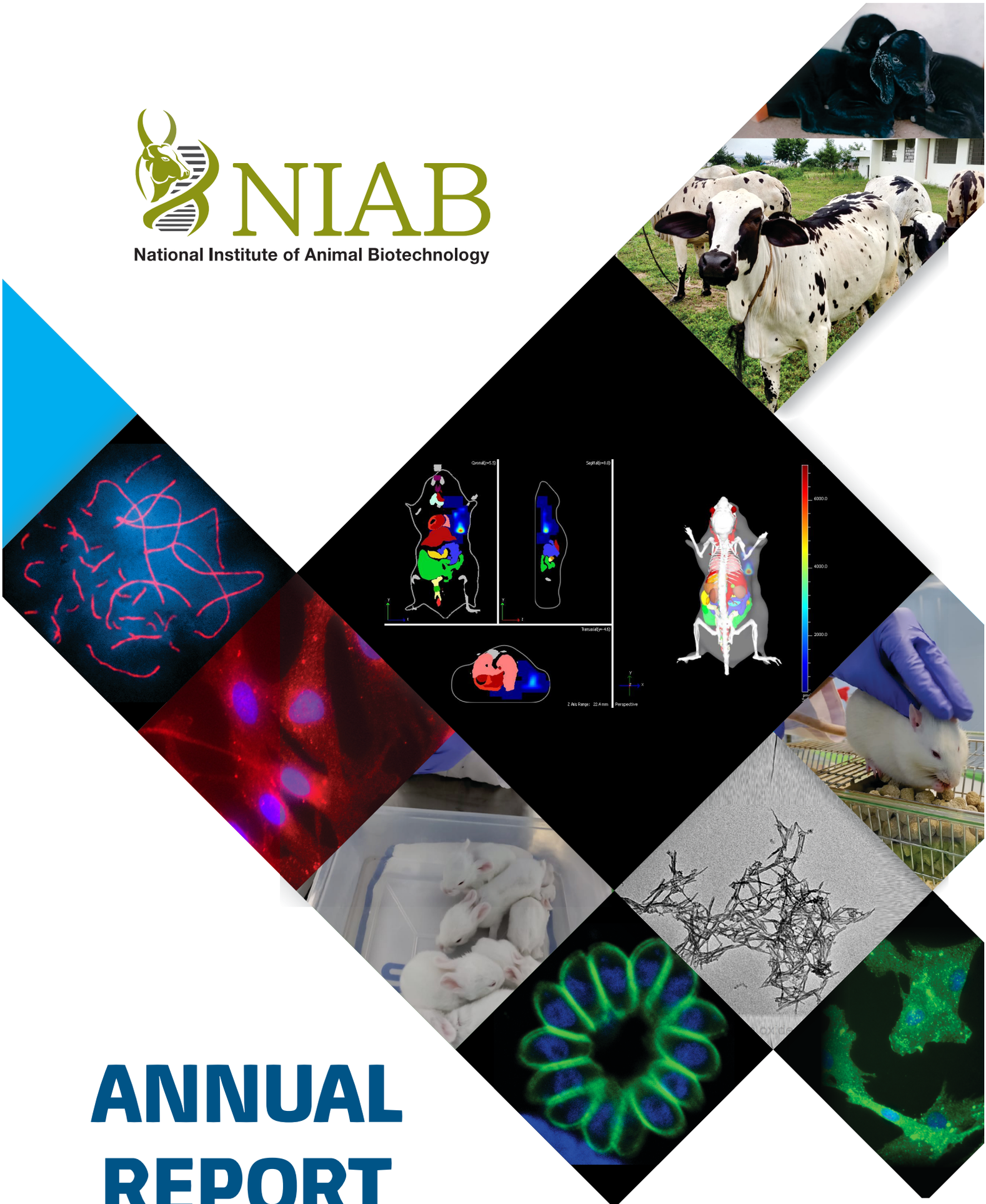
NIAB

National Institute of Animal Biotechnology



ANNUAL REPORT

2020-21

NIAB

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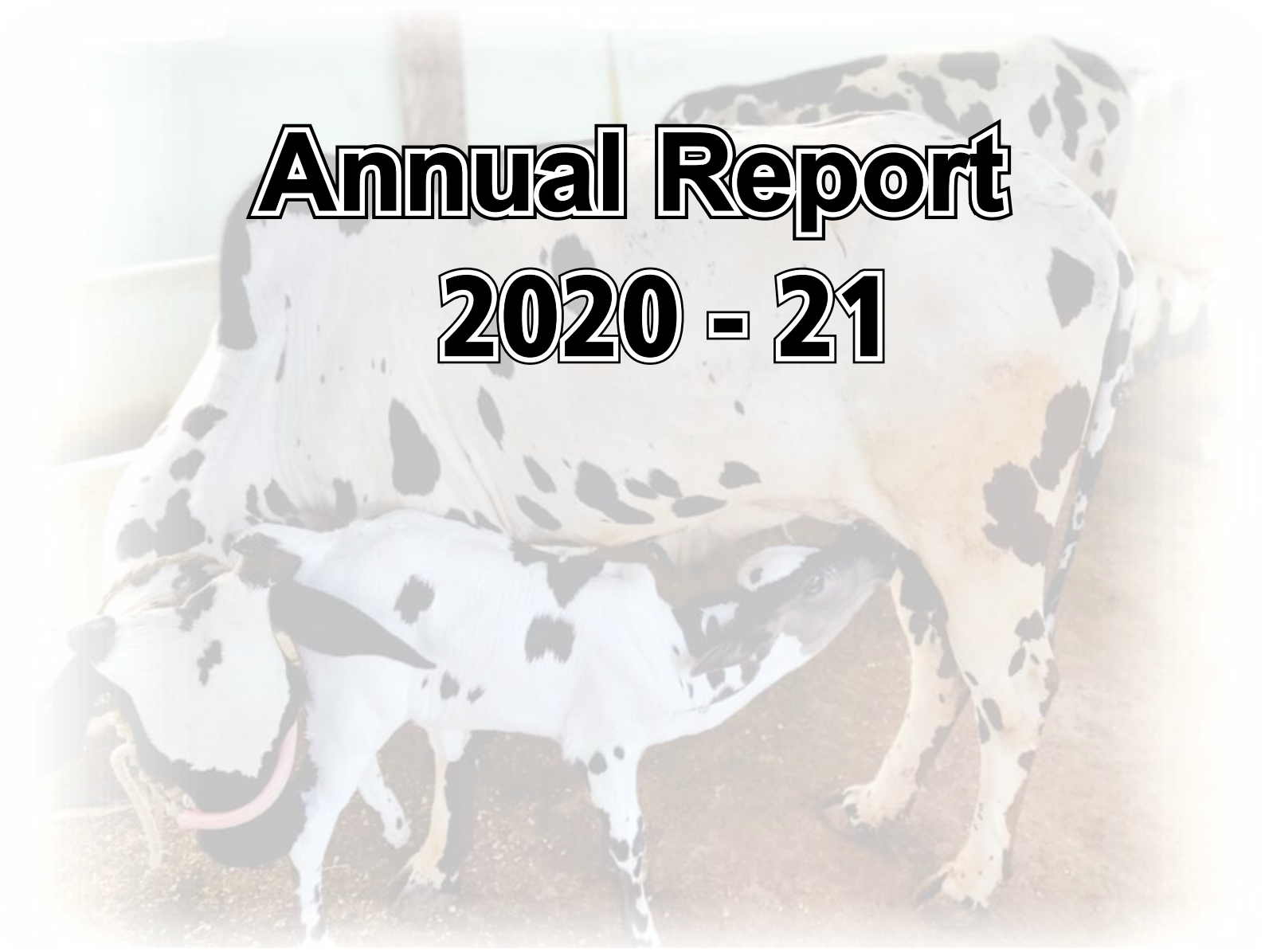

Annual Report 2020 - 21

राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान

National Institute of Animal Biotechnology

(An autonomous Institute of the Department of Biotechnology, Ministry of Science & Technology, Govt. of India)

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MISSION:

Development of sustainable and globally competitive livestock based economy through innovative science & technology development and entrepreneurship promotion.

VISION

To demonstrate excellence in science; develop technology and solutions in animal biotechnology leading to eventual commercialization.

OBJECTIVES:

1. To undertake directed, basic and applied research towards technology and product innovation. Characterization of breeds and selective breeding to enhance productivity; develop technologies for multiplication of elite genotypes. Development of transgenic animals for producing molecules of pharmaceutical value. Enrichment of crop residues into high value products. Development of new generation vaccines, diagnostics and drugs.
2. To develop human resource across the value chain, primarily for translational research, industrial R&D; facilitate introduction of short term advanced training, new courses like MSc/ MVSc-PhD and Ph.D. degree with a focus on interdisciplinary science, innovation and the science of manufacturing.
3. To contribute to national policy formulation related to animal biotechnology, animal bio-safety issues and ethical issues.
4. To promote intellectual property protection, business development, technology transfer, and academia-industry partnerships.
5. To develop collaborative programmes with national and international partners with focus on translational research and product development.
6. To provide incubation facilities for entrepreneurs/ startup companies.
7. To create (i) extramural centers with emphasis on product innovation and translational research (ii) 'not for profit' companies; and (iii) facilitate the creation of 'for profit' companies

Human resource & Scientific Achievement

Major Heads	Upto 31-3-2020	During 20-21	Total upto 31-3-2021
Publications	85	33	118
Patents filed	06	07	13
Awards	19	03	22
Extra Mural grants received	48	09	57
Conferences and Workshop organised	16	03	19
Ph.D students	44	08	52
Scientific / Technical / Admin Staff	38	00	38

From The Desk of Director

From the Desk of Director

It gives me a great pleasure to present the annual report of the National Institute of Animal Biotechnology (NIAB) for the year 2020-21 which is established under the Department of Biotechnology, Ministry of Science and Technology, Government of India to work towards biotechnological issues and growth of animal husbandry sector using modern biotechnological tools.

NIAB aims to harness novel and emerging biotechnologies and take up research in the cutting edge areas for improving animal health and productivity. The Institute's focus of research is on Animal Genetics and Genomics, Transgenic Technology, Reproductive Biotechnology, Animal Diseases, Bioinformatics and Nutrient Enrichment. The institute focuses on basic research which would lead to the development of novel vaccines, diagnostics and improved therapeutic molecules for farm animals.

During the period of report, Institute has progressed well in terms of publications, patents and also development of various technologies which are under process for technology transfer to prospective industries. The Institute scientists published 33 papers, filed 7 patents and obtained many extra mural grants from different funding agencies. The scientists have developed a bent of mind to contribute to product development for the society as well as to excel in basic research.

Scientists are working on various projects in the area of infectious diseases like brucellosis, leptospirosis, tuberculosis, staphylococcosis. Newcastle disease, theileriosis and toxoplasmosis to understand host-pathogen interactions, virulence mechanisms, and molecular pathogenesis. The outcomes of the livestock genomics work is also very promising. The details of major projects undertaken are given below:

(i) Genomic selection for conservation of indigenous cattle breeds.

(ii) Production of therapeutic protein (human Interferon-gamma and Bone Morphogenetic Protein-2) in milk

(iii) Attempt to prolong ovarian life by limiting the death of primordial follicles

(iv) Germ Cell Transplantation in farm animals

(v) Aptamer for detection of progesterone in milk

(vi) Aptamer based cheaper tools to detect antibiotics in milk which helps in tackling antimicrobial resistance

(vii) Potential anti-biofilm agents for bovine mastitis-associated Staphylococcus aureus

(viii) Drivers of antimicrobial resistance in poultry in India

(ix) Development of novel vaccines and diagnostic assays for animal and human brucellosis

(x) Development of leptospirosis vaccine and novel veterinary adjuvant

(xi) Host pathogen interaction studies on animal and avian viruses

(xii) Host pathogen interaction studies on animal parasites

(xiii) Study of virulence, antimicrobial Resistance and host pathogenesis in intracellular parasites

(xiv) Seroprevalence and risk factors of Toxoplasma gondii infection among veterinary personnel and abattoir workers

(xv) Tuberculosis and other zoonotic diseases of livestock: molecular pathogenesis and intervention strategies

(xvi) Livestock genomics

(xvii) Quick diagnostics/therapeutics using smart nanomaterial for animal welfare

(xviii) Stem cell and allied therapies in livestock

Institute is gaining the strength of Ph.D students with number reaching to 52 students during the reporting period. The Institute conferred the first Ph.D degree to Dr. Padmaja Jakka; which is a milestone to encourage others fellow students.

During this pandemic time, Institute continued its research and other allied activities. Some of the notable events organized during the reporting period are listed below:

1. 1st Dr. Lalji Singh Memorial Lecture was delivered by Prof. K. VijayRaghavan, Principal Scientific Adviser to the Government of India on 17th February, 2021.
2. Prof. Padmanabhan Balaram, Former Director, IISc, Bangalore delivered Second Foundation Day lecture of NIAB on 11th August, 2020 through Video Conferencing.
3. Prof. N.K. Ganguly, Former Director-General-ICMR visited NIAB and inaugurated DBT-NIAB Center for One Health on 3rd November, 2020 which is World one health day .

Several events like Hindi pakhwada, shramdaan, swachata daud etc. were organized, where staff and students took active participation. We have initiated an important program of uplifting farmer's income by supporting and training them for scientific rearing of goats at Yadgir (aspirational district of Karnataka). Our program of teaching at school and college level students through bridge program is also being continued.

Finally, I sincerely acknowledge the support, encouragement and advice received from the distinguished members of the NIAB Society, Governing Body, Scientific Advisory Committee, Finance Committee and Building Committee, as well as the support of the Department of Biotechnology, in furthering the activities of NIAB. The support of local institutions like CDFD, CCMB, University of Hyderabad, P. V. Narasimha Rao Telangana Veterinary University and others is greatly appreciated. I also acknowledge the contributions of the cohesive team of highly dedicated scientific, technical and administrative staff of NIAB for their untiring efforts in meeting our objectives.

With continued support and encouragement from our well-wishers, we are committed to strengthen the Institute by excelling in all research and development activities.

Dr. Subeer S Majumdar

Research Projects
A. Animal Genomics & Reproduction

Title: Livestock Genomics for Cattle Improvement and Transgenic Farmed Animals

Subeer S. Majumdar

Research Group: **Dr. Subeer S. Majumdar**

PhD students:
Neelam Topno
Abhishek Das
Goutam Ulgekar
Venkateswaran Ganeshan
Meenakshi Mansukhani
(Since August 2020)

Project Personnel:
Amit Pal
Satarupa Dutta
Dhirendra Suthar
Anindita Ghosal (upto June 2020)
Arpita Mahapatra (Dec 2018 to June 2019)
Vaishnavi (Since Jan 2020)

Collaborators:

Dr. S. Khadse	BIAF, Pune
Dr. Nirmalya Ganguli	NIAB, Hyderabad
Dr. Kadirvel Govindsamy	ICAR Centre for NEH Region, Shillong
Dr. John Hicky	Roslin Institute, UK
Benjamin Rosen	USDA, USA
Curt Van Tassel	USDA, USA

The theme of Research:

Conservation of indigenous cattle breed and determination of purity of the breed. Transgenesis in farm animals for producing therapeutic protein in milk and avenues for generating more female calves through manipulation of spermatogenesis.

Objective

1. Genotyping through the development of HD SNP chip based on NGS data obtained from indigenous cattle breed for determination of purity of breed and conservation of germ pool of native breed.
2. To develop easier methods for farm animal transgenesis and non-transgenic animal bioreactor. To use these technologies for increased milk yield and production of therapeutic proteins in the milk.
3. To generate males, favoring fertilization with X-bearing sperm, to produce more female offspring.

1. Genomic selection for conservation of indigenous cattle breeds and enhancing milk yield.

This project is using a genomics based approach for identification of pure animals and estimation of genetic mixing in graded cattle. For achieving these objectives, we have used Next Generation Sequencing (NGS) to sequence five indigenous cattle breeds namely, Gir, Sahiwal, Tharparkar, Red Sindhi and Kankrej and also 2 samples each of rest of the 38 breed of cattle across the country. Sequencing data generated will be used for extraction of SNPs and development of a HD chip. This HD chip will be used for genotyping all the 43 registered indigenous cattle breeds. Genetic

makeup and SNPs of all the breeds shall be revealed by genotyping representative individuals from each breed. We will try to identify genomic signature of each breed and develop a genetic tool and database for evaluating the level of genetic mixing in an individual. We are also sequencing one sample from each of these five breeds of cattle using 10X Genomics Chromium library.

2. Production of Therapeutic Protein (human Interferon-gama and Bone Morphogenetic Protein 2) in milk:

This work is done in collaboration with Dr. Nirmalya Ganguli of NIAB. We are trying to standardize easy testicular transgenesis in farm animals and direct transfection of mammay epithelial cells in vivo. We collected sperm samples from previously electroporated goats and analyzed them to detect transgene integration in the sperm DNA. Genomic DNA was isolated from the sperm and was checked on agarose gel for integrity. We performed Droplet digital PCR of the DNA isolated form the sperm samples. We detected integration of the transgene in the sperm ejaculate with copy number varying in different ejaculate collected at diferent time interval, post epectroporation.

We have initiated the work to standardise various gene delivery methods for direct transfection of mammary epithelial cells, *in vivo*. We have started Virosome mediated direct transgene delivery in breast gland, *in vivo*. We have standardised the method of culture of Sendai virus in alantoic fluid of embryonated chicken eggs followed by preparation of virosome entrapping the gene of interest. The functional transgene construct was entrapped into reconstituted Sendai Viral envelope to generate an easy and efficient in-vivo gene delivery system. We have obtained initial success in the rabbit model with expression of exogenous perotein in the milk. We are planning further to scale up the process for invivo gene delivery in udder gland of goat. We have also initiated process for generating various nanoparticle for transfecting mammary epithelial cells in vivo. Among all non-viral transfecting agents chitosan (CS) and polyethyleneimine (PEI) is widely used for their ability to transfect mammalian cells. To increase the efficiency and specificity of the PEI mediated delivery, we explored conjugating various ligands with PEI which will increase the efficiency as well as the cell specificity of the PEI. PEI has very high cationic charge density as every third atom in PEI is ionisable nitrogen which is attributed to its ability to overcome various gene delivery barriers. Although, native polyethylenimine of 25Kda (bPEI25) has shown greater transfection efficiency, as compared to other polymers, it still has limitations of transfection efficiency as well as the toxicity. We have tagged hexanoic group to branched polyethylenimine of 25Kda (FA6-bPEI25) using anhydride chemistry to enhance its capability as a transfection agent. We have already characterized the FA6-bPEI25 using Fourier transform infrared spectroscopy (FT-IR) and other biophysical/chemical methods. We conjugated pCMV-hIFNγ-IRES2-EGFP plasmid construct as transgene with both transfecting agent (bPEI25 and FA6-bPEI52), in which human interferon-γ and EGFP are expressed separately under cyto megalovirus immediate early promoter (CMV). Based on Fluorescent imaging, Flourimetry and ELISA, we have determined that FA6-bPEI25 has high transfection efficiency in both cell lines (MCF7 and HC11) and primary cells (Goat mammary epithelial cells) as compared to native polyethylenimine.

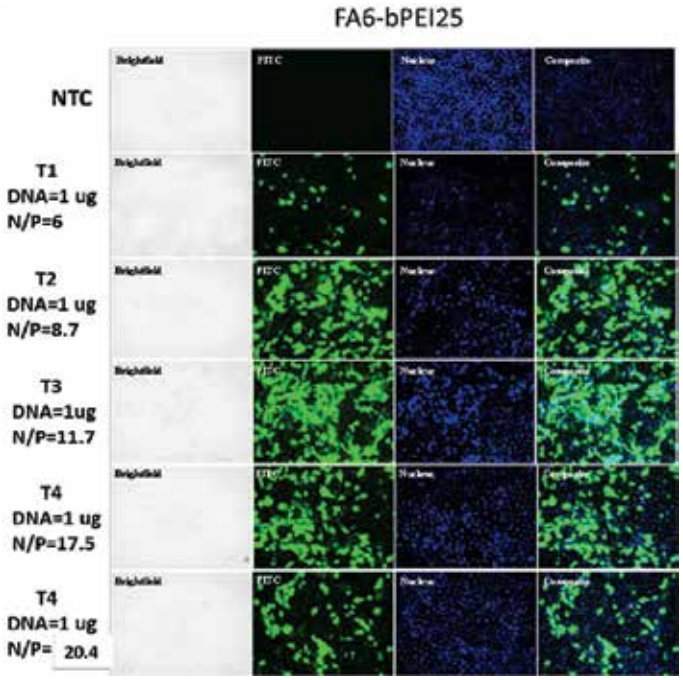


Figure 1. *Transfection in Goat mammary epithelial cells observed after 24 hours of transfection by using FA6-bPEI25 and plasmid DNA encoding human Interferon gamma and EGFP under control of CMV promoter. The N/P ratios used were 6, 8.7, 11.7, 17.5 and 20.4, where maximum transfection efficiency was observed at N/P ratio of 11.7 using Fluorescent imager (Biorad, USA).*

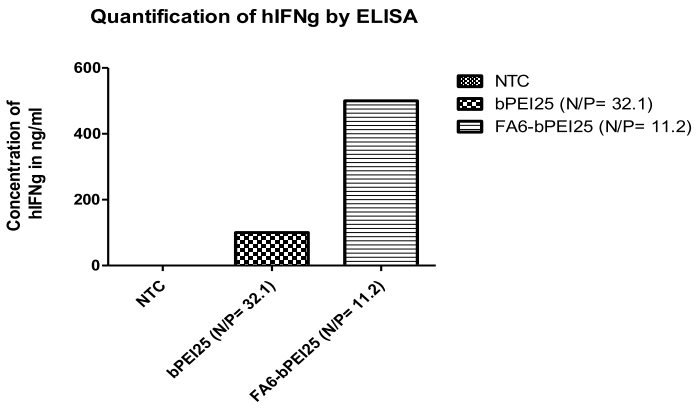


Figure 2*. Quantification of human interferon gamma produced by Goat mammary epithelial cells transfected using bPEI25 and FA6-bPEI25 by plasmid having gene cassette encoding human interferon gamma under CMV promoter. The N/P ratios for bPEI25 and FA6-bPEI25 used were 32.1 and 11.7 respectively at which highest transfection efficiency could be achieved.*

We also detected presence of cell surface asialo glycoprotein receptor (ASGPR) on the mammary luminal epithelial cells in mice and goat. We obtained mammary glands of mice at various developmental stages along with liver (n=3) which served as a positive control, followed by isolation of RNA and quantitative Real Time PCR analysis (QRT-PCR). In QRT-PCR analysis we found that ASGR1 is expressed in the mammary gland of mice and was upregulated in the lactating phase as compared to the other pubertal, adult and pregnant phases (Fig. 1a). We also performed immuno histochemistry of the mice mammary gland to detect expression of ASGPR within it. Expression of ASGPR was visualised in the mammary epithelial cells of mice mammary gland.

It has been shown that Gal or GalNAc conjugated poly-ethylene-imine (PEI) can be used for hepatocyte specific gene delivery utilising the specific interaction of ASGPR and Galactose moiety. We used 25kd branched PEI (bPEI) and conjugated it with direct Galactose moiety (bPEI-Gal). Further we conjugated it with transgene (pCMV-hIFNγ-IRES2-EGFP) and named as bPEI-Gal-Tg. We used Tg conjugated bPEI (bPEI-Tg) as control to assess ASGPR mediated transfection by bPEI-Gal-Tg in the mammary epithelial cells. We obtained relatively high level of expression in bPEI-Gal-Tg transfected cells as compared to bPEI-Tg transfected cells.

We have initiated work of expressing Bone Morphogenetic Protein2 (BMP2) in milk. For this work we procurd cDNA of BMP2 signal peptide which is of ~1200bp in length. This was cloned under CMV promoter initially to check its functionality in cell lines. BMP2 has its endogenous signal peptide which helps it to be secreted. For efficient secretion of BMP2 in milk, we fused signal peptide of beta casein of buffalo origin with it along with its native varient. We validated the expression of BMP2 in mammary epithelial cells. We found expression of hBMP2 transcript in the transfected GMECs. We also detected the expression of BMP2 in the cell lysate and the spent media of GMECs through Enzyme Linked Immunosorbent Assay (ELISA).

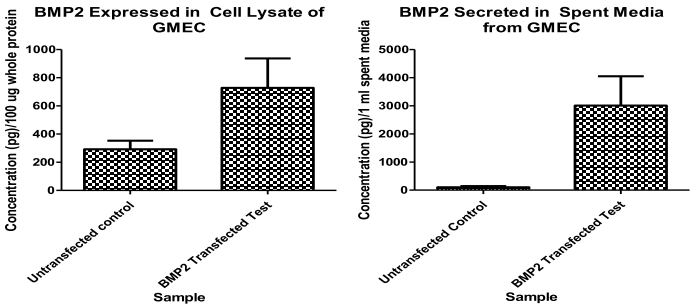


Fig. 3: *Detection of hIFNγ expression in the cells transfected with bPEI-Gal-Tg as compared to bPEI-Tg and Lipofectamine-Tg transfected cells. Increased expression of hIFNγ was detected in the bPEI-Gal-Tg transfected cells as compared to bPEI-Tg and Lipofectamine-Tg transfected cells (N=3, P<0.05).*

In addition to this, we have initiated pig transgenesis work in collaboration with ICAR institute (ICAR Research Complex for NEH Region, Barapani) in North East.

3. To generate males, producing only X bearing sperm:

Dr. Satyapal Arya was working in collaboration for this. Since there is a need to develop new methods to produce sexed semen, this project is focusing on use of multipronged molecular biology-based approach to manipulate spermatogenesis for producing sexed semen naturally from a male animal. For this purpose, we are employing various strategies to kill or slow down Y chromosome containing sperm, so that resultant semen produced have only X chromosome bearing sperm. Such male may produce predominantly female offspring after natural mating. In this project, we have already cloned Apoptosis Inducing Factor (AIF) and Nuclear Apoptosis Inducing Factor (NAIF) genes for

inducing cell death in Y chromosome containing sperm and designed shRNA for a sperm motility gene MLL5 for slowing down the Y sperm. We have also cloned truncated bid (t BID) for inducing apoptosis in Y bearing sperm cells. We have isolated and cloned post meiotic promoters Proacrosin, ELP and SP10 from mice genome for achieving post meiotic expression of these genes. We are now validating the postmeiotic expression of these promoters. We are using signal elements of Sperm Motility Kinase-1 (SMOK1) gene which is known to prevent the transfer of gene products through cytoplasmic bridges during spermatogenesis. We are in the process of standardizing the targeted gene integration using Crispr Cas-9 to target Y chromosome.

Publication

1. Roberts A, Chauhan N, Islam S, Mahari S, Gawri B, Gandham RK, **Majumdar SS**, Ghosh A, and Gandhi S (2020) Functionalized Graphene-Based Field-Effect Transistors for Detection of Japanese Encephalitis and Avian Influenza Virus. Scientific Reports 10: 1-12.
2. Sarkar, RK*., Sen Sharma, S*., Mandal, K., Wadhwa, N., Kunj, N., Gupta, A., Pal, R., Rai, U., **Majumdar, S.S.,** 2021. Homeobox transcription factor Meis1 is crucial to Sertoli cell mediated regulation of male fertility. Andrology,2, 689-699. doi: 10.1111/andr.12941 (*Equal Contribution)
3. Pradhan, B.S. , Bhattacharya, I. ,Sarkar, R, **Majumdar, S.S.**, 2020. Pubertal down-regulation of Tetraspanin 8 in testicular Sertoli cells is crucial for male fertility. Molecular Human Reproduction. Vol 26, 10, 760-772.

Lab Photo

Left to right: *Satarupa Dutta, Abhishek Das, Neelam Topno, Subeer S. Majumdar, Venkateswaran Ganeshan, Amit Pal, Goutam Ulgekar, Dhirendra Suthar.*

Titile : Preservation of ovarian reserve to enhance the livestock fertility.

H.B.D.Prasada Rao

Research Group: Dr. H.B.D.Prasada Rao

PhD students

Rohit Beniwal (UGC – JRF)
Lavakumar (DBT – JRF)
Aradhana Mohanthy (CSIR – JRF)
Anjali Kumari (DBT - JRF)

Project Personnel:

Dr. Ajay Singh-RA (Since October 2018)
Dr. Bhawna Kushwaha-RA (Since November 2019)

Collaborators:

Dr. Attila Tooth	Dresden University Germeny

Theme and Objectives of Research

Focus of our laboratory at NIAB is to understand (a) the quality control pathways in oocyte and spermatocyte development to extend livestock fertility, (b) molecular mechanisms of meiotic processes, such as homologous recombination and synapses in livestock to increase the fecundity and to prevent birth defects, (c) causes and treatments of ovarian disorders in livestock.

Work Reported in 2019-2020

(i) An attempt to prolong ovarian life by limiting the death of primordial follicles

Reproductive life is reduced as the age of mothers continues to rise. At present, the optimal fertility of cattle reaches by the age of 3 to 5 and decreases to 50% by the age of 7.5 and most females reach the infertility threshold by the age of 8yrs. Lack of ovarian function leads to infertility and a huge loss to farmers and dairy industry. At present one of the serious problems is the rehabilitation of aged cattle. This program became the biggest problem to the farmer and government. Thus increase in the fertility lifespan of the cattle would be a great help to the Indian farmers.

Despite the importance and huge loss at primordial follicle stage, how the primordial follicle atresia is regulated is largely unknown. In rodent's, loss of fetal oocytes has been shown to occur via apoptosios. However, the molecular mechanisms behind oocyte or primordial follicle loss are largely not known. In this proposal, we are trying to prolong the ovarian life by finding novel primordial follicles apoptosis checkpoint proteins which would be modulated to prevent the death of primordial follicles.

In our previous report we have concluded that P63 dependent oocyte quality checkpoint mechanisms are conserved in the goat. We found that in early fetal and adult ovaries very few number of oocytes shows the positive signal for P63 whereas around birth 90% of oocytes shows positive signal for P63 indicates that the majority of the oocytes undergo death after birth but not same in adults. In addition we have shown the preliminary results of PRL02 as a potential natural compound that can be used to increase the follicle life or number. These results indicate that the oocyte apoptosis in ovaries particularly primordial and primary oocytes depends on the P63 check point pathway and the majority of the oocytes dies around

birth in goat. Thus targeting the early stage that is primordial and primary follicles would be a very good option to increase the ovarian reserves for longer time.

Progress of work during the current reporting year (2020-2021)

(i) Attempt to prolong ovarian life by limiting the death of primordial follicles

During the current reporting period, we have screened other natural and synthetic compounds that have an inhibitory effect on P63. Eight synthetic compounds were screened for P63 inhibition using computational tools. Out of them, four compounds were injected, shown in the regimen. Compounds were individually injected intraperitoneally into the mouse at 8 days after birth and sacrificed on the 15th day to check the follicle survival. After that, the ovaries were fixed and stained with germ cell marker MVH. Surprisingly, PRL05 injected mice shown increased follicle reserves by 50% compared to control. Further, to know the dose - dependent effect of PRL005, we injected PRL05 every third day. We found that every day injected and every 3rd day injected females show a similar phenotype with follicle survival. These results indicate that PRL05 is a potent synthetic drug for the protection of the ovarian reserve. To check whether there are any other biochemical changes upon treatment with P63 inhibitors. We have stained the untreated and treated ovary sections with P63 and MVH. Surprisingly we could not see any difference in the P63 levels.

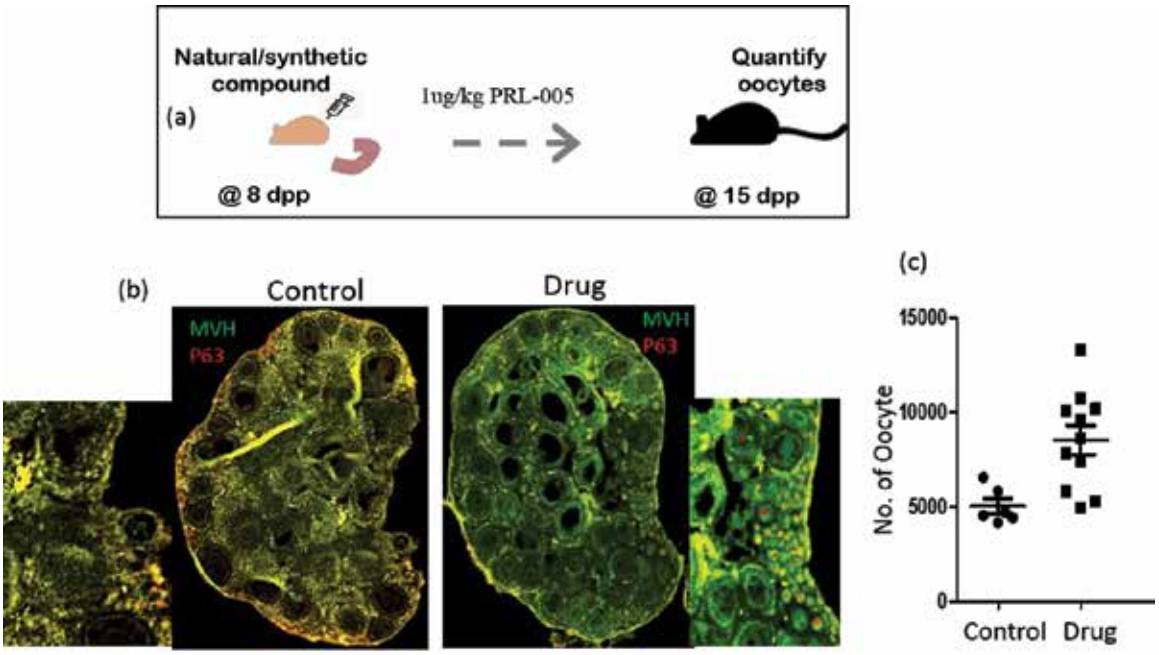


Fig1: *PRL05 protects the oocytes from apoptosis. (a) Schematic representation of the experiment (b) Control and treated ovaries stained with P63 in red and MVH in green (c) Quantification of oocytes in control and treatment. White arrow shows the enlarged follicle reserves*

Previously we have shown that after birth, primordial follicles begin to constitutively express an alternative p53-family member, P63α (the trans-activating isoform of p63), which renders them exquisitely sensitive to damage-induced apoptosis. Following sensing of DNA damage by ATR, the effector kinase Chk2 gets activated, and phosphorylates downstream targets including TAp63α, facilitating its tetramerization, which in turn activates DNA binding. Transcriptional activation by TAp63α may promote DNA repair or induce program cell death. Therefore to check the P63 phosphorylation status, treated and untreated ovarian mouse sections were immune stained for phosphorylated P63 using P63 phosphor antibody. Surprisingly treatment with PRL05 inhibited the phosphorylated P63 but not the nuclear P63. These results indicate the synthetic compound exclusively inhibits the phosphorylated P63, possibly by inhibiting the tetramerization.

Further to know the effect on damaged oocyte protection, 5dpp ovaries were cultured in-vitro, and exogenous DNA damage agent, cisplatin was introduced in the culture with and without PRL05.

Interestingly, without PRL05 ovary lost most of the follicles with extensive DNA damage. Whereas, with PRL05 most of the follicles survived from death in the ovary indicates the PRL05 dependent survival of damaged follicles.

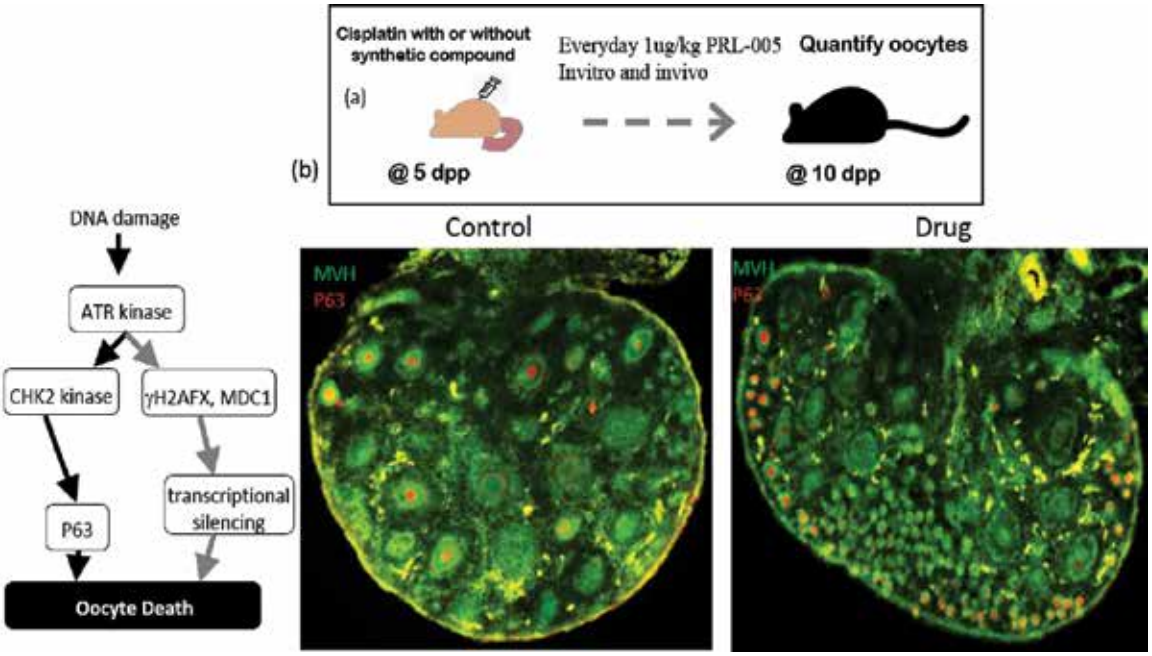


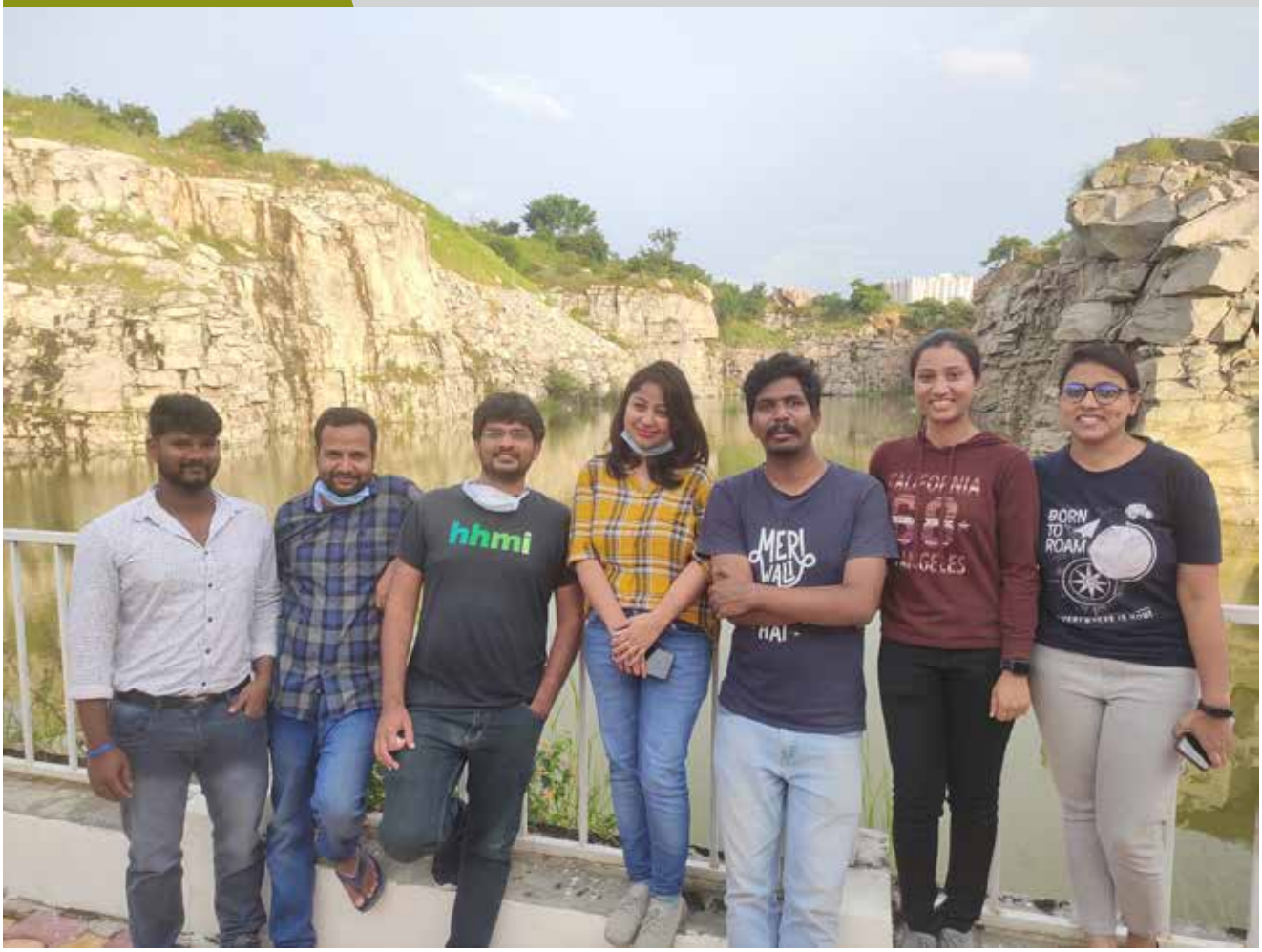
Fig2: *In-vitro goat ovarian culture system using goat ovaries. (a) Schematic representation of the experiment (b) Control and treated ovaries stained with P63 in red and MVH in green*

Further, to translate this work to the field level, it is necessary to check whether these inhibitors are working in livestock species or not. However, it is not so easy to check these drugs in live animals and to monitor their ovarian reserves. Therefore, we have standardized the protocol for an in-vitro ovarian culture system using goat ovaries. To know whether this method works for screening or not, we have introduced one of the synthetic drugs which plays a role in the regulation of P63. After 76hrs of the culture, the control ovary lost most of the primary and primordial follicles. Whereas the addition of the drug protected all follicles. Using this rapid in-vitro ovarian culture method we would like to screen all the potent ovarian reserve protection molecules like PRL002, 005.

Publications:

Anastasiia Bondarieva, Kavya Raveendran, Vladyslav Telychko, H. B. D. Prasada Rao, Ramya Ravindranathan, Chrysoula Zorzompokou, Friederike Finsterbusch, Ihsan Dereli, Frantzeskos Papanikos, Daniel Tränkner, Alexander Schleiffer, Ji-Feng Fei, Anna Klimova, Masaru Ito, Dhananjaya S. Kulkarni, Ingo Roeder, Neil Hunter & Attila Tóth; Proline-rich protein PRR19 functions with cyclin-like CNTD1 to promote meiotic crossing over in mouse. Nature communications, June 11, 3101 (2020)

Lab Photo



Left to right: *Mr. Lava Kumar, Dr. Ajay Singh, Dr. Prasada Rao, Dr.Bhawna Khuswa, Mr. Rohit Beniwal, Ms. Anjali Kumari and Ms. Aradhana Mohanty,*

Title: Biopharming Using Farmed Animals and Avenues for Obtaining Sperm with Elite Trait

Nirmalya Ganguli

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Srimoyee Koner (Since August 2020)

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Anandhi R.
Jagreeti Singh (since Feb 2021)
Divya Singh (since Mar 2021)
Subhra Dutta (since Jan 2021)
Aprajita (upto June 2020)

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Dr. Pankaj Suman	NIAB, Hyderabad
Dr. Syed Faisal	NIAB, Hyderabad
Dr. Neelesh Sharma	SKUAST, Jammu
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Theme of Research:

The theme of research of my laboratory is establishing new, more accessible techniques for the generation of transgenic farm animals or animals with targeted somatic genomic modification of mammary epithelial cells by developing new methods for direct transfection of mammary gland for using them as a bioreactor for generation of biotherapeutics and nutraceuticals. Germ cell/Stem Cell transplantation studies to explore avenues for the production of sperm with elite characteristics. Generation of transgenic mice to develop mice model of farm animal diseases and a system for the study of functional genomics of farm animals.

Objectives:

1. To establish new, more accessible techniques for making transgenic farm animals. To develop new methods for direct transfection of mammary gland. To use these technologies for generating animal bioreactors expressing biotherapeutics in their milk for increasing affordability.
2. To establish germ cell/stem cell transplantation in farm animals to increase production of elite bull sperm.
3. Generation of transgenic mice to develop mice model of farm animal diseases as well as to study farm animal functional genomics.
4. Production of Therapeutic Protein in Milk (bovine FSH and LH, Human Factor8 and Tissue Plasminogen Activator (TPA):

We carry on this work in collaboration with Dr. Subeer S. Majumdar's LAB at NIAB. We are taking a multidimentional approach to target udder glands of farm animals to convert them as a bioreactor. For efficient production of these therapeutic proteins in the milk, we have to develop 1) an Efficient milk specific expression vector, 2) an Efficient method for transgenesis in farm animals, alternatively 3) a Method for direct transfection of mammary epithelial cells in the udder gland.

We have isolated β-Lactoglobulin promoter from the genome of the Indian river buffalo. We are at present working to functionally characterizing this promoter. We also hypothesized that along with a strong promoter, an efficient signal peptide is also required to secrete the expressed protein out of the cell. We are working to check the strength of signal peptides of various milk protein genes for the efficient secretion

of exogenous protein in milk. For this, we have chosen signal peptide of 5 significant milk protein genes (βCasein, αS1-casein, αS2-casein, β-Lactoglobulin, and αLactalbumin). We have generated a fusion protein construct by cloning signal peptides of these milk protein genes with cDNA of EGFP and human interferon-γ. We are validating the strength of these signal peptides by quantifying the secreted form of these proteins by ELISA. Primarily we are working towards expressing bovine FSH and LH in the animal bioreactor. Total RNA was isolated from bovine pituitary, followed by cDNA synthesis. We have cloned cDNA of α and β subunit of bovine FSH and LH in mammalian expression vector for its characterization. For parallel expression of both the α and β subunit of bovine FSH and LH in a multi-cystronic expression vector, we have adopted and standardized synthetic biology approach based on "Extensible Mammalian Modular Assembly" (EMMA) cloning technology. We performed functional characterization of this construct in-vitro and found expression of α and β subunit of bovine FSH and LH validated by RT-PCR, immunocytochemistry analysis (**Figure. 1**).

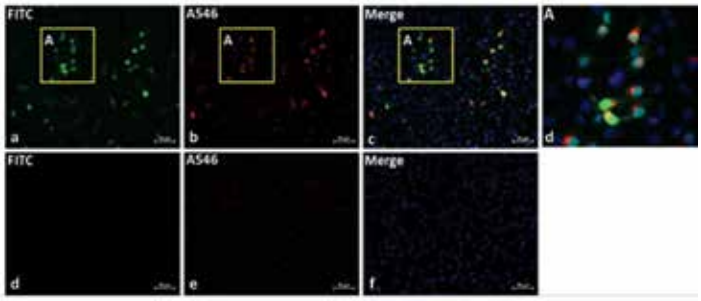

Figure. 1: *Figure showing Immunocytochemical analysis of transfected HEK cells with plasmid pCMV-FSHa-IRES2-EGFP. The cells were stained with primary antibody Anti-FSH and then counterstained with Alexaflour 546 secondary antibody. The upper panel represents the transfected HEK cells, whereas the lower panel represents untransfected HEK cells control. Image (a), (d) shows HEK cells with endogenous EGFP expression , (b)(e) represents the expression of FSHa when stained with primary and secondary antibody, (c) and (f) represents merged image of transfected and untransfected HEK cells when counterstained with nuclear stain HOESCHT and (d)represents the enlarged image of Box area A showing expression of FSH α.*

We are also working to express human Tissue Plasminogen Activator (hTPA) in mammary epithelial cells of goats. The cDNA of human TPA was procured and validated by restriction digestion followed by cloning under CMV promoter and mammary gland specific buffalo β-Lactoglobulin promoter. We are validating the expression of these constructs in in-vitro as well as in-vivo. The ELISA analysis of the cell extract and spent media of cells transfected with hTPA bearing construct detected the expression of hTPA. We found ~17.86µg of hTPA/mg of total cellular protein in cell extract and 4.2µg of hTPA/ml of complete protein in spent media (Figure. 2).

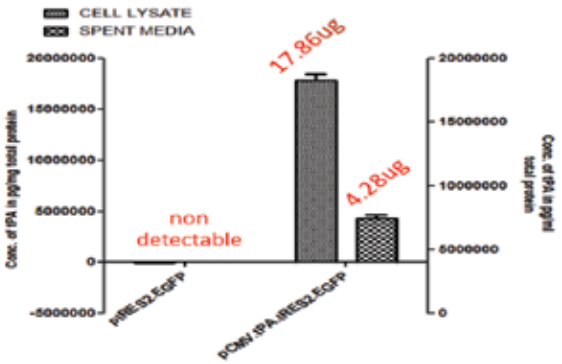

Figure. 2: *Graph showing detection of expression of therapeutic protein hTPA in the cultured goat mammary epithelial cells and in spent media by ELISA. The cells were transfected with mammalian expression vector bearing cDNA of hTPA. The expression was detected in the transfected cells only as compared to untransfected cells. A substantial amount of secretion of hTPA was also observed in the spent media.*

We have also started standardizing the testicular transgenesis in rabbits. It has been proved that rabbits suit better as a bioreactor for producing biotherapeutics in milk. We performed testicular ex-vivo electroporation of rabbit testis followed by in-vitro culture of the tubule of the electroporated testis. We observed the expression of EGFP in the cultured tubule in various electroporation parameters when the transgene cassette contained egfp as a marker gene. We also performed external electroporation of rabbit testis for transgene delivery in the germ cells, followed by generation of transgenic sperm. We performed immuno histochemical analysis of the electroporated testis, which revealed expression EGFP present in the germ cells of the electroporated testis. Mating of such electroporated male rabbits with wild-type females generated pups. PCR, DD-PCR, Immunohistochemistry, and western blot analysis of tissue samples obtained from these are underway to determine the presence of transgene and its expression.

We are working to develop an easy and robust method of farm animal transgenesis. We are trying to standardize easy testicular transgenesis in farm animals, specifically in goats and pigs, by transfecting the goat and pig germ cells through electroporation. In the purview of the difficulties in the transfecting maximum number of germ cells in the testis of large animals that eventually result in poor transgene bearing

sperm in the ejaculate, we are designing and validating the transgene construct, which will help in sorting out of transgene bearing sperms. We have fused the EGFP with a signal peptide and transmembrane domain of the sperm surface protein Basigin (BSG-EGFP) and cloned it under the CMV promoter. Such fusion protein will help in anchoring EGFP in the surface of the sperm tail membrane, facilitating the sorting out of such sperm from the ejaculate. These positive sperm may then be used for an assisted reproductive technique for the generation of transgenic pups. We have designed the construct and performed functional characterization of this construct invitro in HEK cells. We performed in-vivo electroporation of this construct in mice testis. Sperm isolated from such mice were analysed by immunocytochemistry analysis which revealed EGFP expression on the surface of the tail membrane (**Figure. 3**). We are working to sort these EGFP positive sperm for their further use.

