHR	NR	NR	NR
Srikakulam	LR	NR	LR	LR	LR	NR	VHR	VLR	VLR	LR	NR	NR	NR
Visakhapatnam	VLR	NR	VLR	NR	LR	NR	MR	VHR	LR	LR	NR	NR	NR
Vizianagaram	VLR	NR	VLR	MR	LR	NR	VHR	LR	LR	MR	NR	NR	NR
West Godavari	VLR	NR	LR	NR	HR	NR	LR	HR	MR	MR	NR	NR	NR
Y.S.R.	VHR	NR	NR	LR	VHR	NR	MR	VHR	HR	VHR	NR	NR	NR

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

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

## District wise Livestock Disease forewarning for September 2017: 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	NR	NR	NR	NR	VLR	NR	NR
Kurung Kumey	NR	NR	NR	NR	NR	NR	NR	NR	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	NR	NR	NR	NR	VHR	NR	NR	NR	NR	VLR	NR	NR
Papum Pare	NR	NR	NR	NR	NR	VHR	VLR	NR	NR	NR	NR	NR	NR
Tawang	NR	NR	NR	NR	NR	NR	NR	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	VHR	NR	NR	NR	NR	VLR	NR	NR
West Kameng	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
West Siang	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)

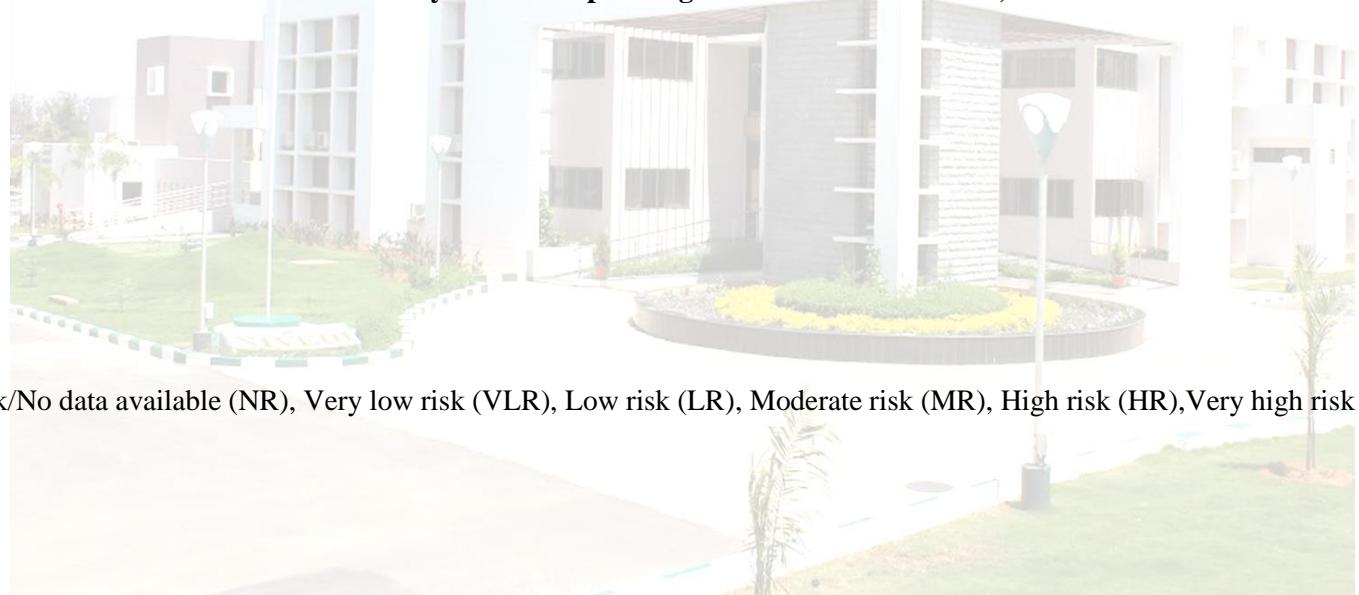
## District wise Livestock Disease forewarning for September 2017: Assam

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

**Continue**

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



## Continue

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

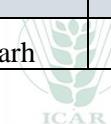
If vaccination is already been done please ignore the disease forecast,for that disease.

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

## District wise Livestock Disease forewarning for September 2017: Chandigarh

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

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



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





## District wise Livestock Disease forewarning for September 2017: Dadra and Nagar Haveli

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

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

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

## District wise Livestock Disease forewarning for September 2017: Daman and Diu

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

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



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



## District wise Livestock Disease forewarning for September 2017: Goa

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

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

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







## District wise Livestock Disease forewarning for September 2017: Himachal Pradesh

Districts of Himachal pradesh	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fascioliasis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Bilaspur	NR	NR	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR
Chamba	NR	NR	NR	NR	NR	NR	NR	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	LR	VLR	NR	NR	NR	NR	NR
Kinnaur	NR	NR	NR	NR	VLR	NR	NR	NR	VLR	VLR	NR	NR	NR
Kullu	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lahul & Spiti	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Mandi	NR	NR	NR	NR	NR	NR	LR	NR	NR	NR	NR	NR	NR
Shimla	NR	NR	VLR	NR	VLR	NR	VLR	VLR	VLR	NR	NR	NR	NR
Sirmaur	NR	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR
Solan	NR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR	NR	NR
Una	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

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

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







## Continue

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

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

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



## District wise Livestock Disease forewning for September 2017: Kerala

Districts of Kerala	Livestock Diseases												
	Anthr ax	Babes iosis	BQ	BT	ET	Fascio liasis	FMD	HS	PPR	S&G Pox	SF	Theile riosis	Trypano somiasis
Alappuzha	NR	NR	NR	NR	NR	NR	VHR	VLR	VLR	NR	NR	NR	NR
Ernakulam	VLR	NR	NR	NR	NR	NR	VHR	MR	LR	NR	VLR	NR	NR
Idukki	LR	NR	NR	NR	NR	NR	VHR	LR	VLR	NR	MR	NR	NR
Kannur	LR	NR	NR	NR	NR	NR	VHR	NR	VLR	NR	LR	NR	NR
Kasaragod	NR	NR	NR	NR	NR	NR	HR	NR	VLR	NR	NR	NR	NR
Kollam	LR	NR	VLR	NR	NR	NR	HR	HR	LR	NR	NR	NR	NR
Kottayam	LR	VHR	VLR	NR	NR	NR	VHR	HR	VLR	NR	LR	VHR	NR
Kozhikode	LR	NR	NR	NR	NR	NR	VHR	LR	VLR	NR	VLR	NR	NR
Malappuram	NR	VHR	VLR	NR	NR	NR	HR	VLR	LR	NR	NR	NR	NR
Palakkad	VLR	NR	NR	NR	VLR	NR	VHR	MR	MR	VLR	LR	VHR	NR
Pathanamthitta	MR	NR	NR	NR	NR	NR	VHR	LR	VLR	NR	VLR	VHR	NR
Thiruvananthapuram	LR	NR	NR	NR	NR	NR	VHR	VHR	MR	NR	NR	VHR	NR
Thrissur	MR	NR	NR	NR	VLR	NR	VHR	VHR	LR	LR	LR	VHR	NR
Wayanad	NR	NR	NR	NR	NR	NR	VHR	NR	VLR	NR	MR	NR	NR

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

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



## District wise Livestock Disease forewarning for September 2017: Lakshadweep

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

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



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









Continue

Districts of Maharashtra	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fascioliasis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Raigarh	NR	NR	VLR	NR	NR	NR	NR	VLR	VLR	VLR	NR	NR	NR
Ratnagiri	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sangli	NR	NR	VLR	NR	VLR	NR	NR	VLR	MR	LR	NR	NR	NR
Satara	VLR	NR	LR	NR	VLR	NR	VLR	LR	NR	VLR	VLR	NR	NR
Sindhudurg	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Solapur	NR	NR	VLR	NR	NR	NR	VLR	LR	VLR	VLR	NR	NR	NR
Thane	NR	NR	LR	NR	NR	NR	NR	HR	VLR	NR	NR	NR	NR
Wardha	NR	NR	VLR	NR	NR	NR	NR	NR	VLR	NR	VLR	NR	NR
Washim	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Yavatmal	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

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

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

## District wise Livestock Disease forewarning for September 2017: Manipur

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

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

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

## District wise Livestock Disease forewarning for September 2017: Meghalaya

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

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

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

## District wise Livestock Disease forewarning for September 2017: Mizoram

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

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

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

## District wise Livestock Disease forewarning for September 2017: Nagaland

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

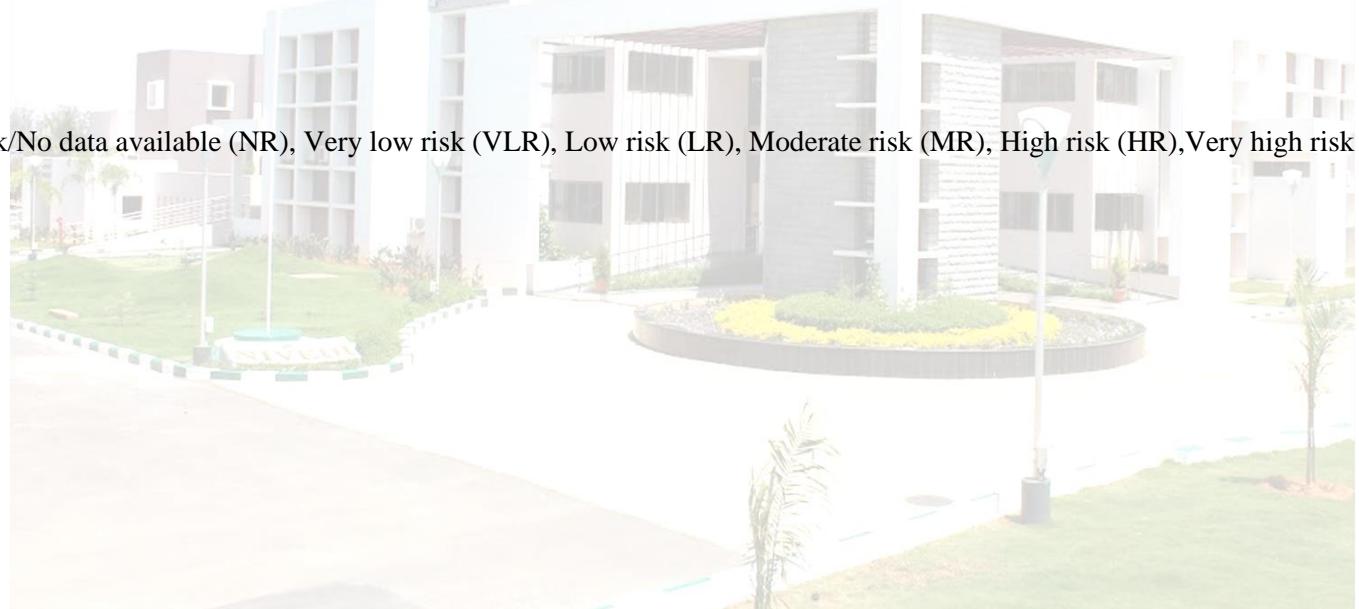
**If vaccination is already been done please ignore the disease forecast,for that disease.**

