भाकृअनुप–राष्ट्रीयपशुरोगजानपदिकएवंसूचनाविज्ञानसंस्थान
ICAR–National Institute of Veterinary Epidemiology and Disease Informatics
रामगोंडनहल्ली, येलहंका, बेंगलुरू – ५६० ११९, भारत
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4th Annual Review Meeting

NADEN- National Animal Disease Epidemiology Network

9–10 July 2026

Presented by

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Principal Scientist, ICAR-NIVEDI, Bengaluru
P. C. Mahalanobis Award (2022) · National e-Governance Award 2024–25

SURVEILLANCE PIPELINE

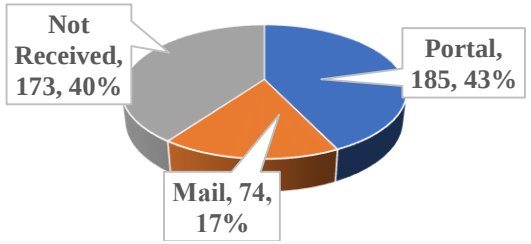
1. Disease Data Capturing

From centre reports to a verified, forecast-ready NADRES database

2025 *full year* — **6,972** District records

2026 *to date* — **3,072** District records

Disease Data Reporting Compliance Status (2025)



Digitization

In 2025, of 432 expected reports (36 states × 12 months), only 259 were received — as PDF, Excel, or scanned files — and manually digitized into standardized NADRES templates capturing disease, species, outbreak date, and State→District→Village.

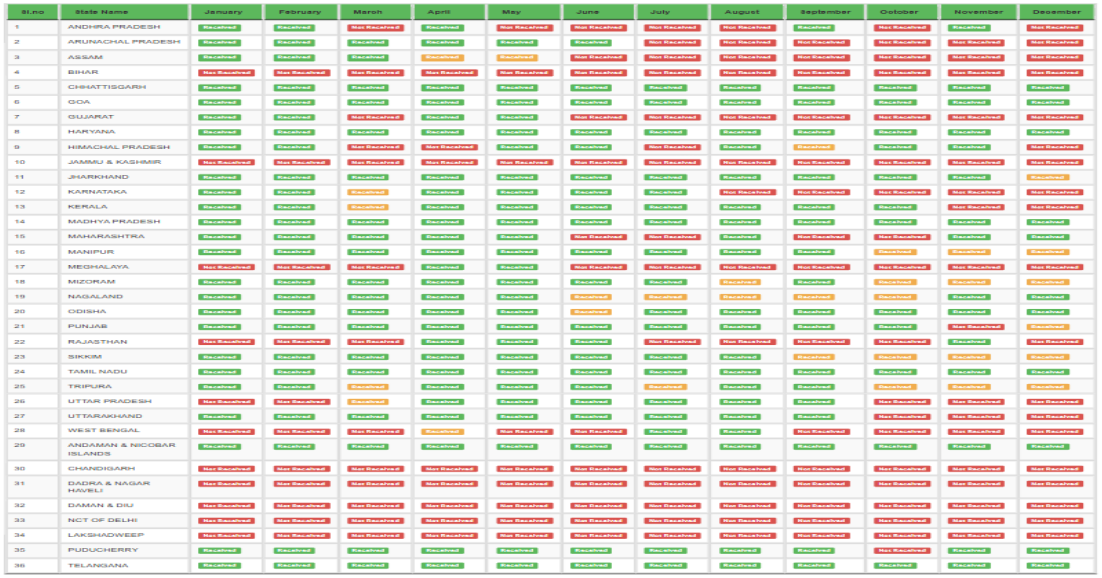
Two-level verification

L1: researcher review for completeness & consistency.
L2: validation by NADEN Nodal In-charge Scientists before upload.

Integration into NADRES

~1,95,000 records across 185 livestock diseases — powering AI forecasting, risk mapping & monthly forewarning bulletins.

Reporting channel by State / UT



Channel	States/UTs	Count
Portal	Arunachal, Assam, Haryana, Chhattisgarh, Goa, HP, Jharkhand, Karnataka, MP, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, TN, Tripura, Uttarakhand, WB, Andaman&Nicobar, Puducherry, Telangana	25 States/UTs
Mail	Andhra Pradesh, Kerala, Odisha	3 States/UTs
Portal + Mail	Andhra Pradesh, Kerala, Odisha, Meghalaya, Uttarakhand, Telangana	6 States/UTs
Not sending	Bihar, Gujarat, Jammu & Kashmir, Uttar Pradesh	4 States/UTs

DATA QUALITY

2. Data Entry Issues — Recurring Patterns

Common problems generalized across NADEN centres, with the standard resolution applied

Delayed / non-submission

Reporting gaps of several months to a full year; some centres with complete absence of reporting.

Village–district mismatch

Right village name, but placed under the wrong district. It exists in the central database, just mapped to the wrong parent district

Non-standard place names

Village name doesn't match the database at all - misspelt, old/alternate name, or free-text - so it can't be located.

Incomplete epi fields

Missing Outbreaks / Susceptible / Deaths; blanks left instead of a numeric 0.

Multiple entities per row

Several species or diseases in one row sharing a single set of case numbers.

Non-numeric / inconsistent

Yes/No, “<” “>”, “no data”, “####”, I-vs-C mix, and prior-month data repeated.

Handled by a Standardized Operating Procedures

Epidemiological imputation: enforce Susceptible ≥ Attacks ≥ Deaths; interchange or back-fill from Deaths where fields are missing ; set Outbreaks = 1 when Attacks ≥ 2.

Location validation: match District→Village to the central database; nearest-name match within district; verified alias/spelling checks before reassigning district.

3. NADRES 3.0 - Technology, Data & Engineered features

The full technology stack · four input data streams · nine engineered epidemiology interactions

Input data streams merged › **Stage A** Feature engineering › **Stage B** Hyperparameter Optimization › **Stage C** Train 40 base models › **Stage D** Validation + calibration › **Stage E** Ensemble + meta-learner › **Risk** grading · 6 levels › **Output** bulletin · maps · SMS

Technology Stack 7 layers

Languages
Python · HTML · CSS · SQL · PHP

Cloud & Compute
Google Colab · NVIDIA H100 GPU · CUDA

Frameworks
scikit-learn · PyTorch · pytorch-tabular · statsmodels

Algorithms
Machine Learning · Deep Learning · Ensemble · AutoML

Hyperparameter Opt.
Optuna · FLAML

Data Sources
Google Earth Engine · NOAA · CRU · NADRES

Reports
Vet-Alert bulletin · Excel · Fast2SMS · FRUITS SMS

Input — data streams 4

Outbreak history
outbreaks, attacks, deaths, vaccinations

Climate & weather
temp, rainfall, humidity, wind, drought

Ecological
NDVI, LST, soil, hydrology, terrain

Livestock population
cattle, buffalo, goat, sheep, pig

Engineered interactions 9 + season

THI
heat & crowding (FMD · HS · PPR)

Saturation deficit
tick survival (Theileriosis · Babesiosis)

Waterlog index
standing water (Fascioliasis · BT · LSD)

Snail habitat
snails (Fascioliasis · Babesiosis)

Soil-spore activation
soil spores (Anthrax · Black Quarter)

Antecedent rainfall
drought-then-rain (HS · BQ · Anthrax)

Density–heat stress
crowding + heat (HS · FMD)

Drought-congregation
shrinking water (FMD · HS · PPR)

Midge suitability
vector-borne (Bluetongue · LSD)

Seasonality
disease timing (all diseases)

MACHINE · AI ENGINE

40 Models + 1 Meta-Learner

7 model families · 22 GPU-accelerated + 18 CPU · fused by a stacking meta-learner