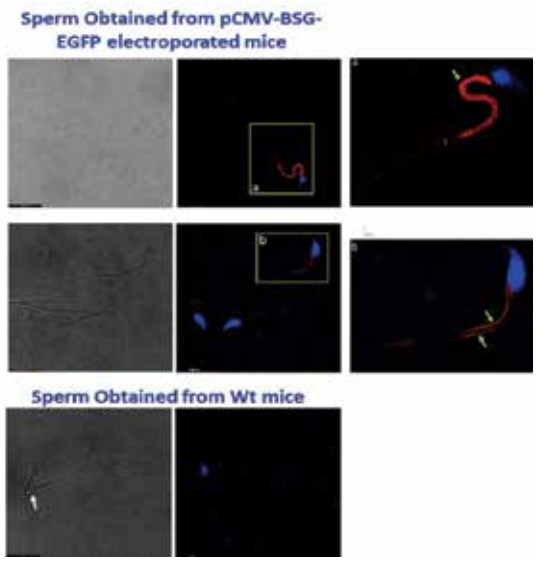

Figure. 3: *figure showing immunocytochemical analysis of the sperm samples stained with primary antibody Anti-GFP followed with Alexa Flour 546 as a secondary antibody when observed under a confocal microscope. The upper panel and middle panel represent the sperm samples isolated from the epididymis of mice electroporated with pCMV-sigBSGEGFP. The lower panel represents the sperm samples isolated from the epididymis of wild-type mice. (a) represents the expression of EGFP in the midpiece of spermatozoa. (b) represents the EGFP expression in the midpiece and tail region when observed in a different optical plane which showed the expression of EGFP is present only in the surface region of spermatozoa.*

For direct transfection of udder glands, we have established pilot-scale culture of Sendai Virus in allantoic fluid of embryonated chicken eggs followed by the development of Virosome from it. We have also initiated work of developing various nanoparticles for transfecting the mammary epithelial cells in-vivo. We have generated chitosan and PEI nanoparticles conjugated with DNA to test their efficacy for transfecting the mammary epithelial cells. We have developed a transfection method using nanoparticles of PEI of molecular weight 25kDa tagged with medium-chain fatty acid by anhydride chemistry. Robust transfection of primary mammary epithelial cells and many other cell types, in-vitro, was obtained using this nanoparticle.

5. Germ Cell Transplantation in Farm Animals:

We are establishing the culture of germ cells from goat/buffalo and an easy method of evacuation of testis from germ cells in large animals without nonspecific cytotoxic effect. There are methods available for evacuation of the testis, but this often creates immune susceptibility in animals leading to deaths sometimes, therefore, generate restrictions for use in farm animals. The development of a safe method for germ cell depletion in farm animals is urgently needed to extrapolate germ cell transplantation in farm animals with full potential. We have successfully established culture of mice testicular stem cells/germ cells on monolayer of mice embryonic fibroblast (MEF). We obtained colonies of stem cells confirmed by immuno cyto chemistry analysis of various germ cell-specific markers. We have also established isolation and culture of spermatogonial stem cells/germ cells from goat testis representing characteristic grape-like morphology of the stem cells colony. We are also attempting to isolate and culture the germ cells from pig testis. We recently obtained a grant in which we aim to generate goat sperm with a knock-down/knock-out myostatin gene/gene locus. It was previously shown that Mstn knock-out/knock-down transgenic animals develop more muscle mass which is exploited for increasing meat production. MSTN is a known adipogenesis stimulator also, and animals with Mstn deficiency have intensified fatty acid oxidation followed by the brown adipose (good fat) formation in place of white adipose (lousy fat) tissue. Hence this is proved to be a potent target for the production of increased muscle mass i.e., meat, with reduced fat content in meat portion, i.e., Lean Meat. We are working to generate multiple shRNA (targeted for mstn mRNA) expressing construct for complete disruption of Mstn mRNA by shRNA mediated knock-down specifically in muscle cells. Alternatively, we are working for a complete knock-out of the Mstn gene locus using the CRISPR/Cas9 system. In this direction, we have developed a single CRISPR/Cas9 expression vector to get a complete knock-out of the Mstn gene using up to 7 different guide RNAs in one go. In-vitro experiments suggest a satisfactory level of knock-out of mstn locus using this construct (Figure. 4).

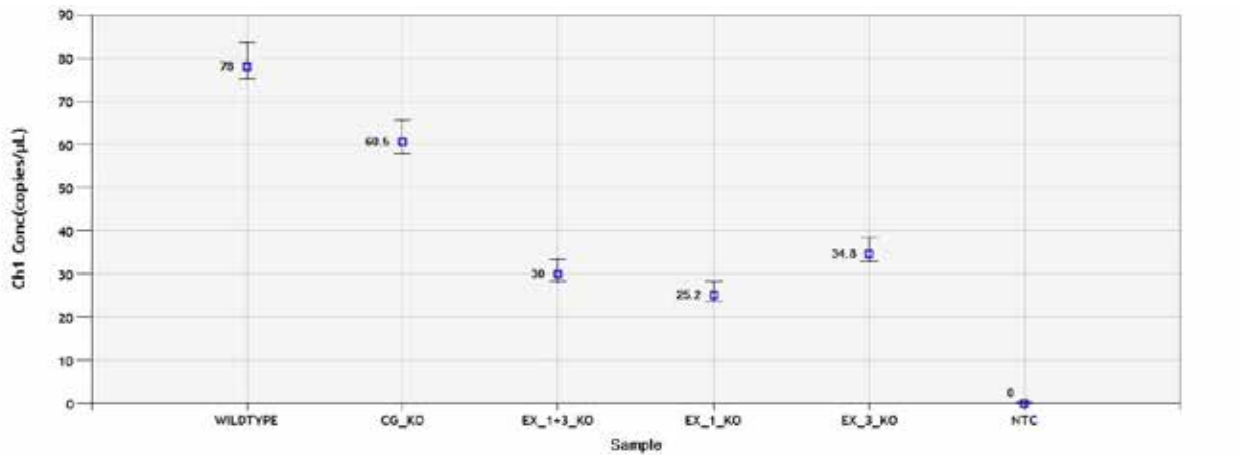

Figure. 4: *Image showing Droplet Digital PCR analysis for detection of copy number in cultured primary epithelial cells of goat transfected with various multiplex CRISPR-Cas based construct to knock-out endogenous mstn gene locus in Indian osmanabadi goat. Wildtype: denotes mstn wildtype allele. CG_KO: denotes deletion of complete genomic region of the mstn allele. EX_1+3_KO: indicates deletion of Exon1 and 3 of the mstn allele. EX_1_KO: indicates deletion of Exon1 of the mstn allele. EX_3_KO: denotes deletion of Exon3 of the mstn allele. NTC: indicates no template control.*

We will use these constructs (shRNA and CRISPR-Cas9 mediated) to generate engineered/transgenic goat germ cells in culture, followed by selection and transplantation of these germ cells into the evacuated testis of the goat.

6. Genetic Basis of Udder Gland Development:

We aim to decipher the biological pathways and mechanisms that govern mammary gland development and lactation which is commercially important. We wish to decode the roles of various genes, and regulatory RNAs (miRNA, long noncoding RNA) involve in mammary gland development and lactational output. Using multiple software available, we have established the pipeline for analyzing the data obtained from RNA seq. Using this pipeline, we have analyzed RNA seq data obtained from total RNA of the mammary gland of Xinong Saanen goat at three different time points, Virgine, Lactating, and Dry off, available in SRA database, NCBI. At present, we are validating the primary targets obtained from this analysis through qRT PCR in the Indian Osmanabadi goat breed. We have also established isolation and culture of mammary epithelial cells from goat mammary gland obtained at the different developmental times. We will perform a high seq analysis of transcripts from the Indian Osmanabadi goat breed also. The information acquired from this analysis will be validated in the mice model to find genes, which may play a vital role in mammary gland development, maintaining milk volume or expression of various milk components (proteins, fats, etc.). We are also working on performing sequencing of total RNA from an Indian breed of goat.

Lab Photo

Left to right: *Dilpreet Kaur, Dewanshu Sharma, Nirmalya Ganguli, Ealisha Jain, Anandhi R.*

Title: Aptamer and antibody-based point-of-care diagnostics for better animal production and health

Pankaj Suman

Research Group: **Dr. Pankaj Suman**

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Ankita Das (Since, September 2020)

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Sherin Kaul
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Anil Babu Korada (Till April 2020)
Sai Muni Yasaswi K (Since March 2021)
Shradha Shetty (Since Feb 2021)
Surabhi Marothkar, Trainee (since Jan 2021)
Channaveera (since Jan 2021)

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Dr. Chandrashekhar Sharma,	IIT Hyderabad
Dr. Subeer S Majumdar,	NIAB Hyderabad
Dr. Nirmalya Ganguli,	NIAB Hyderabad
Dr. Syed M Faisal,	NIAB Hyderabad
Dr. Abhijit Deshmukh,	NIAB Hyderabad

Theme of Research

Our laboratory is working towards devising strategies to improve animal production and health through biomarker discovery and development of aptamer/ antibody based affordable, field applicable, point-of-care diagnostics. In addition, we have also initiated working on improving the digestibility of roughages through manipulation of enzyme or enzymatic pathways of ruminal bacteria and fungi.

Aptamer based cheaper tool to detect antibiotics in milk which helps in tackling antimicrobial resistance

Good quality animal products like milk, meat etc are vital for maintaining proper public health. However, inadvertent use of antibiotics as therapeutic agents and growth promoters in the dairy industry has left consumers in a dilemma about its safety upon long term consumption. Oxytetracycline (OTC), known for its broad-spectrum activity against microbes is one of the extensively used antibiotics in veterinary practices. Antibiotics are widely used in the livestock industry for their anti-microbial properties against various infectious diseases for maintaining health of the animal. Consumption of milk having residual antibiotic in milk (post treatment) may lead to serious health complications like development of antimicrobial resistance, hepatotoxicity, teratogenicity, reduced growth and metabolism to name a few. At present, the kits used for antibiotic detection are being imported and have limited availability with cost more than Rs 100/- per test. To reduce the cost without compromising the sensitivity of detection, we have developed an aptamer (DNA) based lateral flow assay for detection of OTC in milk. Aptamers presents high affinity towards a wide variety of molecules like proteins, peptides, small molecules- antibiotics, hormones, bacterial cells etc. and are advantageous over antibodies by the mode selection, chemical synthesis, cost effectiveness and

negligible batch-to-batch variation. In the present study, we have designed a short (27 nt) aptamer by truncation of its non-essential

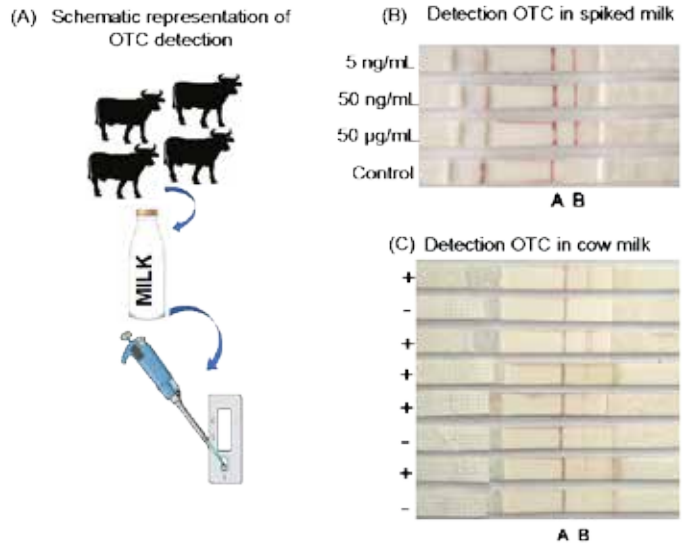


Fig 1. Validation of aptamer based lateral flow assay in milk. *Panel A shows the schematics for detection of OTC in milk while panels B and C shows the detection of OTC in spiked milk and real cow milk samples.*

regions to design the most cost-effective synthetic moiety retaining the specificity and sensitivity of original aptamer. The truncated aptamer has been characterized through several analytical methods and a lateral flow-based assay system has been validated for detection of OTC in milk. The kit has sensitivity to detect up to 5 ng/ml (permissible limit as per FSSAI; 100 ng/ml) of OTC in cow, buffalo and goat milk within 10 minutes. These tests can be performed at the doorstep of farmers or at the level of dairy organizations at milk collection center or by the consumers to safeguard both animals as well as human health. The cost of the test will be between Rs 25-50/test. Rapid screening of more and more milk samples at cheaper cost will help in removal of such milk that has antibiotic level higher than the permissible limit for human consumption. Our group is working towards development of multiplex colorimetric sensor to detect more than one antibiotic.

Cytotoxin antibody-based colorimetric sensor for field level differential detection of elapid envenomation among big four snakes

Death due to snake bite has gained global concern and now included as Neglected tropical disease. Polyvalent antivenom therapy in the management of snake envenomation cases is limited due to its poor venom neutralization capabilities as well as diagnostic ramifications manifested as untoward immunological reactions. The family specific or monovalent antivenom therapy is currently being debated to be more potent under such situations, provided ready availability of precise and rapid detection of the venom in envenomed individual(s). For precise molecular diagnosis of elapid venoms, we have developed a diagnostic kit based on lateral flow assay using monoclonal antibody (AB1) generated against recombinant cytotoxin-7 (7.7 kDa) protein of the elapid venom. The monoclonal antibody specifically detects the venoms of *Naja naja* ($p < 0.0001$) and *Bungarus caeruleus* ($p < 0.0001$), without showing any immunoreactivity against venoms of other Big 4 poisonous snakes. Naked eye analysis reveals that the kit can detect the presence of *N. naja* and *B. caeruleus* venoms up to 1 ng and 10 ng respectively, in spiked samples. The test can be performed on–site, in remote conditions, within 10 minutes without any technical assistance. This kit holds enormous potential in identification of elapid venom from the swab samples collected from the site of bite as per the existing medical guidelines.

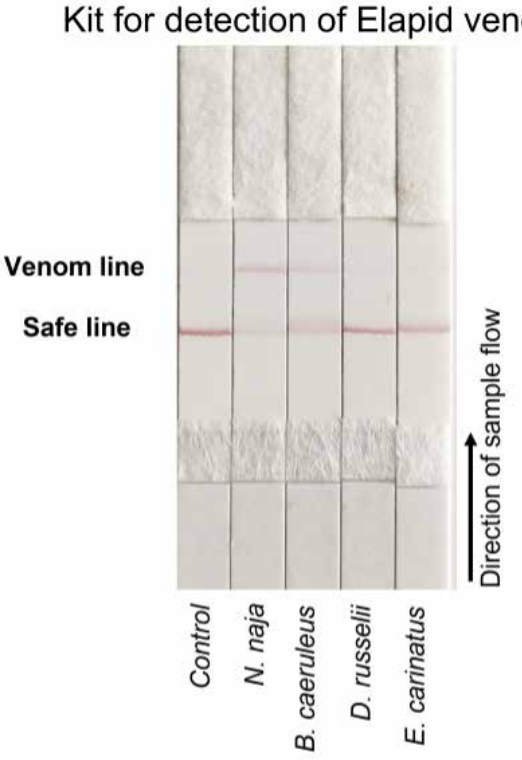
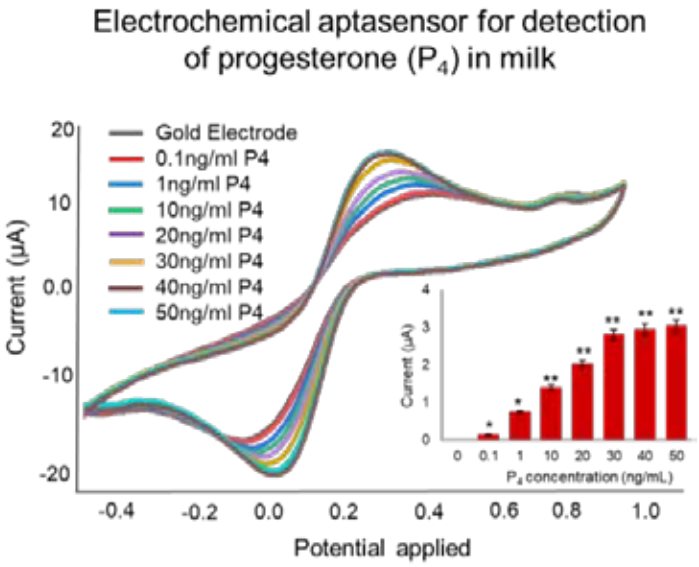


Fig 2. *Lateral flow assay to detect venoms of cobra and krait using monoclonal antibodies against cytotoxin protein.*

Aptamer for detection of progesterone in milk

Progesterone (P4) is a biomolecule which has both biological, environmental and public health significance. Precise monitoring of P4 in milk or serum is associated with prediction of time for breeding/ confirmation of pregnancy in farm animals like cow, buffalo, sheep and goat. It was aimed to select/ identify aptamers that can detect P4 in milk/serum/ environmental sample using standared biosensing approches. Through bead based SELEX process, we have identified two potential aptamers that specifically recognize P4 in buffer as well as in milk. Using one of the aptamers, we have shown the proof-of-concept to detect P4 in nanomolar range using electrochemical sensing as well as lateral flow assay. We are in the process of further optimization of the experimental conditions to validate the P4 detection kit in real clinical sample.



Patents (Filed):

1. **Pankaj Suman,** Komal Birader, T Yathirajarao. "An aptamer – based lateral flow assay for detection of oxytetracycline"; Indian Patent Application Number – 202041051281; Date of filing: November 25, 2020.

2. **Pankaj Suman,** L Sai Keerthana, Sherin Kaul, Deepali Rawat, T Yathirajarao. "Rapid and differential detection of cobra and krait venom using monoclonal antibody"; Indian Patent Application Number – 202041050355; Date of filing: November 19, 2020.

3. **Pankaj Suman**, Sherin Kaul. "Aptamers for binding to snake venom, its paper based rapid screening, and uses thereof"; Indian Patent Application Number – 202041048600; Date of filing: November 6, 2020.

Research Paper

Birader K, Kumar P, Yathirajarao T, Barla JA, Reddy S, **Suman P.** 2021. Colorimetric aptasensor for on-site detection of oxytetracycline antibiotic in milk. Food Chemistry, 356:129659.

Book (Edited)

Immunodiagnostic Technologies from Laboratory to Point-Of-Care Testing. Springer, Singapore **Suman P**., Chandra P. (eds) doi: https://doi.org/10.1007/978-981-15-5823-8 Print ISBN No. 978-981-15-5822-1 Online ISBN 978-981-15-5823-8

Book Chapters

1. Nagar DN, Yathirajarao T, Kumar P, Kushwaha P, **Suman P.** 2021. Bead-Based SELEX for Aptamers Selection and Their Application in Detection of Diverse Antigens. In: Suman P., Chandra P. (eds) Immunodiagnostic Technologies from Laboratory to Point-Of-Care Testing. Springer, Singapore. https://doi.org/10.1007/978-981-15-5823-8_7

2. Kaul S, Singh R, Kamaraju S, **Suman P**. 2021. Changing Trends in Immunosensing Technologies and Their Commercial Aspects in Animal Health and Welfare. In: Suman P., Chandra P. (eds) Immunodiagnostic Technologies from Laboratory to Point-Of-Care Testing. Springer, Singapore. https://doi.org/10.1007/978-981-15-5823-8_8

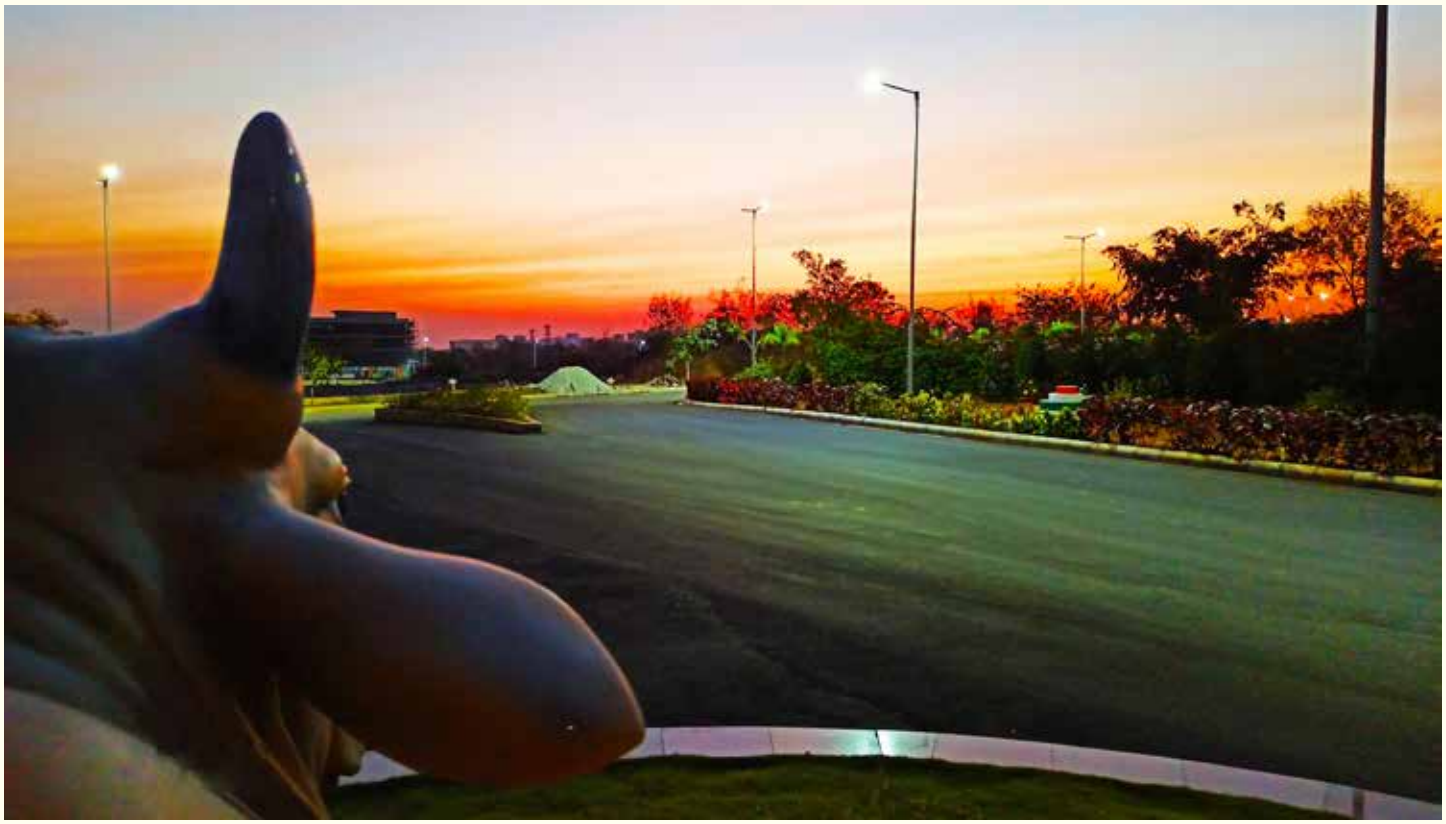
3. Birader K, Keerthana LS, Yathirajarao T, Barla JA, **Suman P**. 2021. Methods for Enhancing Aptamer Affinity for Antigen Detection and Its Characterization. In: Suman P., Chandra P. (eds) Immunodiagnostic Technologies from Laboratory to Point-Of-Care Testing. Springer, Singapore. https://doi.org/10.1007/978-981-15-5823-8_9

4. Kumar P, Chakraborty S, Nagar D, Birader K, Suman P. 2021. Application of Biosensors to Enhance Reproductive Efficiency and Production of Livestock and Poultry by Diverse Antigen Analysis. In: Suman P., Chandra P. (eds) Immunodiagnostic Technologies from Laboratory to Point-Of-Care Testing. Springer, Singapore. https://doi.org/10.1007/978-981-15-5823-8_10.

The Lab Photo

From Left to right: *Sherin Kaul, Sai Muni Yasaswi K, Pankaj Kumar, Komal Birader, Surabhi Marotkar, Pankaj Suman, Ankita Das, Shradha Shetty, Deepali Rawat, T Yathirajarao, Channaveera, Sashidhar Reddy*

Research Projects
B. Animal Health



Title : **Microbial Pathobiology and One Health**

Nagendra R. Hegde

Research Group: **Dr. Nagendra R. Hegde**

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Charanpreet Kaur, RA (Dec 2017 – Aug 2020)
Sathi NN Mallick, RA (since Feb 2019)
Gauthami Sulgey, RA (since Feb 2021)
Madhuranjana Gargi, SRF (since Feb 2019)

Collaborators:

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Shrikrishna Isloor	KVAFSU, Bangalore
SV Rama Rao & SS Paul	ICAR-DPR, Hyderabad
TR Gopala Krishna Murthy	TANUVAS, Namakkal
A Natarajan, V Gowthaman	
Jyoti Joshi	CDDEP & Amity University, Delhi
Nicola Williams & others	U of Liverpool, UK
Jennifer Cole	Royal Holloway U London, UK
Alison Prendiville	U of the Arts London, UK
Javier Guitian	Royal Veterinary College, UK
Dominic Moran	U of Edinburgh, UK
Debasis Nayak	IIT-Indore
Industry Collaborator	Venkateshwara Hatcheries Pvt Ltd., Pune
	Huwel Lifesciences, Hyderabad

Theme and Objectives of Research

Our group works on the broad area of microbial pathobiology and one health, including genomic characterization, virulence factors and mechanisms of pathogenesis, host-pathogen interactions, development of diagnostics, therapeutics and prophylactics, and zoonotic implications. In the current year, we were engaged in (a) exploring inhibition of biofilm formation by bovine mastitis-associated *Staphylococcus aureus*, and (b) understanding drivers of antimicrobial resistance in poultry. In addition, we have initiated programs on bovine ephemeral fever virus, platform technologies for screening anti-coronavirals, and zoonoses and one health.

Potential anti-biofilm agents for bovine mastitis-associated *Staphylococcus aureus*

Bovine mastitis is an important disease of lactating animals, and *Staphylococcus aureus* is the major cause of subclinical, chronic and recurrent mastitis. Antibiotics are used to treat mastitis, but frequently without rationale, resulting in widespread antibiotic resistance. In addition, *S. aureus* can form biofilm, which can be a physical barrier for penetration of antibiotics. Alternatives or synergistic agents to antibiotics are therefore needed, so as to reduce antibiotic use and mitigate antimicrobial resistance (AMR). We have begun to examine the ability of bovine mastitis-associated *S. aureus* isolates to form biofilm, and investigate potential chemical inhibitors of biofilm formation. Towards this, we initially performed biofilm formation assays on 100 *S. aureus* isolates. The results indicated that in media containing 0.1% or 1% glucose or lactose, different isolates exhibited differing abilities to form biofilm. Preliminary data with some known anti-biofilm compounds showed that such compounds could reduce the minimum inhibitory concentrations of oxacillin (Fig. 1). Studies with other compounds are ongoing.

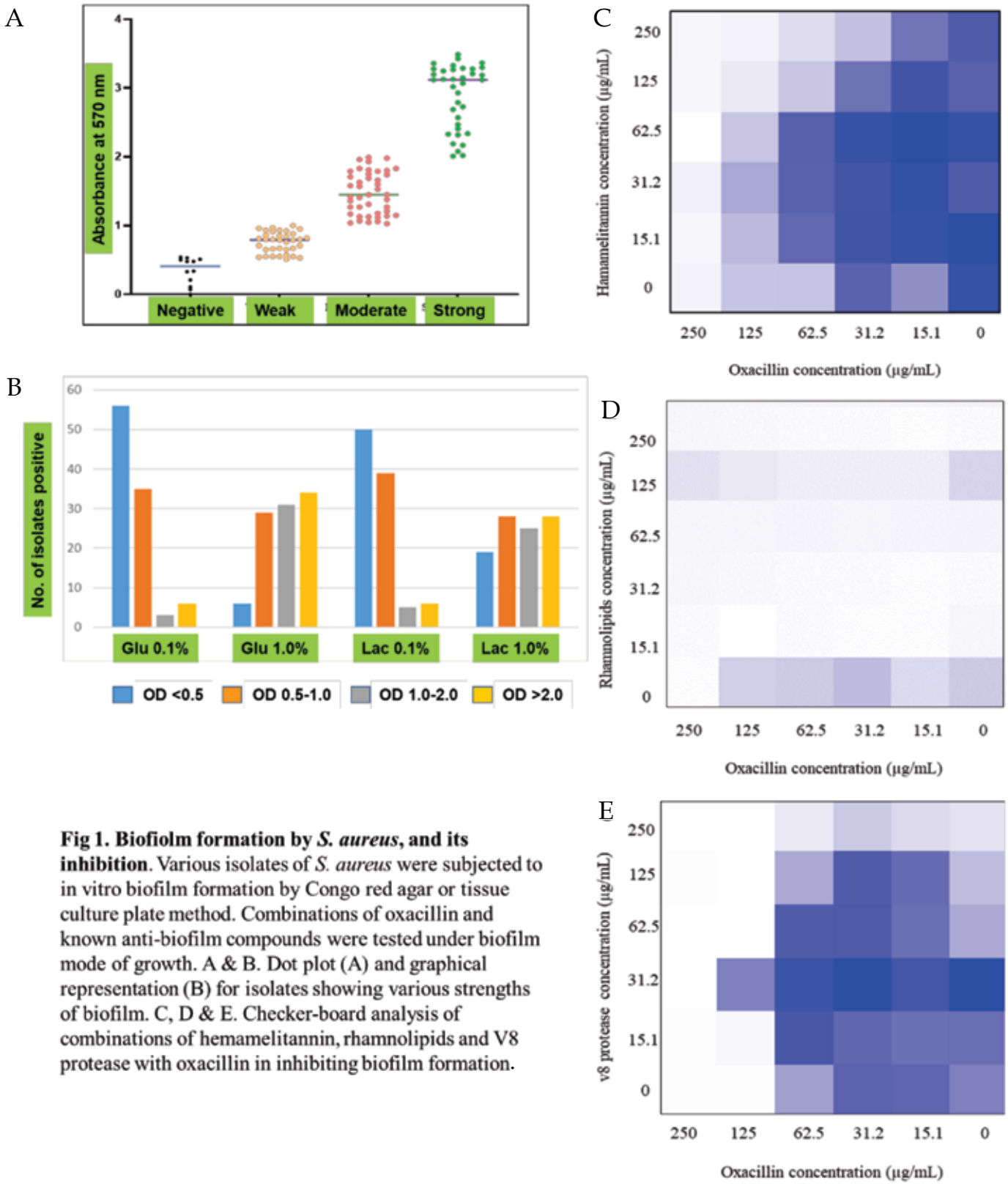

Fig 1. Biofiolm formation by *S. aureus*, and its inhibition. Various isolates of *S. aureus* were subjected to in vitro biofilm formation by Congo red agar or tissue culture plate method. Combinations of oxacillin and known anti-biofilm compounds were tested under biofilm mode of growth. A & B. Dot plot (A) and graphical representation (B) for isolates showing various strengths of biofilm. C, D & E. Checker-board analysis of combinations of hemamelitannin, rhamnolipids and V8 protease with oxacillin in inhibiting biofilm formation.

Drivers of antimicrobial resistance in poultry in India

AMR is a serious public health concern. Agricultural practices, including the use of growth promoters in livestock and poultry production are factors which have been identified as one of the contributors to AMR. AMR is known to be problem in poultry, but systematic and comprehensive studies to understand the consequences of the use of antimicrobials and the implications of withdrawal or the use of alternatives are lacking. Through this project, we intend to understand the drivers of AMR and design intervention strategies through a multi-disciplinary approach encompassing social science, anthropology, microbiology, nutrition, economics and risk assessment.

Towards this, a pilot study was carried out for the full broiler meat production cycle. Samples (feces, water from drinkers, feed from the stock & feeders, swab from drinkers and feeders, boot socks inside and outside) were collected on days 0/1, 7, 14, 21, 28, 35 and 42. Isolation of *E. coli* was carried out with or without cefotaxime, which selects for extended spectrum β-lactamase (ESBL) bacteria. Four individual colonies were selected from each (ESBL and non-ESBL) and confirmed by PCR. To evaluate AMR gene profile, DNA extracted from the isolates was subjected to PCR for *bla* genes (TEM, SHV, OXA, NDM) by employing simplex, followed by multiplex PCR for the various CTX-M genes. Multiplex PCR was also set up for quinolone resistance as well as for *mcr* genes.

E. coli were observed on all days in faeces, drinker swab and water, and boot socks (outside and inside, with the exception of day 42 for inside). Lowest load of *E. coli* was observed in tap water, followed by feeder swab (Fig. 2). The profile for *blaI* showed the highest prevalence of TEM on all the days (22.73% on day 0/1, > 80% on days 7 to 35 and 68.52% on day 42). Similarly, CTX-M resistance was seen on all days with 72.73% on day 0/1, with maximum prevalence in group 1, followed by group 8/25 > group 2 > group 9. No amplification of any of the *mcr* genes was observed. Among the quinolone resistance genes, the prevalence pattern was *qnr*B > *qep*A > *qnr*S > *qnr*C on all days. Lowest resistance was observed for *aac*(6')-*Ib-cr* and its amplification was observed on days 7, 28, 35 and 42 (Fig. 3). These data will be used further to design studies on a larger scale.

Other programs

Our group is also working on two other programs. One is to understand the biology of bovine ephemeral fever virus (BEFV), a rhabdovirus which causes a seemingly innocuous transient infection of cattle. In this direction, we have started to express the viral genes in prokaryotic and eukaryotic expression systems in order to develop reagents and tools, as well as begun setting up the reverse genetics platform for the virus. These will then be used to generate targeted mutants to study the interaction of the virus proteins with cellular proteins or processes. Secondly, we in collaboration with Dr. Madhuri Subbiah and Dr. Guruprasad Medigeshi, have initiated a project to develop platforms for rapid screening of anti-coronaviral drugs without the use of virus culture-based assays which require high containment facility. The objectives are to generate replicon and replicase based systems for human and animal coronaviruses. Towards this, we have begun amplification and assembly of genome fragments to produce replicon cassettes. These as well as replicase systems will then be compared to virus-based assays.

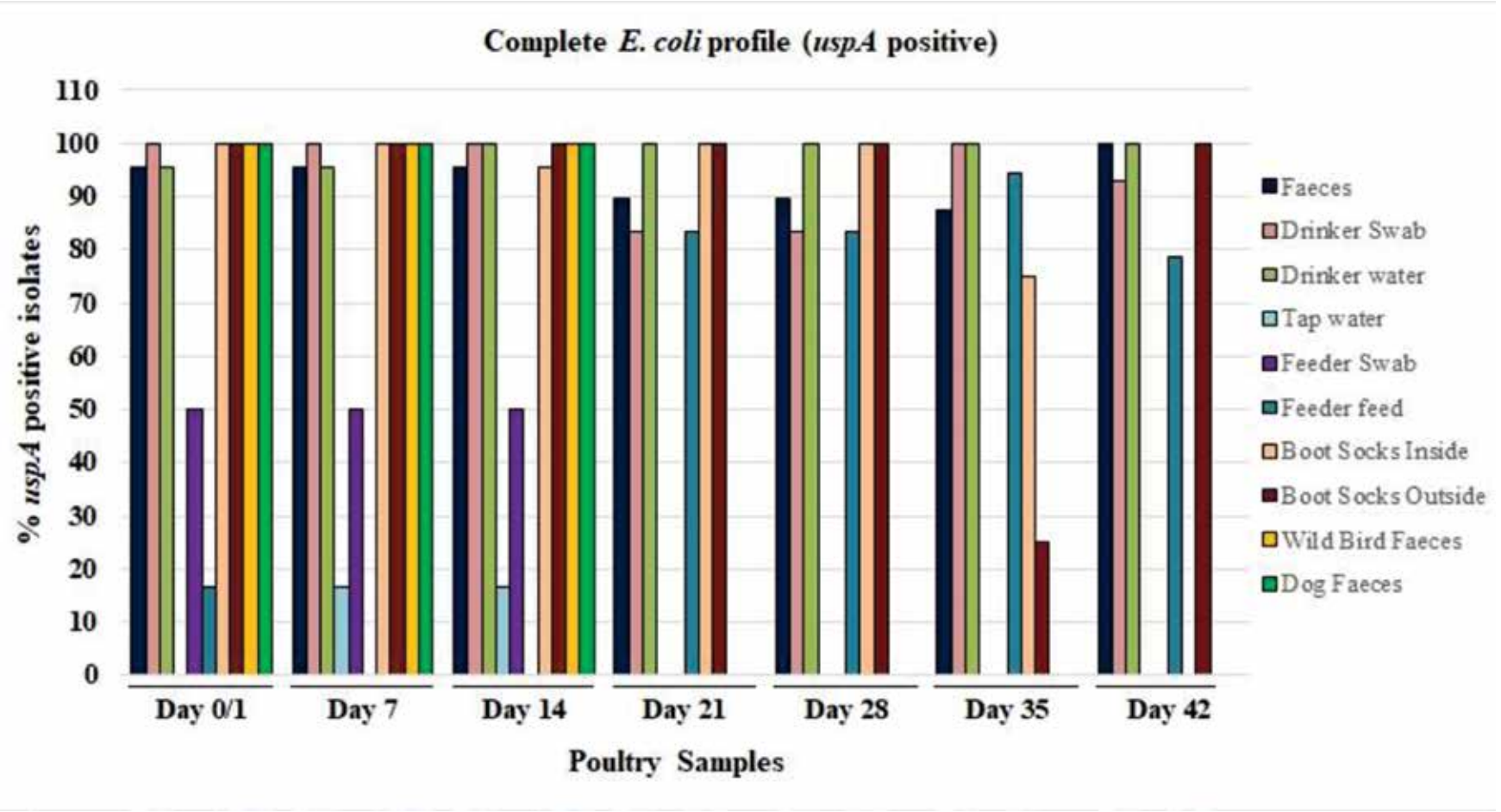

Figure 2. Proportion of *E. coli* isolates obtained from various samples at various time-points during the crop cycle. Samples were obtained from various places on various days and subjected to selective bacterial isolation, followed by PCR for the uspA gene.

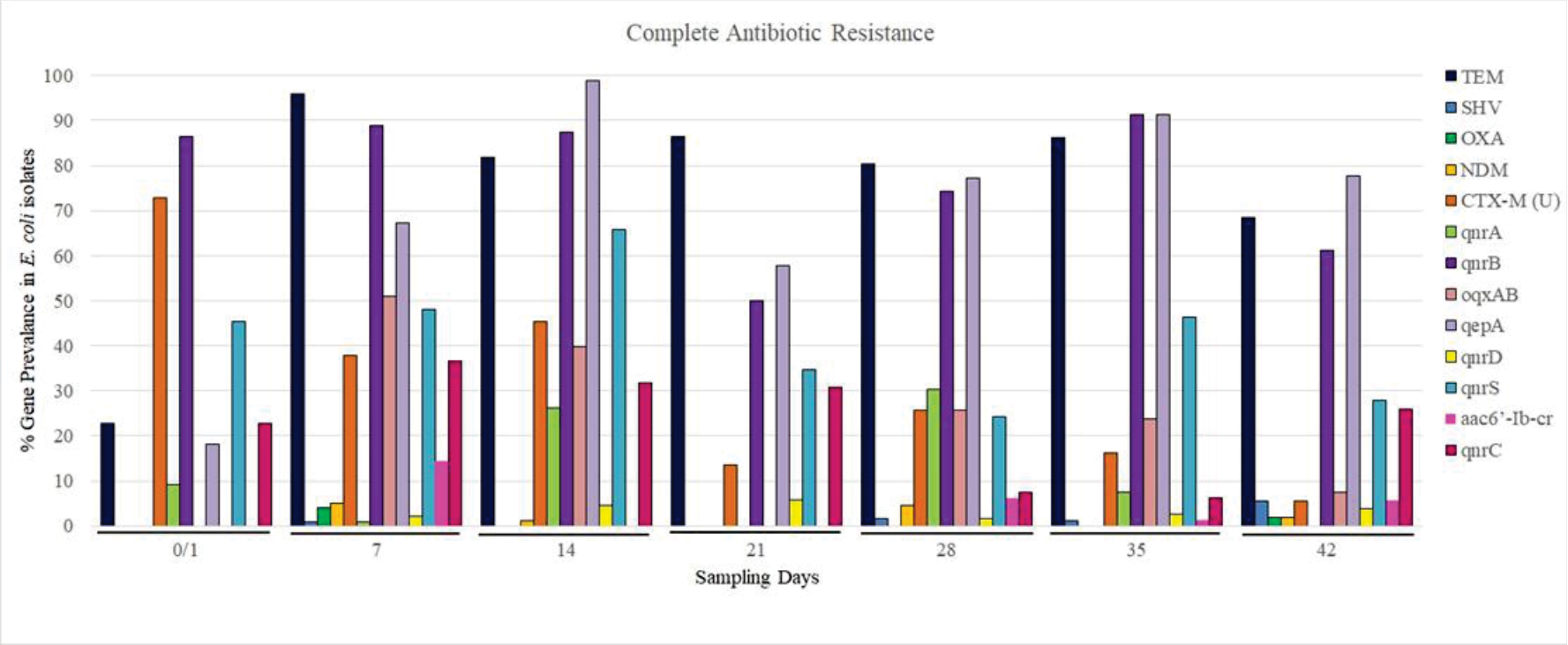

Figure 3. AMR gene profile of *E. coli* isolates obtained from various samples at various time-points during the crop cycle. Isolates obtained from samples collected from various days were subjected monoplex or multiplex PCR for the listed AMR genes.

Publications

1. D Kumar, S Gauthami, J Bayry, SV Kaveri,* **NR Hegde.* 2021**. Antibody therapy: from diphtheria to cancer, COVID-19 and beyond. ***Monoclonal Antibodies in Immunodiagnosis and Immunotherapy 40(2):36-49.***
2. P Sheela,* M Shekar, S Isloor, D Rathnamma, BM Veeregowda, ML Satyanarayana, S Sundareshan, BE Shambulingappa, **NR Hegde. 2021.** Randomly amplified polymorphic DNA analysis of Staphylococcus chromogenes recovered from bovine and bubaline mastitis in Karnataka and adjoining areas. ***Veterinary World 14(1):285-291.***
3. GJ Archana, AY Sinha, M Annamanedi, KP Asrith, SB Kale, NV Kurkure, SP Doijad, K Nagamani, **NR Hegde.* 2020.** Molecular characterization of methicillin-resistant Staphylo-coccus aureus isolated from patients at a tertiary care hospital in Hyderabad, South India. ***Indian Journal of Medical Microbiology 38(2):183-191.***
4. BM Akshatha, S Isloor, S Sundareshan, BH Veeresh, V Nuthanalakshmi, AY Sinha, D Rathnamma, BM Veeregowda, HA Upendra, AS Bhat, BR Shome, R Hegde, KN Prabhu, R Sunagar, CB Waryah, J Gogoi-Tiwari, TK Mukkur, **NR Hegde.* 2020.** Biofilm production, antibiotic resistance and the presence of ica, bap, agr and blaZ genes in bovine mastitis-associated Staphylococcus aureus isolates from South India. ***Indian Journal of Comparative Microbiology Immunology and Infectious Diseases 41(1):39-49.***

The Lab Photo

Left to right: Sathi Mallick, Priya Gupta, Sashikanta Parida, Nagendra Hegde, Madhuranjana Gargi, Pagala Jasmeen, Charanpreet Kaur (not in pictire: Madhavi Annamanedi)

Title: Understanding the virulence mechanisms of the zoonotic pathogen, *Brucella* and development of improved vaccines and diagnostic assays for animal and human brucellosis.

Girish K Radhakrishnan

Research Group: Dr. Girish K Radhakrishnan

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Project Personnel:

Sayanna Are (Since Jan 2020-July 2020)

Theme and Objectives of Research:-

Brucellosis, caused by the facultative intracellular bacterial pathogen, *Brucella*, is the most common zoonotic disease in the world. Brucellosis accounts for huge loss to the livestock sector and poses a serious threat to public health. Brucellosis in livestock and its impact on public health causes a median loss of Rs. 22,800 crores per year in India. A human vaccine for brucellosis is unavailable and the existing animal vaccines have many drawbacks. Furthermore, minimal information is available on virulence mechanisms that enable *Brucella* to successfully infect the host for its chronic persistence. Overall objectives of my research projects are (i) To develop improved vaccines and diagnostic assays for animal and human brucellosis; (ii) To understand the mechanisms by which *Brucella* modulate the host immune responses; (iii) To characterize the host factors that support the invasion and intracellular multiplication of *Brucella*.

To develop novel vaccines and diagnostic assays for animal and human brucellosis

Timely detection of brucellosis in livestock is essential for controlling the spread of disease to humans. The diagnosis of *Brucella* by culture is difficult because of its fastidious nature, slow growth and potential hazard to the laboratory personnel. The existing sero-diagnostic assays for brucellosis have many disadvantages such as poor sensitivity, cross-reactivity and lack of "Differentiating Infected from Vaccinated Animals" (DIVA) capability. With the objective of developing improved serodiagnostic assays and vaccines for brucellosis, we performed a high-throughput immunoprofiling of a *B. melitensis* protein microarray that identified several immunodominant protein antigens of *Brucella*. Subsequently, we developed an indirect ELISA (iELISA) based on one of the immunodominant proteins BM5, followed by its evaluation. Subsequently, we generated three immunodominant peptides from the BM5 protein, followed by their evaluation as candidate antigens for immunoassays. We found that the iELISA based on BM5 peptides could efficiently detect brucellosis with DIVA capability (Fig. 1A & B). The third party evaluation and commercialization of BM5 protein and peptide based sero-diagnostic assays are in progress.

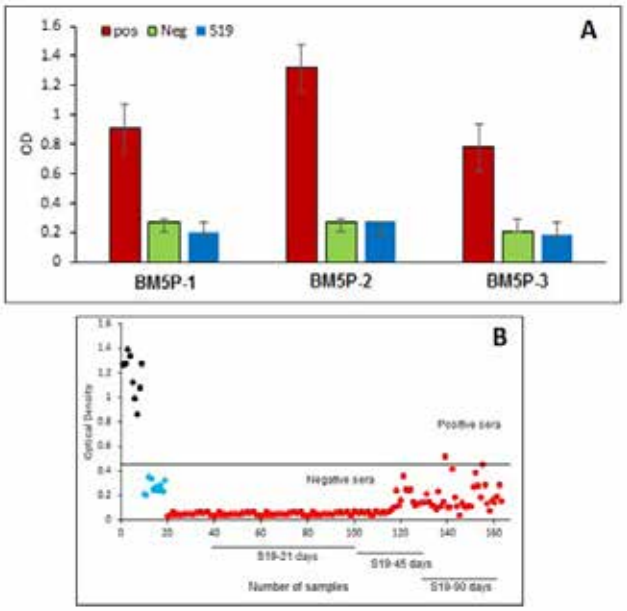

Figure 1. *(A) Comparison of the reactivity and DIVA capability of BM5 peptide-based iELISA using bovine serum samples. (B) Screening of bovine serum samples using BM5 peptide-based iELISA. The dot plot shows the OD values of various samples (Black: +ve serum; Blue: -ve serum; Red: B. abortus S19-vaccinated serum).*

In vivo evaluation of the anti-inflammatory peptide, TB4-BBL2 from the TcpB protein of *Brucella*:-

We generated a cell permeable, anti-inflammatory peptide (TB4-BBL2) from the TcpB protein of *Brucella*. Our *in vitro* studies indicated that the peptide could efficiently suppress LPS-induced NF-κB activation and production of pro-inflammatory cytokines in macrophages. Subsequently, we evaluated the efficacy of TB4-BBL2 peptide in mice. In order to examine whether TB4-BBL2 exhibits any toxicity *in vivo* and to determine the tolerant concentration of the peptide, 6-8 weeks old BALB/c mice were treated with increasing concentrations of TB4-BBL2 peptide with appropriate controls. The mice were observed for 5 days for any symptoms of toxicity, followed by sacrificing the mice and collection of various organs. The experimental data indicate that TB4-BBL2 peptide does not induce toxicity and the mice can tolerate up to 40 mg/kg of peptide. Further, we evaluated the efficacy of TB4-BBL2 peptide to suppress LPS-induced proinflammatory cytokines in mice. Mice were treated with TB4-BBL2 peptide, followed by administration of a sub-lethal dose of LPS and collection of organs and serum at 12-hours post-LPS delivery. The TB4-BBL2 treated mice produced diminished levels of LPS-induced TNF-α and IL-6 (Fig. 2A & B).

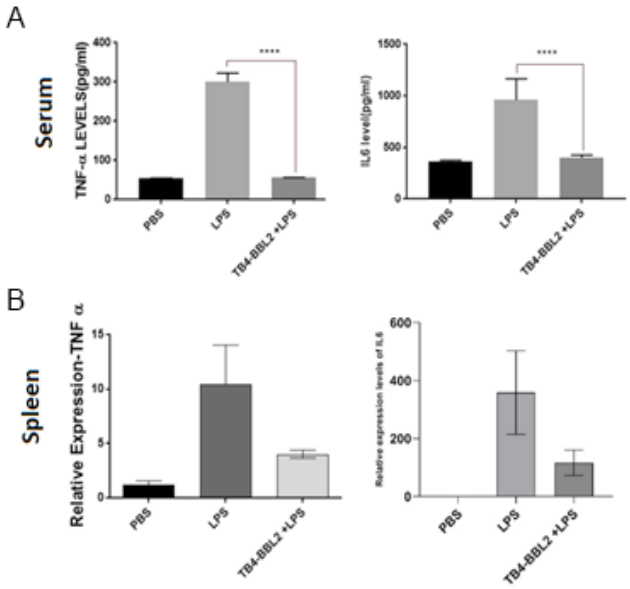

Figure 2. *Expression levels of TNF-α and IL-6 in serum (A) and spleen (B) of mice treated with or without TB4-BBL2 peptide. The expression of TNF-α and IL-6 was induced with LPS.*

To characterize the host factors that support the invasion and intracellular multiplication of *Brucella*.

The complex intracellular cycle of *Brucella* majorly depends on multiple host factors, but limited information is available on the host and bacterial proteins that play essential role in the invasion, intracellular replication and modulation of host immune responses. We performed a high throughput siRNA screening that identified the host protein, FBXO22, which plays an essential role in the Brucella-macrophage interaction. FBXO22 is the key element in the SCF E3 ubiquitination complex where it determines the substrate specificity for ubiquitination and degradation of various host proteins. Downregulation of FBXO22 by siRNA or CRISPR-Cas9 system, resulted diminished uptake of *Brucella* into macrophages, which was dependent on NF-κB-mediated regulation of phagocytic receptors. FBXO22 expression was upregulated in *Brucella*-infected macrophages and the overexpression of FBXO22 resulted induction of phagocytic receptors (Fig. 3A & B) and enhanced production of pro-inflammatory cytokines through NF-κB (Fig. 4A & B). Our experimental data suggest that FBXO22 plays an important role in the uptake of microbial pathogens by macrophages and pathogenesis of infectious diseases that is resulting from aberrant inflammatory responses.

