ANNUAL REPORT 2024

ICAR-NATIONAL RESEARCH CENTRE ON PIG
Rani, Guwahati- 781131, Assam
भा.कृ.अनु.प. राष्ट्रीय शूकर अनुसंधान केन्द्र
रानी, गुवाहाटी - ७८११३१, असम

ANNUAL REPORT

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Citation
ICAR-NRC on Pig, Annual Report, 2024

Compiled and edited by

Chief Editor : Dr. Vivek Kumar Gupta, Director
Editor : Dr. R. Thomas, Principal Scientist
Co- Editors : Dr. Satish Kumar, Scientist
Dr. Salam Jayachitra Devi, Scientist
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Dr. R. Thomas, Principal Scientist and Member Secretary

Cover page theme
Mrs.Rinju Deori, a pig farmer from Bamchenia, Kadamguri, Dhemaji, Assam and an oil painting depicting traditional pig feeding practices.

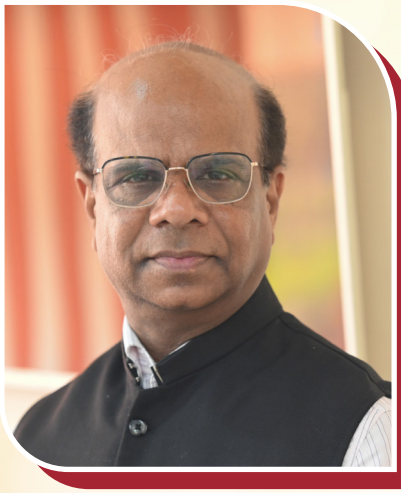
Published by
The Director
ICAR-NRC on Pig, Rani
Guwahati, Assam

ICAR-National Research Centre on Pig
Rani, Guwahati- 781131, Assam, India
Tel No : 0361-2847195
Fax : 0361-2847195
Email : nrconpig@rediffmail.com
Website : http://www.nrcp.icar.gov.in

Printed at :
Bishal Bhuyan (Planetprint)
www.planetprint.co.in

TABLE OF CONTENTS

MESSAGE FROM DIRECTOR



Dear Readers,

It is with great pleasure that I present to you the Annual Report of ICAR-National Research Centre on Pig for the year 2024. As an institute dedicated to advancing the science of pig husbandry and improving the livelihood of our farmers, this year has been an important chapter in our ongoing journey of research, innovation, and development.

Over the past year, our team has made significant strides in both scientific research and community engagement. We have focused on improving pig productivity, health, and genetic resources, addressing key challenges in pig farming, and contributing to the sustainable development of the pig industry. This document encapsulates our collective efforts, achievements, and commitments towards advancing research, innovation, and sustainable practices in the domain of pig farming and husbandry.

Throughout the year, our dedicated team of researchers, scientists, technicians, and support staff have worked tirelessly to address the evolving challenges and opportunities within the pig husbandry/industry. From genetic improvement and disease management to nutrition and welfare, our multidisciplinary approach continues to yield significant breakthroughs and advancements.

The Institute is coordinating 20 All India Coordinated Research Project on Pig, located in different parts of the country. Krishi Vigyan Kendra (KVK) of the institute is actively been engaged in conducting several programmes for extension personnel of line departments, entrepreneurs and farmers in different aspect of animal science, crop science, farm mechanization, fishery, home science, horticulture, plant protection, and soil and water conservation through training, OFTs and FLDs.

Innovation remains at the heart of our endeavours, as we strive to develop novel technologies, methodologies, and best practices to enhance productivity, profitability, and resilience in pig farming systems. Our collaborative partnerships with national and international institutions, academia, industry, and stakeholders have been instrumental in fostering knowledge exchange, capacity building, and technology transfer.

MESSAGE FROM DIRECTOR

Amidst the global uncertainties and disruptions, our resilience and adaptability have been tested, yet we have emerged stronger and more determined than ever. The various transboundary diseases like African Swine Fever (ASF) pandemic underscored the critical role of the pig sector, and we remain steadfast in our commitment to supporting pig farmers and ensuring food security and livelihoods.

On human resource development front, the scientists and administrative staffs of the Institute were awarded/ honoured in various platforms. Looking ahead, we are poised to embrace emerging opportunities and tackle new challenges with vigor and enthusiasm. Our strategic priorities encompass sustainable intensification, digitalization, value addition, and market integration, as we work towards achieving the vision of a vibrant, inclusive, and environmentally responsible pig sector.

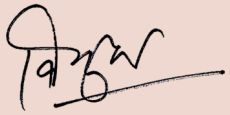
I extend my sincere gratitude to our esteemed stakeholders, including farmers, policymakers, industry partners, funding agencies, and the community at large, for their unwavering support and collaboration. Together, we will continue to push the boundaries of knowledge and innovation, driving positive transformation and prosperity across the pig value chain.

I wish to express my sincere thanks and gratitude for the constant support and encouragement received from Dr. Himanshu Pathak, Secretary, DARE & Director General, ICAR and Dr. Raghavendra Bhatta, Deputy Director General (Animal Sciences). I am thankful to Dr. A.K. Tyagi, ADG (ANP), Dr. Ashok Kumar, Ex-ADG (Animal Health), Dr. Divakar Hemadri, ADG (Animal Health), Dr. G. K. Gaur, ADG (AP&B) and other staff of Animal Science Division, ICAR, Krishi Bhawan, New Delhi for their continuous support.

In conclusion, I would like to extend my sincere gratitude to the team of dedicated scientists, researchers, and support staff at ICAR-NRC on Pig, as well as our partners, collaborators, and farmers, for their unwavering support. Together, we will continue to strive for excellence in research and make a lasting impact on the pig farming community.

Thank you for your continued support and trust in our endeavors.

Warm regards



(Vivek Kumar Gupta)
Director

EXECUTIVE SUMMARY

The ICAR-National Research Centre on Pig has been providing excellent services to farmers, extension agents, lawmakers, and companies engaged in pig farming and pork processing for 22 illustrious years. Since its founding, the institute, along with its affiliated Krishi Vigyan Kendra (KVK) and the 20 centers of the All India Coordinated Research Project on Pig, which are dispersed across the country, has been sincerely working to promote scientific pig production and postharvest management in the country. The Institute employed 21 scientists, 9 technical professionals, and 8 administrative and accounting staff in 2024. During the fiscal year, a total of 2980.13 lakh was allocated for both plan and non-plan budgets. During that time, the institute's revenue target was Rs 15 lakh and institute has achieved it. The Institute's Scientists and staffs diligently strived to meet a number of research and extension goals outlined in the six main programs in accordance with the mission. Under the auspices of the "Indian Council of Agricultural Research," ICAR-NRCP is currently regarded as one of the most active organizations. It is also an ISO/IEC 17025:2017 Accredited and ISO 9001:2015 Certified Institution.

Conservation and genetic improvement of pigs

In order to uncover genome-wide selection signatures, the genotyping of Doom (28) and Ghoongroo (28) along with the Mali (14), Manipuri black (12) and Agonda Goan (14) breeds were conducted. The signature of selection region within Doom pig was identified on 21 regions on SSC9, SSC15, SSC14, SSC13, SSC7, SSC3 and SSC6 with iHS value more than 3. The strong selection signals were detected in 3 regions of SSA1, 9 regions of SSA13, 18 regions of SSA18, 1 region each in SSA10, SSA5, SSA6, SSA9 and SSA15 in Ghoongroo breed. The positive selection for doom pig was observed in the 5 regions in SSA2. A controlled, non-stressful environment was established for image acquisition, utilizing both mobile phone and DSLR cameras across various age cohorts. Facial feature extraction was achieved through the application of Local Binary Patterns Histograms (LBPH), Histograms of Oriented Gradients (HOG), and Principal Component Analysis (PCA).

In order to develop a traceable value chain for safe pork in the north eastern region of India, a comprehensive dataset of approximately 25,000 facial images was acquired over a 12-month period from 30 Ghungroo pigs of diverse post-weaning ages at the ICAR-Indian Veterinary Research Institute, Eastern Regional Station Animal Farm, Kalyani, West Bengal. A supplementary dataset of 12 images was obtained from the ICAR-National Research Centre on Pig. A mobile application was developed for the automated classification of porcine breeds, employing deep learning methodologies. Further, the molecular mechanisms of African Swine Fever Virus (ASFV) resistance in porcine subjects, with a specific focus on differentially expressed genes within indigenous germplasm. An in-house developed PCR and qPCR assay was utilized for ASFV detection in clinically suspected animals.

Improvement in pig farm management practices

Association of farrowing and piglet traits vis-a-vis colostrum characteristics with neonatal performance in pigs was studied. The low colostrum intake group consumed 226.0±3.1g of colostrum, while the high colostrum intake group consumed 288.3±3.4g. However, when normalized to birth weight, the colostrum intake per kilogram of birth weight was higher in the low group compared to the high group. The birth weights of the two groups also differed significantly ($P<0.01$), with the low colostrum intake group weighing 0.9±0.02kg and the high colostrum intake group weighing 1.2±0.02kg. This suggests that piglets with higher birth weights tend to consume more colostrum. The water footprint per Kilogram of pig feed was assessed, which revealed that the water footprint per kilogram of creep feed, starter, grower, and finishers were 10.3, 50.3, 209.7 and 230.2 litres respectively during the life span of a pig in organised pig production system. The total water footprint for feed during a life cycle was calculated as 500.6 litres. Moreover, Estimation of blue water footprint revealed that 61% of fresh water used for pig farming are used for shed washing, 22% for animal washing and 17% as drinking water in an organised pig farm under Indian conditions.

Improvement of reproductive efficiency in pigs

Efforts were made to establish self-sustaining multiplier units with 42 farmers; however, only 25 units were successfully established. DD Kisan team visited the pig multiplier units and a documentary was prepared. Out of 22 bioresources

used in semen preservation, only 6 were selected for the subsequent studies depending on the preliminary trials for the sperm motility upto 96 hours. Briefly, gel free ejaculates were collected by double gloved hand method. Satisfactory semen samples were subjected to evaluation. Different types (I-VI) of nanoparticles from different sources were synthesized in green as per the standard procedure and Zeta size along with potential was estimated. Semen aliquots were extended fortified with different types of nanoparticles and processing as per standard procedures. Using the six bioresources, a cocktail preparation was also prepared that was used in vitro for sperm function testing in extended semen. Extended semen was stored at liquid state. Sperm function parameters, antioxidant status and microbiology were estimated. Studies are being carried out towards establishing self-sustainable cooperative models for propagation of liquid semen artificial insemination and envisaging cryopreservation of spermatozoa in pig. Effect of different concentration of additives on boar spermatozoa at different hours of preservation in Androhep extender at post equilibration and thawing was also assessed. The samples supplemented with 1mM BHT, 3mM GSH and 100 mM trehalose (ATR) showed significantly higher values than the 25MM TAU and control group AND after equilibration, however, the difference between the three groups (BHT, GSH and TRE) were non-significant. At post-thaw, all the treated groups maintained significantly higher membrane integrity than the control group AND. The GSH group (17.85±0.90) maintained the highest percentage of membrane integrity in the boar spermatozoa at post thaw.

Nutritional interventions for profitable pig production

Research works were carried out to synthesize nano-Zn at the laboratory level as an alternative to pharmacological doses of Zn to manage early weaning-associated diarrhea and improve intestinal integrity in piglets. Fresh leaves of plants (neem and curry) were collected and thoroughly washed 3–4 times with running tap water, followed by two washes with double-distilled water. The synthesis of Zn nanoparticles involved the use of 20 ml of the plant extract from the stock solution, which was taken in a 250 ml conical flask and heated with continuous stirring on a magnetic stirrer at 70 °C. The characterization of synthesized nano particles is underway.

Improvement of physiological efficiency in pigs

Physio-genomic responses and MCT profiling of exotic and Indigenous pig breeds in heat stress during different seasons were carried out. The relative changes in the copy number of HSP90 mRNA exhibited a significant upregulation ($P<0.05$) in both the thigh muscle and colon tissue of the Rani pig during the winter and summer seasons when compared to the thermo-neutral control season. Detailed analysis of genome-wide methylation of indigenous (Ghungroo and Mali) and exotic (Hampshire and Large White Yorkshire) was conducted. Out of 29.27 million CpGs, indentified, 68.6, 13.9, 6.1 and 11.3% belonged to high, medium, low-medium and low methylation category. An investigation was conducted to identify the olfactory genes proteins in the porcine genome based on the whole genome sequencing data generated by ICAR-NRC on Pig. The transcriptome data was extracted from the genome data of Ghungroo, LWY, Mali and Hampshire. The study identified 131 genes, mostly coding for various proteins of olfactory receptor family, olfactomedins, lipocalins, retinol binding proteins etc. Additionally, global transcriptomic changes in the porcine oviduct after ovulation and identification of the differentially expressed genes (DEGs) and signaling pathways were explored. The study revealed modulatory factors associated with the ampullary physiology during early embryonic development, which may influence fertility and litter size in pigs.

Further, development of myostatin knock out pigs is in progress towards production of broiler pig using CRISPR technology. The SgRNA were synthetized by in vitro transcription using standard methodology and the guide RNA (gRNA) DNA template was PCR assembled. The cryopreserved fibroblast cells were thawed and seeded in 96 well plate and transfection was conducted with ribonucleoprotein (RNP) complex consisting of SgRNA (G1 to G6) and Cas9 nuclease using lipofectamine in triplicates when the cells reached the confluency of 40-60 %. TIDE analysis revealed significant difference in editing efficiency of SgRNAs designed on different exon 1, 2 and 3 which ranged from 96.4 % to 1.2 %. The sequence alignment of WT and KO sequences revealed 59 bp deletion in myostatin gene caused by G1 guide.

Pig disease monitoring and surveillance

Serum samples were collected and analysed from Assam against targeted diseases and percent prevalence was recorded to be ASF (0.00%), PRRS (1.40%), cysticercosis (0.31%), Swine influenza (42.18%), JE (51.42%), brucellosis (0.00%), cryptosporidiosis (0.00%), LSD (14.44%) and Q fever (0.00%). An Indirect Enzyme-Linked Immunosorbent Assay (ELISA) was developed and standardized for the detection of antibodies against Porcine Circovirus type 2 (PCV2) using a recombinant capsid (Cap) protein as the coating antigen. The Cap-ELISA was validated by testing 548nos. of serum samples in parallel with a commercial ELISA kit (INzegim,Madrid). A total 264 nos. of pig serum samples were collect-

ed/received from Assam, Meghalaya and Tripura for testing the sero-prevalence and molecular epidemiology of important porcine viral diseases in pigs in northeastern part of India. A total of 355 fecal samples/ rectal swabs and 295 nasal swabs were collected from different backyard and organized pig farms of three districts of Assam (Nalbari, Sonitpur and Kamrup) for screening of important bacterial pathogens of pig. A total of 11 post-mortem examinations were conducted on deceased pigs during the reporting period. Gross and histopathological examinations were performed to establish a tentative diagnosis of suspected diseases. Two cases were confirmed as Streptococcus suis infections.

Under the AINP-CEDA project, A total of 162 nos. of tissue samples and 39 nos. of blood samples were analysed by PCR and LFA for the presence of ASFV, PCV, PRRSV, CSF & JEV. 3 samples (1.85%) were positive for ASFV, 6 samples (2.27%) positive for PCV2 and 5 samples (3.08%) were positive for CSFV. PCV2d capsid protein of an Indian isolate was expressed in A038 insect cell line using the recombinant baculovirus system. Immunization of pigs with PCV2d VLPs elicited a significant immune response, with higher antibody titers observed in the group receiving the adjuvanted vaccine candidate (PCV2dVLPadj). The study successfully generated a structurally stable and immunogenic PCV2d capsid protein-based VLP vaccine candidate. This candidate may offer a cost-effective and efficient approach to combating PCV2d infections, addressing a critical need in the Indian piggery industry facing genotype-specific outbreaks. A modified pTruEx1.1plasmid vector, pOPINE vector (6.1kb) was used as baculovirus transfer vector. Both plasmid vector and PCV3 sequence was flanked by unique restriction sites for BstEII and NotI at the 5' and 3' termini respectively to suit the cloning.). Plasmids containing the PCV3 sequence were confirmed by digestion with BstEII/ NotI. A culture-free herbal-aided assay developed for rapid detection of extended spectrum β-lactamase producing bacteria in piggery farms and slaughterhouses. The assay leverages the hydrolysis of β-lactam antibiotics by ESBL enzymes, leading to a detectable color change in a starch-iodine complex. A total of 309 samples from piggery farms and slaughterhouses in India were tested, with the assay demonstrating relative sensitivity and accuracy of 91.3% and 85.1%, respectively, compared to the culture-based double antibiotic disc diffusion method. The assay's potential for broader applications in healthcare, agriculture, and environmental surveillance, enabling timely interventions and improved antibiotic stewardship to combat the spread of AMR. Targeting key ASFV proteins, P54 and CD2v, a chimeric construct was development, codon-optimized, and expressed in insect cells. The chimeric protein retained antigenic determinants, highlighting its potential for immunological assessment in porcine models and vaccine development.

Minipigs and outbred pigs are suitable models for pharmacokinetic studies and monoclonal antibody delivery platform evaluations. However, the immune response differences in minipigs warrant consideration in future studies. To assess the prevalence of African Swine Fever Virus (ASFV), 30 tissue samples suspected of ASF, including spleen, lymph nodes, lungs, liver, and small intestine, were collected/received from different districts of Mizoram, Punjab, and Assam. Out of the samples tested, seven were confirmed positive for ASFV. An initial characterization of porcine muscle cells was conducted to identify muscle stem cell-specific markers. A total of 122 samples were tested for molecular characterization of pork borne parasites. The samples that tested positive in PCR were further selected for amplification of the VP2 gene of PPV using expression primers. Following bioinformatic analysis, expression primers for Porcine Parvovirus (PPV) were designed to amplify the target gene for recombinant protein expression.

Post harvest processing and value addition of pork

Development of a Point-of-Care colorimetric method for detection of meat freshness was targeted. Experiments were performed to develop stable colour both in solution as well as in paper medium using ABTS and TMB dyes targeting ATP breakdown products. During this process, five different muscles viz. *Longissimus dorsi*, *Psoas major, Biceps femoris, Trapezius and Triceps brachii* from electrically stunned as well as percussion stunned pigs were evaluated for understanding the postmortem changes pertinent to different physico-chemical parameters pH, sarcomere length, drip loss, colour, ATP concentration etc. Significant differences were observed w.r.t. the decline in pH in different muscle types which are generally depend on muscle fiber type, activities of the muscle and other factors. It was observed that glycogen depletion is faster in fast twitch muscles resulting in comparatively for lactic acid which in turn decreases the pH more rapidly. Significant correlation was observed between the Lightness (L*), redness (a*) and yellowness (b*) values acquired. In addition, the processed pork products subjected to different processing conditions and temperatures were studied. The processing conditions evaluated include moist heat, dry heat and steam. Further, the effects of hot meat, chilled meat and frozen thawed pork on processing of pork products have evaluated. Microstructure of the above-mentioned pork products were assessed using scanning electron microscopy.

Under the DST-STI Hub project, new technologies for processing value added pork products have been developed and transferred to the beneficiaries, along with necessary machineries and capacity building. Institute has organized

master training programmes, imparted hands-on knowledge on Silage-making for formulating economic yet balanced pig rations and organized field level programmes and distribution of essential implements for maintaining biosecurity in the farms. Under this project, indPOtrace web platform has been developed to document the data pertinent to pig production and management conditions. The web application has distinct components for 'traceability', 'real time meat inspection' as well as 'Pig help line' to cater the specific needs of stakeholders. It provides specific interaction platforms for pig produces, pork processors, traders, feed suppliers, transporters etc. Also, MeatSpecs 1.0, a tool designed to undertake real time virtual antemortem inspection of pigs as well as postmortem inspection of pig carcasses, was developed. The purpose of the tool is to ensure safe and wholesome meat to the consumers. Further, Opti-PigRation 1.0, a web tool was designed to optimize the energy-protein ratio in the feeds offered by the farmers to their pigs, especially while using the un-conventional pig feeds.

Extension interventions to augment pig production

Technology transfer models that facilitate the adoption of improved technologies were evaluated at the filed level. Relationship analysis of their socio-economic variables with technology adoption were seen. age had a negative and significant relationship with adoption level. It might be because the aged persons were less change prone and reluctant to adopt new technologies in their farms. Knowledge and Scientific Orientation were found to have significant contribution at one percent level, 3 variables i.e. Extension contact, Income from piggery, and Farm Education Exposure had significant contribution at five percent level of significance. Using PCA and AHC we have classified the similarity and dissimilarity factors affecting their adoption in farm level. Reels on different aspects of pig farming were made and uploaded in the YouTube handle of the institute. This digital content is accessible remotely on various devices, benefiting those in remote and underserved areas. Priority content areas have been identified within different components of the pig production system. The videos are categorized into different series based on content and viewer preferences. Key topics include biosecurity, feeding, routine farm operations, farrowing, breed identification, training programs, and outreach initiatives by the institute Under the Pig seed village project, training programs were organised and possible beneficiaries were selected through pilot study. By strengthening pig production systems, the project seeks to boost rural livelihoods, support small-scale farmers, and contribute to the overall growth of the pig farming sector in the region.

Computer Application and IT in pig production

The research works of the section emphasized largely on evaluating the deep learning models to enhance the image classification tasks. Deep learning models were used to improve the image accuracy and classification. To construct our hybrid models, we utilized ResNeXt-50 as a feature extractor, replacing its fully connected layer with an identity mapping to retain learned features. Additionally, we explored alternative combinations by integrating ResNeXt-50 with DenseNet121 and EfficientNet-B6, assessing their comparative performance. Data augmentation techniques, including resizing and normalization, were applied to enhance the dataset, which comprised various types of cell images formatted in a sequence-based input structure Different cell images were resized and enhanced through different deep learning models. The research demonstrated that hybrid models effectively enhance classification accuracy over standalone CNN architectures. All cell types underwent viability testing using the trypan-blue dye exclusion method and were regularly monitored for growth characteristics. Cell cultures were maintained under optimal conditions, with media replaced every third day. Once the cells reached 70-80% confluency, they were passaged using trypsinization and imaged using a NIKON TS100 microscope under 20X and 10X magnifications. The comparative analysis resulted in the better performance of our model as compared to the conventional ones.

Technological interventions for livelihood enhancement of socially backward people

Institute has successfully implemented Tribal Sub Plan (TSP) and Scheduled Caste Sub Plan (SC SP) programmes, which are the strategic approaches by the Government of India to ensure that the benefits of national development reach the Scheduled Tribe (ST) and Scheduled Caste (SC) populations. Under TSP, emphasis was placed on involving tribal communities in the planning and implementing of scientific piggery. In the year 2024-2025, a total of 29 such programs were conducted in the tribal-dominated area of Assam Arunachal Pradesh, Meghalaya and Nagaland, in which a total of 1908 numbers of tribal Pig farmers directly benefited through these programmes. Among these farmers, Pig feed and different small inputs like LED lights, Steel buckets, Gumboots, Pig for breeding, mixer and different scientific leaflets on piggery management in local languages were distributed. Among the 29 capacity-building programs, six nos. of one-day training and demonstration programs, eight nos. of three days residential training programs, one five

days program, seven awareness camps and field days program, four Research-Extension-Farmers interface meetings, two Pig Germplasm distribution programs and one health camp. Under SCSP, a total of 122 tonnes of pig grower feed were distributed as key inputs for pig farming. Seven awareness camps were held to educate SC pig farmers on various aspects of pig farming, including housing, reproduction management, feeding practices, market linkages, disease prevention, daily care, and biosecurity measures, particularly to protect against diseases like African swine fever.