Linear / Regression	**Logistic (GLM)** glm GPU	**Multinomial** multinom GPU	**Flexible Disc.** fda GPU	**Bayesian GLM** bayesglm GPU	**Probit** probit CPU	**Ridge** ridge CPU	**LASSO** lasso CPU	**Elastic Net** en CPU	**GAM** gam CPU	**MARS** mars CPU		
Tree & Boosting	**XGBoost** xgb GPU	**LightGBM** lgbm GPU	**CatBoost** catboost GPU	**Random Forest** rf GPU	**Gradient Boost** gbm GPU	**AdaBoost** ada GPU	**Cubist** cubist GPU	**Conditional RF** cforest GPU	**Histogram GB** hgb CPU	**Extra Trees** extratrees CPU	**Decision Tree** tree CPU	**NGBoost** ngb CPU
Kernel / SVM	**SVM (RBF)** svm GPU	**Kernel SVM** ksvm GPU										
Deep & Transformer	**TabNet** tabnet GPU	**TabPFN** tabpfn GPU	**FT-Transformer** ft_transformer GPU	**SAINT** saint GPU	**GANDALF** gandalf GPU	**NODE** node GPU	**Mambular** mambular GPU	**MLP (NN)** nn CPU				
Probabilistic / Discriminant	**Gaussian Proc.** gp CPU	**Complement NB** cnb CPU	**Quadratic DA** qda CPU									
Imbalance-aware	**Balanced RF** balrf CPU	**RUSBoost** rusboost CPU	**Balanced Bag** balbag CPU									
Instance / AutoML	**k-NN** knn CPU	**AutoGluon** autogluon GPU+CPU										

Ensembles — combine the 40 models → 1 risk number

Mean
mean
average of all 40 (default)

Maximum Risk
rmax
precautionary — highest risk

BSSE
bsse
Bayesian skill-weighted, graduated

SAQPSE
saqpse
severity & count-aware, calibrated

+ 1 meta-learner Stacking (XGBoost) — learns the best blend of all 40 base models **22 GPU · 18 CPU**

Output — 6 risk levels

NR | VLR | LR | MR | HR | VHR

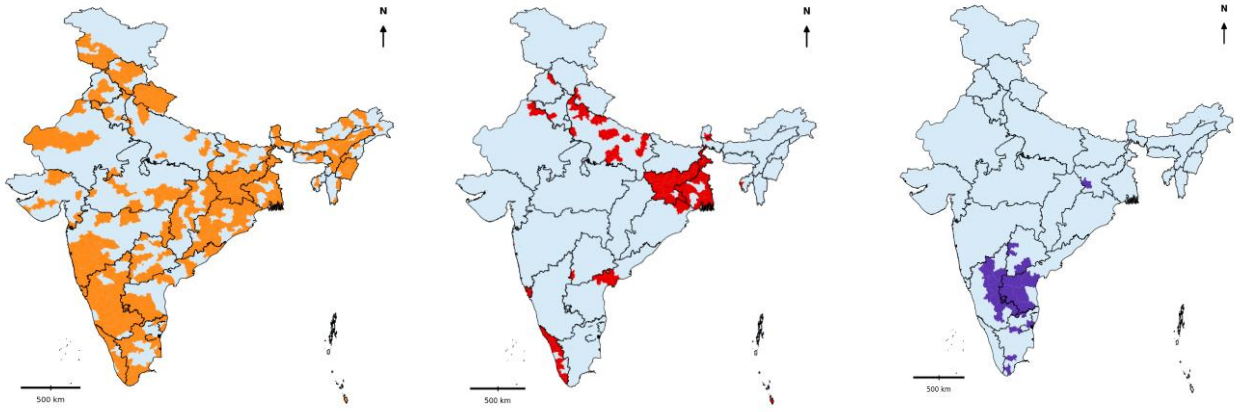
Deliverables

- Monthly Vet-Alert bulletin
- Per-disease district risk maps
- Karnataka Epicentre map (2 / 5 km)
- SMS alerts to vets & farmers

Risk Communication & Dissemination

Multi-channel delivery of the monthly forecast — maps & bulletin to officials, SMS alerts to farmers and vets

Predicted risk maps · *for August 2026*



Viral disease - FMD | Parasitic disease -Theileriosis | Bacterial disease - Anthrax

Monthly Vet-Alert bulletin

NADRES web portal

Real-time district risk maps & bulletins — **27.7 lakh visitors** to date.
https://nivedi.res.in/Nadres_v2/

FRUITS SMS → Farmers

with FRUITS, NIC & Govt. of Karnataka

Jun 2026 (last month)
27.3 lakh
SMS to farmers

2025 (full yr)
3.20 crore

2026 (Jan–Jun)
1.68 crore

Cumulative since Nov 2021: 9.94 crore SMS

DLT SMS → Veterinarians

Distributed Ledger Technology route

Jun 2026 (last month)
13,136
SMS to vets across **27 states**

2025 (full yr)
2.13 lakh

2026 (Jan–Jun)
94,465

Cumulative since Oct 2024: 3.83 lakh SMS

NIVEDI Toll-Free Helpline 1800-599-4233 — launched by DAHD, Govt. of India, to strengthen real-time disease reporting & advisory services.

DISEASE × CLIMATE SIGNALS

4. The Data & the Climate Drivers

Monthly counts for 19 diseases (2000–2025) correlated against three satellite climate indices on the same grid

19	312	2000–25	9.55M
diseases	monthly records	26-yr span	total attacks

Where the burden sits

share of all attacks

Extreme skew — LSD alone is 42%, the top four ≈ 77%.

NDVI Vegetation greenness

mean 0.38 · range 0.26–0.53

LST Land surface temp

mean 24.5 °C · range 11.8–32.8

THI Temp–humidity index

mean 68.4 · range 56.9–75.9

How they enter the model. Each disease is correlated against all three at 0–3 month lags; the strongest lag is kept. NDVI tends to lead; THI / LST act near same-month.

Diseases by Dominant Climate Driver

*Grouped by significant driver(s) at the best 0–3 month lag. Value = strongest r with its p and lag (months). *** p<.001 · ** p<.01 · * p<.05*

All three drivers

NDVI · THI · LST — most robust

African Swine Fever	**NDVI −0.84** p .005 ** · lag 3
Fascioliasis	**LST +0.76** p .018 * · lag 3
Foot & Mouth Disease	**THI +0.73** p .025 * · lag 3

Temperature-driven

THI + LST · cool-season

Sheep & Goat Pox	**THI −0.83** p .001 *** · lag 0
Avian Influenza	**THI −0.73** p .011 * · lag 1

Vegetation-driven

NDVI-led

Bluetongue	**NDVI +0.90** p .0004 *** · lag 2
Enterotoxaemia	**NDVI −0.78** p .005 ** · lag 1
Anthrax	**NDVI +0.69** p .019 * · lag 1
Classical Swine Fever	**NDVI −0.66** p .027 * · lag 1
Lumpy Skin Disease	**NDVI +0.63** p .029 * · lag 0

Single weak link

Theileriosis — THI +0.65, p .032 *, lag 1
Black quarter — THI +0.59, p .045 *, lag 0

No significant signal (best r shown, all p > .05)

PPR LST +0.13, p .73, lag 2

Babesiosis THI −0.65, p .06, lag 3

Haem. septicaemia THI +0.42, p .17, lag 0

Brucellosis LST +0.42, p .20, lag 1

Trypanosomiasis NDVI −0.51, p .16, lag 3

Anaplasmosis LST +0.46, p .19, lag 2

Coccidiosis LST +0.38, p .31, lag 3

Seasonality & the Strongest Signal

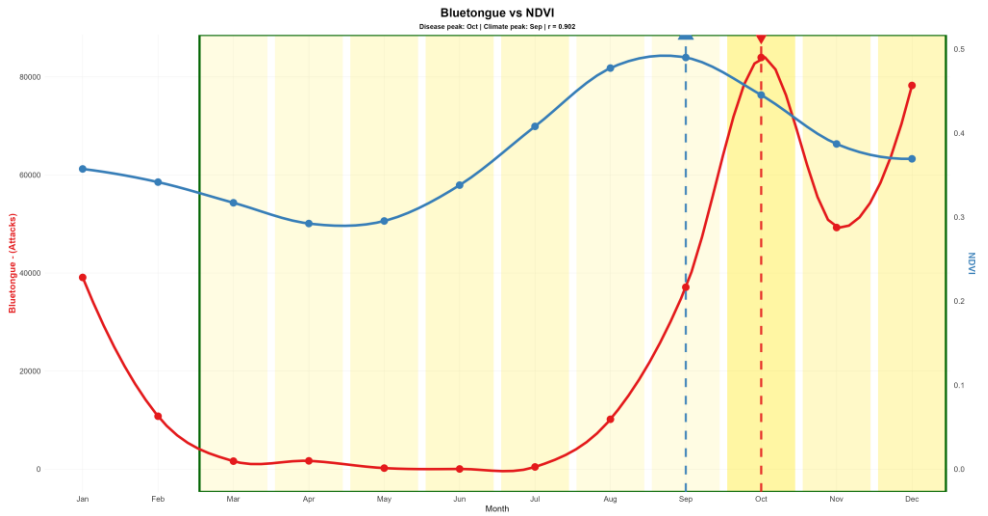
Peak month and cycle type per disease (2000–2025), with the single strongest disease–climate link plotted