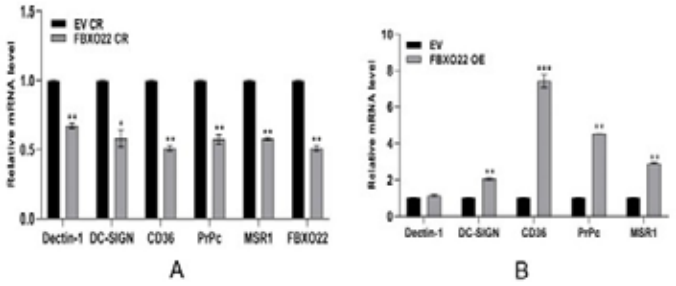

Figure 3*. The expression levels of indicated scavenger receptors in iBMDMs that are down-regulating (A) or overexpressing (B) FBXO22. iBMDMs were transfected with CRISPR-dCas9-gRNA plasmid for downregulating FBXO22 expression (A) or FBXO22 expression plasmid for overexpression of FBXO22 (B). The expression of levels of scavenger receptors was analysed by qRT-PCR at 24 hours post-transfection.*

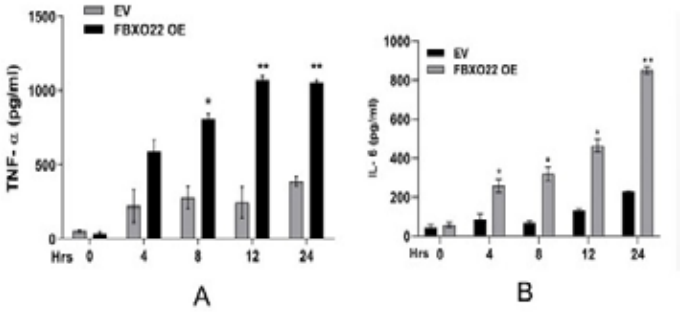

Figure 4. *Overexpression of FBXO22 enhances the production of TNF α and IL-6 in Brucella-infected macrophages. J774 cells were transfected with FLAG-FBXO22 expression plasmid or empty vector, followed by infection with B. neotomae for indicated time points and quantification of secreted TNF- α (A) and IL-6 (B) using ELISA.*

Patents

Applied: -

Immunodominant protein and peptide-based brucellosis diagnosis kits and devices to differentiate infected animals from Brucella abortus S19-vaccinated animals.

International patent application number: PCT/IN2020/050265

The Lab Photo

From Left to Right: Prachita Nandini, Swapna Namani, Padmaja Jakka, Sushreerekha Mallik, Girish Radhakrishnan, Binita Roy, Kiranmai Joshi, Swetha Sankati and Varadendra Mazumdar.

Title: Development of Leptospirosis vaccines and novel veterinary adjuvants

Syed M. Faisal

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Our research is focussed broadly in two areas. First, development of vaccine for Leptospirosis which is zoonotic and emerging infectious disease in India. Using modern biological tools and various approaches we are trying to understand how *Leptospira* interacts and modulates the host immune defences to establish successful infection. This will help in identifying crucial virulence factors that could be potential targets for development of vaccine and diagnostics for serovars prevalent in India. Second, development of novel and cost effective veterinary adjuvants. Vaccines against some of the economically important livestock diseases like brucellosis and FMD provide short term immunity and limited protection mainly due to unavailability of potent adjuvants. Hence we envisage to develop potent adjuvants for vaccines used in Livestock.

Broadly our research is aimed at :-

Identification and characterization of surface proteins of Leptospira involved in evasion/activation of host immune response: In perspective of developing subunit vaccines

Leptospira evades through host innate immune response by avoiding recognition through Toll like receptors and also through complement system by employing various mechanisms like binding to complement regulators (Factor H, C4BP), secreting proteases etc. to establish successful infection in the host. We characterized the domain of surface protein Leptospira immunoglobulin like protein A (LigA) involved in immune activation and evasion from host innate response. 11th domain of LigA (A11) was able to activate the macrophages and bind to complement regulators like FH and C4BP to evade from complement mediated killing (Fig 1A). We discovered that LigA is nuclease capable of degrading Neutrophil extracellular traps (NET) as shown (Fig1B). This project will contribute in identification of novel virulence factor/vaccine candidates.

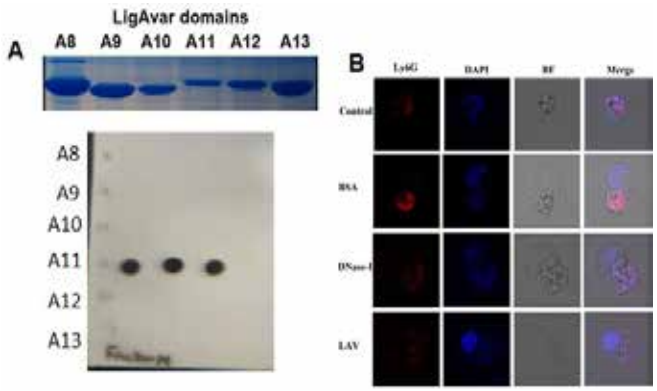

Figure 1. *(A) Binding of A11 domain of LigA with Factor H, as revealed by dot blot (B) Degradation of mouse Neutrophil extracellular trap by variable region of Lig A, indicating its nuclease activity.*

Understanding the role of *Leptospira* LPS in immune evasion: Implications in developing LPS based conjugate vaccine

LPS is a major virulence factor and might play role in modulating host innate immune response. To prove this hypothesis, we purified and immunologically characterized LPS from different pathogenic serovars. In order to test if Leptospira modifies Lipid A of its LPS, we purified Lipid A and tested its activity on mouse, human and bovine macrophage cell line. Our result shows that Lipid A purified from different strains was able to activate macrophages as indicated by production of cytokines (Fig. 2). We are planning test if there is any difference in activation of Lipid A isolated from Leptospira in host environment. This project is aimed at characterizing LPS and eventually develop LPS (Lipid A) based conjugate vaccines.

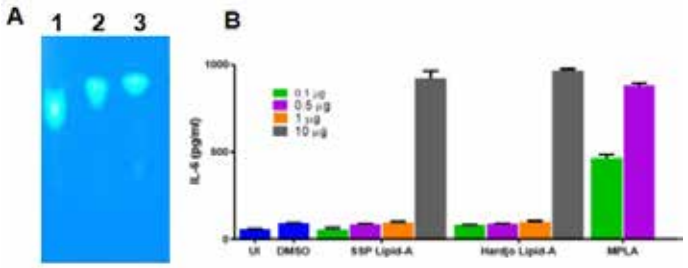

Figure 2 *(A) Thin layar cromatography (TLC) showing Lipid A purified from E.coli (1), L. biflexa (2), L. hardjo (3). (B) IL-6 produced by mouse macrophages after stimulation with Lipid A isolated from different Leptospira serovars*

Creating *Leptospira* mutants: In perspective of identifying novel virulence factor and vaccine candidates

We are trying to create both random and targeted mutants of *Leptospira* to make them attenuated in virulence. We got random mutant of pathogenic *Leptospira* Pomona and in process of being analysed and tested (Fig.3). For targeted mutagenesis we have successfully created plasmid which will aid creating specific targeted mutants that are attenuated in virulence. This project will lead to development of live attenuated vaccine for Leptospirosis.

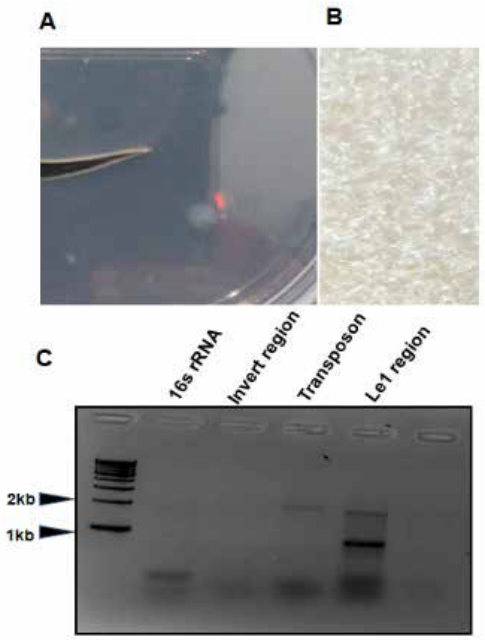

Figure 3 (A) *Leptospira interrogans serovar Pomona colonies mutant on EMJH agar plates. (B) Leptospira mutant from the colonies as seen under dark field microscope. (C) Analysis of Leptospira mutant by PCR.*

Genomics assisted pathobiology to identify novel targets for diagnosis and therapeutic intervention(s) of *Leptospirosis*

To identify new pathways modulated during *Leptospira* infection, we analysed the changes in host protein abundance and post - translational modifications during a human monocyte (THP-1 cells) infection with Leptospira interrogans serovar Icterhaemorrhagie strain RGA. Preliminary data shows changes in expression of both host and pathogen (global protein abundance) as early as 2hrs post infection (Fig. 4A). We also analysed the modifications of proteins (in terms of phosphorylation) and found that several proteins from both host and pathogen were phosphorylated after infection (Fig. 4B). We also identified distinct pathways involving immunity, cellular trafficking, metabolism, and signal transduction that were among the top 20 most statistically significant enriched pathways (Fig. 4C). Similar analysis was performed in bovine macrophages.

This project will contribute in the identification of critical factors of both pathogen and host for developing novel therapeutics and vaccines.

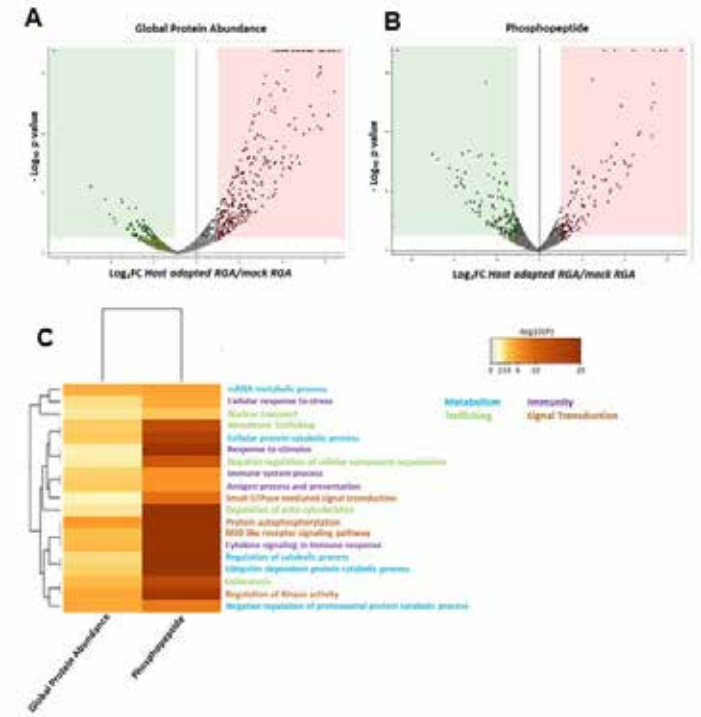

Figure 4. *(A) Analysis in changes in levels of protein expression in Leptospira interrogans serovar Icterhaemorhagie strain RGA after infection in human monocytes (THP-1). (B) Analysis of modifications in Leptospira proteins (in terms of phosphorylation) after infection. (C) Analysis of changes in host protein expression and modification after Letospira infection. Various pathways like metabolic, signalling, immunity etc were analysed.*

Development of novel immunomodulators/adjuvants for veterinary vaccines.

In an effort to develop novel veterinary adjuvants we did computational analysis and identified novel TLR4 agonist. One of the agonist (Hit5) we tested on bovine macrophage cell line (BoMac) for its ability to induce IL-6. Hit5 was able to induce IL-6 in similar to level induced by MPLA (Fig. 5A). Hit-5 also induced expression of MHCII on surface of mouse macrophages (Fig. 5B). These results indicate that Hit5 can activate both mouse and bovine macrophages. We also prepared mesoporous nanoparticles as vaccine delivery system and tested its ability to activate mouse macrophages. This project will contribute in development of novel and potent veterinary adjuvants.

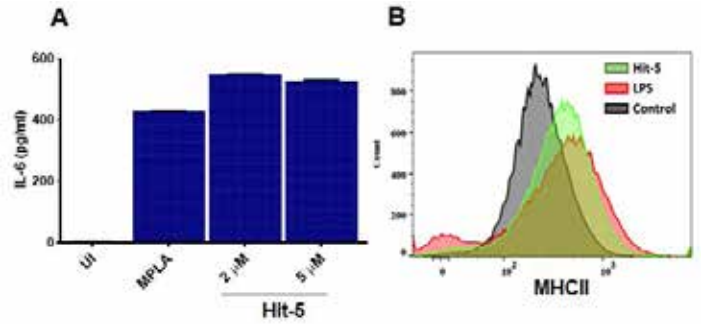

Figure 5. (A) *IL-6 produced by Bovine macrophages (BoMac cells) upon stimulation with TLR4 agonist (Hit5) identified through computational method. (B) Analysis of MHCII expression in Bomac cells after stimulation with Hit5.*

The Lab Photo

From left to right (standing): Himadri Medhi, Mohammed Kadivela, Ramudu Bankala, Sridhar Kavela, Jusail C.P., Pallavi Vyas. (Sitting)- Vivek Varma, Syed Faisal, Ajay Kumar.

Title: Host Pathogen Interaction Studies on Animal and Avian Viruses

Madhuri Subbiah

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Dr. Nagendra Hegde,	NIAB

Newcastle disease virus (NDV) is an economically important virus for poultry industry in India. NDV causes highly contagious respiratory, neurological and/or enteric disease in chickens depending on the viral strain. Our lab is studying molecular biology of accessory viral proteins of NDV, namely V and W proteins. These two proteins are expressed from a single viral gene, Phosphoprotein gene, by cotranscriptional editing mechanism, unique to paramyxoviruses.

The Stimulator of IFN genes (STING) is an adaptor downstream of retinoic acid-inducible gene-I (RIG-I) in mammalian cells. In chickens, the RIG-I, an intracellular receptor for viral nucleic acids which activates type I IFN expression is known to be absent. However, in chicken cells, the chicken (ch) STING has been observed as the major mediator of virus-triggered type I IFN signalling. It has been previously shown that in DF1 cells overexpressing chSTING inhibits NDV replication. We are currently studying the role of V protein of NDV in relation to chSTING.

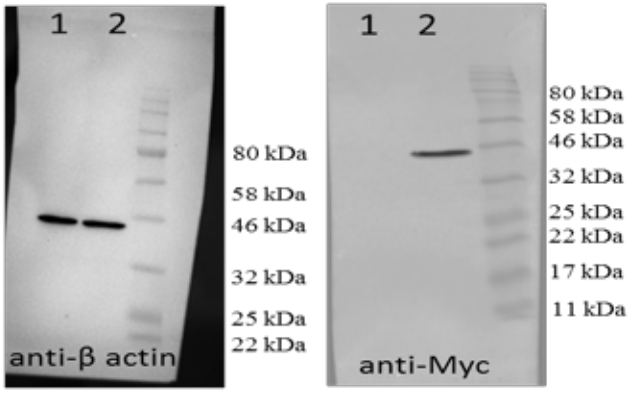


Figure 1a. *Expression of myc-chSTING*

1a. DF1 cells were transfected with myc-chSTING plasmid and western blot was performed on mock transfected (1) and chSTING transfected DF1 cells (2). The figure on the right shows expression of chSTING in the transfected cells.

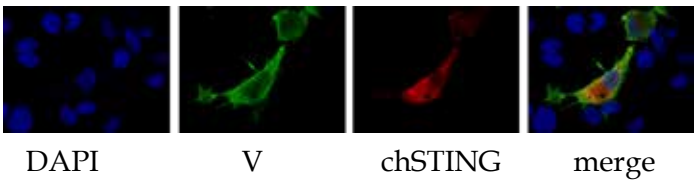


Figure 1b. *Co-expression of myc-chSTING and V protein of NDV*

1b. DF1 cells were co-transfected with HA-V and myc-chSTING plasmids to study the localization pattern of these two proteins using anti-HA (green) and anti-myc (red) antibodies. Our initial studies suggest

co-localization of V protein of NDV with chSTING. Further work is ongoing to understand the effects of such co-localization on IFN production and signalling during NDV infection.

While the multi-functions of V proteins of paramyxoviruses are well characterized, very few information is currently available for the W protein of NDV. Our initial studies on W protein of NDV strain Komarov showed that the W protein localized in nucleus in different cell lines. We used peptide antibody against W protein to study the W protein expression in NDV infected cells.

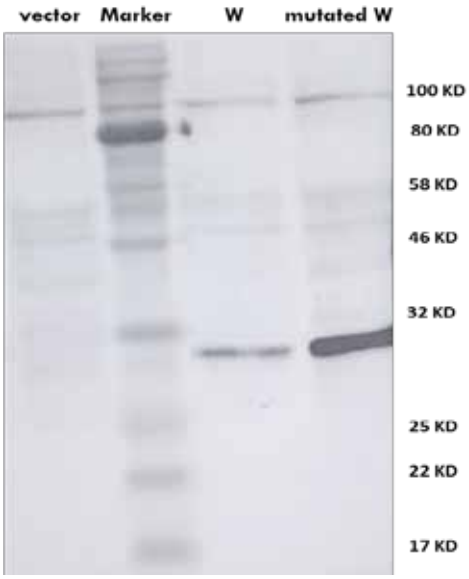
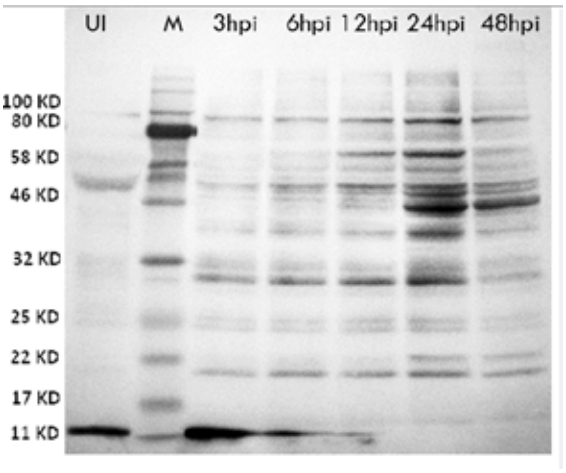


Figure 2a. Specificity of the W-peptide Antibody

2a. DF1 cells were transfected with empty plasmid (vector), plasmids expressing HA tagged W (W) and HA tagged mutated W (mutated W). Immunoblotting with W peptide antibody showed specific bands of 30KDa size in both W and mutated W transfected cells.



2b. Along with the expected 30 kDa protein band, other bands were also observed in NDV infected DF1 cells at 3, 6, 12, 24 and 48 hrs post infection by western blot using W peptide antibody. Optimization of the procedure is in progress to understand the other non-specific bands seen in the above western blot.

The other focus in our lab is on Porcine circoviruses (PCV). Porcine circovirus (PCV) is a small, non-enveloped, single-stranded DNA virus with a circular genome. While, PCV1 is non-pathogenic virus, the PCV2 is an important pathogen of pigs. PCV2 infections lead to abortions, stillbirths, birth of small and weak sized piglets. It causes high mortality rates in pre weaned piglets, wasting with clinical signs of pneumonia, diarrhea and anemia in post weaned piglets and dermatitis, glomerulonephritis in finisher pigs. Porcine Circovirus type 2 associated diseases (PCVAD) is an emerging and important transboundary disease in pig population of India. PCVAD also results in the immunosuppression of the affected pigs. We had previously optimized engineering of recombinant PCV. With the lab optimized protocols, we have engineered chimeric virus with PCV1 backbone carrying the capsid protein of PCV2.

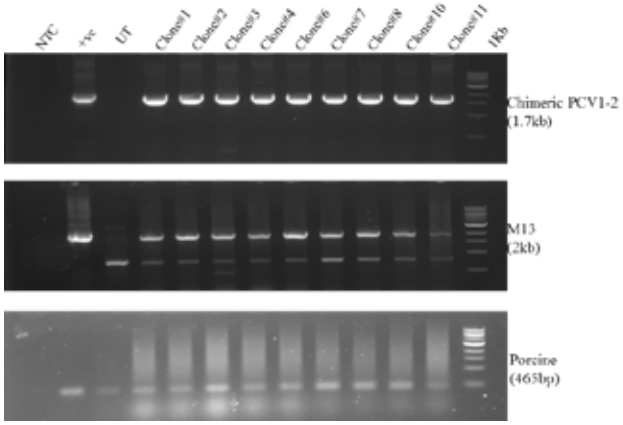
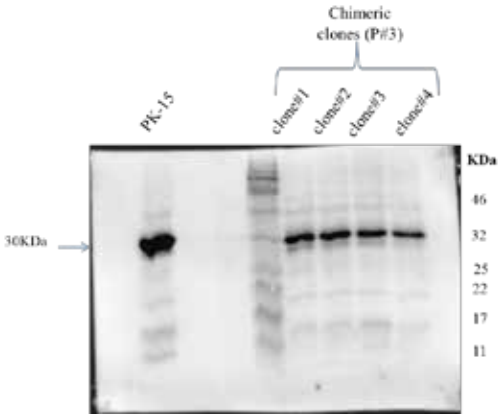


Figure 3a. Agarose gel image showing chimeric viral DNA in transfected cells

3a. Single cell clones of PK15 devoid of PCV were previously generated in the lab. These cells were transfected with TOPO plasmid carrying the chimeric PCV construct. Three days post transfection, the cells were tested for the presence of viral DNA using virus specific primers, TOPO specific primers and porcine specific GAPDH primers. The gel image shows the presence of viral DNA.

Figure 3b. Western image of transfected cells showing expression of PCV2 capsid protein



3b. The transfected cells were tested by western for the expression of Capsid protein from the recombinant chimeric virus using capsid antibody (abcam). The image above shows the expression of capsid protein in the transfected cells. The PK15 cells were used as the positive control for the antibody.

Further characterization of the recombinant chimeric virus is ongoing.

Patent filed:

Madhuri Subbiah,W Nagaraj Nayak and Devasmita Dutta Accessory viral protein as anticancer agent application no. '202141006360', Feb 16, 2021 (provisional patent filed).

Publications:

- Molecular evolution and genetic variations of V and W proteins derived by RNA editing in Avian Paramyxoviruses. **Pachineella Lakshmana Rao**, Ravi Kumar Gandham & **Madhuri Subbiah***. Scientific Reports volume 10, Article number: 9532 (2020).
- Sophora interrupta Bedd root derived flavonoids as prominent antiviral agents against Newcastle Disease Virus. Cherukupalle Bhuvaneswar, Aluru Rammohan, Baki Vijaya Bhaskar,Pappithi Ramesh Babu, **Gujjar Naveen**, Duvvuru Gunasekar, **Subbiah Madhuri****, Pallu Reddanna and Wudayagiri Rajendra. RSC Advances, 10, 33534 (2020).
- Structure-based design, synthesis, biological evaluation, and molecular docking of novel 10-methoxy dibenzo[b,h][1,6] naphthyridinecarboxamides. K. N. Vennila, B. Selvakumar, V. Satish, **D. Sunny, S. Madhuri**, K. P. Elango. Medicinal Chemistry Research 30, 133–141 (2021).
- Spectroscopic Studies on the Interaction of Naphthyridines with DNA and Fluorescent Detection of DNA in Agarose Gel. G. Mahalakshmi & B. Selvakumar & K.N. Vennila & P. **Lakshmana Rao & S. Madhuri** & M. Seenivasaperumal & Kuppanagounder P. Elango. *Journal of Fluorescence* 31, 327–338 (2021).
- Development and validation of high throughput Real-time Polymerase chain reaction assay for quantitative detection of Chicken Infectious Anemia Virus. T. R. Kannaki, E. Priyanka, **Madhuri Subbiah**, Santosh Haunshi. *Virus Disease* https://doi.org/10.1007/s13337-020-00648-1 (2021).
- Emergence of porcine circovirus 2g (PCV2g) and evidence for recombination between genotypes 2g, 2b and 2d among field isolates from non-vaccinated pigs in Mizoram, India. T.K.Rajkhowa, P.Lalnunthanga, **P. L. Rao, M. Subbiah****, B.Lalrohlua. *Infection, Genetics and Evolution* Jun;90:104775 (2021).

The Lab Photo

From Left: Ruchi Malwade, Revathi Sundaram, Sunny Deval, Lakshmana P Rao, Madhuri Subbiah, Devasmita Dutta, Nagaraj Nayak, Kalaimagal Rajagopal and Subhajit Mondal.

Title: Host-Parasite Interactions Studies on Animal Parasites

Anand Srivastava

Research Group: Dr. Anand Srivastava

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M. Rajitha, JRF (Since 2018)

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Akshay Kuriakose, Project fellow (since July 2019)

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Dr. Swasti Raychaudhuri	CCMB
Dr. Gajanan Chigure	Parbhani Veterinary College

Theme of Research

My research group works on Ticks and Tick-borne diseases (TTBDs). TTBDs have been recognized as a major cause of loss of production in ruminants. TTBDs are quite prevalent in tropical and subtropical countries of the world especially in India. The estimated cost of production loss due to TTBDs in India is approximately US$ 498.7 million/annum. In case of tick-borne diseases my research group focuses on theileriosis. This disease causes unchecked proliferation of the leucocytes. The untreated cattle die in 3-4 weeks. The present vaccine and drug molecules have their own limitations. Hence, we are in the quest of developing better interventions in form of vaccine and drug molecules for curing theileriosis. Currently, we are in the process of identifying newer targets for vaccine development and working on identification of new drug molecules.

Objectives

1. **To identify novel drug molecule for treating theileriosis (Intramural)**

   We would like to develop a cost-effective drug which could reduce the drug regime for treatment of theileriosis from a week to few days. We would like to repurpose the known drugs for the treatment of theileriosis.

2. **To identify new molecules that are essential for the survival of *T. annulata* (Extramural)**

   We would like to identify *T. annulata* proteins which are important for the transformation of the host cell and are essential for the survival of the parasite in the host cell. These proteins could be targeted for developing drugs or small molecules for treatment of theileriosis.

Abstract of each project

Discovery of anti-theilerial compounds in the Pathogen box:

Previously, we identified two anti-theilerial compounds, namely MMV000062 and MMV560185, from the pathogen box. These compounds showed

high specificity for the infected cells when compared to uninfected cells.

Now we have made efforts to find the mechanism of action of MMV560185 on Theileria infected bovine lecucytes.

MMV 560185 induces apoptotic pathway:

Previously, we observed that the treatment with MMV560185 led to increase in the apoptotic population in Annexin V assay. To confirm induction of apoptosis further, we analysed apoptotic markers in the cells treated with MMV560185. We found cleaved product of caspase 3 and 8 in cells treated with drug (Figure 1a.).

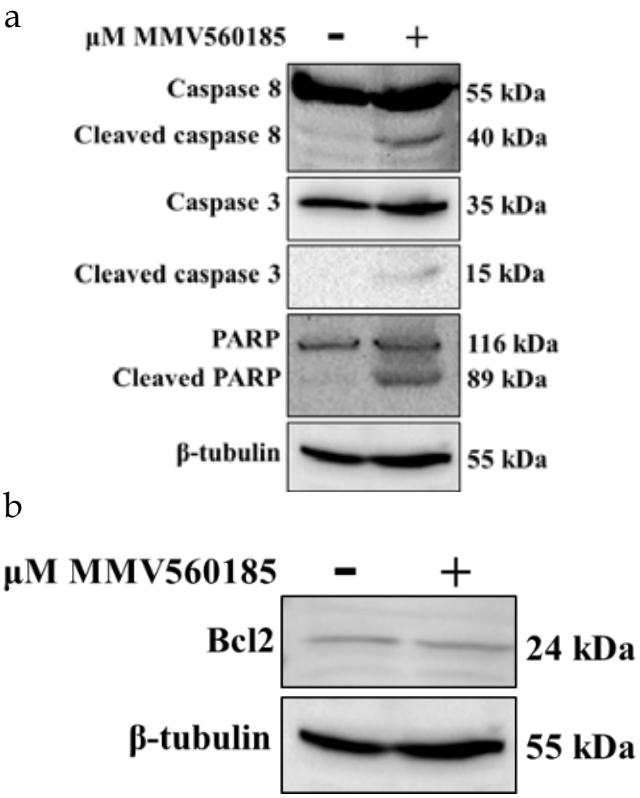


Figure 1: a. Ana2014 cells treated with MMV560185 showed presence of cleavage product of caspase 3, caspase 8 and PARP b. No change in level of Bcl2.

We also observed the presence of cleaved product of PARP in the cells treated with MMV560185 further confirming induction of apoptosis in these cells. In order to find out the upstream effector proteins in the apoptotic pathway, we analysed effector proteins both in the intrinsic and extrinsic apoptotic pathway. We found that there is no downregulation of BCl2 which is a marker for intrinsic pathway figure 1b. Also we did not observe any change in level of

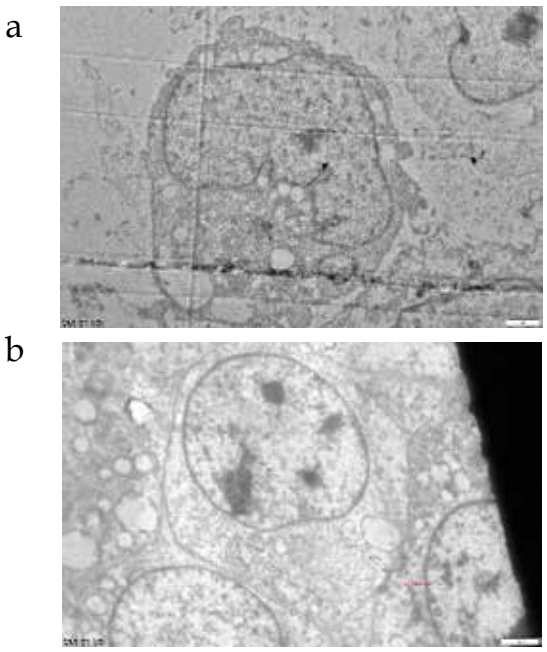


Fig. 2a. Electron micrograph of treat and b.untreated cell.

phospho Bad. This suggests that cells are not dying due to upregulation of intrinsic pathway. The TEM image of treated and untreated cells shows absence of parasite in the treated cells (Figure 2a & b).

MMV 560185 induces extrinsic pathway of Apoptosis:

We observed increase in the death receptors upon treatment Ana2014 cells with MMV560185 (figure 3).

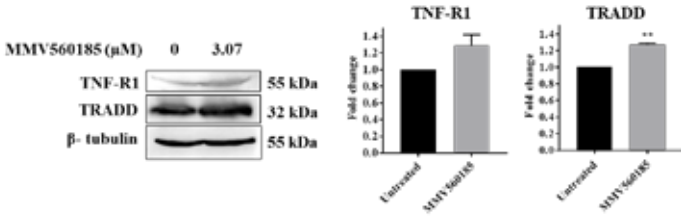


Figure 3: Ana2014 cells treated with MMV560185 showed increase in death receptors

MMV 560185 does not induce autophagy pathway:

Previously, we observed that the treatment of curcumin to Ana2014 cells leads to activation of autophagy pathway. Hence we analysed the level of LC3b in the treated and control cells. We did not observe LC3b in the treated cells (Figure 4). This suggests that there is no upregulation of autophagy pathway in the treated cells.

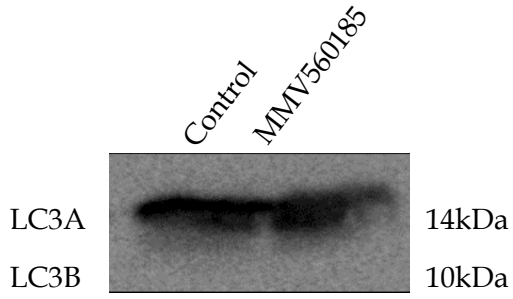


Figure 4: Ana2014 cells treated with MMV560185 showed no LC3b.

The schematic representation of proposed mechanism of action of MMV560185 is shown in figure 5.

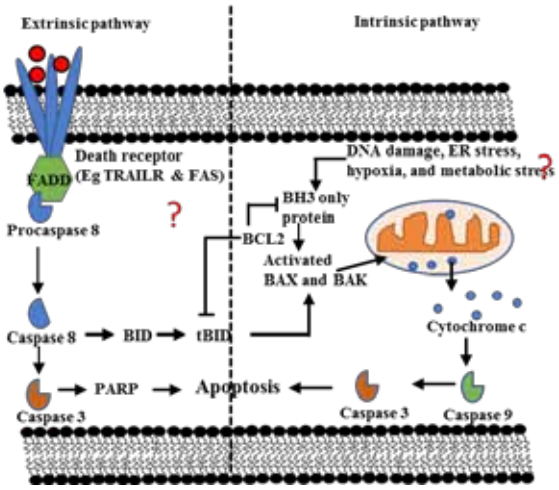


Figure 5: Schematic representation of mechanism of action of putative apoptotic pathway in Ana2014 cells treated with MMV560185

Identification of compounds structurally similar to MMV560185 and MMV000062:

In order to identify structurally similar molecules to MMV560185 and MMV000062 from the Pubchem database, we devised a strategy as shown in the figure 5. We filtered all the molecules structurally similar to MMV560185 and MMV000062 at the Tanimoto threshold of 90%.

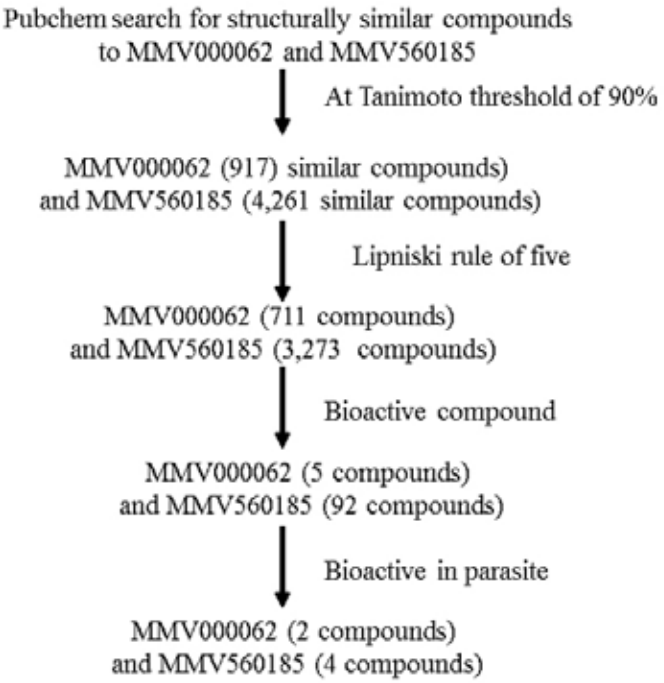
A total of 917 molecules similar to MMV000062, and 4261 molecules similar to MMV560185, were obtained. We applied Lipinski's rule of five to all these molecules. Lipinski's rule of five was applied to evaluate druglikeness of chemical compounds with chemical properties and physical properties that would make it a likely orally active drug. We obtained 711 molecules for MMV000062 and 3273 molecules for MMV560185.

All these molecules were further screened based on the bioactivity data. We obtained 5 molecules for MMV000062 and 92 molecules for MMV560185. Last, we screened these molecules for their known effect on parasite or prokaryotes. We obtained 2 molecules for MMV000062 and 4 molecules for MMV560185 as potential candidates for testing their effect on the *Theileria* infected bovine cells.

Figure 5: *Flow chart showing screening Pubchem database for identification of structurally similar molecules to MMV560185 and MMV000062.*

Following are the molecules obtained after screening Pubchem database.

The two drugs similar to MMV000062 identified



through database search are: Hexamidine and Propamidine

The four drugs similar to MMV560185 identified through database search are:

a) 3-(1-Azabicyclo[2.2.2]oct-2-en-3-yl)quinolone,
b) 4-[[(2R,4R,5R)-5-Ethenyl-1-azabicyclo[2.2.2]octan-2-yl]methyl]quinolone,
c) 1-Methyl-4-[(E)-(1-methylquinolin-4(1H)-ylidene)methyl]quinolinium and
d) N-[4-(4-Methylpiperazin-1-yl)phenyl]quinolin-4-amine.

Future Plans

- Elucidation of mechanism of action of MMV580165.

We will continue to decipher the molecular mechanism due to which infected cells die due to MMV580165.

- Testing of identified 6 novel molecules as anti-theilerial agents.

We will first perform cost analysis for these identified molecules and then test these molecules for their potential as anti-theilerial molecules.

The Lab Photo

Left to right: Achintya Sanju, Akshay Kuriakose, Vijay Macha, Prasanna Babu Araveti, Anand Srivastava, M. Rajitha, Prajna Parimita Kar.

Title: Study of Virulence, Antimicrobial Resistance and Host Pathogenesis in Intracellular Pathogen Infections

Paresh Sharma

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Ms Shweta Noori

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Dr. Partha Ray	UOR, UK
Dr Anand Kumar	NTR College, Gannavaram, AP.
Dr Vasundhra Bhandari	NIPER, Hyderabad
Dr Azhahianambi, P	TANUVAS, Chennai.

Our group is interested in understanding the mechanism of disease pathogenesis behind major intracellular parasites using advanced biotechnology tools. The major intracellular pathogens which we are studying are livestock-related hemoprotozoan parasites and mastitis-causing bacterial pathogens. The focus is to identify and characterize the genes involved in host-parasite interactions/virulence/drug resistance, leading to developing tools/strategies for controlling the disease. We are also working on the global problem of antibiotic resistance, which affects animal and humans and is a global threat of increasing concern. We focus on surveillance of AMR pathogens, understanding antibiotic resistance mechanisms, identifying new drug targets, and repurposing the available drugs.

1: Identification of Genetic and Antigenic variations in Haemoprotozoan parasites causing Livestock Infections:

Apicomplexan parasite *Theileria annulata* causes significant economic loss to the livestock industry in India and other tropical countries. In India, parasite control is mainly dependent on the live attenuated schizont vaccine and the drug buparvaquone. For effective disease control, it is essential to study the population structure and genetic diversity of the *T. annulata* field isolates and vaccine currently used in India. A total of 125 *T. annulata* isolates were genotyped using ten microsatellite markers from four states belonging to different geographical locations of India. Limited genetic diversity was observed in the vaccine isolates than the parasites in the field; a level of the geographical substructure was evident in India. The number of genotypes observed per infection was highest in India than in other endemic countries, suggesting high transmission intensity and abundance of ticks (Figure:1). A reduced panel of four markers can be used for future studies for surveillance of the *T. annulata* parasites in India. High genetic variation between the parasite populations in the country suggests their successful spread in the field and could hamper the disease control programs. Our findings provide the baseline data for the diversity and population structure of *T. annulata* parasites from India. The low diversity in the vaccine advocates

improving the current vaccine, possibly by increasing its heterozygosity. The reduced panel of the markers identified in this study will help monitor the parasite and its reintroduction after *Theileria* eradication (Roy et al.,2021).

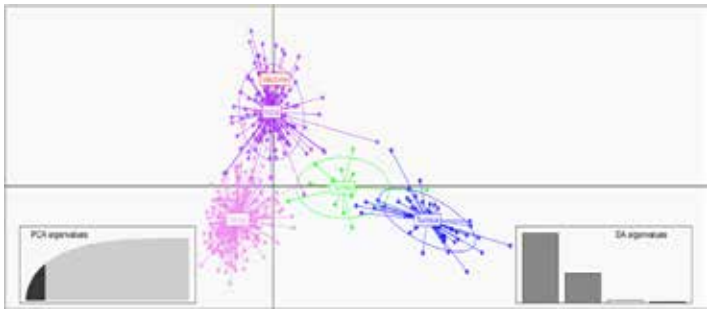

Figure: 1 *DAPC analysis showing the genetic structure of T. annulata populations from India, Turkey, Tunisia, and Oman.*

Genetic diversity, antigenic variation, and the parasite's ability to adapt to new drugs continue to thwart *Theileria* control efforts. Recently there have been widespread reports of the development of resistance of *T. annulata* to buparvaquone, which is currently the only effective compound for the treatment of bovine theileriosis. Artemisia annua L., is used in China as a traditional medicine for 2,000 years for treatment for *P. falciparum* malaria. Currently, artemisinin and artemisinin-based combination therapy (ACT) is recommended by the World Health Organization as the first line of treatment for *P. falciparum* malaria. These drugs act fast, with few side effects, and are also active against *P. falciparum* strains that are resistant to other traditionally used drugs. This year we have screened artemisinin and its derivatives for identifying their antitheilerial activity. In a primary assay, *T.annulata* cells were exposed to artemisinin, artesunate, artemether and dihydroartemisinin compounds and to 50 nM BPQ as a reference compound for a period of 3 days and subjected to the alamar Blue viability assay. Artesunate (ART) and dihydroartemisinin (DHART) showed good potent activity against the *T. annulata* cells; however, there was no or little antitheilerial activity against the other two compounds. In parallel, to eliminate compounds that were highly cytotoxic to mammalian cells, the same screen was performed using confluent BOMAC cells.

We next tried to use artesunate or dihydroartemisinin compounds as combination therapy with BPQ; it was highly potent against the *T. annulata* cells and can reduce the drug dose to about 60 fold for treatment of the *Theileria* infections. Further, we dissected the mechanism of action of the artesunate and dihydroartemisinin compounds showing antitheilerial activity. To evaluate if ART & DHART causes DNA damage, *T. annulata* parasites were treated with increasing drug concentrations for various times, and a comet assay analyzed parasites. The results (Figure 2) demonstrate that ART & DHART induced DNA damage in *T. annulata* in a dose- and time-dependent manner. Treatment of parasites with increasing IC50s of ART & DHART was accompanied by a higher accumulation of DNA damage, shown by an increase in the olive tail moment (OTM). Our results provide novel insights into the antitheilerial activity of artemisinin derivatives and help design next-generation drugs for controlling *Theileria parasites*.

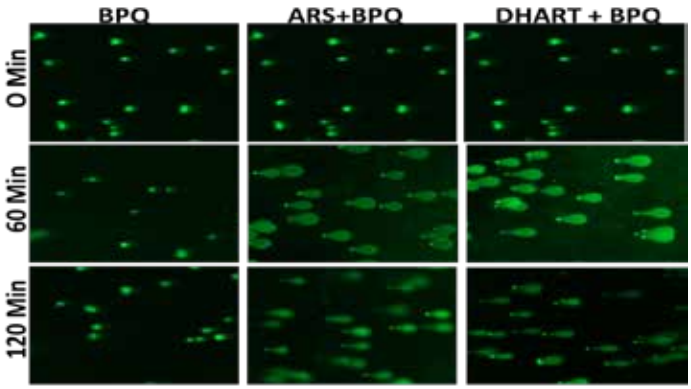

Figure 2: *ART & DHART causes DNA damage in T.annulata infected cells. Comet assay measurement of the olive tail moment (OTM) at 60min and 120min after treatment compared to untreated (Control) parasites.*

2. Study of Host-Parasite interactions to identify genes/proteins involved in disease pathogenesis during *T. annulata* infection

Theileria annulata, an intracellular parasite of bovine lymphoid cells, induces substantial phenotypic alterations to its host cell including continuous proliferation, cytoskeletal changes and resistance to apoptosis. There remains considerable speculation on the complexities of the parasite directed control mechanisms that govern these radical changes to the host cell. The current projects in our lab are focused on identifying the genes associated with host parasite interactions and virulence during bovine theileriosis. We have done a comparative RNAseq analysis of an uninfected bovine cell line and its *Theileria* infected counterpart, to identify the differentially expressed

genes during the parasite infection. The differential analysis is underway for identifying the genes involved in disease pathogenesis.

3. Surveillance of antibiotic susceptibility, antimicrobial resistance mechanism and identification of new treatment options against bacterial pathogens causing mastitis:

Antimicrobial resistance (AMR) is a major global threat of increasing concern. It can occur naturally as all microbes can adapt to their surrounding environment. However, it is aggravated by the inappropriate and excessive use of antimicrobials in both the agriculture sector and human healthcare. The current project aims to monitor and characterize AMR pathogens and identify their resistance mechanism with one health concept. The resistance mechanism of the mecA negative MRSA and OS-MRSA is ongoing. This year due to covid and non-availability of the funds not much was achieved in this particular project.

Publications from NIAB:

Sonti Roy, Vasundhra Bhandari, Madhumanti Barman, Pankaj Kumar, Vandna Bhanot, Jaspreet Singh Arora, Satparkash Singh and **Paresh Sharma**(2021). Population Genetic Analysis of the *Theileria annulata* Parasites Identified Limited Diversity and Multiplicity of Infection in the Vaccine From India. Front. Microbiol., https://doi.org/10.3389/fmicb.2020.579929

The Lab Photo

Left to Right : Debabrata Dandasena, Madhumanti barman, Paresh Sharma, Sonam Kamble, Shweta noori, Sonti Roy, Akash Suresh

Title: Role of CDK-related kinases (Crks) in transcription regulation in *Toxoplasma gondii*

Abhijit S. Deshmukh

Research Group: Dr. Abhijit S. Deshmukh

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Kalyani Aswale (DBT – JRF)
Chitti Raju Khandavalli (ICMR – JRF)

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Bhavana Hebbar, PF (Since December 2020)
Aditya Velidandi, PA-II (Since April. 2021)
Megha Roy, MSc trainee (Since January 2021)

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Dr. Sandeep Chaudhari	NVC, Nagpur
Dr. Shilpshri Shinde	NVC, Nagpur
Dr. S. Barbuddhe	NRC-Meat, Hyderabad

Theme and Objectives of Research

We study the protozoan parasite *Toxoplasma gondii*, responsible for abortion, stillbirth and neonatal mortality in animal and human alike. Current research focuses on two important areas i) understanding the unique cell cycle and transcription using wide array of approaches, including protein biochemistry, cell biology and genetics ii) identifying immunodominant antigens to develop a rapid and cost-effective diagnostic assay for routine testing of T. gondii infection. The ongoing research is directed towards identifying potential drug targets and creating a robust diagnostic tool for mass screening of samples in the field.

Understanding the role of TgCrk2 in cell cycle of Toxoplasma gondii

Given the absence of a full repertoire of canonical CDKs and cyclins in Toxoplasma, the role and relevance of these proteins merit investigation. Currently, we are working on one of the important cell cycle Crks, TgCrk2. TgCrk2 interacted with H-type cyclin (TgCyclinH) and P-type cyclin (TgPHO80). In parasite, TgCrk2 showed both nuclear and cytoplasmic localization, TgCycH and TgPHO80 showed exclusive nuclear and cytoplasmic localization, respectively. In the in-vitro kinase assay, only TgCycH activated TgCkr2 (weakly) and not TgPHO80. However, HsRingo (non-cyclin CDK activator; positive control) activated TgCrk2 more robustly in the same experimental conditions suggesting a non-cyclin factor or cyclin independency for TgCrk2 function in the parasite. Further, TgGCN5B, members of the GCN5-related N-acetyltransferase family of histone acetyltransferases, regulate TgCrk2 function by specifically acetylating the catalytic core of the enzyme and, in particular, a lysine (lysine 32) that is essential for ATP coordination and the phosphotransfer reaction. Acetylation markedly reduces the kinase function of TgCrk2. In contrast to unmodified TgCrk2, the acetylated fraction of the enzyme is specifically found in the nuclear compartment. In the earlier studies, the role TgCrk2 and TgPHO80 have been speculated in the regulation of tachyzoite G1 phase. Therefore, it remains to be seen whether TgCrk2 acetylation does play any role in the cell cycle progression particularly G1 phase of tachyzoite. Given the conservation of the TgCrk2 acetylated residues in the catalytic region of virtually all CDK proteins, we anticipate that this

mechanism of regulation might play a broader role in controlling the function of other members of this kinase family.

Understanding the humoral immune response against cyst stage (chronic phase) antigens

Toxoplasma gondii infection is characterized by an acute phase, associated with the rapidly multiplying tachyzoites, followed by a chronic phase characterized by tissue cyst containing slow-growing bradyzoites. We studied the humoral immune responses against recombinant and native antigens of encysted bradyzoite using ELISA, Western blot and immunofluorescence analysis. Results revealed that most of the *T. gondii* positive sera recognized major cyst wall antigen, CST1. This study provides strong evidence for the presence of humoral immune response towards cyst wall antigens in naturally acquired *T. gondii* infections. This study broadens our understanding of humoral dynamics and add to the repertoire of immunomodulatory antigens of *T. gondii*. Moreover, it provides an experimental basis for defining and designing diagnostic and therapeutic approaches for its clinical management.

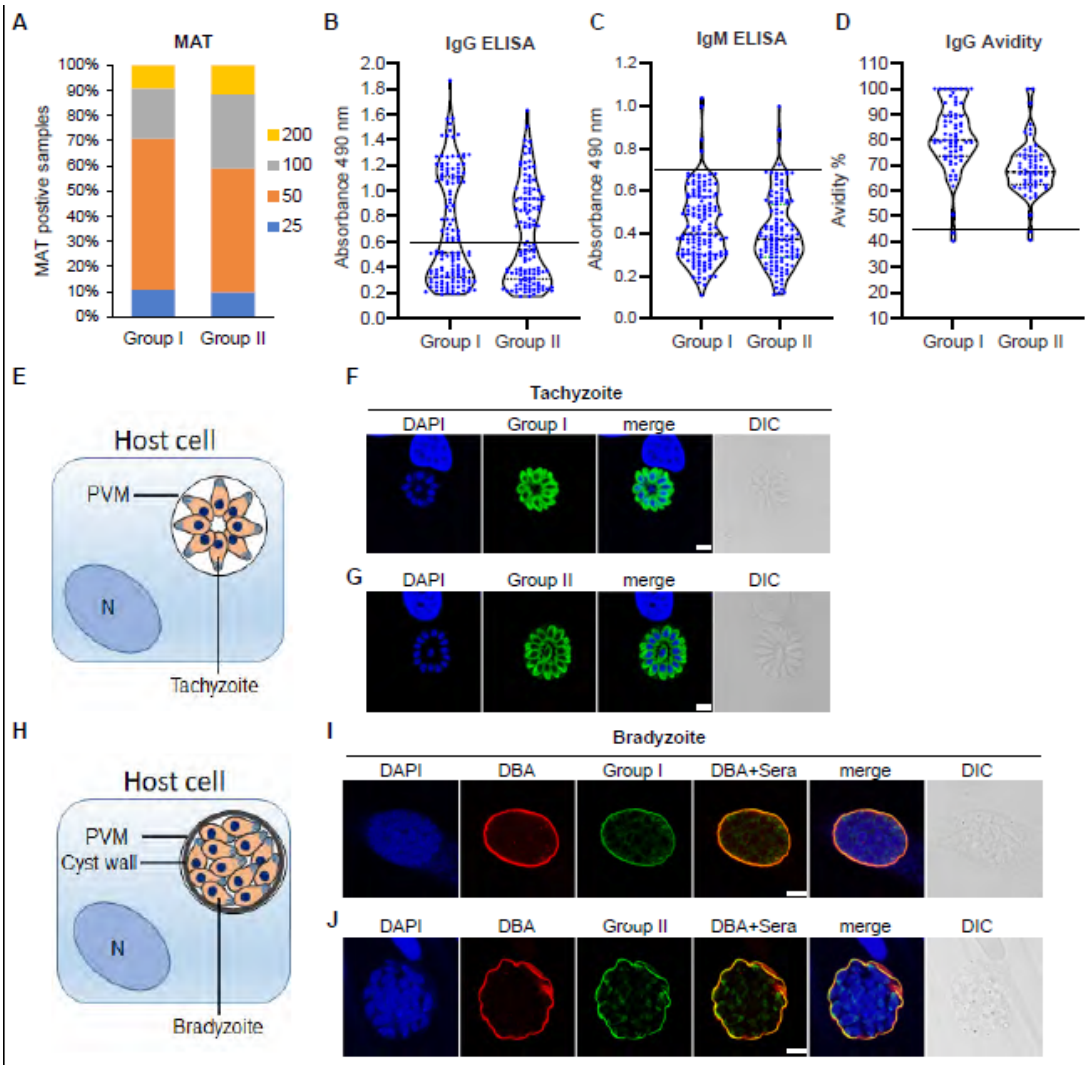

Figure 1. Seroprevalence of toxoplasmosis among veterinary personnel (Group I) and abattoir workers (Group II). (A-C) Anti-T. gondii antibodies were determined using MAT (A), IgG ELISA (B), IgM ELISA (C), and IgG avidity (D). (E) Diagram of tachyzoite-infected cell indicating structures: N, host cell nucleus; PVM, parasitophorous vacuole membrane. (F,G) Representative IFAT in intracellular tachyzoites using group I (E) and group II (F) sera positive for anti-T. gondii antibodies. (H) Diagram of bradyzoite-infected cell indicating structures; N, host cell nucleus; cyst wall. (I,J) Representative IFAT in intracellular bradyzoites using group I (I) and group II (J) sera positive for anti-T. gondii antibodies. Red fluorescence, Rhodamine DBA (bradyzoite marker). Scale bar = 5µm.

