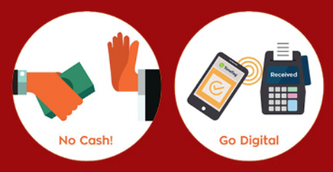
Animal Health is National Wealth



Published by

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2017-18
ANNUAL REPORT

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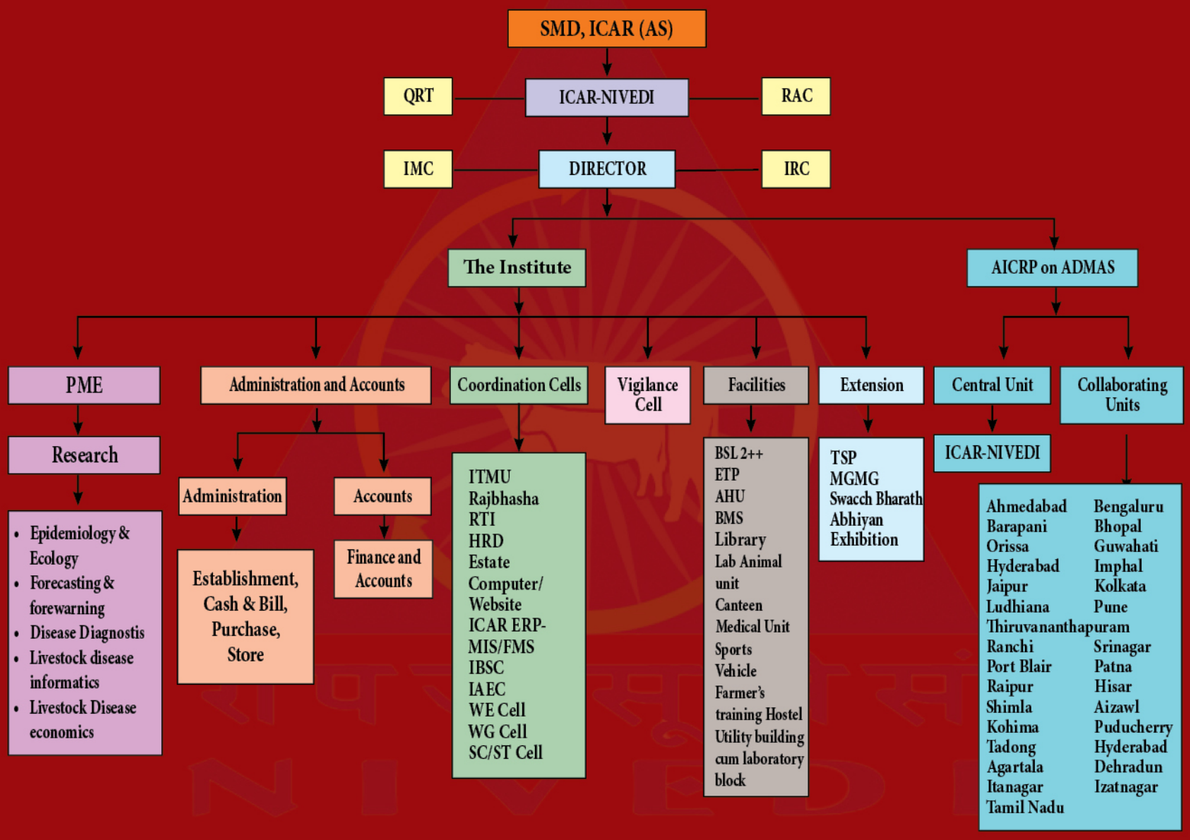
ORGANOGRAM



Laboratory Block

Training cum Farmers' Hostel

Annual Report
2017-18

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

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Printed at:

CNU Graphic Printers
Malleshwaram, Bengaluru - 560 003
Mobile : 9880 888 399

ACKNOWLEDGEMENT

The Director and all the staff of ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (NIVEDI) express their sincere gratitude to Dr. Trilochan Mohapatra, Secretary, DARE and Director General, ICAR for his constant guidance and support.

ICAR-NIVEDI family is also thankful to Dr. J.K. Jena, Deputy Director General (Animal Science) (Acting) and Dr. Ashok Kumar, Assistant Director General (Animal Health) for cooperation, encouragement and generous support.

Our sincere thanks are also due to the Directors and Heads of ICAR institutes located in Bengaluru, viz., ICAR-NIANP, ICAR-NBAIR, ICAR-IVRI, ICAR-NDRI, ICAR-NBSS & LUP, ICAR-IIHR, KVAFSU, Karnataka Veterinary Council, I-AIM and also other institutes and organisations for their vital logistic support and co-operation from time to time.

The institute conveys sincere thanks to all the principal investigators of AICRP on ADMAS and related State Animal Husbandry Departments and Universities for their valuable inputs and cooperation. And the last but not the least, I sincerely thank all the staff members of ICAR-NIVEDI for their timely cooperations.

'Jai Kisan Jai Vigyan'

Jai Hind!

(Parimal Roy)
Director

EXECUTIVE SUMMARY

During the year 2017-18, Training cum Farmers' Hostel and Laboratory Block have been constructed. During the period, one Mobile Application (*app*) *"LDF-Mobile App*" was developed for extending the reach of the NADRES forewarning bulletin among the various stakeholders.The *LDF-Mobile App* also provides details of the clinical samples to be collected in case of outbreaks of the listed diseases for laboratory confirmation.*LDF-Mobile App* was launched on 27th December, 2017 by Shri Radha Mohan Singh, Honorable Union Minister of Agriculture and Farmers' Welfare and dedicated to the nation for helping the stakeholders and farmers.

During this period, a total of 53 diagnostic kits comprising 34 for detection of brucellosis,18 for detection of IBR (Infectious Bovine Rhinotracheitis) and one *Leptospira* staining kit were supplied to different stakeholders.

A total of 4223 serum samples (cattle, buffalo, sheep, goat and pig) were screened for anti-*Brucella* antibodies from Assam, Tripura, Nagaland, Manipur, Uttar Pradesh, Jammu and Kashmir and Goa which revealed an overall 3.12 % positive. The complete MLST profiling of all the 117 *Brucella* isolates analyzed during the period, revealed ST1 as the predominant genotype among the *B. abortus*, whereas ST8 and ST14 as predominant genotypes among *B. melitensis* and *B. suis* circulating in India. Further, five monoclonal antibodies (mAb) against smooth lipopolysaccaharide antigen of *B.abortus* S99 were produced and characterized. An indirect ELISA protocol for brucellosis was modified for 3 hrs instead of 5 hrs duration and has been evaluated to suit the hand held ELISA reader with ready to use reagents. In addition, recombinant BP-26 antigen based indirect ELISA for sero-diagnosis of brucellosis was developed and the performance of the developed assay was found to be better than the available Svanovir C-ELISA kit. The in-house developed recombinant antigen based ELISA and human IgG and IgM lateral flow assay for sero- diagnosis of brucellosis were validated at TRPVB, Tamil Nadu Veterinary and Animal Sciences University, Chennai. A total of 2773 post vaccination serum samples from cattle and buffalo belonging to different states of India were screened by fluorescent polarization assay and the highest vaccination coverage was recorded in Himachal Pradesh.

During this period, Methicillin Resistant *S. aureus* (MRSA) isolates collected from cattle samples from Bengaluru were subjected to spa typing which showed t17242 as the most predominent type. On virulence typing of 43 resistant isolates from Tripura revealed 16% of the isolates harbouring Shiga toxin (*stx2*) gene, 12% *traT* gene and 21% *cnf1* gene.The most common species identified were *S.epidemidis* followed by *S.aureus* and *S.saprophyticus*.

On analysis of haemorrhagic septicaemia (HS) outbreak data, it has been revealed that most of the HS outbreaks are occurring is August followed by June. Spatial and temporal analysis of HS outbreaks in Madhya Pradesh and Karnataka respectively, was carried out.

Risk maps for anthrax in Odisha and Tamil Nadu using remote sensing variables were generated which revealed elevation and land surface temperature play significant role in anthrax outbreaks. Anthrax outbreaks were significant in the month of September and minimum in the month of May. Rainfall 2 months before was significantly correlated with anthrax outbreaks. The analysis resulted in identification of rainfall as important driver in determining the temporal distribution of outbreaks in Karnataka.Further, a total of 92 samples from animal and 16 environmental samples received from Odisha were screened for presence of *B. anthracis* of which 11 samples found positive for the organism.

For surveillance of *Leptospira* serogroup specific antibodies in livestock and human, a total of 1678 serum samples from Karnataka, Maharashtra, Andhra Pradesh and Kerala were tested in MAT. Out of 1295 animal

serum samples and 383 human serum samples,753 animal and 147 human serum samples were showed positive reactivity for *Leptospira* serogroup specific antibodies. Further, the gene coding sequences of the OMP of pathogenic *Leptospira* namely OMP37L, LSA 27, Loa 22, LigB, etc., were cloned, expressed and purified in prokaryotic system. Reactivity of purified and dialyzed recombinant expressed OMP protein was assessed in Western blot and recombinant antigen based Latex Agglutination Test (LAT) was developed for sero-diagnosis of leptospirosis.

During this period, a total of 1276 bovine serum samples from 13 different states of India were screened for the presence of antibodies against IBR and 27.03% sero prevalence of IBR was recorded.

A recombinant protein encoding for Erns glycoprotein of classical swine fever (CSF) virus was expressed in prokaryotic expression system. During this period, a total of 132 samples from different parts of the country were screened for CSFV infection, out of which 6 samples from Karnataka and 2 samples from Odisha were found positive.

A quantitative stochastic risk assessment model for PRRSV was developed to estimate the seasonal probabilities of PRRSV release in to rest of India from north eastern region through local transportation. Also, PRRS nucleo-capsid protein (~20 kDa) is expressed in prokaryotic expression system. Clinical samples (n=9) received from Odisha were found to be positive for PRRSV infection. A total of 56 clinical samples were received from Mizoram, Assam and Sikkim were screened for TTV (Porcine Torqueteno Virus) infection by PCR and 9 samples were positive from Sikkim and 2 each from Assam and Mizoram.

For sero-surveillance of bluetongue, fusion protein involving two non-structural proteins was produced through recombinant DNA technology and used in the ELISA.A total of 5598 goat serum samples from 12 states and 1277 sheep serum samples from 8 states collected through AICRP centers were screened for bluetongue. Among sheep, highest sero-prevalence was found in Odisha and among goats, highest sero-prevalence was found in Madhya Pradesh. During sero-surveillance, 47.58% sero-conversion for bluetongue was found in sheep and goats. Percent seroconversion was found more in adult goats (above 6 months of age) in comparison to the younger animals. Presence of neutralizing antibodies in selected serum samples were investigated by serum neutralization test against six predominant BTV serotypes and BTV-1 was found as most predominant (63.88%) followed by BTV-10 (41.66%), BTV-23 (30.55%), BTV-9 and 16 (22.22%) and BTV-2 (13.88%).A total of 331 clinical specimens from 101 flocks of sheep were collected from Karnataka state. A total of 35 blood samples suspected for BT from Tamil Nadu were tested. A total of 118 isolates from Karnataka and 3 from Tamil Nadu have been recovered in cell lines. All the isolates have been screened against serotypes 1, 2, 3, 4, 5, 9, 10, 16, 23 and 24 which indicated circulation of at least five serotypes (1, 2, 3, 16 and 24).

A total of 90 samples from sheep and goat pox outbreaks were collected of which 72 samples were found positive for the virus and six isolates were recovered in cell culture. The *Capripox virus* was further confirmed in the clinical samples and cell culture by P32 gene based PCR and confirmed as *Capripox virus* by sequencing. PCR amplification for ORF 74 (IMV envelope protein), ORF117 (Fusion protein, Virus Assembly) and ORF122 (EEV glycoprotein) was standardized. On retrospective analysis of sheep and goat pox virus, it was observed that the disease outbreaks were high during 2010 and thereafter it declined till 2013 and then the outbreaks showed increasing trend. The disease was reported from 19 states during 2015 and 2016.

A total of 230 random serum samples collected from PPR (Peste des petits ruminants) suspected surveyed flocks and tested for antibodies using ELISA. The results revealed 87% overall sero-prevalence of PPR in sheep and goats and Chi-square analysis, revealed the significant difference in sero-positivity across age groups and sex. Further, PPR post vaccination sero-conversion in small ruminants after annual mass

vaccination campaign (MVC) implementation in Chhattisgarh was assessed. The overall results indicate a protective level of 55 %.

Avian Influenza disease data was aligned with corresponding risk factors and risk map was developed.

A total of 209 human serum samples (Maharashtra n=199 and Karnataka n=10) were screened for toxoplasmosis of which 38 (18.18%) showed positive reaction for IgG *Toxoplasma gondii* antibodies.

Sero-prevalence of surra in north eastern region of India was estimated. A total of 639 sera samples from Assam, Mizoram, Sikkim and Tripura were screened by recombinant VSG based indirect ELISA which showed highest sero-prevalence in Mizoram (92.45 %) followed by Sikkim (70.16%), Assam (61%) and Tripura (52.55%)

Epidemiological survey of transmission foci of fasciolosis was conducted in Karnataka and a total of 18 water bodies covering 3 districts of Karnataka were screened for the presence of *Lymnea* snails. On analysis of water collected from these lakes,it has been found that pH, TDS, chloride content and turbidity was having a profound effect on presence of snails. Snails were present in the water bodies where pH was ranging from slightly acidic to alkaline.

Risk maps for haemonchosis up to Taluk level in Rajasthan state was developed using different models.

ABOUT ICAR-NIVEDI

ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (ICAR-NIVEDI) had its humble beginning as All India Co-ordinated Research Project (AICRP) on Animal Disease Monitoring and Surveillance (ADMAS) in 1987, upgraded to PD-ADMAS in 2000 and finally in the year 2013 the institute was rechristened as ICAR-National Institute of Veterinary Epidemiology and Disease Informatics (ICAR-NIVEDI). The coordinating units of AICRP-ADMAS continued to grow in number from 4 co-ordinating units during 1987 to 31 at present. ICAR-NIVEDI is a pioneering institute working with the mandate of R&D in the field of veterinary epidemiology and disease informatics. Its role is significant in developing disease models, risk analysis, animal disease forecasting & forewarning, need based diagnostics and analysis of disease economic impact. The institute has developed various technologies and patented few products which are being utilized by different stakeholders of the country. The role of this institute in the eradication of Rinderpest from India and development of National Animal Disease Referral Expert System (NADRES), interactive software for animal disease forecasting are noteworthy. The institute has been conducting plethora of training programmes related to epidemiology, economic impact, research methodologies, sampling frame and disease diagnosis for various stakeholders associated with animal health as part of capacity building in the area. The efforts of ICAR- NIVEDI have been appreciated and recognized by various organizations by conferring international and national awards and fellowships.

ICAR-NIVEDI plays a significant role by delivering many innovative solutions and services in the form of improved diagnostic techniques, animal disease forecasting and forewarning models, animal disease economic impact analysis and capacity building in animal disease epidemiology in the country. The institute is working on the following vision, mission, focus and mandates :

Vision

Achieving freedom from animal diseases, animal welfare, food and nutritional security through healthy foods of animal origin, poverty alleviation and economic growth of rural India.

Mission

Capacity building in frontier areas of Veterinary Epidemiology dynamics of animal diseases including zoonoses and animal healthcare intelligence.

Focus

- Improving disease monitoring and surveillance through development of pen side diagnostics
- Risk assessment for occurrence of economically important animal diseases
- Adapting strategies to improve animal disease data quality
- Understanding the threat from animal diseases in the background of climate change and globalization
- Developing early warning system and disease modelling/ forecasting
- Understanding economic impacts of animal diseases and the management strategies
- Promoting innovations and improving human resource capacity

Mandate of ICAR-NIVEDI

- Epidemiology, informatics and economics of animal disease including zoonoses.
- Surveillance, forecasting and forewarning for management of animal diseases including zoonoses.
- Repository and capacity development.

INSTITUTE RESEARCH PROJECTS

IPC: ANSCNIVEDISIL201500500068 Project ID: IXX12238

Development of Geographic Information System (GIS) enabled Early Warning System(EWS) for detection of Avian Influenza (AI) infection using Remote Sensing (RS)

K P Suresh, M M Chanda, R Sridevi and S Nagarajan

The Geographical Information System (GIS) and satellite image data can provide useful information for detection and management of disease outbreaks. The correlation between disease outbreaks and environmental variables is identified by subjecting the GIS based disease occurrence data and remote sensing data to species distribution modelling (SDM). In this project, Avian Influenza disease data was aligned with corresponding risk factors and were subjected to 11 different models for disease modelling. To assess the models for reasonable predictions and spatial patterns, different measures were used to assess how good the model fits the data. The fit models were assessed for their discriminating power using Receiver Operating Characteristic (ROC), Cohen's Kappa (Heildke Skill Score) and True Skill statistics (TSS). Rather than relying on single best model, many authors recommended the use of combined prediction of different models, which are in the scale of 0 to 1, averaging the score provide the best prediction. The average model score was obtained by considering the models with the kappa>0.60, ROC>0.90 and TSS >0.80. From the evaluation it was clear that *RF - Random Forest*, *ADA-Adaptive Boosting Model* and *GBM - Generalized Boosted Regression Tree models* are the best fit models, which were chosen to calculate the average score. Avian influenza disease Risk map for the India was developed and the average score map is shown (Fig:1).

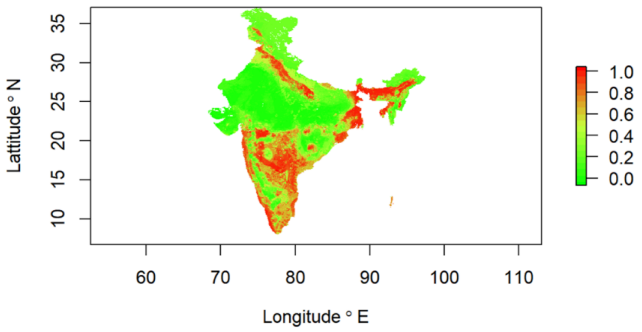


Fig 1: Risk map of Avian Influenza (AI) for India where the risk ranges from 0 to 1, green indicating no or minor risk and red indicates high risk of the disease occurrence.

IPC: ANSCNIVEDISIL201500600069 Project ID: IXXI12456

Identification of Ecological Risk Factors for Occurrence of Anthrax in India

M M Chanda, D Hemadri, P P Sengupta, K P Suresh, R Sridevi and S B Shivachandra

Analysis of outbreak data was conducted to develop risk map for anthrax in Odisha and Tamil Nadu using remote sensing variables. The analysis revealed that elevation and land surface temperature play significant role. In Odisha, Koraput and Mayurbhanj were identified as high risk districts whereas Jharsuguda, Bargarh, Puri, Khhrda and Nabarangapur were low risk districts (Fig. 2A). In Tamil Nadu, Vellore, Tiruvanamalaisambuvara, Viluppuram, Nagapattinam, Madurai and Pudukottai were identified as risk districts for anthrax (Fig. 2B). Temporal and seasonal analysis of anthrax outbreaks in Karnataka revealed seasonal pattern with certain years more severely affected than other years. Anthrax outbreaks is significant in the month of September and minimum in the month of May, hence the timing of vaccination can be planned in the month of May or

June to effectively prevent the occurrence of anthrax outbreaks. Rainfall two months before was positively and significantly correlated with anthrax outbreaks; however there was negative correlation at 14 months before the occurrence of anthrax outbreaks. The analysis resulted in identification of rainfall as important driver in determining the temporal distribution of outbreaks in Karnataka. Based on the these findings, a forecasting model was developed for Karnataka (Fig. 2C). The model predicted outbreaks to occur in regular intervals, unless intervention strategies are carried out.

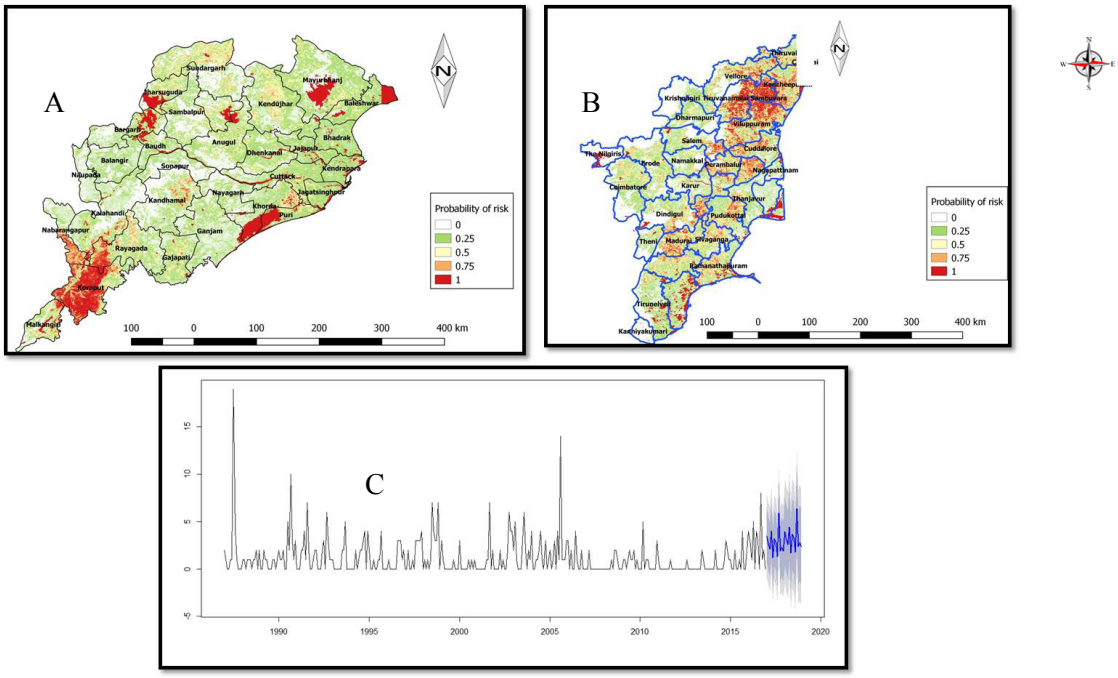


Fig. 2: Risk maps for anthrax in Odisha (A) and Tamil Nadu (B) and forecasting model (C) for anthrax in Karnataka.