Disease	Peak	Season	Modality	Peak month(s)
African Swine Fever	**Jul**	Monsoon	**Multimodal**	Mar · May · Jul
Anaplasmosis	**Jul**	Monsoon	**Unimodal**	Jul
Anthrax	**Sep**	Monsoon	**Multimodal**	Mar · Sep · Nov
Avian Influenza	**Feb**	Winter	**Unimodal**	Feb
Babesiosis	**Jan**	Winter	**Multimodal**	Jan · Apr · Aug
Black quarter	**Aug**	Monsoon	**Unimodal**	Aug
Bluetongue	**Oct**	Post-monsoon	**Bimodal**	Oct · Dec
Brucellosis	**Jun**	Monsoon	**Unimodal**	Jun
Classical Swine Fever	**Jun**	Monsoon	**Bimodal**	Mar · Jun
Coccidiosis	**Sep**	Monsoon	**Multimodal**	Jan·Mar·Jun·Sep·Nov
Enterotoxaemia	**Jun**	Monsoon	**Multimodal**	Apr · Jun · Nov
Fascioliasis	**Aug**	Monsoon	**Multimodal**	Jan · Jun · Aug
Foot & Mouth Disease	**Sep**	Monsoon	**Multimodal**	Jun · Sep · Nov
Haemorrhagic septicaemia	**Aug**	Monsoon	**Unimodal**	Aug
Lumpy Skin Disease	**Sep**	Monsoon	**Unimodal**	Sep
Peste des petits ruminants	**Jun**	Monsoon	**Multimodal**	Feb·Apr·Jun·Oct
Sheep & Goat Pox	**Jan**	Winter	**Multimodal**	Jan · Sep · Dec
Theileriosis	**Aug**	Monsoon	**Multimodal**	Jan·Apr·Jun·Aug·Oct
Trypanosomiasis	**Aug**	Monsoon	**Bimodal**	Jun · Aug

Modality: **Unimodal** · one clear peak **Bimodal** · two peaks **Multimodal** · ≥3 peaks / weak seasonality

Strongest signal — Bluetongue vs NDVI

r = +0.90 p = 0.0004 * ** · NDVI leads by 2 months



Reading it. Each point is one month — climate driver (x) vs. disease attacks at the lagged month (y). Greener conditions ~2 months earlier precede larger Bluetongue outbreaks: vegetation leads the risk.

FORECASTING METHOD

5. GARMA — Forecasting R_t

From monthly cases to the effective reproduction number R_t — fitted and forecast with a Negative-Binomial GARMA

Monthly cases → R_t (EpiEstim) → GARMA forecast

R_t — what it is

The effective reproduction number: average new cases caused by one case at month t. $R_t > 1$ spreads, < 1 fades. Derived from monthly cases with EpiEstim.

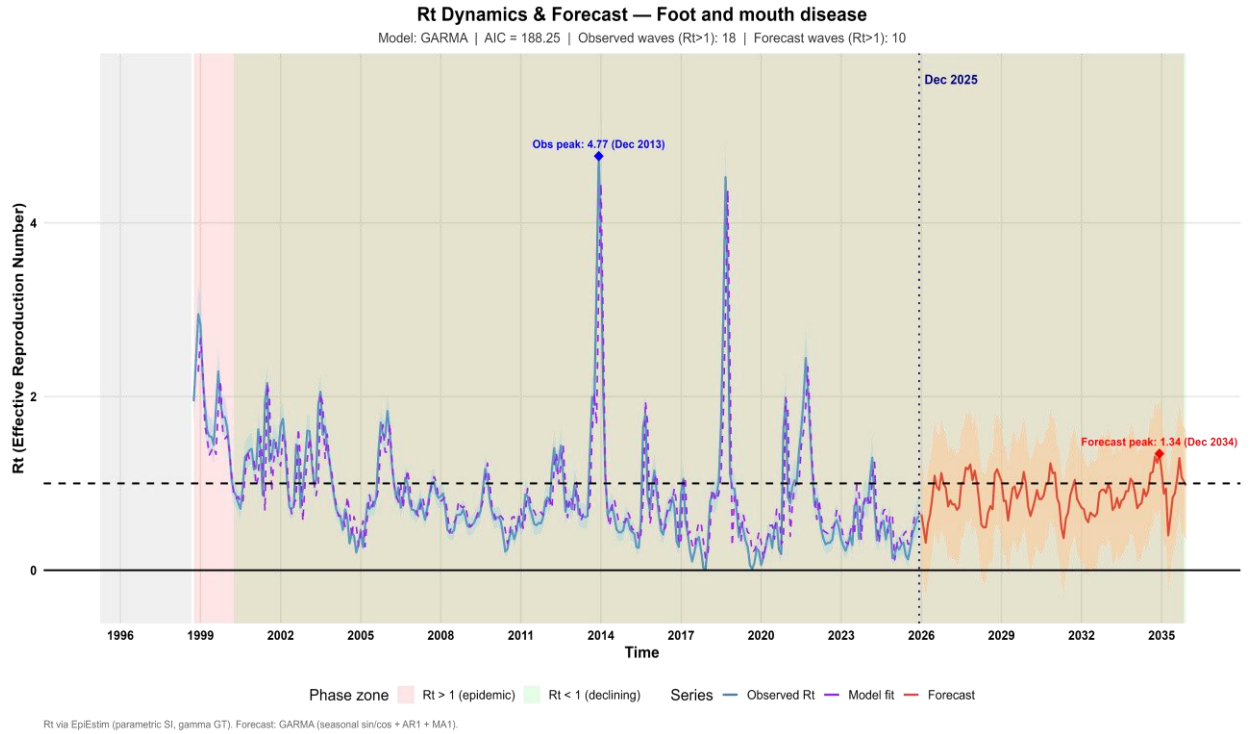
GARMA — the model

Negative-Binomial Generalized Autoregressive Moving Average. Predicts R_t from its own recent values (AR) and past shocks (MA) in a GLM that handles over-dispersed counts ARIMA/SARIMA can't.

Why it's useful

Turns noisy monthly counts into a smooth, forecastable transmission signal — projecting R_t months ahead so forewarning bulletins flag build-ups before the peak.

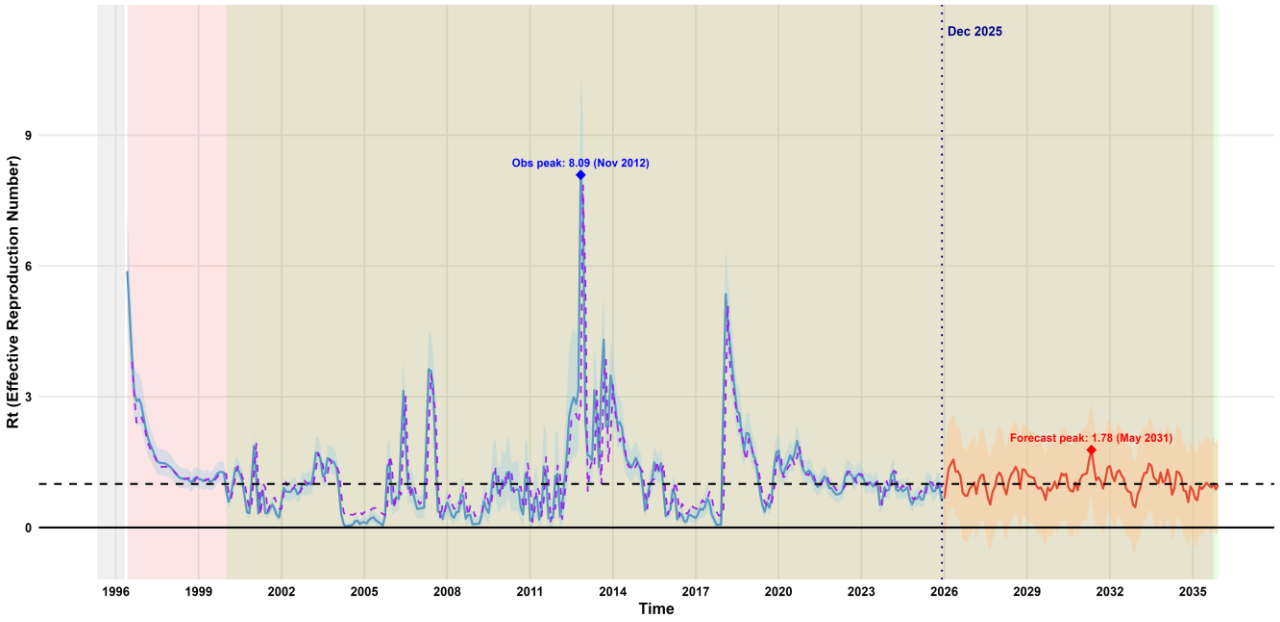
Worked example — Foot and Mouth Disease R_t



Observed R_t (blue) · **model fit** (purple) · **forecast** (red band). Peaks above the dashed $R_t = 1$ line mark epidemic phases; the model projects the monthly signal forward for planning.