Seroprevalence and risk factors of *Toxoplasma gondii* infection among veterinary personnel and abattoir workers

Veterinary personnel and abattoir workers are considered at high risk of *T. gondii* infection through occupational exposure. The association of *T. gondii* infection and occupational exposure to animals has not been determined in India. We analysed 139 and 126 blood samples of veterinary personnel and abattoir workers, respectively for anti-*T. gondii* antibodies using enzyme-linked immunoassays (ELISA), modified agglutination test (MAT), indirect fluorescent antibody test (IFAT). The association of seroprevalence with socio-demographic profiles, work activities and dietary habit in study population was determined. MAT, ELISA and IFAT results showed nearly ~48% seropositivity among veterinary personnel and abattoir workers (Fig1. 1A-J). Of 48% ELISA positive samples, 46% was positive for IgG antibody, 1.5% for IgM antibody, and 1.5% for both IgG and IgM antibodies. These results showed potentially significant association between seropositivity to T. gondii and occupational exposure to animals.

Publications

1. Deshmukh AS, Gurupwar R, Mitra M, Aswale K, Shinde S, and Chaudhari S. (2020) Toxoplasma gondii induces robust humoral immune response against cyst wall antigens in chronically infected animals and humans. Microbial Pathogenesis 152:104643.
2. Mitra P, Deshmukh AS, and Choudhury C. (2020) Molecular chaperone function of stress inducible Hsp70 is critical for intracellular multiplication of Toxoplasma gondii. BBA- Molecular Cell Research 1868(2):118898.

Patent

1. Detection of Toxoplasma gondii infection" Indian Patent filed Application No. 202141012996. Inventors: Abhijit S. Deshmukh and Rajkumar Gurupwar.

The Lab Photo

Left to Right: Megha Roy, Bhavana Hebbar, Chitti Raju, Poonam Kashyap, Abhijit S. Deshmukh, Rajkumar Gurupwar, Aditya Velidandi and Kalyani Aswale.

Title : Tuberculosis and Other Zoonotic Diseases of Livestock: Molecular Pathogenesis and Intervention Strategies

Bappaditya Dey

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Dr. M. Jojula	SSCP, Warangal, India
Dr. P. Ray & Dr. Al Edwards	University of Reading, UK
Dr. Ian Jones	University of Reading, UK
Dr. William Bishai	Johns Hopkins University, USA

Theme and Objectives of Research

Broad areas of research focus of our group is tuberculosis (TB) and other zoonotic bacterial diseases of livestock in the broad area of molecular pathogenesis and intervention strategies including biomarker discovery, development of live attenuated vaccines, drug & probiotic based therapies. Currently, our laboratory is engaged in the following projects:

(A) identification of biomarkers of susceptibility and/or resistance to TB in native and crossbred cattle, (B) screening for inhibitors of a bacterial enzyme involved in biofilm formation and cell wall homeostasis to develop alternative antibacterial to limit antimicrobial resistance (AMR) in a number of important bacterial pathogens, and (C) host-directed therapy against TB.

A) Biomarkers of susceptibility and/or resistance to tuberculosis in native and crossbred cattle. (DBT funded, PI).

Tuberculosis (TB) in cattle not only affects the health of animals but also perturbs livestock economy due to reduced production and causing restriction of economic activities involving animal and animal products at local and international levels. Moreover, increasing incidence of TB in human due to M. bovis and that in bovine due to M. tuberculosis indicates cattle as a major reservoir of zoonotic TB. As prevalence of TB is markedly greater in exotic and crossbred cattle compared to native breeds in India, this project intends to differentiate the immune responses in native cattle underlying its resistance to TB by transcriptomic approaches. This will not only discover a signature of protective immunity guiding to develop appropriate diagnosis and therapy for TB but also help in adopting appropriate crossbreeding policy. The main objectives are: i) to differentiate the influence of breed in the prevalence of M. bovis and M. tuberculosis infection in cattle in India, ii) to determine the influence of breed in the susceptibility and resistance of bovine macrophages to M. bovis and M. tuberculosis infection, and iii) to characterize the transcriptional signature of TB susceptibility and resistance of bovine macrophages from native and crossbred cattle.

During the current reporting period, the following experiments were performed.

- A number of PCR methodology were developed to identify as well as differentiate mycobacterial (MTBC, NTM, MTB, BTB) DNA from animal derived samples by a multiplex PCR reactions (Fig. 1 A).
- Comparative evaluation of IFN-β response of PBMC from native (Sahiwal) and crossbred (Sahiwal x HF) to M. tb (Ra), M. bovis BCG infection as well as stimulation with Bovine Tuberculin (bPPD), Avian Tuberculin (aPPD), WCL (Mtb whole cell lysate), CW (cell wall extract) and LAM

(Mtb Lipoarabinomenon) revealed significant difference in IFN-□ response only in the cases of MTB, BTB and bPPD stimulation (Fig. 1 B). Currently, detail analysis is underway to decipher the molecular events and player involved in this pathway.

- Comparative evaluation of M. tb growth in the in vitro PBMC infection assays revealed less bacterial growth in case of PBMCs from Sahiwal breed compared to that of SxHF cross (Fig. 1 C).

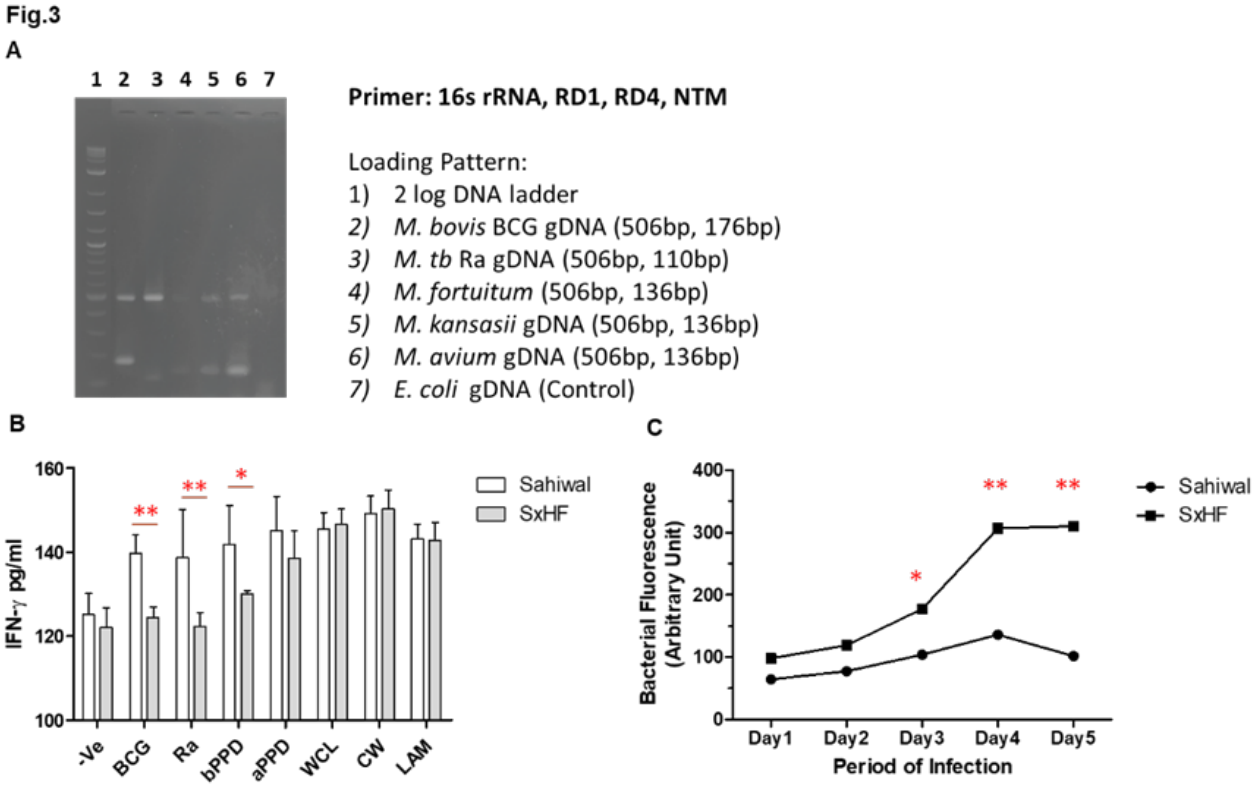


Fig. 1. (A) multiplex-PCR for detection of mycobacterial (MTBC, NTM, MTB, BTB) DNA, (B) IFN-β response of PBMC from native (Sahiwal) and crossbred (Sahiwal x HF) cows stimulated with mycobacterial antigens, (C) M. tb (Ra) growth in the in vitro PBMC infection assay.

B) Screening for inhibitors of a bacterial enzyme involved in biofilm formation and cell wall homeostasis to develop alternative antibacterial to limit AMR. (ICMR funded, PI).

Formation of biofilms is a major contributing factor to the development of antimicrobial resistance (AMR) that prevents effective treatments of a range of bacterial infections posing a serious threat to public health globally. Hence, inhibiting biofilm signaling pathway is a potential approach to develop new classes of antibacterial that can be used alone or in combination with existing antibiotics. We have identified bacterial di-adenylate cyclase (DAC) as a potential drug target that is involved in biofilm formation and cell wall homeostasis in several medically important bacterial pathogens and intend to identify new Natural Compound (NC) inhibitors of DAC that may augment action of existing antibiotics and prevent evolution of AMR. The main objectives are: (i) to identify Natural Compound (NC) inhibitor of bacterial di-adenylate cyclase (DAC) by structure-based virtual screening, (ii) to evaluate the DAC inhibitory potential of selected NCs by in vitro enzymatic assays, and (iii) to assess effect of shortlisted NCs on growth, biofilm formation and antibiotic susceptibility of selected bacterial pathogens.

During the current reporting period, the following experiments were performed.

- Bioinformatic analysis of domain organization and homology modeling of DacA / DisA protein structure. Table-1 depicts the domain organization based categories and availability of solved protein structure of the DacA / DisA proteins of the ten bacterial species analyzed in the project:

Table – 1: DisA/DacA domain organization and protein crystal structure availability.			
DisA type organization	**Protein Structure availability**	**DacA type organization**	**Protein Structure availability**
Mycobacterium tuberculosis	No	*Staphylococcus aureus*	Yes, 6GYW
Klebsiella pneumoniae	No	*Streptococcus pneumoniae*	No
Clostridium difficile	No	*Streptococcus pyogenes*	No
Listeria monocytogenes, CdaA	Yes, 4RV7	*Enterococcus faecalis*	No
		Clostridium perfingens	No

- Those proteins possess DisA type domain organization, the predicted structures are modelled on the basis of Thermotoga maritima, disA, 3C1Z; and those proteins possess DacA type domain organization, the predicted structures are modelled on the basis of Staphylococcus aureus, dacA, 6GYW. Fig. 2 A depicts the available and modelled protein structures.
- Cloning, expression and purification of cyclic-di-AMP biosynthetic enzyme Diadenylate cyclase (DacA/ DisA) from various bacterial species were currently undergoing. Fig. 2 B depicts the representative image of SDS-PAGE analysis of E. coli BL21 DE3 cells expressing DacA / DisA proteins of selected bacterial species. Fig. 2 C depicts a representative image of SDS-PAGE analysis of purified recombinant DacA enzyme of Streptococcus pyogenes. Purification of DacA / DisA protein of other bacteria are currently being carried out.

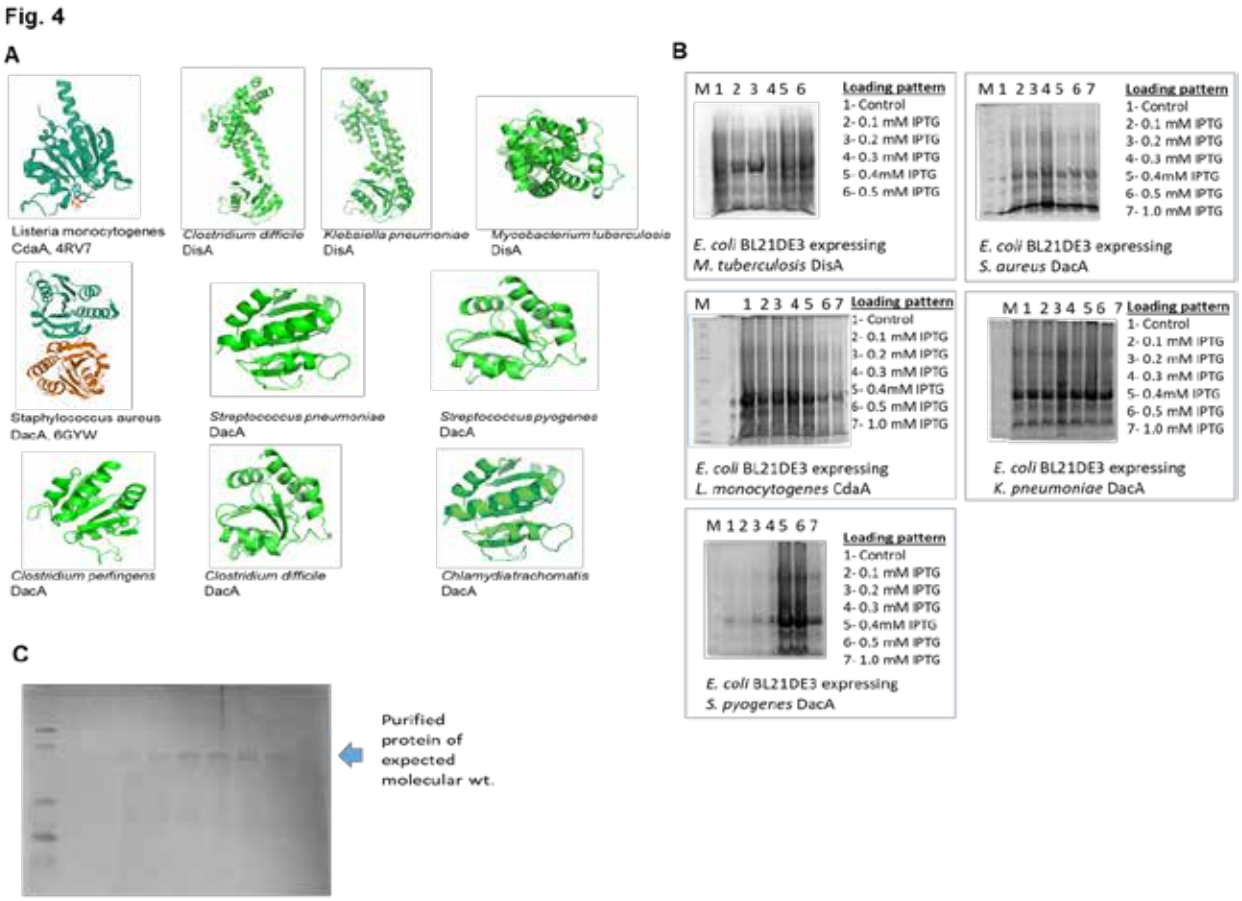


Fig. 2: *(A) available and modelled protein structures, (B) representative image of SDS-PAGE analysis of E. coli BL21 DE3 cells expressing DacA / DisA proteins of selected bacterial species, and (C) a representative image of SDS-PAGE analysis of purified recombinant DacA enzyme of Streptococcus pyogenes.*

C) Host-directed therapy against TB. (Funded by SERB-Ramanujan Fellowship, PI).

TB and diabetes are epidemiologically recognized risk factors for each other; however, underlying molecular mechanism of their co-pathogenesis remains largely unknown. Ectonucleotide pyrophosphatase/ phosphodiesterase 1 (ENPP1) is a known regulator that binds insulin receptor (IR) and inhibits insulin mediated activation of tyrosine phosphorylation and downstream signaling in T2D. On the other hand, ENPP1 exerts biologically relevant down-regulation of the cytosolic surveillance pathway (CSP) activation during M. tuberculosis infection, which is critical to host defence. Consequently, host cells lacking ENPP1 display enhanced clearance of M. tuberculosis. The dichotomy of ENPP1 function during M. tuberculosis infection and in the insulin signaling during T2D, thus motivates to hypothesize that a systematic investigation of the molecular mechanism of ENPP1 function in TB-T2D co-incidence could unravel the causative link between heightened morbidity and mortality of such cases and may lead to development of new host directed therapy for better management and control of TB-T2D co-incidences and fatalities. The main objectives are: (i) to characterize the role of ENPP1 in TB-Diabetes immuno-pathogenesis in the context of macrophage infection; (ii) to evaluate the immuno-therapeutic potential of targeting ENPP1 and associated signaling pathways in TB-Diabetes co-incidences; and (iii) to develop a novel clinically relevant mouse model of T2D for in vivo investigation of TB-T2D pathogenesis and evaluation of new therapies.

During the current reporting period, the following experiments were performed.

- Characterization of the innate cytosolic signaling pathway (CSP) major components such as cyclic GMP AMP Synthase (cGAS), stimulator of interferon genes (STING), Interferon-beta (IFN-β), interleukin-beta (IL1-β), tumor necrosis factor- alpha (TNF-α) and ENPP1 were performed using THP-1 human monocyte cells. As depicted in Fig. 3 A, THP-1 monocyte derived macrophages exhibited transcriptional upregulation of a number of cGAS-STING pathway genes in response to M. tuberculosis infection.
- We analysed the induction of LC3-I/II protein expression as an indicator of autophagosome formation in infected macrophages. We observed that, blocking of ENPP1 by EI-1 and EI-5 led to overall higher induction of LC3 proteins suggesting higher autophagosome formation (Fig. 3 B), which might be one of the contributing factor for restricted intracellular growth of M. tb in THP-1 cells. Currently, thorough analysis of IFN-β signaling pathway and cytosolic signaling pathway (CSP) in the presence of ENPP1 inhibitors is underway.

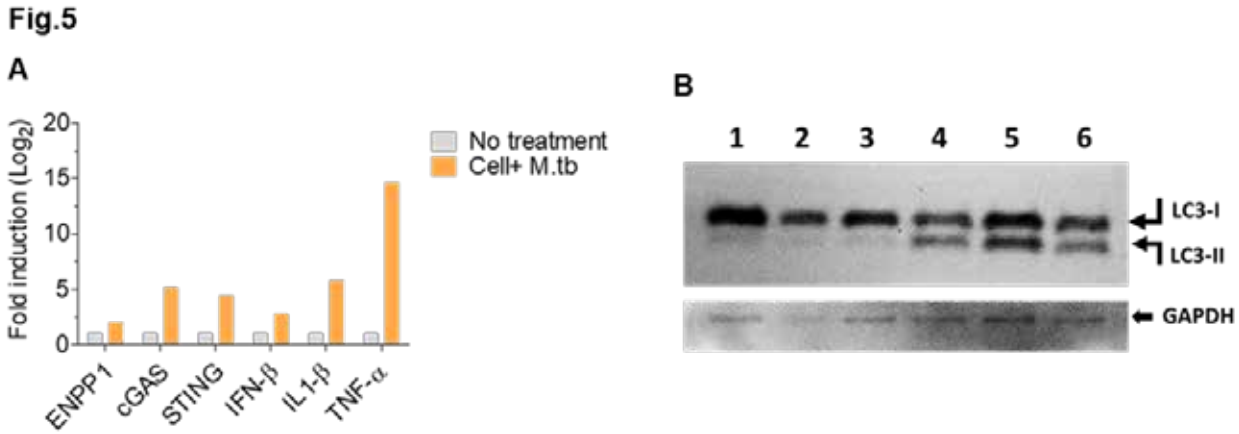


Fig. 3: *(A) Transcription upregulation of host genes following M. tb infection in human macrophages. THP-1 monocyte derived macrophages were infected with M. tb (Ra) with an MOI of 1:10. Twenty-four-hour post-infection total RNA were extracted and expression of important genes were measured by Real-time RT-PCR. The bar diagram depicts the relative fold induction of cGAS-STING pathway related genes; (B) Inhibition of ENPP1 leads to induction of autophagy by human macrophages. THP1 monocyte derived macrophages were infected with M. tb (MOI: 1:10) and subsequently inhibitors were added. Twenty-four hr post-infection LC3 protein expression were analyzed by wester-blot using anti-LC3-I/II antibody. GAPDH protein was used as an internal control. Lane 1- Cell No treatment, Lane 2- Cell+EI-1, Lane 3-Cell+EI-5, Lane 4- Cell+ M. tb, Lane 5- Cell+ M. tb + EI-5, Lane 6- Cell+ M. tb + EI-6.*

Future Plans:

A) Biomarkers of susceptibility and/or resistance to tuberculosis in native and crossbred cattle.

1. Perform Real-time-PCR analysis of major genes and pathways involved in TB immuno-pathogenesis on the extracted RNA from PBMC and whole blood stimulation assays. Dissection of immuno resistance and tolerance pathway.
2. Identify larger group/ number of native and corresponding crossbred cattle for performing Single Intradermal Tuberculin Test (SITT) and other sample collection and analysis for detection of MTBC DNA as well as immune responsiveness studies based on stimulation and infection experiments. Subsequently, categorization of animals into four groups: Group-A: Sick, TB+; Group-B: Sick, TB-; Group-C: Healthy, TB+; Group-D: Healthy, TB-.
3. After appropriate calibration of in vitro PBMC and MDM based experiments, comparative studies for assessment of phagocytosis efficiency, intra-macrophage growth of M. tuberculosis and M. bovis and subsequently transcriptomic studies will be performed.

B) Screening for inhibitors of a bacterial enzyme involved in biofilm formation and cell wall homeostasis to develop alternative antibacterial to limit AMR.

1. Purification of selected DAC protein of selected bacterial pathogens.
2. Procurement of shortlisted NCs from commercial provider and evaluation of the DAC inhibitory potential of selected NCs by in vitro enzymatic assays.
3. Assessment of shortlisted NCs on growth, biofilm formation and antibiotic susceptibility of selected bacterial pathogens.

C) Host-directed therapy against TB.

1. Dissecting the macrophage signaling pathway that enable ENPP1 inhibition mediated restriction of mycobacterial growth.
2. Developing a mouse model of T2D on the backdrop of BCG vaccination and M. tb infection that will be employed for in vivo investigation of TB-T2D pathogenesis and evaluation of new ENPP1 inhibitors.

The Lab Photo

Left to Right : Bhavesh Patil, Niti Kumari, Sripratyusha Gandham, Prerna Saini, Ketan Waigaonkar, Rishi Kumar, Repally Ayyanna and Bappaditya Dey

Research Projects
C. Bioinformatics, Nanotechnology & Stem Cells

Title: Livestock Genomics and Host Pathogen Interaction

Ravi Kumar Gandham

Research Group: **Dr. Ravi Kumar Gandham**

PhD students

Manas Ranjan Praharaj (CSIR – JRF)
Tejaswani Ambati (CSIR – JRF)

Project Personnel:

Neelima (NPDF)
Raja Ishaq Nabi Khan
Trainee – KJ Nanda Kishore

Collaborators:

Dr Subeer S Majumdar	NIAB, Hyderabad
Dr Sarwar Azam	NIAB, Hyderabad
Dr Benjamin D Rosen	USDA, USA
Dr Curtis P Van Tassell (Curt)	USDA, USA
Dr Himani Dhanze	IVRI, IzzatnagarW

Theme of Research :

Our group works on establishing breed signatures for all the indigenous breeds and on future implementation of genomics selection using the genomics chip developed at NIAB. We also work on identifying factors responsible for differential response in various hosts infected with Japanese encephalitis.

Development of Bos indicus high density SNP chip

1. A total of 181 animals out of 192 cleared all the thresholds and are considered for the final analysis (Fig 1). This included 15 duplicates; and 2 trios (Duplicate are marked in Green, Trios are marked in Pink). A clear clustering of Breeds was observed. Three animals (G-43 and TH-18) clustered differently are marked in Red
2. Out of the 1,286,558, a total of 948493 variants were called in 181 animals
3. Out of these SNPs - 788,496 were selected for the final version of the chip -IndiGau
4. The IndiGau Chip has also been validated and said to have ~ 97% best recommended markers
5. From the SNPs screened among the individual breeds, within the breed the SNPs were selected using various parameters - maf, LD, etc.
6. The data from each individual breeds is combined across breeds and discriminative SNPs were identified using TRES - toolbox for ranking and evaluation of SNPs
7. SNPs are ranked in TRES, which identifies SNPs based on three methods - Delta, F_{ST} and informativeness
8. Three options (1000, 25000 and 66000) were selected and got 708, 19869 and 53907 SNPs commonly selected across three methods
9. All these sets were used in PCA (Fig 2). The discriminative SNPs identified clustered the breeds into three distinct clusters
10. 708 SNPs - the top ranked one's seemed to explain more variation in comparison to 19689 and 53907

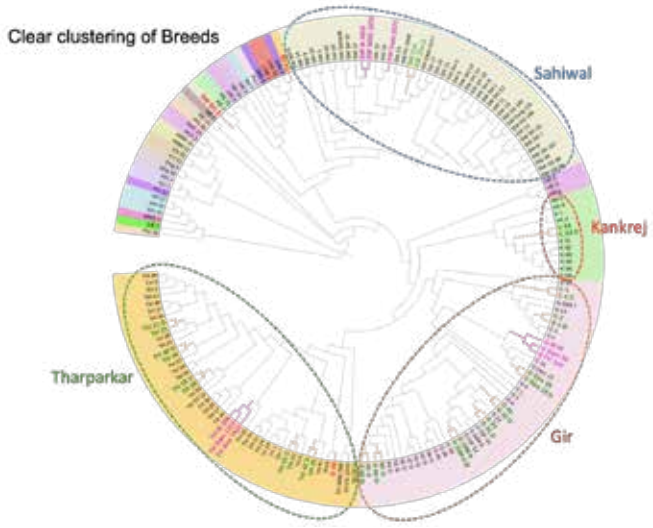


Fig 1. Clustering of breeds

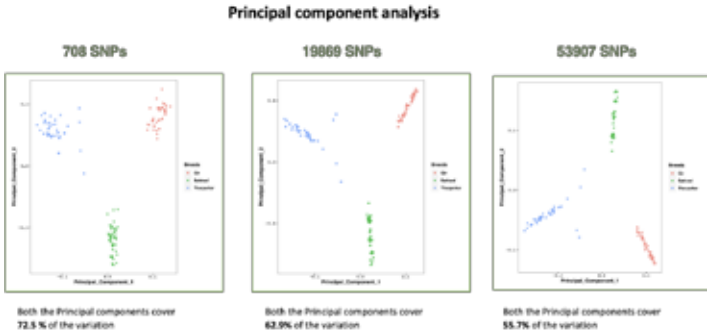


Fig 2. *PCA for all he sets of discriminative markers*

Diversity analysis and identifying molecules that are responsible for differential response to Japanese encephalitis virus in different hosts - Pig and human

Diversity analysis :-

Full length (1500bp) envelope gene sequences from 746 isolates distributed all over the world spanning between 1935 to 2019, were analysed to identify the genotype shift. All over the world, it was observed that there was a genotype shift from genotype III to genotype II (Fig 3). On analysing individual countries a similar trend was observed. In India and Japan, a spike in Genotype III JEV infection was observed between 2007 to 2009; and 2006 to 2008, respectively. In China, Genotype I, III and V were found with Genotype I predominating over the other two. Most of the genotype I isolates in China were of mosquito origin and the genotype III isolates were from different hosts. In Indonesia III and IV were found with a spike in Genotype I infection in 1979 and a spike in genotype IV infection in 1981.It was observed that Genotype IV predominated in Indonesia in the recent past. Most of the isolates were of mosquito origin with few of the genotype IV isolates from pig. In Japan, genotypes I and III, were found with a spike in Genotype I infection in 2008. Most of the genotype I and genotype III isolates were from mosquito, human and swine origin with a few isolates of genotype III from equid origin. In Korea, genotypes I, II, III and V, were found with a spike in Genotype III infection in 1983 and between 1987 - 1988. Genotype I was found to be predominant in Korea. The genotype I isolates were observed to be from mosquito and swine origin, the genotype II isolates from human origin, Genotype III isolates from human and mosquito origin and the genotype V solely from mosquito origin. In Taiwan, genotypes I and III were found with a spike in Genotype III infection in 2005. Some of the Genotype III isolates were of swine origin with most of the genotype I and V isolates from human and mosquito origin. In Thailand, only genotype I was observed with host origin - mosquito and swine. In Vietnam, Genotype I and III were found, with genotype I having a wider host origin - human, mosquito and swine and genotype III found only from human origin. In India, genotype I and III isolates were found with genotype III having a wider host origin - human, mosquito, swine and equid and genotype I found from human and swine origin. On comparing the genotypes across countries, genotype I was found predominantly in China and Japan, Genotype II was found in Australia and Indonesia, Genotype III in China, Japan and India, Genotype IV in Indonesia and Australia and Genotype V in Korea, Malaysia, Singapore and China. On comparing the host origin across the countries among the isolates, mosquito and human isolates were predominantly from India and China and swine isolates from Pig.

To assess the evolutionary relationship of the isolates across hosts within the same country, network analysis was done. The analysis on isolates in China revealed 174 haplotypes from 277 isolates. Within Genotype III, H_109, H_118 and H_169 had isolates from human and mosquito origin; H_142 had isolates from pig and mosquito origin and H_158 had isolates from pig and human origin. Within the genotype I, H_82 had isolates from human and mosquito origin. Most of the pig and human isolates of genotype III, were found directly connected to mosquito isolates in both the genotypes. On a closer look at these isolates some of the isolates between these hosts had two (H_140 to H_144), three(H_ 150 to H_147) or four (H_ 149 to H_147) nucleotide differences. Similar changes were seen among the isolates of genotype I across hosts. The genotype I clearly clustered away from genotype

III through a median vector. A change in single nucleotide was observed between a pig isolate - H_41 and mosquito isolates - H_42 indicating the evolving nature of the virus as as it jumps from one host to the other. Further, this H_41 isolate had one and two nucleotide differences, respectively, with H_39 and H_55 pig isolates. In India within genotype I, H_114 and H_93 had isolates from human and mosquito origin. Some of the pig isolates in both the genotypes in India were connected directly to the mosquito isolates. Within genotype III, the pig and mosquito isolates showed a similar network connectivity. The genotype I isolates clearly clustered away from the genotype III isolates with around 156 nucleotide differences. In Indonesia, genotypes IV, II and III clearly clustered from one another. Most of the isolates for Indonesia are of Pig origin. In Vietnam, The genotype I clearly clustered away from genotype III with 164 nucleotide differences. On analysing the genotypes vis - a - vis the countries of origin, the isolates seem to be connected across countries. The Japanese isolates were found close to the Taiwan and Korean isolates among the Genotype III isolates.

The BEAST analysis of Japanese isolates clearly predicted the TMRCA back to 1810. This is in concordance with the first outbreak in Japan that has taken place in 1874.

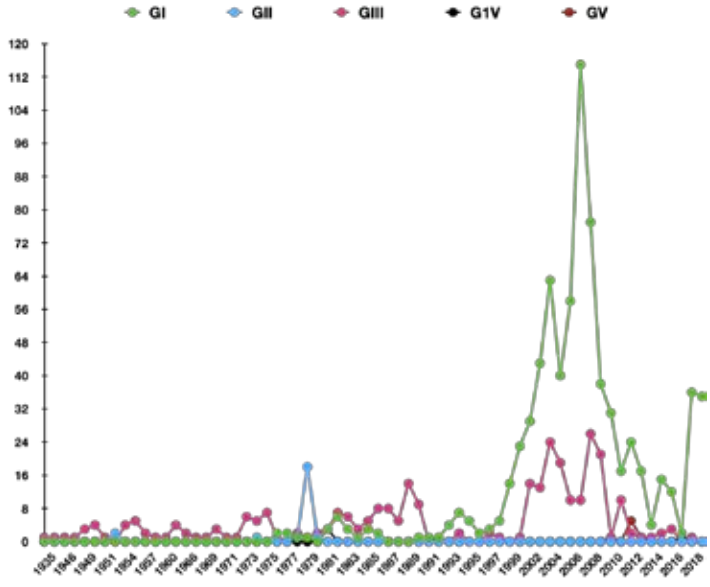


Fig 3. *Genotype shift from III to I*

Systems Biology : Japanese encephalitis (Pig vs human) :

In Human Cell line-

1. MOI of 7 was considered for further infection studies (Fig 4)
   - Immunofluorescence of SA-14-14-2 infected THP1 (Macrophage converted Human monocyte).
   - The Red colour indicated NS5 expression and was observed to be more at MOI 7.
2. 48h post infection was finalised to be the best time post infection to collect the infected cells for omics studies, however, cytokine profiling and titration assay will be done to further determine optimum hour post-infection.

In Pig Cell line-

3. MOI of 1 was considered for further infection studies (Fig 5)

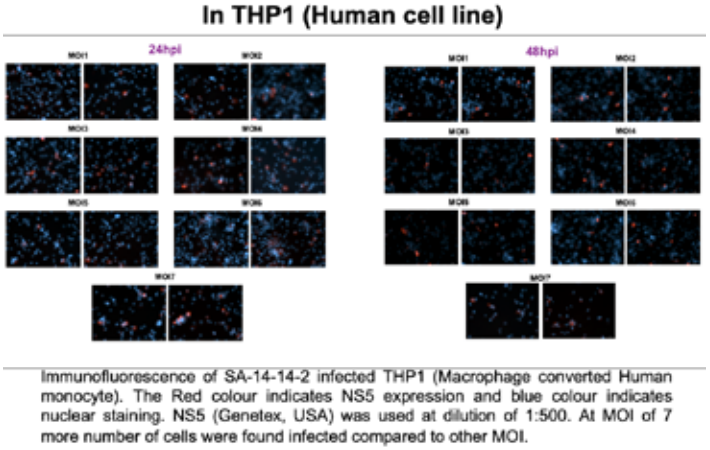


Fig 4. *THP1 cell line infected with JE*

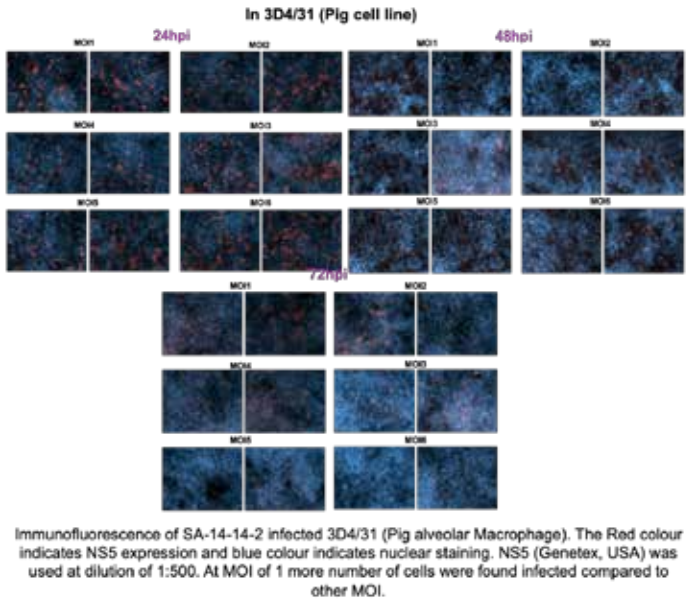


Fig 5. *3D4/31 cell line infected with JE*

Publications / patents

1. Solanki, K. S., **Gandham, R. K.,** Thomas, P., & Chaudhuri, P. (2020). Transcriptome analysis of Brucella abortus S19per immunized mouse spleen revealed activation of MHC-I and MHC-II pathways. Access Microbiol, 2(1), acmi000082. https://doi.org/10.1099/acmi.0.000082
2. Mohandoss Nagalingam, Thaslim J. Basheer, Vinayagamurthy Balamurugan, Rajeswari Shome, S. Sowjanya Kumari, G. B. Manjunatha Reddy, Bibek Ranjan Shome, Habibur Rahman, Parimal Roy, J. Joseph Kingston and **R. K. Gandham**(2021). Comparative evaluation of the immunodominant proteins of Brucella abortus for the diagnosis of cattle brucellosis. Veterinary World, 14(3): 803-812
3. Sameera Farah, Ashwin Atkulwar, Manas Ranjan Praharaj, Raja Khan, **Ravi Kumar Gandham** and Mumtaz Baig (2020). Phylogenomics and phylodynamics of SARS-CoV-2 genomes retrieved from India. Future Virology,30 Nov 2020. https://doi.org/10.2217/fvl-2020-0243
4. Gandhi, S. **Ravi Kumar Gandham** (2020). Graphene functionalized field-effect transistors for ultrasensitive detection of Japanese encephalitis and Avian influenza virus. Sci Rep, 10(1), 14546. https://doi.org/10.1038/s41598-020-71591-w.

The Lab Photo

Left to Right: Manas Ranjan Praharaj, Ravi Kumar Gandham, Tejaswi Ambati & Neelima Hosamani

Title: **Unlocking genomics potential for increased nutrition and productivity**

Shailesh Sharma

Research Group: Dr. Shailesh Sharma

PhD students:

Vanamamalai Venkata Krishna

Itishree Jali

Project Pesonnel/Trainees:

Priyanka Garg (16th Sep 2019 – 10th Mar, 2021),
M. Emmanuel Raj (since 7th Jan, 2021)

Collaborators:

Dr. Vishesh Kumar Saxena	CARI, Izatnagar
Prof. B Senthilkumaran	UoH, Hyderabad
Dr J. P. Pandey	CTR & TI, Ranchi.
Dr. Gautham Kolluri	CARI, Izatnagar

Objective and Theme of Research:

Our team's research experience span bioinformatics and structural biology, including application of data mining, application of bioinformatics tools, computational biology, and structure-activity relationships. Present work includes (a) identification of lncRNAs during host responce against NDV. (b) investigations into structural, functional and dynamic properties of proteins. (b) genome annotation, protein structure, target identification, and molecular dynamics simulations.

Presently we are working on following projects:

1. Analysis of RNA-Seq Data to infer key molecular players involved during host response to Newcastle disease virus challenge in transcriptome of Gallus gallus.
2. Analysis of RNA-Seq data to identify long non-coding RNA in sex-determination of *Bos taurus*.
3. Sequencing of whole genome of tasar silkworm, Antheraea mylitta:

Work Reported in 2020-2021:

1) Analysis of RNA-Seq Data to infer key molecular players involved during host response to Newcastle disease virus challenge in transcriptome of Gallus gallus domesticus in Fayoumi and Leghorn.

Introduction and Aim: Long non-coding RNAs (lncRNAs) are the transcripts longer than 200 nucleotides length that are dynamic regulatory molecules.

Previous work done: To achieve this aim we installed software's, downloaded publicly available datasets and read literature. We prepared a home-made highthroughput pipeline to identify the DElncRNAs and DEGs. All details are available in our publication.

Progress made in current year: Using bioinformatics approaches, we conducted differential expression analysis and determined the potential role of lncRNAs in Leghorn and Fayoumi breeds of *Gallus gallus* domesticus. Functional annotation using co-expression analysis revealed their involvement in regulation of various pathways. Additionally, we identified lncRNAs as putative miRNA precursors and the interaction of lncRNAs with transcription factors. In brief, these transcripts coordinate important biological functions via interactions with both coding and non-coding RNAs as well as Transcription Factors during host response against NDV challenge in Leghorn and Fayoumi breeds of Gallus gallus domesticus. Our study would facilitate future experiments in unravelling regulatory mechanisms of development in this genetic improvement of the two breeds of Gallus gallus.

(Paper is published in Scientific Reports)

Conclusion with future studies:

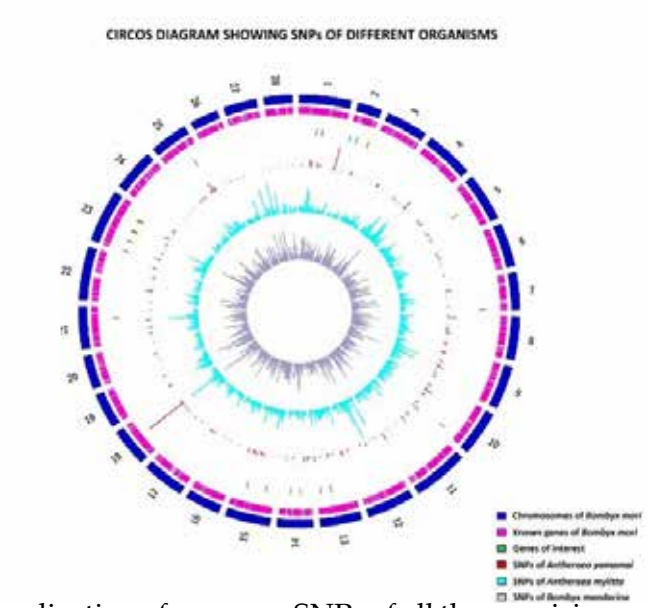
2) Long non-coding RNAs and Sex determination:

In our study we will be identifying the potential role of lncRNA in fetal developmental stages with the transcriptome data analysis. Studies suggest that the well-studied SRY gene located in the Y chromosome has peak expression at 39 days in Bos taurus. In-silico approaches will be used to analyse the RNA-Seq datasets at different time points. We will be analysing DEGs and DElncRNAs.

3) Sequencing of whole genome of tasar silkworm, Antheraea mylitta:

Introduction and Aim: Sequencing of whole genome of tasar silkworm, Antheraea mylitta.

Previous work done: To achieve this aim, we read literature and installed software's for SNP identification and assembly. Firstly, by using the shallow sequencing data of A. mylitta, we have identified the SNPs against Bombyx mori as a reference genome. Apart from this, SNPs in two other sericigenous insects i.e. Antheraea yamamai and Bombyx mandarina which were least studied as compared to Bombyx mori were also identified against Bombyx mori as reference genome. The SNPs identification was done by using three tools that are GATK pipeline, Mplieup and freebayes of these three sericigenous insects against Bombyx mori. In Antherea mylitta, 263180, 482724 and 349653 SNPs were found by using three different tools i.e. GATK, mpileup and freebayes respectively. We plotted the



localization of common SNPs of all three sericigenous insects against the chromosomes and known genes of Bombyx mori by using Circos tool (Figure 1).

Figure 1: Circos plot showing the SNPs identification of three different sericigenous insects against Bombyx mori.

Progress made in current year:

We have assembled the 10X paired-end data by using the Supernova assembler. Afterwards, for for Genome size estimation of Illumina paired-end data, Jellyfish and GenomeScan softwares were used. Error Correction of PacBio reads using high quality paired-end reads. Scaffolding with Error corrected PacBio reads and Evaluating the completness of the high-quality hybrid assembly by using LorDec and SPACE-LongReads. Moreover, we have predicted 24,215 genes by using BRAKER2 5833 and identified 5833 Ortholog Groups between Bombyx mori, Antheraea yamamai and Antheraea mylitta (Figure 2).

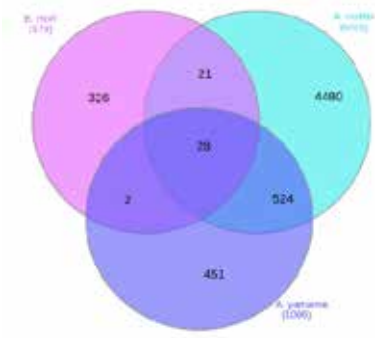


Figure 2: *Venn diagram showing the Orthogroups between Bombyx mori, Antheraea yamamai and Antheraea mylitta*

Conclusion with future studies:

In our study we will be annotating the genes by using BLAST2GO. From this, we can identify the biological functions and pathways of the genes.

Publications / Patents:

1. Vanamamalai, V.K., Garg, P., Kolluri, Gandham R., Jali I., **Sharma S.** (2021) Transcriptomic analysis to infer key molecular players involved during host response to NDV challenge in Gallus gallus (Leghorn & Fayoumi). Sci Rep 11, 8486.
2. Kushwaha SK, Kesarwani V, Choudhury S, Gandhi S, **Sharma S.** (2020) SARS-CoV-2 transcriptome analysis and molecular cataloguing of immunodominant epitopes for multi-epitope-based vaccine design. Genomics 112(6): 5044-5054.
3. Karunakar, P., Mishra, S.P., Razazan, A.P., **Sharma, S.** and Yadav, H. (2020) Identification of potential agonist of human and mouse FFAR2 by homology modeling and molecular docking study approach. The FASEB Journal, 34: 1-1.

The Lab Photo

Left to Right: Priyanka Garg , Itishree Jali, Shailesh Sharma, Venkata Krishna Vanamamalai

Title: **Bioinformatics: Marker Discovery and Comparative Genomics**

Sarwar Azam

Research Group: **Mr. Sarwar Azam**

Project Personnel/Trainees

Lokesh Kumar
Lakshmi Prasad
Naveen Kumar Pandey

Collaborators:

Dr Subeer S Majumdar	NIAB
Dr Ravi Kumar	NIAB
Dr Syed Faisal	NIAB
Dr Shoor Vir Singh	GLA University
Dr Benjamin D Rosen	USDA, USA
Dr Curtis P Van Tassell (Curt)	USDA

Theme of the scientific activity: The research includes analysing sequence data for genome annotation, gene expression, identifying single nucleotide morphism (SNPs), comparative genomics, phylogenomics and other evolutionary analysis. Lab has also been interested in developing easy to use bioinformatics tools and pipeline to facilitate genomic studies.

Genomics for conservation of indigenous cattle breeds and for enhancing milk yield

Data analysis

A total of 48.1M SNPs from freebays method were identified across all the breeds. All these SNPs were filtered through series of steps. Majority of SNPs were filtered at thinning step

and only SNPs which do not have any polymorphism within 30 bp upstream and downstream were selected. Bi-allelic SNPs with no more than 1% missing genotype and atleast 5% minor allele were selected. Finally, 1290488 SNPs were selcted. These SNPs also contain very important SNPs from other sources like bos-taurus QTL, Bovine HD chip, Bovine Affymatrix Chip, known Bos taurus X chromosome SNP, and ISAG marker for parentage analysis.

Design of SNP chip

With aim of developing largest cattle SNPs, we proposed to design two SNP chips for the screening of a small subset of samples. This will help us to identify the most robust and informative SNPs to include in final DBT-NIAB-Axiom cattle Genotyping Array. So that we can finally achieve the densest SNP array for cattle. We developed two SNP chip here referred as Cattle-SNPchip-Ver1-A and Cattle-SNPchip-Ver1-B. Cattle-SNPchip-Ver1-A was consist of 652084 probes and 645332 SNP markers. A total of 6752 VIP markers were having repeated probes in chip. Cattle-SNPchip-Ver1-A has highest number of SNPs markers from chromosome 1 of Brahman genome whereas least number of markers were represented from chromosome 25 (Figure1). On the other hand Cattle-SNPchip-Ver1-B has 651925 probes consisting of 645156 markers of which 6769 markers were having repeated probes. Version1-A and Version1-B were having similar number of markers on each chromosome (Figure1). SNP density of each chromosome in both the chip were in range of 205 to 244 SNPs/Mbp.

Developing de novo genome assemblies of milch breeds of cattle i.e. Kankrej, Tharparker, Red Sindhi, Sahiwal and Gir

Structural variations such as large insertions and

deletions frequently occur in different breeds of a species. These variations also impact phenotype or trait of that breed. In order to capture these structural differences between Tahrparker, Gir, Sahiwal, Red Sindhi and Kankrej breeds, 10X chromium library was prepared and sequenced. Initial supernova assembly of each breed was developed. These phased pseudohap was further anchored and oriented on brahman genome assembly. Most of contigs were placed in chromosomal regions of Brahaman assembly. Brahman reference genome size is 2.68 GB while all other breeds assembly size were assessed from 2.71 to 2.78 Gb. This is because thousands of contigs has been placed on reference with gap size of 100Ns. This increased the cumulative assembly size as well as chromosomes size. Least increase was observed in Sahiwal genome because Sahiwal supernovoa assembly was more contiguous and have least number of pseudohaps. For the same reason N50 statistic of Sahiwal genome assembly is much closer to Brahaman reference genome. Further comparison of each breed for structural variations especially large structural variations were extracted with help of RAGOO software. Scaffolds of improved reference based pseudohap assemblies of each breed was mapped onto Brahaman genome using Minimap2 software. Structural variants were calculated against reference genome using Assemblytics software. Large deletions i.e. deletion of more than 1 kb was extracted for each breed and overlapping statistics were plotted using R software (Figure 2). It is observed that most of the deletions are breed specifics and donot shared by any other breeds. However, there were 808 large deletions which were found common in all breeds against Brahaman genome. This shows 808 fragments are only present in Brahaman but absent in all other analysed breeds. Similarly, insertions were also extracted for each breed against Brahman reference genome. It is bit surprising to observed very few insertions in comparison to deletions from the same dataset. All of these insertions were of small length and only 8 insertions are shared by all breeds.

Exploring Leptospira genomes for phylogenetic analysis and vaccine candidate selection

Earlier we have reported 26 species of Leptopsira clustered with pathogenic clad and analysis of its core and Softcore genome. The soft-core genome consists of 2408 genes of which 1478 genes are present in all species. Other proteins are present in at least more than 22 out of 26 (95%) species. These are highly conserved proteins. Softcore genome i.e. 2408 genes of all pathogenic leptospires were screened for subcellular localizations and 58 proteins were predicted as either outer membrane or secretory proteins. Out of 55, 3 proteins were showing homology with host homologs and discarded. Further, all 52 selected proteins were screened for antigenicity. Sixteen proteins were having antigenicity score less than threshold value 0.5 were discarded. Thus, a total of 36 proteins were selected for adhesin capability. only 19 proteins were selected as confident protein with good adhesins properties. Signal sequences of each proteins were removed and only functional sequence were regarded as potential antigen and subjected for downstream analysis. Each of 19 proteins showing adhesin capabilities were also screened for allergenicity in human. Only one Outer Membrane protein (WP_011671323) that shows significant match with known allergen "Sar s 1 allergen Yv5032C08" were excluded. All non-allergen protein antigens were analysed further for epitope predictions for B and T lymphocytes.