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

## District wise Livestock Disease forewarning for September 2017: NCT OF DELHI

Districts of Nagaland	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fascioliasis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Central	NR	NR	NR	NR	NR	NR	NR	NR	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	NR	NR	NR	NR	NR	NR	NR
North	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
North East	NR	NR	NR	NR	NR	NR	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	NR	NR	NR	NR	NR	NR	NR
West	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

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



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



Continue

Districts of Odisha	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fascioliasis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Puri	NR	NR	LR	NR	NR	NR	VLR	LR	LR	LR	NR	NR	NR
Rayagada	VLR	VHR	MR	NR	VLR	NR	MR	MR	NR	VLR	NR	NR	NR
Sambalpur	LR	NR	NR	NR	NR	NR	NR	LR	VLR	VLR	NR	NR	NR
Subarnapur	NR	NR	MR	NR	NR	NR	LR	MR	LR	LR	NR	NR	VHR
Sundargarh	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

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

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

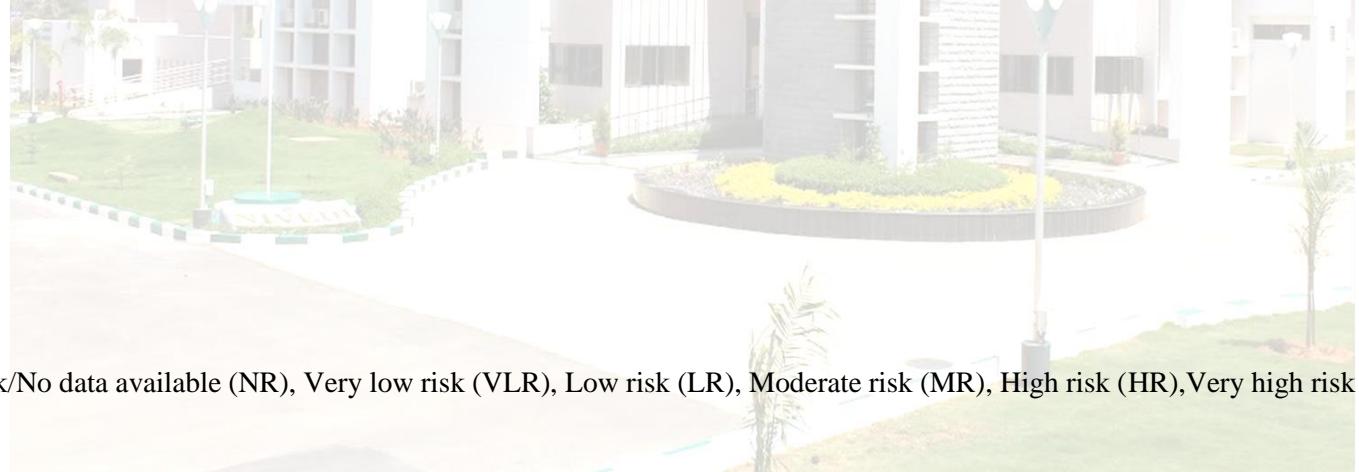


## District wise Livestock Disease forewarning for September 2017: Puducherry



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





**Continue**

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

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



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



Continue

Districts of Tamil Nadu	Livestock Disease												
	Anthr ax	Babes iosis	BQ	BT	ET	Fascio liasis	FMD	HS	PPR	S&G Pox	SF	Theile riosis	Trypano somiasis
Tiruchirappalli	VLR	NR	NR	NR	NR	NR	LR	NR	VLR	NR	NR	NR	NR
Tirunelveli	MR	NR	NR	VLR	VLR	NR	LR	NR	VLR	VLR	NR	NR	NR
Tiruppur	NR	NR	NR	NR	NR	NR	NR	NR	LR	NR	NR	NR	NR
Tiruvannamalai	MR	NR	VLR	NR	NR	NR	HR	NR	LR	NR	NR	NR	NR
Vellore	HR	NR	VLR	NR	VLR	NR	MR	VLR	LR	NR	NR	NR	NR
Viluppuram	HR	NR	MR	NR	VLR	NR	MR	VLR	LR	VLR	VLR	NR	NR
Virudhunagar	VLR	NR	NR	NR	NR	NR	VLR	NR	VLR	VLR	NR	NR	NR

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

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





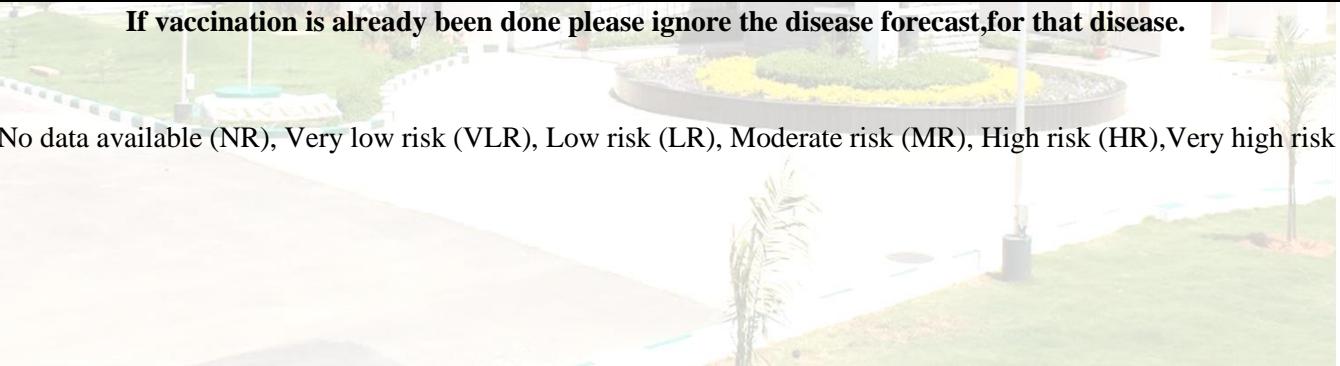
## District wise Livestock Disease forewarning for September 2017: Telangana



Districts of Telangana	Livestock Diseases												
	Anthrax	Babesiosis	BQ	BT	ET	Fascio <li>liasis</li>	FMD	HS	PPR	S&G Pox	SF	Theile riosis	Trypano somiasis
Adilabad	NR	NR	HR	VLR	HR	NR	VLR	HR	VLR	VLR	NR	NR	NR
Hyderabad	NR	NR	NR	NR	NR	NR	VLR	VLR	NR	VLR	NR	NR	NR
Karimnagar	NR	NR	VLR	HR	LR	NR	MR	LR	HR	VHR	NR	NR	VHR
Khammam	VLR	NR	HR	MR	VHR	NR	VHR	HR	VHR	VHR	NR	NR	NR
Mahbubnagar	HR	NR	VHR	HR	HR	NR	NR	VHR	VHR	VHR	NR	NR	NR
Medak	VLR	NR	LR	VHR	MR	NR	NR	VHR	MR	VHR	NR	NR	NR
Nalgonda	MR	NR	LR	HR	HR	NR	VLR	HR	HR	VHR	NR	NR	NR
Nizamabad	LR	NR	VLR	HR	HR	NR	MR	MR	LR	HR	NR	NR	NR
Rangareddy	NR	NR	NR	NR	NR	NR	VLR	NR	NR	NR	NR	NR	NR
Warangal	VLR	NR	LR	MR	MR	NR	VLR	MR	MR	VHR	NR	NR	NR

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

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



## District wise Livestock Disease forewarning for September 2017: Tripura

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

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



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





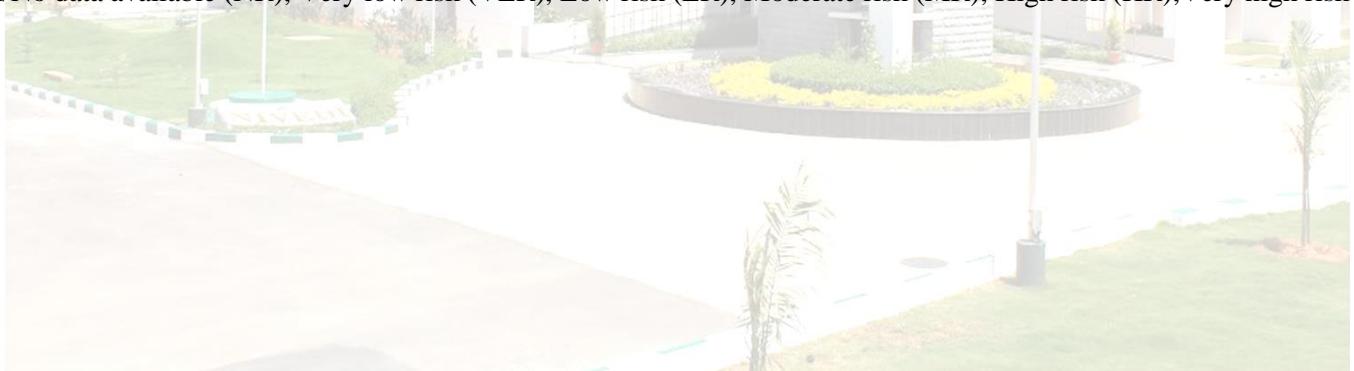


## District wise Livestock Disease forewarning for September 2017: Uttarakhand

Districts of Uttarakhand	Livestock Disease												
	Anthrax	Babesiosis	BQ	BT	ET	Fascio liasis	FMD	HS	PPR	S&G Pox	SF	Theileriosis	Trypanosomiasis
Almora	NR	NR	NR	NR	NR	NR	VLR	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	NR	NR	NR	NR	NR	NR	NR
Champawat	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dehradun	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Garhwal	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hardwar	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nainital	NR	NR	NR	NR	NR	NR	NR	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	NR	NR	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	NR	NR	NR	NR	NR	NR	NR
Uttarkashi	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

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

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







## **Andaman and Nicobar**

All the districts in the state are likely to report Fascioliasis diseases.