Rt Dynamics & Forecast — Babesiosis

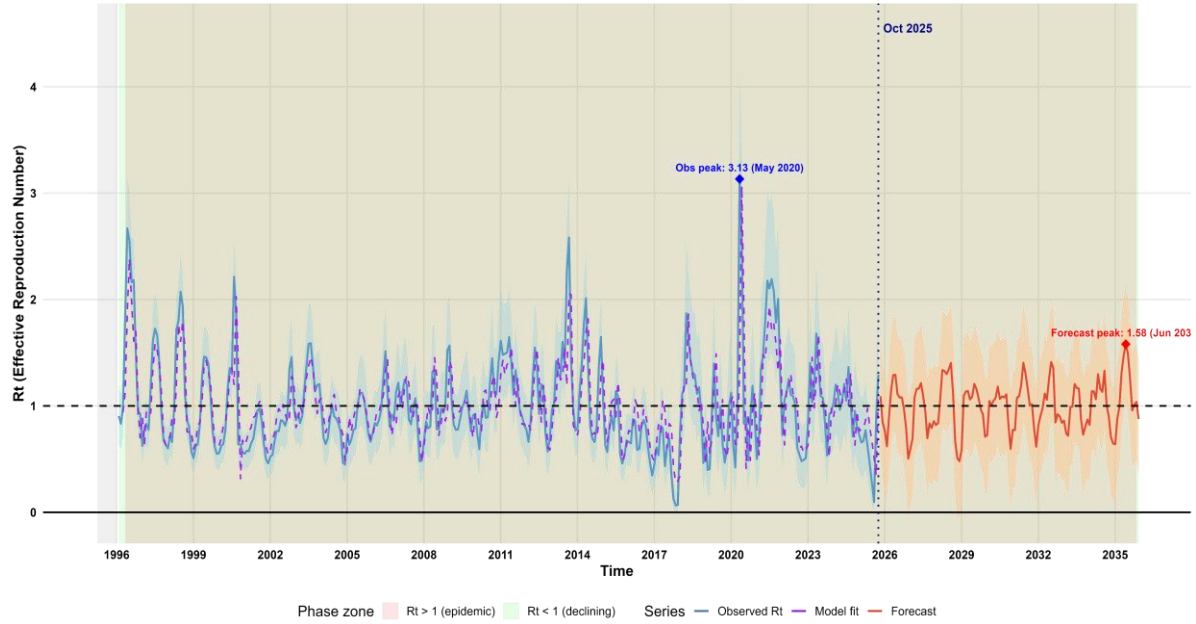
Model: GARMA | AIC = 570.03 | Observed waves (Rt>1): 25 | Forecast waves (Rt>1): 15



Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).

Rt Dynamics & Forecast — Black quarter

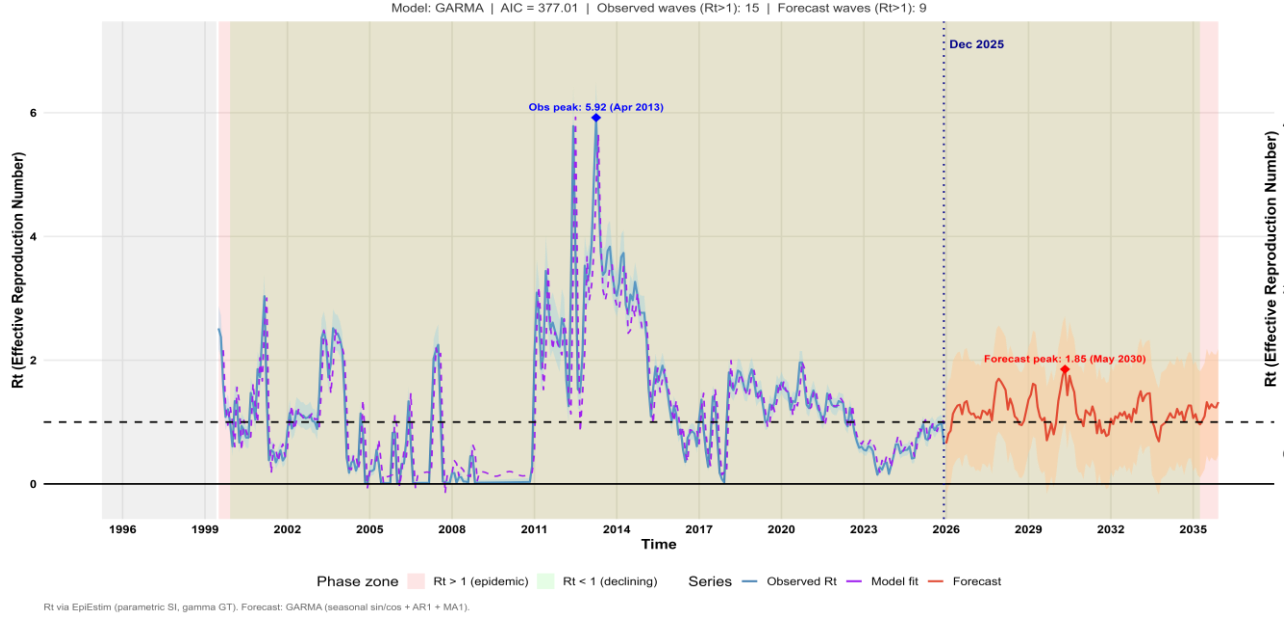
Model: GARMA | AIC = 99.30 | Observed waves (Rt>1): 34 | Forecast waves (Rt>1): 12



Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).

Rt Dynamics & Forecast — Coccidiosis

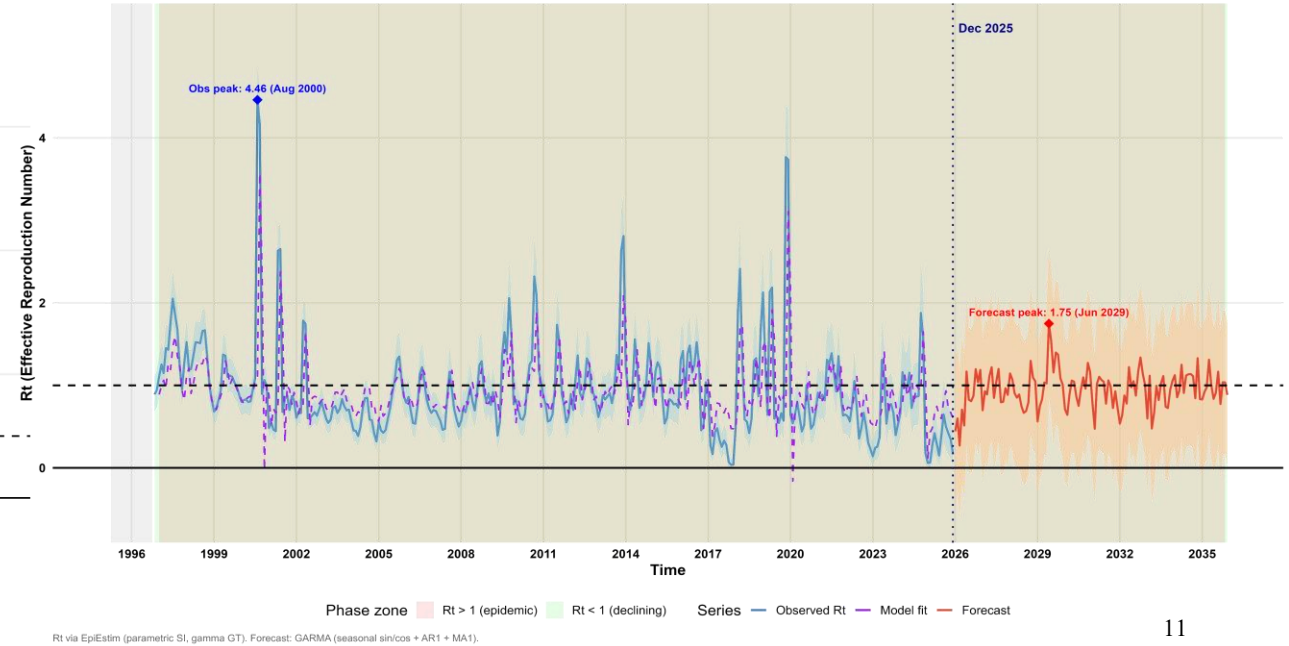
Model: GARMA | AIC = 377.01 | Observed waves (Rt>1): 15 | Forecast waves (Rt>1): 9