Protegenicity analysis:

The recently developed Machine learning based pipeline by Ong et al. (Ong et al. 2020) has been used to predict protegenicity (protective antigenicity) for each adhesins. In our analysis, all adhesins were predicted with protegenicity score more than 90, infact four proteins score more than 99. As all adhesin like proteins has been predicted to induce protective Immunity on basis of protegenicity score, so each protein can be considered as suitable antigen for vaccine candidate. To select further, we annotated each antigen in terms of B-cell, T-cell epitopes and other Immunogenic properties such as immunogenicity, Antigenicity , promiscusity and population coverage.

Assesment of Immunological properties:

B cell epitope Identification: B cell epitope in all 18 potential antigen proteins were identified using two different tools i.e. BCPREDs and IEDB Bepipred 2.0. BCPred Predicted epitopes which were also predicted by Bepipred either identical or with sufficient overlap were selected as confident B cell epitopes. A confident set of 72 epitopes were observed in all the 18 proteins antigen. Each protein was having at least 1 epitope whereas protein "WP_011671327" and "WP_011670696" has maximum of 7 epitopes.

T cell epitope Identification and immunogenicity: We identified epitopes binding to MHC-I reference allele in the range of 10 to 94 for each of 18 antigens. Similarly, epitopes binding to MHC-II reference alleles were predicted in the range of 15 to 87 for each antigen. Calculation of immunogenicity score

for 18 antigens showed that only 12 antigens are immunogenic with positive score.

Promiscuous epitopes: All predicted epitopes were filtered on the basis its binding to four or more MHC-I and MHC-II reference set of alleles and identified as promiscuous epitopes. A total of 69 epitopes were identified as promiscuous epitopes of which 29 epitopes binds to MHC-I reference allele and 40 epitopes binds to MHC-II reference alleles. However, only six protein antigens were predicted to have promiscuous epitopes for both MHC-I and MHC-II reference set of alleles.

Population Coverage Analysis: Population coverage is the assessment of individuals in the population which can interact with epitopes of antigen. Antigen "NP_714239" and "WP_011671327" was predicted with 100 % population coverage over the World and South Asian population and thus having highest coverage among all 18 antigens. Population Coverage of remaining 16 antigens was obtained in the range of 99.99% to 92.31% for World and 99.99% to 91.04% for South Asian countries.

Selection of suitable Vaccine Candidates: A non-redundant set of 6 antigens which qualify all the parameters were selected as final vaccine candidates (Table1) for further testing and challenging in the animal model.

Construction of multipeitopic vaccine: Further we clustered all epitopes of 6 potential vaccine candidate and construct an chain of amino acid sequence which have B cell, MHC-I and MHC-II epitopes from each of 6 proteins. were clustered and stitched into a single 425 amino acid long multi-epitope vaccine construct. In-silco simulations have shown promising B-cell and T-cell immune response. With encouraging results, present study is a step towards development of universal vaccine for Leptospirosis.

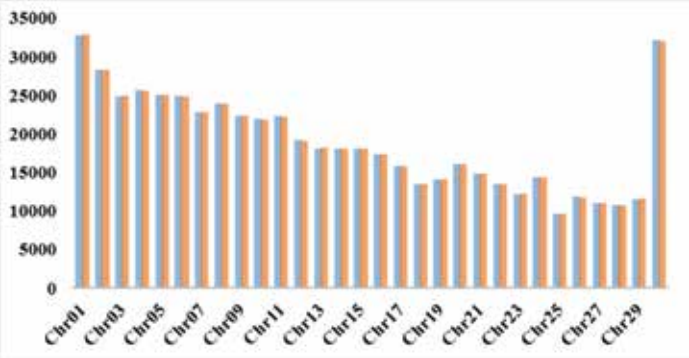


Figure1: *Distribution of SNPs on different chromosomes in SNPchip-ver1-A and SNPchip-ver1-B*

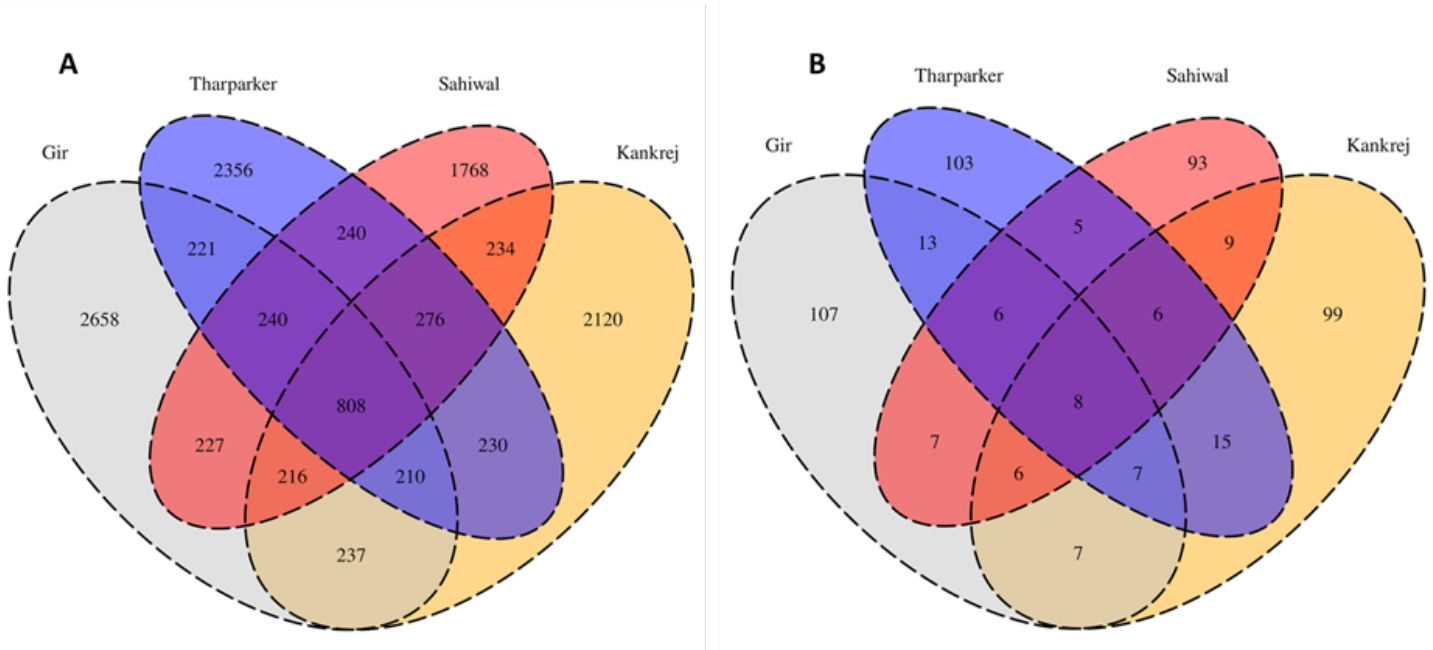
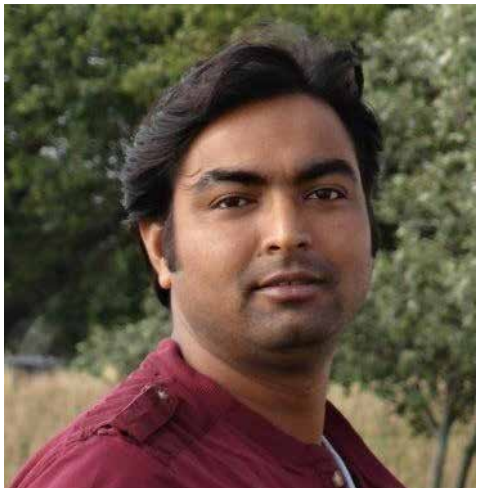


Figure2: *Depicting (A) deletions (B) insertions shared among different cattle breeds with reference to Brahaman genome.*

S. No.	Accession ID	B-Cell Epitope	T-Cell Epitope		No. of promiscuous Epitopes		Immunogenicity	Antigenicity	Protegenicity (%)	Function
			MHC-I	MHC-II	MHC-I	MHC-II				
1	NP_712625	3	48	69	4	1	1.51	0.60	92.31	Outer membrane protein
2	NP_714239	4	53	79	3	7	1.64	0.75	93.98	Outer membrane protein
3	WP_011669637	5	26	40	1	4	0.65	0.67	98.03	Putative lipoprotein
4	WP_011670051	3	61	69	2	5	2.53	0.60	97.98	Uncharacterized protein
5	WP_011670465	6	52	59	3	10	0.59	0.73	99.68	Alginate export family protein
6	WP_011671327	7	94	74	1	8	4.49	0.61	99.75	TonB-dependent receptor plug domain protein

The Lab Photo

Left to Right: : *Lokesh Kumar, Sarwar Azam, Naveen Kumar Pandey, Lakshmi Prasad*



Title: **Molecular Genetics for Animal Health and Welfare**

Sandeep Kumar Kushwaha

Research Group: **Dr. Sandeep Kumar Kushwaha**

Project Personnel:

Karthic Ananda Krishnan, Trainee (Since Feb 2021)

Collaborators:

Dr. Sonu Gandhi	NIAB, Hyderabad
Dr. Sandeep Goel	NIAB, Hyderabad

Our lab is focused on animal molecular genetics to develop methods, tools and resources for animal disease diagnosis and treatment. Our primary objectives are (a) Bioinformatics data analysis and development of computational resources to support livestock research in India, and (b) development of more sensitive high-throughput tools for the detection of livestock diseases and emerging pathogens. Presently, our lab is engaged in following projects:

- Bioinformatics cataloguing of aptamer libraries from publicly available SELEX resources for animal disease diagnosis
- Identification and validation of bovine biomarker for the detection of sub-clinical mastitis

Bioinformatics cataloguing of aptamer libraries from publicly available SELEX resources for animal disease diagnosis

Aptamers, a short stretch of single stranded nucleic acid (DNA/RNA) sequences with strong binding affinity for biological targets are identified through SELEX wet-lab experiments (Systematic Evolution of Ligands by Exponential enrichment). Due to high specificity and binding affinity, aptamers have been widely used in life science research, food safety, and environment monitoring investigations. Aptamers also demonstrated the potential in disease diagnosis and therapeutics researches. Application of aptamers have been reported for several human diseases. In spite of high success and application potential, use of aptamer are still limited in animal disease diagnosis and therapeutics. Here, we proposed to generate in-silico optimized aptamer libraries for the expressed bovine protein and peptides for mastitis disease from publicly available SELEX resources.

Objectives

- *In-silico* cataloguing of aptamer libraries from DNA/RNA SELEX resources for biological targets associated with animal diseases.
- Development of computational method for the high throughput screening of aptamers for biological targets at large scale.
- Generation of bioinformatics resources to contribute in the area of animal disease diagnosis.

Work done and progress: To achieve our objectives, a computational pipeline have been developed to identify aptamer sequences for biological targets. A research proposal has been developed with above mention objectives and submitted at SERB for research funding.

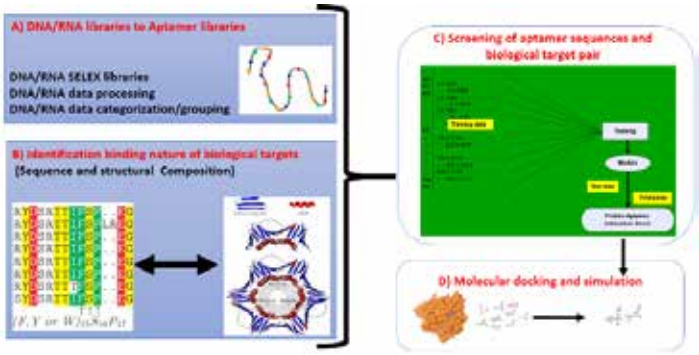


Figure 1 *Computational pipeline for aptamer identification and characterization for biological targets.*

Identification and validation of bovine biomarker for the detection of sub-clinical mastitis

Subclinical form of bovine mastitis (SCM) are affecting the bottom line of dairy industry by reducing milk and milk product quality, lower pricing, suppressing the reproductive potential of animal and other management service cost. Moreover, SCM animal maintain a reservoir of infection which can work as source for herd infection. SCM is mainly detected through elevated somatic cell count (SCC) worldwide. However, SCC are influenced by various factors such as age, lactation period, parity, season, stress, management and breed, and not always correlate with udder infection. Detection limit of SCC based methods are relatively low and highly variable among animals. Therefore, a high quest for the discovery of SCC independent bovine biomarker for SCM diagnosis. Here, multi-omics approaches have been used to enlist SCM diagnostics marker from milk sample. Selected candidates will be validated through real-time qPCR and western blot techniques in the mastitis milk samples of indigenous cows.

Objectives

- Develop bioinformatics approach for biomarker identification and selection.
- In vitro validation of selected candidates through real-time qPCR and western blot

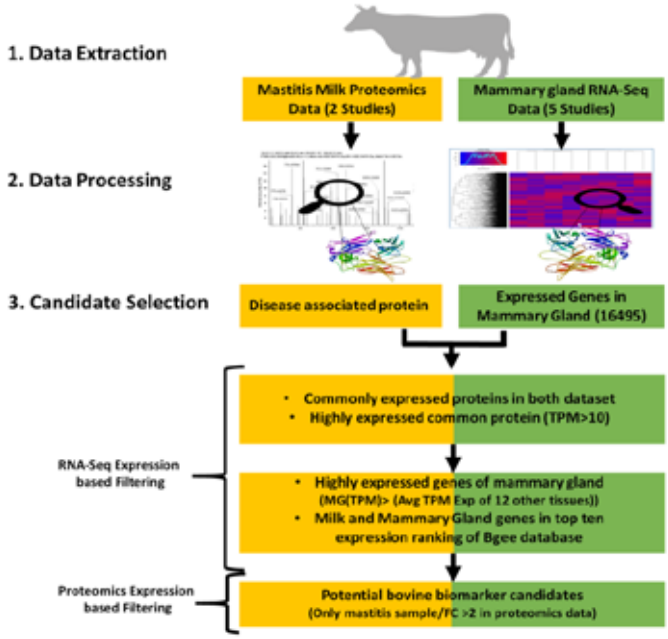


Figure 2: *Schematic representation of used workflow for the study.*

Work done and progress:

To achieve our objectives, a data processing workflow has been developed through a pilot study. In this pilot study, three sub-clinical mastitis milk proteome projects (27 control and 43 diseased samples) were processed together to scan host proteome to identify mastitis associated proteins in milk samples. Total, 688 proteins were exclusively identified in diseased milk samples. Transcriptome of six healthy bovine mammary gland were explored for mammary gland gene expression profile. Identified mastitis associated protein were checked for mammary gland gene expression profile and common genes were selected from both the dataset for further study. Later, commonly identified genes were explored for tissue specificity. After gene ontology analysis and literature study, five proteins

are selected for experimental validated. On the basis of validation results, a research application will be prepared for the screening of milk sample at large scale.

Publications

1. Kushwaha SK, Kesarwani V, Choudhury S, Gandhi S, and Sharma S (2020) SARS-CoV-2 transcriptome analysis and molecular cataloguing of immunodominant epitopes for multi-epitope based vaccine design. Genomics 112: 5044-55.

The Lab Photo

Left to Right: Sandeep Kushwaha, and Karthic Ananda Krishnan

Title **Quick diagnostics / therapeutics using smart nanomaterial for animal welfare**

Sonu Gandhi

Research Group: **Dr. Sonu Gandhi**

PhD students

Akanksha Roberts (JRF)
Subhasis Mahiri (JRF)
Sagar Narlawar Shrikrishna (JRF)

Project Personnel/Trainee

Deepshikha Shahdeo (since Jan 2019)
Veerbhan Kesarvani (since October 2020)
Pratik Kolhe, Fellow (since March 2021)
Rupal Gupta, Trainee (since Jan 2021)
Samaraggi Choudhury, (from November 2019-June 2020)
Akshay B Chandra, Trainee (since Jan 2021)
Naina Abbineni, Trainee (from Jan 2020-June 2020)

Collaborators

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Prof. Chandra Sekar Sharma	IIT Hyderabad
Prof Sergei E. Eremin	Moscow State University, Russia
Dr Vivek K Bajpai	Inha University, Incheon, Republic of Korea
Dr Shruti Shukla	TERI, Gurugram
Dr Raghuraj Chouhan	Jožef Stefan Institute, Slovenia
Dr Jahangeer Ahmed	King Saud University, Saudi Arabia
Dr Sandeep Kushwaha	NIAB, Hyderabad
Dr G J Archana	Gandhi Hospital, Hyd
Dr Arup Kumar Benerjee	N B Medical College, Kolkata

Our lab work is focused on to miniaturization of the devices for the efficient detection of bacterial, viral, pesticides, and toxins in livestock and poultry diseases. To execute this work, we are developing robust assays using novel biomaterials and biomolecules. Another area of research is on to develop therapeutic nanovehicle for targeted delivery.

Smart nanosensors for rapid detection of Japanese Encephalitis

We have fabricated FET sensor for JEV detection using antigen and its specific antibody. The sensing capabilities of FET device was monitored by continuously measuring the resistance of graphene channel for different concentrations of Ag using a lock-in amplifier.

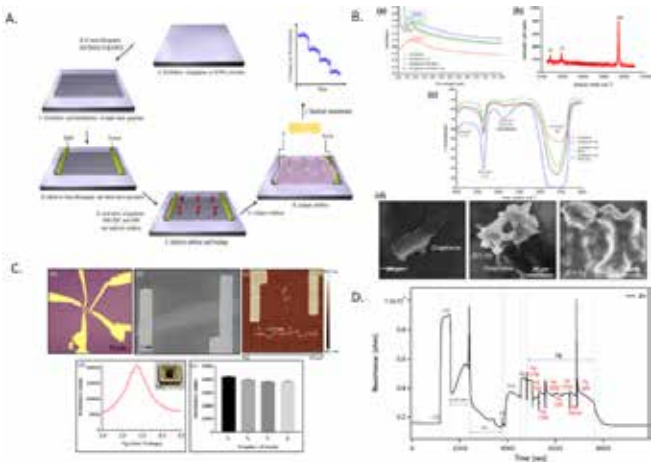


Figure 1. A. *(a) Schematic representation of the steps involved in the fabrication of GraFET biosensor. B. Biophysical characterisation of graphene and its bioconjugate C. FET Device characterization. D. Kinetic response of developed GraFET device of Japanese encephalitis virus (JEV)*

Fabrication of microfluidic device for Mycotoxin detection with specific aptamers

Aflatoxins pose huge economic burden causing around 25% or more of the world food crops to be destroyed every year. When B1 is ingested by cow, it is secreted as hydroxylated metabolite aflatoxin M1 (Afl M1) in the urine and milk of the cow. Consumption of food containing aflatoxin concentrations of one milligram/ kilogram or higher has been suspected to cause aflatoxicosis, the prognosis of which consists of acute liver failure, jaundice, lethargy and nausea, eventually leading to death in 1 to 2 weeks, based on past out breaks. An aptamer (as biorecognition element) based detection is in increasing demand, due to its higher specificity compared to antibodies, and ease of production in case of antibodies to limit the cross reactivity Microfluidic devices gaining importance as cheap, mass producing, ecofriendly, can be used as alternative technology for on-site detection of Afl B1 and M1.

We have fabricated paper microfluidic device for aflatoxin B1, M1 detection in milk samples based on colorimetric pr ocedure.

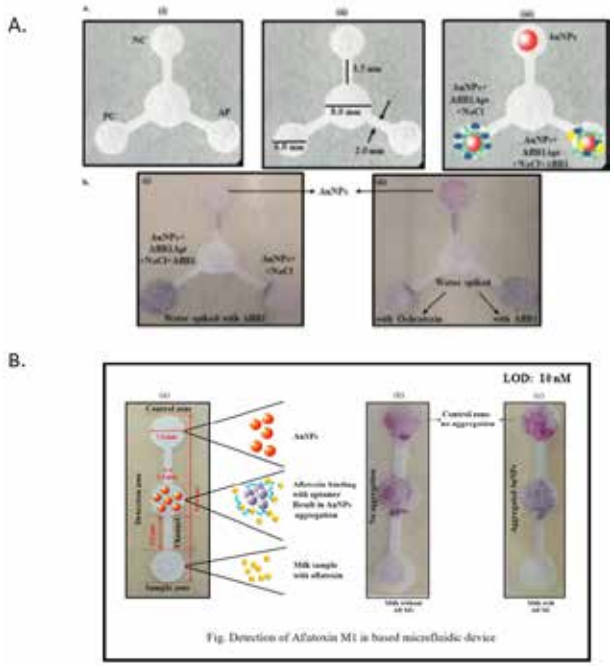


Figure 2. A. *The colour development after spiking Afl B1 in water and (ii) colour development in presence of AflB1/ no change in colour in presence of ochratoxin in water. B. Microfluidic device (μPAD) for the detection of Aflatoxin M1 in milk; (a) Detailed dimensions of the paper based device; (b,c) Paper device in absence and presence of Aflatoxin M1.*

COVID-SCAN (Novel diagnostic platforms for point-of-care SARSCoV-2 detection)

We propose to develop a rapid diagnostics assay that will detect for the presence of SARS-CoV-2 in quick and cost effective manner using aptamers, peptide, and antibodies based assays and biosensor platforms.

Development of Multiplex/Disposable Paper Microfluidic Device for Detection of β-lactam antibiotic residues in livestock and poultry products

The objective of this proposal is to develop an affordable biosensor for quality testing to monitor β-lactam antibiotic residues in livestock and poultry products by developing biosensor platforms in milk, meat, and eggs.

Development of a new generation of biosensors integrated with nanostructured sensitive elements for detection of Salmonellosis

The present investigation was undertaken to develop biosensors primarily for the lab-based use for early, cost-effective, diagnosis of Fowl disease.

Iron oxide nanoparticles-peptide complexes for imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics(Ongoing)

Development of peptide functionalized gold nanoparticles for efficient targeting and imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics (completed in May 2020)

Publications

1 Raghuraj Singh Chauhan, Jerman, David Heath, Sivasambu Bohm, Sonu Gandhi, Veera Sadhu, Syed Baker and Milena Horvat, Emerging tri-s-triazine-based graphitic carbon nitride: A potential signal-transducing nanostructured material for sensor applications. NanoSelect, 2020, 2 (4), 712-743.

2. Yasun E*, **Gandhi S***, Choudhury S, Mohammadinejad R, Benyettou F, Gozubenli N, and Arami H (2020) Hollow Micro and Nanostructures for Therapeutic and Imaging Applications. Journal of Drug Delivery Science and Technology 102094. (*=equal contribution)

3. Kushwaha SK, Kesarwani V, Choudhury S, **Gandhi S,** and Sharma S (2020) SARS-CoV-2 transcriptome analysis and molecular cataloguing of immunodominant epitopes for multi-epitope based vaccine design. Genomics 112: 5044-55.

4. Roberts A, Chauhan N, Islam S, Mahari S, Gawri B, Gandham RK, Majumdar SS, Ghosh A, and **Gandhi S** (2020) Functionalized Graphene-Based Field-Effect Transistors for Detection of Japanese Encephalitis and Avian Influenza Virus. Scientific Reports 10: 1-12.
5. Kaushik S*, **Gandhi S***, Chauhan M, Ghosh S, Chandrasekharan A, Parmar AS, Sharma A, Santhoshkumar TR, and Suhag D (2020) Water-templated, Polysaccharide-rich, Bio-artificial 3D Microarchitectures as Extra-Cellular Matrix Bioautomatons. ACS Applied Materials & Interfaces 12: 20912-20921. (* = equal contribution)
6. Han YK, Shukla S, Haldorai Y, Bajpai VK, Khan I, Sung-Min K, **Gandhi S**, Huh YS (2020) Bioreceptor-free, sensitive and rapid electrochemical detection of patulin fungal toxin, using a reduced graphene oxide@SnO2 nanocomposite. Material Science & Engineering C 113: 110916.
7. Kasoju A, Khan AA, Shrikrishna SN, Shahdeo D, Alanazi AM, **Gandhi S** (2020) Microfluidic Paper Device for Rapid Detection of Aflatoxin B1 using Aptamer Based Colorimetric Assay. RSC Advances 10: 11843–11850.
8 Sarthak Nandi, Ayusi Mondal, Akanksha Roberts, Sonu Gandhi. Biosensor platforms for rapid detection of HIV. Advances in Clinical Chemistry, 2020, 98, 1-34.
9. Akanksha Roberts, **Gandhi S** (2020) Japanese encephalitis Virus: A Review on Emerging Diagnostic Techniques. Frontiers in Bioscience 25: 1875-1893.

Patents

1. **Sonu Gandhi,** Subhasis Mahari, Akanksha Roberts, Ravi Kumar Vuddagiri, System and methods of electrochemical sensing molecules in a solution. Patent application number 202041017366, National filing date 22nd April 2020.

The Lab Photo

Left to Right: Pratik Kolhe, Deepshikha Shahdeo, Sagar Narlawar Shrikrishna, Rupal Gupta, Sonu Gandhi, Akanksha Roberts, Veerbhan Kesarwani, Subhasis Mahari, Akshay B Chandra.

Title: **Stem cell and allied therapies in livestock**

Sandeep Goel

Research Group: **Dr. Sandeep Goel**

PhD Student:

Shivam Saini (since Oct. 2020)

Collaborators:

Dr. Mohamad Idris CCMB, Hyderabad

Education and training:

Dr. Goel completed his B.V. Sc. & A.H. (1996) with honours from Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur, India, and M.V.Sc. (2000; Animal Biotechnology) from Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai, India. In 2000, he joined CSIR-Centre for Cellular and Molecular Biology (CCMB) as a scientist in the Genome Research Group, where he worked at the National Facility for Transgenics and Gene Knockout Mice. In 2005, the Japanese Government Fellowship (MEXT) was awarded to pursue a Ph.D. in Applied Bioscience from Kyoto University, Japan. After completing his Ph.D. in 2008, he established his research group at the Laboratory for the Conservation of Endangered Species (LaCONES, an annexe of CCMB), working towards preserving the reproductive potential of endangered males. Dr. Goel was a visiting faculty at Georgetown Medical School, Washington DC (October 2012-April 2013) and Associate Professor (tenure-track; March 2017-March 2019) at Kyoto University, Japan. Dr. Goel joined NIAB on 06 August 2020.

Research experience

Dr. Goel's broad research focuses on reproductive biotechnology, emphasising stem cell biology, animal transgenesis, testis biology, spermatogenesis, and cryobiology. Dr. Goel's research journey began with assessing growth factors and hormones' effect on developing in vitro-produced sheep embryos. He understand functional genomics by generating transgenic (gene overexpression) and gene knockout (gene deletion) mice models. Using these models, Dr. Goel deciphered several molecular mechanisms and signalling pathways. One of the most interesting was the targeted deletion of the kappa-casein gene, which caused lactation failure, which was the first-ever gene-targeted mice produced in the country using embryonic stem (ES) cell technology. After that, he researched on male germline stem cells as an alternative to ES cells to introduce genetic modification in livestock species such as pigs and domestic buffaloes. His research focuses on testis and germline stem cell cryopreservation, their revival, in vitro, and in vivo differentiation of germ cells to preserve domestic and wild animals' genetic potential. His most recent study deciphered the role of a testis-specific kinase, PBK/TOPK, in spermatogenesis using the CRISPR-Cas9 gene knockout mice model.

Research interests

Several clinical conditions, such as mastitis, wounds, lameness, fracture, and other musculoskeletal

disorders, reflect negatively on milk production and reproductive efficiency in dairy livestock species. The conventional treatment does not suffice for their effective recovery with sequels such as fibrosis of udder post-mastitis, non-healing of deep muscular wounds, and non-union of bone post-fracture are some common occurrences.

Mesenchymal stem cells (MSCs) have received a great deal of attention over the past 20 years, and the establishment of cell differentiation methods has made stem cell therapy clinically attractive in veterinary medicine. Besides, MSCs are easy to isolate. The cells display significant therapeutic plasticity as reflected by their advantageous characteristics: the ability to enhance tissue renovation, the immunomodulatory, anti-inflammatory effects and the possibility to be used for both autologous and allogeneic therapies. MSC may be administered for autologous or allogenic therapy following either fresh isolation or thawing of a previously frozen culture.

We propose to initiate MSC therapy in livestock species with its applications in translational research. Using goat as a model, we propose to develop an adipose-derived mesenchymal stem cell (ADSC)-based technology (Fig. 1). The ADSCs will be isolated, cultured, and characterised. Further, their cryopreservation procedures will be established for developing cryo-banking. Fresh and cryopreserved ADSCs will be differentiated to various mesodermal and possibly neuro-ectodermal lineages. The differentiated ADSCs will be utilised for the treatment of experimentally generated medical conditions in the goats to evaluate their therapeutic potential. This project's findings will be further extended to dairy animals such as buffaloes and cattle for a widespread therapeutic application.

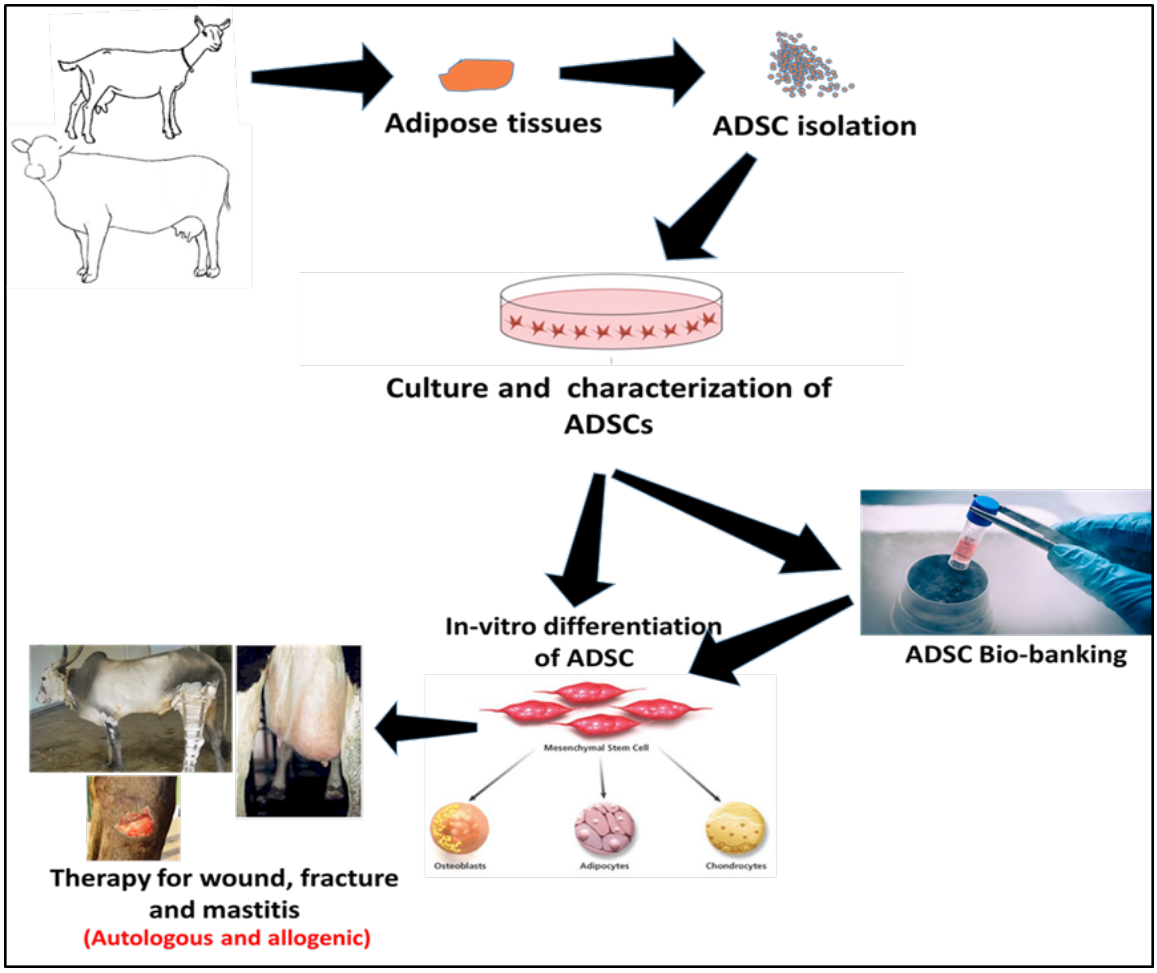


Fig. 1. *Isolation, culture, characterisation and bio-banking of adipose-derived mesenchymal stem cells (ADSCs) from dairy livestock species for therapy.*

inclusion of more publically available data before further studies and validation.

Publications

1. Miki Y, Devi L, Imai Y, Koide T, Minami N and **Goel S** (2020). Male fertility is not impacted by the deletion of the PDZ-binding kinase (Pbk) gene in mice. Reproduction Fertility and Development 32:893-902

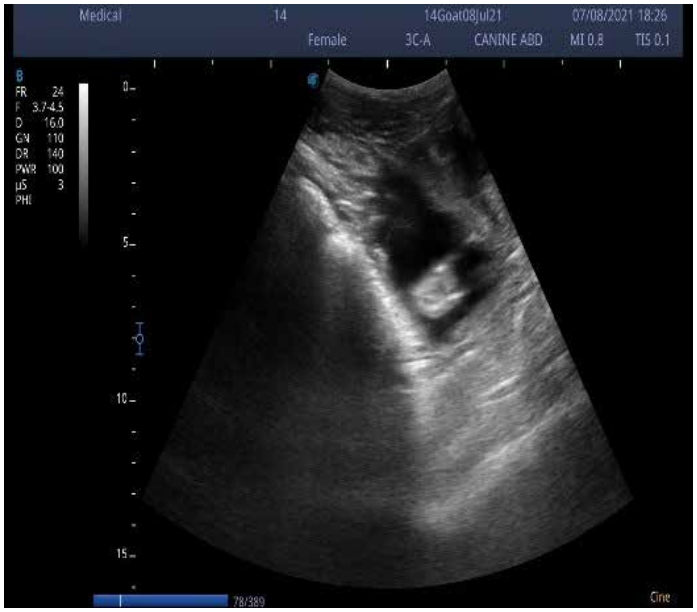
The Lab Photo

Left to Right: Ms. Palak Arora, Ms. Tejeswi Ambati, Dr. Sandeep Goel, Mr. Shivan Saini, Ms. Anjali Parihar and Ms. Parvathy Nair

Large Animal Facility, NIAB

The Large Animal Farm at National Institute of Animal Biotechnology harbours Osmanabadi breed of goats and Dangi breed of cattle, both the breeds are of Indigenous origin and have acclimatised fantastically to the climate and ambience of Hyderabad. After initial phase of adjustment both the breeds have shown improvement in body weight and development of breed specific phenotypic characters. The animals are healthy and are ready for catering all scientific and academic endeavours which will be carried out in institute. As, matter of fact CPCSEA approved experimental protocols have already begun at LAF. LAF is also providing biological samples such as blood, milk, placenta, faeces etc. of goat and cattle. CPCSEA Annual inspection of facility took place in Jan 2021 and mandatory documents such as animal census, mortality register, feed register etc. are been maintained at LAF.

Use of modern diagnostic tool such as ultrasound is also being carried out as part of certain CPCSEA approved research protocols as well to monitor reproductive health of female goats at LAF. New born of both the breeds are healthy and active. Collaborations with Veterinary pharma and feed agencies have also been made to suffice the need for regular and emergency veterinary medicines, surgical and feed for animals.



To increase the self-dependency w.r.t animal feeding, we here at Large Animal farm have begun preparing soil beds (Fertile land) for fodder cultivation to increase self-sustainability in terms of animal fodder availability. Cultivating fodder at LAF will make cattle and goat rearing economical and will facilitate its availability for animals throughout the year. In the last year itself, we have been successful in increasing the area under cultivation at LAF and have been able to decrease the cost of animal feeding to some extent.

Future Directions:

1. Maintenance of animals in healthy state and facilitate research on them as per the CPCSEA/ ethical guidelines.
2. Large scale fodder cultivation at Large animal farm to meet the need of animal feeding throughout the year.

LABORATORY ANIMAL FACILITY, NIAB, HYDERABAD

Dr. Jayant P. Hole, Veterinarian

(Scientist-D)

In charge Animal House Facility

Basic Information

The state-of-the-art barrier-maintained laboratory animal facility at National Institute of Animal Biotechnology is established to conduct experiments using rodents and lagomorphs. It is with clean and dirty (service corridor concept and built in compliance with the guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA). The total area spread over two floor approx. 975.065 Square meter plinth area. The experiments conducted on animals at this facility are through the approval of Institutional Animal Ethics committee (IAEC). Russell and Burch's concept of application of 3R Reduction, Refinement and Replacement in all experiments on animals are closely observed. All the utilities viz. chillers, AHU, compressor, soft water plant and electrical control panel for heavy equipment are planned on terrace area with the ease of maintenance personnel movement without entering inside the facility.

Objectives and Key features

The facility is a core scientific service department of the Institute with an objective to breed, supply, procure and raise experimental laboratory animals of high quality under clean and sterile conditions. It focused to provide husbandry, enrichment, nutrition, veterinary care, technical and professional support to the scientific community of the Institute to facilitate research on animals where animal welfare and human handling ensures that the establishment and the fellows minimize the possibility of needless handling, stress ad discomfort to the animals housed Defined barrier practices are followed strictly. The facility is under electronic surveillance (CCTV system). Access to facility is through access cards only for those who are authorized persons it helps to minimize the risk of infection to the animal's colonies. All the parameters like temperature humidity, air velocity pressure and running of AHU are monitored and controlled through BMS (Building monitoring system). Dark and light cycle 12:12 hours for the normal physiological behaviour of the animals is maintained through automated DALI (Digitally accessible lighting interface) control system. Suitable nutrition with appropriate nutrients, water quality and sterilization using High pressure high vacuum autoclaves on routine basis are the key highlights to maintain sterile conditions in animal colonies.

Accreditation

This facility is operational from August 2019 and conducting IAEC approved protocols for the experiments on animals. Presently this facility housed inbred strains Balb/c, C57/BL6, CBA/C3J, NOD SCID, FVB and NeoR Tg strain line, outbred CD1 mouse line and outbreed Wistar Rats are maintained, in addition out breed New Zealand white Rabbits are frequently being used for the generation of antibodies

and other experiments. All records are properly maintained related to breeding and experiments using registers and software tools. The facility is registered with Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Environment, Forests and climate change, Government of India dated 10.04.2019.

Maintaining Good Laboratory Practices (GLP) for the Animal Facility, intended to assure quality of animals and safety of personnel involved in biomedical and behavioural research. These include: Supervision of animal nutrition: Supervision of animal nutrition; Surveillance, diagnosis, treatment and control of disease in the colonies of animals housed in the Facility.

It is intended to plan the program of the facility to cater the need of Scientists /Research scholars for the various animal experiments on animals. Being a centralised research resource facility provides comprehensive research support to the researchers for whole body animal imaging for rodents, stereo zoom microscope for surgical procedure and identified surgical and procedure room to conduct the procedures. Apart from this, technical assistance is supported with highly skilled staff to perform the procedures like blood collections or organ collections, necropsy etc.

During the year of the report animal facility status in terms of the number of animals were approx. 478 under breeding supplied were 1000 approx. of which 980 were used for the conduct of experiments under the IAEC approved protocols.

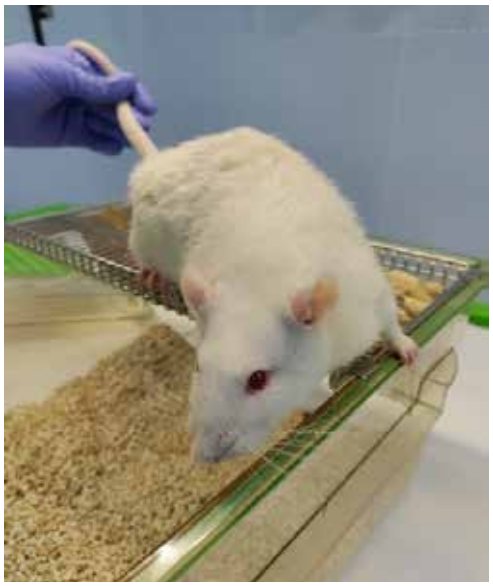
It ensures Health and safety of the people and environment, management of hazardous containment, Record keeping and archiving of various documents required in the animal facility for the purposes of experimentation, hygiene, sanitation, animal and human health following national and international guidelines on research ethics and laws.

Future directions

NIAB Animal Facility is now operational and we plan to expand our breeding colonies to cater the requirements. Cryopreservation, Transgenic mouse strains to add to the repertoire of future experimental animal research at NIAB. Health monitoring of animal program, genetic monitoring and setting up of best practices compliance with international standard are aimed at the animal facility of this institute.





Patents & Publications (01/04/2020 to 31/03/2021)

Patents

1. **Pankaj Suman,** Komal Birader, T Yathirajarao. "An aptamer – based lateral flow assay for detection of oxytetracycline"; Indian Patent Application Number – 202041051281; Date of filing: November 25, 2020.
2. **Pankaj Suman,** L Sai Keerthana, Sherin Kaul, Deepali Rawat, T Yathirajarao. "Rapid and differential detection of cobra and krait venom using monoclonal antibody"; Indian Patent Application Number – 202041050355; Date of filing: November 19, 2020.
3. **Pankaj Suman,** Sherin Kaul. "Aptamers for binding to snake venom, its paper based rapid screening, and uses thereof"; Indian Patent Application Number – 202041048600; Date of filing: November 6, 2020.
4. **Girish K Radhakrishnan.** Immunodominant protein and peptide-based brucellosis diagnosis kits and devices to differentiate infected animals from Brucella abortus S19-vaccinated animals. **International patent application number: PCT/ IN2020/050265**
5. Detection of Toxoplasma gondii infection" Indian Patent filed Application No. 202141012996. Inventors: **Abhijit S. Deshmukh** and Rajkumar Gurupwar.
6. **Sonu Gandhi,** Subhasis Mahari, Akanksha Roberts, Ravi Kumar Vuddagiri, System and methods of electrochemical sensing molecules in a solution. Patent application number 202041017366, National filing date 22nd April 2020.
7. **Madhuri Subbiah**, Nagaraj Nayak and Devasmita Dutta Accessory viral protein as anticancer agent application no. '202141006360', Feb 16, 2021 (provisional patent filed).

Publications

1. Sarkar RK, Sen Sharma, S Mandal, K Wadhwa, N Kunj, N Gupta, A Pal, R Rai, **Majumdar S S** 2021. Homeobox transcription factor Meis1 is crucial to Sertoli cell mediated regulation of male fertility. Andrology,2, 689-699. doi: 10.1111/ andr. 12941
2. Pradhan B S, Bhattacharya I, Sarkar R, **Majumdar S S**, 2020. Pubertal down-regulation of Tetraspanin 8 in testicular Sertoli cells is crucial for male fertility. Molecular Human Reproduction. Vol 26, 10, 760-772.
3. Anastasiia Bondarieva, Kavya Raveendran, Vladyslav Telychko, **H.B.D. Prasada Rao**, Ramya Ravindranathan, Chrysoula Zorzompokou, Friederike Finsterbusch, Ihsan Dereli, Frantzeskos Papanikos, Daniel Tränkner, Alexander Schleiffer, Ji-Feng Fei, Anna Klimova, Masaru Ito, Dhananjaya S. Kulkarni, Ingo Roeder, Neil Hunter & Attila Tóth; Proline-rich protein PRR19 functions with cyclin-like CNTD1 to promote meiotic crossing over in mouse. Nature communications, June 11, 3101 (2020)
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5. D Kumar, S Gauthami, J Bayry, SV Kaveri,* **NR Hegde. 2021**. Antibody therapy: from diphtheria to cancer, COVID-19 and beyond. ***Monoclonal Antibodies in Immunodiagnosis and Immunotherapy 40(2):36-49.***
6. P Sheela, M Shekar, S Isloor, D Rathnamma, BM Veeregowda, ML Satyanarayana, S Sundareshan, BE Shambulingappa, **NR Hegde. 2021.** Randomly amplified polymorphic DNA analysis of Staphylococcus chromogenes recovered from bovine and bubaline mastitis in Karnataka and adjoining areas. ***Veterinary World 14(1):285-291.***
7. GJ Archana, AY Sinha, M Annamanedi, KP Asrith, SB Kale, NV Kurkure, SP Doijad, K Nagamani, **NR Hegde.* 2020.** Molecular characterization of methicillin-resistant Staphylo-coccus aureus isolated from patients at a tertiary care hospital in Hyderabad, South India. ***Indian Journal of Medical Microbiology 38(2):183-191.***
8. BM Akshatha, S Isloor, S Sundareshan, BH Veeresh, V Nuthanalakshmi, AY Sinha, D Rathnamma, BM Veeregowda, HA Upendra,

AS Bhat, BR Shome, R Hegde, KN Prabhu, R Sunagar, CB Waryah, J Gogoi-Tiwari, TK Mukkur, **NR Hegde.* 2020.** Biofilm production, antibiotic resistance and the presence of ica, bap, agr and blaZ genes in bovine mastitis-associated Staphylococcus aureus isolates from South India. ***Indian Journal of Comparative Microbiology Immunology and Infectious Diseases 41(1):39-49.***

9. **Pachineella Lakshmana Rao**, Ravi Kumar Gandham & **Madhuri Subbiah***. Molecular evolution and genetic variations of V and W proteins derived by RNA editing in Avian Paramyxoviruses. Scientific Reports volume 10, Article number: 9532 (2020).
10. Cherukupalle Bhuvaneswar, Aluru Rammohan, Baki Vijaya Bhaskar,Pappithi Ramesh Babu, **Gujjar Naveen**, Duvvuru Gunasekar, **Subbiah Madhuri**, Pallu Reddanna and Wudayagiri Rajendra. Sophora interrupta Bedd root derived flavonoids as prominent antiviral agents against Newcastle Disease Virus. RSC Advances, 10, 33534 (2020).
11. K. N. Vennila, B. Selvakumar, V. Satish, **D. Sunny, S. Madhuri**, K. P. Elango. Structure-based design, synthesis, biological evaluation, and molecular docking of novel 10-methoxy dibenzo[b,h][1,6] naphthyridinecarboxamides. Medicinal Chemistry Research 30, 133–141 (2021).
12. G. Mahalakshmi & B. Selvakumar & K.N. Vennila & P. **Lakshmana Rao & S. Madhuri** & M. Seenivasaperumal & Kuppanagounder P. Elango. Spectroscopic Studies on the Interaction of Naphthyridines with DNA and Fluorescent Detection of DNA in Agarose Gel. *Journal of Fluorescence* 31, 327–338 (2021).
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14. T.K.Rajkhowa, P.Lalnunthanga, **P. L. Rao, M. Subbiah**, B.Lalrohlua. Emergence of porcine circovirus 2g (PCV2g) and evidence for recombination between genotypes 2g, 2b and 2d among field isolates from non-vaccinated pigs in Mizoram, India. *Infection, Genetics and Evolution* Jun;90:104775 (2021).
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18. Solanki, K. S., **Gandham, R. K.,** Thomas, P., & Chaudhuri, P. (2020). Transcriptome analysis of Brucella abortus S19per immunized mouse spleen revealed activation of MHC-I and MHC-II pathways. Access Microbiol, 2(1), acmi000082. https://doi.org/10.1099/acmi.0.000082
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MoUs

The details of MoU signed during the period from 1 April 2020 to 31 March 2021 by NIAB are given below :

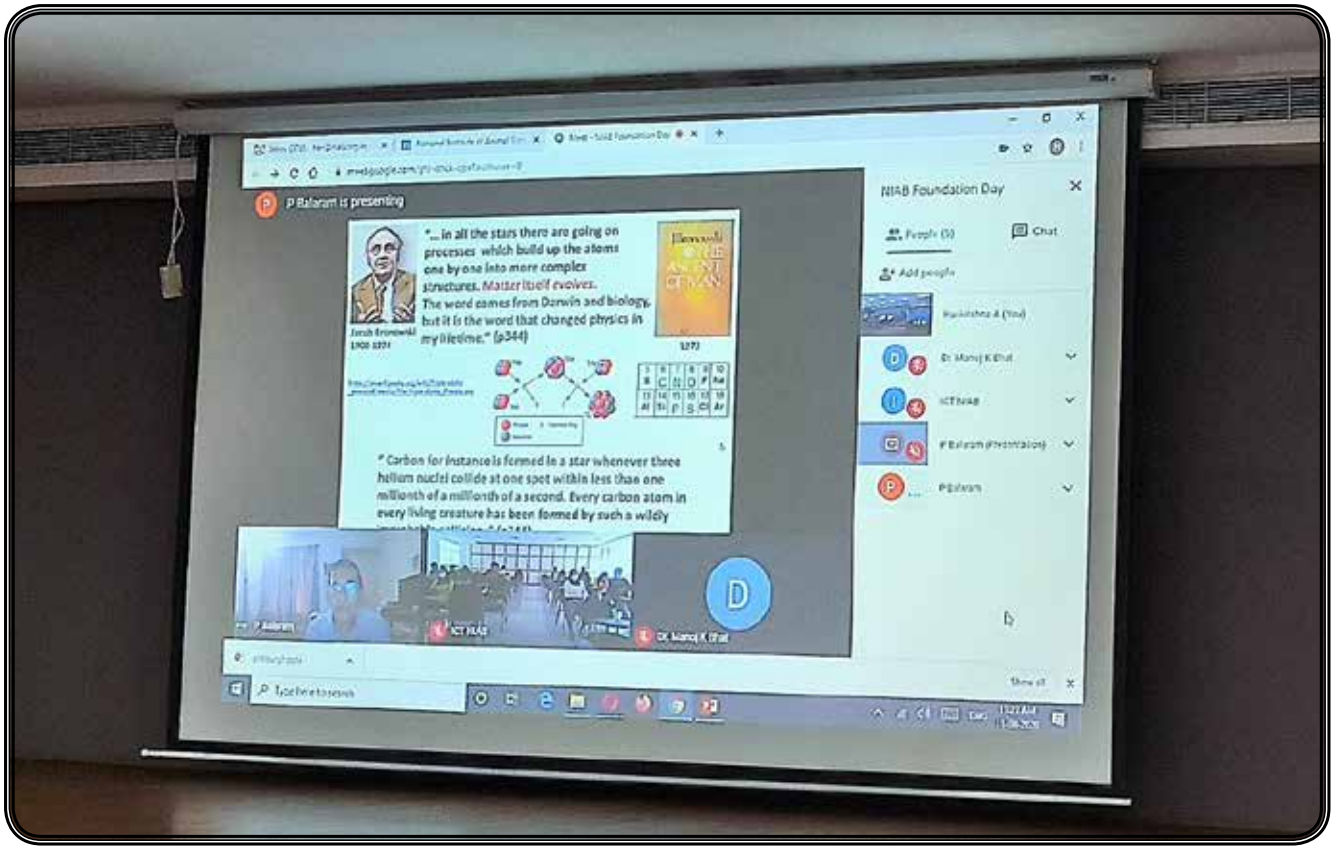
Sl No	MoU with	Date of Signing
(i)	Gandhi Medical College, Hyderabad	9-June-2020
(ii)	ICAR-National Dairy Research Institute (NDRI), Karnal	16-Dec-2020
(iii)	National Dairy Development Board (NDDB), Anand	31-Dec-2020