Trainings and capacity building

ICAR-NRC on Pig has imparted 24 training programmes during the current year for over 660 participants from across the country. These programmes were indented to cover different aspects of pig production, artificial insemination, pork processing and value addition to provide exposure to participants on the basics of selection of breed/ varieties/ strain and breeding strategies for profitable pig farming, feeding of different categories of pigs and use of non-conventional feed stuffs for swine feeding, care and management of different categories of pigs, exposure to semen lab, semen collection, processing and evaluation of boar semen for Artificial Insemination, housing requirement for scientific pig farming, common diseases of pigs and their management including vaccination schedule, farm cleaning, disinfection, routine farm operation practices, castration and needle teeth clipping of piglets and different methods of administration of medicines in pig, and demonstration of formulation of feeds for different categories of pigs.

Technology transfer and Business Incubation Support

Throughout the year, the institute has successfully developed and granted several technologies, formalized collaborations by signing MoUs with stakeholders and organizations, and participated in four national and regional exhibitions to showcase its innovations. The newly developed technologies across various domains will further strengthen intellectual property management within ICAR, enhance technology transfer, and play a pivotal role in improving the economic status of pig farmers through innovation-driven solutions. During the year, 2 patents were granted and 04 patents were filed. Also, 03 numbers each of Trademarks were registered and filed during the year. In addition, 02 numbers of copyrights were registered and 05 applications were filed. Further, 01 design was registered and 01 was filed in the current year.

Agri Business Incubation Centre of ICAR-NRCP has offered its entrepreneurs substantial technical assistance during the reported period. In order to facilitate the entrepreneurs to scale up their initiatives, the ABI centre has offered them proactive, beneficial business support in the form of technical consulting, mentor connections, guidance, and trainings to develop contemporary technology-based business ideas and models in business domains. During the year 2024, two numbers of EDPs were organized where a total of 37 participants from 12 states participated. Special sessions were arranged for issues pertinent to FSSAI licensing/registration; NABARD and NLM project guidelines and different funding options available for the entrepreneurs viz. AHIDF, RKVY, Angel investors etc. The participants were also encouraged to join Agri-Business Incubation (ABI) Unit, ICAR-NRC on Pig for incubation of their businesses and ideas. Graduation Ceremony cum Industry Meet was organized on 4th September, 2024, where the institute has awarded graduation certificates to 5 entrepreneurs who have successfully completed their incubation programme with the institute and initiated their business. Institute has initiated a special call for Expression of Interest (SwineNEST 1.0) from interested entrepreneurs for Incubator support through Agri-Business Incubation (ABI) centre of the Institute, while 'Stu-GNITE 1.0' was aimed at addressing a plan to foster innovation, creativity, and entrepreneurship among students. In addition, a software named 'FoSaRiCa' (Food Safety & Risk calculator) was developed as a platform that ranks the risks of various food by taking into account the interactions between the variables that increase the risk of foodborne illness.

PG Diploma in pork value chain management

During the year 2024, institute has started a Post Graduate Diploma in Pork Value Chain Management which is a specialized program offered by the ICAR-National Research Centre on Pig (NRC on Pig), located in Guwahati, in collaboration with the ICAR-Indian Veterinary Research Institute (IVRI) in Izatnagar, Bareilly. This unique diploma program provides an in-depth understanding of the pork value chain, focusing on the management, processing, preservation, and quality control aspects of the pork industry. It aims to equip professionals with the necessary skills and knowledge to enhance the pork production, processing, and marketing processes, thus improving the sustainability and efficiency of the pork industry. The program is designed to span two semesters and covers a comprehensive range of thematic areas essential for developing a holistic understanding of the pork value chain. These thematic areas are structured to

provide theoretical knowledge, practical exposure, and skill development in the various aspects of pork production, processing, and value addition.

Krishi Vigyan Kendra

The Krishi Vigyan Kendra Goalpara has conducted 44 training programmes in horticulture, animal science, home sciences, agri-engineering covering 1260 number of participants during the year. The training programmes conducted for farmers and farm women were 25 nos. covering 738 participants; training for rural youth were 15 nos. covering 402 participants; training for extension functionaries were 02 nos. covering 74 participants; long duration vocational training were 3 nos. covering 45 participants and skill development trainings were 3 nos. covering 184 participants. KVK Goalpara is well equipped with a Farm machinery bank and is maintaining a custom hiring centre for greater benefit of the farming community of Goalpara district. Production of seed and planting materials is another important activity of KVK Goalpara. During the reported period, 80 kg of foxtail millet and 30 kg of niger was produced in KVK farm. A total of 5500 numbers of disease free planting materials of tapioca, vegetables and 116 kg of ginger rhizomes were produced in KVK Farm.

Women centric programmes

The women scientists and staff of ICAR-National Research Centre on Pig (NRC), Rani, Guwahati, in collaboration with Marwari Hospital, Guwahati, organized a one-day health check-up camp and health awareness program for tribal women farmers and their families. A dedicated medical team from Marwari Hospital facilitated the health check-up sessions and provided free medicines to the beneficiaries. A total of 33 tribal women farmers engaged in pig rearing from Umsur village, Assam, participated in the program along with their families. The women staffs of ICAR-NRC on Pig played a key role in ensuring the success of the initiative. As part of the program, pig health kits containing six essential veterinary supplies mineral mixture, vitamin supplements, dewormer, antiseptic ointment, potash, and cotton roll were distributed to the tribal women farmers to support the health and productivity of their livestock. This initiative underscored ICAR-NRC on Pig's commitment to empowering tribal women farmers by enhancing health awareness and strengthening their knowledge of livestock management practices.

Swachh Bharat

The Swachhata Hi Seva 2024 campaign at ICAR-National Research Centre on Pig, Guwahati, Assam, witnessed a remarkable blend of activities emphasizing environmental cleanliness, social responsibility, and community involvement from 17th September to 2nd October, 2024. From tree plantations, cleanliness drives, and workshops, to public awareness initiatives, the program saw participation from staff, scientists, students, and the community. Notable events like the 'Ek Ped Maa Ke Naam' plantation drive, Eco-art initiative, and outreach programs such as 'Swachhata Ki Pathshaala' highlighted both the qualitative impact on mindset change and quantitative achievements in environmental conservation and public hygiene. With more than 50 saplings planted, extensive public outreach, and multiple community-driven cleanliness initiatives, the campaign not only improved the environmental landscape but also instilled a lasting sense of responsibility among participants. The wide range of activities—from health camps to cultural events—fostered awareness about cleanliness and sustainability, leaving a tangible and impactful legacy in both the campus and local communities.

AICRP on Pig

The Institute continued regular monitoring of the progress of AICRP on Pig project (20 centers) through technical and financial monitoring in consultation with the council and conduction of review meet. The AICRP project is continuing in different centers across the country to study the performance of pigs in different agroclimatic condition, to develop region-specific package of practices including quality germplasm and to conserve the indigenous germplasm.

Others

The Institute has conducted meetings of Quinquennial Review Team, Research Advisory, Institute Research committee, Institute Animal Ethics Committee and Institute Management Committee regularly. The Institute also observed various official functions such as Republic Day, Independence Day, International Yoga Day, Hindi Pakhwada, Institute Foundation Day and World Environment Day. Various social events were also organized by the Recreation Club for the staff. Various initiatives were taken to maintain the office and campus premises clean and environment friendly.

ANNUAL REPORT 2024

INTRODUCTION

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

03 INTRODUCTION

The ICAR-National Research Centre on Pig (ICAR-NRCP) was established in 2002 under the aegis of the Indian Council of Agricultural Research (ICAR) to bring excellence in pig production, health and product processing through innovative research in order to provide technology backstopping for enhanced pork production, employment generation and poverty reduction among socially and economically weaker sections through the medium of pig husbandry. The institute has been trying its level best for popularizing the scientific pig production and post-harvest management in the country since its inception as well as all round development of the piggery sector along with its affiliation units, namely Krishi Vigyan Kendra (KVK), and twenty centres of All India Coordinated Research Project (AICRP) on Pig spread over different parts of the country. All India Coordinated Research Project on Pig is the flagship programmes for which the Institute acts as a nodal agency. Development of region-specific pig production technologies and filling the critical gap of demand for superior pig genetics are the focus of AICRP on Pig programme.

Location

The institute is located at Rani, Guwahati in the state of Assam. The institute is approximately 35 kms away from the Guwahati city railway station and 12 kms from the Lokpriya Gopinath Bordoloi International Airport.

Faculty and Staff

The Institute is headed by the Director and currently 20 scientists, 09 administrative/finance/supporting and 08 technical staffs are in position.

Staff Position

RMP Cadre and Scientist Cadre

Sl. No.	Name of the post	Sanctioned post	In-position	Vacant
1	RMP Cadre - Director	01	01	00
2	Principal Scientist	02	00	02
3	Senior Scientist	04	03	01
4	Scientist	18	17	01
	Total	25	21	04

Administrative Cadre

Sl. No.	Name of the post	Sanctioned post		Total	In-position	Vacant
		ICAR-NRC on Pig	KVK-Goal-para			
1	LDC	01	00	01	01	00
2	UDC	01	00	01	01	00
3	Stenographer Grade III	00	01	01	00	01
4	PA	02	00	02	02	00
5	Assistant	05	01	06	02	04

Sl. No.	Name of the post	Sanctioned post		Total	In-position	Vacant
		ICAR-NRC on Pig	KVK-Goal-para			
6	AAO	01	00	01	01	00
7	AO	01	00	01	01	00
8	FAO	01	00	01	01	00

Technical Cadre and Skilled Supporting Staff Cadre

Sl. No.	Name of the post	Sanctioned post		Total	In-position	Vacant
		ICAR-NRC on Pig	KVK-Goal-para			
1	T-1	05	02	07	04	03
2	T-3	04	00	04	03	01
3	T-4	00	03	03	03	00
4	SMS/STO/T-6	00	06	06	04	02
5	Skilled Supporting Staff	04	02	06	03	03

04 PRIORITY SETTING AND MANAGEMENT

The institute has a high-powered Research Advisory Committee (RAC) comprising of eminent scientists and professors, who guide the research agenda of the institute and set research priorities. Dr. A.K. Srivastava, Vice-Chancellor, Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan, Mathura, UP is the chairman of the committee. The other members include scientists and professors from the field of Animal Genetics and Breeding, Animal Health, Animal Nutrition, Animal Physiology, Extension and Livestock Products Technology. The Quinquennial Review Team (QRT) of the institute is headed by Dr. V.K. Taneja, Former Vice Chancellor, GADVASU, Ludhiana. The functioning of the institute is supervised by Institute Managemental Committee (IMC) headed by the Director of the institute as Chairman and members drawn from state government, university and public personnel. A number of internal committees such as Purchase, Library, Works, Official Language Implementation, ISO 17025: 2017 and ISO 9001- 2015 Implementation, Grievance, Publication, Priority Setting Monitoring and Evaluation Cell, Staff Welfare Club, IPR Cell, Institute Technology Management Unit, Agri-Business Incubation and ICC (women committee) etc. have been constituted to decentralize the management with developed responsibilities for smooth functioning of the institute. The Institute Joint Staff Council has been constituted for promoting healthy and congenial work environment. The Institute Research Council (IRC) provides a platform for effective professional interactions in respect of review and implementation of various research projects.

VISION

To bring in excellence in pig production, health and product processing through innovative research in order to provide technology backstopping for enhanced pork production, employment generation and poverty reduction among socially and economically weaker sections through the medium of pig husbandry.

MISSION

Performance appraisal and genetic cataloguing of indigenous pigs, development of improved pig variety together with production, health, product processing and pig based integrated farming system technologies to facilitate the pig rearers of the country for achieving household food, nutritional and economic security.

MANDATE

The mandate of the institute is:

- To undertake basic and applied research for enhancing pig production
- To act as a repository of information on pig production
- Capacity building

RESEARCH PROGRAMMES

Programme-1: Conservation, breeding and management of pig genetic resources.
Programme-2: Nutritional, physiological and reproductive interventions for improving efficiency of pig production.
Programme-3: Monitoring, development of diagnostics and management protocols for pig diseases for achieving one health.
Programme-4: Value addition, farm to fork management for food safety, entrepreneurship and skill development among stakeholders.

EXPENDITURE STATEMENT

BUDGET VISA-A-VIS EXPENDITURE 2024-25 **Rs. in lakh**

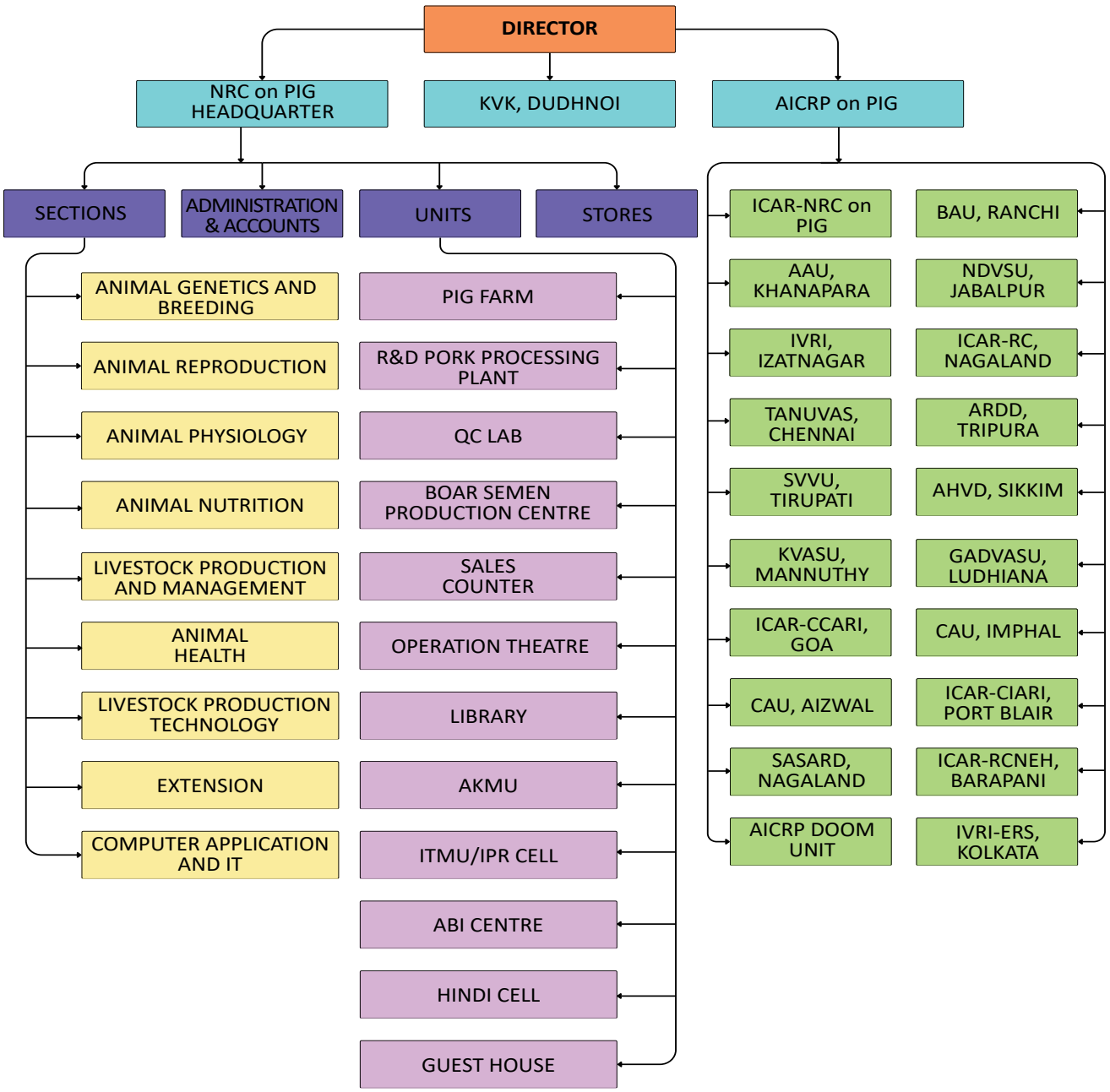
NAME OF THE SCHEME /PROJECT	DETAILED	PAY & ALLOW-ANCES	GENERAL	CAPITAL	TOTAL
ICAR-NRC ON PIG, MAIN SCHEME	R.E.	842.13	574.00	138.00	1554.13
	EXP.	842.12	574.00	138.00	1554.12
AICRP ON PIG PROJECT	R.E.	40.00	1157=00	229.00	1426.00
	EXP.	40.00	1156.95	229.00	1425.95

REVENUE TARGET AND ACHIEVEMENT

Rs.in lakh

REVENUE TARGET DURING 2024-25	15 lakh
REVENUE ACHIEVEMENT DURING 2024-25	117.60 lakhs

05 ORGANIZATIONAL SETUP



The matrix mode of management is adopted in the research activities which provide devolved responsibilities for effective implementation of multidisciplinary/ interdisciplinary programmes. Director is the Head of the Institute, supported by administrative and financial wings. To strengthen the local decision-making and research monitoring, Research Advisory Committee, Institute Management Committee, Institute Research Council and PME Cell play a vital role through periodical meetings.

ANNUAL REPORT 2024

PHYSICAL PROGRESS

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

06 PHYSICAL PROGRESS

Construction of Annexe Building

The main building of the institute has been expanded to improve facilities for both scientific and non-scientific staff. With the expansion, the building now includes wide working spaces, offering an environment that is beneficial for all official staff members of the Institute. Additionally, significant progress has been made in furnishing the interiors and enhancing internet connectivity, ensuring the building is fully equipped and ready for use.

Breed Repository

The Pig Breed Repository has been developed to preserve and manage various pig breeds, ensuring their systematic maintenance and research. The facility now includes well-structured enclosures designed to accommodate different breeds in a controlled environment. Proper housing, designated feeding areas, and biosecurity measures have been established to maintain the health and genetic integrity of the pigs. Additionally, infrastructure enhancements such as improved ventilation, water supply systems, and waste management have been implemented. The repository is now fully operational, with pigs being housed and managed effectively for research and conservation purposes

Jalopchar

The Jalopchar wastewater treatment system has been successfully constructed and is now operational. The infrastructure includes designated treatment zones with wetland plants and stratified filtration media to facilitate natural wastewater purification. The system has been integrated with water flow management structures to optimize treatment efficiency.

With the completion of construction, the system is now actively treating wastewater, significantly reducing pollutants such as BOD, nitrates, phosphates, and heavy metals. The facility operates without external energy input, making it an eco-friendly and cost-effective solution for wastewater treatment.

ANNUAL REPORT 2024

RESEARCH PROJECTS

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

07 RESEARCH PROJECT

ANIMAL GENETICS AND BREEDING

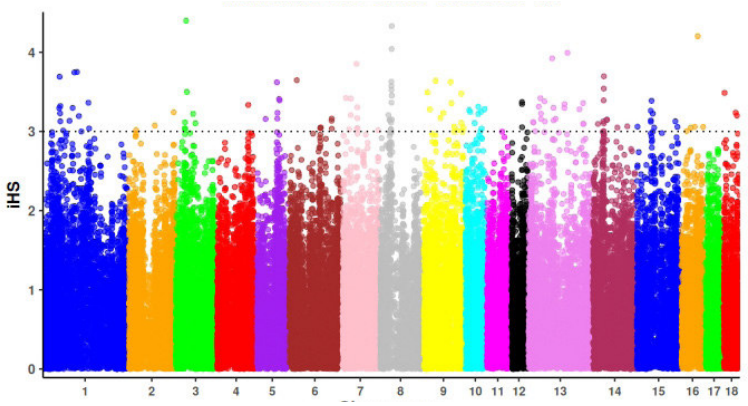
Institute Project: Exploration of Genome-Wide Selection Signatures in Ghoongroo and Doom pigs of India

Satish Kumar, Pranab Jyoti Das, Jaya

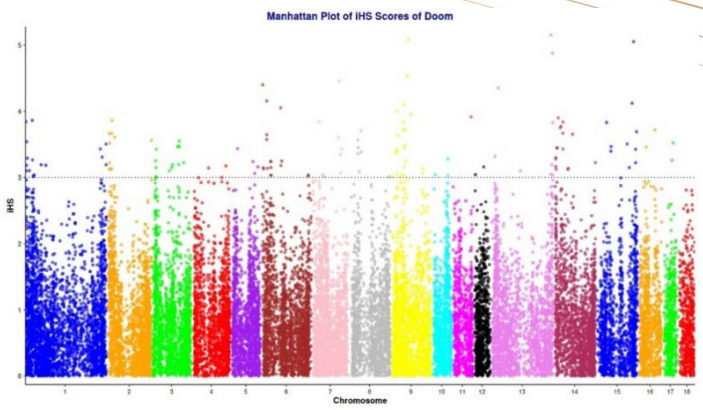
This study aims to identify genome-wide selection signatures in Ghoongroo and Doom pigs using iHS and XPEHH, providing insights into genetic adaptations and potential candidate genes associated with economically important traits. Genetic selection plays a crucial role in shaping the evolutionary trajectory of domesticated animals, influencing traits related to adaptation, productivity, and disease resistance. Identifying genomic regions under selection helps in understanding the genetic basis of these traits, which is critical for conservation and breeding programs. Indigenous pig breeds, such as Ghoongroo and Doom pigs, have evolved distinct genetic characteristics due to natural selection and human-driven breeding practices. These breeds possess unique traits that contribute to their adaptation to local environmental conditions and disease resistance. To uncover genome-wide selection signatures, the genotyping of Doom (28) and Ghoongroo (28) along with the Mali (14), Manipuri black (12) and Agonda Goan (14) breeds were conducted using Illumina Infinium SNP Chip Porcine SNP80v1_HTS_20033000_A2 having 75753 SNPs. The genotyped data were further QC checked for genotyping rate, Hardy Weinberg equilibrium and minor allele frequency. The QC checked genotyped data were further analyzed using Integrated Haplotype Score (iHS) and Cross-Population Extended Haplotype Homozygosity (XPEHH) for detecting recent positive selection within and between populations, respectively. The iHS method identifies selection signals by comparing haplotype homozygosity between derived and ancestral alleles within a single population, while XPEHH detects differential selection between two populations by analyzing the extent of haplotype homozygosity. Regions with absolute XP-EHH scores of 3 (Three SD above the mean) or above were considered as putative candidate regions. Similarly, for iHS method, the regions having an iHS score more than 3 were considered as candidate regions under selection.

Detection of selection signature using iHS approach:

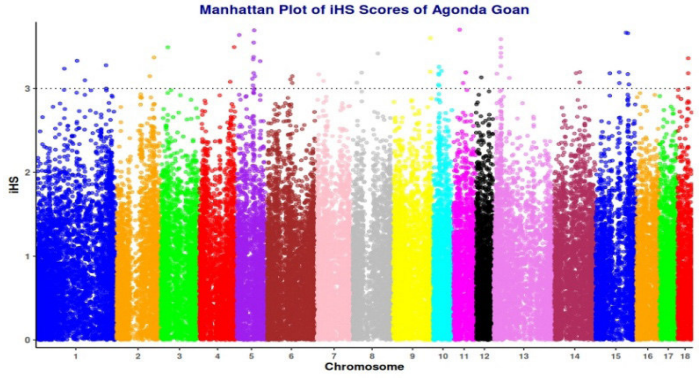
Selection signature within Ghoongroo pigs: The selection signature within the genomic regions of GH pigs was identified using the iHS method. There were regions with selective pressure on the SSC8, SSC13, SSC9, SSC1 and SSC14. The iHS scores for these regions were more than 3. The genes present in these regions under strong signal of selection were *SST, RTP2, BCL6, FRYL, ABCB4, CROT, CRTAC1, NOS1, METTL22, TMEM114, SLIT3, LRRC66, SGCB, SPATA18, TBC1D2B, ADAMTS7, RORA, DCC, NOS1 RARS2, ORC3.*



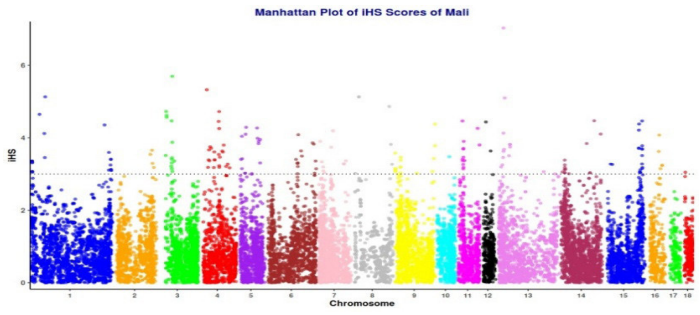
Selection Signature within Doom Pigs: The signature of selection within Doom Pigs was identified using iHS method. The signature of selection region within Doom pig was identified on 21 regions on SSC9, SSC15, SSC14, SSC13, SSC7, SSC3 and SSC6 with iHS value more than 3. The genes under strong signal of selection were *MYSM1, SLC10A1, PBX3, SRPK2, ADGRG5, ANKRD44, CAMTA1, CADM, 1DDR1, FOXI3, GTF2H4, HK2, JAML, NRXN1, NEFL, PTGER4, PSMD9, STIM1, STXBP3.* These genes were found to be involved in immune response, regulation of viral genome regulation, reproductive traits, disease resistance, adaptation traits and thermotolerance.