## **Andhra Pradesh**

A total of 13 districts in Andhra Pradesh are likely report the major 7 livestock diseases. i.e., Anthrax, Bluetongue, Enterotoxaemia, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des petits ruminants, Sheep & Goat pox in which Haemorrhagic Septicaemia is predicted for 9 districts while Sheep & Goat pox is predicted in all the 6 districts. Anthrax, Peste des petits ruminants and Foot and Mouth Disease are likely to occur in 4 districts. Bluetongue is predicted for 2 districts.

## **Arunachal Pradesh**

A total of 16 districts in Arunachal Pradesh of which 4 districts are likely to report Fascioliasis.

## **Assam**

A total of 27 districts from Assam are likely to report 5 livestock diseases i.e. Babesiosis, Black Quarter, Fascioliasis and Swine Fever in which 8 districts are prone to Black Quarter. 9 districts are prone to Fascioliasis. 3districts are likely to have Swine Fever.2 districts are prone to Black Quarter. Kamrup Metropolitan is the only district prone to Babesiosis.

## **Bihar**

A total of 38 districts in Bihar in which 2 district likely to report Trypanosomiasis.

## **Daman and Diu**

Daman is likely to report Foot and Mouth disease.

## **Gujarat**

A total of 47 districts in Gujarat are likely to report 5 diseases i.e. Fascioliasis, Haemorrhagic Septicaemia, Foot and Mouth disease, Theileriosis and Trypanosomiasis. Haemorrhagic Septicaemia is predicted in 6 districts. 3 districts are prone to Fascioliasis. 2 districts are prone to Foot and Mouth disease and Trypanosomiasis. Amreli is the only district prone to Theileriosis.

## **Haryana**

A total of 21 districts in Haryana likely to report 3 major livestock diseases Babesiosis, Theileriosis and Trypanosomiasis. 2 districts are prone to Babesiosis and Theileriosis. Panipat is the district likely to report Trypanosomiasis.

## **Jammu and Kashmir**

A total of 22 districts in Jammu and Kashmir are likely to report 2 diseases i.e., Foot and Mouth disease and Sheep & Goat pox. Foot and Mouth disease is predicted in 4 districts. Sheep & Goat pox disease is predicted in 5 districts.

## **Jharkhand**

A total of 24 districts in Jharkhand are likely to report 7 diseases i.e., Babesiosis, Fascioliasis, Foot and Mouth disease, Haemorrhagic Septicaemia, Peste de pestis ruminants, Theileriosis and Trypanosomiasis. Babesiosis is likely to occur in 19 districts while Theileriosis and Trypanosomiasis disease are likely to occur in 17 districts. Fascioliasis is predicted in 16 districts. Haemorrhagic Septicaemia and Peste de pestis ruminants are prone in 2 districts.

## **Karnataka**

A total of 30 districts in Karnataka are likely to report 8 diseases i.e., Anthrax, Black Quarter, Bluetongue, Enterotoxaemia, Foot and Mouth disease, Haemorrhagic Septicaemia, Peste des petits ruminants and Sheep & Goat pox. 20 districts are prone to Foot and Mouth disease. 15 districts are prone to Black Quarter and 18 districts are prone to Haemorrhagic Septicaemia. Anthrax is prone to 5 districts. Enterotoxaemia is likely to occur in 4 districts. Sheep & Goat pox is likely to occur in 6 districts. Tumkur is the only district prone to Bluetongue.

## **Kerala**

A total of 14 districts in Kerala are likely to report 4 diseases i.e. Babesiosis, Foot & Mouth disease, Haemorrhagic Septicaemia and Theileriosis. 5 districts are prone to Theileriosis. 14 districts are prone to Foot & Mouth disease. Haemorrhagic Septicaemia are threat to 6 districts. Babesiosis is likely to occur in 2 districts. 4 districts are prone to Theileriosis

## **Madhya Pradesh**

A total of 50 districts in Madhya Pradesh likely to have 5 diseases i.e., Anthrax, Black Quarter, Haemorrhagic Septicaemia, Foot & Mouth disease and Trypanosomiasis. 9 districts are prone to Haemorrhagic Septicaemia. 3 districts are prone to Foot & Mouth disease. 4 districts are prone to Black Quarter and 2 districts to Trypanosomiasis. Shivpuri is the only districts prone to Anthrax.

## **Maharashtra**

A total of 34 districts in Maharashtra are likely to report 5 diseases i.e., Anthrax, Black Quarter, Haemorrhagic Septicaemia, Peste des petits ruminants and Trypanosomiasis. Haemorrhagic Septicaemia disease is threat to 5 districts. Black Quarter is likely to occur in 2 districts while 1districts are prone to Peste des petits ruminants, Anthrax and Trypanosomiasis.

## **Manipur**

A total of 9 districts in Manipur are likely to report Black Quarter, Fascioliasis and Swine fever. 5 districts are prone toFascioliasis.4 district likely to have Swine fever.3 districts are prone to Black Quarter.

## **Meghalaya**

A total of 11 districts in Meghalaya are likely to report 4 diseases i.e., Black Quarter, Foot and Mouth disease, Haemorrhagic Septicaemia and Swine Fever. Black Quarter is predicted in 3 districts.7 districts are prone to Foot and Mouth disease while 5 districts likely to have Swine Fever.

## **Nagaland**

A total of 11districts in Nagaland of which Dimapur district is likely to report Swine Fever.

## **Odisha**

A total of 29 districts in Orissa are likely to report 8 diseases i.e., Anthrax, Babesiosis, Black Quarter, Fascioliasis, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des petits ruminants, Theileriosis and Trypanosomiasis. Babesiosis, Theileriosis and Trypanosomiasis are likely to occur in 5 districts. Fascioliasis and Foot and Mouth Disease is threat for 4 districts. Black Quarter is threat for 3 districts. Haemorrhagic Septicaemia is likely to occur in 2 districts. Koraput is the only district likely to have Anthrax.

## **Puducherry**

A total of 4 districts in Puducherry likely to have 4 diseases 2 districts are prone to Babesiosis 1 district is prone to Fascioliasis, Sheep & Goat pox and Theileriosis.

## **Punjab**

A total of 20 districts in Punjab is likely to report 5 major livestock diseases i.e. Babesiosis, Foot and Mouth Disease, Swine Fever, Theileriosis and Trypanosomiasis. Theileriosis is likely to occur in 9 districts. 2 districts are prone to Babesiosis. 1 district is prone to Foot and Mouth Disease, Swine Fever and Theileriosis.

## **Rajasthan**

A total of 32 districts in Rajasthan are likely to report 5 diseases i.e. Babesiosis, Fascioliasis, Haemorrhagic Septicaemia, Theileriosis and Trypanosomiasis. Haemorrhagic Septicaemia are threat for 2 district. 4 districts are prone to Trypanosomiasis. Sikaris prone to Anthrax. Banswara is prone to Fascioliasis

## **Tamil Nadu**

A total of 31 districts in Tamil Nadu are likely to report 3 diseases i.e., Anthrax, Black Quarter and Foot and Mouth Disease. Anthrax is predicted for 2 districts. 3 districts are likely to have Foot and Mouth Disease. Black Quarter is predicted in 1 districts i.e. Kancheepuram.

## **Telangana**

A total of 10 districts in Telangana are likely report the major 9 livestock disease. i.e., Anthrax, Black Quarter, Bluetongue, Enterotoxaemia, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des petits ruminants, Sheep and Goat pox and Trypanosomiasis; Sheep and Goat pox are predicted in all the 7 districts. Bluetongue, Enterotoxaemia and Haemorrhagic Septicaemia are likely to occur in 5 districts. 4 districts are prone to Peste des petits ruminants. Mahbubnagar districts is prone to Anthrax and Khammam districts is likely to have Trypanosomiasis.



## **Tripura**



Dhalai, North Tripura, South Tripura and West Tripura are likely to report 7 diseases i.e. Babesiosis, Black Quarter, Fascioliasis, Foot and Mouth disease, Haemorrhagic Septicaemia, Sheep & Goat pox and Swine Fever. Babesiosis is likely to occur in all 3 districts. 2 districts are prone to Fascioliasis, Foot and Mouth disease, Haemorrhagic Septicaemia and Swine Fever. West Tripura is prone to Black Quarter and Dhalai is prone to Sheep & Goat pox.

## **Uttar Pradesh**

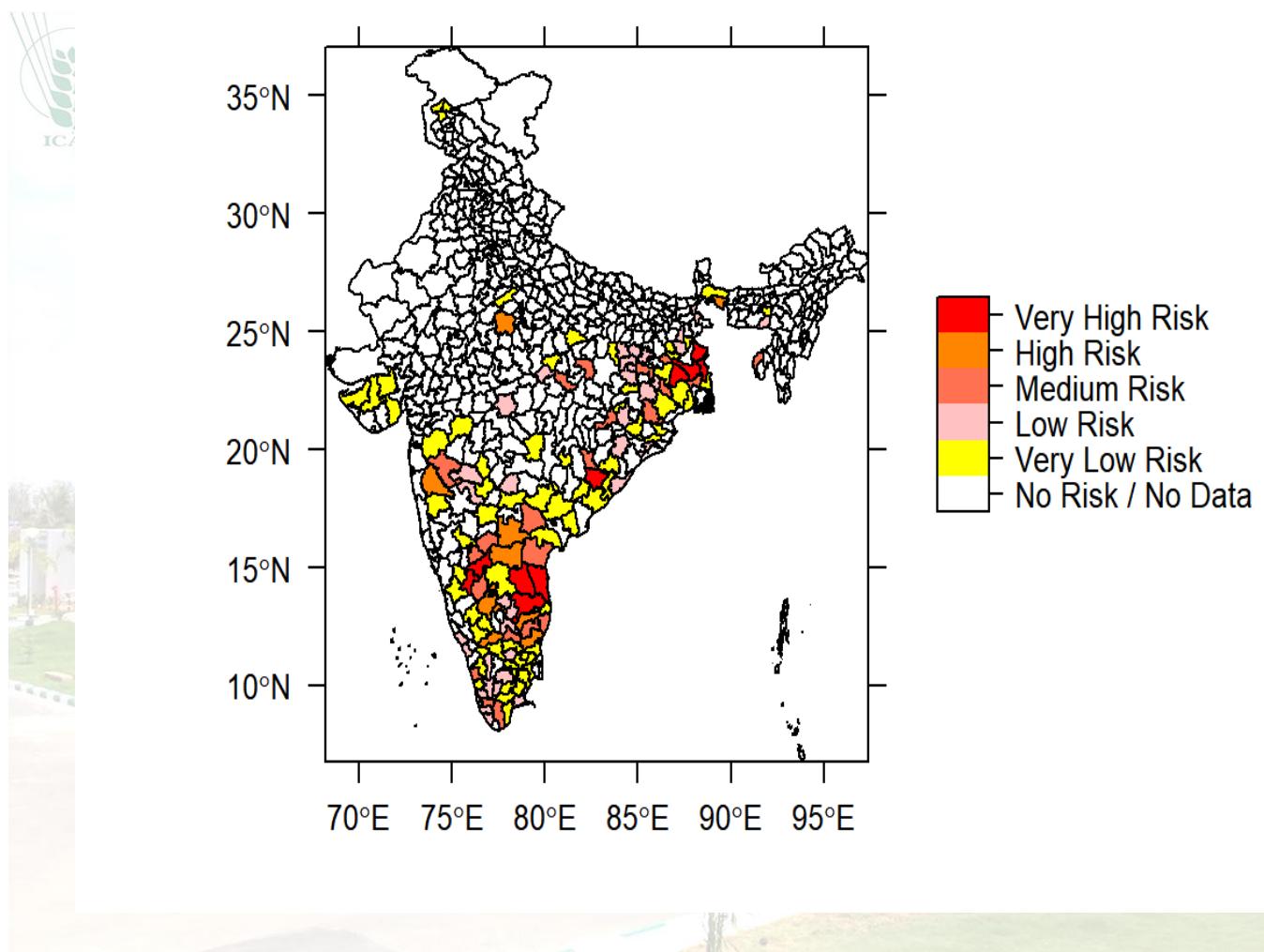
A total of 83 districts in Uttar Pradesh likely to report 4 major livestock diseases i.e. Babesiosis, Fascioliasis, Theileriosis and Trypanosomiasis. Babesiosis and Theileriosis in 2 districts and Fascioliasis in 4 districts. 11 districts likely to have Trypanosomiasis.