Distinguished Lectures

SL. NO.	Lecture By	Title of Lecture	DATE
01	Prof. Padmanabhan Balaram, Former Director, IISc, Bangalore delivered Second Foundation Day lecture of NIAB through Video Conference.	"Chemistry, Biology and the Unity of Nature"	11-08-2020
02	Prof. N.K. Ganguly, Former Director-General-ICMR visited NIAB for inaugurating DBT-NIAB Center for One Health. He also delivered a talk on "One Health" during 1st "World One Health Day" at NIAB, Hyderabad.	"One Health"	3-11-2020
03	Dr. Shesheer Munpally, Director, Huwel Lifesciences Pvt Ltd, Hyderabad delivered talk on "product development for molecular diagnostics: what is needed" in the NIAB Auditorium and had interaction with scientists for collaboration.	"Product development for molecular diagnostics: what is needed"	12-1-2021
04	1st Dr. Lalji Singh Memorial lecture was delivered by Prof. K. VijayRaghavan, Principal Scientific Adviser to the Government of India.	"Bridging the Genotype - Phenotype Gap"	17-2-2021
05	NIAB celebrated the International Women's Day 2021 by conducting following events in the NIAB Auditorium by maintaining social distance and by wearing mask. Prof. Manjula Sritharan, School of Life Sciences, University of Hyderabad delivered lecture during celebration of International Women's Day 2021	"Multitasking: do we see this skill in bacterial systems?"	8-3-2021

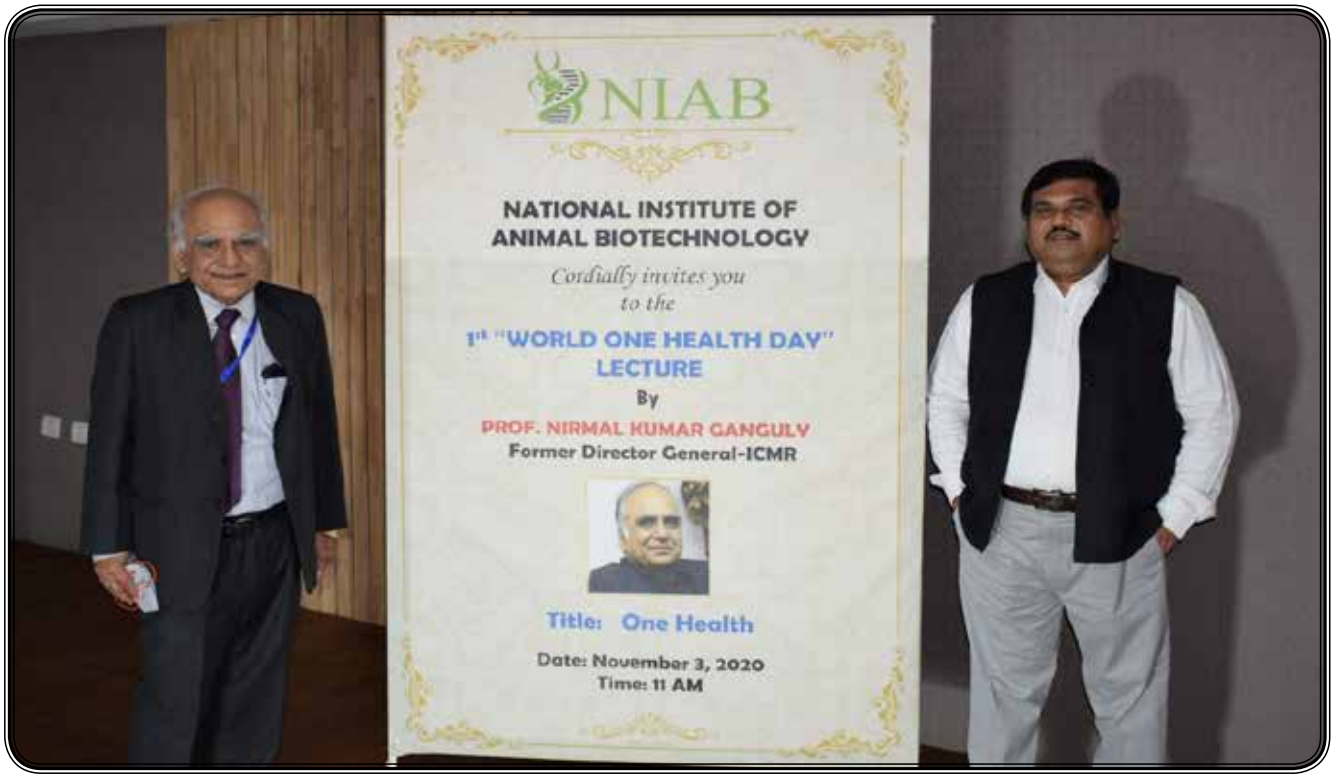
Foundation Day Lecture-2020

Prof. Padmanabhan Balaram, Former Director, IISc, Bangalore Delivered Second Foundation Day lecture of NIAB through Video Conference on 11 August 2020



World One Health Day -2020

Prof. N.K. Ganguly, Former Director-General-ICMR inaugurated DBT-NIAB Center for One Health and also delivered a talk on "One Health" during 1st "World One Health Day" on 3 November 2020



Inauguration of Recereational facility by Dr A.K Rawat, Advisor, DBT on 28 September 2020

Dr. Lalji Singh Memorial Lecture

1st Dr. Lalji Singh Memorial lecture was delivered by **Prof. K. VijayRaghavan**, Principal Scientific Adviser to the Government of India on 17th February 2021

Visit of Dr Praveen Malik, Animal Husbandary Commissioner, Govt of India to NIAB on 23rd September 2020

IMPLEMENTATION OF THE RIGHT TO INFORMATION (RTI) ACT, 2005

Appellate Authority : Dr Syed Faisal
Central Public Information Officer : Shri P.S.G.S Pavan Kumar
Details about the RTI applications and appeals received in NIAB

As received under RTI Act 2005	Opening Balance as on 01.04.2020	Received during the year 2020-21			Disposed of during the year 2020-21				
		Received directly	Received as transfer from other Public Authorities [u/s 6(3) of Act]	Total	Decisions where applications accepted/ appeals upheld	Decisions where applications/ appeals rejected	Transferred to other Public Authorities [u/s 6(3) of Act]	Total	Closing Balance as on 31-03-2021
Applications	0	1	10	11	11	0	0	11	0
Appeals	0	01	Not applicable	01	01	0	Not applicable	01	0

LIST OF EVENTS HELD IN THE YEAR 2020-2021

S. N.	LECTURE/MEETING DETAILS	DATE
1	"Anti-Terrorism Day" was observed by all the NIAB staff by taking pledge in their respective section/lab at 1 PM, due to COVID-19 situation.	21 May 2020
2	MoU between NIAB & Gandhi Medical College, Hyderabad was signed for carrying out COVID research.	9 June 2020
3	7th Internal Complaint Committee meeting of NIAB was held on 12th and 18th June respectively at NIAB.	12 & 18 June 2020
4	International Yoga Day-2020 was observed by all the staff at their home along with their family members due to COVID-19 situation	21 June 2020
5	Dr. Subeer S. Majumdar, Director, NIAB delivered a lecture on **"Importance of Genetically engineered animals in research"** during online workshop on "Prominence of Animals in Research" organized by IIT Ropar, Punjab.	10 July 2020
6	On the occasion of "Telangana's Haritha Haram" NIAB organized "Tree Plantation Drive" and planted trees in NIAB campus.	11 July 2020
7	Dr. Subeer S. Majumdar delivered a talk on **"Field applicable lateral flow device for detection of Oxytetracycline antibiotic in milk-solution for residual antibiotics in milk"** during the webinar on "Agriculture Technologies presentations" facilitated by the office of the PRINCIPAL SCIENTIFIC ADVISER in partnership with the NASSCOM Foundation.	25 July 2020
8	Prof. Padmanabhan Balaram, Former Director, IISc, Bangalore delivered Second Foundation Day lecture of NIAB on **"Chemistry, Biology and the Unity of Nature"** through Video Conference.	11 Aug 2020
9	74th Independence Day was celebrated by hoisting the national flag at NIAB by maintaining social distance and by wearing mask.	15 Aug 2020
10	" Sadbhavana Diwas " was observed by all the NIAB staff by taking pledge in their respective section/lab .	20 Aug 2020
11	Hindi Pakhwada/Diwas was celebrated at NIAB, Hyderabad by maintaining social distancing.	9 Sept 2020 & 11 Sept 2020
12	Finance Committee meeting of NIAB through Video Conference.	12 Sept 2020
13	Governing Body meeting of NIAB through Video Conference.	15 Sept 2020
14	Demonstration of the microscale thermophoresis system by the expert from Nanotemper Technology on **"Introduction to MicroScale Thermophoresis and its applications"**.	22 Sept 2020
15	Visit of Dr. Praveen Malik, Animal Husbandry Commissioner, Govt. of India to NIAB.	23 Sept 2020
16	Inauguration of Community Centre/Recreation facility of NIAB by Dr. A. K. Rawat, Adviser, DBT and Coordinator for NIAB, Hyderabad.	28 Sept 2020
17	Fit India Freedom Race was conducted at NIAB Hyderabad.	1 Oct 2020

S. N.	LECTURE/MEETING DETAILS	DATE
18	Jan Andolan for COVID 19 Campaign - pledge was taken by all the employees working at NIAB, Hyderabad at their respective desks/places.	9 Oct 2020
19	As a part of Jan Andolan, Posters showing that by wearing mask, by following physical distancing, maintaining hand hygiene we can prevent the spread of the virus were stuck at different places inside the institute for creating awareness. House-keeping staff & gardeners were briefed about the important things to be followed to prevent the spread of corona virus.	13 Oct 2020
20	Dr. Subeer S. Majumdar, Director, NIAB delivered talk on **"Response of the DBT's Autonomous Institutes to COVID-19 (Part-III)"** during DBT's Fifth Webinar on COVID-19.	16 Oct 2020
21	MoU signed between DBT and NIAB for the financial year 2020-21.	22 Oct 2020
22	NIAB organized a session on **"Zoonoses, One-Health and integrative approaches to tackle them"** under Vaibhav Summit. (Dr. Subeer S. Majumdar, Director, Dr. Nagendra R Hegde, Scientist G & Dr. G Ravi Kumar, Scientist G, from NIAB participated as panellist in the Vaibhav Summit).	22 Oct 2020
23	As a part of Vigilance Awareness Week – Integrity pledge was taken by all the employees working at NIAB, Hyderabad at their respective desks/places.	27 Oct 2020
24	Prof. N.K. Ganguly, Former Director-General-ICMR visited NIAB for inaugurating DBT-NIAB Center for One Health. He also delivered a lecture on **"One Health"** during 1st "World One Health Day" at NIAB, Hyderabad.	3 Nov 2020
25	On the occasion of the Constitution Day 2020, all the employees of the NIAB have joined the Hon'ble President of India in reading the Preamble of India from their respective labs/offices. Also, planted a tree inside the NIAB campus.	26 Nov 2020
26	Scientific Advisory Committee meeting of NIAB through video conference.	12 Dec 2020
27	Vigyan Yatra was conducted by NIAB with a theme **"Enjoy the festival of Science and its implication on Society"** from 11.30 AM onwards on virtual platform. Students and teachers from different schools have also attended the event online.	13 Dec 2020
28	NIAB celebrated the "National Energy Conservation Day" by planting trees inside the campus.	14 Dec 2020
29	MoU is signed with ICAR-National Dairy Research Institute on 16 Dec 2020 for conducting research on SNP genotyping of DNA samples of dairy cattle and buffaloes maintained at ICAR-NDRI herd using DNA CHIP developed by DBT-NIAB and sharing of data (both phenotypic and genotypic) for analysis at their respective institutions.	16 Dec 2020
30	MoU signed with National Dairy Development Board (NDDB), Anand to jointly develop and implement activities to improve productivity of cattle and buffaloes.	31 Dec 2020
31	Dr. Shesheer Munpally, Director, Huwel Lifesciences Pvt Ltd, Hyderabad delivered lecture on **"Product development for molecular diagnostics: what is needed"** in the NIAB Auditorium and had interaction with scientists on this topic and for collaboration.	12 Jan 2021

S. N.	LECTURE/MEETING DETAILS	DATE
32	Experts who were part of the review committee for the ICAR-NRC-Meat QRT team, Chengicherla, Hyderabad visited NIAB, Hyderabad on 21 Jan 21.	21 Jan 2021
33	In connection with Martyr's day 2021, 2 minutes silence was observed by all the staff at NIAB at 11 AM at their respective workplace.	30 Jan 2021
34	In connection with "National Road Safety Week" from 18 Jan-17 Feb, Road Safety Pledge was taken by all the staff at NIAB at their respective workplace.	15 Feb 2021
35	1st Dr. Lalji Singh Memorial lecture was delivered by Prof. K. VijayRaghavan, Principal Scientific Adviser to the Government of India on **"Bridging the Genotype - Phenotype Gap"** at NIAB Hydrabad.	17 Feb 2021
36	Fire safety training and mock drill was conducted for all the employees at NIAB by the Facility Management Services for precautions and evacuation plans in case of a fire emergency in the NIAB Auditorium by maintain social distancing.	19 Feb 2021
37	National Science Day was celebrated at NIAB on 27th February 2021 (as it was sunday on 28th Feb). Science & Technology Speech was given by Dr. Rajat Kumar, Principal Secretary to Govt. of Telangana and Science Day lecture was delivered by Prof. P. Appa Rao , Vice Chancellor, University of Hyderabad in the NIAB auditorium.	27 Feb 2021
38	Participated in the Global Bio India 2021 which was held on virtual platform.	1 March 2021
39	Finance Committee meeting of NIAB was held through Video Conference.	3 March 2021
40	Annual General Meeting (AGM) of the Society of NIAB, Hyderabad for the year 2019-20 was held through Video Conference.	5 March 2021
41	NIAB celebrated the International Women's Day 2021 by conducting following events in the NIAB Auditorium by maintaining social distance and by wearing mask. Prof. Manjula Sritharan, School of Life Sciences, University of Hyderabad delivered lecture on **"Multitasking: do we see this skill in bacterial systems?"** at 3 pm in the NIAB Auditorium. Inspirational talk was delivered by Dr. Sonu Gandhi, Scientist D, NIAB (one of the four DST-SERB Women Excellence Awardee 2021) to motivate the students at NIAB. Short talks were delivered by the students of NIAB on "Girl Child Education".	8 March 2021
42	Governing Body meeting of NIAB was held through Video Conference	15 March 2021

Organizational Structure of NIAB

NIAB SOCIETY

Dr. Harsh Vardhan Hon'ble Minister of S&T, GoI	President
Dr. Renu Swarup Secretary, DBT, New Delhi	Member
Additional Secretary & Financial Adviser DBT, New Delhi	Member
Mr. CP Goyal JS (Admin), DBT, New Delhi	Member
Dr. Trilochan Mohapatra Secretary, DARE, New Delhi	Member
Dr. Praveen Malik Animal Husbandry Commissioner, GoI, New Delhi	Member
Dr. A. K Rawat Advisor, DBT, New Delhi (Upto 30 Sep 2020)	Member
Prof. Appa Rao Podile Vice Chancellor, UOH, Hyderabad	Member
Dr. A. K. Srivastava Member, ASRB, New Delhi	Member
Dr. Shahid Jameel CEO, The Welcome Trust/DBT India allians (up to September 2020), Hyderabad	Member
Dr. R. N. K. Bamezai Former VC, SMVDU, J&K	Member

Dr. A. S. Nanda VC, GADVASU, Ludhiana	Member
Dr. Anuradha Lohia VC, Presidency University, Kolkata	Member
Dr. V. A. Srinivasan Advisor, NDDB, Hyderabad	Member
Dr. (Ms) Anuradha Acharya Director, Oscimum Bio Solutions, Hyderabad	Member
Dr. D.K Dey CEO, Optima life Sciences Pvt. ltd., Pune	Member
Dr. Ravi Kumar Scientist G, NIAB, Hyderabad	Member
Dr Subeer S Majumdar Director, NIAB, Hyderabad	Member Secretary

NIAB GOVERNING BODY

Dr. Renu Swarup Secretary, DBT, New Delhi	Chairperson
Additional Secretary & Financial Adviser DBT, New Delhi	Member
Mr. CP Goyal JS (Admin), DBT, New Delhi	Member
Dr. Trilochan Mohapatra Secretary, DARE, New Delhi	Member
Dr. Praveen Malik Animal Husbandry Commissioner, GoI, New Delhi	Member
Dr. A. K Rawat Advisor, DBT, New Delhi (Upto 30 Sep 2020)	Member
Prof. Appa Rao Podile Vice Chancellor, UOH, Hyderabad	Member
Dr. A. K. Srivastava Member, ASRB, New Delhi	Member
Dr. Shahid Jameel CEO, The Welcome Trust/DBT India allians (up to September 2020), Hyderabad	Member
Dr. R. N. K. Bamezai Former VC, SMVDU, J&K	Member
Dr. A. S. Nanda VC, GADVASU, Ludhiana	Member

Dr. Anuradha Lohia VC, Presidency University, Kolkata	Member
Dr. V. A. Srinivasan Advisor, NDDB, Hyderabad	Member
Dr. (Ms) Anuradha Acharya Director, Oscimum Bio Solutions, Hyderabad	Member
Dr. D.K Dey CEO, Optima life Sciences Pvt. ltd., Pune	Member
Dr. Ravi Kumar Scientist G, NIAB, Hyderabad	Member
Dr Subeer S Majumdar Director, NIAB, Hyderabad	Member Secretary

NIAB SCIENTIFIC ADVISORY COMMITTEE (SAC)

Dr. K. M.Bujarbaruah Vice Chancellor, AAU, Assam	Chairman
Dr. A. K. Rawat Advisor, Advisor, DBT (Upto 30th Sept 2020)	Member
DDG ICAR, New Delhi	Member
Dr. B.P Mishra Joint Director (Research) IVRI, Bareilly	Member
Prof John Hickey, Roslin Institute, U.K / Prof. Avery August, Cornell University, USA	Member
Prof. R Medhamurthy IISc. Bangalore	Member
Dr. Shekhar Mande, DG, CSIR, New Delhi	Member
Dr. Chandrima Saha Former Director, NII, Delhi	Member
Dr. G. R. Chandak CCMB, Hyderabad	Member
Prof. Dhinakar Raj Director, TRPV, TANUVAS, Chennai	Member
Dr. K. R. Trivedi, Advisor, NDDB, Anand, Gujarat	Member
Dr. Subeer S Majumdar Director, NIAB, Hyderabad	Member Secretary

NIAB FINANCE COMMITTEE (FC)

Additional Secretary & Financial Adviser DBT, New Delhi	Chairman
Dr. Subeer S Majumdar Director, NIAB, Hyderabad	Member
Dr. A. K Rawat Nodal Officer, DBT, New Delhi (Upto 30 Sep 2020)	Member
Dr. A. K. Srivastava Member, ASRB, New Delhi	Member
Prof. Appa Rao Podile Vice Chancellor, UoH, Hyderab	Member
Mr. Harjit Singh Senior manager (Admin & Fin), NIAB, Hyderabad	Member
Mr. I Jagadeesh Manager (Office & Finance), Hyderabad	Non- Member Secretary

NIAB BUILDING COMMITTEE (BC)

Dr. J. Gowrishankar Former Director, CDFD, Hyderabad	Chairman
Prof. P. Reddanna Former Director NIAB, Hyderabad	Member
Dr. Subeer S Majumdar Director, NIAB, Hyderabad	Member
Shri B.L.N. Reddy Superintending Engineer, HMDA, Hyderabad	Member
Shri Rajasekhar, Sup Engineer, TIFR, Hyderabad	Member
Shri Harjit Singh Senior manager (Admin & Fin), NIAB, Hyderabad	Member Secretary

COMPLAIN COMMITTEE FOR THE PREVENTION AND PROHIBITION OF SEXUAL HARASSMENT

The following internal complaint committee has been constituted for the prevention and prohibition of sexual harassment in accordance with Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013:

Dr. Madhuri Subbiah, Scientist	-	Chairperson
Smt. M. Sreelekha, Legal Expert	-	Member
Shri. Harjit Singh, Senior Manager (A&F)	-	Member
Shri. Santosh Mhadeshwar, Manager (S&P)	-	Member
Ms S.V. Dilna, Technical Officer	-	Member
Ms. Krishna Priya, PA to Director	-	Member Secretary

NIAB Staff

NIAB Staff

Scientific

S.No	NAME	DESIGNATION
1	Dr. Subeer S Majumdar	Director
2	Dr. Nagendra R. Hegde	Scientist-H (w.e.f. 29.10.2020)
3	Dr G.V.P.P.S Ravi Kumar	Scientist-G
4	Dr Sandeep Goel	Scientist-F (w.e.f 06.08.2020)
5	Dr. Girish K Radhakrishnan	Scientist-E
6	Dr. Bappaditya Dey	Scientist-E
7.	Dr. H.B.D Prasada Rao	Scientist-E
8.	Dr. Syed Mohd Faisal	Scientist-E
9.	Dr Sandeep Kushwaha	Scientist-E
10	Dr Madhuri Subbiah	Scientist-D
11	Dr. Anand Srivastava	Scientist-D
12	Dr. Paresh Sharma	Scientist-D
13	Dr. Shailesh Sharma	Scientist-D
14	Dr. Sonu Gandhi	Scientist-D
15	Dr. Abhijit S Deshmukh	Scientist-C
16	Dr. Nirmalya Ganguli	Scientist-C
17	Dr. Pankaj Suman	Scientist-C
18	Mr. Sarwar Azam	Scientist-C
19	Dr. Vasundhra Bhandari	DST Inspire Faculty (upto 13th Dec 2020)

Technical Staff

S.No	NAME	DESIGNATION
1	G. Rama Devi	Technical Officer
2	Shashikant Dasharath Gawai	Technical Officer
3	A.Hari Krishna	Technical Officer
4	P.Praveen Kumar	Technical Officer
5	Dilna S V	Technical Officer
6	Kapil Kumar	Technical Officer
7	K Preeti Prasanna	Technical Officer
8	Nilanjana Ganguli	Technical Officer

Administrative and Support Staff

S.No	NAME	DESIGNATION
1	Harjit Singh	Senior Manager (Admin & Finance)
2	I. Jagadeesh	Manager (Office & Finance)
3	Santosh Namdeo Mhadeshwar	Manager (Stores & Purchase)
4	Ravindra Nath	Sup Engineer
5	V. Ramesh Babu	Service & Maintenance Engineer
6	PSGS Pavan Kumar	Asst Manager (Office & Estate)
7	Prem Kumar Kukumalla	Security Officer
8	K. Krishna Priya	PA to Director
9	Bookya Rajendra Prasad	Librarian
10	Dr. Jayant Pundalik Rao Hole	Animal House i/c
11	Dr Himanshu Patil	Farm Manager

Picture Gallery

Independence Day Celebration

BSL-3 Facility Jointly managed by NIAB and UoH

Hindi Pakhwara -2020

Tree Plantation Drive

Constitution Day 2020

Audit Statement of Accounts 2020-21

CHARY AND CO.
CHARTERED ACCOUNTANTS

M.S. Appala Chary FCA
9441490545
ca.msachary@gmail.com

AUDITOR'S REPORT

14th July 2021

The Director
National Institute of Animal Biotechnology (NIAB),
Opp. Journalist Colony, Near Gowlidoddy,
Extended Q City Road, Gachibowli,
Hyderabad - 500 032

We have audited the attached Balance Sheet of **NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY**, Hyderabad, as at 31st March 2021 and also the Income & Expenditure Account for the year ended on that date annexed there to. These financial statements are the responsibility of the organization management. Our responsibility is to express an opinion on these financial statements based on our audit.

We report that:

1. We have obtained all the information and explanations, which are to the best of our knowledge and belief, were necessary for the purpose of our audit.
2. In our opinion, the organization has kept proper books of account as required by law so far, as appears from our examination of those books.
3. The Balance sheet and Income & Expenditure account dealt with by this report is in agreement with the books of accounts.
4. The Institute has maintained accounts on Accrual basis.
5. In our opinion and to the best of our information and according to the explanations given to us, the said Balance sheet and the Income & Expenditure account read together with the notes thereon gives the required information in the manner so required and give a true and fair view.
   a) In so far as it relates to the Balance sheet as at 31st March 2021 and
   b) In so far as it relates to the Income & Expenditure account excess of income over expenditure for the year ended on 31st March 2021.

For CHARY AND CO
Chartered Accountants
F R No. 014102S

CHARY & CO * FRN: 014102S * M.No. 221442 * CHARTERED ACCOUNTANTS

M S Appala Chary
Chartered Accountant
M. No. 221442
UDIN: 21221442AAAADQ4298

Place: Hyderabad
Date: 14/07/2021

4- 119/20, K. Anji Reddy Colony, Balapur, Keshavaagiri Post, Hyderabad - 500 005. T.S.

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY, HYDERABAD

BALANCE SHEET AS ON 31st MARCH 2021

(Amount - Rs.)

Particulars	Schedule	Current Year	Previous Year
CORPUS/CAPITAL FUND AND LIABILITIES			
Corpus / Capital Fund	1	1,759,870,216.56	1,857,773,123.74
Reserves and Surplus	2	-	-
Earmarked / Endowment funds	3	201,802,455.65	111,417,836.01
Secured Loans & Borrowings	4	-	-
Unsecured Loans & Borrowings	5	-	-
Differed Credit Liabilities	6	-	-
Current Liabilities and Provisions	7	12,180,051.45	29,018,405.15
TOTAL		**1,973,852,723.66**	**1,998,209,364.90**
ASSETS			
Fixed Assets	8	1,759,521,959.45	1,864,947,670.45
Investments- From Earmarked / Endowment Funds	9	199,649,800.65	111,417,836.01
Investments - Others	10	11,350,199.35	13,382,163.99
Current Assets, Loans, Advances etc.	11	3,330,764.21	8,461,694.45
Miscellaneous Expenditure		-	-
TOTAL		**1,973,852,723.66**	**1,998,209,364.90**
Significant Accounting Policies	24		
Contingent Liabilities and Notes on Accounts	25		

Dr Subeer S. Majumdar
Direcor
NIAB
Subeer S. Majumdar
Director
National Institute of Animal Biotechnology (NIAB)
(An Autonomous Institute of Department of Biotechnology, MoS&T, GoI)
Survey No.37, Opp:Journalist Colony, Near Gowlidoddi,
Extended Q City Road, Gachibowli, Hyderabad-500 032.

For CHARY AND CO
Chartered Accountants
F R No. 014102S
M S Appala Chary
Chartered Accountant
M. No. 221442

Harjit Singh
Sr. Manager (Admin & Finance)
NIAB
हरजीत सिंह/Harjit Singh
वरिष्ठ प्रबंधक (प्रशासन और वित्त)
Senior Manager (Admin & Finance)
राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान
National Institute of Animal Biotechnology
हैदराबाद/Hyderabad.

I Jagadeesh
Manager (Office & Finance)
NIAB
आई. जगदीश
प्रबंधक (कार्यालय और वित्त)
Manager (Office & Finance)
राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान
National Institute of Animal Biotechnology (NIAB)
हैदराबाद/Hyderabad.

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY, HYDERABAD

Income And Expenditure Statement for the year ended on 31st MARCH 2021

(Amount - Rs.)

Particulars	Schedule	Current Year		Previous Year	
INCOME					
Income from Sales/Services	12		154,825.00		472,001.00
Grants/Subsides	13		180,000,000.00		165,800,000.00
Fees/Subscriptions	14		-		-
Income from Investments	15		-		-
Income from Royalty, Publications etc.	16		-		-
Interest Earned	17		-		-
Other Income	18		2,526,108.98		2,898,318.00
Increase/(decrease) in stock of Finished goods and works-in-progress	19		-		-
TOTAL (A)			**182,680,933.98**		**169,170,319.00**
EXPENDITURE					
Establishment Expenses	20		67,445,342.00		71,627,645.00
Administrative Expenses etc.	21		103,480,673.16		106,099,057.67
Expenditure on Grants, Subsidies etc.	22		-		-
Interest	23		-		-
Depreciation (Net Total at the year-end -corresponding to Schedule 8)		175,184,043.00		183,153,848.00	
Less: Transferred to Grants-in-Aid		175,184,043.00	-	183,153,848.00	-
Provision For Salaries and other Expenses (Annexure-J)			-3,279,240.00		2,726,194.00
TOTAL (B)			**167,646,775.16**		**180,452,896.67**
Balance being excess of Income over Expenditure (A-B)			**15,034,158.82**		**-11,282,577.67**
Transfer to Special Reserve (Specify each)					
Transfer to/from General Reserve					
Balance being SURPLUS/(DEFICIT) carried to CORPUS/CAPITAL FUND					
Significant Accounting Policies	24				
Contingent Liabilities and Notes on Accounts	25				

Dr Subeer S. Majumdar
Direcor
NIAB
Dr. Subeer S. Majumdar
Director
National Institute of Animal Biotechnology (NIAB)
(An Autonomous Institute of Department of Biotechnology, MoS&T, GoI)
Survey No.37, Opp:Journalist Colony, Near Gowlidoddi,
Extended Q City Road, Gachibowli, Hyderabad-500 032.

For CHARY AND CO
Chartered Accountants
F R No. 0141025
M S Appala Chary
Chartered Accountant
M. No. 221442

Harjit Singh
Sr. Manager (Admin & Finance)
NIAB
हरजीत सिंह/Harjit Singh
वरिष्ठ प्रबंधक (प्रशासन और वित्त)
Senior Manager (Admin & Finance)
राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान
National Institute of Animal Biotechnology
हैदराबाद/Hyderabad.

I Jagadeesh
Manager (Office & Finance)
NIAB
जगदीश/I Jagadeesh
प्रबंधक (कार्यालय और वित्त)
Manager (Office & Finance)
राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान
National Institute of Animal Biotechnology (NIAB)
हैदराबाद/Hyderabad.

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY, HYDERABAD
RECEIPTS AND PAYMENTS ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021

(Amount - Rs.)

RECEIPTS	Current Year	Previous Year	PAYMENTS	Current Year	Previous Year
1.Opening Balances			1. Expenses		
a) Cash in hand	-	-	a) Establishment Expenses (corresponding to Schedule 20)	67,445,342.00	71,627,645.00
b) Bank Balances			b) Administrative Expenses (corresponding to Schedule 21)	103,480,673.16	106,099,057.67
i) In current accounts	-	-			
ii) In deposit accounts	-	-	2. Payments made against funds for various projects		
iii) Savings accounts	599,371.45	649,809.26	(Name of the fund or project should be shown along with		
			the particulars of payments made for each project)		
2. Grants Received			Projects (Annexure F)	66,871,731.36	133,812,467.03
a) From Government of India	230,000,000.00	280,800,000.00			
b) From State government	-	-	3. Investments and deposits made		
c) From other sources (details)	-	-	a) Out of Earmarked/Endowment funds	-	-
(Grants for capital & revenue			b) Out of Own Funds (Investments-Others)	-	-
exp. To be shown separately)			c) Investments	312,500,000.00	321,000,000.00
d) Projects (Annexure - C)	157,256,351.00	113,130,147.00	4. Expenditure on Fixed Assets & Capital Work-in-Progress		
			a) Purchases of Fixed Assets:		
3. Income on Investments from			Books & Journals	-	19,629.00
a) Earmarked/Endow. Funds	-	-	Equipment -Lab/Office/Furniture	47,511,355.00	256,040,811.12
b) Own Funds (Oth. Investment)	-	-	b) Expenditure on Capital Work-in-Progress:	10,000,000.00	47,351,200.00
c) Investments Encashed	226,300,000.00	331,700,000.00			
			5. Refund of surplus money/Loans		
4. Interest Received			a) To the Government of India	-	-
a) On Bank deposits (Please Refer Schedule -17)	-	-	b) To the State Government	-	-
b) Loans, Advances etc.	-	-	c) To other providers of funds	-	-
c) on savings accounts	-	-			
d) Interest on LC	-	-	6. Finance Charges (Interest)	-	-
5. Other Income(Specify)			7. Other Payments (Specify)		
a) Analysis Charges	154,825.00	472,001.00	Advances (Annexure-D)	42,082,071.70	32,751,709.00
			I-Remittances (Annexure-E)	9,982,351.00	10,164,540.00
6. Amount Borrowed	-	-	CPF A/c / GPF A/c	1,260,000.00	1,260,000.00
			New Pension Scheme	3,608,567.00	3,406,508.00
7. Any Other Receipts(Give Details)					
I-Remittances (Annexure-A)	9,982,351.00	10,164,540.00			
CPF-SUB, Arrears and adv. Refund/GPF	1,260,000.00	1,260,000.00	8. Closing Balances		
Sundry Receipts	1,816,742.00	1,936,007.00	a) Cash in hand	-	-
Application Fee	84,643.98	19,026.00	b) Bank Balances		
Sale OF Tender Forms	255,000.00	628,500.00	I) In current accounts	-	-
License Fee	369,723.00	314,785.00	ii) In deposit accounts	-	-
NPS	3,608,567.00	3,406,508.00	iii) Savings accounts	3,138,011.21	599,371.45
Advance/Refunds/Recovery/Ad(Annexure-B)	36,192,528.00	239,651,615.01			
TOTAL	**667,880,102.43**	**984,132,938.27**	**TOTAL**	**667,880,102.43**	**984,132,938.27**

Dr Subeer S. Majumdar
Director
NIAB
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For CHARY AND CO
Chartered Accountants
F R No. 014102S
M S Appala Chary
Chartered Accountant
M. No. 221442

Harjit Singh
Sr. Manager (Admin & Finance)
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National Institute of Animal Biotechnology

I Jagadeesh
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National Institute of Animal Biotechnology (NIAB)
हैदराबाद/Hyderabad.

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 1 - CORPUS/CAPITAL FUND :				
Balance as at the beginning of the year		1,857,773,123.74		1,866,087,121.45
Add : Contribution towards Corpus/Capital Fund				
NIAB Core - Plan (Non-Recurring)	50,000,000.00		115,000,000.00	
Capitalised portion of Capital Expenditure of projects	12,246,977.00		71,122,427.96	
Others	-	62,246,977.00	-	186,122,427.96
Less : Lump Sum Depreciation				
Less : Depreciation For the Year 2020-2021	175,184,043.00	175,184,043.00	183,153,848.00	183,153,848.00
Add : Balance of net income/(Expenditure) transferred		15,034,158.82		-11,282,577.67
Add : transferred from General Reserve Account (Schedule2)				
BALANCE AS AT THE YEAR - END		**1,759,870,216.56**		**1,857,773,123.74**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 2 -RESERVES AND SURPLUS :				
1.Capital Reserve :				
Opening Balance	-		-	
Addition during the year	-		-	
Less : Deductions during the year	-	-	-	-
2.Revaluation Reserve :				
Opening Balance	-		-	
Addition during the year	-		-	
Less : Deductions during the year	-	-	-	-
3. Special Reserves :				
Opening Balance	-		-	
Addition during the year	-		-	
Less : Deductions during the year	-	-	-	-
4.General Reserve :				
Opening Balance	-		-	
Addition during the year	-		-	
Less : Deductions during the year	-	-	-	-
Less: Transfer to Corpus Fund		-		-
Total		**-**		**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 3 - EARMARKED/ ENDOWMENT FUNDS :				
(Refer Annexures)				
(a) Opening balance of the Funds		111,417,836.01		132,100,156.04
(b) Additions to the Funds :				
i. Donations / grants	153,835,031.00		109,285,453.00	
ii. Income from investments made on account of funds	-		-	
iii. Other additions	3,421,320.00	157,256,351.00	3,844,694.00	113,130,147.00
TOTAL (a+b)		**268,674,187.01**		**245,230,303.04**
(c) Utilisation/Expenditure towards objective of funds				
(i) Capital Expenditure (Refer Annexures I & II)				
- Fixed Assets	12,246,977.00		71,122,427.96	
- Others	-	12,246,977.00	-	71,122,427.96
Total				
(ii) Revenue Expenditure (Refer Annexures I & II)				
- Salaries, Wages and allowances etc.	-		-	
- Rent	-		-	
- Other Expenses	54,624,754.36	54,624,754.36	62,690,039.07	62,690,039.07
Total				
TOTAL (c)		**66,871,731.36**		**133,812,467.03**
NET BALANCE AS AT THE YEAR-END [(a + b)-c]		**201,802,455.65**		**111,417,836.01**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 4 - SECURED LOANS AND BORROWINGS :				
1. Central Government		-		-
2. State Government (Specify)		-		-
3. Financial Institutions				
a) Term Loans	-		-	
b) Interest accrued and due	-	-	-	-
4. Banks :				
a) Terms Loans	-		-	
- Interest accrued and due	-		-	
b) Other Loans	-		-	
- Interest accrued and due	-	-	-	-
5. Other Institutions and Agencies		-		-
6. Debentures and Bonds		-		-
7. Others (Specify)		-		-
TOTAL		-		-
Note: Amount due within one year				

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 5 - UNSECURED LOANS AND BORROWINGS :				
1. Central Government		-		-
2. State Government (Specify)		-		-
3. Financial Institutions		-		-
4. Banks :				
a) Terms Loans	-		-	
b) Other Loans	-	-	-	-
5. Other Institutions and Agencies		-		-
6. Debentures and Bonds		-		-
7. Fixed Deposits		-		-
8. Others (Specify)		-		-
TOTAL		-		-
Note: Amount due within one year				

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 6 - DEFFERED CREDIT LIABILITIES :				
a) Acceptances secured by hypothecation of capital equipment and other assets		-		-
b) Others		-		-
TOTAL		-		-
Note: Amount due within one year				

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS :				
A. CURRENT LIABILITIES				
1. Acceptances	-		-	
2. Sundry Creditors	-		-	
3. Advances Received (including interest to be returned. Ref Sch-17)	3,662,450.45	3,662,450.45	13,917,763.15	13,917,763.15
4. Interest accrued but not due	-		-	
5. Statutory Liabilities	-		-	
6. Other current Liabilities				
NIAB.CP Fund A/C	-		-	
EMD	-		-	
Security Deposit	982,062.00	982,062.00	3,148,855.00	3,148,855.00
TOTAL (A)		**4,644,512.45**		**17,066,618.15**
B.PROVISIONS				
1. For Taxation	-		-	
2. Gratuity	-		-	
3. Superannuation/Pension	-		-	
4. Accumulated Leave Encashment & Gratuity	-		1,137,008.00	
5. Trade Warranties/Claims	-		-	
6. Others (Specify) (Annexure-G)	7,535,539.00	7,535,539.00	10,814,779.00	11,951,787.00
TOTAL (B)		**7,535,539.00**		**11,951,787.00**
TOTAL (A+B)		**12,180,051.45**		**29,018,405.15**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

SCHEDULE 8 - FIXED ASSETS :

Particulars	GROSS BLOCK				DEPRECIATION				NET BLOCK	
	Cost/valuation As at beginning of the year	Addition during the year	Deductions during the year	Cost/valuation at the year end	As at the beginning of the year	On additions during the year	On Deductions during the year	Total up to the year end	As at the Current year end	As at the Previous year end
A. FIXED ASSETS:										
1. LAND:										
a) Freehold ***	1.00	-	-	1.00	-	-	-	-	1.00	1.00
b) Leasehold	-	-	-	-	-	-	-	-	-	-
2. BUILDINGS										
a) On Freehold Land	1,132,345,605.00	-	-	1,132,345,605.00	113,234,561.00	101,911,104.00	-	215,145,665.00	917,199,940.00	1,019,111,044.00
b) On Leasehold Land	-	-	-	-	-	-	-	-	-	-
c) Ownership Flats/Premises	-	-	-	-	-	-	-	-	-	-
d) Superstructures on Land not belongs to the entity	-	-	-	-	-	-	-	-	-	-
3. PLANT MACHINERY & EQUIPMENT	567,519,073.16	56,513,914.00	-	624,032,987.16	165,081,441.00	65,659,309.00	-	230,740,750.00	393,292,237.16	402,437,632.16
4. VEHICLES	7,728,885.29	-	-	7,728,885.29	3,240,360.00	673,279.00	-	3,913,639.00	3,815,246.29	4,488,525.29
5. FURNITURE, FIXTURES	34,343,839.00	409,550.00	-	34,753,389.00	5,446,878.00	2,920,606.00	-	8,367,484.00	26,385,905.00	28,896,961.00
6. OFFICE EQUIPMENT	18,773,338.00	2,078,645.00	-	20,851,983.00	5,663,624.00	2,208,962.00	-	7,872,586.00	12,979,397.00	13,109,714.00
7. COMPUTER/PERIPHERALS	3,750,313.00	-	-	3,750,313.00	2,488,139.00	504,870.00	-	2,993,009.00	757,304.00	1,262,174.00
8. ELECTRIC INSTALLATIONS	-	-	-	-	-	-	-	-	-	-
9. LIBRARY BOOKS	716,360.00	-	-	716,360.00	706,546.00	9,814.00	-	716,360.00	-	9,814.00
10. TUBEWELLS & WATER SUPPLY	-	-	-	-	-	-	-	-	-	-
11. OTHER FIXED ASSETS	10,812,791.00	756,223.00	-	11,569,014.00	2,928,359.00	1,296,099.00	-	4,224,458.00	7,344,556.00	7,884,432.00
TOTAL	**1,775,990,205.45**	**59,758,332.00**	**-**	**1,835,748,537.45**	**298,789,908.00**	**175,184,043.00**	**-**	**473,973,951.00**	**1,361,774,586.45**	**1,477,200,297.45**
B. CAPITAL WORK-IN-PROGRESS	387,747,373.00	10,000,000.00	-	397,747,373.00	-	-	-	-	397,747,373.00	387,747,373.00
TOTAL	**2,163,737,578.45**	**69,758,332.00**	**-**	**2,233,495,910.45**	**298,789,908.00**	**175,184,043.00**	**-**	**473,973,951.00**	**1,759,521,959.45**	**1,864,947,670.45**

***** LAND OF 100 ACRES ALLOTTED BY GOVT. OF AP. WORTH OF RS. 306.822 CRORES TO NIAB AT FREE OF COST VIDE G.O.MS.NO. 566, DT. 13/09/2012 AT SY NO. 37, GOPANAPALLY VILLAGE, SERILINGAMPALLY VILLAGE, R R DIST. *****

Assets bifurcation by funding :

Core grant	**2,075,557,724.98**	**57,511,355.00**		**2,133,069,079.98**	**284,953,666.00**	**163,031,386.00**	**-**	**447,985,052.00**	**1,685,084,027.98**	**1,790,604,058.98**
Extra mural projects	**88,179,853.47**	**12,246,977.00**	**-**	**100,426,830.47**	**13,836,242.00**	**12,152,657.00**	**-**	**25,988,899.00**	**74,437,931.47**	**74,343,611.47**
TOTAL	**2,163,737,578.45**	**69,758,332.00**	**-**	**2,233,495,910.45**	**298,789,908.00**	**175,184,043.00**	**-**	**473,973,951.00**	**1,759,521,959.45**	**1,864,947,670.45**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 9 - INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS :		
1. In Government Securities	-	-
2. Other approved securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. Others (to be specified) - STDRs	199,649,800.65	111,417,836.01
TOTAL	**199,649,800.65**	**111,417,836.01**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 10 - INVESTMENTS - OTHERS :		
1. In Government Securities	-	-
2. Other approved securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. Others (to be specified) - STDRs	11,350,199.35	13,382,163.99
TOTAL	**11,350,199.35**	**13,382,163.99**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year		Previous Year	
SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC. :				
A. CURRENT ASSETS				
1. Inventories				
a) Stores and Spares	-		-	
b) Loose Tools	-		-	
c) Stock-in-trade				
Finished Goods	-		-	
Work-in-progress	-		-	
Raw Materials	-	-	-	-
2. Sundry Debtors:		-		
a) Debts Outstanding for a period exceeding six months			-	
b) Others-Life Membership Fees	-	-	-	-
3. Cash balances in hand (including cheques/drafts and imprest)				-
4. Bank Balances:				
a) With Scheduled Banks:				
-On Current Accounts	-		-	
-On Deposit Accounts (includes margin money)	-		-	
-On Savings Accounts	3,138,011.21	3,138,011.21	599,371.45	599,371.45
b) With non-Schedules Banks:				
-On Current Accounts	-		-	
-On Deposit Accounts	-		-	
-On Savings Accounts	-	-	-	-
5. Post Office-Savings Accounts				-
TOTAL (A)		**3,138,011.21**		**599,371.45**
B.LOANS, ADVANCES AND OTHER ASSETS				
1. Loans:				
a) Staff	-		-	
b) Other Entities engaged in activities/objectives similar to that of the Entity	-	-	-	-
2. Advances and other amounts recoverable in cash or in kind or for value to be received				
a) On Capital Account (Annexure-H)	-		7,512,070.00	
b) Prepayments - Deposits (Annexure-I)	192,753.00		350,253.00	
c) Others	-	192,753.00	-	7,862,323.00
3. Income Accrued:				
a) On Investments from Earmarked/Endowments Funds	-		-	
b) On Investments - Others	-		-	
c) On Loans and Advances	-		-	
d) Others	-	-	-	-
4. Claims Receivable				-
TOTAL (B)		**192,753.00**		**7,862,323.00**
TOTAL (A+B)		**3,330,764.21**		**8,461,694.45**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 12 - INCOME FROM SALES/SERVICES :		
1) Income from sales		
a) Sale of Finished Goods	-	-
b) Sale of Raw Material	-	-
c) Sale of Scraps	-	-
2) Income from Services		
a) Labour and Processing Charges	-	-
b) Professional/Consultancy Services (Analysis Charges)	154,825.00	472,001.00
c) Agency Commission and Brokerage	-	-
d) Maintenance Services (Equipment/Property)	-	-
e) Others (Specify)	-	-
TOTAL	**154,825.00**	**472,001.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 13 - GRANTS/SUBSIDIES :		
(Irrevocable Grants & Subsides Received)		
1) Central Government (DBT Plan Grant-in-Aid)	180,000,000.00	165,800,000.00
2) State Government(s)	-	-
3) Government Agencies	-	-
4) Institutions/Welfare Bodies	-	-
5) International Organisations	-	-
6) Others (Specify)	-	-
TOTAL	**180,000,000.00**	**165,800,000.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 14 - FEES/SUBSCRIPTIONS :		
1) Entrance Fees	-	-
2) Annual Fees/Subscriptions	-	-
3) Seminar/Program Fees	-	-
4) Consultancy Fees	-	-
5) Others (Specify)	-	-
TOTAL	**-**	**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Investments from Earmarked Fund		Investments-Others	
SCHEDULE 15 - INCOME FROM INVESTMENTS :	**Current Year**	**Previous Year**	**Current Year**	**Previous Year**
(Income on Invest. from Earmarked/Endowment Funds transferred to Funds)				
1) Interest:				
a) On Govt. Securities	-	-	-	-
b) Other Bonds/Debentures	-	-	-	-
2) Dividends:				
a) On Shares	-	-	-	-
b) On Mutual Fund Securities	-	-	-	-
3) Rents	-	-	-	-
4) Others (Specify) STDRs	-	-	-	-
TOTAL	**-**	**-**	**-**	**-**
TRANSFERRED TO EARMARKED/ENDOWMENT FUNDS				

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 16 - INCOME FROM ROYALTY, PUBLICATION ETC. :		
1) Income from Royalty	-	-
2) Income from Publications	-	-
3) Others (Specify)	-	-
TOTAL	**-**	**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars		Current Year	Previous Year
SCHEDULE 17 - INTEREST EARNED :			
1) On Term Deposits			
a) With Schedule Banks #	2,396,385.00	-	-
Less : Transferred to Advances Received under Current Liabilities under Secedule-7	-2,396,385.00		
b) With Non-Scheduled Banks		-	-
c) With Institutions		-	-
d) Others		-	-
2) On Saving Accounts			
a) With Scheduled Banks		-	-
b) With Non-Scheduled Banks		-	-
c) Post Office Savings Accounts		-	-
d) Others		-	-
3) On Loans			
a) Employees/Staff		-	-
b) Others			
4) Interest on Debtors and Other Receivables		-	-
TOTAL		-	-
Note :- Tax deducted at source to be indicated			

An amount of Rs.23,96,385/- earned as interest on Core grant during 2020-21 has been shown as Current Liability under Advances Received in Schedule-7 as the interest earned on Grants in aid or advances should be mandatorily remitted to the Consolidated Fund of India immediately after finalisation of the accounts as per the GRF Rule 230 (8).

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 18 - OTHER INCOME :		
1) Profit on Sale/disposal of Assets:	-	-
a) Owned assets	-	-
b) Assets acquired out of grants, or received free of cost	-	-
2) Export Incentives realized	-	-
3) Fees for Miscellaneous Services	-	-
4) Miscellaneous Receipts	1,410,331.00	1,673,737.00
5) Other Receipts		
Sundry Receipts	406,411.00	262,270.00
Application Fee	84,643.98	19,026.00
Sales Of Tender Forms	255,000.00	628,500.00
Licence Fee	369,723.00	314,785.00
Interest On Computer Advance, Conveyance Advance And HBA	-	-
Leave Salary-Pension Contribution	-	-
Provident Fund Salvage	-	-
Free. Gifts-Donations	-	-
TOTAL	**2,526,108.98**	**2,898,318.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 19 - INCREASE/(DECREASE) IN STOCK OF FINISHED GOODS & WORK IN PROGRESS :		
a) Closing stock		
-Finished Goods	-	-
-Work-in-progress	-	-
Total (a)	**-**	**-**
b) Less: Opening stock		
-Finished Goods	-	-
-Work-in-progress	-	-
Total (b)	-	-
NET INCREASE/(DECREASE) [a-b]	**-**	**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 20 - ESTABLISHMENT EXPENSES :		
a) Salaries and Wages	37,104,133.00	35,785,887.00
b) Allowances and Bonus	19,313,780.00	18,431,657.00
c) Contribution to Provident Fund	270,000.00	784,418.00
d) Contribution to Other Fund (NPS)	3,608,567.00	3,410,221.00
e) Staff Welfare Expenses - Medical charges	1,026,257.00	1,037,231.00
f) Expenses on Employees Retirement and Terminal Benefits	6,122,605.00	12,178,231.00
g) Others	-	-
TOTAL	**67,445,342.00**	**71,627,645.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 21 - OTHER ADMINISTRATIVE EXPENSES :		
a) Purchases	12,821,338.04	12,848,636.00
b) Electricity and power	24,355,295.00	22,154,269.00
c) Water charges	3,549,600.00	8,244,894.00
d) Insurance	128,966.00	144,252.00
e) Repairs and maintenance	9,175,528.00	6,099,841.00
f) Rent, Rates and Taxes	3,732,845.00	6,516,938.00
g) Vehicles Running and Maintenance	830,071.72	1,229,951.64
h) Postage, Telephone and Communication Charges	530,492.00	1,308,977.00
i) Printing and Stationary	337,715.00	1,125,046.00
j) Travelling and Conveyance Expenses	393,405.00	1,915,501.00
k) Expenses on Seminar/Workshops	333,455.00	813,944.00
l) Subscription Expenses	-	-
m) Expenses on Fees	-	-
n) Auditors Remuneration	50,000.00	60,000.00
o) Hospitality Expenses	112,216.00	188,164.00
p) Professional Charges	-	-
q) Advertisement and Publicity	528,717.00	242,545.00
r) Bank Charges	9,593.43	7,689.13
s) Security & Cleaning Contract Charges	36,213,102.00	29,768,587.00
t) Training Course /Symposia	-	14,000.00
u) Other Contingencies	2,322,464.97	11,624,497.90
v) Liveries & Blankets	-	-
w) Other Research Expenses	8,055,869.00	1,788,805.00
x) Office Books	-	2,520.00
TOTAL	**103,480,673.16**	**106,099,057.67**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 22 - EXPENDITURE ON GRANTS, SUBSIDIES ETC. :		
a) Grants given to Institutions/Organisations	-	-
b) Subsidies given to Institutions/Organisations	-	-
TOTAL	**-**	**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
SCHEDULES FORMING PART OF INCOME & EXPENDITURE AS AT 31st MAR 2021

(Amount - Rs.)