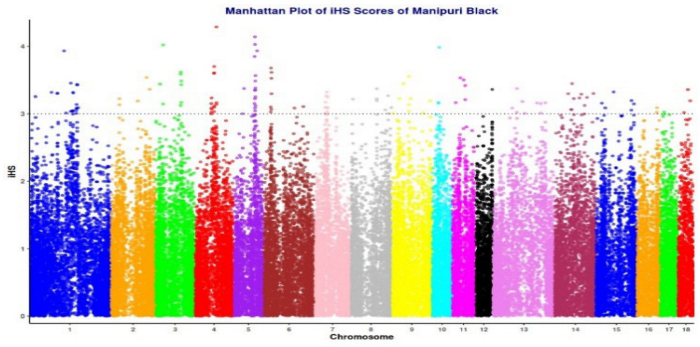
Selection Signature within Agonda Goan Pigs: The selection signature within the genomic regions of Agonda Goan Pig was identified using the iHS method. There were regions with selective pressure on the 49 regions in SSC9, SSC7, SSC18 and SSC15. The iHS scores for these regions were more than 3. The genes present in these regions under strong signal of selection were *TLR3, RAPGEF5, DNAH11, CDCA7L, DST, COL21A1, ASZ1, WNT2, ST7, DOCK4, LRP2BP, ANKRD37, UFSP2, CCDC110, PDLIM3, COL21A1, VPS52, RPS18, ITPR3, SNX25, ST7, NRG1, SORBS2, PLEKHA2, TACC1, CTTNBP2, CFTR, STOX2, ENPP6, IRF2, IP6K3, LEMD2, MLN, GRM4, SORBS2, CAV1, CAV2, TES, ADAM9, DAXX, KIFC1, PHF1, CUTA, SYNGAP1, ZBTB9, CAPZA2, MAGI2, SLC25A4, CFAP97, TFEC, TSPAN12, KCND2, KCND2, RBPMS, HDAC9, SNX13, , FAM149A, CYP4V2, KLKB1, TMEM168, LSMEM1, IFRD1, ZNF277, IMMP2L, ACSL1, SP4, SND1, PAX4, FSCN3, ARF5, GCC1, TACC1, FGFR1, LETM2, NSD3.*



Selection Signature within Mali Pigs: The signature of selection within Mali Pigs was identified using iHS method. The signature of selection region within Mali pig was identified on 34 regions on SSC4, SSC8, SSC3, SSC1, SSC14, SSC16, SSC5, SSC9, SSC13, SSC15, SSC2 and SSC6 with iHS value more than 3. The genes under strong signal of selection were *NKAIN2, XKR9, KCNQ5, ABLIM1, SGTB, NLN, ANXA11, PLAC9, B4GALNT3, DAPP1, SNTG1, RNF121, IL18BP, NUMA1, SNX29, SLMAP, SNIP1, DNALI1, GNL2, RSPO1, ATP6V0D2, NR2F2, PBX1, RBMS3, LPB, ASTN2. ABL2, PDE2A, ARAP1, TIGIT, DRD3, ERBB4, USP15.*

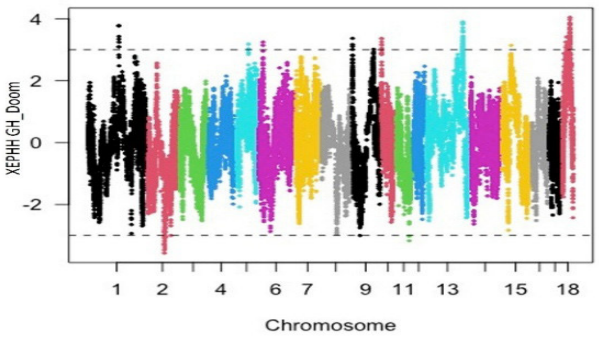


Selection Signature within Manipuri Black Pigs: The selection signature within the genomic regions of Manipuri Black Pig was identified using the iHS method. There were regions with selective pressure on the 14 regions in SSC11, SSC6, SSC13, SSC3, SSC1, SSC5 and SSC14. The iHS scores for these regions were more than 3. The genes present in these regions under strong signal of selection were *EML6, SPTBN1, DLGAP1, CPOX, GPR15, CLDND1, LYST, BCL2, EYA1, TRAM1, NCOA2, CDH20, PDZRN4, SNX16, CHMP4C, ZFAND1, SLC10A5, IMPA1.*



Detection of selection signature using XEPHH approach:

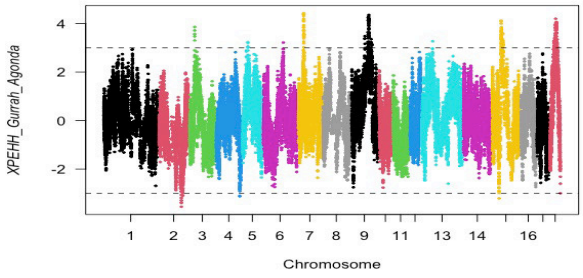
Selection signature between Ghoongroo and Doom Pigs:



The strong selection signals were detected in 3 regions of SSA1, 9 regions of SSA13, 18 regions of SSA18, 1 region each in SSA10, SSA5, SSA6, SSA9 and SSA15 in Ghoongroo breed. The positive selection for doom pig was observed in the 5 regions in SSA2. The genes under positive selection in GH was *ATXN7L1, CDHR3, CADPS2, IMMP2L, LOC100521938, ELMO1, ROBO1, SLC13A1, IRF5, KCP, LOC110257580, LOC100518456, ATP6V1F, FLNC, CCDC136, OPN1SW, CALU.* The genes under positive selection in Doom Pig was *F2RL1, S100Z, ENC1, TBCA, SV2C.*

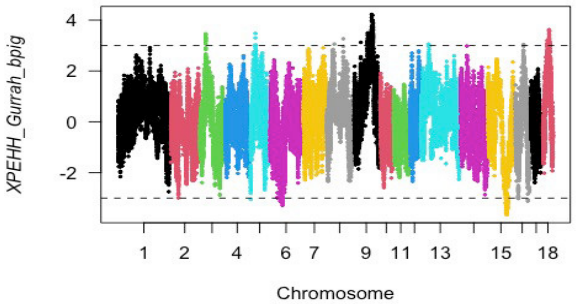
Selection signature between Ghoongroo and Agonda Goan Pigs:

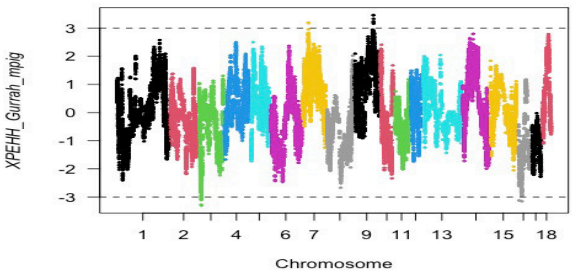
The strong selection signals for Ghoongroo were detected in 29 regions of SSA18, 16 regions of SSA15, 16 regions of SSA9, 6 regions of SSA7, 2 regions in SSA5 and 1 region each in SSA13, SSA5, SSA3, SSA6. The positive selection for Agonda Goan pig was observed in the 1 region in SSA2. The genes under positive selection pressure in GH were *SND1, PAX4, FSCN3, ARF5, GCC1, TSPAN12, KCND2, CTTNBP2, CFTR, ASZ1, WNT2, ST7, DST, COL21A1, CAPZA2, VPS52, RPS18, CAV1, CAV2, TES, DAXX, KIFC1, PHF1, CUTA, SYNGAP1, ZBTB9, ITPR3, IP6K3, LEMD2, MLN, GRM4, TFEC, TMEM168, LSMEM1, IFRD1, ZNF277, DOCK4, IMMP2L, STOX2, ENPP6, IRF2, LOC106506214, ACSL1, SLC25A4, CFAP97, SNX25, LRP2BP, ANKRD37, UFSP2, C15H4orf47, CCDC110, PDLIM3, C15H4orf47, SORBS2, TLR3, FAM149A, CYP4V2, KLKB1, LOC100525542, ADAM9, PLEKHA2, TACC1, TACC1, FGFR1, LETM2, NSD3, NRG1, RBPMS, SNX13, HDAC9, SP4, DNAH11, CDCA7L, LOC100518800, RAPGEF5, RAPGEF5, MAGI2.* The genes under positive selection in Agonda Goan pigs was *FER* gene.



Selection signature between Ghoongroo and Manipuri Black Pigs:

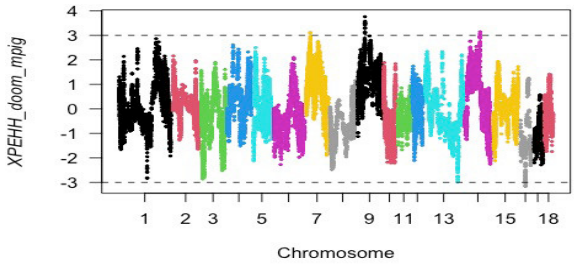
The strong selection signals for Ghoongroo were detected in 8 regions of SSA18, 25 regions of SSA9, and 1 region each in SSA3, SSA5, SSA8. The positive selection for Manipuri black pig was observed in the 42 regions in SSA15 and 3 regions in SSA6. The genes under positive selection pressure in GH were *ASB4, PDK4, DYNC1I1, ASNS, CDCA7L, DYNC1I1, FAM3C, WNT16, GSAP, MAGI2, MAGI2, ORC5, PHTF2, LOC110255565, TMEM60, PTPN12, RELN, SEMA3A, SEMA3E, SLC26A5, RELN, TMEM168, LSMEM1, IFRD1, ZNF277.* The genes under strong positive selection in Manipuri Black pig was *ANKRD44, SF3B1, AOX2, AOX4, BICRA, EHD2, CAVIN2, CCDC150, GTF3C3, C15H2orf66, CFLAR, DNAH7, FZD7, HECW2, TYW5, MYO1B, PGAP1, PLCL1, SATB2, SF3B1, COQ10B, HSPD1, HSPE1, MOBKL3, RFTN2, SLC8A2, KPTN, SPATS2L, KCTD18, SGO2, TMEFF2, ZNF541.*

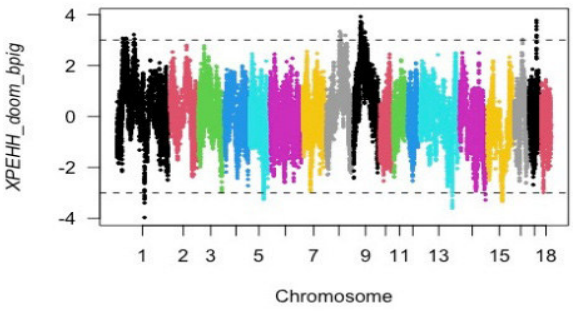




Selection signature between Ghoongroo and Mali Pigs:
The strong selection signals was detected in 3 regions of SSA9 and 1 region of SSA7 in Ghoongroo pig. The positive selection for Mali pig was observed in the 1 region in SSA16 and SSC 3. The genes under positive selection pressure in GH were *MAGI2* and *GRM4* while in Mali Pigs *CDH18, CALN1, AUTS2.*

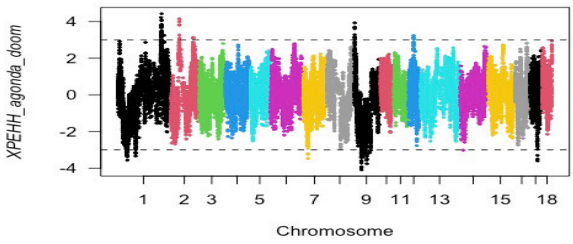
Selection signature between Doom and Mali Pigs:
The strong selection signals for Doom were detected in 2 regions of SSA14, 1 region each in SSA9, SSA7. The positive selection for Mali pig was observed in the 1 region in SSA16. The genes under positive selection pressure in Doom were *NXPE2, KCNMA1, SLC45A3* while genes under selective pressure in Mali pigs were *PELO, ITGA1, ARL15, ITGA2, MOCS2.*



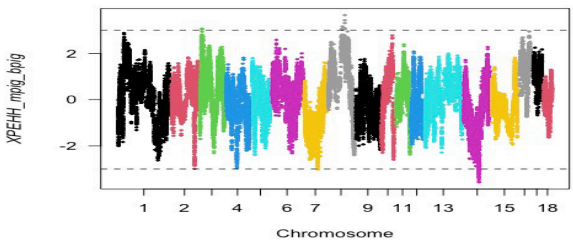


Selection signature between Doom and Manipuri Black Pigs:
The strong selection signals were detected in 14 regions of SSA9, 5 regions of SSA1, 4 regions of SSA8, and 1 region each in SSA16 and SSA17 in Doom breed. The positive selection for Manipuri black pig was observed in the 2 regions of SSA15, two regions in SSA1 and one region in SSA13. The genes under selective pressure in Doom Pigs were *DLGAP4, NXPE2, OPCML, DRD2, DCLK2, LOC102165147, TRIM2, SORL1, MAP1B, SHROOM3.* The genes under selective pressure in Manipuri Black pig was *ROBO1, PDE11A, RBM45, PDE11A, GALR1, SLC38A2, SLC38A4, AGPS, LOC100738403, LOC100517977, PDE11A.*

Selection signature between Agonda Goan and Doom Pig:
The strong selection signals were detected in 11 regions of SSA1, 3 regions of SSA2, and 2 regions each in SSA9, and SSA12 in Agonda Goan. The positive selection for Doom pig was observed in the 5 regions in SSA9 and 3 regions in SSA1. The genes under selection pressure in Agonda Goan pigs was *GCNT1, TLE4, CTR9, GCNT1, PRUNE2, GCNT1, GALNT18, PRUNE2, LOC106509192, NUP98, CHRNA10, ART1, ART5, LOC100523131, RNF121, IL18BP, NUMA1, CEP78, PSAT1, VPS13A, MRVI1, GNAQ.* The genes under selection pressure in Doom pigs were *CDK14, NXPE2, COL19A1, B3GAT2, FMOD, PRELP, DLGAP4, EYS, SLC14A2, SLC14A1.*

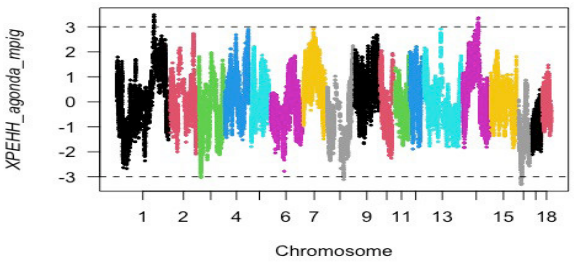


Selection signature between Mali and Manipuri Black Pigs:
The strong selection signals for Mali were detected in 7 genomic regions of SSA8 and one regions each in SSA3 and SSC16. The positive selection for Mali pig was observed in 6 different regions in SSA14. The genes under positive selection in Mali pigs were *AUTS2, SHROOM3, DCLK2, ANXA5, TENM2*. The

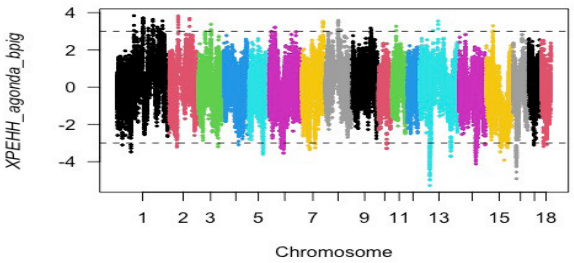


genes under selective pressure in Manipuri Black pigs were *LOC106507128, ZNF503, VDAC2, COMTD1, LOC106507128, DUPD1, DUSP13, SAMD8, KAT6B, PPP3CB, USP54, MYOZ1, SYNPO2L, SEC24C, FUT11, CHCHD1, ZSWIM8, NDST2, LOC106506035, CAMK2G, LOC102160869, PLAU.*

Selection signature between the Agonda Goan and Mali Pigs:
The strong selection signals for Agonda Goan were detected in 14 regions of SSA1 and SSA14. The positive selection for Mali pig was observed in the 15 regions in SSA3, SSA8 and SSA16. The genes under positive selection in Agonda Goan pigs were *AGBL1, LOC106507128, ZNF503, KCNMA1, NTRK3.* The genes under positive selection in Mali pigs were *NOCT, SETD7, MAML3, MGARP, MGST2, RNF150, LOC100624892, SHROOM3, EGFLAM, AUTS2, LOC110260079, TARS, ADAMTS12, MAML3, DAB2, WDR70, GDNF.*



Selection signature between the Agonda Goan and Manipuri Black Pigs:
The strong selection signals for Agonda Goan were detected in 13 regions of SSA1, 4 regions of SSA2, 4 regions of SSA8 and 1 region each in SSA3, SSA7, SSA9, SSA13, and SSA15. Positive selection for the Manipuri pig was observed in the 40 regions in SSA13, SSA14, SSA15, SSA16, and SSA5 2, where strong selection signature signals were found in SSA13, SSA15, and SSA16. The genes under positive selection in Agonda Goan Pigs were *GABRG3, CTR9, AMCF-II, PPBP, LOC100520680, LOC100525396, LRRK1, CHSY1, SELENOS, GABRG3, SBF2, NTRK3, AGBL1, MOB1B, DCK, GALNT18, GRIN3A, AGBL1, CSMD1, ZFAND5, TMC1, LOC102165335, NUDT12, EEFSEC, RUVBL1, CSMD1.* The genes under selection signature in Manipuri black pigs were *PDZRN3, PPP4R2, CDH6, DROSHA, SHQ1, GXYLT2, WDFY4, EPHA3, ARHGAP22, RYBP, LOC100525311, PDZD2, ZNF488, GDF10, PTPN20, FRMPD2, MAPK8, ANO6, CNTN4, PPYR1, ANXA8, STK39, ANO6, CNTN3, EPHA3, GLUD1, FAM35A, CNTN6, DRGX, ERCC6, SLC18A3, CHAT, C14H10orf53, OGDHL, VSTM4, WDFY4, LRRC18.*



External Funded (NASF Project) : Traceable Value Chain for safe pork in the North Eastern Region of India

Pranab Jyoti Das, Seema Rani Pegu, Satish Kumar, R. Thomas, B.C. Das, V.K. Gupta

This study investigated the feasibility of individual porcine identification through facial image analysis. A controlled, non-stressful environment was established for image acquisition, utilizing both mobile phone and DSLR cameras across various age cohorts. Facial feature extraction was achieved through the application of Local Binary Patterns Histograms (LBPH), Histograms of Oriented Gradients (HOG), and Principal Component Analysis (PCA). A standardized image capture protocol was formulated, defining parameters such as illumination, camera distance, and angle to ensure data consistency. Over an eight-month period, facial images of porcine subjects (79-150 days) from diverse breeds were collected at the ICAR-National Research Centre on Pig (ICAR-NRCP), Rani. Algorithms were developed to amplify subtle facial features for enhanced recognition. Feature-based machine learning techniques, including LBPH, HOG, PCA, and Support Vector Machines (SVM), were employed for individual identification. Furthermore, post-mortem imagery, encompassing carcasses and organs, was acquired from the ICAR-NRCP, Rani Slaughterhouse and the ICAR-National Meat Research Institute, Hyderabad, (Fig) during the same experimental period.

Development of a Facial Image-Based Unique Animal Identification (UAI) System: A comprehensive dataset of approximately 25,000 facial images was acquired over a 12-month period from 30 Ghungroo pigs of diverse post-weaning ages at the ICAR-Indian Veterinary Research Institute (IVRI), Eastern Regional Station Animal Farm, Kalyani, West Bengal. A supplementary dataset of 12 images was obtained from the ICAR-National Research Centre on Pig (NRC on

Pig). To evaluate the robustness of the identification system over time, six sets of sequential images were captured from each pig, with each set comprising 60 images. These datasets were partitioned into training (n=50) and testing (n=10) subsets. Feature extraction was performed using Histogram of Oriented Gradients (HOG) and Scale-Invariant Feature Transform (SIFT). Machine learning classifiers, including Support Vector Machines (SVM), Naive Bayes, k-Nearest Neighbors (KNN), Decision Trees, and Random Forests, were trained and evaluated for individual pig identification using facial image features. Model performance was assessed using test accuracy.

Mobile Application for Porcine Breed Classification: A mobile application was developed for the automated classification of porcine breeds, employing deep learning methodologies. The application's operational sequence, from image capture to breed prediction, is depicted in Fig.

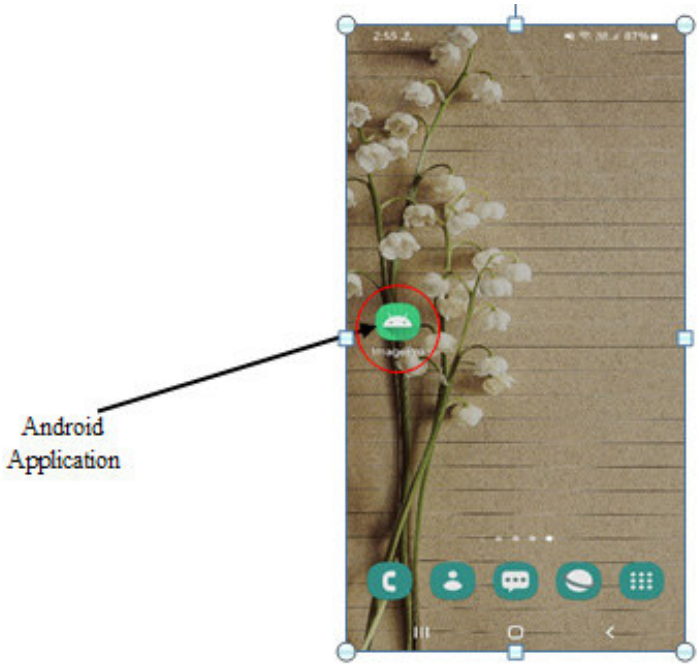


Fig: Apps for pig breed prediction

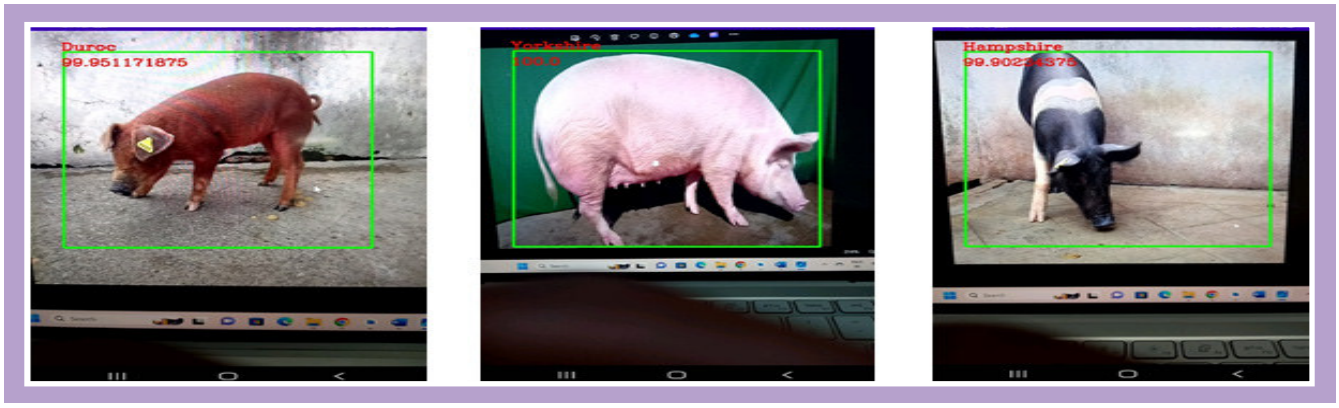


Fig: Predicted pig breed

External Funded Project (DBT): Cataloguing of genomic and transcriptomic signature in indigenous pig tolerant to African Swine Fever Virus

P. J. Das, S. R. Pegu, Rajib Deb, Satish Kumar, Swaraj Rajkhowa, V.K. Gupta

This project investigates the molecular mechanisms of African Swine Fever Virus (ASFV) resistance in porcine subjects, with a specific focus on differentially expressed genes within indigenous germplasm. The study encompasses single nucleotide polymorphism (SNP) analysis of infected and tolerant individuals, alongside the identification of mutation loci within putative host receptor genes. Individual porcine breeds exhibiting enhanced resistance will be determined through RT-qPCR and RNA-seq analyses of tissue panels from infected and tolerant subjects.