IPC: ANSCNIVEDISIL201100200021 Project ID: IXX08329

Molecular Epidemiology of MRSA, MR-CoNS and ESBL Producing Gram-Negative Bacteria in Animals Including their Environment

B R Shome and R Shome

A total of 247 cattle samples (215 milk, 10 nasal swabs, 9 extra-mammary site, 13 wound) were collected from various organized and unorganized farms in and around Bengaluru. Moreover, 6 hand swabs of animal handlers and 6 environmental swabs (comprising floor of cattle shed, feeding trough, milking machine) were collected from these farms. Among these samples, Gram positive and catalase positive isolates were taken for further analysis. A total of 258 *Staphylococci* isolates (218 from milk origin, 9 from nasal swabs, 6 from extra-mammary site, 17 from wound, 5 from animal handlers hand swabs and 3 from environmental swabs) were identified by *Staphylococcus* genus specific PCR. On molecular detection, 25 isolates were found to be methicillin resistant (*mec*A gene positive) by PCR, *i.e.* 22 from milk, 1 from extra-mammary site, 1 from wound and 1 from animal handlers hand swab). But none of the isolates were positive for mecA

gene. All *mec*A positive isolates (n=25) were subjected to species specific identification by multiplex PCR (mPCR) targeting 5 major *Staphylococcus* species viz., *S. aureus, S. epidermidis, S. haemolyticus, S. chromogenes* and *S. scuiri.* The results showed *S. aureus* (n=6 from milk), *S. epidermidis* (n=12 *i.e.,* 10 from milk, 1 from extra-mammary site and 1 from animal handlers hand swab), *S. chromogenes* (n=1 from milk), while 6 isolates were unidentified by mPCR. Six unidentified *mec*A positive isolates by mPCR were subjected to partial 16SrRNA gene sequencing for species identification and the sequence analysis confirmed their species as *S.saprophyticus* (n=1 from milk), *S. hominis* (n=3 *i.e.,* 2 from milk and 1 from wound), *S. arlettae* (n=1 from milk) and *S. equorum* (n=1 from milk). A total of 25 mecA positive isolates were subjected to PCR SCC*mec* typing, results showed 12 isolates as Type V and 13 isolates as untypeable. Subsequently, Methicillin resistant *S. epidermidis* (6 isolates from 2016-17 and 3 isolates from 2017-18) were further subjected for population structure studies using Multi Locus Sequence Typing (MLST) analysis which found a common clonal strain ST-110 from cattle originating from two geographical locations (Table1). Methicillin resistant *S. aureus* (MRSA) isolates (n=10 from 2016-17 and 6 from present year 2017-18) were subjected to spa typing by PCR. The sequencing results showed t17242 as the most predominent type.

Table 1: MLST information of Methicillin Resistant S. epidermidis

Sample ID	Location	Source	MLST	SCC mec typing
Kod 33 w	Kodihalli	Cattle milk	ST-110	Type V
RAH1sw	Ramagondanahalli	Animal handler	ST-226	Type V
RDH1w	Ramagondanahalli	Animal handler	ST-21	Untypeable
F2AH2w	Kanakpura	Animal handler	New ST	Untypeable
BF1M1sw	Bidadi	Cattle milk	ST-110	Untypeable
E12Mw	Erahalli	Cattle milk	ST-457	Type V
700Mw	Kanakpura	Cattle milk	ST-110	Type V
H 4 Uw	Hesaraghatta	Extramammary site	New ST	Type V
H AH1	Hesaraghatta	Animal handler	ST 114	Type V

IPC: ANSCNIVEDISIL201500300066 Project ID: IXX12176

Epidemiology of Haemorrhagic Septicaemia in India

S B Shivachandra, M M Chanda, J Hiremath, P Krishnamoorthy and R Yogisharadhya

Haemorrhagic septicaemia (HS), an acute, fatal and septicaemic disease of cattle and buffaloes caused by bacterium *Pasteurella multocida,* has been recorded in almost all geographical regions of India. In view of this, HS outbreak data were analysed and choropleth maps were prepared for all endemic states of India to understand the spatial variability in the occurrence of HS outbreaks. Further, temporal analysis of HS outbreaks in endemic states was carried out to identify the vulnerable months in which the outbreaks are occurring (Fig. 3A). The analysis revealed that most of the HS outbreaks are occurring in August followed by June after accounting for seasonality and trend. Hence, systematic vaccination can be carried out before peak outbreak starts to timely prevent HS outbreaks. Spatial analysis of HS outbreaks in Madhya Pradesh was carried out and risk map for the occurence of HS was developed using remote sensed variables (Fig. 3B). The temporal analysis of HS outbreaks in Karnataka was carried out, which indicated slight decreasing trend in the HS outbreaks which may be due to effective vaccination (Fig. 3). There is a seasonality in the

occurrence of HS outbreaks in Karnataka. Forecasting model was developed in order to forecast the HS outbreaks in Karnataka. Rainfall and wet day frequency were positively associated with HS outbreaks. The forecasting model was validated on the data not used for modeling purpose and shows good correspondence with the observed outbreaks. During the reporting period, more than 30 suspected clinical specimens such as blood, nasal swabs and tissue samples (heart, liver, spleen, bone marrow) from sheep/goat/cattle/buffaloes/ pigs belonging to Karnataka state were screened for presence of *P. multocida* by conventional methods as well as by specific PCR assay and a total of 2 samples were found positive.

A State	Significant month of outbreaks
Jammu & Kashmir	April
Andhra Pradesh	August
Assam	August
Gujarat	August
Madhya Pradesh	August
Maharashtra	August
Meghalaya	August
Rajasthan	August
West Bengal	August
Karnataka	August
Haryana	February
Orissa	February
Uttaranchal	July
Bihar	June
Chattisgarh	June
Himachal Pradesh	June
Kerala	June
Manipur	May
Punjab	May
Tamil Nadu	November
Goa	September
Jharkhand	September

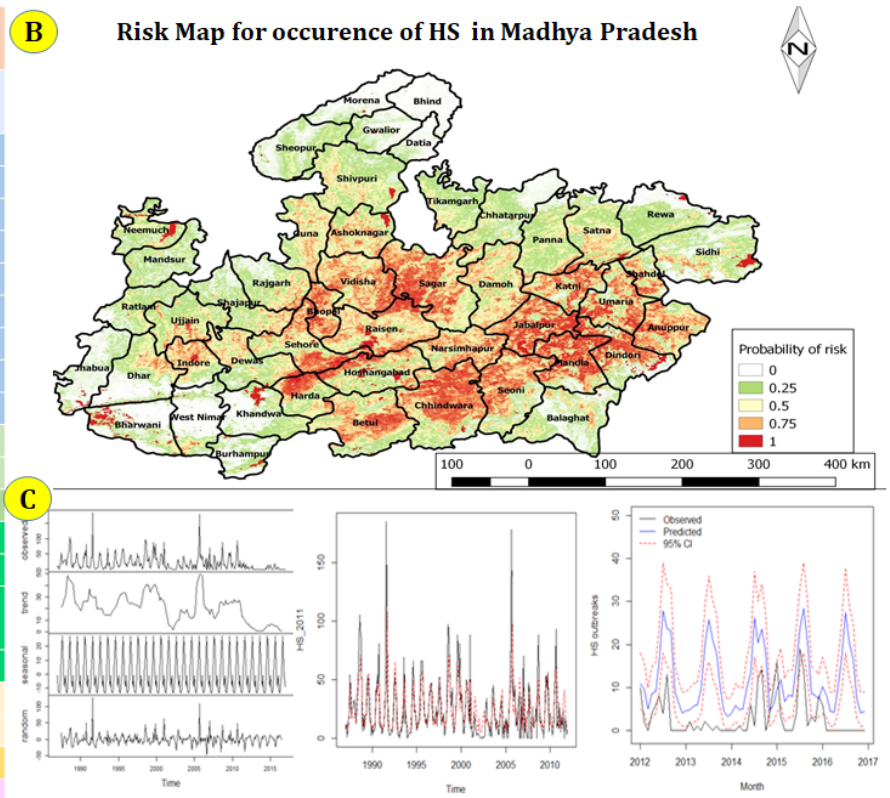


Fig. 3 (A): Vulnerable months for occurrence of HS outbreaks in endemic states; (B): Risk map for occurrence of HS outbreaks in Madhya Pradesh; (C): Temporal analysis of HS outbreaks in Karnataka].

IPC: ANSCNIVEDISIL201500200065 Project ID:IXX12420

Disease Severity Pattern and Risk Factors Identification for PPR in Sheep and Goats in India

V Balamurugan, G Govindaraj, G B Manjunatha Reddy and R Yogisharadhya

PPR in epidemiological perspective and its associated predisposing socio-economic and other risk factors in sheep and goats in poorly studied Madhya Pradesh state of India was investigated through multistage random survey between December 2016 and January 2017. The data was collected from 410 flocks through survey in three districts (Betul, Sagar and Bhopal). On Chi-square analysis, significant difference was observed in the socio-economic factors like education and income level of the farmers, size of the farming

unit, feeding and rearing pattern of animals, and awareness of farmers about PPR vaccination. Further, logistic regression model revealed education level of the farmer, farming unit size, rearing pattern and awareness were the more influencing socio-economic factors. Additionally, 230 random serum samples were also collected from PPR suspected surveyed flocks and tested for antibodies using ELISA. The results revealed 87% overall sero-prevalence of PPR in sheep and goats and Chi-square analysis, revealed the significant difference in sero-positivity across age groups and sex. Further, PPR post vaccination sero-conversion in small ruminants after annual mass vaccination campaign (MVC) implementation in Chhattisgarh was assessed. Random stratified serum samples (n=269) along with epidemiological parameters from flocks were collected and tested for PPR virus antibodies using competitive ELISA. The overall results from random stratified sampling indicate 55 % protective levels. Multivariable logistic regression revealed age of animals as an influencing factor for sero positivity.

IPC: ANSCNIVEDISIL201500400067 Project ID: IXX12421

Epidemiology of Porcine Reproductive and Respiratory Syndrome in India

J Hiremath, D Hemadri, K P Suresh, S S Patil, G Govindaraj and M M Chanda

A quantitative stochastic risk assessment model for PRRSV was developed to estimate the seasonal probabilities of PRRSV release into rest of India from north eastern region through local transportation. Based on the OIE guidelines for the risk analysis, the methodology for PRRSV introduction through live pig was developed. In the present study, the risk assessment model was developed to assess the probability of PRRSV being released into rest of India and its subsequent exposure of the susceptible population. The probability was calculated as follows

$$P_F = P_R * P_E$$

Where, P_F is final probability, P_R is probability of PRRSV being released in to rest of India and P_E is probability of exposure. An event tree was prepared which summarizes the structure and chain of the events of the risk pathways of the legal transportation of the live pigs (Fig.4).

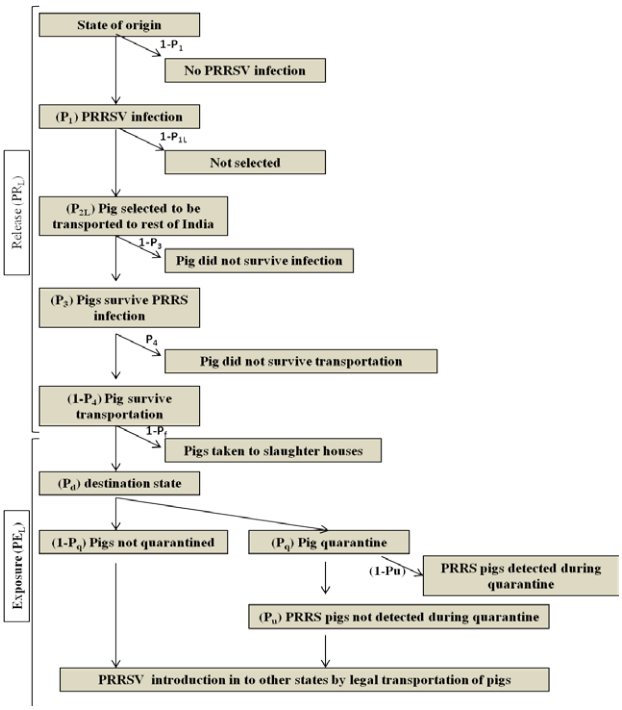


Fig.4: Event tree of PRRSV introduction into the rest of India by the imports of live pigs

Further the input parameters and probabilities (Table.2) were taken from published literature and were used in the quantitative models and the estimation of release and exposure assessment of risk of PRRS introduction in to rest of India through legal transportation of live pigs is in process

Table.2 Description of input parameters and probabilities used in the quantitative models for the release and exposure assessment of the risk of PRRS introduction into rest of India through legal transportation of live pigs

Symbols	Definition	Parameter	Source
P_1	Probability of PRRS infection in the states	00.28	Gogoi et al, 2017
P_{2L}	Probability of selecting a PRRSV infected pig from the state before disease exhibits symptomatically	0.25-0.55	Markowskadaniel et al., 1997
P_3	Probability of pigs surviving to PRRSV infection (Adults)	0.90	Pejsak et al., 1997
P_4	Probability of pigs surviving transportation	0.80-0.96	Brown et al., 1994 and Warriss et al., 1994
PR_L	Probability of release of at least one PRRSV infected live pig	0.56	Le, Potier et al., 1997
P_d	Probability of infected pigs reaching the destination state	$P_3*P_4*PR_L$	
P_q	Probability of pigs quarantined	0.02-0.05	Based on feedback of the 50 farmers
P_u	Probability of pigs quarantined go undetected	0.60-0.75	Yoon et al., 1993

IPC: ANSCNIVEDISIL201700200080 Project ID: IXX13244

Monitoring and Surveillance of Sheep Pox and Goat Pox Diseases

G B Manjunatha Reddy, V Balamurugan, S B Shivachandra, M Nagalingam and R Yogisharadhya

A total of ninety samples from sheep and goat pox outbreaks were collected of which seventy two samples were found positive for the virus. All the samples were also subjected for virus isolation, however only six isolates were recovered in cell culture.

The capripox virus was isolated from the clinical samples (scabs, skin, lungs and nasal swabs) with cytopathic effects such as rounding of cells, clumping and detachment. During outbreak, various clinical signs observed were fever, vesicles, anorexia, loss of body condition, wool loss, nodules in hairless regions of body including the axillae, groin, perineum, ventral surface of the tail, muzzle, udder, teats, around the muzzle, lips and ears. The post-mortem examination revealed typical gunshot wounds/pox lesions in lungs with congestion and consolidation, enlargement of lymph nodes mucosal congestion and sometimes haemorrhages in other visceral organs. The morbid tissues were subjected for histopathology and the microscopic lesions of oedema, thickening of alveolar septa, mononuclear cell infiltration, congestion and various degrees of vascular haemorrhages, necrosis were recorded in the lungs. The skin sections revealed hyper keratization, epithelial cell proliferation, inflammatory cells infiltration, intra-cytoplasmic inclusions and necrosis similar to the earlier reports were recorded. Lymph nodes also showed varying degrees of inflammatory changes. The capripox virus was further confirmed in the clinical samples and cell culture by P32 gene based PCR and expected specific amplification of 1006 bp product and confirmed as capripox virus by sequencing. The phylogenetic analysis revealed 94.6 to 100 % homology with all the other Indian capripox virus isolates at nucleotide as well as amino acid levels. PCR amplification for ORF 74 (IMV envelope protein), ORF117 (Fusion protein, Virus Assembly) and ORF122 (EEV glycoprotein) were standardized. The cloning and over expression of ORF117 was carried out and was confirmed by colony PCR, RE digestion and SDS-PAGE.

IPC: ANSCNIVEDISIL201700300081 Project ID: IXX13245

Development of Assay for Detection of Antibodies Against CSFV Infection in Pigs

S S Patil, K P Suresh, S B Shivachandra, D Hemadri and P Roy

Classical swine fever (CSF) is one of the top 5 viral diseases of livestock in the country which is caused by classical swine fever (CSF) virus. Neutralizing antibodies against two major glycoproteins Erns and E2 have been demonstrated previously in infected animals. Glycoprotein Erns has been considered as potential candidate antigen in development of diagnostic test. RT-PCR amplification was carried out using the specific primers and obtained an amplified product of 205 bp. For the expression of Erns protein, CSFV erns gene (205 bp) was cloned into pET32a vector and expression was done by transforming into BL21 (DE3) *E.coli* strain. The recombinant protein expression was confirmed by SDS-PAGE and Western blotting method. Induction of recombinant cloned product was done using IPTG at 37°C for 5 hours. Purification of expressed protein was done by passing the protein samples through Ni-NTA columns and 28kDa protein was obtained in the denatured form that was analyzed by running in SDS-PAGE with pre-stained protein ladder and further confirmed by Western blot using anti histidine antibodies (Fig.5).

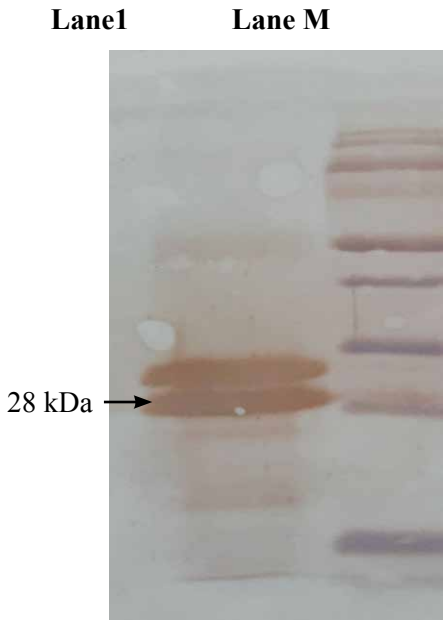


Fig.5: Western Blotting of Erns expressed protein with Anti His antibodies (Lane 1-Erns purified protein Lane M- Prestained protien ladder)

IPC: ANSCNIVEDISIL201700600084 Project Code:IXX13346

Estimation of Economic loss of Sheep and Goat Pox in Endemic States of India

G Govindaraj, G B Manjunatha Reddy, V Balamurugan, P Krishnamoorthy and R Yogisharadhya

The results of time series data analysis revealed that the number of sheep and goat pox outbreaks were high (214) during 2010 and thereafter it declined till 2013 and then the outbreaks showed increasing trend. In recent years, though the number of outbreaks are less than peak levels during 2010 and 2014, with increase attack and death indicating the severity of the disease. The disease was reported from 19 states during 2015 and 2016 and among the reported states, more outbreaks were reported in Jammu and Kashmir (176) followed by Karnataka (61), Puducherry (24), Tripura and Assam (14) and Tamil Nadu (13). A survey instrument and deterministic mathematical model were developed to assess various morbidity and mortality losses due to sheep and goat pox. The developed survey schedule was pilot tested in 30 sheep and goat pox affected farms during 2017-18 in Karnataka state. (Fig. 6)

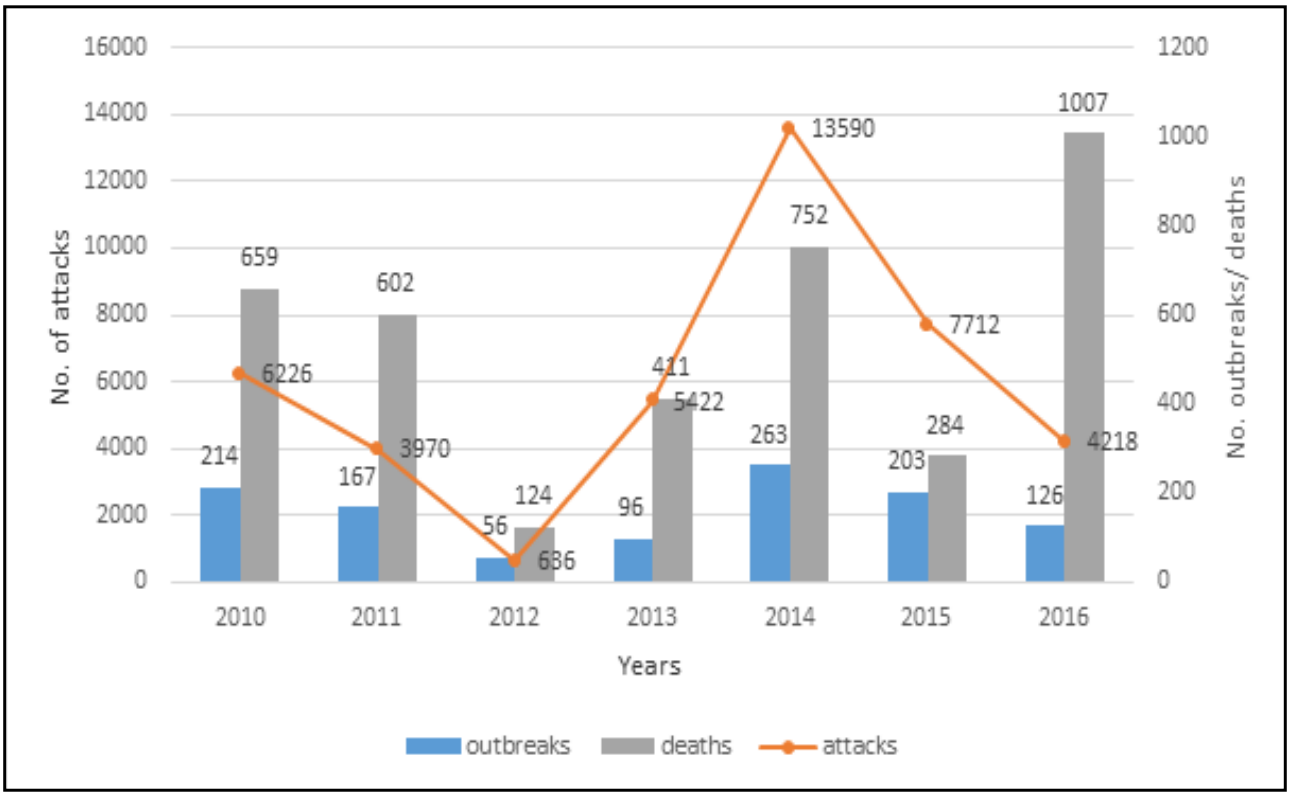


Fig 6: Sheep and goat pox outbreak, attack and death levels in India (2010-16)

IPC : ANSCNIVEDISIL201700500083 Project ID: IXX13141

Development of an Expert System for Cattle Disease Diagnosis: a Participatory Approach

P Krishnamoorthy, K P Suresh, G Govindaraj and P Roy

An expert system for disease diagnosis is a computer system that emulates the decision making ability of a human expert. The idea behind creating an expert system is that it is useful for many people from the knowledge of one person - the expert. Expert system simulates the judgment and behavior of a human that has expert knowledge and experience in a particular field. The questionnaire for collecting the scores for symptom/signs of thirteen diseases of cattle was prepared. The questionnaire was assessed for validity and the suitability of the symptoms/signs for a particular disease by using the symptoms/signs given in the literature and determined by discussion with the experts. The pilot survey for the questionnaire was carried out in Puducherry and Tamilnadu and slight modifications in the cattle symptoms/signs were made and the final questionnaire version 2 was prepared. The data was collected by using questionnaire from 70 veterinarians belonging to Puducherry, Tamilnadu, Assam, Kerala, PI's of AICRP on ADMAS centres and Karnataka states. The questionnaire was assessed for content and logical validity.