Particulars	Current Year	Previous Year
SCHEDULE 23 - INTEREST :		
a) On Fixed Loans	-	-
b) On Other Loans (including Bank Charges)	-	-
c) Others	-	-
TOTAL	**-**	**-**

Schedule 24: Significant Accounting Policies &

Schedule 25: Contingent Liabilities & Notes on Account for the period ended 31/03/2021

1. Method of Accounting:

a. The accounting system adopted by the organization is on "Accrual basis".

b. The organization has been allocated grant-in-aid under the "Non-recurring" & "Recurring" heads in 3 categories grant-in-aid for Capital Assets, grant-in-aid General, grant-in-aid Salaries.

2. Revenue recognition:

Income comprises of Grant-in-Aid, Internal Resources through services and User charges and interest from short term deposits. Income accounted on the basis of the Cash/DD/Cheques/Cr notes received.

3. Fixed Assets:

a. Fixed assets are stated at cost. Cost includes freight, duties, and taxes etc.,

b. Depreciation: Based on the recommendation of the Finance Committee and approval of the Governing Body of the Institute, Depreciation Account on Fixed Assets has been prepared at the rate prevailing to the concerned Fixed Assets as specified in the Income Tax Act, 1961 on Written Down Value Method of Depreciation. This has been set off against the Grant in Aid (Non Recurring) in the concerned account.

c. Capital work in progress has been entered to the extent of the last running account bills paid.

d. Realization on sale of obsolete/surplus fixed assets which is not required for the purpose of research activities are adjusted against capital cost.

4. Inventories:

All purchases of chemicals, glassware and other consumables have been charged to consumption at the time of purchase.

5. Foreign Currency transactions:

Foreign Currency transactions are recognized in the books at the exchange rates prevailing on the actual date of transaction.

6. Investments:

Investments in STDR's are stated at book values.

7. Terminal benefits of employees:

Contributions to New Pension Scheme (Defined Contribution Plans) are Charged to income and expenditure account as per applicable rules. Provision towards Leave Encashment and Gratuity (Defined benefit Plan) is made on actuarial valuation carried out by Life Insurance Corporation of India as stated in AS-15 (Revised) –"Accounting for Retirement Benefits". The Society has covered its Leave Encashment and Gratuity Liability with Life Insurance Corporation of India (LIC) and contributions are made to LIC on yearly basis.

8. The previous year balances have been regrouped / rearranged, wherever necessary.

For CHARY AND CO
Chartered Accountants
F R No. 014102S

Director, NIAB	**Sr. Manager (Admin & Finance), NIAB**	**Manager (Office & Finance), NIAB**	**M S APPALA CHARY FCA M.No.221442**

Place: Hyderabad
Date: 14/07/2021

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
HYDERABAD

CLARIFICATION ON NOTES ON ACCOUNTS: 2020-21

- **Notes on Accounts 1 to 2 & 4 to 8:** Method of Accounting / Revenue recognition / Fixed Asset/ Inventories / Foreign Currency transactions / Investments:

  These are all only informatory items.

- **Notes on Accounts 3: Fixed Assets:**

  Depreciation has been calculated on Written Down Value method and at the rates prevailing to the concerned Fixed Asset as specified on the Income Tax Act, 1961 and set off against the Grant-in-aid (non-recurring). The details of the Depreciation on Fixed Assets are at Schedule – 8 is an integral part of the financial statements.

Harjit Singh
Senior Manager (Admin &Finance)

I Jagadeesh
Manager (Office & Finance)

Place: Hyderabad
Date: 14/07/2021

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
Details of Closing balances of various Earmarked / Endowement Funds (Refer Sch-3)
For the Year Ended 31 MAR 2021

Annexure-I (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
-0.00	FS 013 (MVS)	SERB - Post Doctoral Fellowship	-0.00
219,589.00	FS003(PJ)	DST - INSPIRE Fellowship	-
61,083.00	FS005(NAT)	DBT JRF	77,283.00
-	FS006(PN)	CSIR JRF	-97.00
12,856.00	FS-007(PB)	Junior Research Fellow (RSP)	370,000.00
-	FS-009(NN)	CSIR-UGC Fellowship	-16,130.00
176,986.00	FS-011(SR)	DBT-JRF Fellowship	173,439.00
1,921.00	FS016(DD)	DBT JRF	3,921.00
96,901.00	FS017(AD)	DBT JRF	101,901.00
70,267.00	FS018(PPK)	DST INSPIRE Fellowship	93,587.00
-	FS019(PK)	CSIR Project	-2,680.00
16,667.00	FS020(VG)	Generation of recombinant therapeutics in animal bioreactors for increasing affordability and improvement of human health.	598.00
-	FS021(SD)	CSIR-UGC	-16,044.00
479,310.00	FS023 (NH)	SERB	11,124.00
20,000.00	FS024(RK)	DBT-JRF	15,002.00
150.00	FS025(PG)	DBT-JRF	-3,651.00
58,400.00	FS026(SN)	ICMR	20,000.00
39,552.00	FS027(KRA)	DBT- JRF	28,552.00
40,416.00	FS028(LK)	DBT-JRF	30,784.00
95,353.00	FS029(AR)	DST-INSPIRE FELLOWSHIP	29,760.00
11,640.00	FS030(VPV)	CSIR - Fellowship	-188.00
80,264.00	FS031(MA)	DBT-Research Associate-I	21,901.00
159.00	FS032(PS)	CSIR - Fellowship	159.00
19.00	FS033(MRP)	CSIR - Fellowship	19.00
219.00	FS034(SM)	CSIR - Fellowship	-
10,000.00	FS035(PJM)	CSIR - Fellowship	186.00
98,200.00	FS036(KJ)	Identification and characterization of novel host targets for developing improved therapeutics for the zoonotic disease, Brucellosis.	748.00
-	FS037(SSN)	ICMR	3.00
-	FS038(KCR)	ICMR	38,188.00
-	FS039(PLR)	Improving gene editing with twin technologies- CRISPR & Reverse Genetics	5,833.00
-	FS040	DBT-SRF-1	19,880.00
77,504.50	SP002	Characterization of Cell Cycle regulators associated with DNA replication machinery in Toxoplasma Gondii - DST INSPIRE Faculty	79,829.50
128,917.00	SP004	Evaluation of Anti-inflammatory Natural Compounds for Therapeutic use in Mastitis of Dairy Animals - NMPB	-
-62,034.00	SP005	Role of gamma delta T cells in inflammation - DST Women Scientist Scheme	-
290,265.00	SP014(PS)	Identification of Virulence factors associated with Theileria annulata infection in Indian Cattle	-

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
Details of Closing balances of various Earmarked / Endowement Funds (Refer Sch-3)
For the Year Ended 31 MAR 2021

Annexure-I (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
365,497.00	SP015(MS)	A Study to Understand the genetic variations among the field isolates of porcine circo viruses from piggery farms in Mizoram, with ultimate aim to engineer an effective recombinant chimeric DIVA vaccine	-
206,638.00	SP016 (VB)	DST INSPIRE FACULTY-Charterization of transglycosylases associated with cell wall biogenesis in Vancomycin resistant Staphylococcus aureus	448,254.00
108,397.00	SP017 (AS)	Elucidation of mechanism(s) of transformation of host cells by Theileria annulata	-
260,698.00	SP018 (SM)	Towards establishing an efficient animal-based production of thrapeutic Protein in Milk of farmed animals using various modes of gene delivery	-
590,375.96	SP019	Development of peptide based anti-inflammatory drug for septicemia	-
708,324.00	SP020(AS)	Evaluation of medicinal plant extracts for anti-tick activity and identification of active compounds	55,340.00
727,665.00	SP022 NRH)	Development, testing and evaluation of whole and recombinant antigen-based ELISA for monitoring the health of laboratory animals Phase -II	233,487.00
71,195,033.67	SP024 (SSM)	Genomics for conservation of indigenous cattle breeds and for enhancing milk yield, Phase -I	65,864,545.67
280,036.00	SP025 (SF)	Random and Targeted mutagenesis of zoonotic pathogen Leptospira interrogans: In perspective of vaccine development"	110,389.60
373,938.00	SP026 (SS)	Integrated Biotechnological Approach towards Improvement of Quality and Productivity of Tropical Tasar Silk	94,300.00
434,891.00	SP027(PS)	Aptamer based lateral flow device for the detection of heat or estrous in buffalo	144,900.00
24,196.00	SP028(BD)	The Ramanujan Fellowship	91,115.00
255,371.00	SP029(GKR)	To understand the role of Cytoplasmic linker protien-170 in the down-regulation of TLR4 signaling	299,260.00
492,770.00	SP030(SSM)	Genome ending for generating semen favoring production of cow.	213,155.00
149,088.68	SP031(HBD)	"Unraveling Molecular Mechanisms of Homologues recombination and Germ cell maintenance to prevent Birth Defects, Extend Human and livestock Fertility"	35,054.68
60,344.00	SP032 (NRH)	"DBT-GADVASU Canine Research Centre and Networks"	16,296.00
901,439.00	SP033(SSM)	JC Bose National Fellowship	852,153.00
265,675.00	SP034(SSM)	"An attempt to generate transgenic pig through testicular transgenesis or male germ cell transplantation to enhance productivity"	363,574.00
-114,657.67	SP035(PS)	"Development of point -of-care diagnostics for detection of venom proteins of Naja Naja Cobra and Bungarus caeruleus Krait in envenomed animals"	0.33
804,110.00	SP036(NG)	Feasibility of producing cattle gonadotropins in milk of rabbit by invivo gene transfection	1,303,027.00
379,892.71	SP037(NG)	Establishment of goat mammary epithelial/stem cell lines for the production of pharmaceutical interest proteins	582,138.71

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
Details of Closing balances of various Earmarked / Endowement Funds (Refer Sch-3)
For the Year Ended 31 MAR 2021

Annexure-I (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
1,106,707.00	SP038(VB)	To investigate the mechanisms regulating the enigmatic Oxacillin susceptible mecA positive phenotype in the clinical isolates of staphylococcus aureus.	258,772.00
11,781.00	SP039(SF)	Development of Novel Mucosal Delivery System and Testing its Efficacy Against Salmonella Infection	51,746.00
2,154,949.00	SP040(NRH)	Chicken or egg: Drivers of antimicrobial resistance in poultry in India	7,007,422.00
164,223.00	SP041(GKR)	"Understanding the mechanism of host innate immune suppression by the Brucella effector protein, TcpB to identify novel drug targets for brucellosis"	79,611.00
14,240.00	SP042(MS)	"Molecular platform for pidemiology, disease mapping and development of diagnostics for economically important diseases of ducks."	573,760.00
1,887,785.00	SP043(AKG)	Development of injectable nanofibrous implant for oestrus synchronization in cattle.	1,982,379.00
338,002.00	SP044(PS)	Understanding the Epigenetics of Host Pathogen interaction during Bovine Theileriosis"	704,995.00
69,354.00	SP045(ASD)	Characterization of spliceosome- associated Nine Teen complex (NTC) like proteins in Toxoplasma Gondii.	135,195.00
161,908.00	SP046(SF)	Immunocharaterization of Lipopolysaccharide (LPS) from Leptospira:Towards develepment LPS based Vaccine."	104,521.00
76,261.00	SP047(SG)	"Development of peptide functionalized gold nanoparticles for efficient targeting and imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics"	-
389,281.00	SP048(SG)	"Iron oxide nanoparticles peptide complexes for imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics."	415,607.00
1,149,011.00	SP049(ASD)	"Development of lateral flow based chromatographic immunoassay using recombinant chimera antigens for point of care testing of Toxoplasma gondii infection."	949,733.00
551,783.00	SP050(AS)	"Establishment of genome manipulation technology in Theileria parasite for identification of gene involved in transformartion of host cell."	175,672.00
11,897,080.16	SP051(RKG)	"Genomics assisted pathobiology to identify novel targets for diagnosis and therapeutic intervention(s) of Japanese encephalitis and Leptospirosis"	5,204,242.16
347,372.00	SP052(HBD)	"Development of large animal models and Polyherbal medicines to treat ovarian cysts in livestock"	600,649.00
1,173,560.00	SP053(PD)	"Identification and characterization of virulence factors of Aspergillus fumigatus field isolates from poultry chicken".	-
765,778.50	SP054(VB)	Deciphering the role of efflux pumps in imparting antimicrobial resistance in staphylococcus aureus and their inhibitors in potentiating the existing therapy.	511,998.50
898,225.50	SP055(BD)	Limiting antimicrobial resistance by inhibiting diadenylate cyclase (DAC)- a bacterial second messenger biosynthetic enzyme involved in biofilm formation and cell wall intgrity.	953,270.50

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
Details of Closing balances of various Earmarked / Endowement Funds (Refer Sch-3)
For the Year Ended 31 MAR 2021

Annexure-I (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
376,237.00	SP056(SM)	Understanding the mechanism of buparvaquone resistance in apiomplexan parasite theileriaannulata.	528,258.00
4,381,715.00	SP057(HBD)	An attempt to enhance the shelf life of an oocyte to increase the fertilization time window.	265,072.00
1,769,556.00	SP058(SA)	Identification of key molecular factors involved in resistance/ susceptibility to paratuberculosis infection in indigenous breeds of cows	1,601,844.00
1,238,700.00	SP059(MS)	Molecular biological studies on porcine reproductive & respiratory syndrome (PRRS) virus in pig population of North East Region of India for development of sustainable diagnostics and vaccine.	1,033,469.00
-	SP060(BD)	A transcriptional approach to identify biomarkers of susceptibility and/or resistance to tuberculosis in native and crossbred cattle.	332,019.00
-	SP061(NRH)	Complete solution for molecular diagnosis of COVID 19 multiplex assay along with screening for other related respiratory diseases.	1,088,716.00
-	SP062(SG)	"COVID-SCAN(Novel diagnostic platforms for point-of-care SARS-CoV-2 detection)"	1,179,057.00
-	SP063(NRH)	Hunt for PANACeA (PAN-Anti-CoronAvirals) against coronaviruses of the past, present, and the future.	2,995,471.00
-	SP064(PS)	Socio-economic upliftment of landless and marginal farmers of Yadgir district (an aspirational district) of Karnataka through goat rearing.	6,232,007.00
-	SP065(NG)	Gene editing for generating tissue specific complete knock down/out of Myostatin gene for increased lean meat production in Indian goat (Capra hircus, Osmanabadi breed), Phase-1	1,499,682.00
-	SP066(SG)	Development of Multiplex/Disposable Paper Microfluidic Device for Detection of β-lactum antibiotic residues in livestock and poultry products.	944,139.00
-	SP067(VTF)	Upgradation of Department of Biotechnologie's two existing laboratories as Central Drugs Laboratory for testing of COVID-19 vaccine.	92,101,223.00
-	SP068(SG)	Development of a new generation of biosensors integrated with nanostructured sensitive elements for detection of Salmonellosis.	501,028.00
111,417,836.01		**TOTAL**	**201,802,455.65**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
Details of Fixed Assets Fund (Capitalised Portion of Project Grants)
For the Year Ended 31 MAR 2021

Annexure-II (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
-	FS005(NAT)	DBT JRF	16,500.00
-	FS018(PPK)	DST INSPIRE Fellowship	9,997.00
67,519.00	FS023 (NH)	SERB	24,500.00
-	FS036(KJ)	Identification and characterization of novel host targets for developing improved therapeutics for the zoonotic disease, Brucellosis.	4,299.00
-	FS038(KCR)	ICMR	13,200.00
96,000.00	SP002	Characterization of Cell Cycle regulators associated with DNA replication machinery in Toxoplasma Gondii - DST INSPIRE Faculty	-
228,225.00	SP003	Understanding the host response and molecular pathogenesis of Leptospira interrogans infection - Ramalingaswamy Fellowship	-
40,566,626.00	SP024(SSM)	Genomics for conservation of indigenous cattle breeds and for enhancing milk yield, Phase -I	-
1,589,782.00	SP025 (SF)	Random and Targeted mutagenesis of zoonotic pathogen Leptospira interrogans: In perspective of vaccine development"	-
489,811.00	SP028(BD)	The Ramanujan Fellowship	34,003.00
2,316,328.00	SP030(SSM)	Genome ending for generating semen favoring production of cow.	-
-	SP031(HBD)	"Unraveling Molecular Mechanisms of Homologues recombination and Germ cell maintenance to prevent Birth Defects, Extend Human and livestock Fertility"	159,766.00
1,258,777.00	SP033(SSM)	JC Bose National Fellowship	-
426,518.00	SP034(SSM)	"An attempt to generate transgenic pig through testicular transgenesis or male germ cell transplantation to enhance productivity"	-
428,351.67	SP035(PS)	"Development of point -of-care diagnostics for detection of venom proteins of Naja Naja Cobra and Bungarus caeruleus Krait in envenomed animals"	-
2,196,365.00	SP036(NG)	Feasibility of producing cattle gonadotropins in milk of rabbit by invivo gene transfection	-
2,210,312.29	SP037(NG)	Establishment of goat mammary epithelial/stem cell lines for the production of pharmaceutical interest proteins	-
745,859.00	SP038(VB)	To investigate the mechanisms regulating the enigmatic Oxacillin susceptible mecA positive phenotype in the clinical isolates of staphylococcus aureus.	-
2,149,980.00	SP040(NRH)	Chicken or egg: Drivers of antimicrobial resistance in poultry in India	-
1,137,150.00	SP043(AKG)	Development of injectable nanofibrous implant for oestrus synchronization in cattle.	-
1,264,143.00	SP044(PS)	Understanding the Epigenetics of Host Pathogen interaction during Bovine Theileriosis"	-
1,041,795.00	SP045(ASD)	Characterization of spliceosome- associated Nine Teen complex (NTC) like proteins in Toxoplasma Gondii.	-
1,147,191.00	SP046(SF)	Immunocharaterization of Lipopolysaccharide (LPS) from Leptospira:Towards develepment LPS based Vaccine."	-
342,732.00	SP048(SG)	"Iron oxide nanoparticles peptide complexes for imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics."	-

Annexure-II (Amount in Rs.)

Previous year	Proj No	Particulars	Current Year
-	SP049(ASD)	"Development of lateral flow based chromatographic immunoassay using recombinant chimera antigens for point of care testing of Toxoplasma gondii infection."	197,348.00
199,710.00	SP050(AS)	"Establishment of genome manipulation technology in Theileria parasite for identification of gene involved in transformartion of host cell."	220,000.00
9,689,669.00	SP051(RKG)	"Genomics assisted pathobiology to identify novel targets for diagnosis and therapeutic intervention(s) of Japanese encephalitis and Leptospirosis"	6,047,554.00
1,000,000.00	SP052(HBD)	"Development of large animal models and Polyherbal medicines to treat ovarian cysts in livestock"	-
120,200.00	SP053(PD)	"Identification and characterization of virulence factors of Aspergillus fumigatus field isolates from poultry chicken".	-
409,384.00	SP055(BD)	Limiting antimicrobial resistance by inhibiting diadenylate cyclase (DAC)- a bacterial second messenger biosynthetic enzyme involved in biofilm formation and cell wall intgrity.	240,610.00
-	SP057(HBD)	An attempt to enhance the shelf life of an oocyte to increase the fertilization time window.	3,175,270.00
-	SP059(MS)	Molecular biological studies on porcine reproductive & respiratory syndrome (PRRS) virus in pig population of North East Region of India for development of sustainable diagnostics and vaccine.	419,227.00
-	SP060(BD)	A transcriptional approach to identify biomarkers of susceptibility and/or resistance to tuberculosis in native and crossbred cattle.	449,505.00
-	SP061(NRH)	Complete solution for molecular diagnosis of COVID 19 multiplex assay along with screening for other related respiratory diseases.	186,088.00
-	SP062(SG)	"COVID-SCAN(Novel diagnostic platforms for point-of-care SARS-CoV-2 detection)"	999,760.00
-	SP067(VTF)	Upgradation of Department of Biotechnologie's two existing laboratories as Central Drugs Laboratory for testing of COVID-19 vaccine.	49,350.00
71,122,427.96		**TOTAL**	**12,246,977.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021
Annexure: A Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	I-Remittances	
6,368,316.00	Income Tax	6,679,890.00
7,260.00	Others (I-Remittances)	839,162.00
123,150.00	Professional Tax	106,600.00
3,665,814.00	TDS	2,356,699.00
10,164,540.00	**TOTAL**	**9,982,351.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: B Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Advance refunds/recovery/Adjustments.	
171,543.00	LTC [Advance]	-
41,577.00	TA India & Abroad [Advance]	-
192,753.00	Telephone [Advance]	-
941,640.00	Rent [Advance]	100,000.00
10,000.00	Office Books [Advance]	-
39,000.00	Transport maintenance [Advance]	-
35,000.00	Printing & Stationery [Advance]	-
23,906.00	Insurance [Advance]	-
469,040.00	Others [Contingencies Advance]	332,395.00
382,484.00	Others [Maintenance Advance]	495,368.00
164,498.00	Consumables, glassware and Spares [Advance]	11,500.00
25,000.00	Scientific Workshops Symposiums Seminars [Advance]	-
305,000.00	Other Research Expenses [Advance]	36,094.00
649,000.00	Works and Services [Advance]	-
202,437,788.86	Equipment [Advance]	24,206,568.00
21,275.00	Major Software [Advance]	-
170,000.00	Vehicles [Advance]	-
86,922.00	Office Equipment [Advance]	7,500.00
14,796,915.15	General Deposits And Advances	2,596,560.00
-	EMD	845,000.00
6,297,091.00	Security Deposit	164,384.00
102,612.00	Revolving Advance	98,810.00
-	GDA [Others]	459,602.00
151,562.00	Prepaid Expenses	192,753.00
12,137,008.00	Leave Encashment and gratuity provision	6,645,994.00
239,651,615.01	**TOTAL**	**36,192,528.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: C Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Projects-Receipts	
608,214.00	FS003(PJ)	-
25,320.00	FS005(NAT)	628,548.00
-	FS006(PN)	13,333.00
455,060.00	FS-007(PB)	902,144.00
611,129.00	FS-011(SR)	225,000.00
367,320.00	FS016(DD)	266,161.00
456,326.00	FS017(AD)	225,000.00
371,867.00	FS018(PPK)	492,317.00
450,667.00	FS020(VG)	73,333.00
1,117,368.00	FS023 (NH)	409,200.00
420,000.00	FS024(RK)	201,000.00
420,000.00	FS025(PG)	201,000.00
759,200.00	FS026(SN)	497,342.00
571,694.00	FS027(KRA)	201,000.00
534,583.00	FS028(LK)	201,000.00
451,520.00	FS029(AR)	326,407.00
20,000.00	FS030(VPV)	-
562,020.00	FS031(MA)	771,680.00
15,793.00	FS032(PS)	-
20,000.00	FS033(MRP)	-
10,219.00	FS034(SM)	-
20,000.00	FS035(PJM)	-
270,400.00	FS036(KJ)	270,272.00
-	FS037(SSN)	588,000.00
-	FS038(KCR)	480,516.00
-	FS039(PLR)	366,667.00
-	FS040	352,120.00
8,525.00	SP002	2,325.00
161,112.00	SP004	-
-	SP005	332,945.00
1,127,304.00	SP014(PS)	-
24,381.00	SP015(MS)	-
2,418,398.00	SP016 (VB)	1,991,596.00
1,176,945.00	SP017 (AS)	-
17,914.00	SP018 (SM)	-
918,394.00	SP019	-
1,039,070.00	SP020(AS)	11,113.00
1,773,832.00	SP022 (NRH)	10,418.00
396,400.00	SP023 (NRH)	-
35,538,775.00	SP024(SSM)	2,082,889.00
685,850.00	SP025 (SF)	6,594.00

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Projects-Receipts	
59,943.00	SP026 (SS)	120,975.00
964,765.00	SP027(PS)	700,402.00
354,364.00	SP028(BD)	745,276.00
1,762,023.00	SP029(GKR)	1,406,191.00
46,095.00	SP030(SSM)	741,701.00
735,318.00	SP031(HBD)	380,969.00
179,329.00	SP032(NRH)	706.00
1,500,000.00	SP033(SSM)	1,121,130.00
27,378.00	SP034(SSM)	505,881.00
926,733.00	SP035(PS)	545,245.00
1,289,167.00	SP036(NG)	1,657,002.00
249,355.00	SP037(NG)	660,133.00
971,123.00	SP038(VB)	17,748.00
2,812.00	SP039(SF)	258,573.00
135,506.00	SP040(NRH)	7,252,998.00
872,018.00	SP041(GKR)	707,125.00
4,052.00	SP042(MS)	907,786.00
1,405,740.00	SP043(AKG)	1,857,228.00
995,976.00	SP044(PS)	1,304,925.00
16,906.00	SP045(ASD)	559,105.00
45,680.00	SP046(SF)	608,364.00
507,438.00	SP047(SG)	-
521,478.00	SP048(SG)	547,501.00
711,421.00	SP049(ASD)	1,396,014.00
1,190,234.00	SP050(AS)	488,806.00
26,842,172.00	SP051(RKG)	3,219,575.00
2,362,653.00	SP052(HBD)	1,426,363.00
2,510,492.00	SP053(PD)	-
1,509,676.00	SP054(VB)	998,134.00
1,839,025.00	SP055(BD)	1,024,560.00
1,005,731.00	SP056(SM)	908,898.00
4,489,683.00	SP057(HBD)	99,161.00
1,769,556.00	SP058(SA)	51,202.00
1,500,705.00	SP059(MS)	1,662,683.00
-	SP060(BD)	1,840,647.00
-	SP061(NRH)	1,427,642.00
-	SP062(SG)	2,605,456.00
-	SP063(NRH)	3,206,069.00
-	SP064(PS)	6,686,830.00
-	SP065(NG)	1,730,296.00
-	SP066(SG)	946,098.00
-	SP067(VTF)	92,200,005.00
-	SP068(SG)	601,028.00
113,130,147.00	**TOTAL**	**157,256,351.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: D Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Advances	
171,543.00	LTC [Advance]	-
41,577.00	TA India & Abroad [Advance]	-
10,000.00	Office Books [Advance]	-
39,000.00	Transport maintenance [Advance]	-
35,000.00	Printing & Stationery [Advance]	-
23,906.00	Insurance [Advance]	-
502,040.00	Others [Contingencies Advance]	299,395.00
357,484.00	Others [Maintenance Advance]	475,368.00
162,498.00	Consumables, glassware and Spares [Advance]	11,500.00
25,000.00	Scientific Workshops Symposiums Seminars [Advance]	-
309,500.00	Other Research Expenses [Advance]	31,594.00
14,761,070.00	Equipment [Advance]	16,694,498.00
21,275.00	Major Software [Advance]	-
85,000.00	Vehicles [Advance]	-
86,922.00	Office Equipment [Advance]	7,500.00
758,464.00	General Deposits And Advances	13,175,993.70
-	EMD	845,000.00
4,066,065.00	Security Deposit	2,331,177.00
102,612.00	Revolving Advance	98,810.00
-	GDA [Others]	135,481.00
192,753.00	Prepaid Expenses	192,753.00
11,000,000.00	Leave Encashment and gratuity provision	7,783,002.00
32,751,709.00	**Total**	**42,082,071.70**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: E Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	I-Remittances	
6,368,316.00	Income Tax	6,679,890.00
7,260.00	Others (I-Remittances)	839,162.00
123,150.00	Professional Tax	106,600.00
3,665,814.00	TDS	2,356,699.00
10,164,540.00	**TOTAL**	**9,982,351.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021
Annexure: F Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Projects - Expenditure	
76,022.67	FS 013 (MVS)	-
554,124.00	FS003(PJ)	219,589.00
50,320.00	FS005(NAT)	612,348.00
-	FS006(PN)	13,430.00
464,704.00	FS-007(PB)	545,000.00
-	FS-009(NN)	16,130.00
494,143.00	FS-011(SR)	228,547.00
425,398.00	FS016(DD)	264,161.00
445,613.00	FS017(AD)	220,000.00
411,600.00	FS018(PPK)	468,997.00
-	FS019(PK)	2,680.00
434,000.00	FS020(VG)	89,402.00
-	FS021(SD)	16,044.00
1,096,558.00	FS023 (NH)	877,386.00
400,000.00	FS024(RK)	205,998.00
419,876.00	FS025(PG)	204,801.00
700,800.00	FS026(SN)	535,742.00
532,142.00	FS027(KRA)	212,000.00
494,167.00	FS028(LK)	210,632.00
356,167.00	FS029(AR)	392,000.00
8,360.00	FS030(VPV)	11,828.00
481,756.00	FS031(MA)	830,043.00
15,634.00	FS032(PS)	-
19,981.00	FS033(MRP)	-
10,000.00	FS034(SM)	219.00
10,000.00	FS035(PJM)	9,814.00
172,200.00	FS036(KJ)	367,724.00
-	FS037(SSN)	587,997.00
-	FS038(KCR)	442,328.00
-	FS039(PLR)	360,834.00
-	FS040	332,240.00
408,924.00	SP002	-
740,488.00	SP003	-
156,709.00	SP004	128,917.00
-	SP005	270,911.00
267,305.00	SP007(PS)	-
832,839.00	SP008(GKR)	-
188,636.00	SP011(PS)	-
224,761.00	SP013(GKR)	-
886,779.00	SP014(PS)	290,265.00
666,347.00	SP015(MS)	365,497.00
2,226,774.00	SP016 (VB)	1,749,980.00
1,697,359.00	SP017 (AS)	108,397.00
645,254.00	SP018 (SM)	260,698.00
1,063,063.00	SP019	590,375.96
979,472.00	SP020(AS)	664,097.00
1,181,949.00	SP022 (NRH)	504,596.00
452,412.00	SP023 (NRH)	-

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: F Forming part of Receipts and Payment a/c

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Projects - Expenditure	
56,796,579.91	SP024(SSM)	7,413,377.00
872,273.00	SP025 (SF)	176,240.40
176,814.00	SP026 (SS)	400,613.00
855,276.00	SP027(PS)	990,393.00
745,863.00	SP028(BD)	678,357.00
1,893,804.00	SP029(GKR)	1,362,302.00
3,114,748.00	SP030(SSM)	1,021,316.00
968,336.00	SP031(HBD)	495,003.00
178,451.00	SP032(NRH)	44,754.00
2,067,299.00	SP033(SSM)	1,170,416.00
812,762.00	SP034(SSM)	407,982.00
1,098,231.27	SP035(PS)	430,587.00
4,597,359.00	SP036(NG)	1,158,085.00
798,200.43	SP037(NG)	457,887.00
1,153,538.00	SP038(VB)	865,683.00
204,973.00	SP039(SF)	218,608.00
3,738,995.00	SP040(NRH)	2,400,525.00
861,919.00	SP041(GKR)	791,737.00
356,323.00	SP042(MS)	348,266.00
2,676,780.00	SP043(AKG)	1,762,634.00
2,178,053.91	SP044(PS)	937,932.00
1,688,427.00	SP045(ASD)	493,264.00
1,669,467.00	SP046(SF)	665,751.00
595,500.00	SP047(SG)	76,261.00
806,743.00	SP048(SG)	521,175.00
593,195.00	SP049(ASD)	1,595,292.00
638,451.00	SP050(AS)	864,917.00
14,945,091.84	SP051(RKG)	9,912,413.00
2,015,281.00	SP052(HBD)	1,173,086.00
1,336,932.00	SP053(PD)	1,173,560.00
743,897.50	SP054(VB)	1,251,914.00
940,799.50	SP055(BD)	969,515.00
629,494.00	SP056(SM)	756,877.00
107,968.00	SP057(HBD)	4,215,804.00
-	SP058(SA)	218,914.00
262,005.00	SP059(MS)	1,867,914.00
-	SP060(BD)	1,508,628.00
-	SP061(NRH)	338,926.00
-	SP062(SG)	1,426,399.00
-	SP063(NRH)	210,598.00
-	SP064(PS)	454,823.00
-	SP065(NG)	230,614.00
-	SP066(SG)	1,959.00
-	SP067(VTF)	98,782.00
-	SP068(SG)	100,000.00
133,812,467.03	**TOTAL**	**66,871,731.36**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: G Forming part of Balance sheet

(Amount-Rs.)

Previous Year	Particulars	Current Year
4,432,197.00	March Salaries	4,694,706.00
153,787.00	NPS Employer Contribution	324,551.00
59,000.00	Audit Fee	59,000.00
1,943,500.00	Electricity Charges	1,764,024.00
282,030.00	Water Charges	272,310.00
21,830.00	Telephone Charges	21,830.00
9,794.00	Website maintenance Charges	-
26,253.00	Photo Copier maintenance Charges	5,880.00
3,116.00	Postage & Courier Charges	-
1,631,342.00	Outsourcing Contract Charges	-
907,927.00	Security Contract Charges	-
241,020.00	Technical maintenance Contract Charges	-
	Chillers maintenance Contract Charges	91,733.00
	Lifts Maintenance Contract Charges	245,455.00
5,900.00	Biowaste maintenance Charges	11,800.00
73,750.00	Software Maintenance Charges	44,250.00
1,023,333.00	HVAC AMC	-
10,814,779.00	**TOTAL**	**7,535,539.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: H Forming part of Balance sheet

(Amount-Rs.)

Previous Year	Particulars	Current Year
	LOANS AND ADVANCES	
7,512,070.00	Equipment [Advance]	-
7,512,070.00	**TOTAL**	**-**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: I Forming part of Balance sheet

(Amount-Rs.)

Previous Year	Particulars	Current Year
	PREPAYMENTS / DEPOSITS	
4,500.00	Other Research Expenses [Advance]	-
33,000.00	Others [Contingencies Advance]	-
20,000.00	Others [Maintenance Advance]	-
192,753.00	Prepaid Expenses	192,753.00
100,000.00	Rent [Advance]	-
350,253.00	**TOTAL**	**192,753.00**

NATIONAL INSTITUTE OF ANIMAL BIOTECHNOLOGY
For the Year Ended 31st MAR 2021

Annexure: J Forming part of Income and Expenditure statement

(Amount-Rs.)

Previous Year	Particulars	Current Year
	Provision For Salaries and other Expenses	
	Addition during the year :	
4,432,197.00	Salaries for March	4,694,706.00
153,787.00	NPS (Employer contribution)	324,551.00
59,000.00	Audit Fee	59,000.00
1,943,500.00	Electricity	1,764,024.00
282,030.00	Water charges	272,310.00
21,830.00	Telephone Charges	21,830.00
9,794.00	Website maintenance charges	-
26,253.00	Photo copier maintenance charges	5,880.00
3,116.00	Postage & Courier Charges	-
1,631,342.00	Outsourcing Contract Charges	-
907,927.00	Security Contract Charges	-
241,020.00	Technical maintenance Contract Charges	-
-	Chillers maintenance Contract Charges	91,733.00
-	Lifts Maintenance Contract Charges	245,455.00
5,900.00	Biowaste maintenance Charges	11,800.00
73,750.00	Software Maintenance Charges	44,250.00
1,023,333.00	HVAC AMC	-
10,814,779.00	**Sub total**	**7,535,539.00**
8,088,585.00	Less : Adjustments during the year (Refer Annexure-G)	10,814,779.00
2,726,194.00	**TOTAL**	**-3,279,240.00**

NIAB, Hyderabad
FS013 (MVS)-SERB - Post Doctoral Fellowship
P.I:Dr. Muthu Varunan Shalu
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
76,022.67	Opening Balance	0.00		Opening Balance	0.00
0.00	Grant In Aid	0.00	73,333.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	2,689.67	Transfer of Funds	0.00
76,022.67		**0.00**	**76,022.67**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
76,022.67		**0.00**	**76,022.67**		**0.00**

NIAB, Hyderabad
FS003(PJ)-DST-INSPIRE FELLOWSHIP
P.I:Dr.Padmaja Jakka, SRF(RSP)
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,65,499.00	Opening Balance	2,19,589.00			0.00
6,08,214.00	Grant In Aid	0.00	5,46,840.00	Salaries - Manpower	2,06,873.00
0.00	Other Receipts	0.00	0.00	Consumables	7,716.00
0.00		0.00	2,000.00	Contingencies	5,000.00
0.00		0.00	5,284.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
7,73,713.00		**2,19,589.00**	**5,54,124.00**		**2,19,589.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,19,589.00**	Closing Balance	**0.00**
7,73,713.00		**2,19,589.00**	**7,73,713.00**		**2,19,589.00**

NIAB, Hyderabad
FS005(NAT)-DBT-JRF
P.I:Ms.Neelam A Topno
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
86,083.00	Opening Balance	61,083.00			0.00
25,320.00	Grant In Aid	6,28,548.00	50,320.00	Salaries - Manpower	5,83,548.00
0.00	Other Receipts	0.00	0.00	Consumables	1,100.00
0.00		0.00	0.00	Contingencies	11,200.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	16,500.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
1,11,403.00		**6,89,631.00**	**50,320.00**		**6,12,348.00**
0.00	Excess of Expenditure over Income	**0.00**	**61,083.00**	Closing Balance	**77,283.00**
1,11,403.00		**6,89,631.00**	**1,11,403.00**		**6,89,631.00**

NIAB, Hyderabad
FS006(PN)-CSIR-JRF
P.I:Ms.Prachita Nandini
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	13,333.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	13,430.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**13,333.00**	**0.00**		**13,430.00**
0.00	Excess of Expenditure over Income	**97.00**	**0.00**	Closing Balance	**0.00**
0.00		**13,430.00**	**0.00**		**13,430.00**

NIAB, Hyderabad
FS-007(PB)-DST-INSPIRE FELLOWSHIP
P.I:Mr.Araveti Prasanna Babu
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
22,500.00	Opening Balance	12,856.00			0.00
4,55,060.00	Grant In Aid	9,02,144.00	4,44,871.00	Salaries - Manpower	5,25,000.00
0.00	Other Receipts	0.00	8,179.00	Consumables	3,411.00
0.00		0.00	5,000.00	Contingencies	16,589.00
0.00		0.00	6,654.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,77,560.00		**9,15,000.00**	**4,64,704.00**		**5,45,000.00**
0.00	Excess of Expenditure over Income	**0.00**	**12,856.00**	Closing Balance	**3,70,000.00**
4,77,560.00		**9,15,000.00**	**4,77,560.00**		**9,15,000.00**

NIAB, Hyderabad
FS-009(NN)-CSIR-UGC Fellowship
P.I:Mr.B.Nagaraj Nayak
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	16,130.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**0.00**	**0.00**		**16,130.00**
0.00	Excess of Expenditure over Income	**16,130.00**	**0.00**	Closing Balance	**0.00**
0.00		**16,130.00**	**0.00**		**16,130.00**

NIAB, Hyderabad
FS-011(SR)-DBT-JRF Fellowship
P.I:Mr.Sonti Roy
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
60,000.00	Opening Balance	1,76,986.00			0.00
6,11,129.00	Grant In Aid	2,25,000.00	4,73,129.00	Salaries - Manpower	2,10,000.00
0.00	Other Receipts	0.00	3,026.00	Consumables	0.00
0.00		0.00	17,988.00	Contingencies	18,547.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
6,71,129.00		**4,01,986.00**	**4,94,143.00**		**2,28,547.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,76,986.00**	Closing Balance	**1,73,439.00**
6,71,129.00		**4,01,986.00**	**6,71,129.00**		**4,01,986.00**

NIAB, Hyderabad
FS016(DD)-DBT-JRF
P.I:Mr.Debabrata Dandasena
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
59,999.00	Opening Balance	1,921.00			0.00
3,67,320.00	Grant In Aid	2,66,161.00	3,97,320.00	Salaries - Manpower	2,51,161.00
0.00	Other Receipts	0.00	6,278.00	Consumables	0.00
0.00		0.00	21,800.00	Contingencies	13,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,27,319.00		**2,68,082.00**	**4,25,398.00**		**2,64,161.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,921.00**	Closing Balance	**3,921.00**
4,27,319.00		**2,68,082.00**	**4,27,319.00**		**2,68,082.00**

NIAB, Hyderabad
FS017(AD)-DBT-JRF
P.I:Mr.Abhishek Das
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
86,188.00	Opening Balance	96,901.00			0.00
4,56,326.00	Grant In Aid	2,25,000.00	4,22,320.00	Salaries - Manpower	2,10,000.00
0.00	Other Receipts	0.00	13,293.00	Consumables	0.00
0.00		0.00	10,000.00	Contingencies	10,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
5,42,514.00		**3,21,901.00**	**4,45,613.00**		**2,20,000.00**
0.00	Excess of Expenditure over Income	**0.00**	**96,901.00**	Closing Balance	**1,01,901.00**
5,42,514.00		**3,21,901.00**	**5,42,514.00**		**3,21,901.00**

NIAB, Hyderabad
FS018(PPK)-DST- INSPIRE Fellowship
P.I:Ms.Prajna Parimita Kar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,10,000.00	Opening Balance	70,267.00			0.00
3,71,867.00	Grant In Aid	4,92,317.00	3,91,600.00	Salaries - Manpower	4,54,000.00
0.00	Other Receipts	0.00	301.00	Consumables	0.00
0.00		0.00	13,045.00	Contingencies	5,000.00
0.00		0.00	6,654.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	9,997.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,81,867.00		**5,62,584.00**	**4,11,600.00**		**4,68,997.00**
0.00	Excess of Expenditure over Income	**0.00**	**70,267.00**	Closing Balance	**93,587.00**
4,81,867.00		**5,62,584.00**	**4,81,867.00**		**5,62,584.00**

NIAB, Hyderabad
FS019(PK)-CSIR Fellowship
P.I:Mr.Pankaj Kumar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	1,680.00
0.00		0.00	0.00	Travel	1,000.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**0.00**	**0.00**		**2,680.00**
0.00	Excess of Expenditure over Income	**2,680.00**	**0.00**	Closing Balance	**0.00**
0.00		**2,680.00**	**0.00**		**2,680.00**

NIAB, Hyderabad
FS020(VG)-Generation of recombinant therapeutics in animal bioreactors for increasing affordability and improvement of human health.
P.I:Mr.Venkateswaran Ganeshan
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	16,667.00			0.00
4,50,667.00	Grant In Aid	73,333.00	4,34,000.00	Salaries - Manpower	70,000.00
0.00	Other Receipts	0.00	0.00	Consumables	9,402.00
0.00		0.00	0.00	Contingencies	10,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,50,667.00		**90,000.00**	**4,34,000.00**		**89,402.00**
0.00	Excess of Expenditure over Income	**0.00**	**16,667.00**	Closing Balance	**598.00**
4,50,667.00		**90,000.00**	**4,50,667.00**		**90,000.00**

NIAB, Hyderabad
FS021(SD)-CSIR-UGC
P.I:Mr.Sunny Deval
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	16,044.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**0.00**	**0.00**		**16,044.00**
0.00	Excess of Expenditure over Income	**16,044.00**	**0.00**	Closing Balance	**0.00**
0.00		**16,044.00**	**0.00**		**16,044.00**

NIAB, Hyderabad
FS023 (NH)-SERB
P.I:Dr.Neelima Hosamani
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
4,58,500.00	Opening Balance	4,79,310.00			0.00
11,17,368.00	Grant In Aid	4,09,200.00	8,05,200.00	Salaries - Manpower	7,18,868.00
0.00	Other Receipts	0.00	1,66,034.00	Consumables	1,32,118.00
0.00		0.00	2,256.00	Contingencies	1,900.00
0.00		0.00	5,549.00	Travel	0.00
0.00		0.00	50,000.00	Overheads	0.00
0.00		0.00	67,519.00	Equipment	24,500.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
15,75,868.00		**8,88,510.00**	**10,96,558.00**		**8,77,386.00**
0.00	Excess of Expenditure over Income	**0.00**	**4,79,310.00**	Closing Balance	**11,124.00**
15,75,868.00		**8,88,510.00**	**15,75,868.00**		**8,88,510.00**

NIAB, Hyderabad
FS024(RK)-DBT-JRF
P.I:Mr.Rishi Kumar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	20,000.00			0.00
4,20,000.00	Grant In Aid	2,01,000.00	3,90,000.00	Salaries - Manpower	1,86,000.00
0.00	Other Receipts	0.00	0.00	Consumables	19,998.00
0.00		0.00	10,000.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,20,000.00		**2,21,000.00**	**4,00,000.00**		**2,05,998.00**
0.00	Excess of Expenditure over Income	**0.00**	**20,000.00**	Closing Balance	**15,002.00**
4,20,000.00		**2,21,000.00**	**4,20,000.00**		**2,21,000.00**

NIAB, Hyderabad
FS025(PG)-DBT-JRF
P.I:Ms.Priya Gupta
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
26.00	Opening Balance	150.00			0.00
4,20,000.00	Grant In Aid	2,01,000.00	3,90,000.00	Salaries - Manpower	1,86,000.00
0.00	Other Receipts	0.00	19,876.00	Consumables	13,801.00
0.00		0.00	10,000.00	Contingencies	5,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,20,026.00		**2,01,150.00**	**4,19,876.00**		**2,04,801.00**
0.00	Excess of Expenditure over Income	**3,651.00**	**150.00**	Closing Balance	**0.00**
4,20,026.00		**2,04,801.00**	**4,20,026.00**		**2,04,801.00**

NIAB, Hyderabad
FS026(SN)-ICMR
P.I:Ms.Swapna N
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	58,400.00			0.00
7,59,200.00	Grant In Aid	4,97,342.00	6,95,800.00	Salaries - Manpower	5,20,800.00
0.00	Other Receipts	0.00	0.00	Consumables	9,942.00
0.00		0.00	5,000.00	Contingencies	5,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
7,59,200.00		**5,55,742.00**	**7,00,800.00**		**5,35,742.00**
0.00	Excess of Expenditure over Income	**0.00**	**58,400.00**	Closing Balance	**20,000.00**
7,59,200.00		**5,55,742.00**	**7,59,200.00**		**5,55,742.00**

NIAB, Hyderabad
FS027(KRA)-DBT- JRF
P.I:Ms.Kalyani Rajendra Aswale
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	39,552.00			0.00
5,71,694.00	Grant In Aid	2,01,000.00	5,27,903.00	Salaries - Manpower	1,86,000.00
0.00	Other Receipts	0.00	4,239.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	26,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
5,71,694.00		**2,40,552.00**	**5,32,142.00**		**2,12,000.00**
0.00	Excess of Expenditure over Income	**0.00**	**39,552.00**	Closing Balance	**28,552.00**
5,71,694.00		**2,40,552.00**	**5,71,694.00**		**2,40,552.00**

NIAB, Hyderabad
FS028(LK)-DBT-JRF
P.I:Mr.Lava Kumar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	40,416.00			0.00
5,34,583.00	Grant In Aid	2,01,000.00	4,94,167.00	Salaries - Manpower	1,86,000.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	24,632.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
5,34,583.00		**2,41,416.00**	**4,94,167.00**		**2,10,632.00**
0.00	Excess of Expenditure over Income	**0.00**	**40,416.00**	Closing Balance	**30,784.00**
5,34,583.00		**2,41,416.00**	**5,34,583.00**		**2,41,416.00**

NIAB, Hyderabad
FS029(AR)-DST-INSPIRE FELLOWSHIP
P.I:Ms.Akanksha Roberts
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	95,353.00			0.00
4,51,520.00	Grant In Aid	3,26,407.00	3,46,167.00	Salaries - Manpower	3,72,000.00
0.00	Other Receipts	0.00	0.00	Consumables	9,969.00
0.00		0.00	10,000.00	Contingencies	10,031.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,51,520.00		**4,21,760.00**	**3,56,167.00**		**3,92,000.00**
0.00	Excess of Expenditure over Income	**0.00**	**95,353.00**	Closing Balance	**29,760.00**
4,51,520.00		**4,21,760.00**	**4,51,520.00**		**4,21,760.00**

NIAB, Hyderabad
FS030(VPV)-CSIR-Fellowship
P.I:Mr.D Vivek Phani Varma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	11,640.00			0.00
20,000.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	8,360.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	11,828.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
20,000.00		**11,640.00**	**8,360.00**		**11,828.00**
0.00	Excess of Expenditure over Income	**188.00**	**11,640.00**	Closing Balance	**0.00**
20,000.00		**11,828.00**	**20,000.00**		**11,828.00**

NIAB, Hyderabad
FS031(MA)-DBT-Research Associate-I
P.I:Dr. Madhavi Annamanedi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	80,264.00			0.00
5,62,020.00	Grant In Aid	7,71,680.00	4,66,240.00	Salaries - Manpower	7,79,960.00
0.00	Other Receipts	0.00	15,516.00	Consumables	50,083.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
5,62,020.00		**8,51,944.00**	**4,81,756.00**		**8,30,043.00**
0.00	Excess of Expenditure over Income	**0.00**	**80,264.00**	Closing Balance	**21,901.00**
5,62,020.00		**8,51,944.00**	**5,62,020.00**		**8,51,944.00**

NIAB, Hyderabad
FS032(PS)-CSIR - Fellowship
P.I:Ms.Prerna Saini
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	159.00			0.00
15,793.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	5,634.00	Consumables	0.00
0.00		0.00	10,000.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
15,793.00		**159.00**	**15,634.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**159.00**	Closing Balance	**159.00**
15,793.00		**159.00**	**15,793.00**		**159.00**

NIAB, Hyderabad
FS033(MRP)-CSIR-Fellowship
P.I:Mr.Manas Ranjan Praharaj
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	19.00			0.00
20,000.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	19,981.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
20,000.00		**19.00**	**19,981.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**19.00**	Closing Balance	**19.00**
20,000.00		**19.00**	**20,000.00**		**19.00**

NIAB, Hyderabad
FS034(SM)-CSIR - Fellowship
P.I:Mr. Subhasis Mahari
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	219.00			0.00
10,219.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	10,000.00	Contingencies	219.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
10,219.00		**219.00**	**10,000.00**		**219.00**
0.00	Excess of Expenditure over Income	**0.00**	**219.00**	Closing Balance	**0.00**
10,219.00		**219.00**	**10,219.00**		**219.00**

NIAB, Hyderabad
FS035(PJM)-CSIR - Fellowship
P.I:Ms.Pagala Jasmeen
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	10,000.00			0.00
20,000.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	6,614.00
0.00		0.00	10,000.00	Contingencies	3,200.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
20,000.00		**10,000.00**	**10,000.00**		**9,814.00**
0.00	Excess of Expenditure over Income	**0.00**	**10,000.00**	Closing Balance	**186.00**
20,000.00		**10,000.00**	**20,000.00**		**10,000.00**

NIAB, Hyderabad

FS036(KJ)Identification and characterization of novel host targets for developing improved therapeutics for the zoonotic disease, Brucellosis.