Tissue samples (spleen, lung, liver, heart, and kidney) were collected from infected, susceptible, and tolerant porcine subjects representing indigenous, crossbred, and exotic germplasm. Collected tissues were rinsed in phosphate-buffered saline (PBS), submerged in RNA stabilization solution, and stored at -80°C. An in-house developed PCR and qPCR assay was utilized for ASFV detection in clinically suspected animals. Based on the B646L (capsid protein, P72) gene sequence, the current ASFV outbreak in Northeast India (since 2020) was attributed to genotype II.

RT-qPCR was conducted to validate the differential expression patterns of *MYD88* (innate immune signal transduction adaptor), LDHB (lactate dehydrogenase B), and *IFIT1* (interferon-induced protein with tetratricopeptide repeats 1), genes implicated in ASFV pathogenesis, in infected, survived, and healthy porcine subjects. Relative fold change analysis of *MYD88* expression revealed significant upregulation in infected subjects (1.22), downregulation in survived subjects (0.69), and further downregulation in healthy subjects (0.17). This indicates that *MYD88* expression is significantly upregulated during ASFV infection. A significant difference in *MYD88* expression was observed between infected and survived subjects, suggesting a role for *MYD88* in ASFV pathogenesis. LDHB gene expression was significantly downregulated in infected, survived, and healthy subjects, potentially indicating its involvement in the host response to ASFV infection. *IFIT1* expression was significantly upregulated in infected subjects (15.98), while survived subjects exhibited near-basal levels (0.97). This data suggests a critical role for *IFIT1* in the host response to ASFV infection, as its downregulation may contribute to successful host defense.

The project specifically investigates the differentially expressed genes that are resistant to African Swine Fever Virus (ASFV) in pigs with special reference to indigenous germplasm. Moreover, single nucleotide polymorphism (SNP) analysis of infected and tolerant pigs will be carried out along with study of mutation locations in suspected host receptor gene. The individual pig breed bearing higher resistance will be identified based on the RT-qPCR and RNA-seq results obtained from various tissue panels of infected and tolerant pigs.

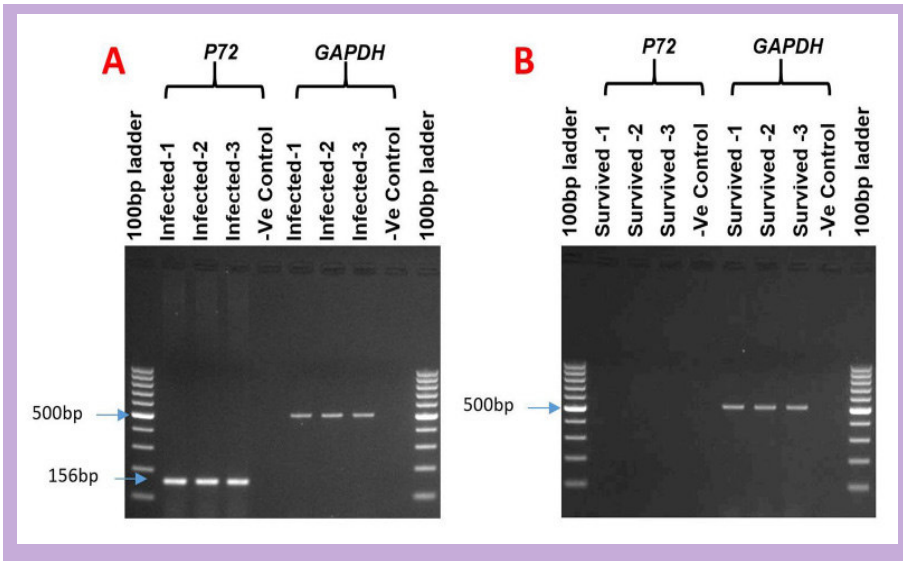
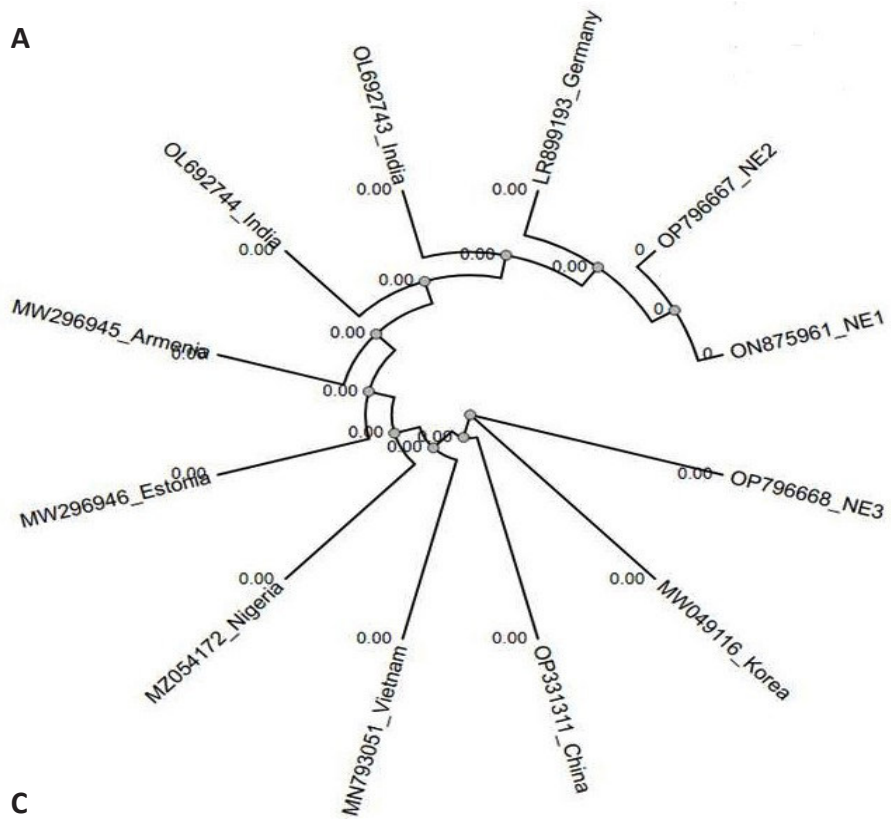


Fig: Agarose gel electrophoresis results showing PCR amplification of the ASFV p72 gene (156bp) and GAPDH (501bp) in pig samples that are either infected or dead with ASFV or infected and survived. The infected pig samples (1, 2, 3) exhibited bands at the respective positions indicating the presence of ASFV p72 gene products (A), whereas there is no corresponding band in survived pig samples (B). Both the infected and healthy pig samples displayed the endogenous control band of GAPDH at the appropriate position

A



B

C

	Sequence name	PERCENT IDENTITY												
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
DIVERGENCE	LR899193_Germany		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	**1**
	MN793051_Vietnam	0.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	**2**
	MW049116_Korea	0.0	0.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	**3**
	MW296945_Armenia	0.0	0.0	0.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	**4**
	MW296946_Estonia	0.0	0.0	0.0	0.0		100.0	100.0	100.0	100.0	100.0	100.0	100.0	**5**
	MZ054172_Nigeria	0.0	0.0	0.0	0.0	0.0		100.0	100.0	100.0	100.0	100.0	100.0	**6**
	OL692743_India	0.0	0.0	0.0	0.0	0.0	0.0		100.0	100.0	100.0	100.0	100.0	**7**
	OL692744_India	0.0	0.0	0.0	0.0	0.0	0.0	0.0		100.0	100.0	100.0	100.0	**8**
	ON875961_NE1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		100.0	100.0	100.0	**9**
	OP331311_China	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		100.0	100.0	**10**
	OP796667_NE2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		100.0	**11**
	OP796668_NE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		**12**
		1	2	3	4	5	6	7	8	9	10	11	12	

Fig: (A) Radial Phylogram and (B) Phylogram with branch length of ON875961_NE1, OP796667_NE2, OP796668_NE3 (Present study), OP331311_China, MN793051_Vietnam, MZ054172_Nigeria, MW296946_Estonia, MW296945_Armenia, OL692744_India, OL692743_India, LR899193_Germany and MW049116_Korea are position in a single cluster with 0.00 branch length belongs to Genotype II ASFV. (C) Pairwise distance matrix calculated ClustalW showing per cent identity and divergence of VP72 gene sequences of ASFV genotype calculated using MegAlign program. All the tested sequences of the present study viz. ON875961_NE1, OP796667_NE2, and OP796668_NE3 show 100% similarity with the existing other sequences of VP72 gene sequences.

Institute Project: Performance evaluation of a novel Duroc (male) × Ghoongroo (female) crossbred pig

Meera K, P.J. Das, N.M. Attupuram, Satish Kumar, N.H. Mohan, R. Islam, R. Thomas , Lokesha E

Establishment of Base Population:

Purebred Duroc boars and sows and Ghoongroo boars and sows were procured from organized farms to ensure genetic purity, known pedigree and high-quality breeding stock.

Pedigree structure of Ghoongroo pigs procured:

The pedigree structure consists of 62 individuals, with 8 sires (blue lines) and 14 dams (pink lines) and the maximum paternal and maternal family sizes are 9 and 7, respectively, indicating balanced mating among the parents. Tier 1 (22 individuals) represents the parents *i.e.* the first generation, while Tier 2 (40 individuals) represents the progeny generation to be selected as parents to make subsequent generation.

Mating plan for making base population of Ghoongroo:

Thirty eight individuals including 14 males and 24 females were selected to be used as parents to make the base population for breeding. This base population will also serve as the reference group for performance evaluation before crossbreeding. The inbreeding coefficients were calculated for 336 possible mating combinations between these 14 males and 24 females. A heatmap was created to visualize future inbreeding coefficients for different mating pairs of males and females where each tile represents a possible mating pair between 14 males and 24 females.

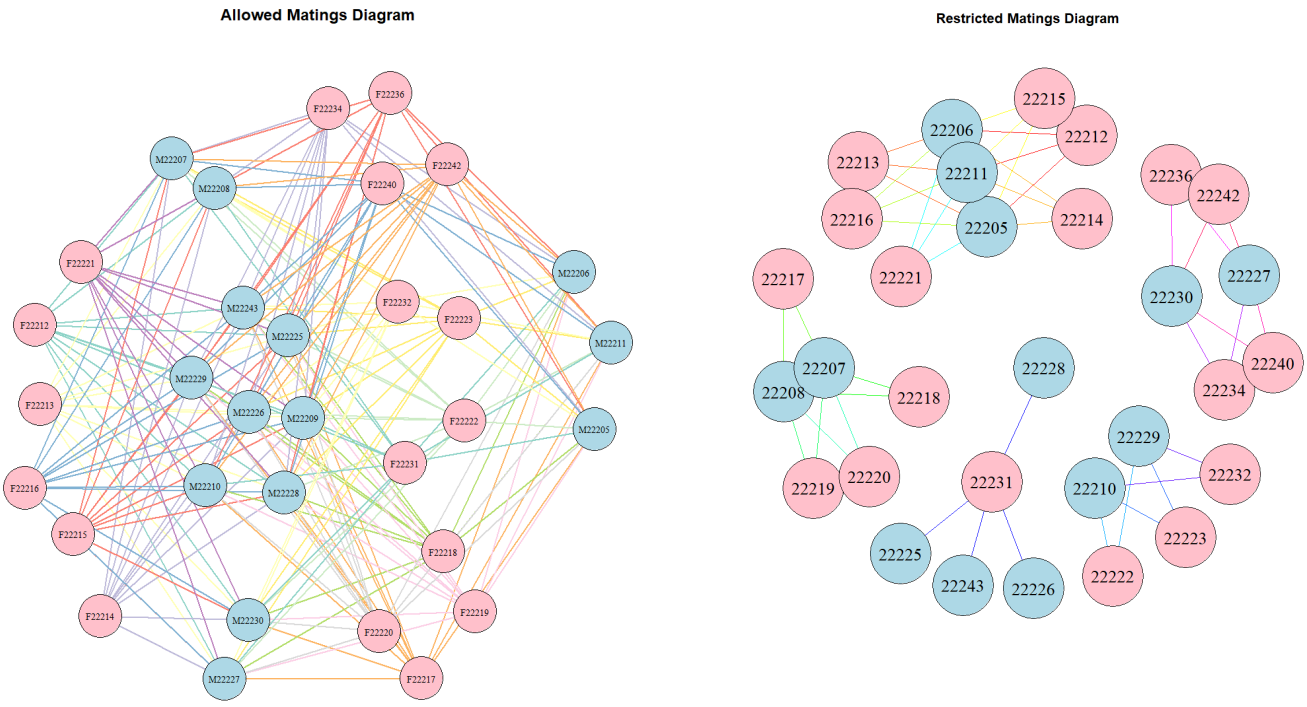


Fig : The diagram represents the allowed and restricted matings among the selected animals in the study, based on the inbreeding coefficient calculated. Each female is depicted as a distinct pink-colored node, connected to its respective males represented by blue-colored nodes. All connections from a single female share the same colour. The left cluster represents allowed matings, whereas the right cluster illustrates restricted matings, indicating pairs with a high inbreeding coefficient that are not recommended.

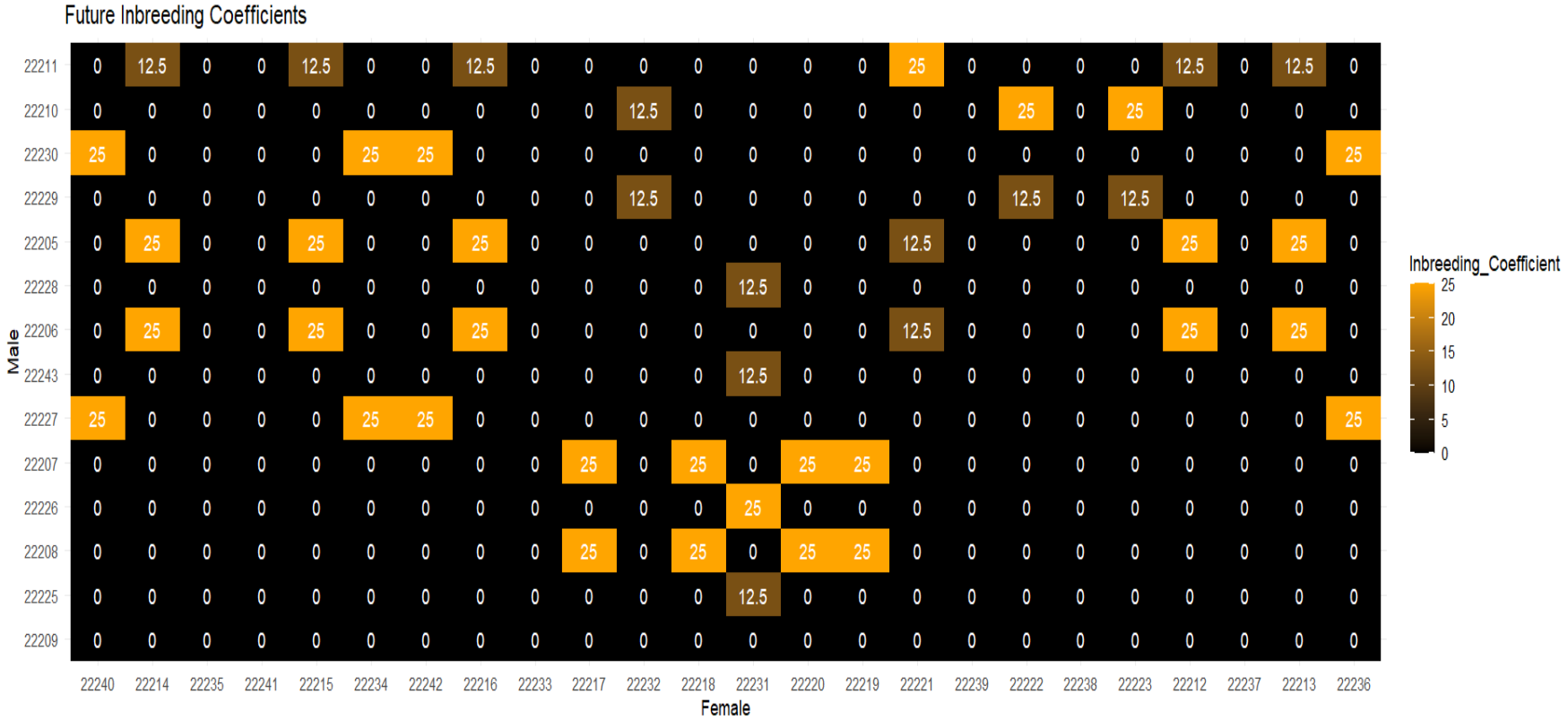


Fig : The color intensity in the heatmap indicates the future inbreeding coefficient. Darker tiles (black) represent low or zero inbreeding, while lighter tiles (orange) indicate higher inbreeding coefficients. Each tile is labeled with the corresponding inbreeding coefficient.

Genetic characterization of Duroc pigs:

The mitochondrial DNA (mtDNA) D-loop region of 24 Duroc pigs was amplified using PCR with specific primers (Forward primer -5'-AGGAGACTAACTCCGCCAT-3' and Reverse primer- 5'-CGCGGATACTTGCATGTGT-3'), yielding a 1365 bp fragment. The reaction was set up in 50 µl volume, including 25 µL of 2x PCR master mix, 2.5 µL of 10 mM forward primer and 2.5 µL of 10 mM reverse primer, 16 µL Nuclease Free Water and 4µL template DNA. The thermal cycling conditions consisted of an initial denaturation at 94°C for 5 minutes, followed by 30 cycles of denaturation at 94°C for 1 minute , annealing at 59°C for 45 seconds, extension at 72°C for 1 minute, and a final extension step at 72°C for 10 minutes. The amplified products were analyzed via 2% agarose gel electrophoresis, purified, and then sent for Sanger sequencing to determine their nucleotide sequences.

LIVESTOCK PRODUCTION AND MANAGEMENT

Institute Project: Association of farrowing and piglet traits *vis-a-vis* colostrum characteristics with neonatal performance in pigs

Kalyan De, N.M. Attupuram, Jaya, Lokesha E.

Colostrum yield and colostrum intake of Rani pig

The amount of colostrum a piglet drinks right after birth is crucial for its survival and growth until weaning. The present study investigated sow colostrum yield (CY). The study involved 15 sows and their 130 live-born piglets from the institute's farm. Sow farrowing was monitored, and piglets were individually weighed at birth (BWB) and again 24 hours after the birth of the first piglet. This data was used to calculate piglet colostrum intake and sow colostrum yield (CY). The colostrum production of the Rani pig breed was found to vary from a minimum of 1372.5 grams to a maximum of 2844.1 grams, with a mean yield of 2153.8 grams ± 146.4 grams. The amount of colostrum consumed by newborn piglets varied from 147.4 grams to 365.4 grams, with an average intake of 254.5 grams ± 3.9 grams.

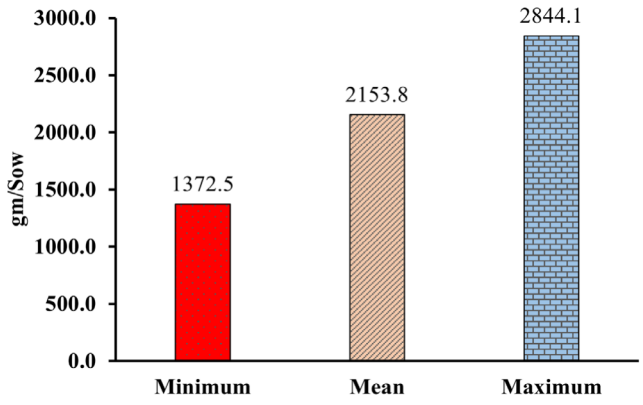


Fig: Colostrum yield of Rani pigs

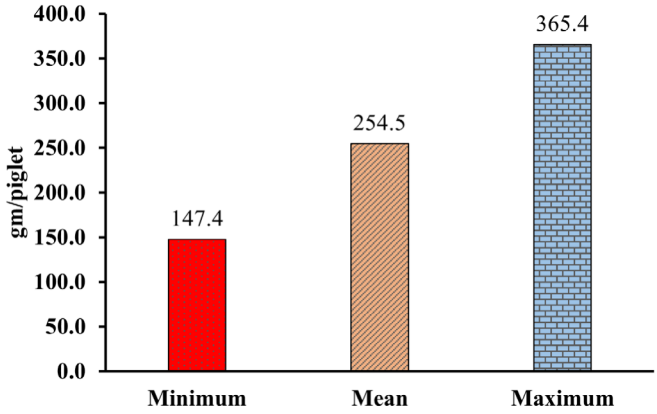


Fig: Colostrum intake of Rani piglets

Association of colostrum intake with neonatal traits

To investigate the relationship between colostrum intake and neonatal characteristics, various traits were recorded from 140 newborn piglets. Immediately after birth, the following measurements were taken: sex, weight, and crown-rump length, as well as rectal temperature one hour later. Body mass index (BMI) and ponderal index (PI) were also calculated. The piglets were weighed again at exactly 24 hours, and the weight gain between birth and 24 hours was used to estimate individual colostrum intake, based on an equation developed by Theil et al. (2014). The piglets were then divided into two groups based on their average colostrum intake: a low colostrum intake group (<254 g) and a high colostrum intake group (>254 g). As expected, the colostrum intake of the two groups differed significantly ($P<0.001$).

The low colostrum intake group consumed 226.0±3.1 g of colostrum, while the high colostrum intake group consumed 288.3±3.4 g. However, when normalized to birth weight, the colostrum intake per kilogram of birth weight was higher in the low group compared to the high group. The birth weights of the two groups also differed significantly (P<0.01), with the low colostrum intake group weighing 0.9±0.02 kg and the high colostrum intake group weighing 1.2±0.02 kg. This suggests that piglets with higher birth weights tend to consume more colostrum, as shown in Fig. Additionally, the length at birth and BMI were also higher (P<0.05) in piglets that consumed more colostrum, as seen in Table. Furthermore, the rectal temperature of piglets that consumed more colostrum was also higher (P<0.05) compared to those that consumed less.