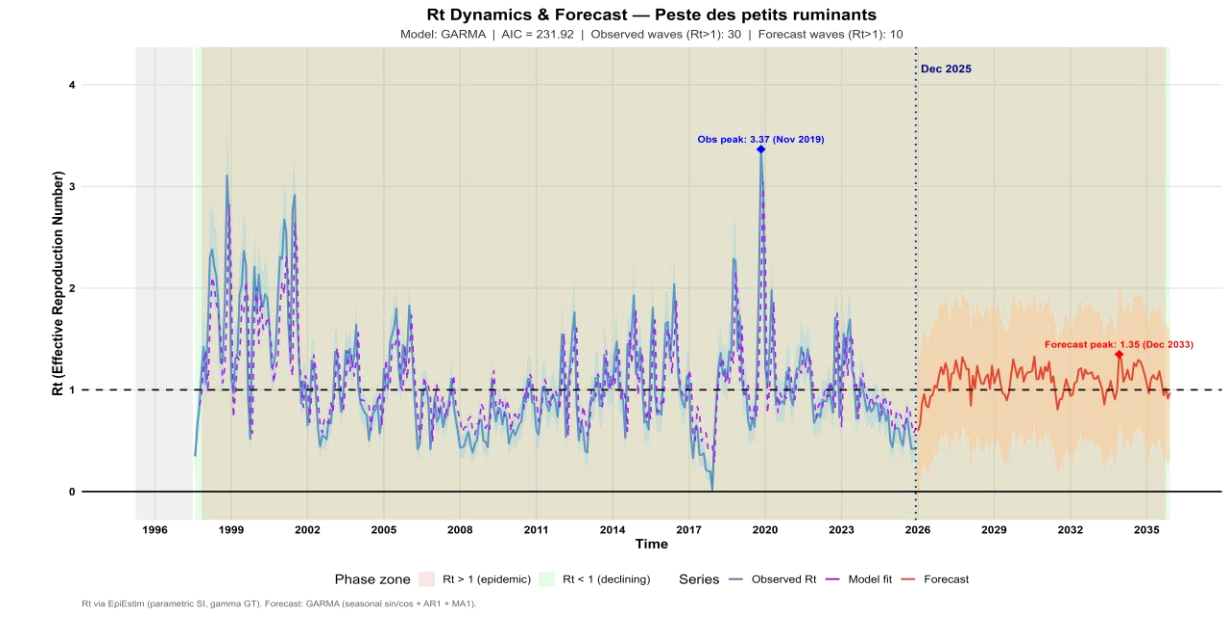
Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).

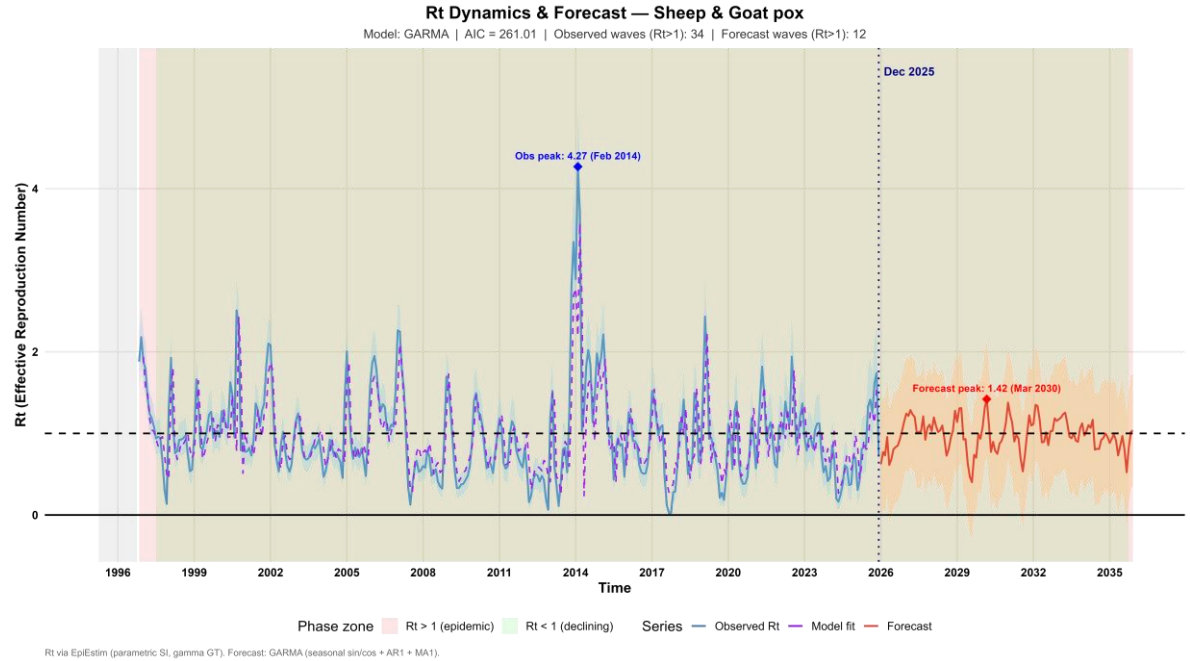
Rt Dynamics & Forecast — Haemorrhagic septicaemia

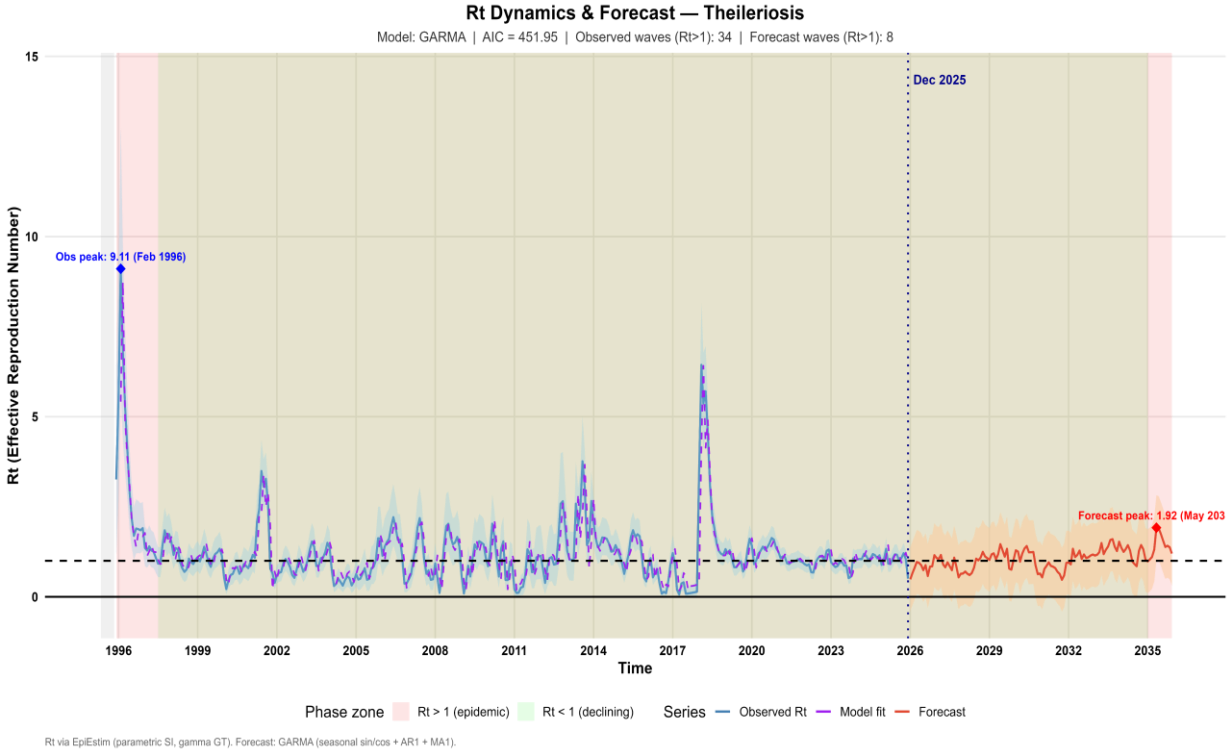
Model: GARMA | AIC = 423.39 | Observed waves (Rt>1): 36 | Forecast waves (Rt>1): 24