Epidemiological Surveillance of Transmission Foci of Fasciolosis

S S Jacob, P P Sengupta, R Yogisharadhya and A Prajapati

Fasciolosis in ruminants is caused by the liver fluke *Fasciola gigantica* in India and is transmitted by lymnaeid snails. Distribution of fasciolosis depends on the presence and population dynamics of the snails. In this project, a total of 18 water bodies covering 3 districts (Bengaluru, Tumkur and Ramanagara) of Karnataka were screened for the presence of *Lymnea* snails and a total of 219 snails were collected. Water samples collected from all the 18 lakes were screened for 12 parameters. Among these, pH, TDS, chloride content and turbidity found to have effect on presence of snails. Snails were present in the water bodies where pH was ranging from slightly acidic to alkaline (Fig. 7). In order to genetically characterize the collected snails, ribosomal DNA (ITS-1, ITS-2 and 18S) and mitochondrial DNA (Cytochrome Oxidase I) were identified as markers . Total genomic DNA was isolated from 10% of the collected snails and quantified. PCR was standardized with 9 sets of primers.

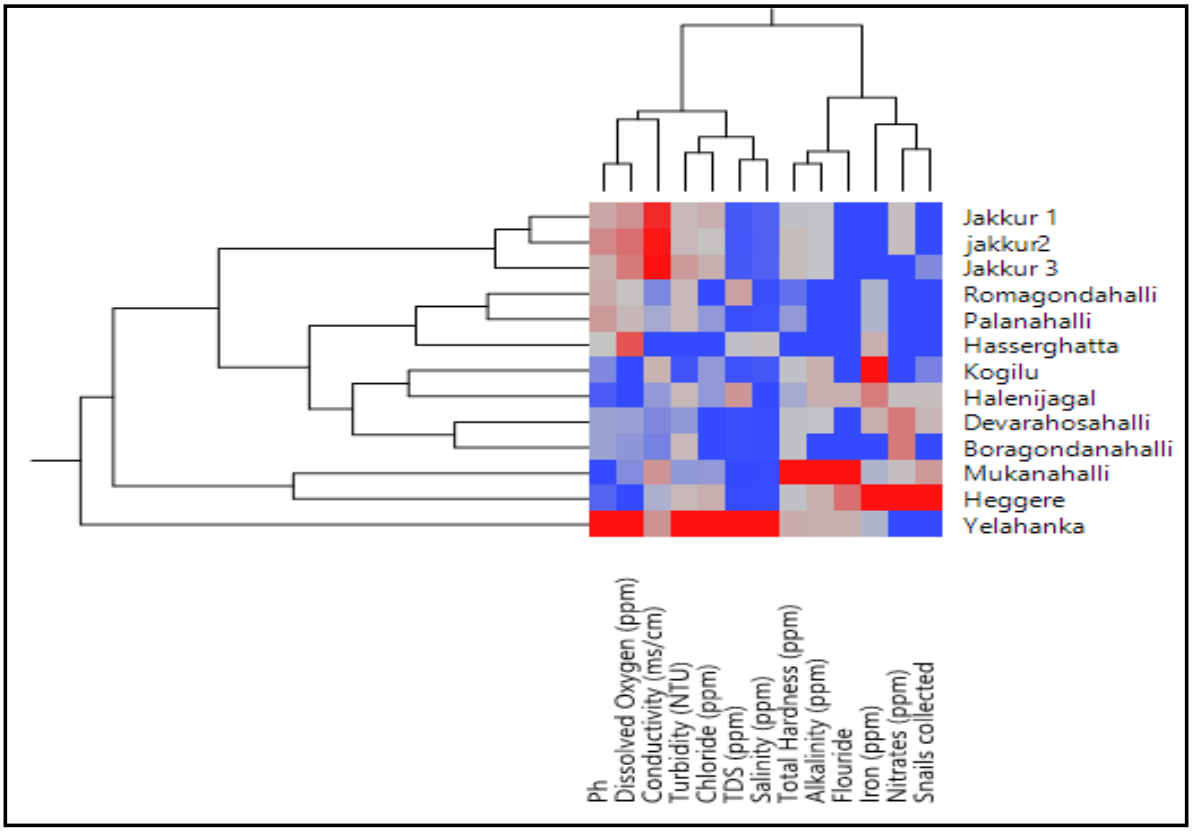


Fig. 7: Two way clustering analysis of different parameters in different lakes

INSTITUTE SERVICE PROJECTS

National Animal Disease Referral Expert System (NADRES)

D Hemadri, K P Suresh and S S Patil

Generalized Linear Model (Logistic Regression) was used to predict the probability of disease outbreak in relation to weather parameters, remote sensing variables and livestock population or densities. The probability of disease outbreak was categorized in 6 risk levels - No risk (NR), Very low risk (VLR), Low risk (LR), Moderate risk (MR), High risk (HR) and Very high risk (VHR) for enabling the stake holders to take appropriate control measures by suitably allocating available resources (Fig.8A). Internal accuracy was performed using 10 years data and accuracy obtained was > 90% except, foot and mouth disease (86.72%).

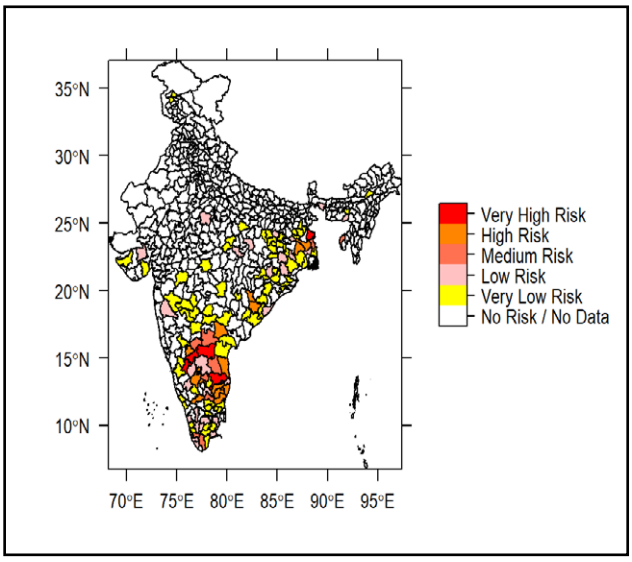


Fig. 8 A: Risk prediction of anthrax for the month of June 2018

Database on disease outbreaks, location of outbreaks, susceptible population, deaths, attacks etc were prepared. Further, the asociated risk factors such as weather parameters, monthly precipitation (mm), sea level pressure (millibar), minimum temperature (°C), maximum temperature (°C), wind speed (m/s), vapour pressure (millibar), soil moisture (%), perceptible water (mm), potential evaporation transpiration (mm), cloud cover (%) etc. were extracted from different sources like National Centre for Environmental Prediction (NCEP), Indian Meteorological Department (IMD), National Innovations on Climate Resilient Agriculture (NICRA) and other sources. The remote sensing variables like Normalised Difference Vegetation Index (NDVI) and Land Surface Temperature (LST) were extracted from MODIS/LANDSAT/LISS III or IV satellite images. The livestock population and densities were extracted from Livestock census 2012.

Further, to extend the reach of the NADRES forewarning bulletin among the various stakeholders, a Mobile Application (*app*) "LDF-Mobile *App"* was developed (Fig. 8B). The forewarning methodology adapted in the "mobile app" remains the same as monthly bulletin. In addition to forewarning, the LDF-Mobile App also provides the details of clinical samples to be collected in case of outbreaks of the listed diseases for laboratory confirmation. Immediate preventive measures to be taken up in case of positive prediction/disease confirmation. The mobile App will also be made available on Google play store.

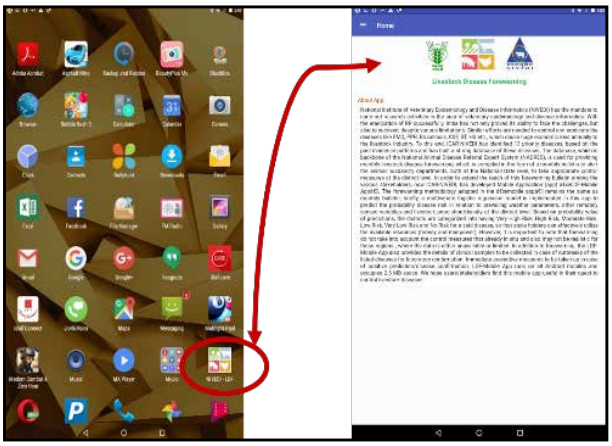


Fig. 8B: The LDF - Mobile app available at ICAR-NIVEDI website.

IPC: ANSCNIVEDISIL201100300022 Project ID: IXX08279

Maintenance and Updating of Livestock Serum Repository

D Hemadri, K P Suresh and S S Patil

As a part of the annual survey conducted by the AICRP on ADMAS, central unit at NIVEDI designs and sends sampling plan every year to each of the centers of AICRP on ADMAS. The serum samples so collected, as per the plan, are sent to NIVEDI for screening against various livestock diseases. During the year 2017-18, it was decided to screen serum samples from small ruminants for peste des petits ruminants (PPR), brucellosis and bluetongue. Given below are state wise details of serum samples (n=24291) received (Fig. 9). A total of 2065 samples (1567 goats and 498 sheep) belonging five states were screened for brucellosis and a total of 5598 goat serum samples from 12 states and 1277 sheep serum samples from 8 states collected through AICRP centers were screened for bluetongue.

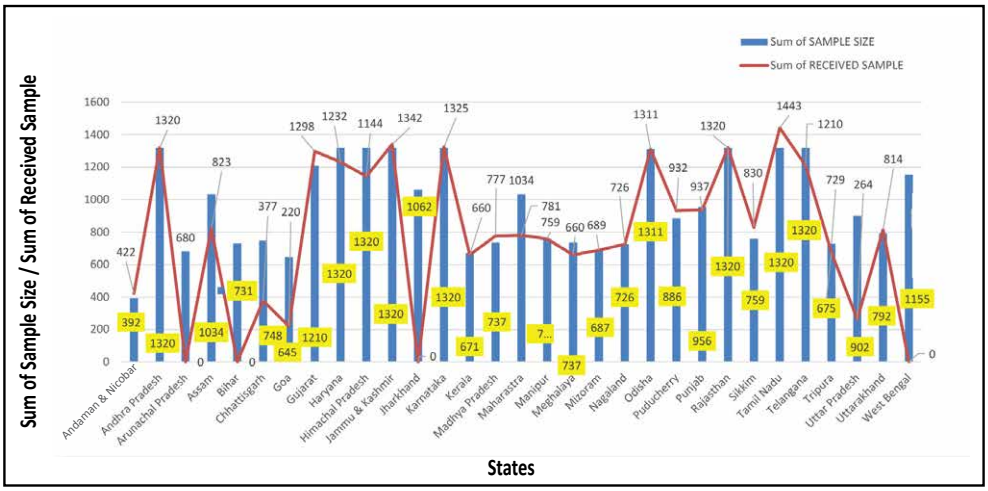


Fig. 9: The sum of samples size and received samples from different states of India.

IPC: ANSCNIVEDISIL201300200045 Project ID: IXX10708

Sero-Epidemiology of Brucellosis

R Shome, B R Shome and M Nagalingam

A total of 2100 random serum samples (sheep -512 and goat-1588) received from 5 AICRP centers were screened for brucellosis by iELISA kit. Sero prevalence of 3.71% (19/512) and 1.32% (21/1588) was recorded for sheep and goat respectively. The results revealed highest sero prevalence of 6.7% in Assam (5/76) state compared to other states.

Similarly, a total of 2,123 serum samples from seven collaborating units of AICRP on ADMAS, ie. Nagaland-477 (cattle=143, buffalo=7, sheep=6, and goat=48 and pig=273), Tripura-223 (cattle=137, goat=58 and pig=28), Jammu and Kashmir-287 (cattle=113, buffalo=1, sheep=41 and goat=132), Manipur-332 (cattle=147, buffalo=19, sheep=34, goat=2 and pig=130) Assam-499 (cattle=297, buffalo=1, sheep=30, goat=146 and pig=25), Goa-58 (cattle=46, buffalo=12) and Uttar Pradesh-247 (cattle=48, buffalo=156, sheep=42 and pig=1) were screened for brucellosis by Protein G iELISA, anti sheep and goat indirect ELISA and iELISA protocol for swine. The seroprevalence of 7.7% (30/386) in goats, 6.5% (10/153) in sheep, 5.0% (47/931) in cattle, 0.8% (4/457) in pigs and 0.5% (1/196) in buffaloes was recorded.

Seroepidemiology of Infectious Bovine Rhinotracheitis in India

S S Patil and D Hemadri

Infectious Bovine Rhinotracheitis (IBR) is a highly contagious disease that is caused by Bovine Herpes virus-1 (BoHV-1). It can affect young and older bovines. In addition to causing respiratory disease, this virus can cause conjunctivitis, abortions, encephalitis, and generalized systemic infections. Disease outbreaks can result in production losses, abortion and delayed inter calving periods. A total of 1276 bovine serum samples from 13 different states of India were screened for the presence of antibodies against IBR using the NIVEDI's Avidin-Biotin ELISA kit and percent positivity was found to be 27.03% (Table 3).

Table 3: Sero-prevalence of IBR in different states of India during 2017-18

Sl No.	State	Total No. of samples	No. of samples positive	Percent Positivity
1	Assam	68	9	13.24%
2	Chhattisgarh	177	40	22.59%
3	Goa	95	12	12.63%
4	Gujarat	93	15	16.12%
5	Jammu & Kashmir	111	88	79.27%
6	Karnataka	64	11	17.18%
7	Kerala	26	2	7.69%
8	Punjab	203	52	25.61%
9	Sikkim	35	2	5.71%
10	Telangana	40	8	20%
11	Tripura	126	39	30.95%
12	Uttar Pradesh	76	17	22.36%
13	Uttarakhand	162	50	30.86%
	Total	**1276**	**345**	**27.03%**

The highest prevalence rate of 79.27% was observed in Jammu & Kashmir and the lowest (5.71%) in Sikkim.

EXTERNALLY FUNDED PROJECTS

ICAR Project: All India Network Project on Outreach Programme on Zoonotic Diseases

V Balamurugan, P P Sengupta, S B Shivchandra, G Govindaraj, R Sridevi and M M Chanda

For surveillance of *Leptospira* serogroup specific antibodies in livestock and human, a total of 1678 serum samples from different areas were collected / received during the period from Karnataka (Kunigal and Ramanagara), Maharashtra (Nagpur, Pune, Raigad), Andhra Pradesh (Kurnool) and Kerala (Kochi) were tested in MAT (at 1:100 for livestock samples and at 1:50 for human samples) with 18 reference *Leptospira* serovars (Table 4). A total of 1295 animal serum samples (cattle-1192, rat-52 and horse-51) and 383 human serum samples were tested in the MAT at 1:100 titre and 1:50 titre, respectively, of which 753 animal (cattle-670, rat- 34 and horse-49) and 147 human serum samples (Veterinarian risk group-36; PUO cases – 111) were showed positive reactivity for *Leptospira* serogroup specific antibodies.

Table. 4 Panel of leptospiral reference serovars used in the MAT

Species	Serovar	Strain	Serogroup
L. interrogans	Australis	Ballico	Australis
L. interrogans	Bankinang	Bankinang 1	Autumnalis
L. interrogans	Canicola	HondUtrech IV	Canicola
L. interrogans	Hardjo	Hardjo prajitno	Sejroe
L. interrogans	Hebdomadis	Hebdomadis	Hebdomadis
L. interrogans	Pyrogenes	Salinem	Pyrogenes
L. borgpetersenii	Tarassovi	Perepelicin	Tarassovi
L. interrogans	Icterohaemorrhagiae	RGA(ATCC443642)	Icterohaemorrhagiae
L. interrogans	Pomona	Pomona	Pomona
L. Santarosai	Shermani	1342 K	Shermani
L. inadai	Kaup	LT 64 - 68	Tarassovi
L. kirschneri	Grippotyphosa	MoskvaV	Grippotyphosa
L. fainei	Hurstbridge	BUT 6	Hurstbridge
L. borgpetersenii	Javanica	Poi	Javanica
L. noguchii	Panama	CZ 214 K	Panama
L. interrogan	Djasiman	Djasiman	Djasiman
L. interrogan	Copenhageni	M 20	Icterohaemorrhagiae
L. interrogan	Bataviae	Swart	Bataviae

Toxoplasmosis is a well-known zoonotic disease in human and it mainly causes abortion and reproductive disorders in human, sheep and other animals. As a preliminary study during the period 2017-18, a total of 209 human serum samples (Maharashtra =199 and Karnataka =10) were screened for toxoplasmosis by using commercial diagnostic kit (*Toxoplasma* IgG & IgM, DIESSE Diagnostica Senese, Italy Enzywell), of

which 38 showed positive reaction for IgG *Toxoplasma* antibodies indicating not recent infection.

Further, to detect *Bacillus anthracis* (*B. anthracis*) in clinical / environmental samples, standard bacterial techniques like inoculation, streaking on different media (Brain Heart Infusion Agar (BHI), Polymyxin-Lysozyme-EDTA-Thallous acetate (PLET), Nutrient Agar and Blood Agar), along with Grams Staining and confirmatory test by using Protective antigen (PA) and capsular specific PCR are being used. A total of 92 samples (Cattle-61; Goat- 3; Bone-8; Muscle-1; Dried meat-3 and Environmental sample-16) received from Odisha state were screened for presence of *B. anthracis* of which 11 samples (Bone-1, Soil-1, Blood-09) showed positive.

IPC: ANSCNIVEDISOP201200600030 Project ID: OXX01504

ICAR Project: All India Network Programme on Bluetongue

D Hemadri, M M Chanda and K P Suresh

The work in All India Network on bluetongue focuses mainly on identifying bluetongue risk regions in the country. To achieve the objective, it was planned to conduct country wide sero-surveillance for bluetongue and also to collect and collate nation wide bluetongue outbreak data. Since combining the said data with livestock demography, climatic and non-climatic parameters will help in developing robust predictive risk map it was envisaged to collect the said data through various govt agencies, internet resources and remote sensed images. As a first step a recombinant protein based indirect ELISA was developed under student research programme for detecting antibodies to bluetongue virus in serum of sheep and goats. It was important to consider alternative strategy as existing kits use recombinant structural proteins, and as result there is a higher possibility of detecting antibodies developed in response to BT vaccine in animals, in addition to those developed due to active virus replication. Given that there are lesser possibility of antibody response to non-structural proteins in vaccinated animals, a fusion protein involving two non-structural proteins was produced through recombinant DNA technology and used in the ELISA. In addition, buying an imported kit would have implicated an economic burden of Rs. 43 lacs (for screening 23000 serum samples approximately), which is now saved.

So far a total of 5598 goat sera from 12 states and 1277 sheep sera from 8 states collected through AICRP centers were screened and results of which are shown in Fig.10.

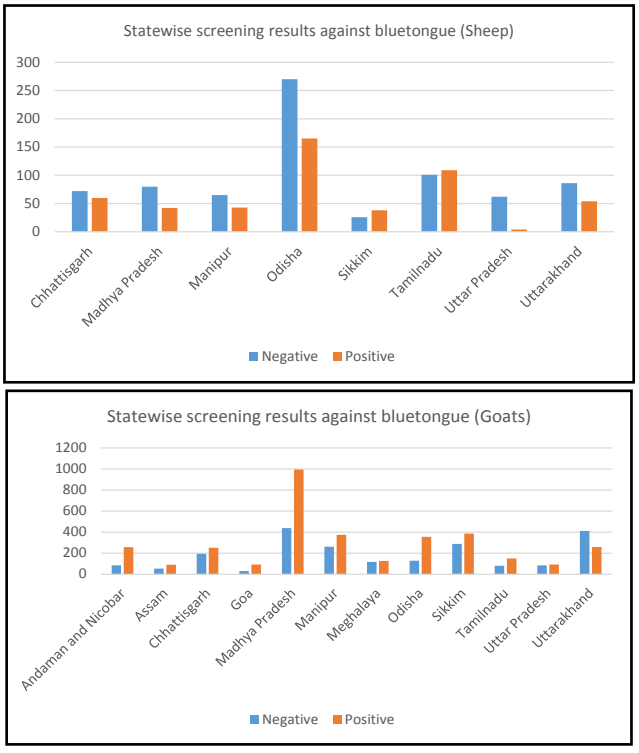


Fig. 10: Seroscreening for bluetongue in sheep and goats

IPC: ANSCNIVEDICOP201500100064 **Project ID: 0XX03915**

ICAR Project: National Innovations on Climate Resilient Agriculture - Modelling the effect of climate vulnerability on transmission of vector-borne livestock diseases in India using remote sensing and geographical information system

K P Suresh, P Krishnamoorthy and S S Jacob

In this study, based on agro climatic zones, the 10 sampling sites for the states of Karnataka and Kerala (Fig.11) were selected for tick collection to identify the species and its transmission of three economically important livestock diseases viz., Anaplasmosis, Babesiosis and Fasciolosis. Processed the tick samples collected during (September 2017 to March 2018) from identified sites and permanent slides were prepared.