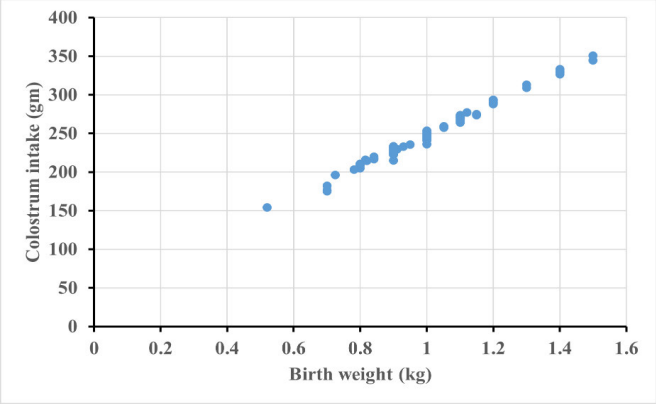


Fig: Association of colostrum consumption and birth-weight of the piglets

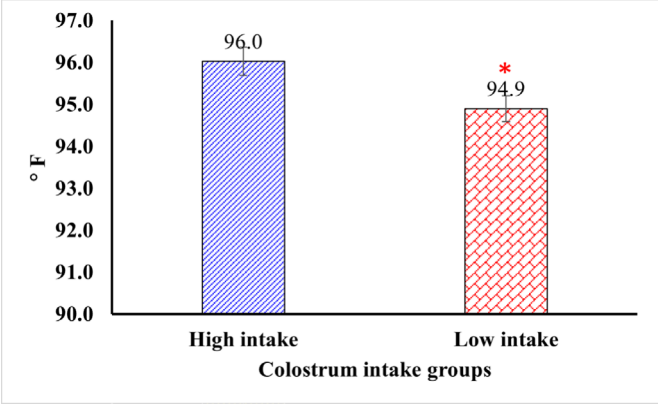


Fig: Rectal temperature of different amounts of colostrum-consuming piglets

Farrowing traits and colostrum consumption

To examine the relationship between farrowing traits and colostrum consumption, three key traits were recorded at birth: birth order, birth interval (time between the birth of a piglet and its predecessor), and cumulative birth interval (time between the birth of a piglet and the first piglet in the litter). The analysis revealed that the birth order of piglets in the high and low colostrum-consuming groups differed significantly (P<0.05), with an average birth order of 4.1±0.4 in the high group and 5.7±0.4 in the low group. In contrast, birth interval had no impact on colostrum consumption. However, the cumulative birth interval was found to be higher (P<0.05) in piglets that consumed less colostrum compared to those that consumed more.

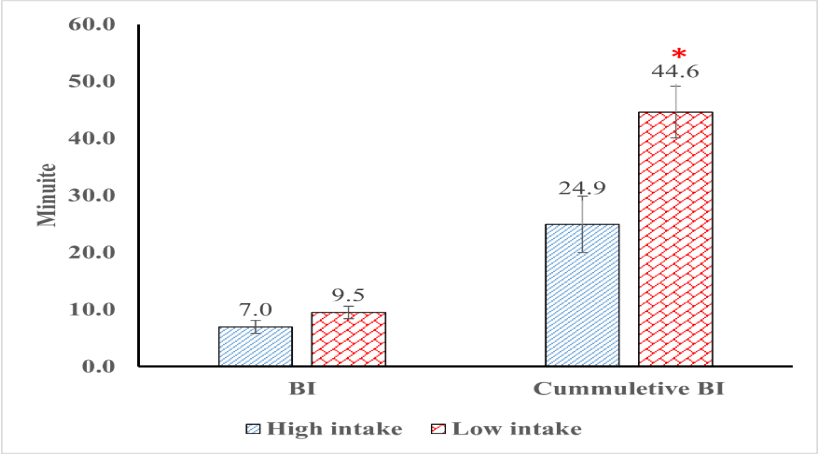


Fig: Birth interval and cumulative birth interval of different amounts of colostrum-consuming piglets

Table: Piglet length, BMI and PI in low (<254 gm) and high (>254 gm) colostrum-consuming piglets

	>254 g	<254 g	Overall	P-value
Piglet length (cm)	24.1±0.5	22.7±0.4	23.4±0.3	0.025
BMI (kg/m2)	21.2±0.7	18.4±0.7	19.8±0.5	0.004
PI (kg/m3)	91±4.9	86.1±4.5	88.6±3.3	0.467

BMI, Body mass index; PI, ponderal index

Institute Project: Assessment and optimization of the water footprint in organized pig production

N.M. Attupuram, Kalyan De, Rajendran Thomas, N.H. Mohan

The freshwater usage patter in pork production using a cradle-to-gate system boundary was assessed across the seasons and various production systems. The research utilized Life Cycle Assessment (LCA) analysis approach to map hotspots along the value chain, assess the environmental impact of pig farming. A cradle-to-gate analysis by using ReCiPe midpoint 2016(H) revealed that feed and manure are significant hotspots of environmental impact in swine production. The evaluation of the water footprint for the significant hotspots of environmental impact in swine production was performed.

Activity 1: Assessment of water usage under organised pig production system

The study on the water footprint per Kilogram of pig feed was assessed, which revealed that the water footprint per kilogram of creep feed, starter, grower, and finishers were 10.3, 50.3, 209.7 and 230.2 litres respectively during the life span of a pig in organised pig production system. The total water footprint for feed during a life cycle was calculated as 500.6 litres. Moreover, Estimation of blue water footprint revealed that 61% of fresh water used for pig farming are used for shed washing, 22% for animal washing and 17% as drinking water in an organised pig farm under Indian conditions.

Activity 2: Assessment of water foot print under various pig production systems

Comparative analysis of water footprint per lifecycle of a finisher pig under intensive pig production system and backyard pig production system was conducted. Water footprint pig feed were 467 m^3/tonne and 1039.7 m^3/tonne for intensive and backyard pig production, respectively. Similarly, the footprint of potable water for drinking purposes were 1994 m^3 and 2214 m^3 during the lifecycle for intensive and backyard pig production, respectively. The service water requirement followed inverse trend i.e., 3186 m^3 and 2970 m^3 respectively for intensive and backyard pig production systems. Pork production through intensive and backyard production systems had total water footprints of 6254 m^3/tonne and 7734 m^3/tonne of pork produced.

ANIMAL REPRODUCTION

Institute Project: Propagation of Artificial Insemination for establishment of multiplier units and optimizing reproductive efficiency in pigs at farmers' field

Sunil Kumar, Rafiqul Islam and P.J. Das

Establishment of pig multiplier units at farmers' field

Under the objective for pig multiplier units establishments following services were provided to the farmers such as knowledge scaling up of farmers, technical guidance, hormones for estrus synchronization, needful veterinary aids, inputs such as dewormer, feed (as per availability), supplements and mineral mixture, ultrasonographic services and artificial insemination services.

Efforts were made to establish self-sustaining multiplier units with 42 farmers; however only 25 units were successfully established. Some farmers (18) were not able to maintain the required number of 6 sows units due to several constraints and discontinued. Farmers discontinued the units because several constrains including the lack of sufficient financial availability and emergency requirement of money for their daily needs and fear of death of animals because of disease outbreak/diseases. DD Kisan team visited the pig multiplier units and a documentary was prepared.

External Funded Project (DBT): Augmenting pig production by accretion of reproductive efficiency and artificial insemination for generating livelihood security and Entrepreneurship in NER

Sunil Kumar, Rafiqul Islam and V.K. Gupta

Reproductive efficiency is one of the most important facets in swine production. Limited hormones, poor ovarian dating and unavailability of fertile boar/semen cause economic percussions to piggery stakeholders particularly under backyard production systems.

A. Effect of feeding of *Moringa oleifera* on reproductive efficiency in anestrum sows

For the purpose of augmenting the reproductive efficiency in sows, one plant identified as *Moringa oleifera*. Firstly, *Moringa oleifera* therapeutics at the standardized therapeutic regimen was used in anestrum sows. Secondly, proximate composition of control feed, dried leaves powder of *Moringa oleifera* and dried leaves powder of *Moringa oleifera* mixed with feed was estimated.

Table : Effect of *Moringa oliefera* feeding on reproductive and productive characteristics of sows ($p<0.05$)

Parameters	Anestrus Sow (n)	
	Control (6)	Treatment (6)
Age (months)	16.16±0.27	16.91±0.25
B.Wt (kg)	110.0±4.47	110.8±2.85
Estrus induced (%)	100 (6/6)	66.66 (4/6)
EEI (1/2/3/4) (Estrus expression intensity)	2.5 ± 0.02^{a}	3.61 ± 0.24^{b}
ITEE (Days) Interval from treatment to first estrus expression	45.16 ± 1.87^{a}	27.66 ± 2.15^{b}
IFTSH (days) Interval from first to second estrus expression	-	-
Pregnancy Rate (PR) %	100	66.66
Repeat Breeding Rate (RBR)%	00	33.33
Litter Size at Birth (LSB)	7.33±1.08	9.66±0.59

In conclusion, *Moringa oliefera* supplementation reduces reproductive and production performance was also improved

B. Effect of local bioresources on *in vitro* sperm functions

The objective of the activity was to estimate the effect of nanoparticles on boar sperm preservation at liquid state**.** Out of 22 bioresources used in semen preservation, only 6 were selected for the subsequent studies depending on the preliminary trials for the sperm motility upto 96 hours. Briefly, gel free ejaculates were collected by double gloved hand method. Satisfactory semen samples were subjected to evaluation. Different types (I-VI) of nanoparticles from different sources were synthesized in green as per the standard procedure and Zeta size along with potential was estimated. Semen aliquots were extended fortified with different types of nanoparticles and processing as per standard procedures. Using the six bioresources, a cocktail preparation was also prepared that was used in vitro for sperm function testing in extended semen. Extended semen was stored at liquid state. Sperm function parameters, antioxidant status and microbiology were estimated at liquid (0, 24, 48, 96h) in the study.

At liquid state, extender fortification with type IV nanoparticles significantly ($p<0.05$) improved all the estimated paratmeters upto 96h than control. Type I, II, III, nanoparticles fortification group showed significant positive difference 72h in all the estimated parameters except microbiology. Further, no significant ($p>0.05$) effect of Type V and VI, nanoparticles was found in extended semen at liquid state. Metabolomics analysis of the resources (used to prepare the nanoparticles) revealed that some of the identified compounds have potential roles in as antioxidants, hormonal precursor, antimicrobials antifungal and are involved in several metabolic pathways, biostimulation, plasma membrane stabilization and capacitation. In conclusion, the studied nanoparticles and bioresources can be used to improve boar sperm preservation at liquid.

C. Comparative antimicrobial efficacy of bioresources:

The comparative antimicrobial efficacy of bioresources was also estimated: control-1 (with antimicrobials), control-2 (with half doses antimicrobials), control- 3 (without antimicrobials, phytococktail of bioresources and Moringa-Zn NPs. Briefly, Plant extracts were prepared and the effect of these plant extracts was studied by monitoring the motility of the extended semen for 72 hours, which were compared to extended semen without antibiotics and extended semen with antibiotics (500 IU/mL Penicillin and 500 IU/mL Streptomycin).

Table: Effect of bioresources and NPs on semen preservation and mitigation of addition of antimicrobials in extended semen

BRS	Time	Motility(%)	Live (%)	Clumping (%)	HOST (%)	CFUs (/ml)
Control (+SP)	0h	90.83±0.83	85.83±2.00	4.50±0.22	75.83±2.00	0.55±0.02^{a}
	48h	70.00±1.29	63.33±1.66	7.83±1.01	60.83±1.53	
	96h	52.5±2.50^{a}	41.66±2.78^{a}	14.16±1.53^{a}	46.66±2.47^{a}	
Control (+SP/2)	0h	88.33±1.05	86.66±1.05	6.33±0.80	74.16±3.00	1.05±0.07^{b}
	48h	62.50±3.35	57.5±2.50	13.33±1.66	58.33±3.33	
	96h	44.16±2.00^{a}	39.16±2.00^{a}	19.16±2.71^{b}	38.33±2.10^{b}	
Control (--SP)	0h	86.66±1.66	81.66±1.66	9.5±0.05	69.16±0.83	1.94±0.09^{c}
	48h	43.33±2.47	36.66±1.05	25.83±2.38	30.83±1.53	
	96h	33.33±1.66^{b}	28.33±1.66^{b}	27.5±2.50^{c}	23.33±1.66^{c}	

BRS	Time	Motility(%)	Live (%)	Clumping (%)	HOST (%)	CFUs (/ml)
Phyto-cock-tail (6ml/60ml)	0h	90.83±0.83	85.00±1.29	7.83±1.01	74.16±3.51	1.20±0.01[b]
	48h	58.33±2.88	52.50±2.81	12.50±1.11	49.16±3.00	
	96h	45.00±2.23[a]	33.33±1.66[a]	15.83±1.53[b]	36.66±2.10[a]	
Moringa ZnNPs (6ml/60ml)	0h	91.66±1.66	85.83±2.38	7.5±1.11	78.33±3.07	1.11±0.07[b]
	48h	73.33±4.01	76.66±2.10	15±1.82	53.33±3.33	
	96h	43.33±2.47[a]	37.5±1.70[a]	19.16±1.53[b]	38.33±6.66[a]	

Values with different superscripts differs significantly (p<0.05) between different groups

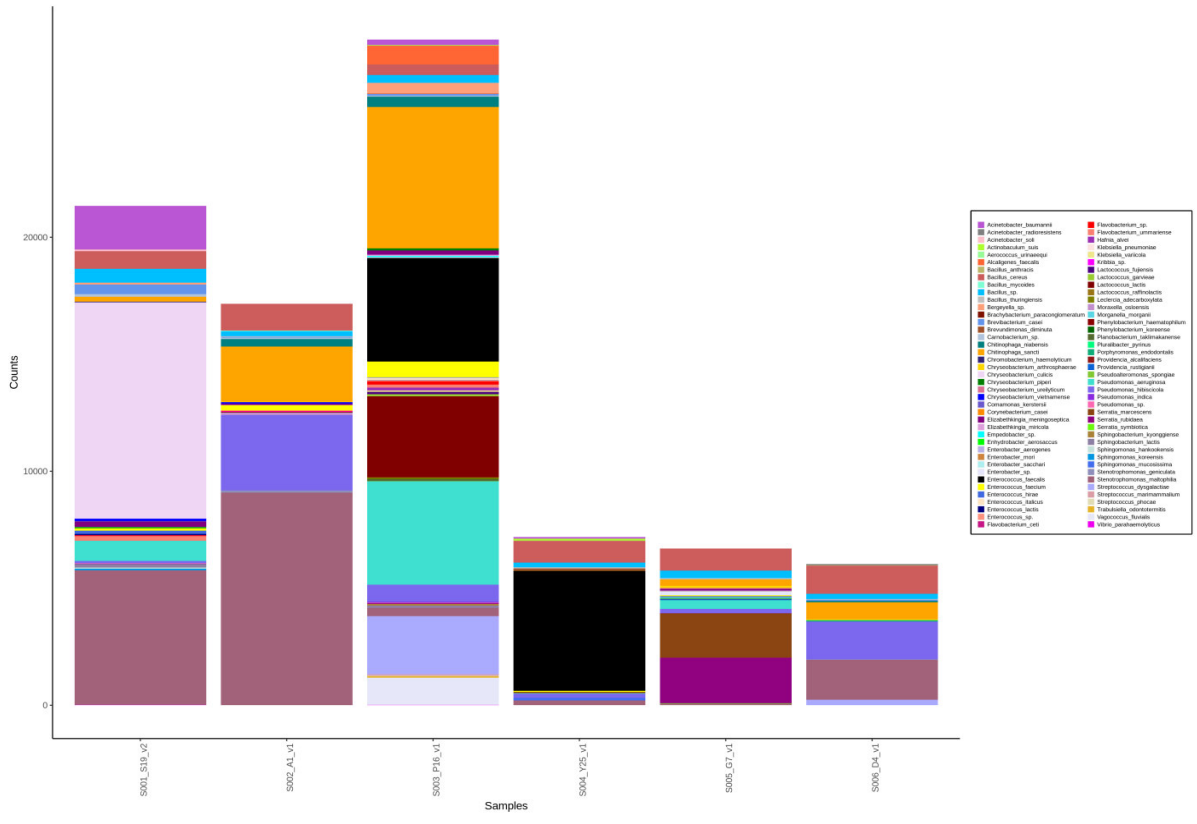
In conclusion, compounds identified in the bioresources may be explored further for semen preservation for fertility and antimicrobial activity

External Funded Project (National Livestock Mission): Self-sustainable Cooperative Models for Propagation of Liquid Semen Artificial Insemination and Envisaging Cryopreservation of Spermatozoa in Pig

Sunil Kumar, R. Islam, P.J. Das, N.H. Mohan and V.K. Gupta

a. Metagenomic analysis of boar semen samples

Genomic DNA was extracted from each collected sample, and a specific PCR was carried out to amplify the V2-V9 regions of the 16S rRNA. Sequence reactions were carried out on the Ion Torrent Platform and analysed by specific bioinformatic tools. 16S metagenomics analysis of the semen samples was carried out where reads are mapped on



databases and quantified. Comparison between samples was performed using different metrics and results are visualized. Sample wise abundance counts were represented and Sample wise OTUs based representative sequences were generated. OTUs clustered for all the samples were represented for Family, Genus and Species. Diversity studies are represented as rarefaction curves (Alpha Diversity) and PCoA Plots 3D (Beta Diversity) by using different metrics utilized.

b. To estimate the effect of nanoparticles on boar sperm preservation at frozen state

Improvement in cryoresistance is a critical approach for wide spreading the artificial insemination in pig husbandry. However, boar spermatozoa is highly temperature sensitive than spermatozoa of other domestic animals. This predisposes the spermatozoa to difficult in preservation at frozen state.

Gel free ejaculates were collected by double gloved hand method. Satisfactory semen samples were subjected to evaluation. Different types (I-VI) of nanoparticles from different sources were synthesized in green as per the standard procedure and Zeta size along with potential was estimated. Semen aliquots were extended fortified with different types of nanoparticles and processing as per standard procedures. Extended semen was stored at frozen state. Sperm function post-thaw parameters, were estimated in the study. Although not acceptable, yet a significant ($p<0.05$) difference was observed in the post-thaw motility of the samples extended with type IV nanoparticles. Further, no significant ($p>0.05$) effect of Type V and VI, nanoparticles was found.

Institute Project: Preservation of boar semen using different additives in liquid and frozen state

Rafiqul Islam and Sunil Kumar

The long-term storage of boar semen for artificial insemination (AI) needs to develop a suitable protocol for cryopreservation. The research work on cryopreservation of boar spermatozoa around the globe is still ongoing for improvement of boar spermatozoa. Because of their greater quantities of polyunsaturated fatty acids, low cholesterol: phospholipid ratio, and asymmetrical distribution of cholesterol within their sperm membranes, boar spermatozoa are more susceptible to the negative effects of cryopreservation.

The experiment was conducted to study the effect of different additives *viz*., butylated hydroxytoluene (BHT), reduced glutathione (GSH), taurine (TAU) and trehalose (TRE) on the quality of boar spermatozoa when using Androhep and LEY as the base cooling and freezing extender. The collected boar semen using gloved hand method was diluted with a Beltsville thawing solution (BTS) extender. It was initially held at 22°C for 1 hour and then lowered to 17°C within 2 hours in a BOD incubator. Androhep was used as cooling extender and the freezing extender consist of 6% glycerol and 94% cooling extender. Top of FormBottom of Form

Experiment 1 (a): Effect of different concentration of additives on boar spermatozoa at different hours of preservation in Androhep extender at post equilibration and thawing

Quality of fresh boar semen in Androhep extender

The mean percentage of Sperm motility, viability, membrane and acrosome integrity of freshly collected boar semen was 84.25±0.40, 81.60±0.67, 73.85±0.57 and 77.60±0.65, respectively immediately after extension in androhep extender at 0 h.

Post equilibration and thawing in Androhep extender

Significant difference ($P<0.05$) in sperm motility was seen between control and the treatment groups using the Androhep extender both during equilibration and at post thaw. The samples supplemented with 3mM GSH and 100 mM TRE in the semen in androhep extender significantly ($P<0.05$) improved motility after equilibration, maintaining more than 67% sperm motility than the control androhep extender (50.25±0.76). However, it's revealed that post-thaw motility was also significantly higher ($p<0.05$) in the GSH group (25.75±1.32) than the BHT, TAU and TRE and control androhep group.

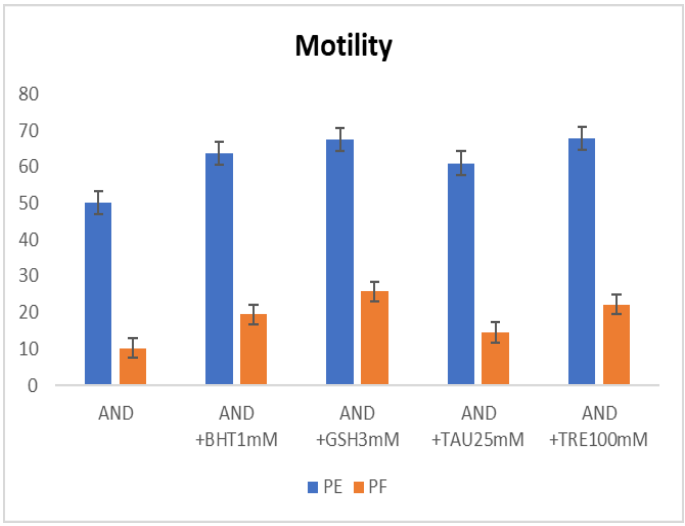


Fig: Effect of different additives on motility of boar spermatozoa at post equilibration and freezing in Androhep extender

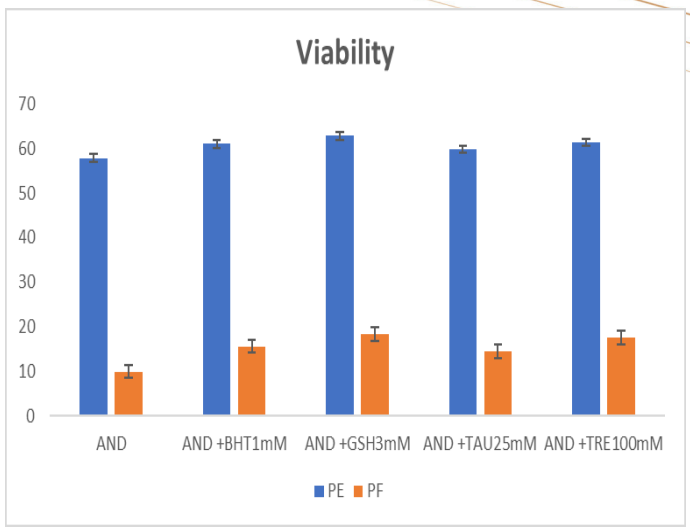


Fig: Effect of different additives on viability boar spermatozoa at post equilibration and freezing in Androhep extender

*AND: Androhep; BHT: Butylated hydroxytoluene; GSH: Reduced glutathione; TAU: Taurine; TRE: Trehalose; **PE: Post equilibration; PF: Post freezing (after thawing)*

The samples supplemented with 3mM GSH showed significantly (P<0.05) higher live sperm count at post equilibration period (62.80±0.48) and at Post thaw (18.35±0.72) than the corresponding values for other treatment groups including the control androhep extender. However, the difference in live sperm count at post equilibration and post thaw between the GSH and TRE group was non-significant (P>0.05)

Significant differences (P<0.05) were observed between the control and treatment groups concerning sperm acrosomal integrity. The sample supplemented with 3mM GSH showed significantly higher sperm acrosomal integrity (64.05±0.35) than the other groups after equilibration. At post thaw both treatment groups, GSH (19.85±0.89) and TRE (18.00±1.04) maintained significantly higher acrosomal integrity than the other treatment groups and control extender.