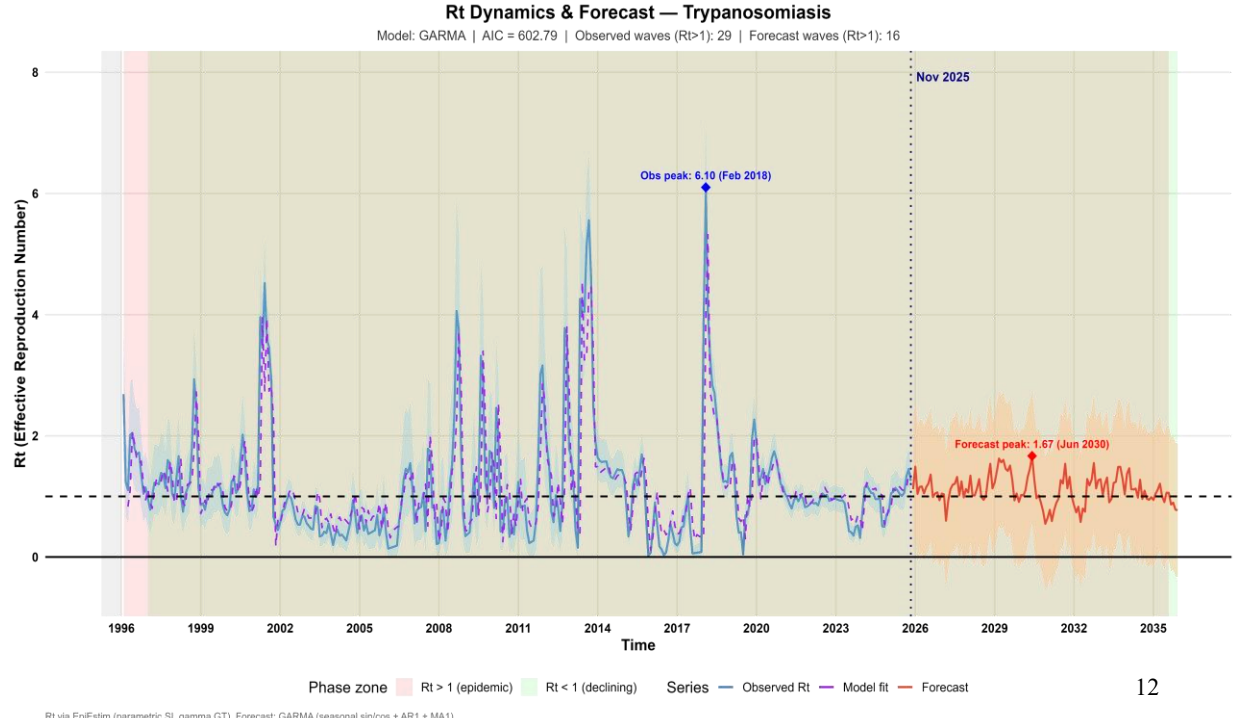


Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).


Rt Dynamics & Forecast — Peste des petits ruminants
Model: GARMA | AIC = 231.92 | Observed waves (Rt>1): 30 | Forecast waves (Rt>1): 10
Dec 2025
Obs peak: 3.37 (Nov 2019)
Forecast peak: 1.35 (Dec 2033)
Rt (Effective Reproduction Number)
Time
Phase zone Rt > 1 (epidemic) Rt < 1 (declining)
Series Observed Rt Model fit Forecast
Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).


Rt Dynamics & Forecast — Sheep & Goat pox
Model: GARMA | AIC = 261.01 | Observed waves (Rt>1): 34 | Forecast waves (Rt>1): 12
Dec 2025
Obs peak: 4.27 (Feb 2014)
Forecast peak: 1.42 (Mar 2030)
Rt (Effective Reproduction Number)
Time
Phase zone Rt > 1 (epidemic) Rt < 1 (declining)
Series Observed Rt Model fit Forecast
Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).


Rt Dynamics & Forecast — Theileriosis
Model: GARMA | AIC = 451.95 | Observed waves (Rt>1): 34 | Forecast waves (Rt>1): 8
Dec 2025
Obs peak: 9.11 (Feb 1996)
Forecast peak: 1.92 (May 203
Rt (Effective Reproduction Number)
Time
Phase zone Rt > 1 (epidemic) Rt < 1 (declining)
Series Observed Rt Model fit Forecast
Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).


Rt Dynamics & Forecast — Trypanosomiasis
Model: GARMA | AIC = 602.79 | Observed waves (Rt>1): 29 | Forecast waves (Rt>1): 16
Nov 2025
Obs peak: 6.10 (Feb 2018)
Forecast peak: 1.67 (Jun 2030)
Rt (Effective Reproduction Number)
Time
Phase zone Rt > 1 (epidemic) Rt < 1 (declining)
Series Observed Rt Model fit Forecast
Rt via EpiEstim (parametric SI, gamma GT). Forecast: GARMA (seasonal sin/cos + AR1 + MA1).

6. Super EL NIÑO: The 2026 Signal & the Regime Shift

What the forecast means on the ground — and how the disease mix has moved

What El Niño is — and the 2026 signal

El Niño is the periodic warming of the central and eastern equatorial Pacific Ocean that shifts atmospheric circulation and, over India, weakens the southwest monsoon — typically bringing below-normal rainfall, drought risk, and heat stress.

IMD long-range forecast (29 May 2026): a moderate-to-strong El Niño through the 2026 monsoon — seasonal rainfall ≈10% below the long-term normal.

Nearly half of cultivated area is rainfed, so deficits translate directly into grazing, fodder and water stress for livestock.

How it reaches the animal

- **Heat stress** lower intake, immunosuppression
- **Fodder deficit** under-nutrition, weak immunity
- **Water & vector shift** stagnant pools breed vectors
- **Disease surge** vector-borne & TADs rise

The disease mix has shifted

NADRES records show El Niño years split into two eras — the target of intervention has moved.

1994–2009

Bacterial & viral era

HS, Black quarter, FMD, PPR — clostridial and epidemic diseases led every year.

2014–2023

Vector-borne era

Babesiosis, Theileriosis, Trypanosomiasis, Fascioliasis dominate — plus emerging LSD & ASF.

NADRES disease record across El Niño years

Top-5 livestock diseases by reported outbreaks · 1994–2023

Bacterial / clostridial | Viral / transboundary | Vector-borne / parasitic

Year	Strength	#1 disease	#2	#3	#4	#5
1994	Moderate	HS	BQ	FMD	Bluetongue	Anthrax
1997	Very Strong	Babesiosis	HS	FMD	BQ	Theileriosis
2002	Moderate	FMD	HS	CSF	BQ	Enterotoxaemia
2004	Weak	HS	BQ	PPR	FMD	Enterotoxaemia
2006	Weak	FMD	Sheep & Goat Pox	HS	PPR	BQ
2009	Moderate	FMD	HS	BQ	Enterotoxaemia	PPR
2014	Weak	Fascioliasis	Trypanosomiasis	Babesiosis	FMD	Theileriosis
2015	Very Strong	Fascioliasis	Babesiosis	Trypanosomiasis	FMD	Theileriosis
2018	Weak	Fascioliasis	Trypanosomiasis	Theileriosis	Babesiosis	FMD
2019	Weak	Fascioliasis	Trypanosomiasis	Babesiosis	Theileriosis	PPR
2023	Strong	LSD	Theileriosis	Babesiosis	Trypanosomiasis	ASF