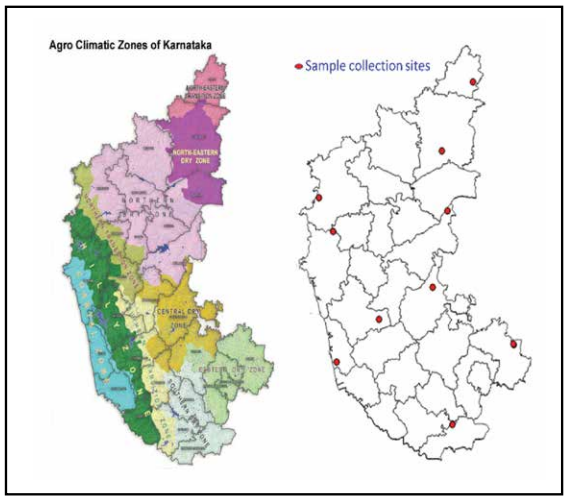


Fig: 11: Agro climatic zones of Karnataka and samples collection sites

IPC: ANSCNIVEDICOP201600800077 Project ID: OXX03488

ICAR Project: All India Network Programme on GIP

P P Sengupta, K P Suresh, S S Jacob and M Pratheepa

The disease data on haemonchosis was received from CSWRI, Avikanagar unit. The data was related to eight districts viz., Ajmer, Bhilwara, Bikaner, Jaipur, Jodhpur, Pali, Sikar, Tonk including 17 talukas. Risk parameters like remote sensing variables [Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST)], Meteorological variables [Cloud, Day time temperature, Meridonal Wind, Potential Evaporation (Transpiration), Perceptible Water, Precipitate, Pressure, Relative Humidity, Sea Level Pressure and Soil Moisture] Temperature, Maximum Temperature, Minimum temperature, Vapour pressure, Wet, Zonal wind and Elevation were identified and measured. These parameters generated on date, one month lag and two month lag were used in the development of statistical models and the disease prediction models were developed using logistic regression analysis. Risk maps using eight models (GLM, GAM, ANN, GBM, RF, MARS, FDA, CTA) were developed for EPG for Taluk level data in Rajasthan during 2001-2016 using R software with the control data (Fig.12).

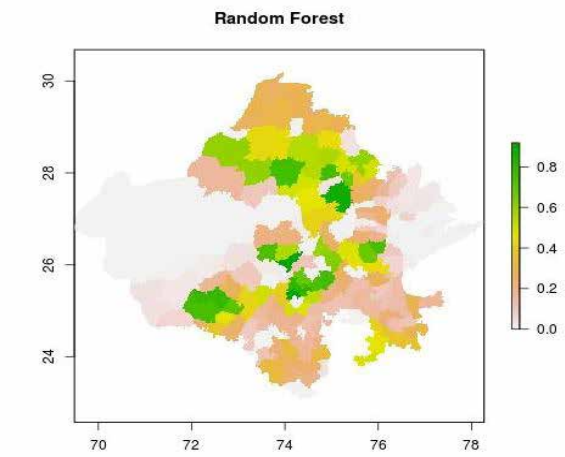


Fig. 12: From the risk map (Rajasthan) predicted, regions represented in green colour were observed to be at high risk whereas regions represented in light orange were at moderate risk and regions represented in light pink at low risk.

IPC: ANSCNIVEDISOP201201600040 Project ID: OXX02578

DBT - Network Project on Brucellosis : Brucellosis Epidemiology (BE-1)

R Shome, B R Shome and M Nagalingam

A total of 160 culture DNA samples from all the 8 DBT network project epidemiology units received were amplified by both *bcsp* genus (223bp product) and species specific PCRs (AMOS and Bruce ladder) and 132 (82.5%) confirmed to be *Brucella* and 90% of these isolates were typed as *B. abortus* (117) and 12 and 3 were belonging to *B. melitensis* and *B.suis*. The complete MLST profiling of all the 117 *Brucella* isolates analysed during the period revealed ST1 as the predominant genotype among the *B. abortus*, similarly ST8 and ST14 as predominant genotypes among *B. melitensis* and *B. suis* circulating in India. The sequence highlighted the genetic relatedness among the different *Brucella* species of Indian isolates with their respective species of 544 global isolates (Fig 13).

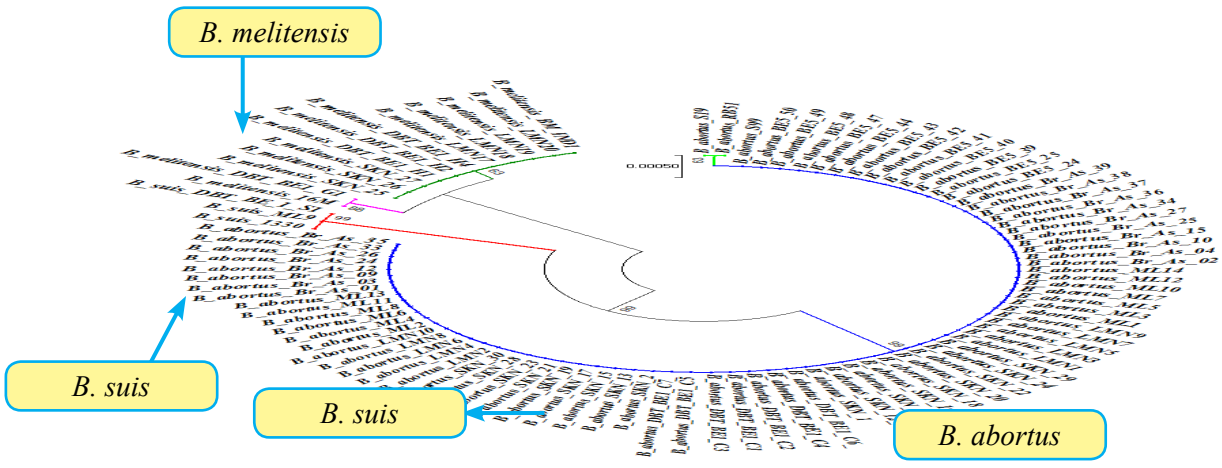


Fig. 13: Sequence divergence of Indian *Brucella* isolates by neighbor-joining dendrogram

Similarly, VNTR (MLVA-15) assay for 54 isolates (49 field and 5 reference strains) analysed designated the 49 field *Brucella* isolates into 33 genotypes, among which 3 genotypes (genotype 159, 183, 188) were similar to that of previously described and 30 as novel genotypes. Sero-surveillance in the sheep market (n-451) and sheep farms (n-1049), indicated 8.3% and 5.5% sero-prevalence in organised sheep farms and markets, respectively indicating endemicity, inter-phase correlation of brucellosis transmission between the farms and markets. Samples revealed an overall 5.5% (25/451) positivity with varying prevalence in different districts. Milk surveillance in 5277 villages in 5 districts of Karnataka highlights an overall 7.96 percent positivity in milk samples and brucellosis prevalence greater than 10% in 3 out of 5 districts surveyed warrants systematic preventive strategy to control brucellosis.

IPC: ANSCNIVEDISOP201201700041 Project ID: OXX02384

DBT - Network Project on Brucellosis : Brucellosis Diagnostics (BD-2)

M Nagalingam, V Balamurugan, R Shome and GB Manjunathareddy

The project was initiated in an attempt to develop serological test for diagnosing bovine brucellosis using recombinant proteins in order to avoid use of lipopolysaccharide (LPS) of *Brucella* species which causes cross reactivity with organism like *Yersinia enterocolitica*: O9 that share common features of the LPS thereby reducing the specificity of the test. *Brucella abortus* serine protease and malate dehydrogenase genes were amplified, cloned and recombinant proteins were expressed. In addition, combining two immuno dominant proteins fused by linker as a chimeric protein with partial BP26-BLS was also carried out. All the expressed proteins were characterized by SDS-PAGE and Western blot. The Western blot showed BP26, SodC, BAB-1885, serine protease, Bfr, BLS and BP26-BLS proteins reactivity with positive cattle serum which were further optimized for their concentration and serum dilution in ELISA with *Brucella* antibodies positive and negative bovine serum. Evaluation with Rose Bengal Plate Test (RBPT), Svanovir I-ELISA and Svanovir C-ELISA confirmed positive (n=113) and negative (n=113) bovine sera for *Brucella* antibodies resulted in BP26 antigen based ELISA performing better with AUC, sensitivity, specificity and Youden's index based on Percent Positive (PP) values of 0.953, 90.27 %, 95.58 % and 0.8584 respectively with a kappa statistic of 0.85v (Fig.14 A & B). BP26 based ELISA could perform better than Svanovir C-ELISA in detecting only 8 samples as positive as compared to 13 samples with C-ELISA out of 52 *Brucella* S19 vaccinated bovine serum samples indicating its DIVA potential. The recombinant antigen based ELISA kit for diagnosis of bovine brucellosis was also validated at TRPVB, TANUVAS, Chennai.

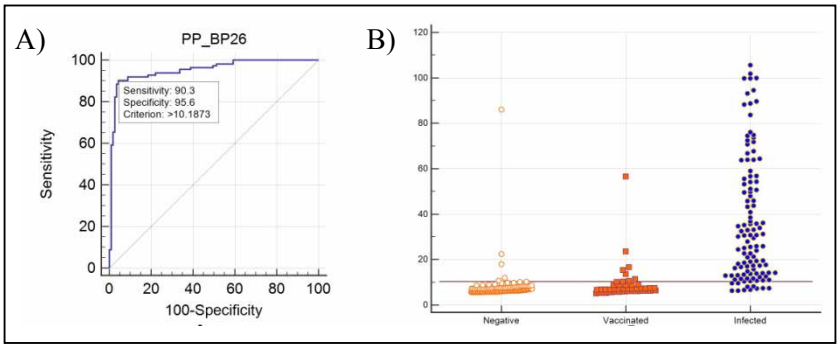


Fig.14. (A). ROC graph analysis of PP values of BP26 in ELISA with *Brucella* antibodies positive and negative cattle serum to optimize sensitivity and specificity. (B). Dot plot graph showing BP26 in ELISA with *Brucella* antibodies positive, negative and S19 vaccinated cattle serum with cut off obtained from ROC curve analysis

IPC ANSCNIVEDICOL201600100070 Project ID: OXX03486

DBT-TRPVB Project : External Validation of the Diagnostic Assays for Detection of Anti-Brucella Antibodies Developed under the DBT-Network Project on Brucellosis

R Shome and M Nagalingam

A total of 844 bovine and small ruminants serum samples screened for brucellosis by laboratory standardized Protein G iELISA kit, Bionote iELISA kit Korea and Rose Bengal Plate Agglutination Test (RBPT). All the three test positive and negative serum samples were sorted out and good quality one ml quantity sera samples were coded and sent to TRPVB, Chennai for third party validation of the diagnostic assays. Similarly, a total of 111 human serum samples categorized based on RBPT, SAT titres and Human IgG and IgM ELISA were sorted as IgG positive and negative and IgM positive and negative serum for evaluation of Human IgG and IgM lateral flow assay for the serological diagnosis of brucellosis. During the period, 57 and 132 each Human IgG and IgM lateral flow assay for the serological diagnosis of brucellosis were prepared, tests were performed in the laboratory and tests were sent in four batches for 3rd party validation to Head, TRPVB, Tamil Nadu Veterinary and Animal Sciences University, Chennai (Fig.15) .

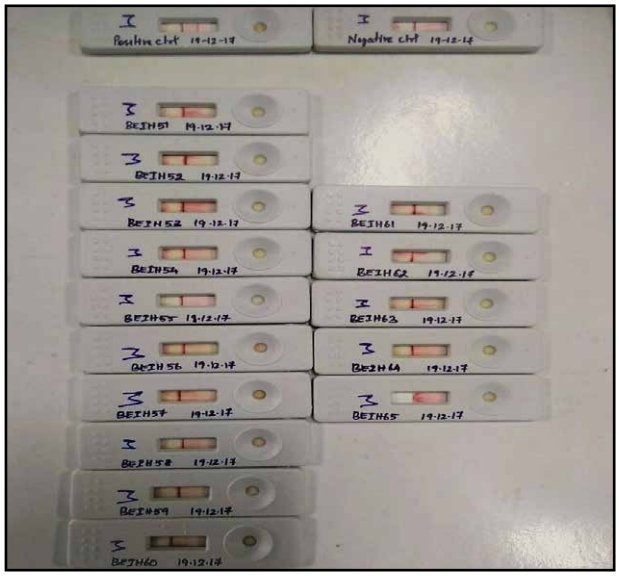


Fig. 15: Test result of Human IgM evaluation pictures at TRPVB, Chennnai

DBT-NER Centre for Advanced Animal Diagnosis and Management Consortium (ADMaC)

Project Co-ordinator : P. Roy

IPC: ANSCNIVEDISOL201400100054 Project ID: OXX01506

Sub Project 1: Surveillance and Molecular Analysis of MRSA, MR-CoNS, VRE; ESBL and Carbapenemase Producing Gram-Negative Bacteria in Farm Animals and the Animal Handlers and Livestock Products in NE India

B R Shome, K P Suresh and P Krishnamoorthy

A total of 191 (84 faecal + 98 nasal + 9 animal handler) samples were collected from Livestock (Pig, Goat, Sheep, Duck, Cattle) and Poultry from different regions of Tripura (Debipur, Gandhigram, Madhyamgram,

RK farm and Champapura farm). A total of 88 Gram negative isolates were identified and subjected to antibiotic sensitivity testing by disk diffusion method. A total of 43 isolates are found to be resistant by phenotypic method to one or the other antibiotics (Fig. 16).

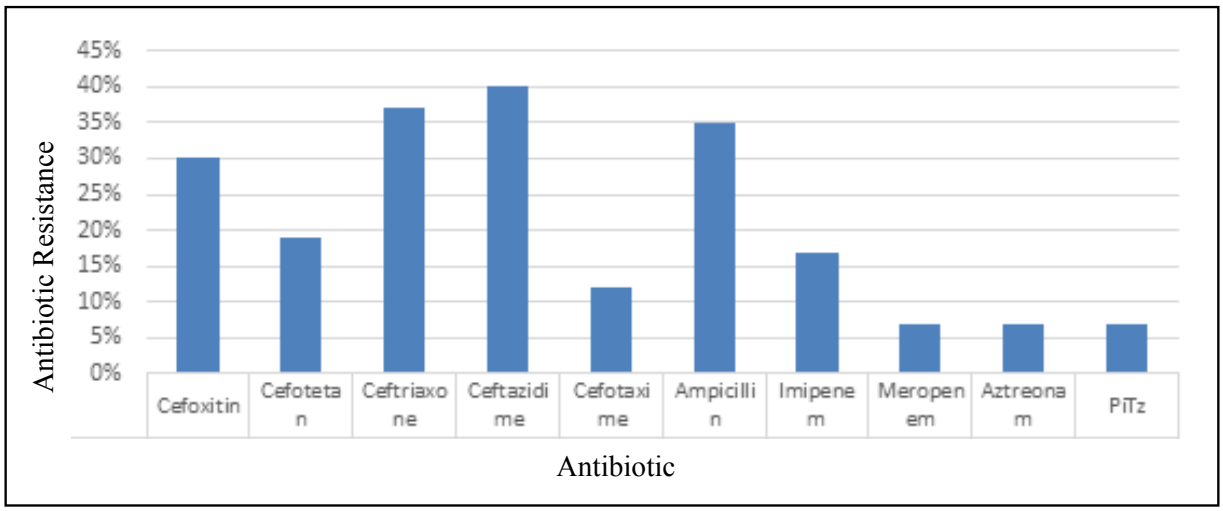


Fig.16: Antimicrobial resistance profile by phenotypic method

On molecular identification, out of 43 resistant isolates, 25 isolates were identified as *E. coli,* 4 isolates as *Shigella*, 1 isolate as *Klebsiella pneumoniae* by PCR and 13 other Gram negative isolates were unidentified by genus/species specific PCR and will be subjected to partial 16s rDNA gene sequencing for identification. On processing of 98 nasal samples, 104 isolates were identified as Gram positive bacteria out of which 63 isolates were identified as *Staphylococcus* by genus specific PCR. On processing of 9 hand swabs of animal-handler, 9 isolates were recovered and were identified as *Staphylococcus* by genus specific PCR. On screening of 25 resistant *E. coli* strains for presence of antimicrobial resistant genes by PCR, 3 isolates were found harbouring ESBL resistance determinants, 6 isolates carrying AmpC and 1 isolate carrying MBL resistance determinants (Table 5A).

Table 5A: Distribution of ARGs according to farm wise

Sl No.	FARM	*E.coli*	*TEM*	*CTXM-I*	*CTXM-IV*	*MBL*	*AmpC*
1	Debipur	8	3	-	-	-	*2(1=mox/1=acc)*
2	Madhyamgram	3	-	-	-	1(1=*imp*)	1(1=*ebc*)
3	Gandhigram	4	-	-	-	-	1(1=cmy)
4	RK farm	5	-	-	-	-	1(1=ebc)
5	Champapura	5	-	-	-	-	1(1=ebc)

Discordant results were observed while detecting the ESBL/AmpC/MBL producers by disk diffusion method and PCR as ESBLs (26% vs 6%), AmpC (35% vs 14%) and MBL producers (13% vs 3%). Out of 63 *Staphylococcus* isolates obtained from nasal swabs, one isolate was found positive for *mec*A gene. Similarly, out of 9 *Staphylococcus* isolates obtained from hand swabs of animal-handlers, none was found positive for *mec*A gene. *Staphylococcus* species specific PCR identified *mec*A positive isolate as *S. Epidermidis* and SCC mec Typing identified it as Type V. Plasmid replicon typing was carried out for 43 Gram negative resistant isolates. It was found that 21% (9/43) of isolates were harbouring plasmids of *FIC, P, Y and L/M* replicons (Table 5B).

Table 5B: Distribution of plasmid replicon types

Sample ID	Host	mPCR 1	mPCR 2	mPCR 3		PCR level identification
		FIC (262 bp)	P (534 bp)	Y (765 bp)	L/M (785 bp)	
DEB-P6	Pig			positive	positive	*E.coli*
KURO-P09	Chicken			positive	positive	*E.coli*
GAMA-P09	Chicken			positive	positive	*E.coli*
RKCA3	Cattle			positive		*E.coli*
DEB-D10	Duck		positive			*Shigella*
DEB-G10	Goat	positive				*E.coli*
GANDHI-P6	Pig		positive	positive		*E.coli*
DEB-D7	Duck	positive				*E.coli*
RKCA10	Cattle		positive	positive	positive	*E.coli*

On virulence typing of 43 resistant isolates, 16% (7/43) of the isolates were found harbouring Shiga toxin (*stx2*) gene, 12% (5/43) of the isolates were found possessing *traT* gene and 21% (9/43) of the isolates were having *cnf1* gene. The ESBL (TEM & CTXM Group) resistant strains of *E. coli* isolates from Tripura (n=10) & Mizoram (n=13; from previous year 2016-2017) were subjected to MLST. The samples are currently undergoing PCR amplification for 7 house keeping genes, which will be accompanied by sequencing and analysis.

IPC: ANSCNIVEDISOL201400200055 Project ID: IXX03176

Sub Project 2: Sero-Epidemiological Study of Brucellosis in Livestock in North East Region of India using ELISA and Fluorescent Polarization Assay

R Shome, G B Manjunathareddy and R Sridevi

The indirect ELISA protocol was modified for 3 hrs instead of 5 hrs duration and has been evaluated to suit the hand held ELISA reader as per the requirement of NE region with ready to use reagents. Very encouraging feedback was obtained for the ELISA protocol and hand held battery operated ELISA reader from the 8 NE-ADMaC State Animal Husbandry Department partners. The procedure has been initiated to procure the hand held battery operated ELISA reader for all the 8 units. This will definitely facilitate brucellosis as well as other disease reporting in NE states as per international standards (Fig.17A & B). Fluorescence Polarization Assay (FPA) standardized in the ADMaC project were demonstrated during two days training program conducted (23-25th August 2017) at Manipur. All the Disease Investigation Officers of the Dept. of Animal Husbandry, Govt. of Manipur participated in the training. During the training Transfer of Innovative Technologies for Animal Disease Diagnosis conducted from 7-9th November 2017 at Core Lab-2 (ICAR-Barapani), the hands on training on Indirect ELISA protocols suitable for hand held battery operated ELISA reader for diagnosis of brucellosis standardized in the ADMaC project and other diagnostics tests were demonstrated to all the 8 state Principal Investigator of the ADMaC project on brucellosis.

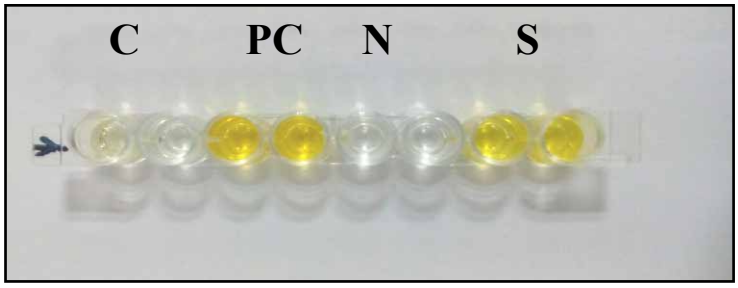


Fig. 17 A: Indirect ELISA strip showing the test results (CC-Conjugate control; PC-Positive control); Fig. 17B: Battery operated ELISA reader

Further, five monoclonal antibodies (mAb) against smooth lipopolysaccaharide antigen of *B.abortus* S99 were produced and characterized. Out of five, 4 mAbs i.e. 1D8, 1F4, 2G2 and 2B3 were identified as C/Y specific and clone 1E3 as C epitope specific. Isotyping results had revealed 1D8, 1F4 and 1E3 as class IgG1and mAb 2G2 as IgG3 and mAb 2B3 as class IgG2a and all with kappa light chain. Clone 1E3 has been selected for the development of specific serodiagnostic for brucellosis.

IPC:ANSCNIVEDISOL201400300056 Project ID:OXX03175

Sub Project 3: Epidemiological Study of Classical Swine Fever (CSF), Porcine Reproductive and Respiratory Syndrome (PRRS) and Porcine Torqueteno Virus (TTV) in Pigs in North East (NE) Region of India

D Hemadri and S S Patil

During this period, a total of 132 samples from different parts of the country were screened for CSFV infection. A total of 25 clinical samples (10 blood and 15 tissue) were received from Mizoram of Northeast India were found to be negative by RT PCR. A total of 35 clinical samples collected, Udupi (1 blood and 5 tissue), Mandya (6 blood, 6 serum and 5 tisuue), Dakshina Kannada (5 blood, 5 serum and 5 tissue) and Bagalkote (6 blood, 6 serum and 4 tissue) were screened for CSFV infection. The samples collected from Mandya showed positive for CSFV infection; however rest were found negative. A total of 8 clinical samples (plasma) received from Odisha were screened by RT PCR, out of which 2 samples were found positive. Clinical samples from other states i.e., Chhattisgarh (10 sera), Goa (6 blood, 11 nasal swab, 11 tissue, 3 total RNA and 5 serum) and Maharashtra (blood 3, tissue 7, sera 22, nasal swab 3 and total RNA 1) were screened by RT PCR which were found to be negative for CSFV.