## **West Bengal**

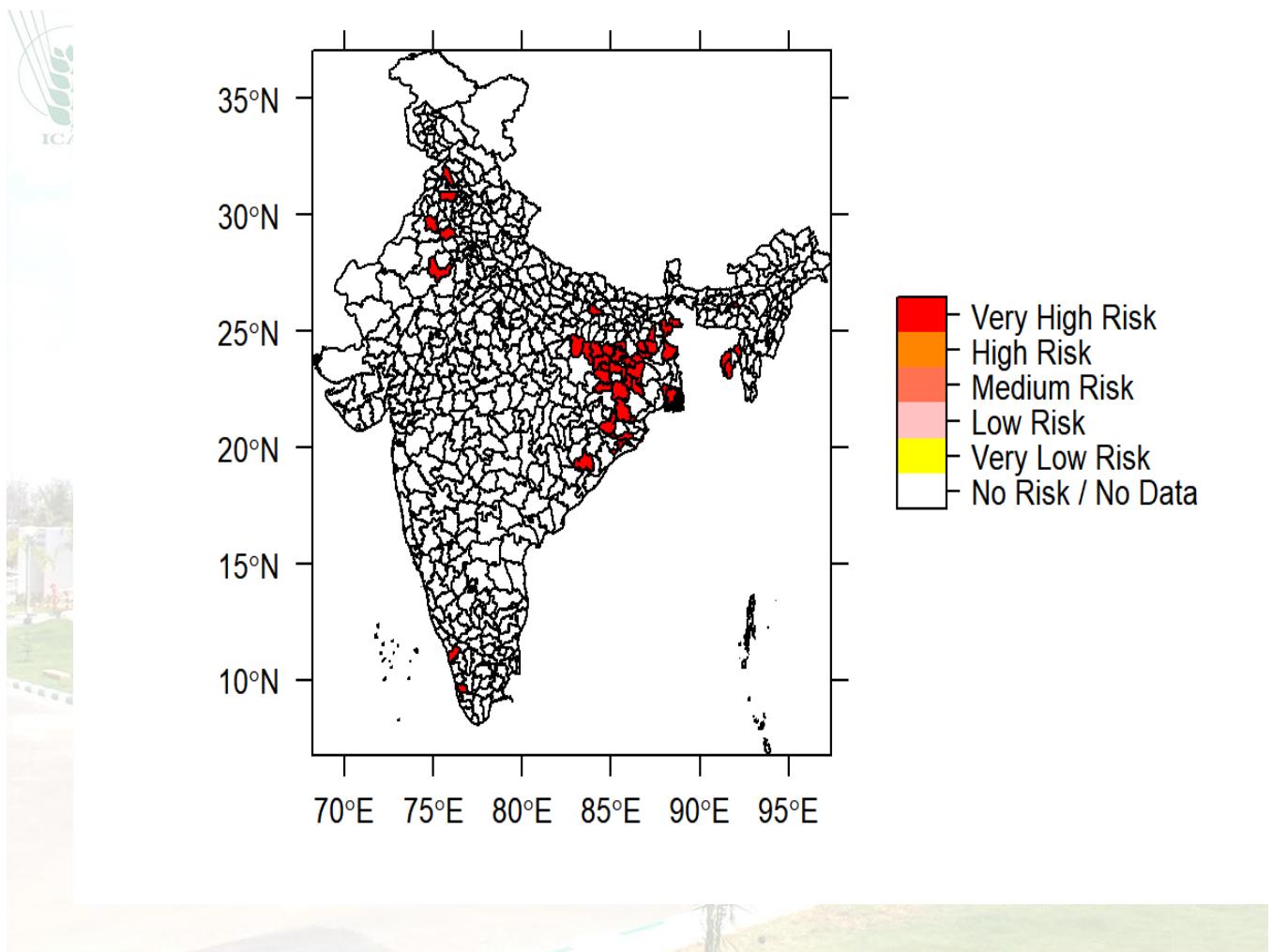
A total of 19 districts in West Bengal are likely to report 10 diseases i.e., Anthrax, Babesiosis, Black Quarter, Fascioliasis, Foot and Mouth Disease, Haemorrhagic Septicaemia, Peste des petits ruminants, Sheep & Goat pox, Theileriosis and Trypanosomiasis. Black Quarter is likely to occur in 14 districts. Peste des petits ruminant's disease is predicted in 13 districts. Foot and Mouth Disease is predicted in 18 districts. Anthrax and Sheep & Goat pox is threat for 5 districts. Babesiosis and Haemorrhagic Septicaemia is likely occur in 6 districts. 2 districts are prone to Theileriosis. Jalpaiguri is prone to Fascioliasis.

### iii) Livestock Risk Prediction - Disease forewarning Maps

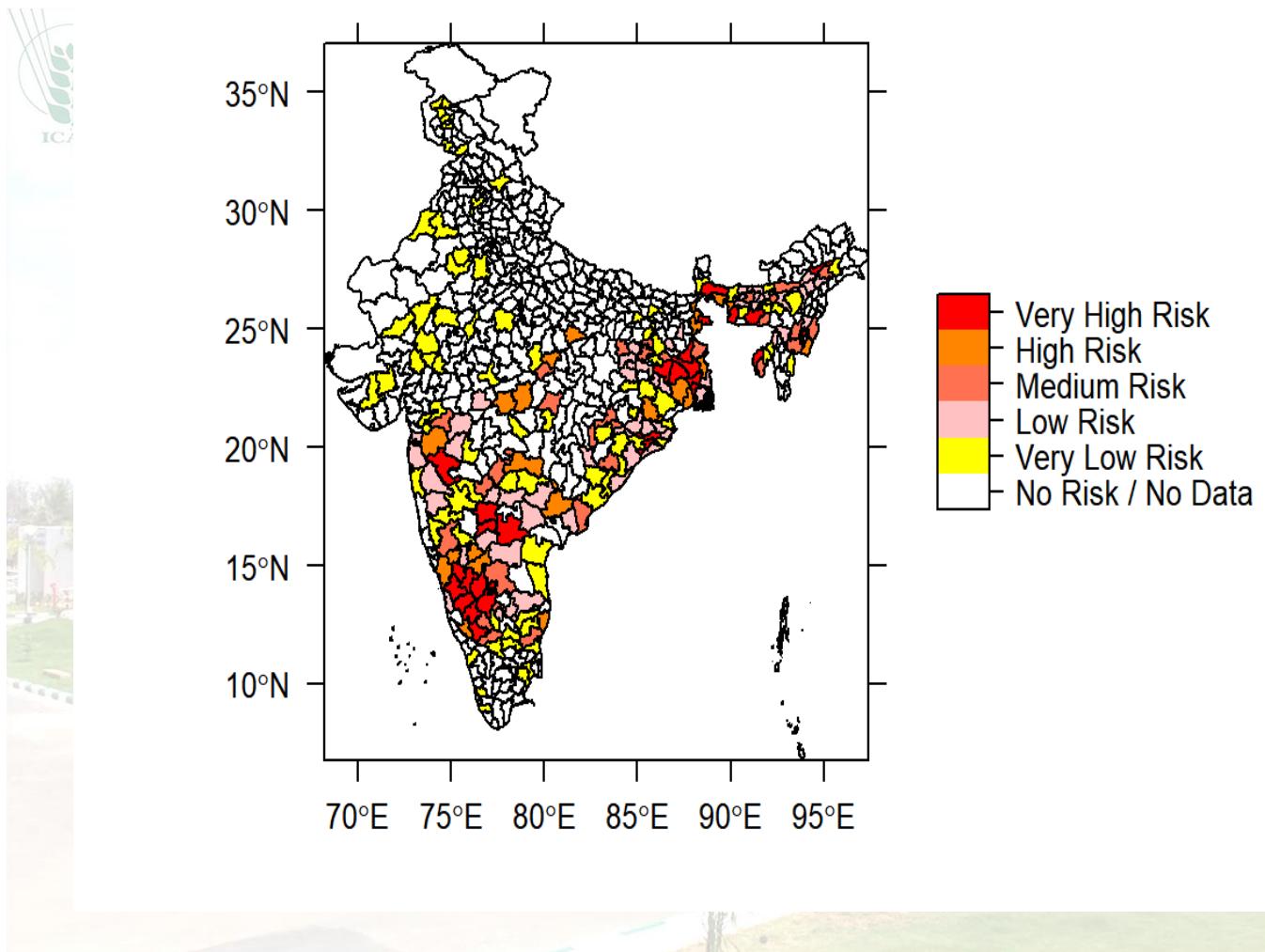
Risk Prediction of Anthrax for the month of September 2017