P.I:Mrs.Kiranmai Joshi

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	98,200.00			0.00
2,70,400.00	Grant In Aid	2,70,272.00	1,72,200.00	Salaries - Manpower	3,48,553.00
0.00	Other Receipts	0.00	0.00	Consumables	9,872.00
0.00		0.00	0.00	Contingencies	5,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	4,299.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
2,70,400.00		**3,68,472.00**	**1,72,200.00**		**3,67,724.00**
0.00	Excess of Expenditure over Income	**0.00**	**98,200.00**	Closing Balance	**748.00**
2,70,400.00		**3,68,472.00**	**2,70,400.00**		**3,68,472.00**

NIAB, Hyderabad

FS037(SSN)-ICMR

P.I:Mr.Sagar Shrikrishna Narlawar

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	5,88,000.00	0.00	Salaries - Manpower	5,58,000.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	29,997.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**5,88,000.00**	**0.00**		**5,87,997.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**3.00**
0.00		**5,88,000.00**	**0.00**		**5,88,000.00**

NIAB, Hyderabad
FS038(KCR)-ICMR
P.I:Mr.Khandavalli Chitti Raju
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	4,80,516.00	0.00	Salaries - Manpower	4,24,000.00
0.00	Other Receipts	0.00	0.00	Consumables	5,128.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	13,200.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**4,80,516.00**	**0.00**		**4,42,328.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**38,188.00**
0.00		**4,80,516.00**	**0.00**		**4,80,516.00**

NIAB, Hyderabad
FS039(PLR)-Improving gene editing with twin technologies- CRISPR & Reverse Genetics
P.I:Mr. Pachineela Lakshmana Rao
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	3,66,667.00	0.00	Salaries - Manpower	3,44,167.00
0.00	Other Receipts	0.00	0.00	Consumables	11,947.00
0.00		0.00	0.00	Contingencies	4,720.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**3,66,667.00**	**0.00**		**3,60,834.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**5,833.00**
0.00		**3,66,667.00**	**0.00**		**3,66,667.00**

NIAB, Hyderabad
FS040-DBT-SRF
P.I:Dr.Himadri Medhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	3,52,120.00	0.00	Salaries - Manpower	3,27,120.00
0.00	Other Receipts	0.00	0.00	Consumables	5,120.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**3,52,120.00**	**0.00**		**3,32,240.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**19,880.00**
0.00		**3,52,120.00**	**0.00**		**3,52,120.00**

NIAB, Hyderabad
SP002-Characterization of Cell Cycle regulators associated with DNA replication machinery in Toxoplasma Gondii - DST INSPIRE Faculty
P.I:Dr. Abhijit S Deshmukh
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
4,77,903.50	Opening Balance	77,504.50			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
8,525.00	Other Receipts	2,325.00	3,12,924.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	96,000.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
4,86,428.50		**79,829.50**	**4,08,924.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**77,504.50**	Closing Balance	**79,829.50**
4,86,428.50		**79,829.50**	**4,86,428.50**		**79,829.50**

NIAB, Hyderabad
SP003-Understanding the host response and molecular pathogenesis of Leptospira interrogans infection - Ramalingaswamy Fellowship
P.I:Dr. Syed Mohd Faisal
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
7,40,488.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	2,28,225.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	5,12,263.00	Transfer of Funds	0.00
7,40,488.00		**0.00**	**7,40,488.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
7,40,488.00		**0.00**	**7,40,488.00**		**0.00**

NIAB, Hyderabad
SP004-Evaluation of Anti-nflammatory
Natural Compounds for Therapeutic use in Mastitis of Dairy Animals - NMPB
P.I:Prof P Reddanna & Dr. Paresh Sharma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,24,514.00	Opening Balance	1,28,917.00			0.00
1,56,709.00	Grant In Aid	0.00	1,56,709.00	Salaries - Manpower	0.00
4,403.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	12,454.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	1,16,463.00
2,85,626.00		**1,28,917.00**	**1,56,709.00**		**1,28,917.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,28,917.00**	Closing Balance	**0.00**
2,85,626.00		**1,28,917.00**	**2,85,626.00**		**1,28,917.00**

NIAB, Hyderabad
SP005-Role of gamma delta T cells in inflammation - DST Women Scientist Scheme
P.I:Dr. Aparna Rachamallu
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00	62,034.00	Opening Balance	62,034.00
0.00	Grant In Aid	3,32,945.00	0.00	Salaries - Manpower	2,70,911.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**3,32,945.00**	**62,034.00**		**3,32,945.00**
62,034.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
62,034.00		**3,32,945.00**	**62,034.00**		**3,32,945.00**

NIAB, Hyderabad
SP007(PS)-Identification of disease related markers for the diagnosis of Subclinical Mastitis
P.I:Dr. Paresh Sharma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
2,67,305.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	2,67,305.00	Transfer of Funds	0.00
2,67,305.00		**0.00**	**2,67,305.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
2,67,305.00		**0.00**	**2,67,305.00**		**0.00**

NIAB, Hyderabad

SP008(GKR)-Understanding the immune mechanism of host disease and development of marker vaccines and DIVA test for Peste des Petits ruminants

P.I:Dr.Girish K Radhakrishnan

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
8,32,839.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	8,32,839.00	Transfer of Funds	0.00
8,32,839.00		**0.00**	**8,32,839.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
8,32,839.00		**0.00**	**8,32,839.00**		**0.00**

NIAB, Hyderabad

SP011(PS) - Genome-wide association study for identification of novel loci associated with resistance to Theileriosis in India

P.I:Dr. Paresh Sharma

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,88,636.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	1,88,636.00	Transfer of Funds	0.00
1,88,636.00		**0.00**	**1,88,636.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
1,88,636.00		**0.00**	**1,88,636.00**		**0.00**

NIAB, Hyderabad
SP013(GKR)-To develop novel therapeutics for brucellosis: Identification and characterization of host factors supporting Brucella replication
P.I:Dr. Girish K Radhakrishnan
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
2,24,761.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	0.00	70,980.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	1,53,781.00	Transfer of Funds	0.00
2,24,761.00		**0.00**	**2,24,761.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.00**
2,24,761.00		**0.00**	**2,24,761.00**		**0.00**

NIAB, Hyderabad
SP014(PS)-Identification of Virulence factors associated with Theileria annulata infection in Indian Cattle
P.I:Dr. Paresh Sharma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
49,740.00	Opening Balance	2,90,265.00			0.00
11,09,453.00	Grant In Aid	0.00	2,27,787.00	Salaries - Manpower	0.00
17,851.00	Other Receipts	0.00	6,36,152.00	Consumables	0.00
0.00		0.00	22,840.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	2,90,265.00
11,77,044.00		**2,90,265.00**	**8,86,779.00**		**2,90,265.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,90,265.00**	Closing Balance	**0.00**
11,77,044.00		**2,90,265.00**	**11,77,044.00**		**2,90,265.00**

NIAB, Hyderabad

SP015(MS)-A Study to Understand the genetic variations among the field isolates of porcine circo viruses from piggery farms in Mizoram, with ultimate aim to engineer an effective recombinant chimeric DIVA vaccine

P.I:Dr. Madhuri Subbiah

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
10,07,463.00	Opening Balance	3,65,497.00			0.00
0.00	Grant In Aid	0.00	1,44,000.00	Salaries - Manpower	24,400.00
24,381.00	Other Receipts	0.00	4,74,248.00	Consumables	75,627.00
0.00		0.00	9,377.00	Contingencies	0.00
0.00		0.00	38,722.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	2,65,470.00
10,31,844.00		**3,65,497.00**	**6,66,347.00**		**3,65,497.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,65,497.00**	Closing Balance	**0.00**
10,31,844.00		**3,65,497.00**	**10,31,844.00**		**3,65,497.00**

NIAB, Hyderabad

SP016 (VB)-DST INSPIRE FACULTY-Charterization of transglycosylases associated with cell wall biogenesis in Vancomycin resistant Staphylococcus aureus

P.I:Dr.Vasundhra Bhandari

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
15,014.00	Opening Balance	2,06,638.00			0.00
24,01,067.00	Grant In Aid	19,80,137.00	19,24,779.00	Salaries - Manpower	11,98,448.00
17,331.00	Other Receipts	11,459.00	2,66,995.00	Consumables	4,41,412.00
0.00		0.00	0.00	Contingencies	75,120.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	35,000.00	Overheads	35,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
24,33,412.00		**21,98,234.00**	**22,26,774.00**		**17,49,980.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,06,638.00**	Closing Balance	**4,48,254.00**
24,33,412.00		**21,98,234.00**	**24,33,412.00**		**21,98,234.00**

NIAB, Hyderabad
SP017 (AS)-Elucidation of mechanism(s) of transformation of host cells by Theileria annulata
P.I:Dr. Anand Srivastava
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
6,28,811.00	Opening Balance	1,08,397.00			0.00
11,50,000.00	Grant In Aid	0.00	5,38,955.00	Salaries - Manpower	0.00
26,945.00	Other Receipts	0.00	9,56,572.00	Consumables	0.00
0.00		0.00	6,500.00	Contingencies	0.00
0.00		0.00	41,559.00	Travel	0.00
0.00		0.00	1,50,000.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	3,773.00	Transfer of Funds	1,08,397.00
18,05,756.00		**1,08,397.00**	**16,97,359.00**		**1,08,397.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,08,397.00**	Closing Balance	**0.00**
18,05,756.00		**1,08,397.00**	**18,05,756.00**		**1,08,397.00**

NIAB, Hyderabad
SP018 (SM)-Towards establishing an efficient animal-based production of thrapeutic Protein in Milk of farmed animals using various modes of gene delivery
P.I:Dr. Subeer S Majumdar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
8,88,038.00	Opening Balance	2,60,698.00			0.00
0.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
17,914.00	Other Receipts	0.00	6,19,490.00	Consumables	0.00
0.00		0.00	8,455.00	Contingencies	0.00
0.00		0.00	17,309.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	2,60,698.00
9,05,952.00		**2,60,698.00**	**6,45,254.00**		**2,60,698.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,60,698.00**	Closing Balance	**0.00**
9,05,952.00		**2,60,698.00**	**9,05,952.00**		**2,60,698.00**

NIAB, Hyderabad
SP019-Development of peptide based anti-inflammatory drug for septicemia
P.I:Dr. Girish K Radhakrishnan
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
7,35,044.96	Opening Balance	5,90,375.96			0.00
9,00,000.00	Grant In Aid	0.00	3,12,841.00	Salaries - Manpower	0.00
18,394.00	Other Receipts	0.00	5,79,211.00	Consumables	2,78,727.96
0.00		0.00	39,488.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	1,06,400.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	25,123.00	Transfer of Funds	3,11,648.00
16,53,438.96		**5,90,375.96**	**10,63,063.00**		**5,90,375.96**
0.00	Excess of Expenditure over Income	**0.00**	**5,90,375.96**	Closing Balance	**0.00**
16,53,438.96		**5,90,375.96**	**16,53,438.96**		**5,90,375.96**

NIAB, Hyderabad
SP020(AS)-Evaluation of medicinal plant extracts for anti- tick activity and identification of active compounds
P.I:Dr. Anand Srivastava
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
6,48,726.00	Opening Balance	7,08,324.00			0.00
10,38,480.00	Grant In Aid	0.00	2,25,000.00	Salaries - Manpower	2,23,000.00
590.00	Other Receipts	11,113.00	4,65,152.00	Consumables	3,82,722.00
0.00		0.00	41,466.00	Contingencies	41,033.00
0.00		0.00	12,622.00	Travel	17,342.00
0.00		0.00	92,280.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	1,42,952.00	Transfer of Funds	0.00
16,87,796.00		**7,19,437.00**	**9,79,472.00**		**6,64,097.00**
0.00	Excess of Expenditure over Income	**0.00**	**7,08,324.00**	Closing Balance	**55,340.00**
16,87,796.00		**7,19,437.00**	**16,87,796.00**		**7,19,437.00**

NIAB, Hyderabad
SP022 (NRH)-Development, testing and evaluation of whole and recombinant antigen- based ELISA for monitoring the health of laboratory animals Phase-II
P.I:Dr. Nagendra R Hegde
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,35,782.00	Opening Balance	7,27,665.00			0.00
17,53,908.00	Grant In Aid	0.00	9,68,932.00	Salaries - Manpower	1,82,280.00
19,924.00	Other Receipts	10,418.00	2,03,475.00	Consumables	3,22,316.00
0.00		0.00	520.00	Contingencies	0.00
0.00		0.00	9,022.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
19,09,614.00		**7,38,083.00**	**11,81,949.00**		**5,04,596.00**
0.00	Excess of Expenditure over Income	**0.00**	**7,27,665.00**	Closing Balance	**2,33,487.00**
19,09,614.00		**7,38,083.00**	**19,09,614.00**		**7,38,083.00**

NIAB, Hyderabad
SP023(NRH)-Molecular epidemiology and genomics of mastitis-associated staphylococci
P.I:Dr. Nagendra R Hegde
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
56,012.00	Opening Balance	0.00			0.00
3,96,400.00	Grant In Aid	0.00	2,34,000.00	Salaries - Manpower	0.00
0.00	Other Receipts	0.00	91,224.00	Consumables	0.00
0.00		0.00	23,587.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	103601.00	Transfer of Funds	0.00
4,52,412.00		**0.00**	**4,52,412.00**		**0.00**
0.00	Excess of Expenditure over Income	**0.00**	0.00	Closing Balance	0.00
4,52,412.00		**0.00**	**4,52,412.00**		**0.00**

NIAB, Hyderabad
SP024(SSM)-Genomics for conservation of indigenous cattle breeds and for enhancing milk yield, Phase -I
P.I:Dr Subeer S Majumdar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
9,24,52,838.58	Opening Balance	7,11,95,033.67			0.00
3,34,94,169.00	Grant In Aid	0.00	24,47,548.00	Salaries - Manpower	11,84,613.00
20,44,606.00	Other Receipts	20,82,889.00	1,75,33,068.00	Consumables	59,61,986.00
0.00		0.00	10,24,431.00	Contingencies	1,44,017.00
0.00		0.00	12,09,009.00	Travel	1,22,761.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	3,45,82,523.91	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
12,79,91,613.58		**7,32,77,922.67**	**5,67,96,579.91**		**74,13,377.00**
0.00	Excess of Expenditure over Income	**0.00**	**7,11,95,033.67**	Closing Balance	**6,58,64,545.67**
12,79,91,613.58		**7,32,77,922.67**	**12,79,91,613.58**		**7,32,77,922.67**

NIAB, Hyderabad
SP025 (SF)-Random and Targeted mutagenesis of zoonotic pathogen Leptospira interrogans: In perspective of vaccine development"
P.I:Dr Syed Mohd Faisal
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
4,66,459.00	Opening Balance	2,80,036.00			0.00
6,69,315.00	Grant In Aid	0.00	72,800.00	Salaries - Manpower	25,161.00
16,535.00	Other Receipts	6,594.00	6,83,610.00	Consumables	1,37,391.40
0.00		0.00	10,827.00	Contingencies	13,688.00
0.00		0.00	20,210.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	84,826.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
11,52,309.00		**2,86,630.00**	**8,72,273.00**		**1,76,240.40**
0.00	Excess of Expenditure over Income	**0.00**	**2,80,036.00**	Closing Balance	**1,10,389.60**
11,52,309.00		**2,86,630.00**	**11,52,309.00**		**2,86,630.00**

NIAB, Hyderabad
SP026 (SS)-Integrated Biotechnological Approach towards Improvement of Quality and Productivity of Tropical Tasar Silk
P.I:Dr Shailesh Sharma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
4,90,809.00	Opening Balance	3,73,938.00			0.00
44,000.00	Grant In Aid	1,14,000.00	1,53,194.00	Salaries - Manpower	3,79,113.00
15,943.00	Other Receipts	6,975.00	0.00	Consumables	0.00
0.00		0.00	3,620.00	Contingencies	21,500.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	20,000.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
5,50,752.00		**4,94,913.00**	**1,76,814.00**		**4,00,613.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,73,938.00**	Closing Balance	**94,300.00**
5,50,752.00		**4,94,913.00**	**5,50,752.00**		**4,94,913.00**

NIAB, Hyderabad
SP027(PS)-Aptamer based lateral flow device for the detection of heat or estrous in buffalo
P.I:Dr.Pankaj Suman
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
3,25,402.00	Opening Balance	4,34,891.00			0.00
9,40,520.00	Grant In Aid	6,86,589.00	2,20,000.00	Salaries - Manpower	2,76,322.00
24,245.00	Other Receipts	13,813.00	5,42,743.00	Consumables	6,89,352.00
0.00		0.00	47,748.00	Contingencies	5,963.00
0.00		0.00	44,785.00	Travel	18,756.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
12,90,167.00		**11,35,293.00**	**8,55,276.00**		**9,90,393.00**
0.00	Excess of Expenditure over Income	**0.00**	**4,34,891.00**	Closing Balance	**1,44,900.00**
12,90,167.00		**11,35,293.00**	**12,90,167.00**		**11,35,293.00**

NIAB, Hyderabad
SP028(BD)-The Ramanujan Fellowship
P.I: Dr. Bappaditya Dey
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
4,15,695.00	Opening Balance	24,196.00			0.00
3,45,000.00	Grant In Aid	7,36,000.00	0.00	Salaries - Manpower	0.00
9,364.00	Other Receipts	9,276.00	2,53,579.00	Consumables	5,80,006.00
0.00		0.00	2,473.00	Contingencies	4,348.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	60,000.00
0.00		0.00	4,89,811.00	Equipment	34,003.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
7,70,059.00		**7,69,472.00**	**7,45,863.00**		**6,78,357.00**
0.00	Excess of Expenditure over Income	**0.00**	**24,196.00**	Closing Balance	**91,115.00**
7,70,059.00		**7,69,472.00**	**7,70,059.00**		**7,69,472.00**

NIAB, Hyderabad
SP029(GKR)-To understand the role of Cytoplasmic linker protien-170 in the down-regulation of TLR4 signaling
P.I: Dr. Girish K Radhakrishnan
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
3,87,152.00	Opening Balance	2,55,371.00			0.00
17,27,548.00	Grant In Aid	13,81,100.00	4,34,000.00	Salaries - Manpower	2,04,100.00
34,475.00	Other Receipts	25,091.00	13,35,583.00	Consumables	10,95,967.00
0.00		0.00	6,190.00	Contingencies	12,235.00
0.00		0.00	18,031.00	Travel	0.00
0.00		0.00	1,00,000.00	Overheads	50,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
21,49,175.00		**16,61,562.00**	**18,93,804.00**		**13,62,302.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,55,371.00**	Closing Balance	**2,99,260.00**
21,49,175.00		**16,61,562.00**	**21,49,175.00**		**16,61,562.00**

NIAB, Hyderabad
SP030(SSM)-Genome ending for generating semen favoring production of cow.
P.I: Dr. Subeer S Majumdar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
35,61,423.00	Opening Balance	4,92,770.00			0.00
0.00	Grant In Aid	7,32,969.00	2,20,000.00	Salaries - Manpower	3,29,323.00
46,095.00	Other Receipts	8,732.00	5,66,362.00	Consumables	6,45,368.00
0.00		0.00	12,058.00	Contingencies	530.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	23,16,328.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	46,095.00
36,07,518.00		**12,34,471.00**	**31,14,748.00**		**10,21,316.00**
0.00	Excess of Expenditure over Income	**0.00**	**4,92,770.00**	Closing Balance	**2,13,155.00**
36,07,518.00		**12,34,471.00**	**36,07,518.00**		**12,34,471.00**

NIAB, Hyderabad
SP031(HBD)-Unraveling Molecular Mechanisms of Homologues
recombination and Germ cell maintenance to prevent Birth Defects, Extend Human and livestock Fertility.
P.I:Dr.HBD Prasada Rao
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
3,82,106.68	Opening Balance	1,49,088.68			0.00
7,27,080.00	Grant In Aid	3,73,831.00	5,84,655.00	Salaries - Manpower	0.00
8,238.00	Other Receipts	7,138.00	3,33,939.00	Consumables	3,28,588.00
0.00		0.00	36,231.00	Contingencies	6,649.00
0.00		0.00	13,511.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	1,59,766.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
11,17,424.68		**5,30,057.68**	**9,68,336.00**		**4,95,003.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,49,088.68**	Closing Balance	**35,054.68**
11,17,424.68		**5,30,057.68**	**11,17,424.68**		**5,30,057.68**

NIAB, Hyderabad
SP032(NRH)-DBT-GADVASU Canine Research Centre and Networks.
P.I:Dr.Nagendra R Hegde.
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
59,466.00	Opening Balance	60,344.00			0.00
1,76,131.00	Grant In Aid	0.00	0.00	Salaries - Manpower	0.00
3,198.00	Other Receipts	706.00	1,35,832.00	Consumables	44,754.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	17,619.00	Travel	0.00
0.00		0.00	25,000.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
2,38,795.00		**61,050.00**	**1,78,451.00**		**44,754.00**
0.00	Excess of Expenditure over Income	**0.00**	**60,344.00**	Closing Balance	**16,296.00**
2,38,795.00		**61,050.00**	**2,38,795.00**		**61,050.00**

NIAB, Hyderabad
SP033(SSM)-JC Bose National Fellowship
P.I:Dr.Subeer S Majumdar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
14,68,738.00	Opening Balance	9,01,439.00			0.00
15,00,000.00	Grant In Aid	11,00,000.00	6,52,969.00	Salaries - Manpower	3,22,033.00
0.00	Other Receipts	21,130.00	0.00	Consumables	7,41,281.00
0.00		0.00	3,150.00	Contingencies	3,000.00
0.00		0.00	52,403.00	Travel	8,760.00
0.00		0.00	1,00,000.00	Overheads	95,342.00
0.00		0.00	12,58,777.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
29,68,738.00		**20,22,569.00**	**20,67,299.00**		**11,70,416.00**
0.00	Excess of Expenditure over Income	**0.00**	**9,01,439.00**	Closing Balance	**8,52,153.00**
29,68,738.00		**20,22,569.00**	**29,68,738.00**		**20,22,569.00**

NIAB, Hyderabad

SP034(SSM)-An attempt to generate transgenic pig through testicular transgenesis or male germ cell transplantation to enhance productivity.

P.I:Dr.Subeer S Majumdar

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
10,51,059.00	Opening Balance	2,65,675.00			0.00
0.00	Grant In Aid	4,92,678.00	1,43,200.00	Salaries - Manpower	2,70,420.00
27,378.00	Other Receipts	13,203.00	1,73,494.00	Consumables	1,36,262.00
0.00		0.00	8,260.00	Contingencies	1,300.00
0.00		0.00	61,290.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	4,26,518.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
10,78,437.00		**7,71,556.00**	**8,12,762.00**		**4,07,982.00**
0.00	Excess of Expenditure over Income	**0.00**	**2,65,675.00**	Closing Balance	**3,63,574.00**
10,78,437.00		**7,71,556.00**	**10,78,437.00**		**7,71,556.00**

NIAB, Hyderabad

SP035(PS)-Development of point -of-care diagnostics for detection of venom proteins of Naja Naja Cobra and Bungarus caeruleus Krait in envenomed animals.

P.I:Dr.Pankaj Suman

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
56,840.60	Opening Balance	0.00		Opening Balance	1,14,657.67
9,23,000.00	Grant In Aid	5,45,245.00	6,47,996.00	Salaries - Manpower	3,27,677.00
3,733.00	Other Receipts	0.00	3,97,938.00	Consumables	89,250.00
0.00		0.00	41,150.00	Contingencies	0.00
0.00		0.00	26,693.00	Travel	13,660.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	-15,545.73	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
9,83,573.60		**5,45,245.00**	**10,98,231.27**		**5,45,244.67**
1,14,657.67	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**0.33**
10,98,231.27		**5,45,245.00**	**10,98,231.27**		**5,45,245.00**

NIAB, Hyderabad
SP036(NG)-Feasibility of producing cattle gonadotropins in milk of rabbit by invivo gene transfection
P.I:Dr. Nirmalya Ganguli
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
41,12,302.00	Opening Balance	8,04,110.00			0.00
11,90,858.00	Grant In Aid	16,34,797.00	4,24,920.00	Salaries - Manpower	6,04,673.00
98,309.00	Other Receipts	22,205.00	19,04,409.00	Consumables	3,84,161.00
0.00		0.00	38,893.00	Contingencies	28,307.00
0.00		0.00	32,772.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	21,96,365.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	1,40,944.00
54,01,469.00		**24,61,112.00**	**45,97,359.00**		**11,58,085.00**
0.00	Excess of Expenditure over Income	**0.00**	**8,04,110.00**	Closing Balance	**13,03,027.00**
54,01,469.00		**24,61,112.00**	**54,01,469.00**		**24,61,112.00**

NIAB, Hyderabad
SP037(NG)-Establishment of goat mammary epithelial/ stem cell lines for the production of pharmaceutical interest proteins
P.I:Dr. Nirmalya Ganguli
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
9,28,738.14	Opening Balance	3,79,892.71			0.00
2,30,746.00	Grant In Aid	6,51,542.00	2,20,000.00	Salaries - Manpower	3,12,960.00
18,609.00	Other Receipts	8,591.00	4,35,733.00	Consumables	1,26,318.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	1,42,467.43	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	18,609.00
11,78,093.14		**10,40,025.71**	**7,98,200.43**		**4,57,887.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,79,892.71**	Closing Balance	**5,82,138.71**
11,78,093.14		**10,40,025.71**	**11,78,093.14**		**10,40,025.71**

NIAB, Hyderabad
SP038(VB)-To investigate the mechanisms regulating the enigmatic Oxacillin susceptible mecA positive phenotype in the clinical isolates of staphylococcus aureus.
P.I:Dr. Vasundhra Bhandari
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
12,89,122.00	Opening Balance	11,06,707.00			0.00
9,40,000.00	Grant In Aid	0.00	2,01,100.00	Salaries - Manpower	1,13,419.00
31,123.00	Other Receipts	17,748.00	82,598.00	Consumables	7,52,264.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	1,00,000.00	Overheads	0.00
0.00		0.00	7,45,859.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	23,981.00	Transfer of Funds	0.00
22,60,245.00		**11,24,455.00**	**11,53,538.00**		**8,65,683.00**
0.00	Excess of Expenditure over Income	**0.00**	**11,06,707.00**	Closing Balance	**2,58,772.00**
22,60,245.00		**11,24,455.00**	**22,60,245.00**		**11,24,455.00**

NIAB, Hyderabad
SP039(SF)-Development of Novel Mucosal Delivery System and Testing its Efficacy Against Salmonella Infection
P.I:Dr. Syed Mohd Faisal
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
2,13,942.00	Opening Balance	11,781.00			0.00
0.00	Grant In Aid	2,55,645.00	16,107.00	Salaries - Manpower	0.00
2,812.00	Other Receipts	2,928.00	1,88,866.00	Consumables	2,18,608.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
2,16,754.00		**2,70,354.00**	**2,04,973.00**		**2,18,608.00**
0.00	Excess of Expenditure over Income	**0.00**	**11,781.00**	Closing Balance	**51,746.00**
2,16,754.00		**2,70,354.00**	**2,16,754.00**		**2,70,354.00**

NIAB, Hyderabad
SP040(NRH)-Chicken or egg: Drivers of antimicrobial resistance in poultry in India
P.I:Dr. Nagendra R Hegde
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
57,58,438.00	Opening Balance	21,54,949.00			0.00
0.00	Grant In Aid	70,40,946.00	8,32,000.00	Salaries - Manpower	11,38,908.00
1,35,506.00	Other Receipts	2,12,052.00	5,12,147.00	Consumables	11,25,111.00
0.00		0.00	1,55,384.00	Contingencies	1,000.00
0.00		0.00	89,484.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	21,49,980.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	1,35,506.00
58,93,944.00		**94,07,947.00**	**37,38,995.00**		**24,00,525.00**
0.00	Excess of Expenditure over Income	**0.00**	**21,54,949.00**	Closing Balance	**70,07,422.00**
58,93,944.00		**94,07,947.00**	**58,93,944.00**		**94,07,947.00**

NIAB, Hyderabad
SP041(GKR)-Understanding the mechanism of host innate immune suppression by the Brucella effector protein, TcpB to identify novel drug targets for brucellosis.
P.I:Dr.Girish K Radhakrishnan
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,54,124.00	Opening Balance	1,64,223.00			0.00
8,64,000.00	Grant In Aid	7,00,000.00	0.00	Salaries - Manpower	0.00
8,018.00	Other Receipts	7,125.00	7,98,577.00	Consumables	7,26,071.00
0.00		0.00	675.00	Contingencies	3,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	62,667.00	Overheads	62,666.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
10,26,142.00		**8,71,348.00**	**8,61,919.00**		**7,91,737.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,64,223.00**	Closing Balance	**79,611.00**
10,26,142.00		**8,71,348.00**	**10,26,142.00**		**8,71,348.00**

NIAB, Hyderabad
SP042(MS)-Molecular platform for pidemiology, disease mapping and development of diagnostics for economically important diseases of ducks.
P.I:Dr.Madhuri Subbiah
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
3,66,511.00	Opening Balance	14,240.00			0.00
0.00	Grant In Aid	9,06,877.00	2,27,500.00	Salaries - Manpower	3,28,536.00
4,052.00	Other Receipts	909.00	84,658.00	Consumables	558.00
0.00		0.00	239.00	Contingencies	3,000.00
0.00		0.00	43,926.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	16,172.00
3,70,563.00		**9,22,026.00**	**3,56,323.00**		**3,48,266.00**
0.00	Excess of Expenditure over Income	**0.00**	**14,240.00**	Closing Balance	**5,73,760.00**
3,70,563.00		**9,22,026.00**	**3,70,563.00**		**9,22,026.00**

NIAB, Hyderabad
SP043(AKG)-Development of injectable nanofibrous implant for oestrus synchronization in cattle.
P.I:Dr.Pankaj Suman
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
31,58,825.00	Opening Balance	18,87,785.00			0.00
13,44,016.00	Grant In Aid	18,14,686.00	7,74,181.00	Salaries - Manpower	11,27,102.00
61,724.00	Other Receipts	42,542.00	7,11,197.00	Consumables	3,30,508.00
0.00		0.00	9,400.00	Contingencies	2,31,234.00
0.00		0.00	44,852.00	Travel	12,066.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	11,37,150.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	61,724.00
45,64,565.00		**37,45,013.00**	**26,76,780.00**		**17,62,634.00**
0.00	Excess of Expenditure over Income	**0.00**	**18,87,785.00**	Closing Balance	**19,82,379.00**
45,64,565.00		**37,45,013.00**	**45,64,565.00**		**37,45,013.00**

NIAB, Hyderabad
SP044(PS)-Understanding the Epigenetics of Host Pathogen interaction during Bovine Theileriosis"
P.I:Dr.Paresh Sharma
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
15,20,079.91	Opening Balance	3,38,002.00			0.00
9,50,000.00	Grant In Aid	12,80,000.00	2,18,400.00	Salaries - Manpower	88,800.00
45,976.00	Other Receipts	24,925.00	7,77,686.00	Consumables	6,76,877.00
0.00		0.00	6,140.00	Contingencies	3,460.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	1,50,000.00	Overheads	80,000.00
0.00		0.00	10,25,827.91	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	88,795.00
25,16,055.91		**16,42,927.00**	**21,78,053.91**		**9,37,932.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,38,002.00**	Closing Balance	**7,04,995.00**
25,16,055.91		**16,42,927.00**	**25,16,055.91**		**16,42,927.00**

NIAB, Hyderabad
SP045(ASD)-Characterization of spliceosome- associated Nine Teen complex (NTC) like proteins in Toxoplasma Gondii.
P.I:Dr. Abhijit S Deshmukh
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
17,40,875.00	Opening Balance	69,354.00			0.00
0.00	Grant In Aid	5,50,000.00	1,71,600.00	Salaries - Manpower	2,02,800.00
16,906.00	Other Receipts	9,105.00	4,26,088.00	Consumables	1,97,230.00
0.00		0.00	27,280.00	Contingencies	18,234.00
0.00		0.00	21,664.00	Travel	0.00
0.00		0.00	0.00	Overheads	75,000.00
0.00		0.00	10,41,795.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
17,57,781.00		**6,28,459.00**	**16,88,427.00**		**4,93,264.00**
0.00	Excess of Expenditure over Income	**0.00**	**69,354.00**	Closing Balance	**1,35,195.00**
17,57,781.00		**6,28,459.00**	**17,57,781.00**		**6,28,459.00**

NIAB, Hyderabad
SP046(SF)- Immunocharaterization of Lipopolysaccharide (LPS) from Leptospira: Towards develepment LPS based Vaccine."
P.I: Dr. Syed Mohd Faisal
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
17,85,695.00	Opening Balance	1,61,908.00			0.00
0.00	Grant In Aid	6,00,000.00	2,24,000.00	Salaries - Manpower	2,52,000.00
45,680.00	Other Receipts	8,364.00	2,20,779.00	Consumables	3,00,131.00
0.00		0.00	29,802.00	Contingencies	12,965.00
0.00		0.00	47,695.00	Travel	0.00
0.00		0.00	0.00	Overheads	1,00,655.00
0.00		0.00	11,47,191.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
18,31,375.00		**7,70,272.00**	**16,69,467.00**		**6,65,751.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,61,908.00**	Closing Balance	**1,04,521.00**
18,31,375.00		**7,70,272.00**	**18,31,375.00**		**7,70,272.00**

NIAB, Hyderabad
SP047(SG)-Development of peptide functionalized gold nanoparticles for efficient targeting and imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics.
P.I:Dr.Sonu Gandhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
1,64,323.00	Opening Balance	76,261.00			0.00
5,00,000.00	Grant In Aid	0.00	1,80,000.00	Salaries - Manpower	16,452.00
7,438.00	Other Receipts	0.00	2,53,007.00	Consumables	29,128.00
0.00		0.00	25,349.00	Contingencies	0.00
0.00		0.00	12,144.00	Travel	0.00
0.00		0.00	1,25,000.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	30,681.00
6,71,761.00		**76,261.00**	**5,95,500.00**		**76,261.00**
0.00	Excess of Expenditure over Income	**0.00**	**76,261.00**	Closing Balance	**0.00**
6,71,761.00		**76,261.00**	**6,71,761.00**		**76,261.00**

NIAB, Hyderabad
SP048(SG)-Iron oxide nanoparticles peptide complexes for imaging of urokinase plasminogen activator receptor (uPAR) in cancer diagnostics.
P.I:Dr.Sonu Gandhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
6,74,546.00	Opening Balance	3,89,281.00			0.00
5,13,329.00	Grant In Aid	5,37,917.00	2,28,800.00	Salaries - Manpower	2,46,194.00
8,149.00	Other Receipts	9,584.00	2,02,369.00	Consumables	2,64,530.00
0.00		0.00	5,806.00	Contingencies	2,302.00
0.00		0.00	27,036.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	3,42,732.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	8,149.00
11,96,024.00		**9,36,782.00**	**8,06,743.00**		**5,21,175.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,89,281.00**	Closing Balance	**4,15,607.00**
11,96,024.00		**9,36,782.00**	**11,96,024.00**		**9,36,782.00**

NIAB, Hyderabad
SP049(ASD)-Development of lateral flow based chromatographic immunoassay using recombinant chimera antigens for point of care testing of Toxoplasma gondii infection.
P.I:Dr.Ahijit S Deshmukh
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
10,30,785.00	Opening Balance	11,49,011.00			0.00
6,86,400.00	Grant In Aid	13,72,800.00	2,15,317.00	Salaries - Manpower	4,41,591.00
25,021.00	Other Receipts	23,214.00	3,43,686.00	Consumables	9,32,410.00
0.00		0.00	19,037.00	Contingencies	23,943.00
0.00		0.00	15,155.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	1,97,348.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
17,42,206.00		**25,45,025.00**	**5,93,195.00**		**15,95,292.00**
0.00	Excess of Expenditure over Income	**0.00**	**11,49,011.00**	Closing Balance	**9,49,733.00**
17,42,206.00		**25,45,025.00**	**17,42,206.00**		**25,45,025.00**

NIAB, Hyderabad
SP050(AS)-Establishment of genome manipulation technology in Theileria parasite for identification of gene involved in transformartion of host cell.
P.I:Dr.Anand Srivastava
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	5,51,783.00			0.00
11,53,680.00	Grant In Aid	4,77,363.00	1,71,045.00	Salaries - Manpower	3,19,742.00
36,554.00	Other Receipts	11,443.00	1,92,872.00	Consumables	2,72,175.00
0.00		0.00	24,824.00	Contingencies	3,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	50,000.00	Overheads	50,000.00
0.00		0.00	1,99,710.00	Equipment	2,20,000.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
11,90,234.00		**10,40,589.00**	**6,38,451.00**		**8,64,917.00**
0.00	Excess of Expenditure over Income	**0.00**	**5,51,783.00**	Closing Balance	**1,75,672.00**
11,90,234.00		**10,40,589.00**	**11,90,234.00**		**10,40,589.00**

NIAB, Hyderabad
SP051(RKG)-Genomics assisted pathobiology to identify novel targets for diagnosis and therapeutic intervention(s) of Japanese encephalitis and Leptospirosis.
P.I:Dr.Ravi Kumar Gandham
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	1,18,97,080.16			0.00
2,61,12,764.00	Grant In Aid	29,10,000.00	6,61,280.00	Salaries - Manpower	8,40,865.00
7,29,408.00	Other Receipts	3,09,575.00	43,49,412.00	Consumables	28,82,376.00
0.00		0.00	1,19,152.84	Contingencies	1,00,502.00
0.00		0.00	1,25,578.00	Travel	41,116.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	96,89,669.00	Equipment	60,47,554.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
2,68,42,172.00		**1,51,16,655.16**	**1,49,45,091.84**		**99,12,413.00**
0.00	Excess of Expenditure over Income	**0.00**	**1,18,97,080.16**	Closing Balance	**52,04,242.16**
2,68,42,172.00		**1,51,16,655.16**	**2,68,42,172.00**		**1,51,16,655.16**

NIAB, Hyderabad
SP052(HBD)-Development of large animal models and Polyherbal medicines to treat ovarian cysts in livestock.
P.I:Dr.HBD Prasada Rao
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	3,47,372.00			0.00
23,21,120.00	Grant In Aid	14,00,000.00	1,87,075.00	Salaries - Manpower	4,61,280.00
41,533.00	Other Receipts	26,363.00	6,39,662.00	Consumables	5,77,546.00
0.00		0.00	63,804.00	Contingencies	34,260.00
0.00		0.00	4,740.00	Travel	0.00
0.00		0.00	1,20,000.00	Overheads	1,00,000.00
0.00		0.00	10,00,000.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
23,62,653.00		**17,73,735.00**	**20,15,281.00**		**11,73,086.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,47,372.00**	Closing Balance	**6,00,649.00**
23,62,653.00		**17,73,735.00**	**23,62,653.00**		**17,73,735.00**

NIAB, Hyderabad
SP053(PD)-"Identification and characterization of virulence factors of Aspergillus fumigatus field isolates from poultry chicken".
P.I:Dr.Prasad Dasari
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	11,73,560.00			0.00
24,72,000.00	Grant In Aid	0.00	8,35,424.00	Salaries - Manpower	0.00
38,492.00	Other Receipts	0.00	3,31,251.00	Consumables	0.00
0.00		0.00	57.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	50,000.00	Overheads	0.00
0.00		0.00	1,20,200.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	11,73,560.00
25,10,492.00		**11,73,560.00**	**13,36,932.00**		**11,73,560.00**
0.00	Excess of Expenditure over Income	**0.00**	**11,73,560.00**	Closing Balance	**0.00**
25,10,492.00		**11,73,560.00**	**25,10,492.00**		**11,73,560.00**

NIAB, Hyderabad

SP054(VB)-Deciphering the role of efflux pumps in imparting antimicrobial resistance in staphylococcus aureus and their inhibitors in potentiating the existing therapy.

P.I:Dr.Vasundhra Bhandari

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	7,65,778.50			0.00
14,83,280.00	Grant In Aid	9,81,670.00	92,452.00	Salaries - Manpower	2,44,742.00
26,396.00	Other Receipts	16,464.00	5,13,773.00	Consumables	5,98,296.00
0.00		0.00	572.50	Contingencies	9,530.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	1,37,100.00	Overheads	91,500.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	3,07,846.00
15,09,676.00		**17,63,912.50**	**7,43,897.50**		**12,51,914.00**
0.00	Excess of Expenditure over Income	**0.00**	**7,65,778.50**	Closing Balance	**5,11,998.50**
15,09,676.00		**17,63,912.50**	**15,09,676.00**		**17,63,912.50**

NIAB, Hyderabad

SP055(BD)-Limiting antimicrobial resistance by inhibiting diadenylate cyclase (DAC)- a bacterial second messenger biosynthetic enzyme involved in biofilm formation and cell wall intgrity.

P.I:Dr.Bappaditya Dey

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	8,98,225.50			0.00
18,08,090.00	Grant In Aid	10,04,052.00	1,52,600.00	Salaries - Manpower	4,34,000.00
30,935.00	Other Receipts	20,508.00	3,06,853.00	Consumables	2,32,583.00
0.00		0.00	9,672.50	Contingencies	7,532.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	62,290.00	Overheads	54,790.00
0.00		0.00	4,09,384.00	Equipment	2,40,610.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
18,39,025.00		**19,22,785.50**	**9,40,799.50**		**9,69,515.00**
0.00	Excess of Expenditure over Income	**0.00**	**8,98,225.50**	Closing Balance	**9,53,270.50**
18,39,025.00		**19,22,785.50**	**18,39,025.00**		**19,22,785.50**

NIAB, Hyderabad
SP056(SM)-Understanding the mechanism of buparvaquone resistance in apiomplexan parasite theileriaannulata.
P.I: Ms. Shweta Murthy
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	3,76,237.00			0.00
9,93,200.00	Grant In Aid	9,00,000.00	2,92,640.00	Salaries - Manpower	5,95,200.00
12,531.00	Other Receipts	8,898.00	2,48,854.00	Consumables	36,800.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	88,000.00	Overheads	88,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	36,877.00
10,05,731.00		**12,85,135.00**	**6,29,494.00**		**7,56,877.00**
0.00	Excess of Expenditure over Income	**0.00**	**3,76,237.00**	Closing Balance	**5,28,258.00**
10,05,731.00		**12,85,135.00**	**10,05,731.00**		**12,85,135.00**

NIAB, Hyderabad
SP057(HBD)-An attempt to enhance the shelf life of an oocyte to increase the fertilization time window.
P.I:Dr.HBD Prasada Rao
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	43,81,715.00			0.00
44,69,210.00	Grant In Aid	0.00	71,310.00	Salaries - Manpower	6,14,008.00
20,473.00	Other Receipts	99,161.00	36,658.00	Consumables	3,98,604.00
0.00		0.00	0.00	Contingencies	27,922.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	31,75,270.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
44,89,683.00		**44,80,876.00**	**1,07,968.00**		**42,15,804.00**
0.00	Excess of Expenditure over Income	**0.00**	**43,81,715.00**	Closing Balance	**2,65,072.00**
44,89,683.00		**44,80,876.00**	**44,89,683.00**		**44,80,876.00**

NIAB, Hyderabad

SP058(SA)-Identification of key molecular factors involved in resistance/ susceptibility to paratuberculosis infection in indigenous breeds of cows

P.I:Sri.Sarwar Azam

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	17,69,556.00			0.00
17,61,280.00	Grant In Aid	0.00	0.00	Salaries - Manpower	1,99,999.00
8,276.00	Other Receipts	51,202.00	0.00	Consumables	18,915.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
17,69,556.00		**18,20,758.00**	**0.00**		**2,18,914.00**
0.00	Excess of Expenditure over Income	**0.00**	**17,69,556.00**	Closing Balance	**16,01,844.00**
17,69,556.00		**18,20,758.00**	**17,69,556.00**		**18,20,758.00**

NIAB, Hyderabad

SP059(MS)-Molecular biological studies on porcine reproductive & respiratory syndrome (PRRS) virus in pig population of North East Region of India for development of sustainable diagnostics and vaccine.

P.I:Dr. Madhuri Subbiah

Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	12,38,700.00			0.00
15,00,000.00	Grant In Aid	16,24,938.00	0.00	Salaries - Manpower	2,58,321.00
705.00	Other Receipts	37,745.00	2,12,005.00	Consumables	10,97,948.00
0.00		0.00	0.00	Contingencies	15,040.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	50,000.00	Overheads	77,378.00
0.00		0.00	0.00	Equipment	4,19,227.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
15,00,705.00		**29,01,383.00**	**2,62,005.00**		**18,67,914.00**
0.00	Excess of Expenditure over Income	**0.00**	**12,38,700.00**	Closing Balance	**10,33,469.00**
15,00,705.00		**29,01,383.00**	**15,00,705.00**		**29,01,383.00**

NIAB, Hyderabad
SP060(BD)-A transcriptional approach to identify biomarkers of susceptibility and/ or resistance to tuberculosis in native and crossbred cattle.
P.I: Dr. Bappaditya Dey
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	18,11,280.00	0.00	Salaries - Manpower	2,56,680.00
0.00	Other Receipts	29,367.00	0.00	Consumables	7,57,327.00
0.00		0.00	0.00	Contingencies	4,000.00
0.00		0.00	0.00	Travel	41,116.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	4,49,505.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**18,40,647.00**	**0.00**		**15,08,628.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**3,32,019.00**
0.00		**18,40,647.00**	**0.00**		**18,40,647.00**

NIAB, Hyderabad
SP061(NRH)-Complete solution for molecular diagnosis of COVID 19 multiplex assay along with screening for other related respiratory diseases.
P.I: Dr. Nagendra R Hegde
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	14,00,000.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	27,642.00	0.00	Consumables	1,52,838.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	1,86,088.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**14,27,642.00**	**0.00**		**3,38,926.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**10,88,716.00**
0.00		**14,27,642.00**	**0.00**		**14,27,642.00**

NIAB, Hyderabad
SP062(SG)-COVID-SCAN(Novel diagnostic platforms for point-of-care SARS-CoV-2 detection).
P.I:Dr.Sonu Gandhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	25,64,450.00	0.00	Salaries - Manpower	93,510.00
0.00	Other Receipts	41,006.00	0.00	Consumables	1,70,113.00
0.00		0.00	0.00	Contingencies	23,016.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	1,40,000.00
0.00		0.00	0.00	Equipment	9,99,760.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**26,05,456.00**	**0.00**		**14,26,399.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**11,79,057.00**
0.00		**26,05,456.00**	**0.00**		**26,05,456.00**

NIAB, Hyderabad
SP063(NRH)-Hunt for PANACeA (PAN-Anti-CoronAvirals) against coronaviruses of the past, present, and the future.
P.I:Dr.Nagendra R Hegde
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	31,56,014.00	0.00	Salaries - Manpower	70,161.00
0.00	Other Receipts	50,055.00	0.00	Consumables	1,37,437.00
0.00		0.00	0.00	Contingencies	3,000.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**32,06,069.00**	**0.00**		**2,10,598.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**29,95,471.00**
0.00		**32,06,069.00**	**0.00**		**32,06,069.00**

NIAB, Hyderabad
SP064(PS)-Socio-economic upliftment of landless and marginal farmers of Yadgir district (an aspirational district) of Karnataka through goat rearing.
P.I:Dr.Pankaj Suman
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	66,33,520.00	0.00	Salaries - Manpower	3,28,632.00
0.00	Other Receipts	53,310.00	0.00	Consumables	42,209.00
0.00		0.00	0.00	Contingencies	30,717.00
0.00		0.00	0.00	Travel	28,265.00
0.00		0.00	0.00	Overheads	25,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**66,86,830.00**	**0.00**		**4,54,823.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**62,32,007.00**
0.00		**66,86,830.00**	**0.00**		**66,86,830.00**

NIAB, Hyderabad
SP065(NG)-Gene editing for generating tissue specific complete knock down/ out of Myostatin gene for increased lean meat production in Indian goat (Capra hircus, Osmanabadi breed), Phase-1
P.I:Dr.Nirmalya Ganguly
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	17,19,000.00	0.00	Salaries - Manpower	35,714.00
0.00	Other Receipts	11,296.00	0.00	Consumables	68,250.00
0.00		0.00	0.00	Contingencies	1,650.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	1,25,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**17,30,296.00**	**0.00**		**2,30,614.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**14,99,682.00**
0.00		**17,30,296.00**	**0.00**		**17,30,296.00**

NIAB, Hyderabad
SP066(SG)-Development of Multiplex/Disposable Paper Microfluidic Device for Detection of β-lactum antibiotic residues in livestock and poultry products.
P.I:Dr.Sonu Gandhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	9,40,000.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	6,098.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	1,959.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**9,46,098.00**	**0.00**		**1,959.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**9,44,139.00**
0.00		**9,46,098.00**	**0.00**		**9,46,098.00**

NIAB, Hyderabad
SP067(VTF)-Upgradation of Department of Biotechnologie's two existing laboratories as Central Drugs Laboratory for testing of COVID-19 vaccine.
P.I:Dr.Subeer S Majumdar
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	9,22,00,000.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	5.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	49,432.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	0.00
0.00		0.00	0.00	Equipment	49,350.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**9,22,00,005.00**	**0.00**		**98,782.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**9,21,01,223.00**
0.00		**9,22,00,005.00**	**0.00**		**9,22,00,005.00**

NIAB, Hyderabad
SP068(SG)-Development of a new generation of biosensors integrated with nanostructured sensitive elements for detection of Salmonellosis.
P.I:Dr.Sonu Gandhi
Receipts and Payments Account from 01/04/2020 to 31/03/2021

Previous Year Amount Rs.	Receipts	Current Year Amount Rs.	Previous Year Amount Rs.	Payments	Current Year Amount Rs.
0.00	Opening Balance	0.00			0.00
0.00	Grant In Aid	6,00,000.00	0.00	Salaries - Manpower	0.00
0.00	Other Receipts	1,028.00	0.00	Consumables	0.00
0.00		0.00	0.00	Contingencies	0.00
0.00		0.00	0.00	Travel	0.00
0.00		0.00	0.00	Overheads	1,00,000.00
0.00		0.00	0.00	Equipment	0.00
0.00		0.00	0.00	Books	0.00
0.00		0.00	0.00	AMC	0.00
0.00		0.00	0.00	Others	0.00
0.00		0.00	0.00	Transfer of Funds	0.00
0.00		**6,01,028.00**	**0.00**		**1,00,000.00**
0.00	Excess of Expenditure over Income	**0.00**	**0.00**	Closing Balance	**5,01,028.00**
0.00		**6,01,028.00**	**0.00**		**6,01,028.00**

मानव कल्याण के लिए पशु स्वास्थ्य

Animal Health for Human Welfare

राष्ट्रीय पशु जैव प्रौद्योगिकी संस्थान

National Institute of Animal Biotechnology

(An autonomous Institute of the Department of Biotechnology, Ministry of Science & Technology, Govt. of India)

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