During this period, a total of 56 clinical samples were received from Northeast region of India i.e., Mizoram (15 tissue and 10 blood), Assam (6 blood) and Sikkim (40 blood) were screened for TTV infection by PCR. Out of the 56 clinical samples, 9 samples were positive from Sikkim and 2 each from Assam and Mizoram for TTV infection. Since TTV is suspected to play cofactor role, clinical samples from Karnataka including Udupi (1 blood, 5 tissue), Mandya (6 Blood, 6 serum and 5 tisuue), Dakshin Kannada (5 blood, 5 serum and 5 tissue) and Bagalkote (6 blood, 6 serum and 4 tissue) districts were screened for TTV infection, out of which 4 samples each were positive from Bagalkote and Udupi. A total of 33 clinical samples (6 blood, 11 nasal swab, 11 tissue and 5 sera) from Goa were screened for the presence TTV, of which 6 samples (2 blood and 4 nasal swab) were positive. Clinical samples received from Maharashtra, (26 sera, 4 tissue and 2 blood) were screened for the presence of TTV. A total of 9 serum

and 3 blood were found positive by gene detection PCR. A total of 13 clinical samples (9 sera and 4 blood) received from Odisha, were screened against TTV infection and were found negative.

A total 24 clinical samples were received from Mizoram (10 blood and 14 tissue) and all the samples were found to be negative for PRRS infection. An outbreak investigation done in different parts of Karnataka (Udupi, Mandya, Dakshin Kannada and Bagalakote) and 53 samples (blood, serum and tissue) were collected, out of which 9 samples (2 Udupi and 7 Dakshin Kannada) found positive for PRRS infection. Total 84 samples (blood, serum and tissue) were received from different parts of India (Madhya Pradesh, Odisha, Goa and Maharashtra) through AICRP centers, out of which 9 samples (Odisha) were found to be positive for PRRSV infection.The PRRS nucleocapsid protein is successfully expressed ~20kDa size (~15kDa protein + ~5kDa tag) by inducing with 2mM IPTG. The expressed protein was confirmed by Western blot using PRRSV hyper immune sera and the purification is under progress.

IPC: ANSCNIVEDISOL201400400057 Project ID: OXX03162

Sub Project 4: Development of Infectious Disease Information System (IDIS) and Risk Assessment Models for Transboundary Animal Diseases (TAD) & other Emerging Livestock Diseases in NE Region of India

K P Suresh and S S Patil

The occurrence of livestock diseases at village level in North-Eastern states of India was analyzed. Village level disease data (BQ, FMD, CSF, HS, PRRS and Babesiosis) for the states of Assam, Meghalaya, Mizoram, Manipur, Sikkim, Nagaland and Tripura were collected. Based on North-East India's agro-climatic zones, livestock diseases outbreak locations were classified and respective disease status maps were developed. A rectangular raster grid (grid resolution: 0.8 sq.km) is being created from the extent of shapefile using R software. Environmental, remote sensing risk parameters and projected Livestock Population data 2017 were generated. The risk parameters were aligned to the corresponding disease data and control data for developing Grid based Risk maps for the mentioned livestock diseases using Species Distribution Modeling (Fig.18). Risk maps were plotted for 11 different models ('GLM', 'GAM', 'NNET', 'GBM', 'RF', 'MARS', 'FDA', 'CTA', 'ADA', 'NB', 'SVM'). The fit models were assessed for their discriminating power using Receiving Operating Characteristics (ROC), Cohen Kappa (Heildke Skill Score) and True Skill statistics (TSS) (Table 6). Rather than relying on single best model, It is recommended the use of combined the prediction of different models, which are in the scale of 0 to 1, averaging the score provide the best prediction. The average model score was obtained by considering the models with the kappa> 0.60, ROC>0.90 and TSS >0.80.A Sampling plan for NER was developed. Design and development mobile application and dynamic website

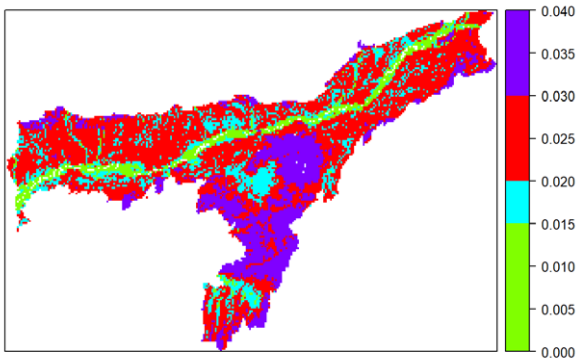


Fig. 18: NDVI/LST Induced risk for CSF in Assam (Red colour ecological suitability risk for CSF)

Table 6: Threshold (Mean±2SD) for NDVI, LST and NDVI/LST to determine risk of CSF in Assam

Variable	Threshold Range (Mean±2SD)	Number of Outbreaks	Percentage (%)
LST	24.16-28.52	293	97.02
NDVI	0.43-0.71	279	92.38
NDVI/LST	0.020-0.040	214	70.86

IPC: ANSCNIVEDICOP20140100061 Project ID: OXX03173

DBT -NER Project: Serosurveillance, Isolation and Molecular Characterization of Bluetongue Virus in Sheep and Goats of Tripura and Assam states

D Hemadri and V Balamurugan

The seroepidemiological data of small and large ruminants are available from several states of India; however, little is known of the disease burden and prevalent serotypes in Tripura, small hilly state of north-eastern India sharing a vast porous border with Bangladesh. A surveillance study was conducted to understand the disease burden in goats in Tripura. Serum (n = 1240) and blood (n =194) samples were collected during the years 2014 to 2017 from all the eight districts of Tripura and screened for group-specific antibodies and antigen of bluetongue virus (BTV) in serum and blood samples respectively. Overall prevalence of BTV seroconversion was found to be 47.58%, whereas presence of viral antigen was 20.61% at individual level. Percent seroconversion was found more (50.47± 4.00, CI: 41.31 to 49.47) in adult goats (above 6 months of age) in comparison to the younger animals (45.39± 2.08, CI: 42.63 to 58.31). Presence of neutralizing antibodies in selected serum samples were investigated by serum neutralization test (SNT) against six predominant BTV serotypes and BTV-1 was found as most predominant (63.88%) followed by BTV-10 (41.66%), BTV-23 (30.55%), BTV-9 and 16 (22.22%) and BTV-2 (13.88%) (Fig. 19).

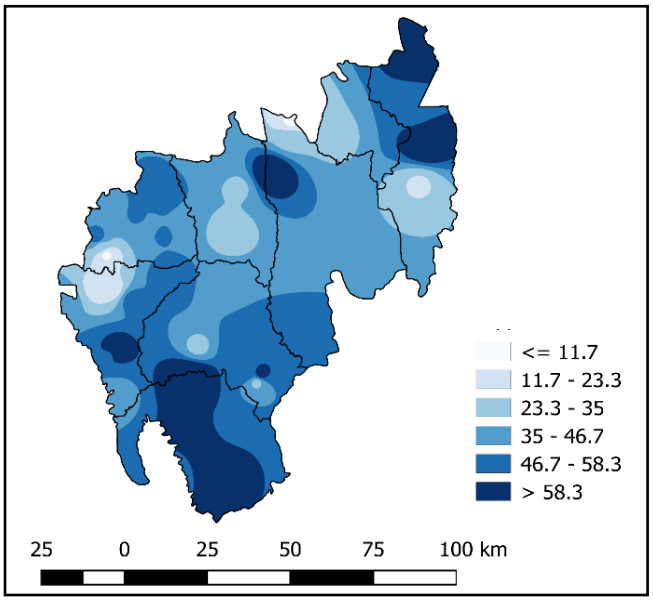


Fig. 19: Surface map showing prevalence of BT in Tripura

IPC: ANSCNIVEDICOP201300900052 Project ID: OXX02581

NFDB Project: National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)

K P Suresh and G B Manjunathareddy

During this period, the following activities were performed :

- Farm code duplication issue is corrected
- Data entry bugs are rectified
- Master data for state, district, block and villages data were collected from the client and updated in the database
- Center wise weekly data entry report for all the farms submitting to the client
- Training Troubleshooting of NSPAAD
- NSPAAD application backup and maintenance
- Epidemiological analysis
- Aquatic disease maps were created based on statewise disease reported.
- Baseline Finfish and Baseline shrimp hatcheries were created
- Regular Maintaining status checking of databse of NSPAAD was performed

IPC: ANSCNIVEDISOL201200300027 Project ID: OXX02580

DADF Project: Brucellosis Control Programme

R Shome, M Nagalingam and P Roy

A Differentiation of Vaccinated and infected animals (DIVA) for brucellosis (Flurocent polarization Assay) which has been standardized and evaluated is being routinely used for post vaccination seromonitoring of samples received from states and UTs under control program. A total of 2773 serum samples from nine states received for post-vaccination seromonitoring of brucellosis (Maharashtra=254; Chandigarh=231; Karnataka=354, Meghalaya=44, Tamil Nadu=148; H.P. =269; Gujarat =289; Chhattisgarh= 706; Nagaland 291 and Rajasthan; 187) were screened by RBPT, ELISA and FPA. The highest vaccination coverage was recorded in H.P state (95%), followed by Gujarat (86%,); Maharashtra (74%) and Tamil Nadu (79%) (Table 7). The seroprevalence trend indicates the decreasing seroprevalence of brucellosis in cattle and buffoles.

Table 7: State wise seroprevalence of brucellosis in cattle

State	Seroprevalence of brucellosis in cattle during 2006-2010			Seroprevalence of brucellosis in cattle during 2011-2017		
	No. of cattle samples tested	No. of positives	Sero-positivity (%)	No. of cattle samples tested	No. of positives	Sero-positivity (%)
1. Punjab	309	83	26.8	485	98	20.2
2. Maharashtra	557	100	17.9	966	105	10.8
3. Rajasthan	119	21	21	408	24	5.8
4. Karnataka	447	53	15.0	557	54	9.6
5. Madhya Pradesh	918	105	11.4	2243	116	5.7
6. Tamil Nadu	152	17	11.1	783	18	2.2
7. Gujarat	593	65	10.9	728	67	9.2
8. Kerala	839	81	9.6	1298	86	6.6
9. Assam	198	19	9.5	437	19	4.3

10. Meghalaya	470	44	9.3	893	45	5.0
11. Manipur	523	41	7.8	899	41	4.5
12. Andhra Pradesh	785	60	7.6	819	61	7.4
13. Odisha	1072	73	6.6	1878	79	4.2
14. Uttarakhand	140	07	5.0	418	7	1.6
15. Jammu & Kashmir	2114	102	4.8	2574	102	3.9
	9236	871	9.4	15386	922	5.9

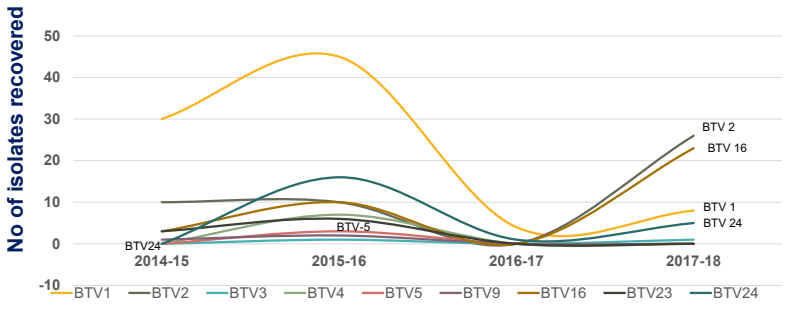
IPC: ANSCNIVEDICOP201400900062 Project ID: OXX03174

BBSRC-DBT Project: Development of Diagnostic Systems, Reference Collection and Molecular Epidemiology Studies for Important Arboviral Pathogens of Livestock in India

D Hemadri

A total of 46 suspected bluetongue (BT) outbreaks in 7 districts of Karnataka were attended during 2017-18. A total of 331 clinical specimens from 101 flocks of sheep were collected from the said state. Morbidity rate in the study districts ranged from 6.39 to 23.68%, while case fatality rates ranged from 33.83 to 46.08%. Highest morbidity and case fatality rates were observed in Chitradurga district, which could be due to circulation of more than 4 serotypes of virus in the district. Animals between the age group 1-3 years were largely affected. In addition to samples from Karnataka, 35 blood samples suspected for BT from Tamil Nadu were also tested. All the 365 clinical specimens were subjected for two passages in KC cells and two/three blind passages in BHK-21 cells for virus isolation. So far 118 isolates from Karnataka and 3 from Tamil Nadu have been recovered in cell lines.

All the isolates have been screened against serotypes 1, 2, 3, 4, 5, 9, 10, 16, 23 and 24 and screening against other serotypes are in progress. The results indicated circulation of at least five serotypes (1, 2, 3, 16 and 24 plus some yet to be determined serotypes) during the said year (Fig. 20). The study also indicated that a sheep flock may not necessarily get infected with a single serotype; infection with multiple serotypes is in vogue. Further, analysis of serotypes circulated during the past four years showed the dynamic fluctuations in the predominance of one or more serotypes over the others in every passing season; most likely due to selection precipitated by the prevailing flock immunity against a particular serotype/s.



Season	BTV1	BTV2	BTV3	BTV4	BTV5	BTV9	BTV16	BTV23	BTV24
2014-15	■	■				■	■	■	
2015-16	■	■	■	■	■	■	■		■
2016-17	■								■
2017-18	■	■	■				■		■

Fig. 20: Year wise dynamic of serotype circulation.

IPC: ANSCNIVEDICOL201600500074 Project ID: OXX04235

ILRI Project: Assessment of Antimicrobial Residues and Resistance from Dairy Animals in India.

B R Shome

A total of 328 samples for the analysis of Gram +ve bacteria and 401 samples for analysis of Gram -ve bacteria were carried out. Out of 328 Gram +ve isolates 243 were identified as *Staphylococcus* out of which 17 were identified as methicillin resistance by PCR (*mecA*=15; *mecC*=2). The most common species identified were *S.epidemidis* n=6 followed by *S.aureus* (n=5); and *S.saprophyticus* (n=2). A single isolate of SCCmec typing identified 3 isolates of *S.epidermidis*, 4 isolates of *S.aureus* as Type V. Out of 454 Gram–ve isolates 43 isoaltes were resistant. Multiplex PCR identified resistant isolates as *E.coli* (n=2); *Shigella* sp. (n=12); *Klebsiella* sp. (n=6) and other gram –ve bacteria (n=23). Molecular method identified 7 ESBL, 26 AmpC and 6 MBL producers respectively. Co-occurrence of AmpC+MBL and AmpC+ESBL genes were also detected in 5 and 1 isolates respectively. E strip MIC method identified resistant isolates as AmpC (n=8), ESBL (n=2), MBL (n=1), AmpC+ESBL (n=4), AmpC+ESBL+MBL (n=2). 14 isolates were susceptible for any of the antibiotic class.

IPC: ANSCNIVEDICOL201600600075 Project ID: OXX04236

ILRI Project: Prevalence, Risk Factors, Economic Cost and Control Options of *Brucella*-Infection in Small and Large Ruminants and Humans in Eastern India

R Shome

From each animal / household basic demography and farm details, milk production and reproduction details, risk factors and economic losses caused due to brucellosis and knowledge and attitude practices of farmers were collected in close ended questionnaire from Assam and Odisha for brucellosis seroepidemiological studies.A total of 431(Assam- 198 and Odisha- 233) sera samples collected from small ruminant through random sampling approach from three each districts of Assam (Sonitpur, Bongaigaon and Kamrup) and Odisha (Kendrapad, Cuttack, Mayaurbhanj) states were screened for antibodies directed against *Brucella*. In Assam, 6.06% (12/198) and in Odisha 13.7% (32/233) samples were detected positive for anti-*Brucella,* antibodies, respectively (Fig. 21). District wise seroprevalence in Odisha state indicated highest seroprevalence in Kendrapara district (30.5%) followed by Mayurbhanj (16.30%) and negligible prevalence in Cuttack district. On the contrary, lower seroprevalence was observed from Assam state and highest being in Bongaigaon (8.54%) district.

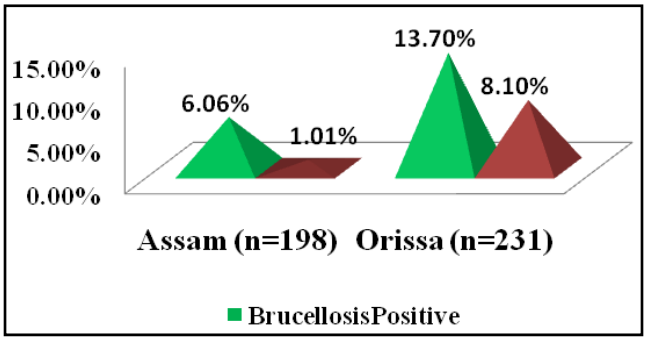


Fig.21: State wise sero-prevalence of zoonotic diseases in Assam and Bihar

IPC: ANSCNIVEDISOL201700100079 Project ID: OXX03762

ICMR Project:Development of Recombinant Antigen Based Diagnostics for Bovine and Human Leptospirosis

V Balamurugan, M Nagalingam and R Sridevi

The gene coding sequences of the OMP of pathogenic *Leptospira* namely OMP37L, LSA 27, Loa 22, LigB , etc., was amplified, cloned and expressed in prokaryotic system to evaluate the potential use of recombinant protein as a diagnostic antigen in LAT/ELISA for sero-diagnosis. Expression of OMP protein was induced with IPTG in recombinant pET vector clone and the expression level of protein was optimized and characterized by SDS-PAGE and Western blot using a *Leptospira* specific serum, anti-HisTag conjugate that confirmed *Leptospira* specific recombinant OMP expressed protein. Then Ni-NTA denaturation purification method was standardized for purification of the expressed His-Tag OMP protein followed by dialysis for downstream process of expressed OMP protein in *E.coli* system. Refolding methods with different concentration of urea were used to obtain the expressed protein in native soluble form. Reactivity of purified and dialyzed recombinant expressed OMP protein was assessed in western blot and LAT for its diagnostic potential as antigen. Specific, sensitive, and simple test format using recombinant antigen based Latex Agglutination Test (LAT) was developed for screening of the samples for serodiagnosis of leptospirosis and sensitivity and specificity of test with a number of samples assessed and compared with MAT. Recombinant LAT can be applied as initial screening test for diagnosis of bovine leptospirosis. Evaluation of the recombinant protein(s) based LAT along with other proteins to be carried out in future for increasing sensitivity of assay, which is required for initial screening test for diagnosis of leptospirosis.

IPC: ANSCNIVEDISOL201800100091 Project ID:OXX03929

CDC Project:Countrywide Surveillance for Anthrax in Livestock and Mastitis in Cattle for Protecting and Improving Health Globally: Building and Strengthening Public Health Impact, Systems, Capacity (Mastitis Component)

B R Shome, G Govindaraj, P Krishnamoorthy, M Nagalingam, R Yogisharadhya, R Sridevi and R Shome

The overall aim of the project is to strengthen mastitis surveillance system in selected locations of Karnataka and Assam for detection of major mastitis pathogens and their antimicrobial resistance pattern. Collaborating with the human health authority (one health concept) to study the transmission dynamics of antimicrobial resistance pattern between animal and humans and vice-versa. Two study sites in Karnataka and Assam under the jurisdiction of Karnataka Milk Federation (KMF) and Brihattaor Guwahati Go-Palak Sangstha (BGGPS) were selected. Meeting was held among various stakeholders for executing the project activities. In Assam, CMT Kits were distributed among selected dairy farmers for routine evaluation of milk for subclinical mastitis. Knowledge, Attitude and Practices (KAP) tool to assess farming system, risk factors, impact of mastitis in dairy animal including assessment of use/abuse of antibiotics in dairy animal health care has been developed. Further, pilot study to validate the survey instrument for understanding Knowledge, Attitude and Practices (KAP) of farmers/ animal handlers/ other stakeholders in the study locations undertaken. Developed standard operating protocols for identification of drug resistant pathogens from bovine mastitis cases.

IPC: ANSCNIVEDICOP201700800086 Project ID: OXX04095

ICMR (FAO) Project: To Build Capacity for Integrated Surveillance of Antimicrobial Resistance (AMR) in Pathogen/ Commensals in Food Producing Animals, Food of Animal Origin and their Environment and Food-Borne Pathogens from Humans

B R Shome, G Govindaraj and P Krishnamoorthy

The questionnaires for laboratory assessment for the capacity to carry out antimicrobial susceptibility testing (AST) were compiled. The preliminary draft of sample collection and despatch module was prepared. The list of standard quality control (QC) strains for antimicrobial resistance (AMR) testing was prepared as per the international standards *viz*., VetCAST and VAST.There are various strains of microorganisms used across the various labs for accessing the antimicrobial susceptibility testing. But, there is requirement of uniformity of the strains to be used for QC analysis *i.e.* as per the international standards *viz*. VetCAST (EUCAST) and/or VAST (CLSI). The second most important criterion among the laboratories those are involved in assessing the antimicrobial resistance (AMR) is the dissimilarity in the concentrations of the antibacterials/antibiotics used. So, there is an urgent need to implement the unanimous procedures in using the standard antibacterial/antibiotic discs of an appropriate concentration during screening of antimicrobial resistance. These important issues are being taken care of while developing the SOPs to be adopted for AST in the laboratories in the veterinary institutes.