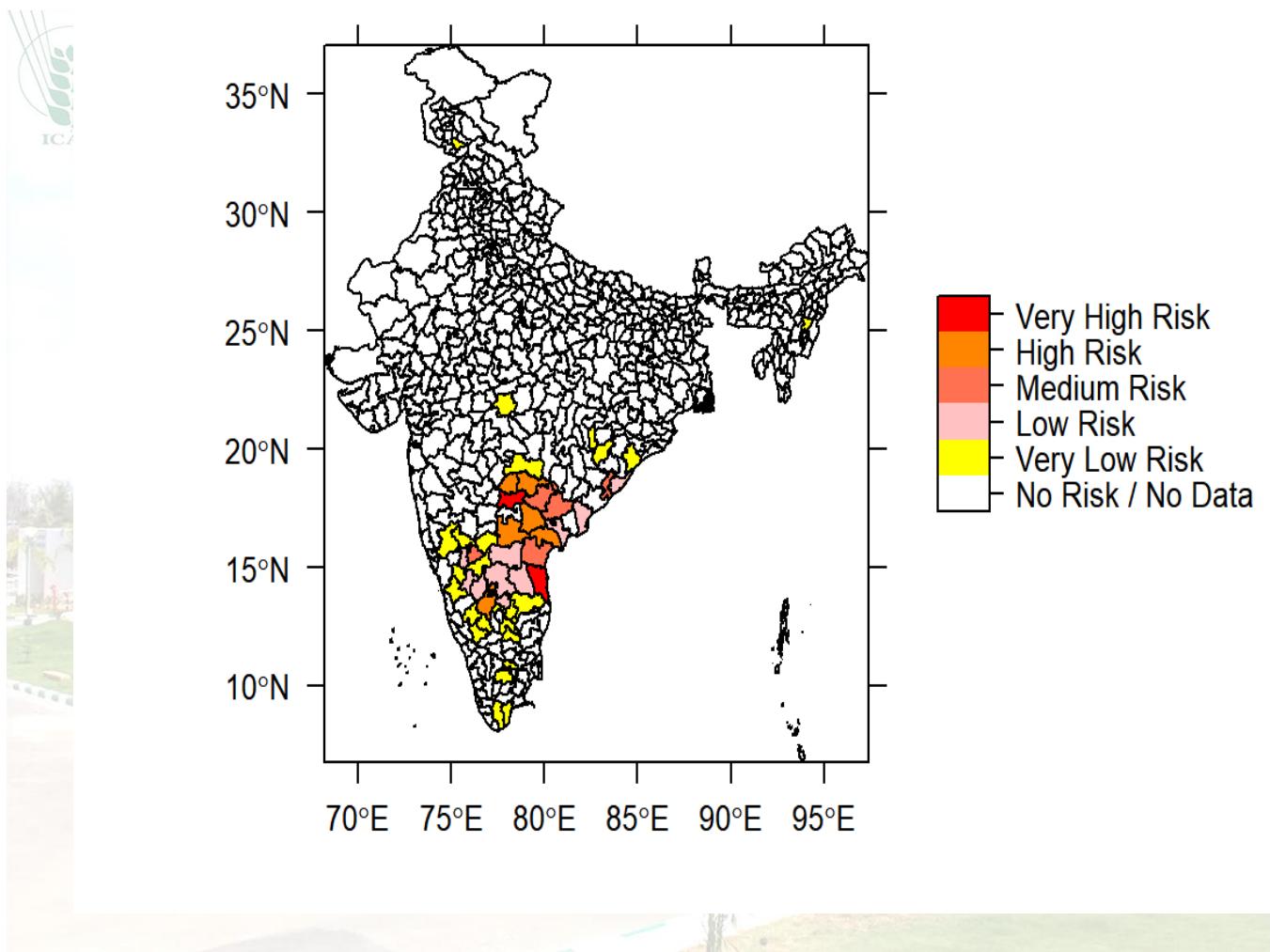
## Risk Prediction of Babesiosis for the month of September 2017



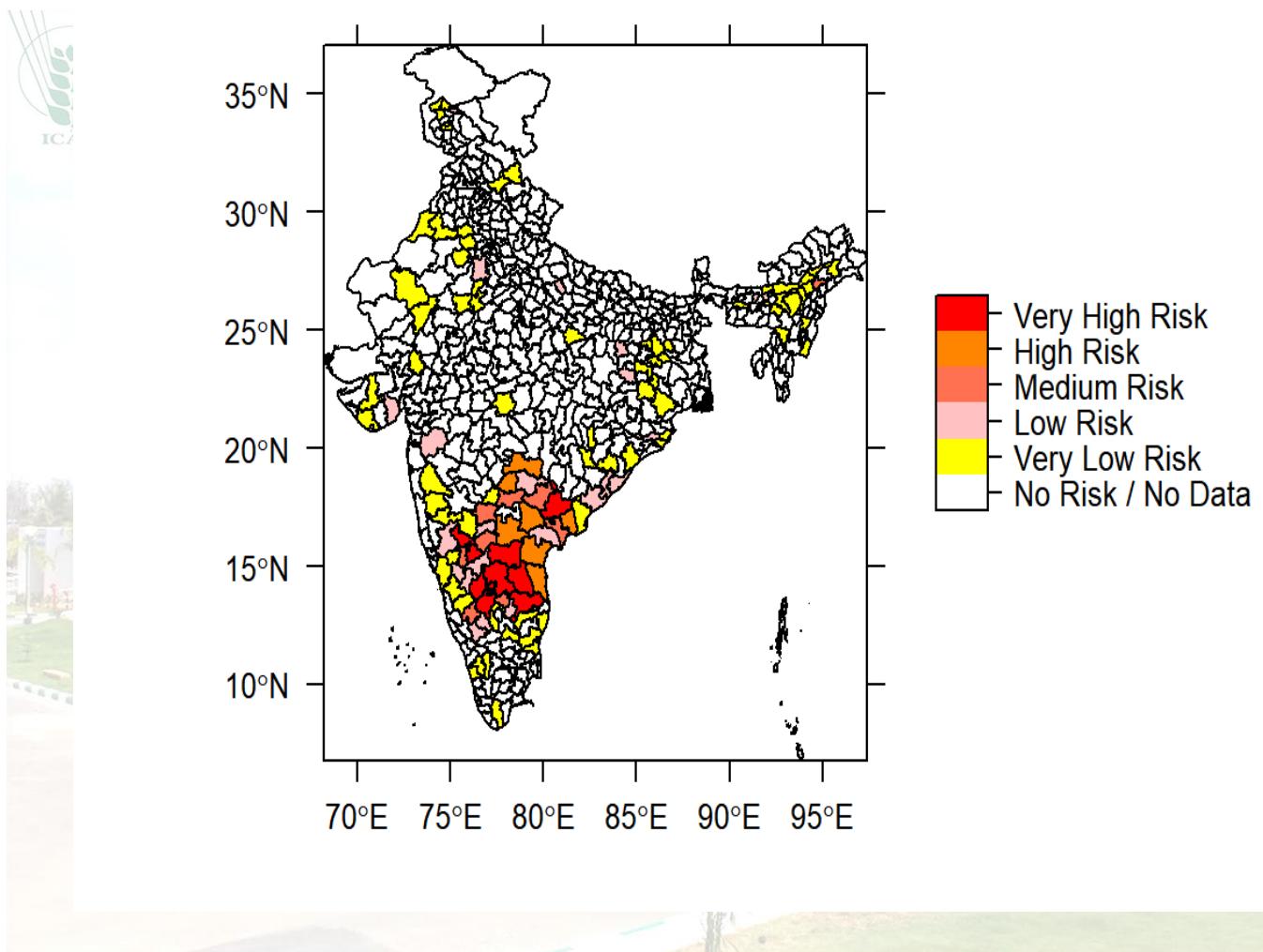
## Risk Prediction of Black quarter for the month of September 2017



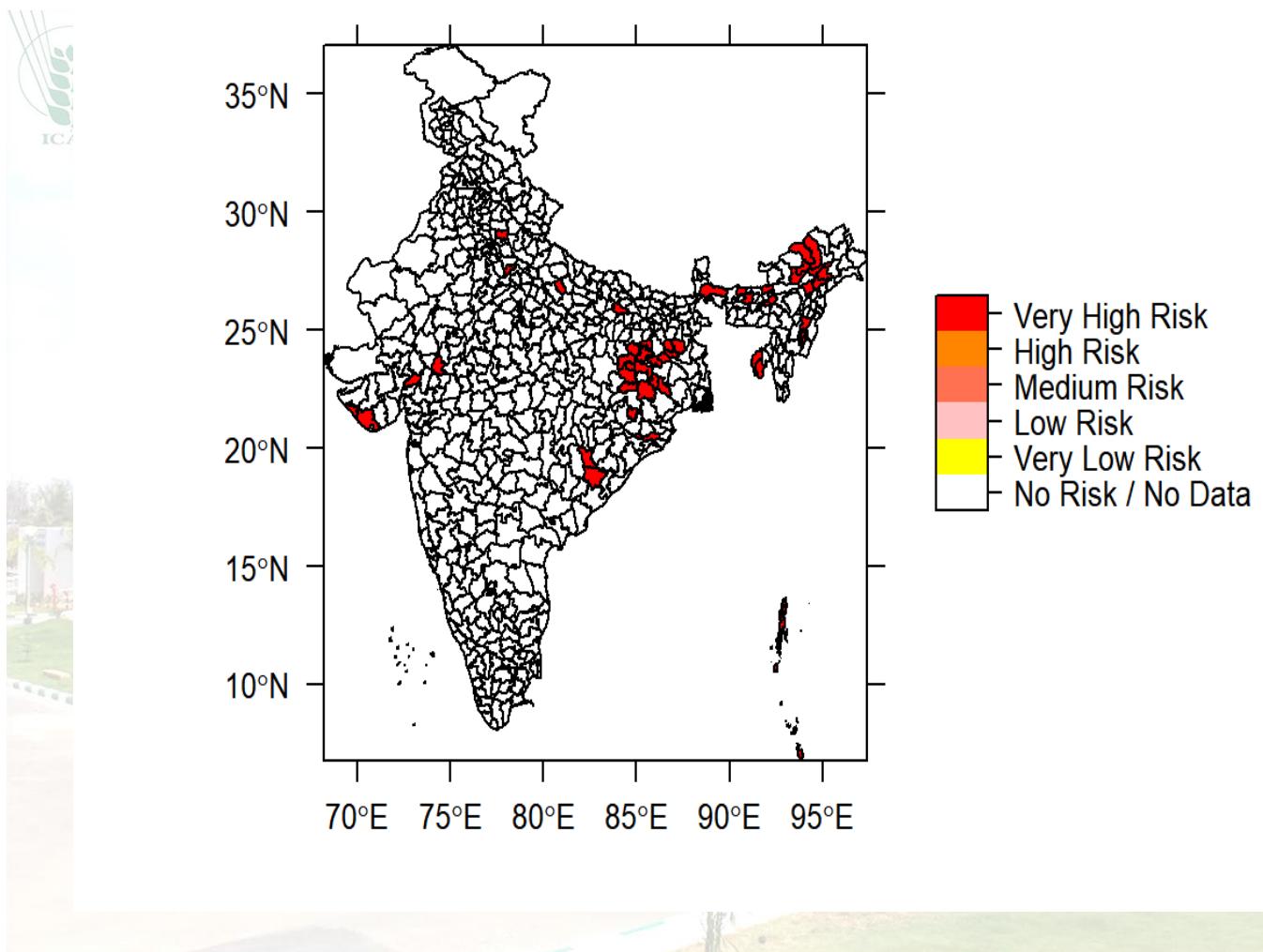
## Risk Prediction of Bluetongue for the month of September 2017