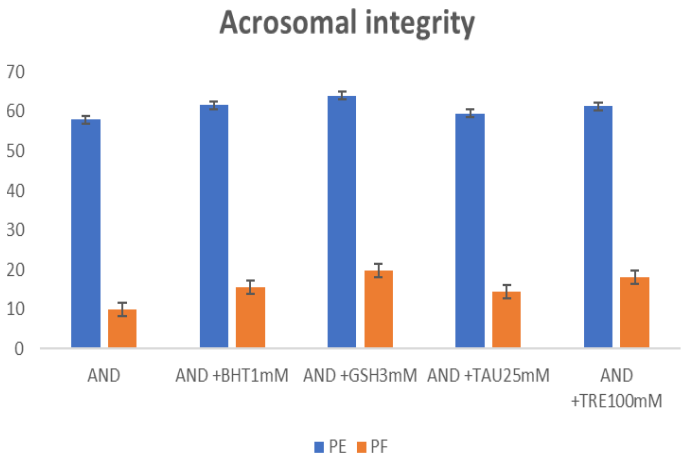


Fig: Effect of different additives on acrosomal integrity of boar spermatozoa at post equilibration and freezing in Androhep extender

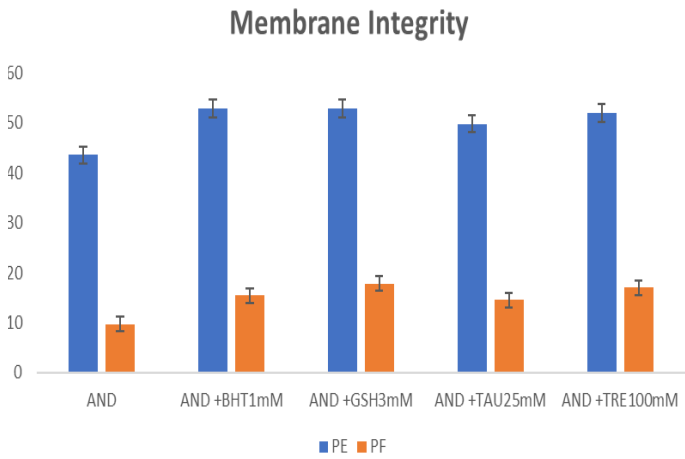


Fig: Effect of different additives on membrane integrity boar spermatozoa at post equilibration and freezing in Androhep extender

The samples supplemented with 1mM BHT, 3mM GSH and 100 mM trehalose (ATR) showed significantly higher values

than the 25MM TAU and control group AND after equilibration, however, the difference between the three groups (BHT, GSH and TRE) were non-significant. At post-thaw, all the treated groups maintained significantly higher membrane integrity than the control group AND. The GSH group (17.85±0.90) maintained the highest percentage of membrane integrity in the boar spermatozoa at post thaw.

The samples supplemented with 3mM GSH and 100 mM trehalose exhibited improved semen quality after equilibration and at post thaw. The research findings indicate that the inclusion of 1 mM BHT, 3 mM GSH and 100 mM trehalose in the Androhep extender resulted in improved quality of boar semen after undergoing cryopreservation using the conventional freezing method. From the study, it could be concluded that GSH 3 mM followed by Trehalose 100 mM in Androhep extender maintained significantly higher quality of boar spermatozoa after equilibration and at post thaw.

Experiment 1 (b): Effect of different concentration of additives on boar spermatozoa at different hours of preservation in LEY Extender at post equilibration and thawing

Fresh boar semen in LEY extender

The mean percentage of Sperm motility, viability, membrane and acrosome integrity of freshly collected boar semen was 84.00±0.68, 80.65±0.76, 73.25±0.64 and 77.20±0.69, respectively immediately after extension in LEY extender at 0 h.

Post equilibration and thawing in LEY extender

A significant difference (P<0.05) in sperm motility was observed between the control and treated groups during preservation of boar spermatozoa in LEY extender. Samples supplemented with 3mM GSH in LEY extender showed significantly (p<0.05) higher sperm motility after equilibration (66.25±1.25) and at post thaw (29.00±0.68) than the other groups. Sperm motility in all supplemented group was significantly higher than the sperm motility in control extender (LEY) both after equilibration and post freezing.

Similarly, sperm liveability was also significantly higher in the semen samples supplemented with 3mM GSH both after equilibration (62.95±0.38) and at post thaw (22.65±0.90). The sperm viability in control group (LEY) was significantly lower than other treatment groups at post thaw (Fig).

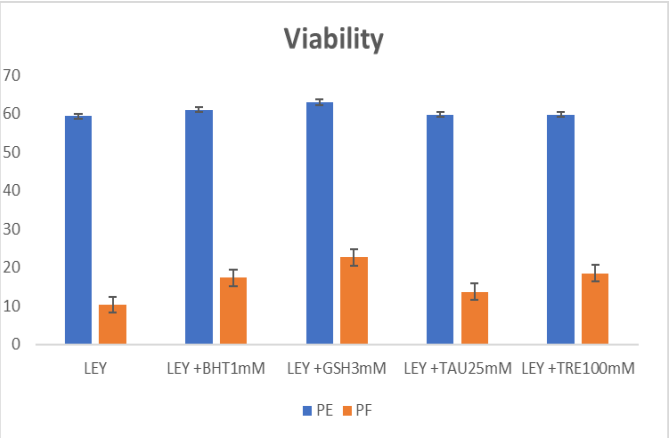


Fig: Effect of different additives on viability boar spermatozoa at post equilibration and freezing in LEY extender

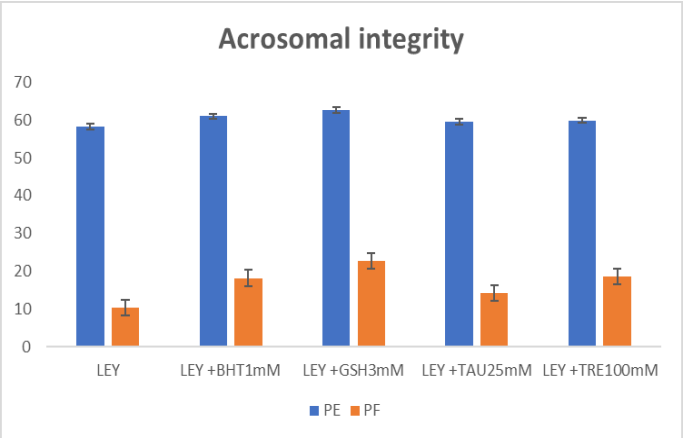


Fig: Effect of different additives on acrosomal integrity boar spermatozoa at post equilibration and freezing in LEY extender

A significant difference in acrosomal integrity of boar spermatozoa was observed when preserved in LEY extender with the supplementation of additives. Acrosomal integrity was significantly higher in GSH supplemented group (22.65±0.90) at post thaw.

It is evident from the study that addition of GSH 3 mM followed by Trehalose 100 mM and BHT 1mM in LEY extender showed an enhancement in boar semen quality after cryopreservation via the conventional freezing method. It is revealed that supplementation of the additives in LEY extender is beneficial for the boar spermatozoa to protect them from the adverse effect of the low temperature during equilibration and freezing.

Institute Project: Hormonal and herbal interventions for optimizing eutocic farrowing in pigs

Rafiqul Islam, Sunil Kumar, Jaya and Lokesha E.

Prolong farrowing occurs in pigs due the large litter bearing animals. The delay in farrowing may cause death of the fetus and birth of weak fetus. This arises due to the force of uterine contrition over the fetus, which sometimes lead to compression of the umbilical vessels and asphyxia in the piglets. Timely management of the of the problems increases the survival rate of the piglets during farrowing and also improves the maternal reproductive health. It prevents the mothers from suffering from post-farrowing uterine diseases and fertility of the mother also remained normal.

The pregnant female pigs were given PGF2α analogue, cloprostenol sodium injection in two dose rates on 113 day of gestation and observed the events during farrowing with an aim to expedite the process of farrowing to reduce piglets' mortality and also to obtain healthy piglets. The blood samples were collected at -7d (7 days before the expected date of farrowing, EDF), 0 day (on the day of farrowing and +7d (7 days post farrowing), plasma harvested and kept for further analysis. The following findings were observed during farrowing and post farrowing period.

The gestation length was significantly ($P<0.05$) lower in group 2 than group 1 and 3. It indicates that PG treatment with 150 µg Cloprostenol (group 2) was more effective in inducing the farrowing in comparison to two injections of PG at the rate 75µg/ inj (group 3). Simultaneously, group 2 followed by group 3 pigs took less time to complete the process of farrowing than Group 1 pigs (control). However, the difference in farrowing time between the groups was non-significant. The treatment for group 2 (22.75±2.63 h) also initiated the farrowing faster and delivered the first piglets significantly earlier than in group 1 (51.72±6.65 h) and group 3 (54.00±8.93 h). The live litter size did not vary between the treatment groups. It is revealed from the study that induction farrowing in managing the farrowing effectively within shorter duration and PG treatment with 150µg cloprostenol can be effectively applied in managing the prolonged gestation case in pigs.

Table : Effect of Prostaglandin injections on the process of farrowing in Rani pigs

Groups	Treatments	No of Piglets born			Gestation Length (days)	Duration from PG inj to 1st piglet born (h)	Total duration of farrowing (min.)
		Male	Female	Total			
Group 1:	No treatment (control)	4.05 ±0.31	4.55 ±0.49	8.61 ±0.62	115.44^{b} ±0.29	51.72^{b} ±6.65	66.66 ±5.13
Group 2:	PGF2α 150µg	3.77 ±0.61	4.11 ±0.80	7.88 ±1.08	114.11^{a} ±0.11	22.75^{a} ±2.63	58.66 ±13.06
Group 3	PGF2α 75µg+ PGF2α 75µg	3.70 ±0.51	4.00 ±0.78	7.70 ±1.04	115.2^{b} ±0.35	54.00^{b} ±8.93	45.90 ±8.73
Overall		3.89 ±0.25	4.29 ±0.36	8.18 ±0.48	115.05 ±0.19	45.29 ±4.52	59.10 ±4.7

Mean with different superscripts (a, b) within a column differ significantly ($P<0.05$)

Service Project: Artificial Insemination in Pigs

Rafiqul Islam and Sunil Kumar

The following services have been extended to the stakeholders during 2024 under the Service Project. The efforts were collectively aimed at improving pig farming practices, boosting the adoption of modern AI techniques, and ensuring that farmers have ongoing support for successful reproductive management.

Supplied liquid boar semen doses for AI

A total of 4217 liquid boar semen doses were produced and supplied by the Institute for artificial insemination in pigs at the farmers' field and organized farms during January to December, 2024. The boar semen doses were produced from the 523 ejaculates collected from healthy boars during the year which consists of 396 ejaculates from Rani, 84 from Large White Yorkshire and 43 from Hampshire boars. Out of this, 559 doses were given to tribal farmers under TSP, 57 to scheduled caste farmers under SCSP, 353 to organized farm and rest 3248 boar semen doses were sold to other category of farmers.

New inseminators trained

During the year, 249 new entrepreneurs/ farmers were trained on artificial insemination in pigs with liquid boar semen to carry out inseminations at their farms and also to the neighboring farms of their locality for self-employment.

New farmers registered

During the reported period, 106 new farmers were registered, who learnt the technique of AI and received liquid semen supplied by ICAR- NRC on Pig, Rani for artificial insemination of their pigs.

Training Programs on AI in Pigs

Six training programmes (3-4 days each) conducted for various stakeholders, aimed at educating them about artificial insemination in pigs.

Technology Demonstrations

Two one-day demonstrations on AI techniques specifically targeted at progressive farmers and entrepreneurs, showcasing the application of the technology.

Lectures and Demonstrations in Other Programs

AI demonstrations and lectures were integrated into other training and awareness initiatives, such as those organized under the SCSP, TSP, EDP, and externally funded projects.

Regular Advisory Services

These services were provided through-

- On-site visits to the farmers.
- Farmer visits to the Institute.
- Telephonic consultations for continued support.

Reproductive management support

Regular advisory services were offered to farmers, including guidance on-

- Therapeutic management of infertility in pigs.
- Best practices for AI, such as the proper method and timing of insemination.
- Post-insemination care and measures.

Some photographs of the farmers with their piglets born due to the artificial insemination with liquid boar semen doses received from ICAR-NRC on Pig, Rani are presented below.

Mr. Jaydev Rabha, Village: Hahim; Litter size: 8 (Male: 6, Female:2)

Mr. Chanakya Das, Hatkhuwapara, Barihat, Sikarhati; Litter size: 12 (Male: 5, Female: 7)

Ms. Anima Das, Village: Barkuchi; Litter size: 08 (Male: 6, Female:2)

Mr. Karna Rabha, Village: Ouguri; Litter size: 10 (Male: 4, Female: 6)

Mr. Raju Rabha, Village: Batabari with his piglets; Litter size: 8 (Male: 3, Female:5)

Mr. Jaydev Boro, Vill: Jongakhuli
Litter size: 12 (Male: 10, Female:2)

Mr. Pabitra Kalita, Choudhurykhat, (Gobardhan)
Litter size: 08

Mr. Karna Rabha, Ouguri
Litter size: 07 (Male: 5 Female: 2)

Sri. Jogesh Nath, Rangamati
Litter size: 9 (Male: 5, Female:4)

ANIMAL PHYSIOLOGY

Institute Project: Physio-genomic responses and MCT profiling of exotic and Indigenous pig breeds in heat stress during different seasons

B.C. Das, N.H. Mohan, Jaya, K. De, J. Doley, A. Paul, N.M. Attupuram

To assess the expression patterns of various heat stress-responsive Heat Shock Protein (HSP) and Monocarboxylate Transporter (MCT) genes in the thigh muscle and colon tissue of indigenous Rani and Ghoongroo pig breeds under different seasonal conditions, tissue samples were collected from local butchers. The study aimed to understand how these genes respond to varying environmental temperatures, potentially influencing thermotolerance and metabolic adaptation in these breeds. The collected tissue samples were processed for RNA extraction, followed by complementary DNA (cDNA) synthesis. The relative messenger RNA (mRNA) expression levels of the target genes were then quantified using real-time polymerase chain reaction (RT-PCR). The comparative cycle threshold (Ct) method, also known as the delta-delta Ct method, was employed to analyze gene expression levels. This approach allowed for the normalization of target gene expression relative to an internal housekeeping gene, facilitating the comparison of expression trends across different seasonal conditions.

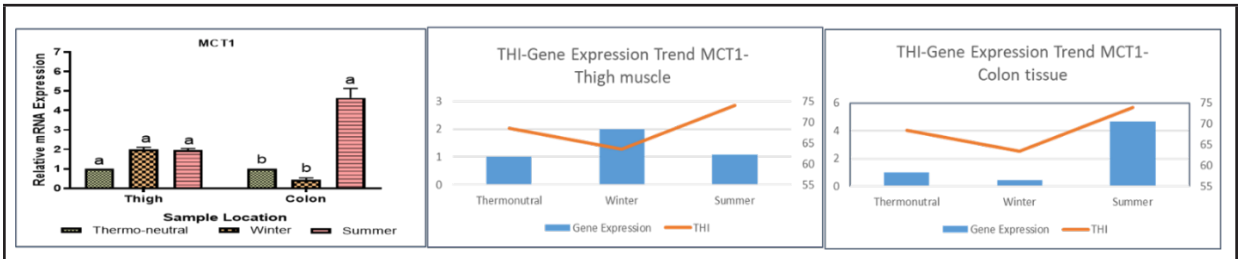


Fig: Expression trend of MCT1 with THI in Rani Pigs

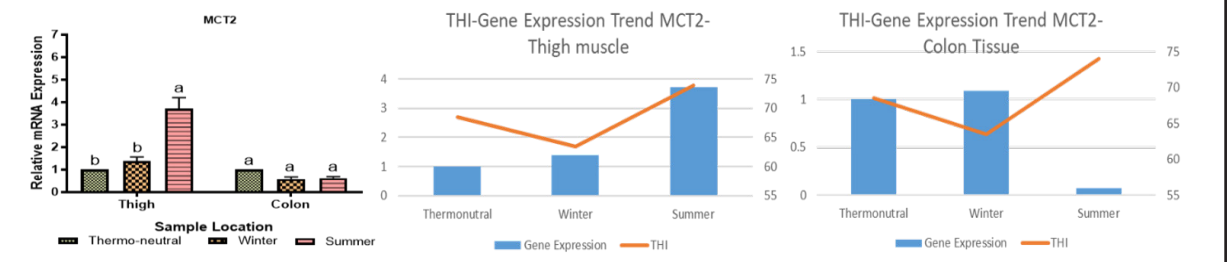


Fig: Expression trend of MCT2 with THI in Rani Pigs

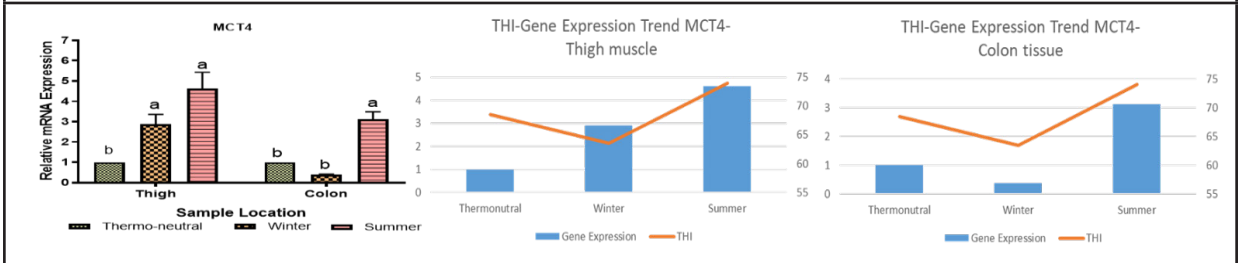


Fig: Expression trend of MCT4 with THI in Rani Pigs

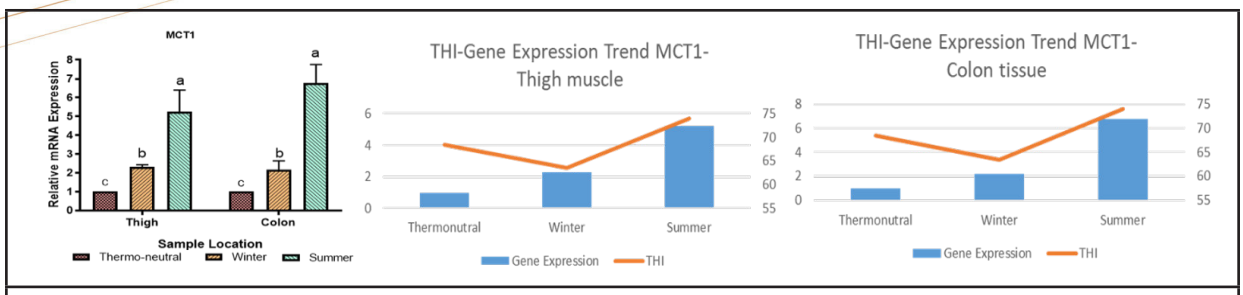


Fig: Expression trend of MCT1 with THI in Ghoongroo Pigs

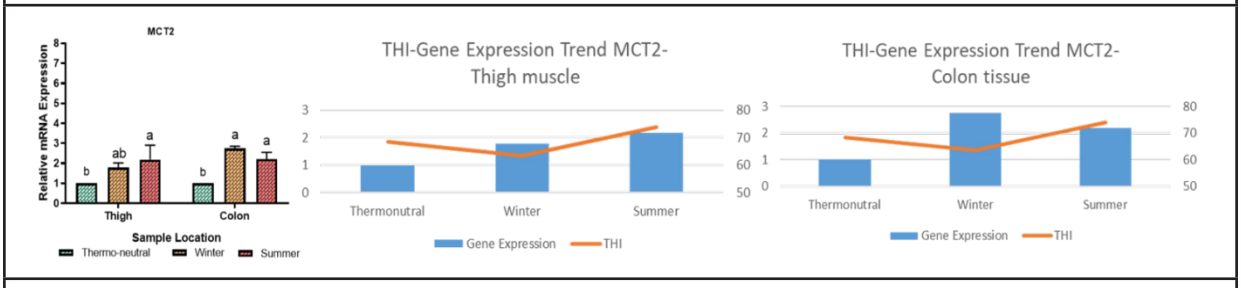


Fig: Expression trend of MCT2 with THI in Ghoongroo Pigs

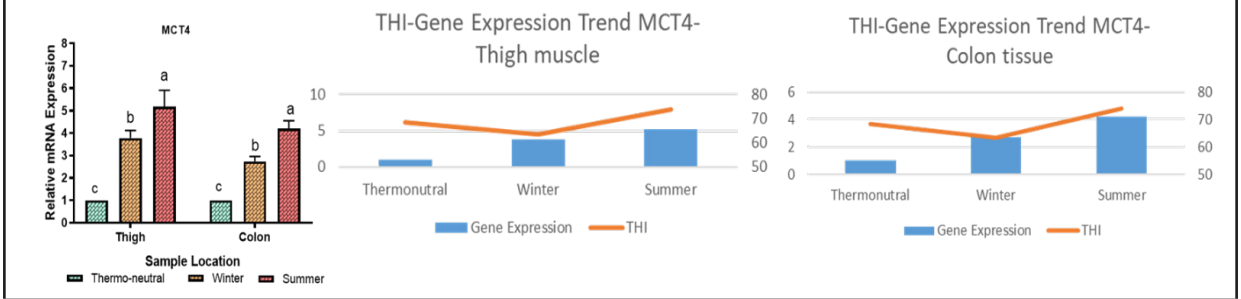


Fig: Expression trend of MCT4 with THI in Ghoongroo Pigs

The relative changes in the copy number of *HSP90* mRNA exhibited a significant upregulation ($P<0.05$) in both the thigh muscle and colon tissue of the Rani pig during the winter and summer seasons when compared to the thermo-neutral control season. This suggests that *HSP90* plays a crucial role in cellular protection and stress response mechanisms under varying environmental conditions. Furthermore, the expression pattern of *HSP70* mRNA showed a strong correlation with the Temperature-Humidity Index (THI). In the thigh muscle, *HSP70* mRNA expression was found to be elevated during the summer season, indicating a heat-induced stress response compared to the thermo-neutral season. In the colon tissue, the expression levels of *HSP70* were highest during the summer season when THI was at its peak, whereas the lowest expression was observed during the thermo-neutral THI conditions. These findings highlight the tissue-specific and seasonal variation in the heat shock protein response, emphasizing their potential role in thermotolerance and adaptation in Rani pigs.

External Funded Project (DBT-BiotechKisan): Development and promotion of Atmanirbhar pig production in tribal areas of NER states through need based and area specific customized scientific interventions in Goalpara District (Assam) and Dhalai District (Tripura)

B.C. Das, P.J. Das, S.R. Pegu, S. Paul, K. De, R. Deb, Sunil Kumar, Jaya, N.M. Attupuram, S.J. Devi, S. Baishya, H. Choudhary, A. Debnath, S. Das, E. Debbarman, S. Roy, T. Bhowmik

The project aimed at enhancing pig farming practices among tribal communities by introducing scientific interventions to improve productivity, sustainability, and profitability. This report outlines the activities carried out under the project and their impact. Training and Demonstration Activities involved a total of 297 farmers and have been trained in scien-

tific pig production practices, creating a well-rounded human resource capable of driving transformative changes in pig farming across the KarbiAnglong district of Assam. The training covered diverse aspects such as reproductive management, biosecurity measures, and value-added product development, equipping farmers with essential skills to ensure pig farming becomes a resilient and viable livelihood option. The aspects demonstrated are Artificial Insemination, Silage Making, Scientific Slaughter, Scientific Feeding Practices, Scientific Pig Production Practices, Scientific Health Management Practices, Low-Cost Pig Housing, Biosecurity Measures, Integrated Pig Farming, Reproductive Management and Record Keeping and Breeding Practices. In addition to scientific pig rearing, farmers were introduced to the potential of pork value addition through demonstrations in Scientific Slaughter Practices ensuring quality pork production, Pork Value Addition through processing techniques to increase product shelf-life and marketability and Preparation of Value-Added Pork Products such as smoked pork, sausages, and other processed meat items. This training empowered farmers to generate higher revenues by moving beyond primary pig rearing to processing and marketing value-added pork products. A five-day specialized training program was conducted at ICAR-NRC on Pig, where 14 Scheduled Tribe (ST) farmers received hands-on exposure to advanced pig rearing practices. This included Interaction with experts to understand innovative research, Exposure to modern pig farming technologies, Practical sessions on feeding, breeding, and disease management and Knowledge-sharing sessions on business models for profitable pig farming.