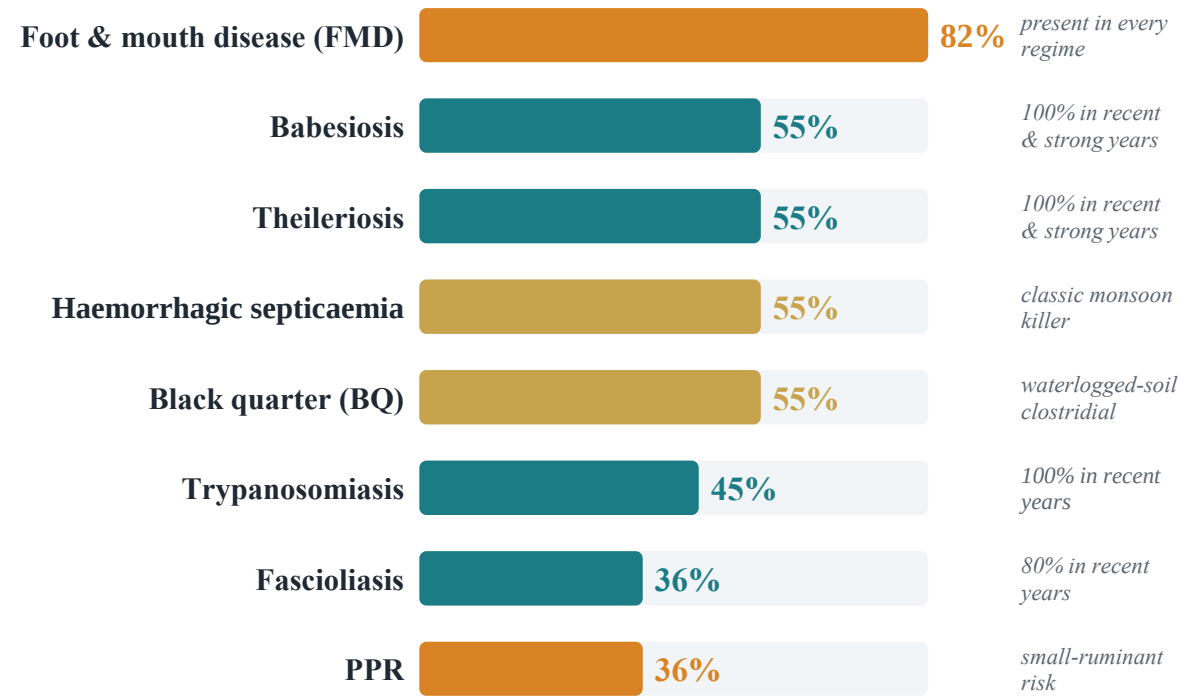
Read down the columns: *gold/amber (bacterial-viral) fills the top half; teal (vector-borne) takes over from 2014 — the same regime shift that drives the 2026 outlook.*

2026 Outlook & Safeguarding Strategy

Probability of ranking among top livestock diseases this El Niño year, and the prioritized response

2026 disease outlook

share of 11 El Niño years each disease was in the top-5 (NADRES v2)



Percentages = frequency each disease appeared in the annual top-5 across 11 El Niño years (NADRES v2, curated notifiable set). Co-occurrence with El Niño, not a causal claim.

2026 consensus call: vector-borne haemoparasites are the highest-confidence threat; FMD, HS & BQ remain constants; LSD & ASF on the emerging watch.

Safeguarding strategy — prioritized to the forecast

Vector control — lead action

Acaricide dipping/spraying, fly & vector management, drain stagnant water. Cuts Babesiosis, Theileriosis, Trypanosomiasis.

Pre-monsoon vaccination

Complete HS, BQ, FMD, PPR & LSD boosters before onset; ring-vaccinate NADRES-flagged hotspots.

Fodder & mineral security

Fodder banks, silage/hay, mineral mix & fluke deworming to hold immunity through the deficit.

Heat-stress management

Shade, ventilation, clean water and adjusted grazing hours to limit immunosuppression.

Surveillance & early warning

NADRES hotspot targeting, rapid reporting, sentinel monitoring at district KVKs.

Biosecurity & movement

Screen/restrict movement and quarantine for LSD & ASF; farm biosecurity where no vaccine exists.

7. Mathematical Modelling of FMD Transmission

A unified multi-host framework turns complex transmission into actionable decision support

Quantifies the invasion threshold

Derives R_0 / R_e to tell whether an outbreak grows or dies out, a clear go/no-go control target.

Compares strategies before spending

Weighs intervention options on cost and impact so control budgets are committed with evidence, not guesswork.

Ranks what actually drives spread

Sensitivity analysis pinpoints cattle density & transmission rate, focusing limited resources where they matter.

Captures the whole multi-host system

Cattle, buffalo, pigs, sheep & goats + environment in one model reveals cross-species effects single-species models miss.

Validated & predictive

83% accuracy, 100% outbreak sensitivity vs. 6 yr surveillance; 2021 forecast within 1.95% of reported cases.

Scalable, low-cost decision support

Runs on district livestock data; transferable to any endemic region for evidence-based, cost-effective planning.