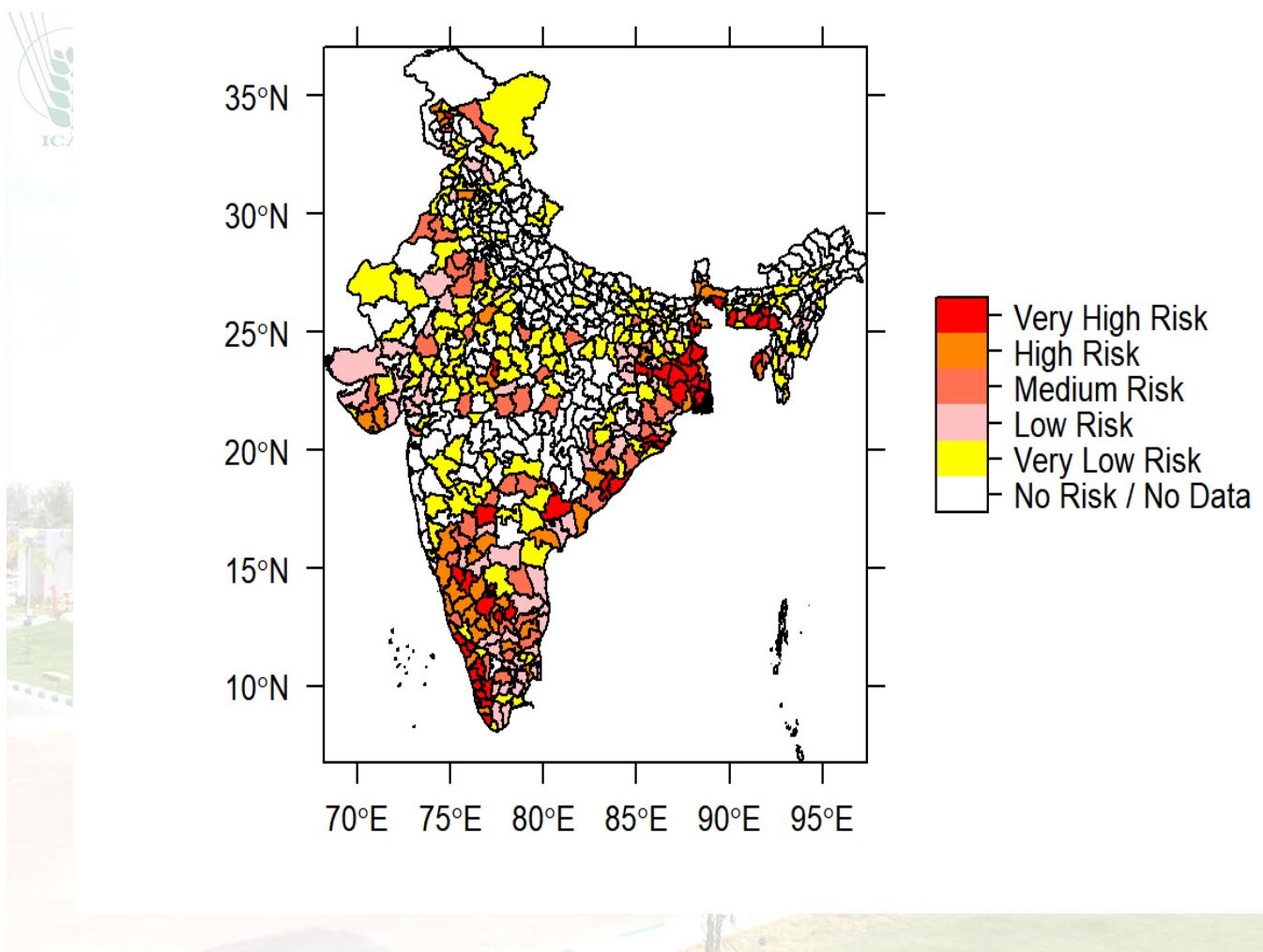
## Risk Prediction of Enterotoxemia for the month of September 2017



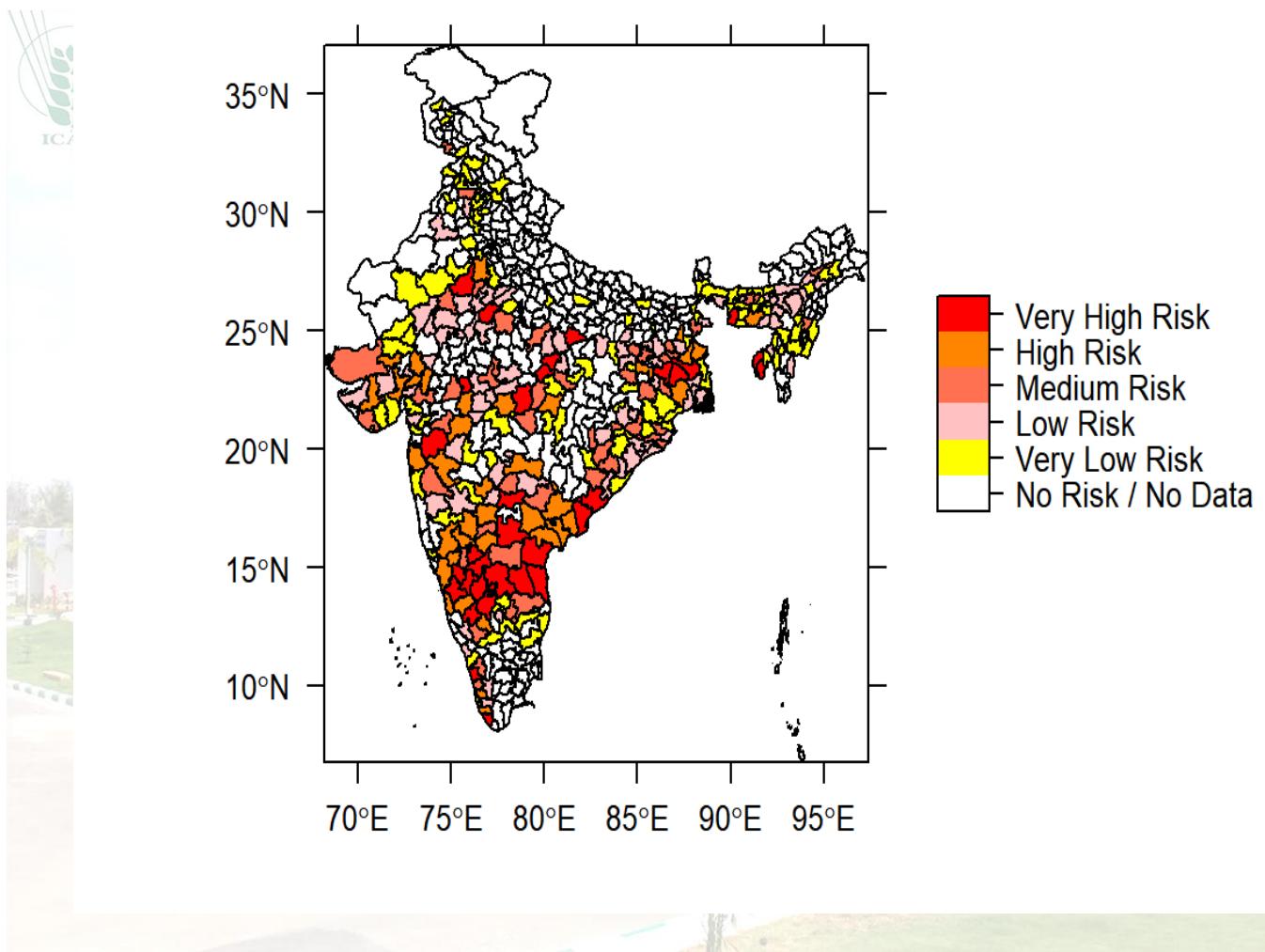
## Risk Prediction of Fascioliasis for the month of September 2017