ICAR-National Fellow Project: Development of thermo-tolerant pig through biomarker assisted selection

Mohan N. H.

Genome-wide methylation in indigenous and exotic breeds of pigs

Detailed analysis of genome-wide methylation of indigenous (Ghungroo and Mali) and exotic (Hampshire and Large White Yorkshire) was conducted. The chromosome-wise differentially methylated, unmethylated and methylated regions were identified across the whole genome in all the breeds. Out of 29.27 million CpGs, indentified, 68.6, 13.9, 6.1 and 11.3% belonged to high, medium, low-medium and low methylation category. Chromosome-wise distribution of CpGs in the pig genome is shown in fig.

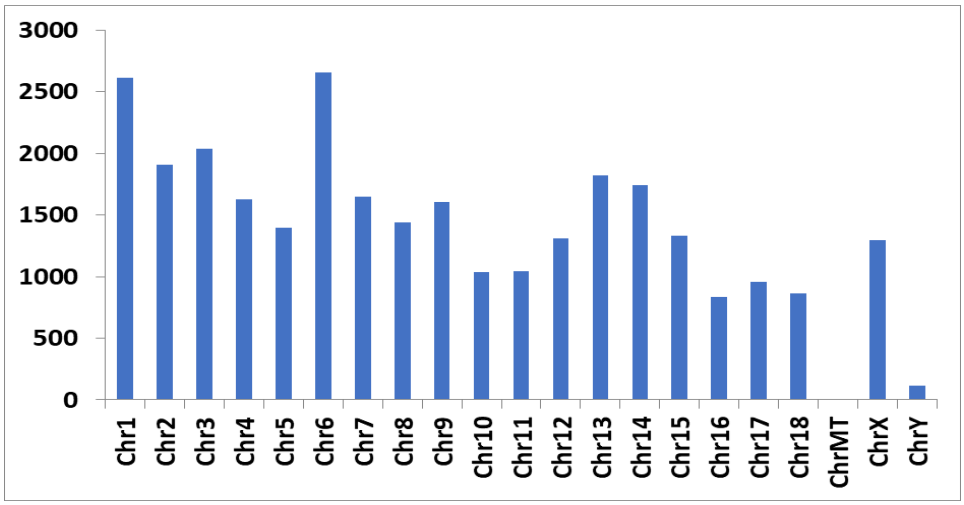


Fig: Chromosome-wise distribution of CpGs in the pig genome

Differentially Methylated Regions

The study identified Differentially Methylated Regions (DMR) across the chromosomes and location with respect to gene. DMRs in chromosome 1 in Ghungroo as compared to Hampshire, LWY and Mali is shown in fig. Identification of hypomethylated regions and were classified as unmethylated region (UMR) and low methylated region (LMR) was. The UMR is defined as CpG rich and completely unmethylated, corresponding to proximal regulatory sites. While, LMR is defined as CpG poor and low-methylated regions, corresponding to distal regulatory sites.

	regulation	overlap	G1-H1	G1-L1	G1-M1	H1-L1	H1-M1	L1-M1
Chr1	DOWN	-	1525	2022	1000	995	478	432
		C	40	57	38	32	14	38
		G	2020	2547	1370	1036	565	627
		G,C	89	121	87	43	20	43
		P	24	31	19	11	5	18
		P,C	3	3	3	1	1	5
		P,G	59	82	34	32	11	37
		P,G,C	8	3	10	4	4	13
	UP	-	617	480	831	599	1005	1519
		C	17	30	23	42	28	24
		G	539	598	989	871	1485	1957
		G,C	22	50	40	71	40	42
		P	8	13	12	20	17	26
		P,C		3		8	2	
		P,G	13	25	47	42	39	67
		P,G,C	2	3	6	8	2	3

Fig: Distribution of upregulated and down regulated methylated regions in chromosome 1in Ghungroo as compared to Hampshire, LWY and Mali in relation with gene. C: CpG, G: Gene, P: Promoter

Institute Project: Design of recombinant multi-epitope protein(s) and their expression for assay development

N.H. Mohan, V.K. Gupta, Jaya, S.J. Devi

The project aimed to develop a multi-epitope protein(s) using *in sillico* immunoformatics. Considering contextual importance, proteins from African swine fever virus were identified from NCBI database, initially screened and epitopes were identified using online tools. After selecting epitopes, a draft model of protein was developed and the peptide structure and properties were evaluated through online tools. Various physical properties of various peptides is shown in table.

Table: Physio-chemical properties of peptides

Property	Peptide1	Peptide 2	Peptide 3
Number of amino acids	584	542	500
Molecular weight	66.36 kDa	61.74 kDa	57.63 kDa
Theoretical pI	10.1	9.99	10.11
Chemical Formula	$C_{3027}H_{4943}N_{813}O_{796}S_{28}$	$C_{2840}H_{4597}N_{745}O_{751}S_{1}$	$C_{2675}H_{4324}N_{690}O_{681}S_{18}$
Estimated half-life	30hrs	3.5hrs	1hr
Aliphatic index	92.48	98.04	100.82
Instability index	39.39	37.65	36.98
Predicted scaled solubility	0.516	0.518	0.554
Hydropathy value	2.84	2.84	2.64

The nucleotides corresponding to aminoacids were identified, optimized and synthesized with 1767, 1641 and 1515 nucleotides, corresponding to peptides 1, 2 and 3, respectively. Subsequently, the synthesized genes cloned into pET28a+vector (Fig) and expressed in *E.coli* BL21(DE3).

Institute Project: Development of proteomic and transcriptomics atlas of porcine olfactory system

N.H. Mohan, Jaya, S.J. Devi, N.M. Attupuram

An investigation was conducted to identify the olfactory genes proteins in the porcine genome based on the whole genome sequencing data generated by ICAR-NRC on Pig. The transcriptome data was extracted from the genome data of Ghungroo, LWY, Mali and Hampshire using GEMOMA tools. Subsequently, from the list of proteins, the olfactory proteome was derived from protein annotation. The study identified 131 genes, mostly coding for various proteins of olfactory receptor family, olfactomedins, lipocalins, retinol binding proteins etc.

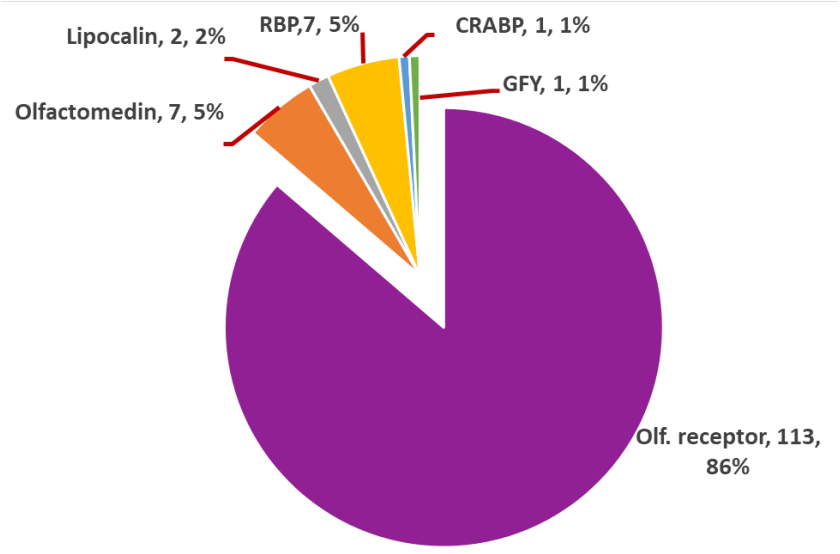


Fig: Distribution of olfactory proteins in the porcine genome

The study identified breed specific in protein distribution of protein, where 45 proteins were common to all breeds studies.

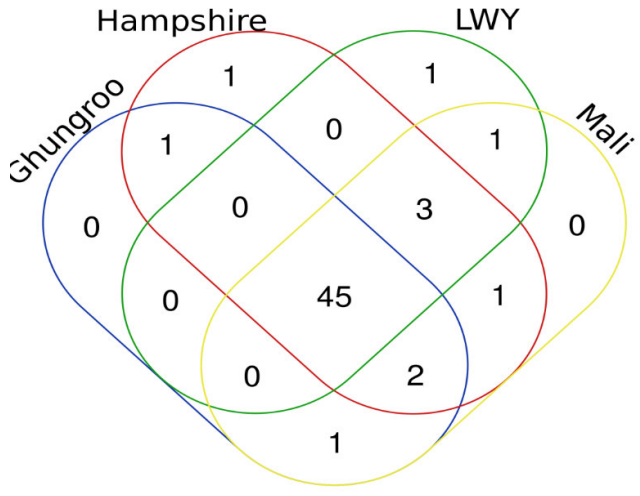


Fig: Distribution of olfaction related proteins among various breeds of pigs

The proteins specific to breeds were identified and provides clues towards breed specific differences in olfactory perception.

Table: Breed-wise distribution of various transcripts/proteins related to olfaction

Breeds of pig	Transcript/proteins
Ghungroo, Hampshire, Mali	OR2AT4, OR52R1
Hampshire, LWY, Mali	OLFM3, OR51C1P, OR14K1
Ghungroo, Hampshire	OLFM2
Ghungroo, Mali	OLF42-1
Hampshire Mali	OR2T27
LWY, Mali	OR51G2
Hampshire	OR51L1
LWY	OR6S1

Functional annotation of olfactory proteins was conducted through the online resource shows the association of proteins with various physiological processes related to olfaction such detection of chemical stimulus, cell signaling and transduction and olfactory perception.

Table: Gene ontology analysis of the olfactory proteins

GO.ID	Description	p-Value	FDR
GO:0004984	Olfactory Receptor Activity	2.5E-06	2.5E-06
GO:0004930	G Protein-Coupled Receptor Activity	1.68E-05	1.68E-05
GO:0004888	Transmembrane Signaling Receptor Activity	6.39E-05	6.39E-05
GO:0060089	Molecular Transducer Activity	0.000108	0.000108
GO:0038023	Signaling Receptor Activity	0.000108	0.000108
GO:0007186	G Protein-Coupled Receptor Signaling Pathway	3.85E-06	3.85E-06
GO:0050911	Detection Of Chemical Stimulus Involved in Sensory Perception of Smell	6.11E-06	6.11E-06
GO:0007608	Sensory Perception of Smell	6.78E-06	6.78E-06
GO:0050907	Detection Of Chemical Stimulus Involved in Sensory Perception	7.26E-06	7.26E-06
GO:0009593	Detection Of Chemical Stimulus	8.26E-06	8.26E-06
GO:0050906	Detection Of Stimulus Involved in Sensory Perception	9.6E-06	9.6E-06
GO:0007606	Sensory Perception of Chemical Stimulus	9.92E-06	9.92E-06
GO:0051606	Detection Of Stimulus	1.37E-05	1.37E-05
GO:0003008	System Process	1.59E-05	1.59E-05
GO:0007600	Sensory Perception	3.76E-05	3.76E-05
GO:0050877	Nervous System Process	0.000182	0.000182
GO:0042221	Response To Chemical	0.019937	0.019937
GO:0007165	Signal Transduction	0.023989	0.023989
GO:0023052	Signaling	0.041942	0.041942
GO:0007154	Cell Communication	0.04758	0.04758
KEGG:04740	Olfactory Transduction	0.000367	0.000367

Development of a pregnancy diagnostic test for pigs

A colour reaction based urine test was developed for detection of pregnancy in pigs. Development of coloured precipitate within the test window period indicates positive pregnancy. Unique chemical shifts (in ppm) in ^{1}H as well as ^{13}C NMRs were evaluated for non-pregnant and pregnant animals. The obtained unique peaks were compared with the approximate values of chemical shifts for ^{1}H and ^{13}C NMRs of different functional groups.

Institute Funded: Functional characterization of genes regulating reproduction in sows

Jaya, Satish Kumar, N.H. Mohan

Exploration of global transcriptomic changes in the porcine oviduct after ovulation and identification of the differentially expressed genes (DEGs) and signalling pathways

The study was conducted to investigate the global transcriptomic changes in the porcine oviduct after ovulation and to identify the differentially expressed genes (DEGs) associated with the transition from estrus to the metestrus phase. The RNA-Sequencing of the post-ovulatory ampulla (POA) and early luteal ampulla (ELA) tissues was conducted using Illumina NextSeq2000. The R package NOISeq was used to obtain significant differentially expressed genes (DEGs) with probability of differential expression (1-FDR) value ≥ 0.95 and $\log_2$ fold change ($\log_2$FC) ≥ 1, revealed 817 DEGs (657 up- and 160 down-regulated). These DEGs were functionally annotated with varied gene ontology terms like sterol biosynthetic process, cell repair, growth and cell migration, synthesis of DNA, signalling by WNT indicating their major role in post-ovulatory oviductal functionality. The DEGs were mainly enriched in basic cellular pathways like signal transduction, metabolism and cell cycle, which indicate highly active cellular machinery during the phase when gametes are present in oviductal microenvironment. The present study revealed modulatory factors associated with the ampullary physiology during early embryonic development, which may influence fertility and litter size in pigs.

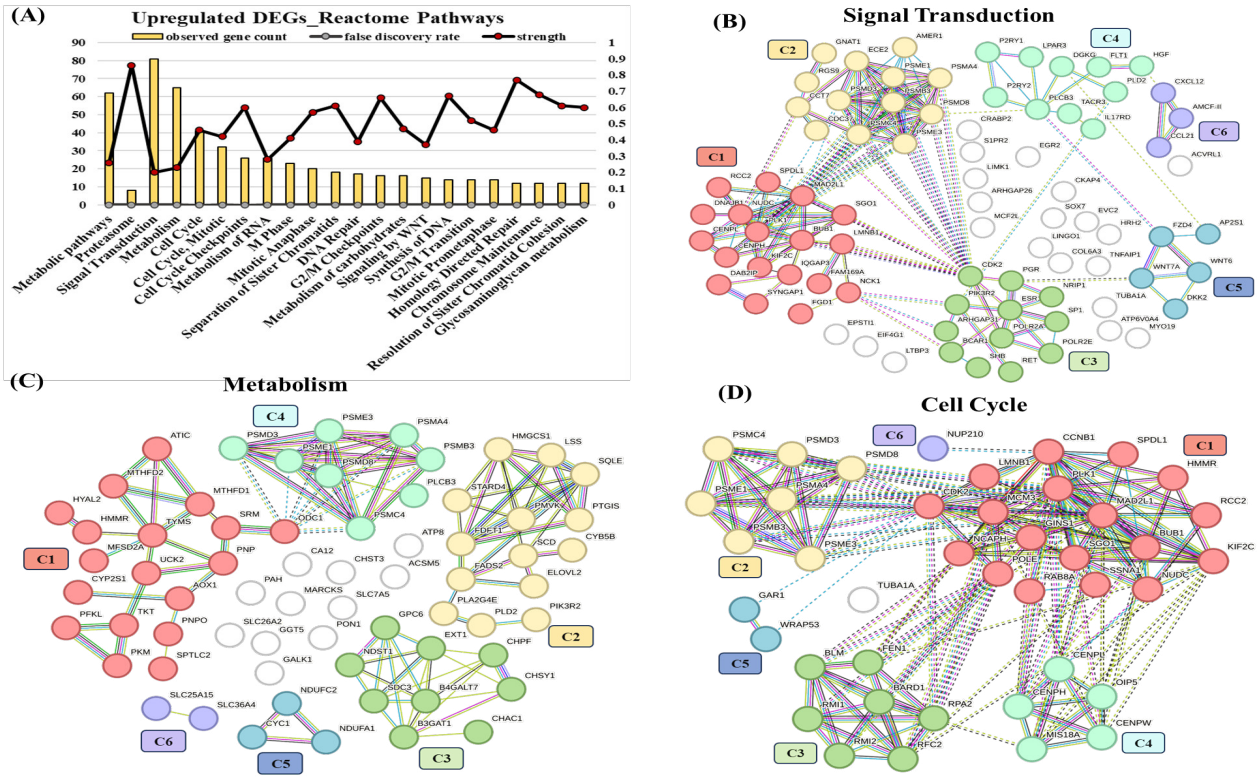


Fig: (A) The reactome pathway analysis of differentially expressed genes and the protein protein interaction analysis of the DEGs of highly enriched pathway (B) signal transduction, (C) metabolism and (D) cell cycle.

Differentially expressed transcriptome signature of luteal stage oviduct and uterus in cyclic pigs

The present study aimed to explore the transcriptomic changes in the luteal stage oviduct and uterus after ovulation and to identify the differentially expressed genes (DEGs) regulating the ovo-uterine environment during early embryonic stages in cyclic pigs. The RNA-Sequencing of the luteal stage oviduct (OV) and uterine horn (UH) tissues was conducted using Illumina NextSeq2000. The R package NOISeq was used to obtain significant differentially expressed genes (DEGs) with probability of differential expression (1-FDR) value ≥ 0.95 and $\log_2$ fold change ($\log_2$FC) ≥ 1. These upregulated DEGs were functionally annotated with varied biological process terms like embryonic development, blood vessel development, system development embryonic morphogenesis etc., whereas the downregulated DEGs were enriched in cilium movement, axoneme assembly, microtubule movement etc. The enriched molecular functions included binding activities like calcium binding, heparin binding, tubulin binding etc. These biological and molecular processes were physiologically active in cellular components like cell periphery, extracellular matrix, the cilium, cell projection, cell junction etc. The study indicates concerted mechanism active during the transition phase in oviduct, when embryo traverses from oviduct to the uterus.

Network Program on Application of Genome Editing Technology for Improvement in Livestock Health and Production (NPGET) (ICAR): Production of broiler livestock and poultry using CRISPR technology. Development of myostatin knock out pigs

Jaya, Satish Kumar, Sunil Kumar, Rafiqul Islam and N.H. Mohan

Design and synthesis of Single guide RNA (SgRNA) and genomic cleavage detection assay primers for myostatin KO experiments

The CRISPR target sequence were identified and SgRNA primers were designed for exonic regions in myostatin gene. Two SgRNA were designed on each exon and target oligos were synthetized. The oligos for on site target PCR product validation were also designed and the restriction sites and enzymes for genomic edit confirmation were identified.

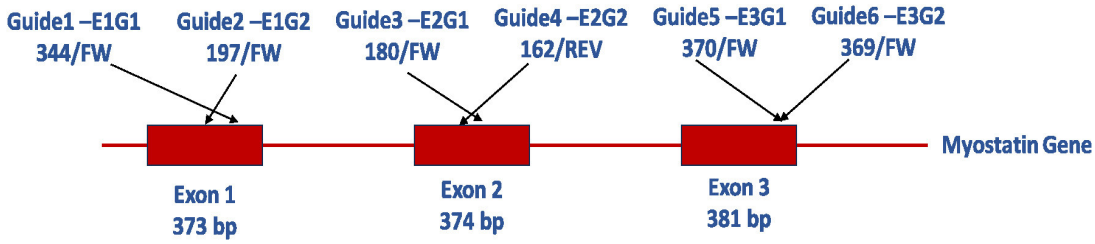


Fig: Location of SgRNA target site on different exonic region of myostatin gene.

The SgRNA were synthetized by in vitro transcription using standard methodology and the guide RNA (gRNA) DNA template was PCR assembled. The Fig. shows 2 % agarose gel electrophoresis image with PCR assembled gRNA DNA template (120 bp) and the SgRNA synthetized through in vitro transcription (100 bases). The DNA template removed by DNase digestion, SgRNA was column purified and its concentration was measured by nanodrop. The SgRNA was further stored at -80^{O}C for transfection experiment. The cryopreserved fibroblast cells were thawed and seeded in 96 well plate and transfection was conducted with ribonucleoprotein (RNP) complex consisting of SgRNA (G1 to G6) and Cas9 nuclease using lipofectamine in triplicates when the cells reached the confluency of 40-60 %. The cells before and after transfection is shown in fig. After 42 hours of transfection then genomic DNA was isolated and on target edit sites were amplified using standardized PCR primers for all the samples in triplicates, as shown in fig.

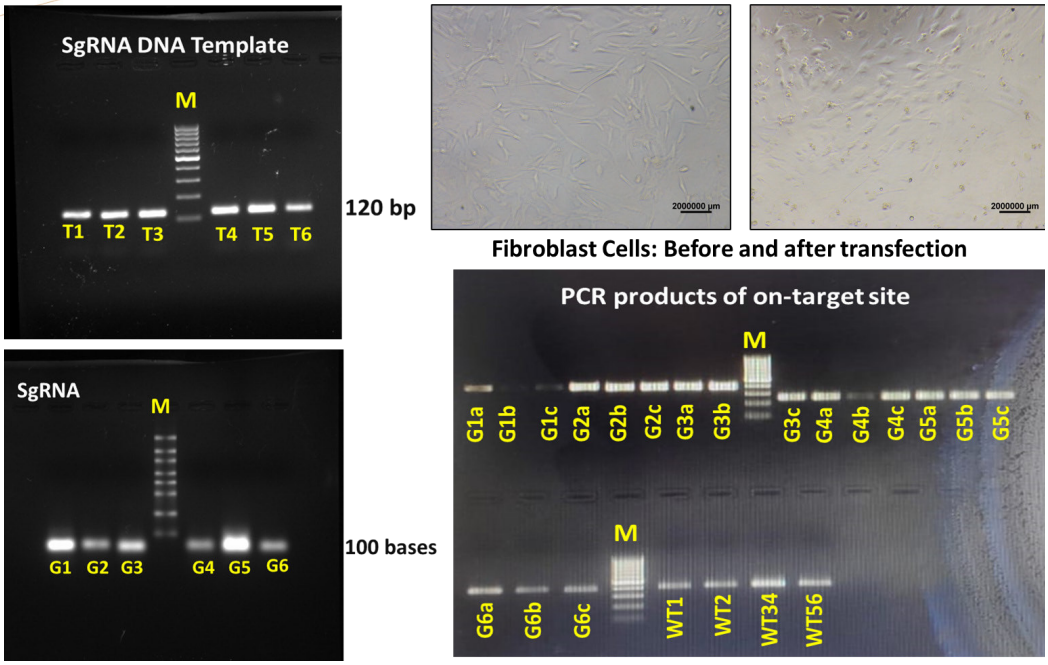


Fig: Agarose gel electrophoresis image showing bands for SgRNA DNA template (120 bp), SgRNA (100 bnases), fibroblast cells before and after transfection and amplified PCR products of on-target edit site for all the guide RNAs in triplicate and the wild type (control) samples

The PCR products were sent for Sanger sequencing and the sequenced results were analysed for editing efficiency for each SgRNA at different confluency percentages were determined by TIDE (Tracking of Indels by Decomposition) analysis. TIDE analysis revealed significant difference in editing efficiency of SgRNAs designed on different exon 1, 2 and 3 which ranged from 96.4 % to 1.2 %. The sequence alignment of WT and KO sequences revealed 59 bp deletion in myostatin gene caused by G1 guide. The G1 SgRNA on Exon 1 was selected for further experimentation.