Model schematic: multi-host transmission

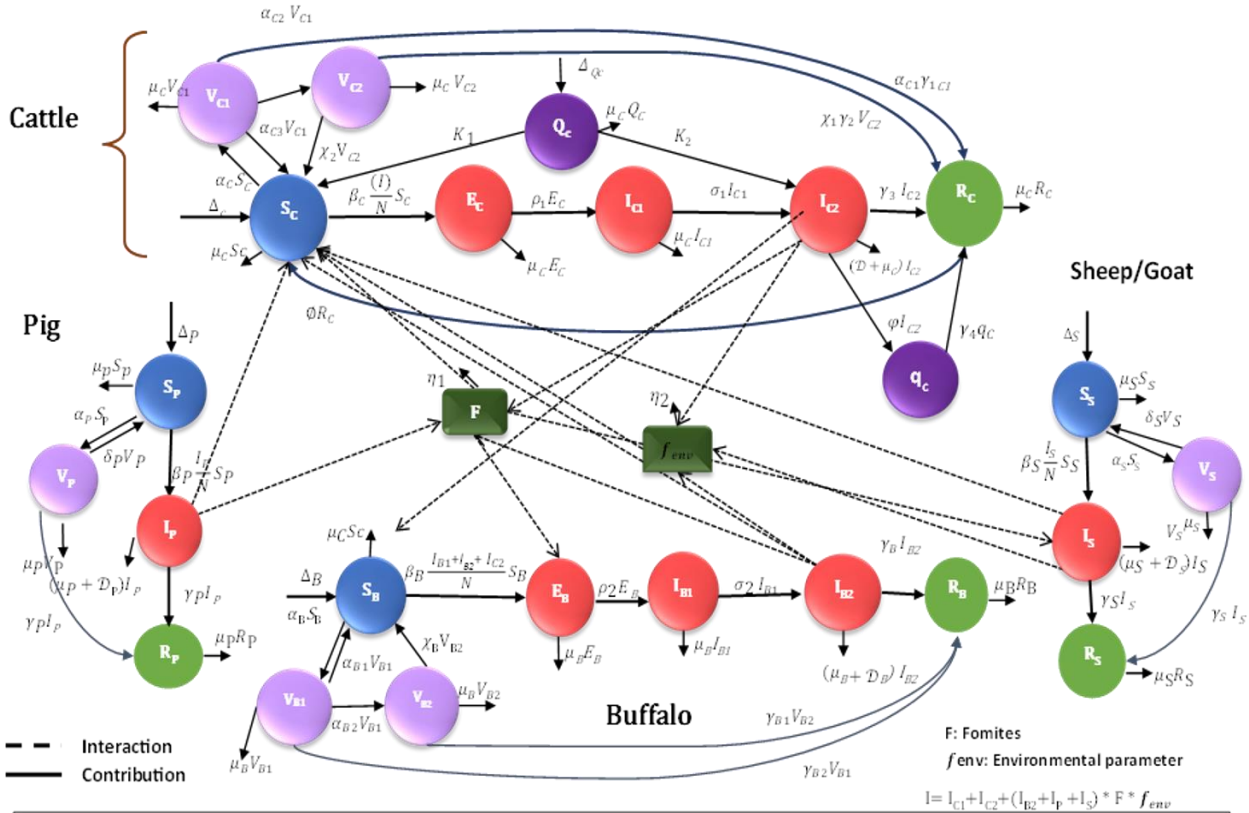
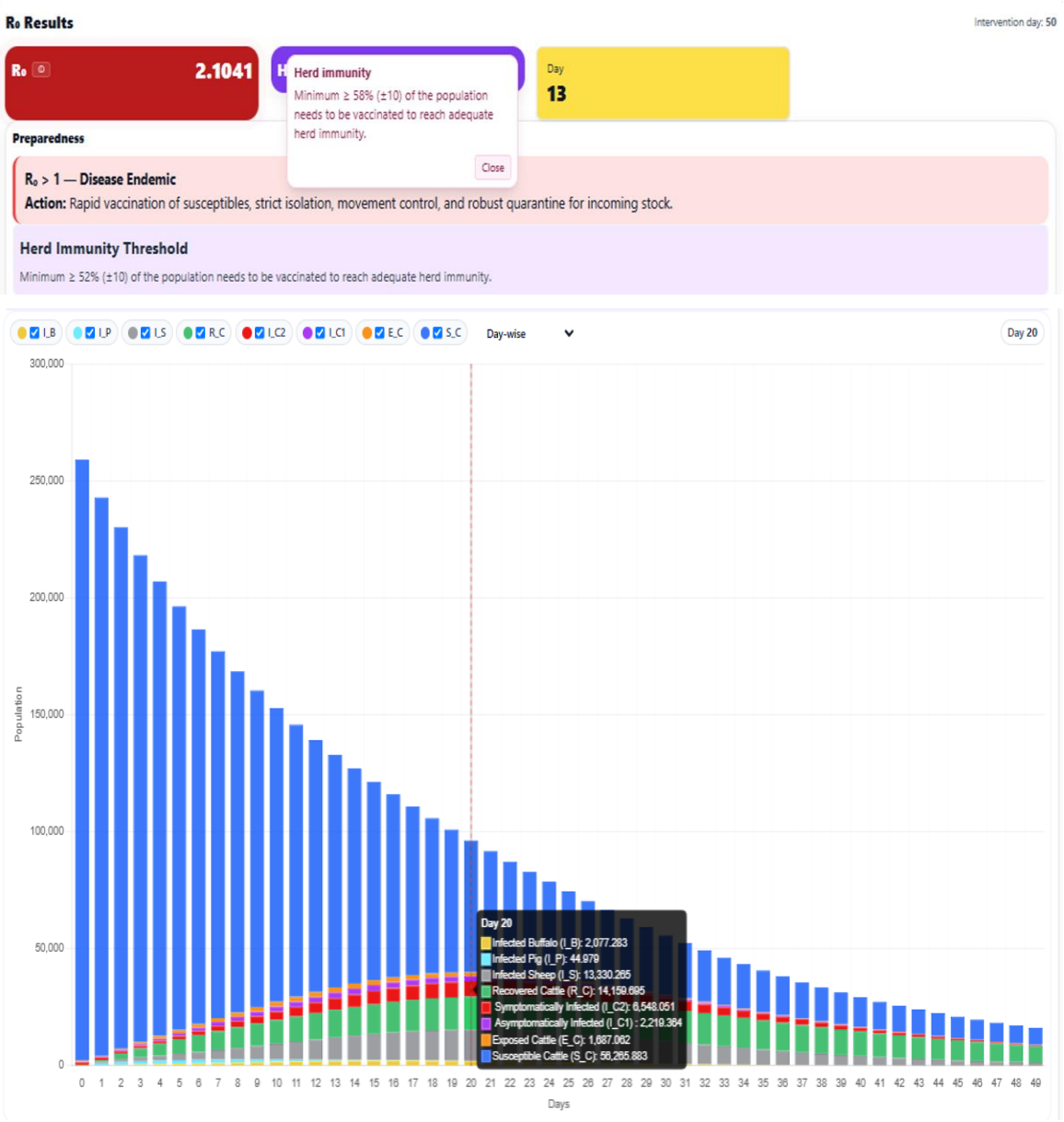


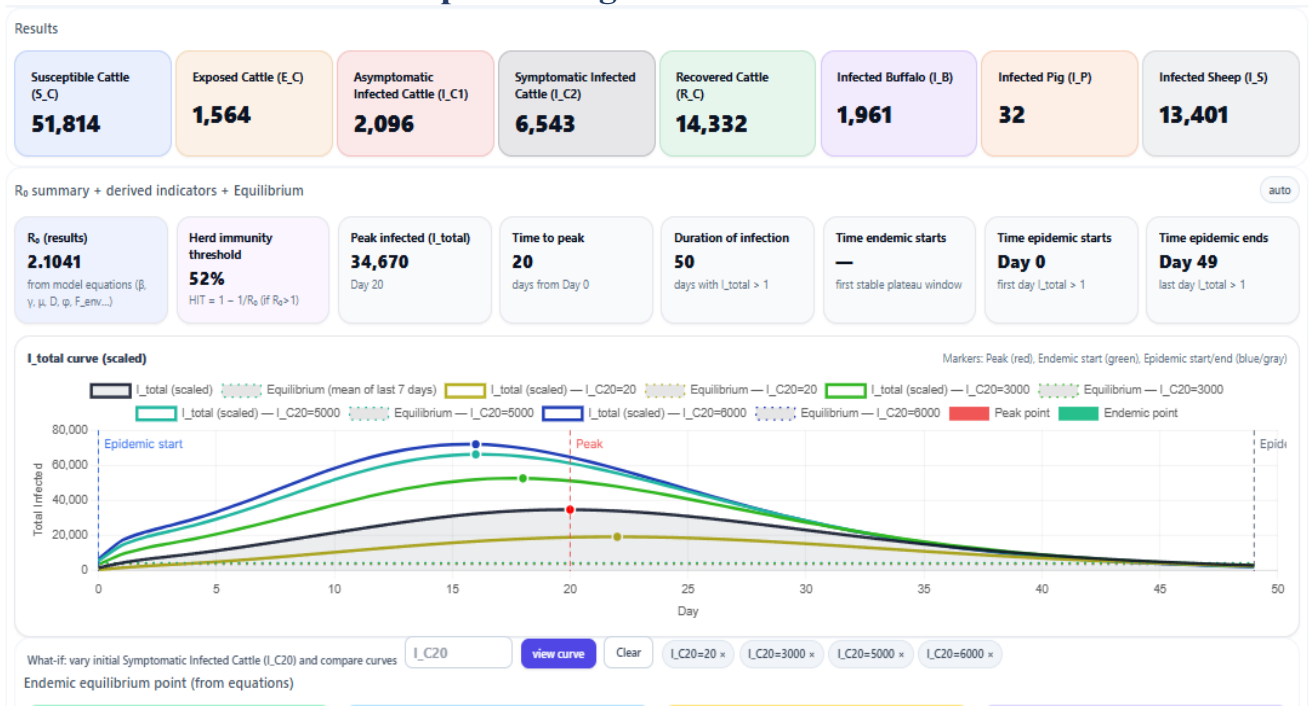
Figure 1: Conceptual architecture of the multi-host transmission model. Cattle ($SV_1V_2EI_1I_2RQq$) act as the central susceptible host, acquiring infection through environmental transmission (f_{env}), carrier fomites (F), and direct contact with infected cattle, buffalo contributes via direct and indirect transmission ($SV_1V_2EI_1I_2R$), pigs function as amplifiers (SVIR), while sheep and goats act as silent carriers (SVIR)

FMD Multi-Species Disease Simulation



Simulation Chart

Epidemiological Curve



With and without Control Measures Curve

DECISION SUPPORT TOOLS

8. Symptom-Based Disease Diagnosis Expert Systems

Enter the clinical signs observed in an animal — the system returns the probable disease with advice on treatment, prevention, vaccination & biosecurity

CaDDES

Cattle & Buffalo Disease Diagnosis Expert System

Web platform

13	51	8
diseases	symptoms	breeds

Symptom-based diagnosis with etiology, treatment, prevention, vaccination & control — plus digital record management and disease monitoring.

PDDES

Pig Disease Diagnosis Expert System

Android app

13	79	11
diseases	symptoms	breeds

Field-ready app: symptom-based diagnosis plus a disease-wise advisory (treatment, vaccination, biosecurity & husbandry). Built for the North-East Region.

Sheep & Goat

Small Ruminant Disease Diagnosis Expert System

Under development

11	93
diseases	symptoms

Diagnostic questionnaire — in progress

structured symptom sets being defined per disease

Your expertise is invited

Help define the diseases, clinical signs & advisories that will power the sheep & goat system.

How it works: observed clinical signs → expert knowledge base → probable disease + scientifically validated advisory. Developed by ICAR-NIVEDI.

THANK YOU