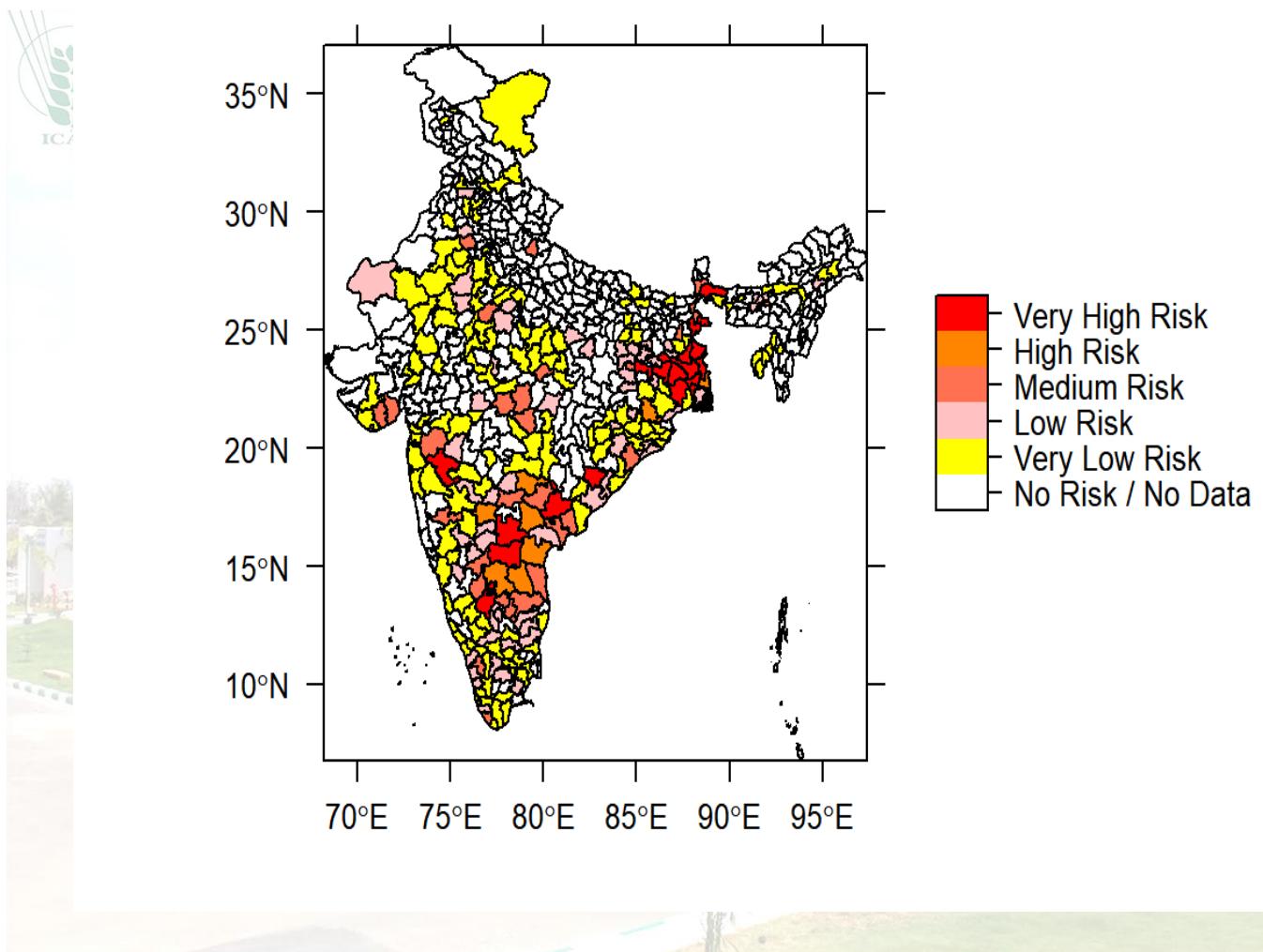
## Risk Prediction of Foot and mouth disease for the month of September 2017



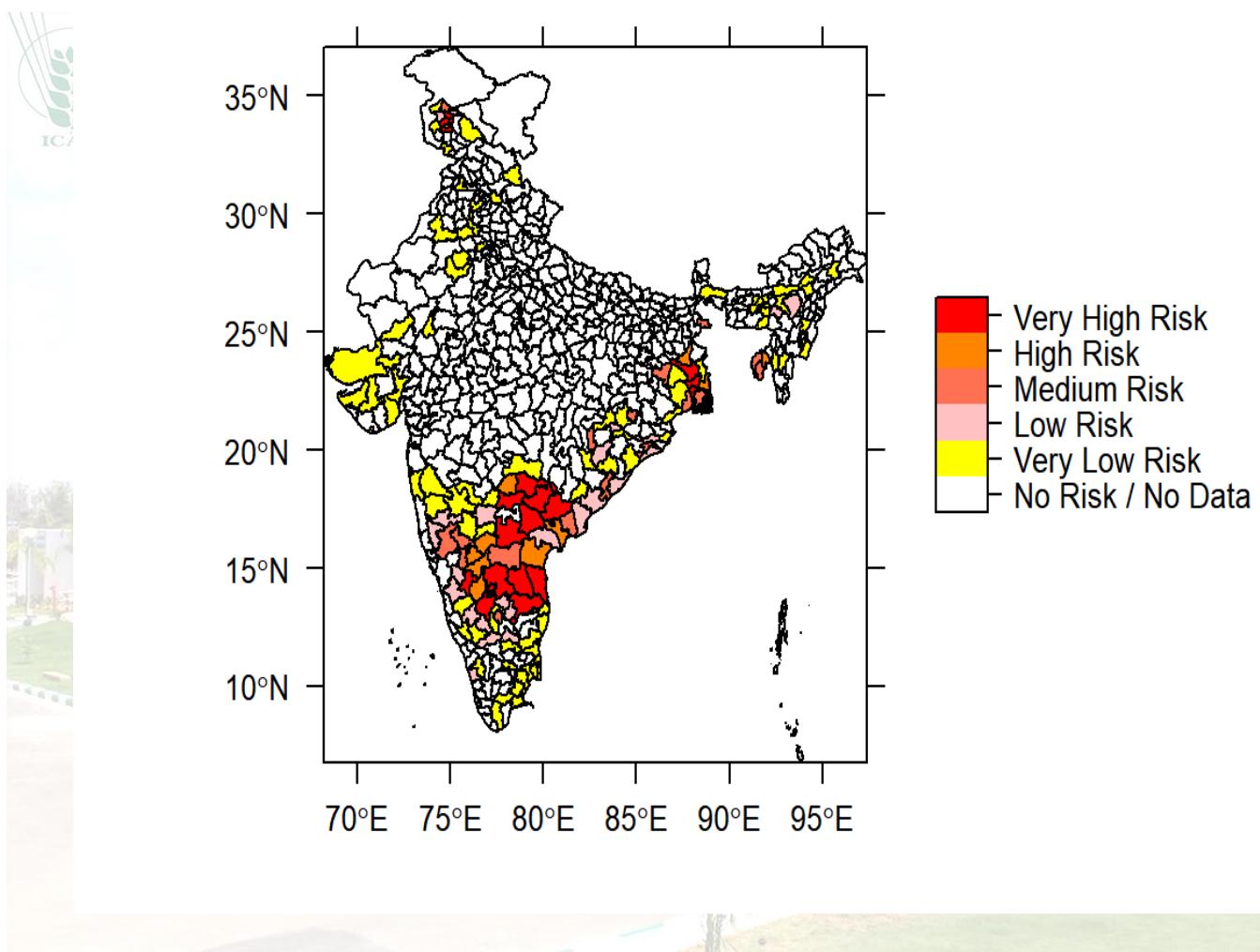
## Risk Prediction of Haemorrhagic septicaemia for the month of September 2017



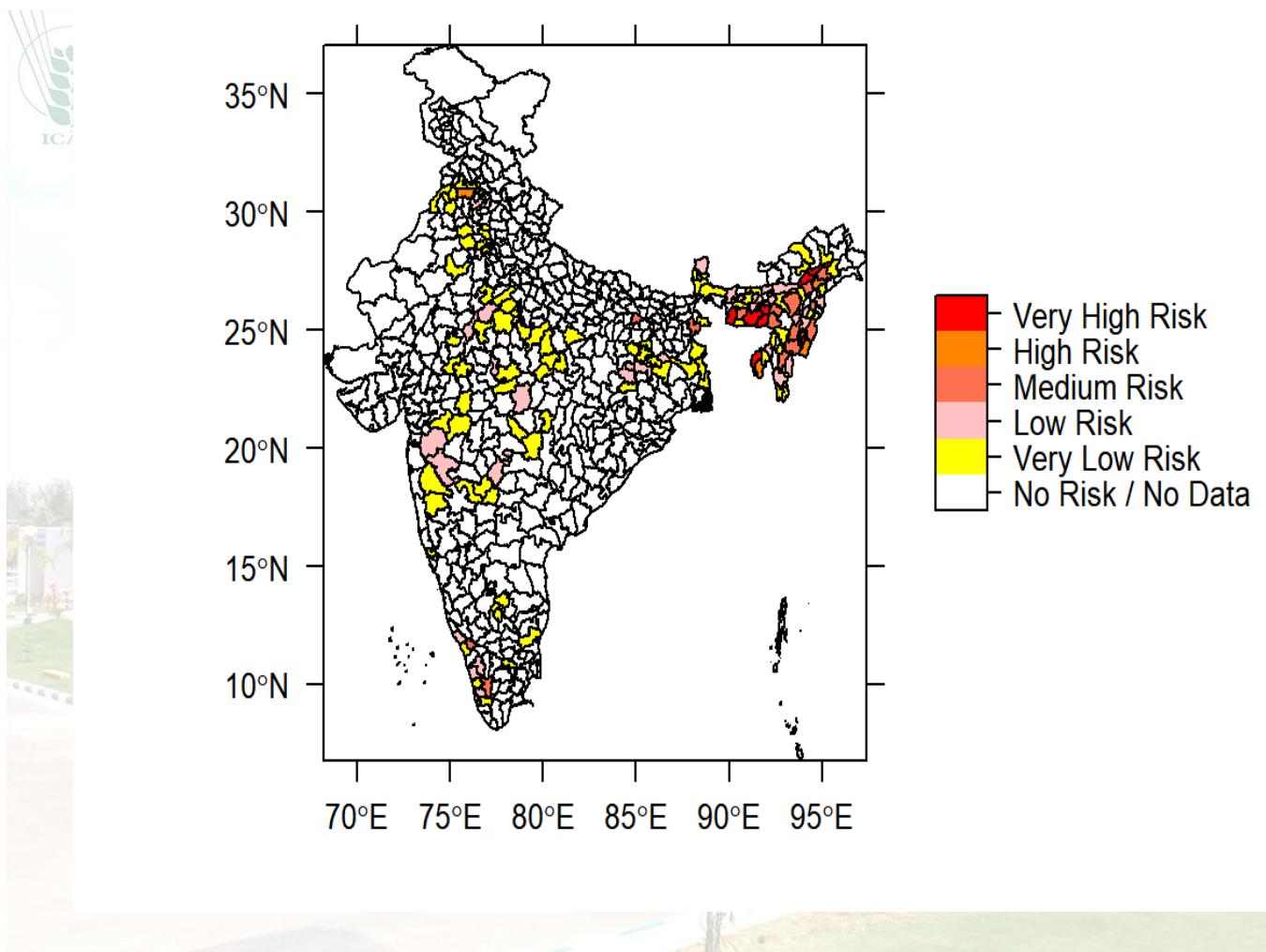
## Risk Prediction of Peste des petits ruminants for the month of September 2017