IPC:ANSCNIVEDICOL201700100078 Project ID: OXX03736

DBT-NER Project: Molecular and Sero-Diagnosis of Surra in livestock in North Eastern States of India

P P Sengupta, S S Jacob, S Borthakur, G Patra, K Sarma, F A Ahmed

Trypanosoma evansi a haemoflagellate parasite is etiological agent of a disease called surra in a wide range of animals. Surra is considered as an important, chronic wasting disease of domestic and wild herbivores and carnivores in tropical and sub-tropical countries. In order to estimate the status of surra in northeastern region of India, a total of 639 sera samples from Assam, Mizoram, Sikkim and Tripura comprising 445-cattle, 25-pig and 169-dog were screened. Cattle samples were analyzed using recombinant VSG antigen based indirect ELISA and dog and pig samples were analyzed by standard CATT-assay. Sero-prevalence was highest in Mizoram (92.45 %) followed by Sikkim (70.16%), Assam (61%) and Tripura (52.55%) (Fig.22)

In order to genetically characterize *T. evansi* in northeastern region of India, a set of specific primers (DITRY) were used for amplification of 400bp region of VSG gene from the DNA extracted from the blood. In overall 30 (6.74%) cattle and 6 (3.55%) dog samples found to be positive by PCR. Selected positive samples were sequenced and analyzed. A phylogenetic tree was constructed using neighborhood-joining method to compare the genetic variation in the sequence of the organism. Between Chinese isolate (AB259839) and Mizoram isolates homology was ranging from 84.9 to 94.6%. The gene sequences of five cattle isolates from Mizoram and rest of India were compared with each other which were showing a homology of 84.7 – 93.8 %. Sequence comparison of Mizoram Cattle isolates with that of Indian isolate (EF495337) revealed homology ranging from 86.5- 97.9 % and with that of Chinese isolate (AB259839) revealed 86.3 to 97.4% homology.

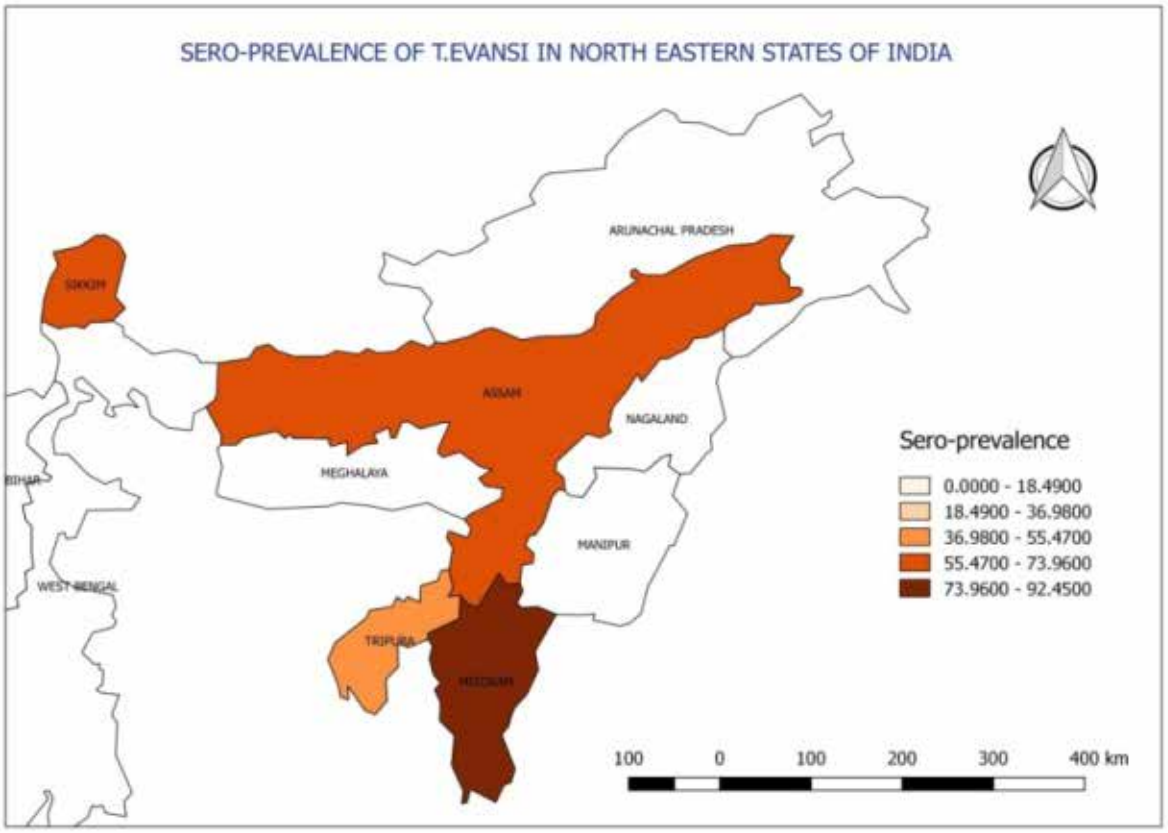


Fig. 22. Sero prevalence of surra in north eastern region of India

IPC: ANSCNIVEDISOL201700700085 Project ID: OXX04081

DST Project: Understanding the Genetic Diversity of *Taenia solium* Cysticercosis and Development of Recombinant Antigen Based Diagnostic Assays for Sero Surveillance

S S Jacob. P P Sengupta, M M Chanda, Nagarathna S and R Yogisharadhya

Taenia solium cysticercosis is one of most important zoonotic diseases having public health importance especially in developing countries. Human is the only definitive host for this parasite whereas both human and pig can act as intermediate hosts. The first objective of this project is to understand the genetic diversity of *T. solium* cysticercosis and the second objective is to develop recombinant antigen based diagnostic assays for sero surveillance. In order to fulfill the first objective, cysticercus infected pork was collected from local slaughter house. The cysts were separated from the muscle and washed with PBS. Total genomic DNA was isolated from the cysts and PCR was standardized for amplifying mitochondrial cytochrome b gene and large subunit ribosomal RNA (TBR) gene. The PCR amplicons were sent for sequencing. In order to develop recombinant antigen, total RNA was isolated and cDNA was prepared. PCR was standardized for the amplification of Ag1, Ag2 and TS 14 genes (low molecular weight antigens from the cyst) and subsequently ligated into T/A cloning vector. The Ag1 and Ag2 recombinant proteins have been expressed in prokaryotic systems and their characterization is in process.

Tribal Sub Plan (TSP)

G Govindaraj, P Krishnamoorth and R Yogisharadhya

During the year 2017-18, TSP programme was implemented in Tripura, Karnataka and Andaman & Nicobar Islands. The major activities include distribution of piglets, sheep distribution, mineral mixture/vitamin supplements to goat rearing farmers and training. Further, the exposure visit to the research institute were also arranged for tribal farmers in order to impart knowledge and skill on scientific rearing of livestock and poultry.

Mera Gaon Mera Gaurav (MGMG)

During the year 2017-18, MGMG programme was implemented in 24 villages in Bengaluru rural district. The brief activities undertaken by ICAR-NIVEDI under MGMG programme were conducted awareness camp on feeding management in dairy animals, awareness on bio-security measures for disease prevention and general awareness of hygiene to school children. Further, the linkages were also established with milk collection centres, village dairy co-operative societies and local school teachers in the identified MGMG villages.

Scientists of ICAR NIVEDI interaction with benefiary of MGMG addopted villages

Swachh Bharath Abhiyan

Swachh Bharat Abhiyaan activities were carried out ICAR-NIVEDI by active participation of staffs. Cleaning of the campus was carried out and monitored as per the guidelines of Ministry of Urban Development, Government of India, regarding guidelines and SOP (Standard Operating Procedures) for "Swachh office." During 2017-18, two *Swachhta Pakhwada* were organized at ICAR-NIVEDI. As part of *Swachhta Hi Seva, Swachtta Pledge, Sewa diwas, Samagra Swachhta Diwas, Sarwatra Swachhta,* visit to nearest tourist spot for creating awareness, were organised. *Sewa Diwas* was observed and all the staffs were involved in cleaning of entire campus. The cleaning of campuses of Gram Panchayat and Veterinary Hospital located in the Channa Devi Agrahara village, Doddaballapur taluk was undertaken on the occasion of *Samagra Swachhta Diwas*. *Sarwatra Swachhta* was observed by visiting village Veerasagara by the staff of ICAR-NIVEDI involved in cleaning of the village along with the villagers. A rally was taken out along with villagers along the streets of Veerasagara village by raising slogans of 'One step towards cleanliness' and about construction of toilets in all the households. The villagers were given Swachhta Pledge in local language (Kannada) for committing themselves to keep their village and surroundings clean. Awareness on keeping the animal shed clean to prevent mastitis and other diseases was also done. Staff of ICAR-NIVEDI visited nearest Tourist spot (Bannerghatta Zoo, Bengaluru) and involved in cleaning the zoo premises. Wide publicity was done inside the Zoo for tourists by displaying banners of *Swachh Bharat Abhiyaan* and *Swachhta hi Seva hai.* Swacchta Pakhwada was organized at ICAR-NIVEDI as part of Swacchh Bharat Abhiyan programme by cleaning the campus and laboratories during 16-31st May, 2017.

Swachh Bharat activities organized by ICAR-NIVEDI

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23. Manjunatha Reddy G B, Sumana K, Apsana R, Kiran K, Yogisharadhya R, Prajapati A, Balamurugan V, Govindraj G and Roy P. Investigation of Sheep Pox Disease Outbreak in Fattening Lambs in Karnataka. In the 34th Annual Conference of IAVP cum Asian Veterinary Pathology Congress 2017 and International conference on Emerging Horizon in diagnosis of animal and poultry diseases towards sustainable production in Asian Countries during 9-11th November, 2017 held at Veterinary College, Hebbal, KAVFSU, Bengaluru-24, India. Pp.56-57.

24. Manjunatha Reddy G B, Sumana K, Apsana R, Yogisharadhya R, Roy P. Molecular and Phylogietnic analysis of sheep pox virus isolates from outbreak in India. In National symposium on Innovations in Animal Health - Current Challenges and Future Prospects and XXXI annual convention of IAVMI-2018 during College of Veterinary Sciences, Tirupati, 29-31stJanuary, 2018. Pp.136.

25. Mundas S, Rao S, Patil SS, Satyanarayana ML, Byregowda S M, Yalagod S. Quantification of cytokines by real time PCR. In International conference on emerging horizons in diagnosis of animal and poultry diseases-towards sustainable production in Asian countries organized by Indian Association of Veterinary Pathologists from 9-11th November, 2017 held at Veterinary College, Hebbal, Bengaluru.

26. Mundas S, Rao S, Patil S S, Satyanarayana M L, Byregowda S M, Yalagod S. dRIT-Current diagnostic technique in the diagnosis of Rabies. In International conference on emerging horizons in diagnosis of animal and poultry diseases-towards sustainable production in Asian countries organized by Indian Association of Veterinary Pathologists from 9-11thNovember 2017 held at Veterinary College, Hebbal, Bengaluru.

27. Nagalingam M, Thaslim J B, Balamurugan V, Shome R, Sowjanya Kumari S, Manjunatha Reddy G B, Shome B R, Rahman H, Parimal Roy, Joseph Kingston J and Gandham RK. BP26 excels the immuno dominant proteins of Brucella abortus in the diagnosis of brucellosis in cattle. In 18th Indian Veterinary Congress & XXV Annual Conference of IAAVR cum National Symposium at College of Veterinary Science, Tirupati during 23-24thFebruary,2018. Pp. 121-122.

28. Patil S S, Suresh K P, Saha S, Sridevi R, Hemadri D, Manjunatha Reddy G B, Roy P. Quantitative risk assessment of classical swine fever virus (CSFV) introduction into Arunachal Pradesh via importation of pigs from bordering countries. In National Symposium on "Innovations in Animal Health-Current Challenges and Future Prospective" XXXI Annual Convention of IAVMI held from 29-31stJanuary 2018 held at CVSc., Tirupati, A.P. Pp.59

29. Purse B, White S, Schafer S, Chanda M, Searle K. Predicting and managing impacts of midge-borne infections in changing environments: Why vector host ecology matters. In 7th International SOVE congress "New Technology conquering old vectors. Oct 1-7, 2017, Spain.

30. Sengupta P P, Jacob S S, Reddy P, Roy P. Sero-prevalence of surra in cattle by enzyme immunoassay using recombinant variable surface glycoprotein of *Trypanosoma evansi*. In 27thNational Conference of Parasitology held from 25th - 27th April 2017, NIMHANS, Bengaluru. Pp.8.

31. Sengupta P P, Siju S J, Chandu AGS, Borthakur S, Patra G, Roy P. Molecular characterization of *Trypanosoma evansi* isolates from cattle in northeastern region of India. 27th National Conference of Veterinary Parasitology, held from 12th to 14th February 2018 Udaipur. Pp.OS3-8.

32. Shome R, Suresh K P. Lead paper on Impact of Climatic Change on disease Vulnerability. In XV biennial conference Indian Association of Women Veterinarians (IAWV) and National Symposium held at College of Veterinary Sciences, Rajendranaganar, Hyderabad during 21-22nd November, 2017.

33. Shome R. Invited speaker on Past and ongoing research on brucellosis in Indian with key findings, plan for future by ICAR. In One-health workshop during 26th October, 2017 at NASC complex, New Delhi.

34. Shome R. Lead paper on Brucellosis: Changing epidemiology in India vis-a vis in Southern India. In XV Annual Conference of Indian Association of Veterinary Public Health Specialists (IAVPHS) & National Symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges" during 11-13th October, 2017 at SVVU, Tirupati.

35. Shome R. Lead paper on Current status of brucellosis diagnosis in Humans and animals. In 18th Indian Veterinary Congress & XXV Annual Conference of IAAVR & National Symposium during 23-24th February, 2018 at Sri Venkateshwara Veterinary Collage, SVVU, Tirupati.

36. Shruthi G, Shivaprasad K, Balamurugan V, Pavan H K, Chandan S. Metabolic approaches in treatment leptospirosis using green synthesiszed silver nanorods: a novel alternative in antimicrobial therapy. In XV IAVPHS annual conference and National Symposium on Intersectoral Approaches to combat Zoonoses: Strategies and Challenges during 17-19th November 2017 held at Department of Vet. Public Health and Epidemiology, SVVU, Tirupati, AP.Pp. 245.

37. Sridevi R, Dheeraj R, Patil S S, Suresh K P, Roy P. Avian Influenza: A spatial risk analysis and prediction modelling of Indian outbreaks. In National Symposium on "Innovations in Animal Health-Current Challenges and Future Prospective" XXXI Annual Convention of IAVMI held from 29-31stJanuary 2018 held at CVSc., Tirupati, A.P.

38. Sridevi R, Dheeraj R, Patil S S, Suresh K P, Roy P.Avian Influenza: A spatial risk analysis and Prediction Modelling of Indian Outbreaks. In National Symposium on "Innovations in Animal Health-Current Challenges and Future Prospective" XXXI Annual Convention of IAVMI held from 29-31st January 2018, CVSc., Tirupati, A.P.

39. Sridevi R, Krishnamoorthy P, Rashmi K, Dheeraj R, Patil S S, Suresh K P. *Peste des petits* ruminants: Spatial risk mapping of Maharashtra by Bioclimatic variables. In National Symposium on "Innovations in Animal Health-Current Challenges and Future Prospective" XXXI Annual Convention of IAVMI held from 29-31st January 2018, CVSc., Tirupati, A.P.

40. Suresh K P, Patil S S, Dheeraj R, Kurli R, Roy P. Foot and Mouth Disease: A Spatial Risk Analysis and Prediction Modelling of outbreaks in Karnataka during 2015-16. In National Symposium on "Innovations in Animal Health-Current Challenges and Future Prospective" XXXI Annual Convention of IAVMI during 29-31st January 2018 held at CVSc., Tirupati, A.P.

41. Tamilselvan R P, Krishnamoorthy P, Patel NKP, Bhanuprakash V, Patel BHM, Sanyal A. Laboratory rodent models for understanding pathogenesis of Foot and mouth diseases virus: histopathological analysis of suckling Wistar rat tissues. In 26th Annual conference of Indian Virological Society held at NITTE University, Mangaluru during 7-9th December, 2017. Pp. AVOP13.

42. Venkatesan G, Arya S, Bora D P, Kumar A, Karki M, Muthuchelvan D, Manjunatha Reddy G B, Balamurugan V, Pandey A B. Identification and genetic analysis of goat pox virus isolates from Assam of North-Eastern India. In XXIII Annual Convention of Indian Society for Veterinary Immunology and Biotechnology (ISVIB)& National Conference during 6-8th April, 2017 held at Maharashtra Animal & Fishery Sciences University, Nagpur.

43. Venkatesan G, Arya S, Bora D P, Teli M K, Kumar A, Borah B, Das S K, Muthuchelvan D, Manjnatha Reddy G B, Balamurugan V, Pandey A B. Sequence and phylogenetic analysis of Orf virus isolates of goats from outbreaks in North-Eastern states of India.In XXIII Annual Convention of Indian Society for Veterinary Immunology and Biotechnology (ISVIB)& National Conference during 6-8th April, 2017 held at Maharashtra Animal & Fishery Sciences University, Nagpur.

44. Venkatesan G, KumarA, Prabhu M, BhanuprakashV, Balamurugan V, Singh RK. Comparative sequence analysis of hemagglutinin gene of Indian camelpox viruses: Conserved N-terminal Immunoglobulin V-set domain and carboxy terminal heterogeneity among orthopox viruses. In XXXI Annual Convention of Indian Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMI) and National Symposium on "Innovations in Animal Health-current Challenges and Future Prospective" during 29-31st January, 2018 held at Department of Veterinary Microbiology, College of Veterinary Science, SSVU, Tirupati. Andhra Pradesh. Pp.167.

45. Yogisharadhya R, Sumana K, Apsana R, Abraham S S, Asha TT, Prajapati A, Patil S S, Hemadri D, Shivachandra S B, Manjunatha Reddy G B. Molecular characterization of swinepox virus from outbreak in pigs of Kerala, a southern state of India. In National symposium on "Innovations in Animal Health - Current Challenges and Future Prospects and XXXI annual convention of IAVMI-2018 held at College of Veterinary Sciences, Tirupati during 29-31st January, 2018. pp.169.

Book/Book Chapter/Manuals

1. Balamurugan V, Nagalingam M, Raju DSN. (2018). Polymerase Chain Reaction (PCR): Principle and its application in disease diagnosis. In : Haemoprotozoan parasitic diseases of animals (Eds. Sengupta PP, Krishnamoorthy P, Nagalingam M), Daya publishing house, New Delhi. ISBN: 978-93-5124-913-9. Pp. 78-82.
2. Balamurugan V, Nagalingam M, Sridevi R, AlamuriA, Govindaraj G, Manjunatha Reddy G B, M.(2017). Laboratory Training manual on Capacity Building for Leptospirosis. CDC & ASM sponsored Workshop on Laboratory Capacity Building.Pp.1-100.
3. Chanda M M, Hiremath J, Sridevi R, Jacob S S, Suresh K P.(2018). Training Manual on Field Veterinary Epidemiology.Pp.1-78.
4. Govindaraj G, Krishnamoorthy P. (2018). Estimation of Socio-economic losses due to animal diseases. In: Haemoprotozoan Parasitic Diseases of Animals (Eds. Sengupta PP, Krishnamoorthy P, Nagalingam M). Daya Publishing House, New Delhi, India. ISBN 978-93-5124-913-9, Pp. 103-108.
5. Hemadri D, Chanda M M, Suresh K P, Shivachandra S B. (2017) "Field Epidemiology Training programme for Veterinarians (FETPV)"Training Manual, Vol I & II. Pp.1-164.
6. Krishnamoorthy P. (2018). Geographical Information system (GIS) and its application in Veterinary Epidemiology. In: Haemoprotozoan Parasitic Diseases of Animals (Eds. Sengupta PP, Krishnamoorthy P, Nagalingam M). Daya Publishing House, New Delhi, India. ISBN 978-93-5124-913-9. Pp. 129-134.
7. Krishnamoorthy P. (2018). Pathological changes in Haemoprotozoan diseases of animals. In: Haemoprotozoan Parasitic Diseases of Animals (Eds. Sengupta PP, Krishnamoorthy P, Nagalingam M). Daya Publishing House, New Delhi, India. ISBN 978-93-5124-913-9. Pp. 65-72.
8. Manjunathareddy G B, Sajjanar B, Sejian V. (2017). Impact of Climate Change on Sheep Disease Occurrences and Its Management. Book chapter in Sheep Production Adapting to Climate Change. Published by Springer Singapore. Pp.197-207.
9. Nagalingam M, Balamurugan V, Shome R (2018). Novel biotechnological tools for diagnosis and control of blood protozoal diseases in animals. In Haemoprotozoan parasitic diseases of animals Daya publishing house, New Delhi. ISBN: 978-93-5124-913-9. Pp. 93-98.
10. Sengupta P P, Krishnamoorthy P, Nagalingam M. (2018). Haemoprotozoan Parasitic Diseases of Animals. Daya Publishing House, New Delhi. ISBN 978-93-5124-913-9, Pp. 1-146.
11. Sengupta P P, Suresh K P, Jacob S S, Chandu AGS. (2017). Training manual of ICARshort course on 'Advances in risk analysis and GIS based prediction modeling of livestoc parasitic diseases'. Pp.1-126.
12. Sridevi R.(2018).Collection and Dispatch of Samples for Diagnosis of Haemoprotozoan Diseases in Animals. In: Haemoprotozoan Parasitic Diseases of Animals.(Ed.) Daya Publishing House, New Delhi. Pp. 57-64.

Technical Bulletins/Booklets

1. Shivachandra S B, Chanda MM, Hiremath J, Hemadri D. (2017). 'Pocket guide on Anthrax in Animals." Booklet, Pp 1-52, ICAR-NIVEDI, Bengaluru, Karnataka, India.
2. Balamurugan V, Yogisharadhya R, Sengupta P P, Govindaraj G. (2018). ICAR-NIVEDI at a glance 1987-2017. Bulletin Pp.1-28.

Popular Articles

1. Manjunatha Reddy G B. (2017). Epidemiology of rabies. In Souvenir, Technical seminar on Rabies: Zero by 2030 organized on world rabies day during 28thSeptember, 2017 at College of Veterinary and Animal Sciences, MAFSU, Udgir. Pp1-5.
2. Gowda NKS, Bhasker T V, Pal D T, Mondal S, Bhat S K, Krishnamoorthy P, Bhatta R. (2017). Boron - An importance micronutrient for Animals. ICAR News, 23(1): 8.