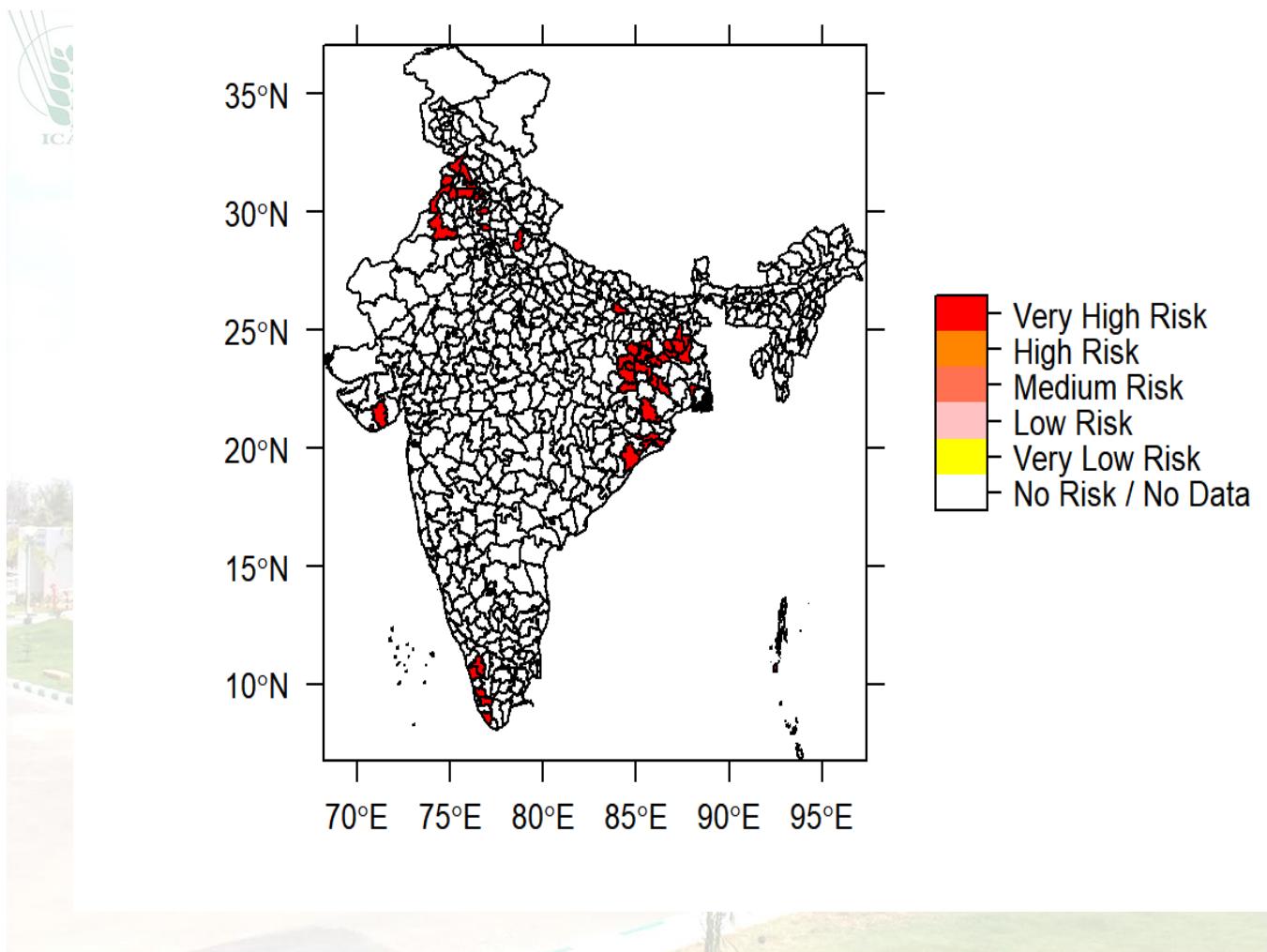
## Risk Prediction of Sheep and Goat pox for the month of September 2017



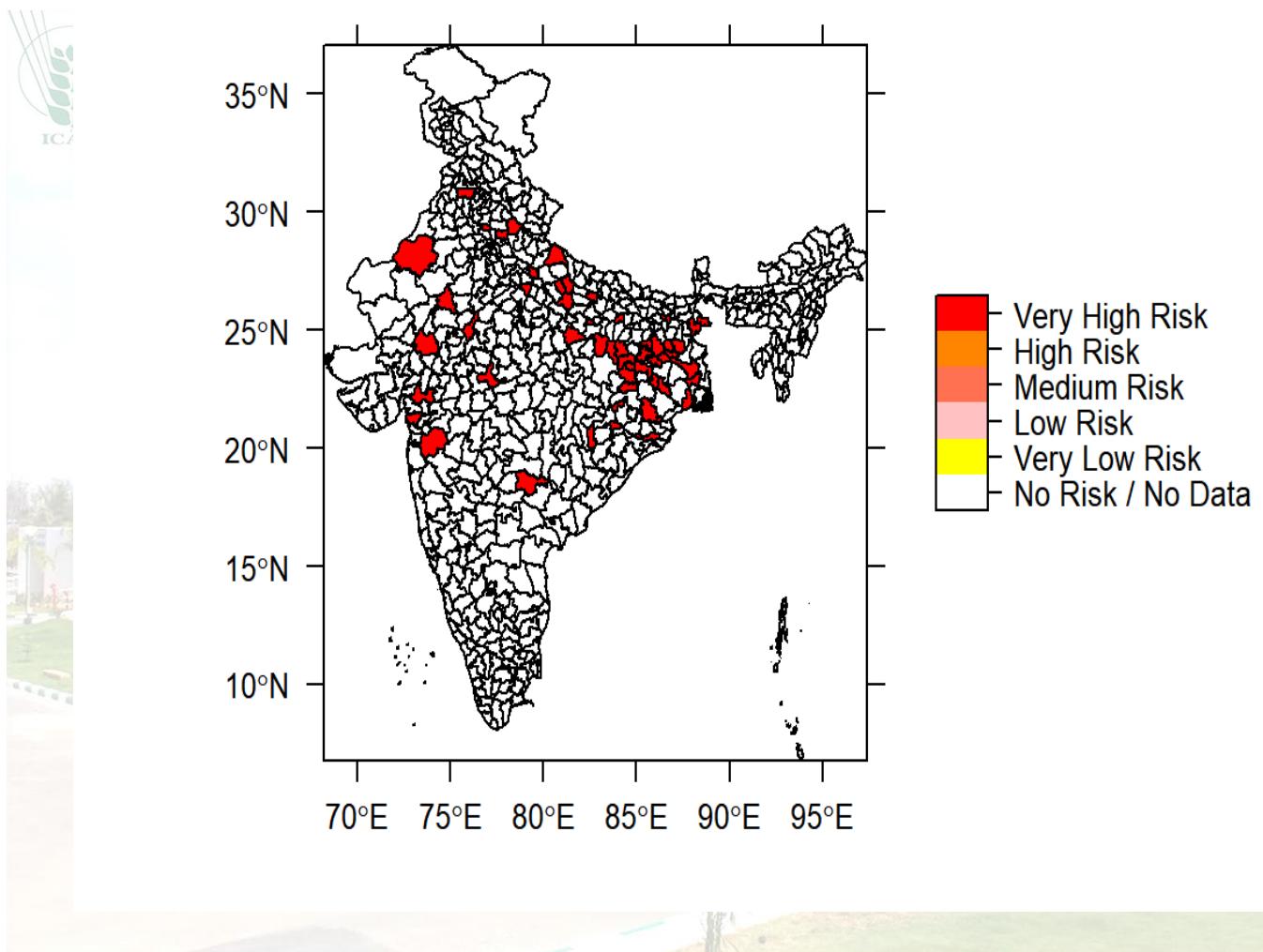
## Risk Prediction of Swine fever for the month of September 2017



## Risk Prediction of Theileriosis for the month of September 2017



## Risk Prediction of Trypanosomiasis for the month of September 2017



## Appendix

### A. R Code

```
#pars month_number=8; year_number=2006; current_year=2017;  
  
nadres_func=function(current_year,year_number,month_number)  
{  
  args = commandArgs(trailingOnly=TRUE)  
  
  if (length(args)<3) {  
    stop("Correct number of arguments must be supplied", call.=FALSE)  
  }  
  
  current_year=args[1]  
  year_number=args[2]  
  month_number=args[3]  
  
  df_total<-NULL  
  month_name=data.frame(  
    month=c(1:12),  
  
    month_names=c("January", "February", "March", "April", "May", "July", "July", "September", "September", "October", "November", "December")  
  )  
  
  ss<-fread(file="NADRES.csv",header=T,check.names = F)  
  
  col_pars=names(ss)  
  
  vars= paste(col_pars[7:ncol(ss)],collapse = "+")  
  
  options(verbose = F)  
  
  for(disease in c(8,10,11,12,24,31,35,37,48,60,62,65,70,72,79))  
  {
```



```

# disease=8

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

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

")

data = fetch(rs, n=-1)

# year change

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

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

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

attach(ss1,warn.conflicts = F)

attach(df,warn.conflicts = F)

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

attach(dd,warn.conflicts = F)

out<-data.frame(outbreak)

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

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

final<-cbind(dd,out)

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

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

ncs= ncol(final1)-5

```



```

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

for(i in 1:ncol(temp)){
  temp[is.na(temp[,i]), i] <- mean(temp[,i], na.rm = TRUE)
}

#temp = as.matrix.data.frame(temp)

#temp = as.data.frame(temp)

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

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

formula=paste("out ~",vars)

as.formula(formula)

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

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

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

summary(prediction)

vv<-round(prediction,2)

df1<-cbind(final2,vv)

df_total<-rbind(df_total,df1)

gc()

}

f=function(m){

if(m<=0.0) i=1

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

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

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

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

```

```

else i=6
}

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

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

##### ACCURACY

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

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

df_poa=df_total

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

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

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

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

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

print(df_acc)

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

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

#####PLOT

i=1

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

dir.create(path = plot_dir)

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

while(i<=length(disease))

{

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

```



```

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

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

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

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

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

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

#View(kar@data)

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

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

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

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

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

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

dir.create(plot_loc)

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

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

png(file_name)

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

dev.off()

i=i+1

```



## B. Abbreviations

NADRES : National Animal Disease Referral Expert System

R : R environment for statistical computing

BQ : Black Quarter

BT :Blue tongue

ET : Enterotoxaemia

FMD : Foot and Mouth disease

HS : Haemorrhagic Septicaemia

PPR : Peste des petits ruminants

S&G POX : Sheep and Goat pox

SF : Swine Fewer

NR : No risk/No data available

VLR : Very low risk

LR : Low risk

MR : Moderate risk

VHR : High risk

HR : Very high risk





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ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (ICAR\_NIVEDI),

P. B. No.6450, Yelahanka, Bengaluru-560064

Phone: +91-80-23093111, Fax: +91-80-23093222, Email: director.nivedi@icar.gov.in