Capacity Building/Human ResourceDevelopment/ Training/RefresherCourse/Summer /WinterSchool/ Seminars/Conferences/Symposia/Workshops/Krishi Mela/Fair Programmes Organized

SN.	Name of Seminar/Workshop/Training	Venue	During (Days)	Date
1	SAARC Agriculture Center (SAC) sponsored training programme on "Field Epidemiology Training Programme for Veterinarian" for the participants from SAARC countries	ICAR-NIVEDI	9	15-23rd May, 2017
2	Workshop on "Orientation cum Technical seminar on 'Anthrax surveillance' for Veterinary and Medical professionals" (Kolar & Chikkaballapur, Karnataka)	Chikkaballapur, Karnataka	1	11th Aug, 2017
3	Training on "Protein G based iELISA using hand held ELISA reader and Florescent Polarization assay"	ADMaC Peripheral Lab, AH &VS ,Govt of Manipur	1	23rdAug, 2017
4	Brucellosis awareness program	Department of AH &VS, Govt of Manipur	1	24thAug, 2017
5	Brucellosis training program	ICAR-K.H.Patil KrishiVigyan Kendra Hulkoti, Gadag District, Karnataka	1	31stAug, 2017
6	Workshop on "Orientation cum Technical seminar on 'Anthrax surveillance' for Veterinary and Medical professionals" (Bellary, Koppal, Davanagere & Raichur)	Hospete, Bellary, Karnataka	1	5th Sept, 2017
7	CDC and ASM sponsored stakeholder meeting on "Laboratory capacity building for leptospirosis"	ICAR-NIVEDI	1	11th Sept, 2017
8	CDC and ASM sponsored workshop on laboratory capacity building for leptospirosis	ICAR-NIVEDI	4	12-15th Sept, 2017
9	Workshop on "Sampling plan and data analysis using online software".	ICAR-NIVEDI	2	20-21st Sept, 2017
10	Interactive workshop on Brucellosis	Directorate of AH & VS Department, Kohima, Govt of Nagaland	1	26 Sept, 2017

SN.	Name of Seminar/Workshop/Training	Venue	During (Days)	Date
11	ICAR sponsored short course on 'Advances in risk analysis and GIS based prediction modeling of livestock parasitic diseases'	ICAR-NIVEDI	10	23rd Oct - 1stNov, 2017
12	Training cum transfer of innovative in-house technologies for animal disease diagnosis (DBT-ADMaC)	ICAR , Barapani	3	07-09th Nov, 2017
13	Sensitization training program on Control of brucellosis on "Emerging and re-emerging diseases of livestock, their prevention and control"	Gwalior, Madhya Pradesh.	1	13th Feb, 2018
14	Workshop on Orientation cum Technical seminar on 'Anthrax surveillance' for Veterinary and Medical professionals (Koraput and Rayagada)	Koraput, Odisha	1	22nd Feb, 2018
15	Master Trainers Training Programme on Field Veterinary Epidemiology sponsored by Animal Husbandry Dept. Karnataka under ASCAD scheme.	ICAR-NIVEDI	5	20 -24th Feb, 2018
16	Brucellosis training program	AH &VS Department, Govt. of Mizoram	1	27th Feb, 2018
17	Interactive Meeting between the Health and Veterinary Departments of Karnataka.	ICAR-NIVEDI	1	28th Feb, 2018
18	Master Trainers Training Programme on Field Veterinary Epidemiology sponsored by Animal Husbandry Dept. Karnataka under ASCAD scheme.	ICAR-NIVEDI	5	26th Feb - 02nd Mar, 2018
19	Sensitization training program on control of brucellosis	Thiruvananthapuram, Kerala	1	06 Mar, 2018
20	Meta-analysis and Mapping, using R software	AAU Guwahati	4	7-10th Mar, 2018

Capacity Building / Human Resource Development/Training/ Refresher Course/ Summer/Winter School/ Seminars/ Conferences/ Symposia/ Workshops/Meeting/ Krishi Mela/Fair Programmes participated

Sl.No	Name of Seminar/ Workshoop/ Training	Venue	Date	Attended by
1	Farmer's Fair cum inauguration of FMD International Center	Bhubaneswar, Odisha	1st Apr, 2017	Dr S S Patil Dr J Hiremath
2	EIMA Agrimach India 2017	Taj Gateway, Bengaluru	4th Apr, 2017	Dr. V Balamurugan Dr. G Govindaraj
3	International Symposium on aquatic animal health and epidemiology for sustainable Asian aquaculture	ICAR-NBFGR, Lucknow	20 to 21st Apr, 2017	Dr. G.B. Manjunatha Reddy
4	27th National Conference of Parasitology	NIMHANS, Bengaluru,	25 - 27th April, 2017	Dr. P P Sengupta Dr. S S Jacob
5	2nd Quarterly Review Meeting of Research projects under Global Health Security Agenda (GHSA)	NIMHANS, Bengaluru,	29th May, 2017	Dr. S.B. Shivachandra
6	Twenty-Fourth General Body Meeting and Foundation Day Programme of the NAAS	NASC complex, New Delhi	4-5th Jun, 2017	Dr V Balamurugan
7	ICAR-ICMR collaborative meeting on Zoonotic Diseases	ICAR-NIVEDI	7th Jun, 2017	Dr R Shome Dr P P Sengupta Dr V Balamurugan Dr S B Shivachandra Dr R Sridevi Dr Manjunatha Reddy G B
8	Awareness programme and Gap analysis for upgrading ISO 9001-2008 certification to ISO 9001-2015	ICAR-NIVEDI, Bengaluru	30th Jun, 2017	All staff of ICAR-NIVEDI
9	Brucellosis workshop	IAH V&B, Bengaluru	30th Jun, 2017	Dr M Nagalingam
10	FAO-USAIDsponsered Two day Meeting/workshop on 'Finalization of Research Proposals on Antimicrobial Resistance'	ICAR-NIVEDI/ Verda Prakyati Hotel, Bengaluru	5-6th Jul, 2017	Dr. Shome Dr. S.B. Shivachandra Dr. M Nagalingam Dr. P Krishnamoorthy Dr. Sridevi R Dr Yogisharadhya R

Sl.No	Name of Seminar/ Workshoop/ Training	Venue	Date	Attended by
11	CDC sponsored workshop on "Diagnosis of Anthrax"	Department of Microbiology, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand.	12-14thJul, 2017	Dr.Md.Mudassar Chanda
12	Training programme on Pay fixation	ISTM, New Delhi	12-14th Jul,2017	Sh. Gangadharesh-wara
13	National conference on Enhancing efficiency and effectiveness in institutional administration/ management and effective implementation of official language policy in ICAR system	ICAR-IIHR, Bengaluru.	11th Aug, 2017	Dr. G.B. Manjunatha Reddy
14	ILRI -ICAR Project planning meeting	NASC complex, Krishi Bhavan, New Delhi	17th Aug, 2017	Dr R. Shome
15	Training on Establishment & Financial Matters for FAO, SFAO, AO, FAO of ICAR	NAARM, Hyderabad	17th-23rd Aug, 2017	Sh. V. Raghuraman
16	CDC-ASM sponsored Stakeholders Meeting for Leptospirosis Organized Jointly by ICAR -NIVEDI and CDC-Atlanta, USA	ICAR-NIVEDI	11th Sep, 2017	Dr V Balamurugan
17	Workshop on "Sampling plan and data analysis using online software"	ICAR-NIVEDI	20-21st Sep, 2017	Dr R Shome Dr V Balamurugan Dr M Nagalingam
18	Regional meeting for strengthening of Inter-Sectoral Coordination between Health & Other Sectors (for CBRN with all Hazard approach) for effective coordination on Public Health measures at Regional and Sub regional levels	The Chancery Pavellion, Bengaluru	4-6th Oct, 2017	Dr.Md.Mudassar Chanda
19	XV Annual conference of IAVPHS and National symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges"	College of Veterinary Science, Tirupati, Andhra Pradesh	11-13th Oct, 2017	Dr V Balamurugan Dr M M Chanda Dr. P Krishnamoorthy
20	All India Network Programme on Bluetongue	NASC complex, New Delhi	24th Oct, 2017	Dr D Hemadri

Sl.No	Name of Seminar/ Workshoop/ Training	Venue	Date	Attended by
21	Annual Scientist's meet of AICRP on Animal Disease Monitoring and surveillance	Pune, Maharash-tra	26-27th Oct, 2017	Dr D Hemadri
22	One-health workshop	NASC complex, New Delhi	26th Oct, 2017	Dr R. Shome
23	Training on Goods & Service Tax	Institute of Sec-retariat Training & Management, New Delhi	6-7th Nov, 2017	Sh. Rajeevalochana
24	National Interactive Meeting of OIE-PVS pathway by DADF, Ministry of Agriculture and Farmers Welfare, GOI, New Delhi	New Delhi	9th Nov, 2017	Dr S S Patil
25	XXXIV Annual conference of IAVP, Asian Veterinary Pathology Con-gress and International seminar on "Emerging Horizons in Diagnosis of Animal and Poultry Diseases: Towards Sustainable Production in Asian Countries"	Veterinary Col-lege, Bengaluru, Karnataka	9-11th Nov, 2017	Dr. P Krishnamoorthy Dr. G.B. Manjunatha Reddy
26	XV biennial conference of Indian Association of Women Veterinarians	College of Vet-erinary Sciences, Rajendranagar, Hyderabad	21 -22nd Nov, 2017	Dr R. Shome
27	26th Annual Conference of In-dian Virological Society VIRO-CON-2017	NITTE Univer-sity, Mangaluru, India	7-9th Dec, 2018	Dr V Balamurugan Dr G Govindaraj
28	Management Development Pro-gramme on 'Leadership Develop-ment (A pre-RMP pro-gramme)'	ICAR-NAARM, Hyderabad	12-23rd Dec, 2017	Dr. S.B. Shivachandra
29	Workshop on *"Brucella* Bio-informatics*"* Organized under DBT-*Brucella* Network project	MKU, Madu-rai,TN	18-22nd Dec, 2017	Dr V. Balamurugan
30	Training Programme on ICAR ERP training programme	ICAR-IASRI, New Delhi	22-27th Dec,2017	Sh. Gangadharesh-wara L
31	Seminar on 'Zoonosis' for field veterinary officers of Chitradurga district, Karnataka	Chitradurga, Karnataka	12th Jan, 2018	Dr. S.B. Shivachandra

Sl.No	Name of Seminar/ Workshoop/ Training	Venue	Date	Attended by
32	National training on "Host-Pathogen Interaction"	College of Veterinary Science, Nagpur	9-13th Jan, 2018	Dr Yogisharadhya R
33	XXXI Annual Convention of IAVMI and National Symposium on “Innovation in Animal Health-Current challenges and future perspectives”	College of Veterinary Science, Sri Venkateshwara University, Tirupati, Andhra Pradesh.	29-31st Jan, 2018	Dr. R. Shome Dr. D Hemadri Dr V Blamurugan Dr Sathish B Shivachandra Dr Sridevi R Dr Manjunatha Reddy GB
34	Interactive Meeting with CDC	ICAR-NIVEDI	3rd Feb,2018	All team members of CDC project
35	Technical seminar for Veterinarians of Chitradurga	Chitradurga, Karnataka	7th Feb, 2018	Dr S B Shivachandra Dr Md.Mudassar Chanda
36	National Congress of Veterinary Parasitology 2018 and XXVII National symposium on "Technologies for sustainable parasite control and readdressal of detection methods directed for upliftment of rural economy"	College of Veterinary and Animal Science, Udaipur, Rajasthan	12-14th Feb, 2018	Dr P P Sengupata Dr. P Krishnamoorthy
37	Farmers Conclave	ICAR-NIANP, Bengaluru	16-17thFeb, 2018	Dr S S Patil Dr G Govindaraj Dr J Hiremath Dr G B Manjunatha Reddy Dr Yogisharadhya R
38	18th Indian Veterinary Congress & XXV Annual Conference of IAAVR	Veterinary College, SVVU, Tirupathi	23-24th Feb, 2018	Dr. R Shome
39	Expert Committee for discussing the preparation of National Contingency Plan for Rinderpest Holding Facility (RHF) at NIHSAD, Bhopal held under chairmanship of AHC, DADF, Government of India	Krishi Bhavan, New Delhi	26th Feb, 2018	Dr V Balamurugan

Sl.No	Name of Seminar/ Workshoop/ Training	Venue	Date	Attended by
40	Interactive meeting with Health and Animal Husbandry Department under CDC for Anthrax	ICAR-NIVEDI	28th Feb, 2018	Dr R.Sridevi,
41	Interactive meet with OIE-PVS Team	New Delhi	5th Mar, 2018	Dr S S Patil
42	Training on Management Development Programme on Advance Public Procurement	National Institute of Financial Management, Faridabad	5th Mar, 2018	Sh. V. Raghuraman,
43	Conference on Technological Empowerment of women	Vigyana Bhavan,New Delhi	08th Mar, 2018	Dr.R Shome
44	National Workshop on revisiting Foundation Course for Agricultural Research Service (FOCARS) Reflection and feedback of trained scientists	ICAR- NAARM, Hyderabad	15-16th Mar, 2018	Dr Siju Susan Jacob
45	National Horticulture Fair	ICAR-IIHR, Bengaluru	15-17th Mar, 2018	Dr R Shome Dr P P Sengupta Dr V Balamurugan Dr G Govindaraj Dr Yogisharadhya R
46	Meeting of the partners of the Indo-UK/DBT-BBSRC project	University of Nottingham, UK	15-16th Mar, 2018	Dr D Hemadri
47	Krishi Unnati Mela -2018	ICAR-IARI, New Delhi	16-18th Mar, 2018	Dr M Nagalingam Dr R Sridevi

AWARD/FELLOWSHIP/RECOGNITION

1. Dr. V.Balamurugan, Principal Scientist,received NAAS Fellow-2017 during 24th General Body Meeting and Foundation Day Programme of the NAAS held at New Delhi, during 4-5th June 2017.

2. Dr Rajeswari Shome, Principal Scientist received fellow of IAVPHS from Indian Association of Veterinary Public Health Specialists (IAVPHS). In XV Annual Conference of IAVPHS & National Symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges" held at SVVU, Tirupati during 11-13th October 2017.

3. First prize in poster presentation for the "Assessment of the contextual managemental risks for brucellosis seropositivity in sheep and goat". In XV Annual Conference of IAVPHS& National Symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges" held at SVVU, Tirupati during 11-13th October 2017 (R Shome and Team)

4. First prize in oral presentation for the "Spatial distribution of *Brucell*a species sequence types based on Multi Locus Sequence Typing in India". In XV Annual Conference of IAVPHS & National Symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges" held at SVVU, Tirupati during 11-13th October 2017 (R Shome and Team).

5. Best paper award for oral presentation entitled "Impact of heat stress on the carcass traits, plasma leptin profile and skeletal muscle HSP70 expression pattern in Malabari goats". In Kerala Veterinary Science Congress, KVSC-2017 on "Food Adequacy and Climate Change: Strategies for sustainable food production" held at Cochin, Kerala during 11-12thNovember, 2017(Archana P R, Sejian V, Krishnan G, Bhagat M, Ruban W, Manjunatha Reddy G B, Beena V, Indira Devi P and Bhatta R)

6. Best paper award for oral presentation entitled "Impact of heat stress on meat quality as indicated by the alterations in the physio-chemical variables, proximate composition and organoleptic attributes of meat in Malabari goats".In National Seminar on "Food Adequacy and Climate Change: Strategies for sustainable food production" heldat Veterinary College, KVASU, Thrissur, Kerala during 3-4th November, 2017 (Archana P R, Sejian V, Ruban W, Manjunatha Reddy G B, Beena V, Krishnan G, Bhagat M, Indira Devi P and Bhatta R)

7. Best paper award for oral presentation entitled "Assessing the physiological adaptability of Malabari goats when shifted from its native tract to different agro-ecological zone".In National Seminar on "Food Adequacy and Climate Change: Strategies for sustainable food production" held at Veterinary College, KVASU, Thrissur, Kerala during 3-4th November, 2017(Aleena Joy, Sejian V, Bhagat M, Krishnan G, Manjunatha Reddy G B, Beena V, Indira Devi P and Bhatta R)

8. Best oral presentation award for the abstract entitled 'Spatio-temporal epidemiological analysis of zoonotic diseases of livestock in Gujarat'. In: XV IAVPHS Annual conference & National symposium on "Intersectoral approaches to combat zoonoses: strategies and challenges", held at College of Veterinary Science, Tirupati, Andhra Pradesh during 11-13thOctober 2017 (Krishnamoorthy P, Govindaraj G, Kanani A, Shah N, Shome B R and Roy P).

9. Best poster award for the abstract entitled 'Meta-analysis on prevalence of extended spectrum beta lactamase (ESBL) producing pathogens in animals'. In: XXXI Annual Convention held at College of Veterinary Science, SVVU, Tirupati, Andhra Pradesh of IAVMI during 29-31stJanuary 2018 (P Krishnamoorthy and team).

10. Best oral presentation award for the presented paper entitled "Expression of recombinant LSA 27 protein of Leptospira serovars Hardjo in *E.coli* and its use as diagnosis antigen for sero diagnosis of Bovine leptospirosis". In XV Annual Conference of Indian Association of Veterinary Public health Specialists and national Symposium on Intersectoral Approaches to combat Zoonoses: Strategies and Challenges held at Department of Veterinary Public health and Epidemiology, College of veterinary Sciences, SSVU, Tirupati.

AP during 11-13th October, 2017 (Anusha A, Sowjanya Kumari S, Linshamol A, Sridevi R, Nagalingam M, Roy P and Balamurugan V)

11. Best oral presentation award for the presented paper entitled "Expression of Fusion protein of PPR virus in Baculo virus system and its role as a putative immunogen. In the XV IAWV-2017 Biennial conference and National Symposium on Role of Women Veterinaraians in Enhancement of Livestock Productivity, Health and Welfare, held at College of Veterinary Science, Rajendranagar, PVNR TVU, Hyderabad, AP, during 21-22ndNovember, 2017 (Amitha R Gomes, Veeregowda B M, Byregowda S M, Rathnamma D, Placid E D Souza and Balamurugan V.).

12. Best oral presentation award for the presented paper entitled "Expression of recombinant OMP 37 protein of leptospira in *E.coli* and assessing its potential use as diagnostic antigen for bovine leptospirosis. In XXXI Annual Convention of Indian Association of Veterinary Microbiologists, Immunologists and Specialists in Infectious Diseases (IAVMI) and National Symposium on "Innovations in Animal Health-current Challenges and Future Prospective" held at Department of Veterinary Microbiology, College of Veterinary Science, SSVU, Tirupati. Andhra Pradesh during 29-31st January, 2018 (Balamurugan V, Thirumalesh SRA, Sowjanya Kumari S, Lakshmanan L, Alamuri A, Sridevi R, Nagalingam M and Roy P).

Patent Filed:

Title: 'Recombinant non-structural proteins NS1 and NS3 as fusion protein (rNS1-NS3) based immuno-diagnostic assay for bluetongue'

Inventors: Dr. D. Hemadri., Dr. N. N. Mohanty., and Dr. S. B. Shivachandra

Application Number: 201741040913; Date of filing: 16th November, 2017

MISCELLANEOUS

Institute Technology Management Committee (ITMC)

Name	Designation	Role
Dr. Parimal Roy	Director, ICAR-NIVEDI	Chairman
Dr. B. R. Shome	Principal Scientist, ICAR-NIVEDI	Member
Dr. D. Hemadri	Principal Scientist, ICAR-NIVEDI	Member (Technical Expert)
Dr. K.P. Suresh	Principal Scientist, ICAR-NIVEDI	Member (Technical Expert)
Dr. P.P. Sengupta	Principal Scientist, ICAR-NIVEDI	Member (Member Secretary, IRC)
Dr. B.P. Srinivasa	Principal Scientist, ICAR-IVRI	Member (IPR Expert External)
Dr. S.B. Shivachandra	Principal Scientist, ICAR-NIVEDI	Member Secretary

The Institute Technology Management Committee (ITMC) meeting was held on 3rd August, 2017.

The Institute Technology Management Committee (ITMC) meetings were conducted on 20th March, 2018.

Research Advisory Committee (RAC)

Name	Designation	Role
Dr. K.M. Bujarbaruah	Vice Chancellor, Assam Agricultural University, Jorhat	Chairman
Dr. Ashok Kumar	ADG (AH), ICAR, New Delhi	Member
Dr. Devendra Swarup	Former Director, CIRG, Makhdoom	Member
Dr. J.R. Rao	Former Head, Divion of Parasitology JD (Res) IVRI, Izatnagar	Member
Dr. Minakshi Prasad	Professor & Head Department of Animal Biotechnology, LUVAS, Hisar, Haryana	Member
Dr. Parimal Roy	Director, ICAR-NIVEDI, Bengaluru	Member
Dr. D. Hemadri	Principal Scientist, ICAR-NIVEDI, Bengaluru.	Member Secretary

The RAC meeting was conducted on 12th March, 2018.

Institutional Animal Ethics Committee (IAEC)

No.	Name &Address		Designation
1	Dr. Parimal Roy	Director, ICAR-NIVEDI, Bengaluru	Chairman
2	Dr. R.K. Shakthi Devan,	Syngene International Limited, Biocon-Bristol Meyers Squibb Research Centre, Bengaluru	CPCSEA Nominee
3	Dr. Jagadeesh S,	Professor & Head, Dept. of Veterinary Pharmacology and Toxicology, Hebbal, Bengaluru- 560 024.	Link Nominee
4	Dr. Shivakumar,	Head, Technical & Labs, Provimi animal Nutrition India Pvt. Limited, IS-40, KHB Industrial area, Yelahanka new town, Bengaluru-560064.	Scientist from outside the institute
5	Dr. R. G. Prakash,	Animal Facility, Jawaharlal Nehru Centre for Advances Scientific Research, Jakkur Post, Bengaluru-560064.	Socially Aware Nominee
6	Dr. B. R. Shome	Principal Scientist, ICAR-NIVEDI, Bengaluru	Biological Scientist
7	Dr. V. Balamurugan	Senior Scientist, ICAR-NIVEDI, Bengaluru	Scientist of different discipline
8	Dr. Siju, S.J.	Scientist, ICAR-NIVEDI, Bengaluru	Veterinarian
9	Dr. P. Krishnamoorthy	Scientist, ICAR-NIVEDI, Bengaluru	Member Secretary/ Animal house In-charge

ICAR-NIVEDI conducted 10th Institutional Animal Ethics Committee (IAEC) meeting on 14th June, 2017 under the Chairmanship of Dr. Parimal Roy, Director. Dr. R.K. Shakthi Devan, CPCSEA Main Nominee, Dr. Shiva Kumar, Scientist from outside the Institute and Dr. R.G. Prakash, Socially aware Nominee and other members from ICAR-NIVEDI attended the meeting.

Institute Management Committee (IMC)

1.	Dr. Parimal Roy, Director, ICAR-NIVEDI, Bengaluru	Chairman
2.	Dr.R.V. Prasad, Vice Chancellor, KVAFSU, Bidar (previously Dean, Veterinary College, Shimoga)	Member
3.	Dr. B.C. Ghosh, Principal Scientist, ICAR-NDRI, Bengaluru	Member
4.	Dr. A.K. Samanta, Principal Scientist, ICAR-NIANP, Bengaluru	Member
5.	Dr. B. P. Srinivasa, Principal Scientist, ICAR-IVRI, Bengaluru	Member
6.	Sh. Mallappa Gowda, Mysore	Non-Official Member
7.	Sh. Ashok Allapur, Vijayapura	Non-Official Member
8.	Sh. Rajeevalochana, AAO, ICAR-NIVEDI	Special Invitee
9.	Sh. Babu. R.K, AF&AO, ICAR-NIVEDI	Special Invitee
10.	Sh. Raghuraman.V, AO, ICAR-NIVEDI	Member Secretary

The XVI meeting of the Institute Management Committee was held on 17th October, 2017

Distinguished Visitors

1. Dr. H. Rahman, Former DDG (AS) and ILRI Regional Representative for South Asia
2. Dr. J. Jena, DDG (Animal Science), ICAR, New Delhi
3. Shri Chhabilendra Roul, Additional Secretary (DARE) & Secretary (ICAR), Krishi Bhavan, New Delhi
4. Dr. Renee L Galloway, Bacterial Special Pathogens Branch, CDC, Atlanta, USA
5. Dr. Daniel Garcia, Senior Lab Advisor, Division of Global Health Protection, CDC, India
6. Dr. Naveen Gupta, Joint Director, NCDC, New Delhi, India
7. Dr. Simmi Tiwari, Deputy Director, NCDC, New Delhi, India
8. Dr. Mohan Papanna, Public Health Specialist, Global Disease detection, Regional Centre, CDC India Office, New Delhi
9. Dr. P. Vijayachari, Director, RMRC (ICMR), Port Blair, A&N Islands, India
10. Dr. Dinakar Rawal, Deputy Director (Epidemic), Commissionerate of Health, M.S. and M. E., Gandhinagar, Gujarat
11. Dr. Rekha Jain, Senior Consultant, American Society for Microbiology, India
12. Dr. Avijit Roy, Joint Secretary, IDSP, Andaman and Nicobar Islands, India
13. Dr. Ravi Kumar, Senior Regional Director, Regional Office for Health and Family Welfare, Govt. of India, Bengaluru
14. Dr. Sunil Lahane, Asst. Commisioner of Animal Husbandry, Western Regional Disease Diagnostic Laboratory, Pune, Maharashtra
15. Dr. Neeta Khandelwal, Professor and Head, Dept. of Microbiology, Govt. Medical College, Surat, Gujarat
16. Dr. M. Shivamurthy, Professor and Head, Department of Agricultural Extension, UAS, Bengaluru
17. Dr. Basavaraj Benni, Assistant Director, Dept. of AH&VS, Hospet, Karnataka
18. Dr. T.S. Manju, Additional Director (Livestock Health), Department of Animal Husbandry and Veterinary Services, Govt. of Karnataka
19. Dr. K.V. Halagappa, Joint Director (Epidemiology), Department of Animal Husbandry and Veterinary Services, Govt. of Karnataka
20. Dr. M.T.Manjunath, Director, AH & VS, Karnataka
21. Dr. Aniket Sanyal, Joint Director, Indian Veterinary Research Institute, Bengaluru campus,
22. Dr. M.D. Venkatesh, JD, SRDDL, IAH & VB, Bengaluru
23. Dr. M. Rajashekhar, Founding Director, ICAR-NIVEDI (Formerly PD-ADMAS)
24. Dr. Suresh Honnappagol, Animal Husbandry Commissioner, DADF
25. Dr. Howard Batho, One Health Expert, Former Official at European Commision DG Sanco, Belgium
26. Dr. Susanne Mustermann, Independent Animal Health Consultant Bonn, Nordrhein Westfalen, Deutschland, World Organisation for Animal Health (OIE Team)
27. Dr. K.M. Bujarbaruah, Vice Chancellor, AAU, Jorhat
28. Dr. Devendra Swarup, Former Director, CIRG, Makhadoom
29. Dr. Ashok Kumar, ADG(AH), Indian Council of Agricultural Research, New Delhi
30. Dr. J.R. Rao, Former Professor & Head, Division of Parasitology, IVRI, Izatnagar
31. Dr. Minakshi Prasad, Professor & Head, Dept. of Animal Biotechnology, LUVAS, Hisar
32. Dr. Md. Nuse Alam siddiky, Senior Programme Officer, SAC, Dhaka

Staff Position During 2017-18

Sl. No.	NAME OF THE STAFF	Designation
1	Dr. Parimal Roy	Director (RMP)
	SCIENTIFIC STAFF	
2	Dr. B.R.Shome	Principal Scientist
3	Dr. (Mrs) R.Shome	Principal Scientist
4	Dr. D. Hemadri	Principal Scientist
5	Dr. P. P. Sengupta	Principal Scientist
6	Dr. K.P. Suresh	Principal Scientist
7	Dr.V. Balamurugan	Principal Scientist
8	Dr. S.S. Patil	Principal Scientist
9	Dr. Sathish B Shivachandra	Principal Scientist
10	Dr. G. Govindaraj	Senior Scientist
11	Dr. P. Krishnamoorthy	Scientist
12	Dr. Jagadish Hiremath	Scientist
13	Dr. (Mrs.). R.Sridevi	Scientist
14	Dr. Md. Mudassar Chanda	Scientist
15	Dr. M. Nagalingam	Scientist
16	Dr. G. B.Manjunatha Reddy	Scientist
17	Dr. (Mrs.). Siju Susan Jacob	Scientist
	TECHNICAL STAFF	
18	Dr. R.Yogisharadhya	Senior Technical Officer
19	Dr. Awadesh Prajapati	Senior Technical Officer
	ADMINISTRATIVE STAFF	
20	Sh. V. Raghuraman	Administrative Officer
21	Sh. Rajeevalochana	Assistant Administrative Officer
22	Sh. Babu R.K	Assistant Finance & Accounts Officer
23	Smt. Divya C.N	Assistant
24	Sh. N. Narayanaswamy	Assistant
25	Smt. A. Saranya	Stenographer Grade-III
26	Mr. K.Vijayraj	Stenographer Grade-III
27	Smt. G. C.Sridevi	Lower Division Clerk
28	Sh. Gangadhareshwara L	Lower Division Clerk
	SKILLED SUPPORTING STAFF	
29	Sh. M. K Ramu	Skilled Support Staff
30	Sh. B. Hanumantharaju	Skilled Support Staff
31	Mr. H. S. Umesh	Skilled Support Staff

Joined /Transfered/Promoted :

Joined :

Sh. K. Jayaram Naik joined as Administrative Officer of this Institute on 15-5-2017

Sh. V. Raghuraman joined this Institute as Administrative Officer on 4-8-2017

Transferred :

Sh. K. Jayaram Naik , Administrative Officer transferred to ICAR- Directorate of Cashew Research, Puttur on 3-8-2017.

Promoted:

Dr. K. P.Suresh, promoted to the post of Principal Scientist in the Research grade pay of Rs.10000/- w.e.f. 30-4-2014

Dr. V. Balamurugan, promoted to the post of Principal Scientist in the Research Grade Pay of Rs.10,000 w.e.f. 15-6-2015

Dr. S.S. Patil, promoted to the post of Principal Scientist in the Research Grade Pay of Rs.10000/- w.e.f. 28-7-2015

Dr. Sathish B. Shivachandra, promoted to the post of Principal Scientist in the Research Grade Pay of Rs.10000/- w.e.f. 17-2-2016

Dr. G.Govindaraj promoted to the post of Senior Scientist in the Research Grade Pay of Rs.9000/- w.e.f. 1-1-2017

BUDGET

Revised Estimate and Expenditure under Government Grant for 2017-18

(In lakh rupees)

Major Heads	PLAN	
	Revised Estimate	Expenditure
Grants for Creation of Capital Assets (Capital)		
Works	165.51	165.51
Equipments	23.49	22.89
Information Technology	2.50	0.48
Library Books & Journals	1.00	1.02
Vehicles & Vessels	0.50	0.50
Furniture & Fixtures	36.00	19.61
Grants in Aid - Salaries (Revenue)		
Establishment Expenses (Salaries)	471.00	471.00
Grants in Aid - General (Revenue)		
Pension & Other Retirement Benefits	2.34	2.34
Travelling Allowances	12.87	12.87
Research & Operational Expenses	163.43	163.43
Administrative Expenses	196.96	196.93
Miscellaneous Expenses	10.19	10.18
AICRP on ADMAS	87.55	87.55
TSP	7.45	7.45
Grant Total	**1180.79**	**1161.76**
Revenue Receipts during 2017-18		
Description	Amount (Rs.)	
Licence Fee	48970.00	
Interest earned on loans & advances	207906.00	
Application Fee from Candidates	150.00	
Interest earned on short term deposits	1826965.00	
Receipt from Schemes	1956162.00	
Income generated on sale of kits	1026027.00	
Income generated on Training	110000.00	
Miscellaneous receipts	27492630.00	
Total	**32668810.00**	

NIVEDI ACTIVITIES

Hon'ble Dr. J. Jena, DDG (Animal Science), inaugurated the "Field Epidemiology Training programme for Veterinarians (FETPV)" at ICAR-NIVEDI, sponsored by SAARC Agricultural Centre (SAC), Bangladesh and Food and Agriculture Organization (FAO)-Regional Support Unit (RSU), Nepal during 15-23rd May, 2017. The guests of honour were Dr. H. Rahman, Former DDG (AS) and ILRI Regional Representative for South Asia and Dr. Md. Nure Alam Siddiky, Senior Programme Officer, SAC, Dhaka.

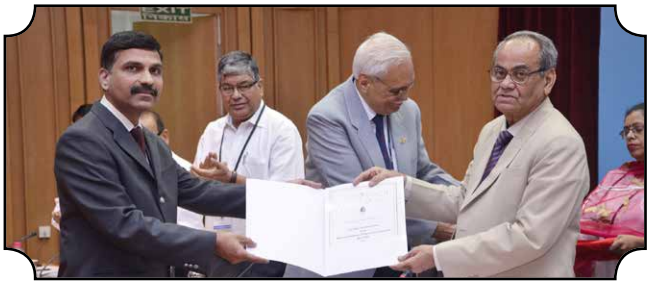
ICMR and ICAR-NIVEDI interactive meeting was organized at ICAR-NIVEDI on 7th June, 2017 in the presence of Dr. Ashok Kumar, ADG(AH), ICAR, Dr. Manju Rahi, Scientist E and Dr. Ameeth Singh, Scientist C, ICMR and Scientists, ICAR-NIVEDI.

ICAR-NIVEDI celebrated the International Yoga day by organizing Yoga session by Dr.Prathik, Institute of Ayurveda and Integrative Medicine (I-IAM), Bengaluru to staff members on 21st June, 2017.

Dr. S.S. Patil, Principal Scientist and Dr. J. Hiremath, Scientist exhibited the achievements of ICAR-NIVEDI in Farmer's Fair cum inauguration of FMD International Centre, Bhubaneswar, Odisha on 1st April, 2017.

Hindi Implementation Committee meeting of ICAR-NIVEDI was held under the Chairmanship of Dr. Parimal Roy, Director, ICAR-NIVEDI on 27th April, 2017.

Dr. D. Hemadri, Principal Scientist, Dr. Sathish, S.B, Principal Scientist and Dr. J. Hiremath, Scientist from ICAR-NIVEDI attended the disease outbreak investigation in a Pig farm at Sunkadakatte, Udupi district on 27th May, 2017.



Dr. V. Balamurugan, Principal Scientist, elected as Fellow of NAAS-2017 during Foundation Day Programme held at NASC complex, New Delhi, during 4-5th June 2017.

Hon'ble Shri Radha Mohan Singh, Union Minister of Agriculture and Farmers' Welfare released the Livestock Disease Forewarning (LDF) Mobile Application in the presence of Hon'ble Shri Gajendra Singh Shekhawat, Union Minister of State for Agriculture and Farmers' Welfare, Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR, Dr. J. Jena, DDG (Animal Science), ICAR, Dr. Parimal Roy, Director, Dr. D. Hemadri, Principal Scientist and Dr. K.P. Suresh, Principal Scientist, ICAR-NIVEDI on 27th December, 2017 at Krishi Bhawan, New Delhi.

Shri Chabbilendra Roul, Additional Secretary, DARE & Secretary, ICAR visited ICAR-NIVEDI and reviewed the progress of the Institute by interacting with scientists on 25th August, 2017.

Dr. H. Rahman, Former DDG (Animal Science) and Regional Representative for South Asia, International Livestock Research Institute, New Delhi visited ICAR-NIVEDI on 25th November, 2017 and interacted with all the staff and reviewed the progress of ILRI project.

25th Annual Review meeting of AICRP on ADMAS of ICAR-NIVEDI held during 26-27th October, 2017 at Disease Investigation Section, Aundh, Pune and reviewed the progress of the work done for the year 2016-17.

International trainees from Central Poultry Development Organization, Hessarghatta visited ICAR-NIVEDI facility and interacted with scientists on 5th December, 2017.

XVI Institute Management Committee (IMC) meeting of ICAR-NIVEDI was conducted under the Chairmanship of Dr. Parimal Roy, Director, ICAR-NIVEDI on 17th October, 2017.

World Antibiotics Awareness week was celebrated at ICAR-NIVEDI during 13-19th November, 2017 and imparted awareness on use of antibiotics and antimicrobial resistance to ICAR-NIVEDI staff members and school children of Nagarjuna Vidyaniketan School, Ramagondanahalli on this occasion.

Organized Eye Camp in association with Dr. Agarwal's Eye Hospital, Yelahanka, Bengaluru for all the staff of ICAR-NIVEDI on the eve of Institute Foundation day on 1st July, 2017. Dr.M. Shivamurthy, Professor and Head, Department of Extension, UAS, Bengaluru delivered a guest lecture on 'Doubling of farmers' income' on this occasion.

ICAR-NIVEDI staff took pledge for New India on the occassion of 75 years of Quit India Movement on 9th August, 2017.

71st Independence day was celebrated at ICAR-NIVEDI on 15th August, 2017 and Dr. Parimal Roy, Director addressed the staff members on this occasion.

Hindi Saptah was celebrated during 14-20th September, 2017 at ICAR-NIVEDI and various competitions like extempore speech, essay writing, letter writing and debate were organized and distributed certificate and prizes to winners.

Vigilance awareness week was celebrated during 30th October-5th November, 2017 at ICAR-NIVEDI and Dr. Parimal Roy, Director administered the vigilance and integrity oath to staff members and various competitions were organized on this occasion.

Kannada Rajyotsava was celebrated at ICAR-NIVEDI on 8th November, 2017 and Dr. Basvaraj Benni, Assistant Director, Dept. of AH & VS, Bellary delivered a guest lecture and various competitions were organized on this occasion.

On the occasion of Constitution day, Preamble of the Indian Constitution was read by staff members of ICAR-NIVEDI on 27th November, 2017.

Agricultural Education day was celebrated at ICAR-NIVEDI by organizing sensitization programme for school students from Nagarjuna Vidyaniketan School, Yelahanka on 4th December, 2017.

Dr. M.M. Chanda, Scientist investigated a suspected anthrax outbreak in a Sheep and Goat farm, Harihara, Davanagere, Karnataka and collected clinical samples on 23rd August, 2017.

Dr. J. Hiremath, Scientist conducted outbreak investigation and collected clinical samples from Pigs in Mudhole, Bagalkot, Karnataka on 25th November, 2017.

Dr. P.P. Sengupta, Principal Scientist, Dr. Siju, S.J., Scientist and Dr. R. Yogisharadhya, STO collected snails from Ramagondanahalli, Jakkur, Hessarghatta, Palanahalli and Yelahanka lakes in Bengaluru for the research project work during 11-12th December, 2017.

ICAR-NIVEDI organized Orientation cum Technical seminar on 'Anthrax surveillance' for Veterinary and Medical professionals from Chikkaballapur and Kolar districts on 11th August, 2017.

CDC and American Society for Microbiology sponsored workshop on 'Laboratory Capacity Building for Leptospirosis' organized jointly by ICAR -NIVEDI and CDC, Atlanta, USA at ICAR-NIVEDI during 11-15th September, 2017.

ICAR-NIVEDI organized DBT-PMU sponsored training cum workshop on 'Sampling plan and data analysis using online software' to the Network project staff members during 20-21st September, 2017.

Dr. Rajeswari Shome, Principal Scientist and Dr. M. Nagalingam, Scientist conducted DADF sponsored one day training program to field Veterinarians under Brucellosis Control Program at Directorate of AH & VS, Kohima, Nagaland on 26th September, 2017.

ICAR-NIVEDI organized ICAR short course on 'Advances in Risk Analysis and GIS based prediction modeling of livestock parasitic diseases' held during 23rd October-1st November, 2017.

ICAR-NIVEDI participated in the ICAR-South Zone sports meet held at ICAR-Sugarcane Breeding Institute, Coimbatore during 9-13th October, 2017.

Dr. S.S.Patil, Principal Scientist and Mr. Babu, AF&AO, of the institute participated in the training programme for ICAR institutes, SAUs and NGO-KVKs held at ATARI, Zone VIII, Bengaluru on 18th September, 2017

Dr. S S. Patil and Dr. Jagadish Hiremath, Scientists investigated the cause of Piglet diarrhoea of a farm in Halebudanur, Mandya district on 27th July, 2017.

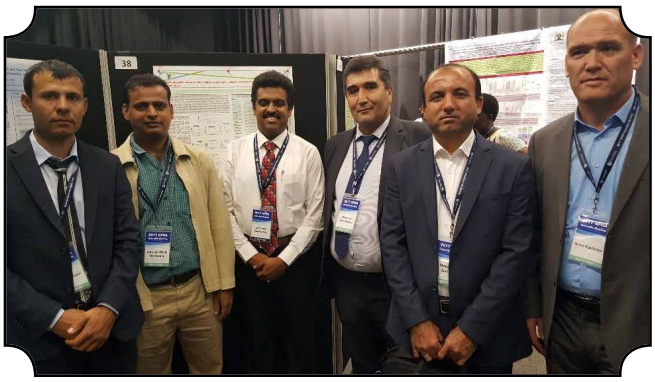
Dr S S Patil Principal Scientist had discussions with the farmers regarding FMD vaccine effectiveness in Doddaryagadahalli, Doddaballapur on 15th February, 2017

Dr. S.S. Patil, Principal Scientist attended the suspected MCF case in Medahalli, Anekal Taluk, Bengaluru rural district on 6th January, 2018

Celebration of National Productivity Day on 15th February, 2018 at ICAR-NIVEDI, Bengaluru

Visit of OIE team along with AHC, DADF and Director, DAHVS to ICAR-NIVEDI on 5th March, 2018

ICAR-NIVEDI conducted Trilingual Committee Meeting on 16th January, 2018 to discuss about issues related to use of Kannada language in addition to Hindi and English in various forums, name plates, banners etc.



Foreign delegates interacting with Dr. G.Govindaraj, Senior Scientist, ICAR-NIVEDI in GFRA scientific meeting held at Seoul, South Korea during 25-27th October, 2017.

ICAR-NIVEDI celebrated "Hindi Week" during 14-20th September, 2017

Dr. M. Nagalingam, Scientist provided sensitization training on control of brucellosis under "Emerging and re-emerging diseases of livestock, their prevention and control" organized by Animal Husbandry Department, Madhya Pradesh on 13th February, 2018.

Dr. B. R. Shome, Principal Scientist and Dr. P. Krishnamoorthy, Scientist, ICAR-NIVEDI participated in the ICMR-FAO meeting on Integrated AMR surveillance held at Indian Council of Medical Research, New Delhi on 15th February, 2018.

Dr. M. Nagalingam, Scientist conducted one day training program to field Veterinarians under Brucellosis Control Program at Animal Husbandry Department, Thiruvananthapuram, Kerala on 06th March, 2018.

ICAR-NIVEDI participated in the Krishi Unnati Mela, 2018 organized at Indian Agricultural Research Institute, New Delhi during 16-18th March, 2018

ICAR-NIVEDI participated in the exhibition of regional horticulture fair organized at ICAR-IIHR Bengaluru during15-17th, March, 2018

Masters Trainers Training programme conducted during 20-24th February 2018 at ICAR-NIVEDI

69th Republic day was celebrated at ICAR-NIVEDI on 26th January, 2018 and Dr. Parimal Roy, Director addressed the staff members on this occasion

ICAR-NIVEDI participated in farmers conclave conducted during 16-17th February, 2018 at NIANP, Bengaluru

Masters Trainers Training programme conducted during 26th February - 02nd March, 2018 at ICAR-NIVEDI

Two days training program conducted (23-25 August 2017) at Manipur

International Women's Day Celebrations at ICAR-NIVEDI – 2018

International Women's Day was celebrated at ICAR- NIVEDI, Bengaluru on 9th March 2018 with a theme of 'Press for Progress'. Dr. B.R. Shome highlighted about the concern for the women group working in the institute and asked them to initiate some field oriented programs for the benefit of rural women. Guest speaker, Medical Officer, ICAR-IVRI, Dr. Sakey Srinivas sensitized on "Stress management at work place" and Dr. Padmakashi, Indiranagar, Bengaluru delivered lecture on "Health issues confronting working women". In total, 65 women employees attended the celebration including members from women cell and women complaint committee of the institute. Dr. Rajeswari Shome stressed for the equal opportunities for women staff considering their social and personal commitments at home.