Optimization of in vitro maturation and culture of porcine embryos

The process of in vitro fertilization is being standardized to obtain an efficient production of blastocyst for genome editing and embryo transfer experiment. The in vitro maturation was conducted with porcine follicular fluid and gonadotropic hormones in combination with FBS, however, zygote was not obtained. The process is being optimized with different media composition, feeder layers and culture conditions.

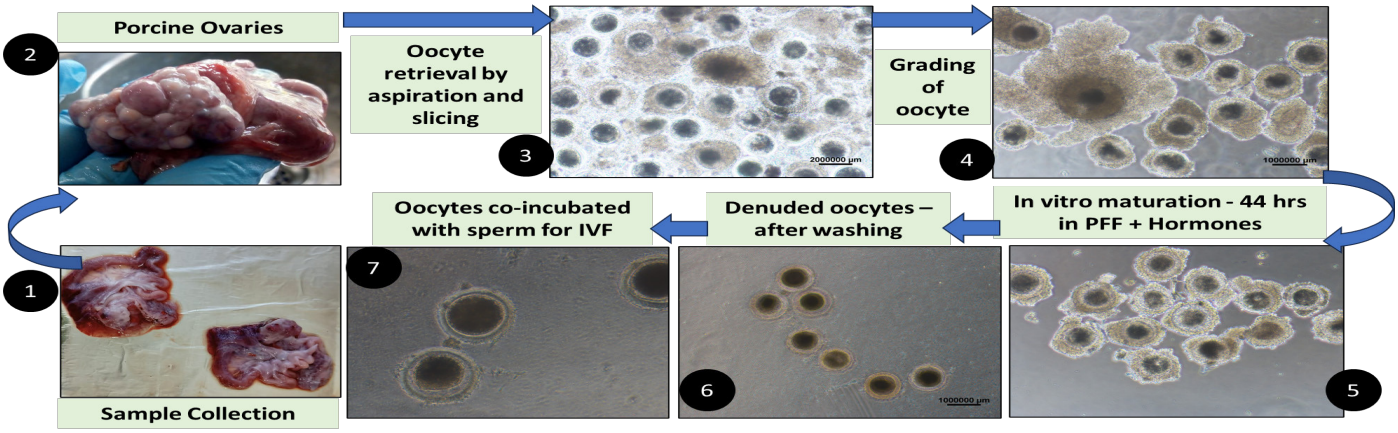


Fig: The workflow of in vitro fertilization in pig starting from sample collection, oocyte retrieval, grading, in vitro maturation and washing to co-incubation with sperm

A bibliometric mapping of advancements and trends in genome editing in pigs

The bibliographic information of publications on genome editing in pigs from 2010 to 2023 was retrieved from the Scopus database. Bibliometric parameters, such as coauthorship, keyword co-occurrence, citation, bibliographic coupling and cocitation, was analyzed using VOS viewer. We found 727 documents on genome editing in pigs, 407 of which were research articles authored by 2826 researchers from 1359 research organizations across 40 countries. Investigations on the optimization of the procedure, delivery methods, editing efficiency, and reducing off-target effects dominated the early phase of research, which has shifted to its application for generating knockout (KO) or knockin (KI) pigs in recent years. Areas such as xenotransplantation, disease resistance, higher muscling and disease models have dominated the research horizon for genome editing in pigs. Emerging areas in gene editing include base editing, CRISPR-based screens, diagnostics and therapeutics. Challenges such as off-target effects and regulatory, ethical and societal issues related to channelizing gene-edited pigs from lab to land and then from farm to fork continue to restrain this field.

ANIMAL HEALTH

External Funded Project (DBT): Establishment of a Consortium for One Health to address Zoonotic and Transboundary Diseases in India, including the Northeast Region

S. Rajkhowa, S. R. Pegu, J. Doley, S. Paul, R. Deb and V. K. Gupta

The salient findings of the project during the reported period are as follows:

Collected and analyzed serum samples from the second cycle from Assam against targeted diseases and percent prevalence was recorded to be ASF (0.00%), PRRS (1.40%), cysticercosis (0.31%), Swine influenza (42.18%), JE (51.42%), brucellosis (0.00%), cryptosporidiosis (0.00%), LSD (14.44%) and Q fever (0.00%). Percent positivity of *Salmonella* in meat samples was recorded to be 13.79% whereas 15.78 % meat sample was found positive for *Listeria.* The percent positivity of targeted diseases from the state of Sikkim were ASF (5.26%), PRRS (15.78%), Swine influenza (20.00%), brucellosis (30%), JE (0.00%), cysticercosis (0.00%), LSD (0.00%) and Q fever (0.00%). Cryptosporidiosis was found in faecal samples of 10% calves. *Salmonella* could be detected in 20% pork samples whereas meat samples from Sikkim were found negative for *Listeria*. Collected and analyzed a total of 89 blood, 62 pooled tissue samples and 32 nasal swabs from different outbreaks / clinical cases for the presence of ASFV, PRRSV, SIV & JEV by PCR/RT-PCR. A total of 15 no.s of blood sample and 8 no.s of tissue samples were found positive for ASFV. It was also observed that 9 blood and 6 tissue samples were positive for PRRSV. JEV was present in one tissue sample. All nasal swabs were found negative for SIV. Recorded presence of norovirus in diarrhoeic faecal samples of piglets (through RT-PCR), an emerging zoonotic virus in India. Standardized the RT-PCR protocol for rapid detection of norovirus from faecal samples of pigs.

External Funded Project (DBT): SWINOSTICS: A platform for development and validation of on-field diagnostics of important pig pathogens in NE Region of India for commercial exploration

Seema Rani Pegu, S. Rajkhowa, Rajib Deb, P.J. Das and V.K. Gupta

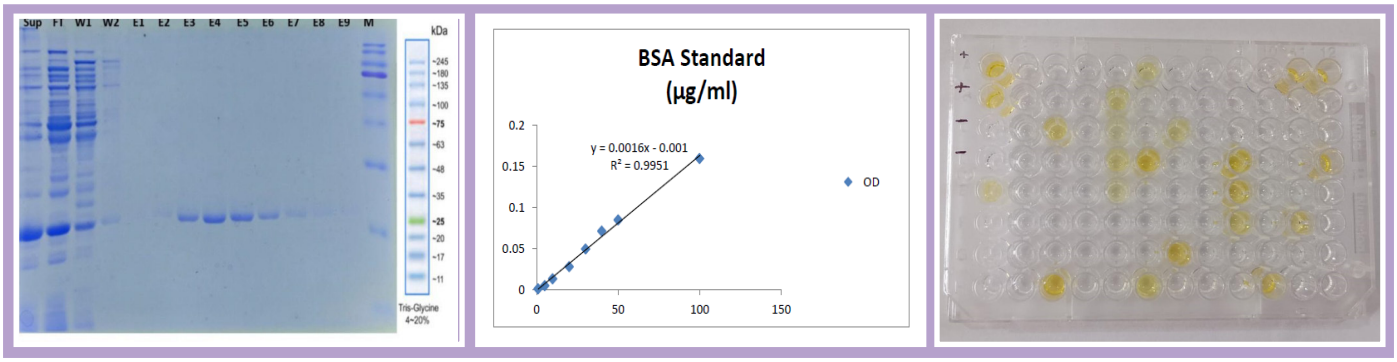
Development and Standardization of Recombinant PCV2 Capsid Protein (Cap) Based Indirect ELISA for antibody Detection Following OIE Protocol.

An Indirect Enzyme-Linked Immunosorbent Assay (ELISA) was developed and standardized for the detection of antibodies against Porcine Circovirus type 2 (PCV2) using a recombinant capsid (Cap) protein as the coating antigen. The assay was designed and optimized following the World Organisation for Animal Health (OIE) guidelines, ensuring compliance with international diagnostic standards. The optimum concentration of coating antigen, serum dilution and conjugate dilution were determined by checker board titration.The highly positive, moderate positive and true negative PCV2 serum panel is being prepared by screening samples with commercial or in-house developed ELISA Kits and a repository has been created. The Cap-ELISA was validated by testing 548nos. of serum samples in parallel with

a commercial ELISA kit (INzegim,Madrid). The diagnostic sensitivity (DSN), diagnostic specificity (DSP) and accuracy of the standardized Cap ELISA were calculated as follows:

- Diagnostic Sensitivity: 99.91%
- Diagnostic Specificity: 95.83%
- Diagnostic Accuracy: 97.87%

The cross-reactivity of the PCV2 Cap protein with antibodies against other swine viruses, including PPV, CSFV, JEV and PRRSV was tested to determine the specificity of the assay.



Service Project: Surveillance and Monitoring of Swine Diseases in NER

S.R.Pegu, S. Rajkhowa, S.Paul, J. Doley, R. Deb, V.Rai

Sero-prevalence and molecular epidemiology of important porcine viral diseases in pigs in northeastern part of India with special reference to Assam

Objectives of the project are: To screen for detection of important viral diseases of pigs for effective management of the disease; To screen for isolation and identification of important bacterial pathogens associated with porcine diseases; To screen for detection of parasitic diseases of pigs for effective management of the disease and to investigate the antimortem and post-mortem alterations in the diseased pigs and patholomorphological evaluation in the affected organs/tissue.

Salient achievements include: A total 264 nos. of pig sera samples were collected/received from Assam, Meghalaya and Tripura. 11 samples (4.16%) were positive for JEV, 19 samples (7.19%) positive for PCV2, 4 samples (1.51%) positive for ASFV and 12 samples (4.54%) positive for CSFV; A total of 355 fecal samples/ rectal swabs and 295 nasal swabs were collected from different backyard and organized pig farms of three districts of Assam (Nalbari, Sonitpur and Kamrup) for screening of important bacterial pathogens of pig. Out of all 355 samples, 6 samples (1.69%) positive for Clostridium perfringens type A and C, 12 (3.38%) samples found E. coli strains of ETEC & STEC pathotype; A total of 11 post-mortem examinations were conducted on deceased pigs during the reporting period. Gross and histopathological examinations were performed to establish a tentative diagnosis of suspected diseases. Two cases were confirmed as Streptococcus suis infections. The characteristic pathological findings included the accumulation of pericardial fluid in the thoracic cavity and pneumonia in the lungs. One animal was confirmed for Pasteurella multocida infection with the characteristic lungs lesions of firm, consolidated and marbling appearance due to fibrinous & appearance due to fibrinous & suppurative bronchopneumonia.

Fig: Suppurative endocarditis in the endocardium of a grower pig

Fig: Suppurative pneumonia in the lung parenchyma of a grower pig

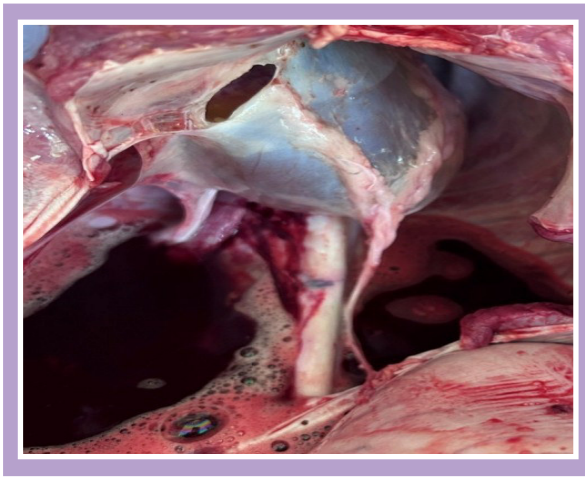


Fig: Accumulation of serosanguinus fluid in the pericardial sac and thorasic cavity of a pig

Fig: Marbling appearance of lungs due to Bronchopneumonia (arrow) in the lungs of adult pig with pasteurellosis

ICAR Funded Project: All-India Network Project on "Challenging and Emerging Diseases of Animals" (AINP-CEDA)

Seema Rani Pegu, Juwar Doley, Souvik Paul, Vishal Rai

Objectives of the project are: Disease monitoring, sampling and epidemiology of challenging and emerging swine pathogens in selected states of NER; Isolation, characterization and sequencing of field isolates of Porcine Circo Virus (PCV), African Swine Fever Virus (ASFV), Porcine Respiratory and Reproductive Syndrome Virus (PRRSV) and other emerging & challenging pathogens of swine in NER; The project AINP-CEDA ICAR funded project was started from 30th of September 2024. As per the objectives the following are the salient achievements under this project- A total of 162 nos. of tissue samples and 39 nos. of blood samples were analysed by PCR and LFA for the presence of ASFV, PCV, PRRSV, CSF & JEV. 3 samples (1.85%) were positive for ASFV, 6 samples (2.27%) positive for PCV2 and 5 samples (3.08%) were positive for CSFV.

Molecular characterization of *Ascaris suum*, and *Trichuris suis* spp. Isolates

It is the most frequently observed GI nematode, with prevalence rates reaching up to 60 % in the North eastern states of India (Laha *et al*., 2013). The presence of adult worms in the intestines can significantly hinder the growth rate of young pig and thus contribute to the economic loss of the farmers. There is a notable scarcity of molecular data concerning significant porcine helminthes and there is lack of scientific reports on molecular characterization of *Ascaris spp*. from pigs in India based on which the current investigation had been designed. The samples (worms) were collected from various slaughter points at different market places. All collected worms were washed carefully in normal saline solution, identified tentatively by studying its morphological characters and stored at – 45^{0}C for further study.

The molecular characterization of *Ascaris* worms was carried out using polymorphic markers such as nuclear ribosomal internal transcribed spacer (ITS, ITS 1 and ITS 2) and mitochondrial genomes such as Cytochrome C oxidase subunit 1 (COX 1), Cytochrome C oxidase subunit 2 (COX 2) and NADH dehydrogenase sub unit 1 (NAD 1). The total genomic DNA was extracted by using DNA isolation kit (QIAamp DNA mini kit Qiagen, USA) and kept in -20° C. The polymerase chain reaction was carried out to amply six genes sequence of ITS (590 bp), ITS 1 (580 bp), ITS 2 (550 bp), COX 1 (450 bp), COX 2 (600 bp) and NAD 1 (370 bp). The working solution of primers were diluted at 10 pmol/µl using NFW and then kept in -20° C. All PCR reactions were performed in 10 µl mixture containing 5 µl 2x master mix, 1 µl of each primer, 1 µl template and 2 µl of nuclease free water (NFW). The PCR cycling parameters of ITS are mentioned in the Table. Optimum conditions of PCR with each set of primers for the remaining genes were summarized in Table. The PCR products were separated in 2 % Agarose gel electrophoresis, stained with Syber safe dye and visualised under Gel-doc documentation system (BioRad, USA).

Table : Primer details of ITS, ITS1 and ITS2

Targeted gene		Primer sequence	Reference	Product length (bp)	Annealing Temperature (°C)
ITS	F R	CTT GAA CCG GGT AAA AGT CG ATG TGT CTG CAA TTC GCA CT	(Palma et al., 2019)	590	58
ITS1	F R	GGC AAA AGT CGT AAC AAG GT CTG CAA TTC GCA CTA TTT ATC G	(Ishiwata et al., 2004)	580	58
ITS2	F R	TAG CGG TGG ATC ACT CGG AAG GAT TCA GCG TTG GGC	(Sadaow et al., 2018)	550	58

Table : Primer details of COX1, COX2, NAD1

Targeted gene	Primer sequence		Reference	Product length (bp)	Annealing Temperature (°C)
COX1	F R	TTT TTT GGG CAT CCT GAG GTT TAT TAA AGA AAG AAC ATA ATG AAA ATG	(Luo et al., 2017)	450	52
COX2	F R	TTT GTT TGG TGT TTT ATC TTT TGT TTC AAT AAC CCC ATA CAT CAA CT		600	56
NAD1	F R	TTC TTA TGA GAT TGC TTT T TAT CAT AAC GAA AAC GAG G		370	48

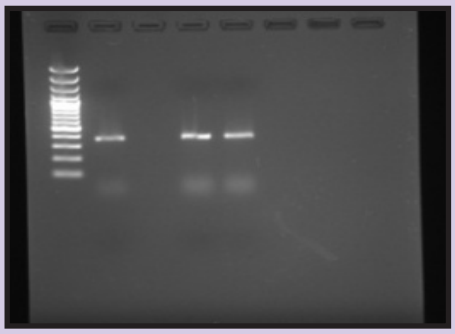


Fig : COX 1 (450 bp)

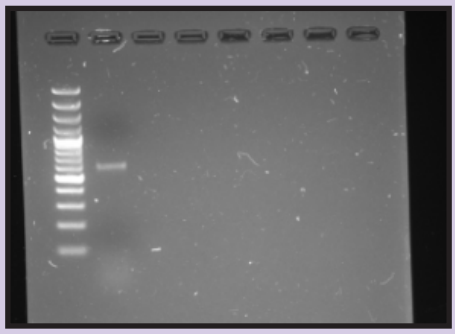


Fig : COX 2 (600 bp)

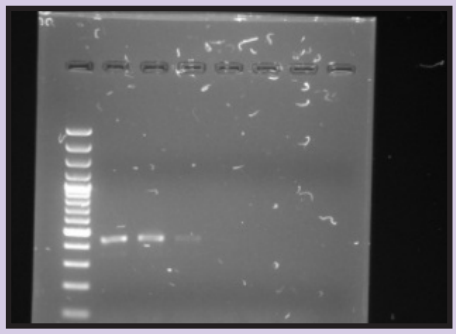


Fig : NAD 1 (370 bp)

Trichuris suis:

Trichuris suis (swine whipworm) is a nematode parasite of pigs found worldwide. The samples (worms) were collected from various slaughter points at different market places in Tirupati and Assam. All collected worms were washed carefully in normal saline solution, identified tentatively by studying its morphological characters and kept in 70 % ethanol for further study. The molecular characterization of worms was carried out using ITS2A and 18S. The total genomic DNA was extracted by using DNA isolation kit (QIAamp DNA mini kit Qiagen, USA) and kept in -20° C. The polymerase chain reaction was carried out to amply the genes sequence of ITS2A (355 bp) and 18S (727 bp). The working solution of primers were diluted at 10 pmol/µl using NFW and then kept in -20° C. All PCR reactions were performed in 10 µl mixture containing 5 µl 2x master mix, 0.5 µl of each primer, 2 µl template and 2 µl of NFW. The PCR cycling parameters of ITS are mentioned hereunder. The PCR products were separated in 2 % Agarose gel electrophoresis, stained with Syber safe dye and visualised under Gel-doc documentation system (BioRad, USA).

Table : Primer details of ITS2B, 18S

Targeted gene		Primer sequence	Reference	Product length (bp)	Annealing Temperature (°C)
ITS2A	F	GCTCGTAGGTCGTTGAAG	(Phosuk et al., 2018)	325	58
	R	GGGCAGCTTCCGTACT			
18S	F	GGCGATCAGATACCGCCCTAGTT	(Meekums et al., 2018)	727	58
	R	TACAAAGGGCAGGGACGTAGT			

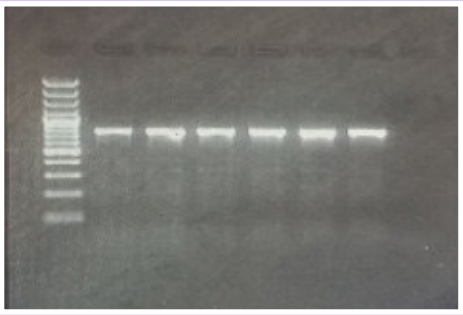


Fig: ITS2A (355 bp)

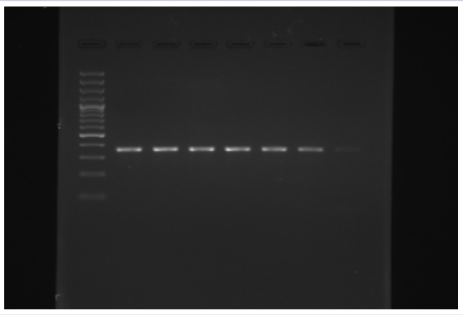


Fig: 18S(727 bp)

External Funded Project (DBT): Development of a virus like particle-based vaccine against Indian Isolate porcine circovirus

Rajib Deb, Swaraj Rajkhowa, Juwar Doley and Hemanta Maity (West Bengal University of Animal & Fishery Sciences, Kolkata)

PCV2d capsid protein of an Indian isolate was expressed in A038 insect cell line using the recombinant baculovirus system. The expressed protein self-assembled into empty virus-like particles (VLPs), confirmed through transmission electron microscopy, which revealed particles approximately 17–20 nm in diameter. Furthermore, stability assessments revealed that VLPs remained functional at temperatures up to 45°C for six hours and maintained efficacy at pH levels above 5.5. The PCV2d capsid protein demonstrated structural and functional integrity under thermal and acidic stress, showcasing its stability. Immunization of pigs with PCV2d VLPs elicited a significant immune response, with higher antibody titers observed in the group receiving the adjuvanted vaccine candidate (PCV2dVLPadj). Neutralizing antibodies were found to sustained effectively with a prime-boost immunization strategy. Additionally, cytokine profiling showed a marked increase in IL-2, IL-4, IL-6, IL-12, and IFN-gamma expression in the adjuvanted group, indicating robust immune activation. Challenge studies with the virulent Indian PCV2d isolate will be conducted to evaluate the efficacy of the vaccine candidates. In conclusion, the study successfully generated a structurally stable and immunogenic PCV2d capsid protein-based VLP vaccine candidate. This candidate may offer a cost-effective and efficient approach to combating PCV2d infections, addressing a critical need in the Indian piggery industry facing genotype-specific outbreaks. An Indian patent application was filed with application number 202411060519, dated 09.10.2024.

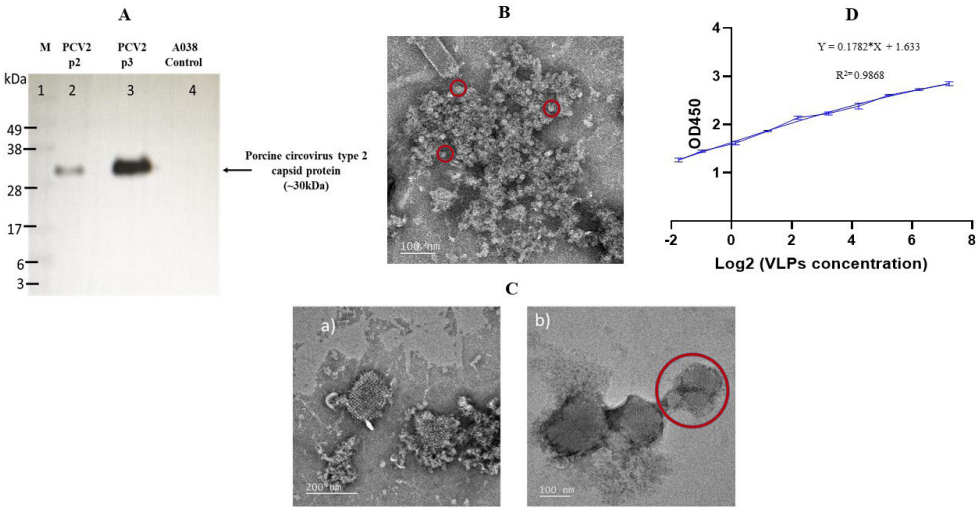


Fig: The expression of capsid structural protein in insect cell by recombinant baculovirus encoding of PCV2d sequence was analysed Western blot. Lane 1-Represents prestained marker (Invitrogen); Lane 2 & 3- Represents baculovirus (passage 2 and passage 3) infected insect cell. The blot showed serum reactivity against anti-PCV2 polyclonal antibody (Invitrogen) at the anticipated molecular weight (~30kDa) and Lane 4 represents negative control (A038cells only). B. TEM Analysis of empty capsid 30% sucrose gradient sample of PCV2d Indian isolate expressed in insect cell A038. The empty capsid sample of PCV2d Indian isolate expressed in insect cell, prepared from 30% peak sucrose gradient visualised under transmission electron microscopy by negative staining with 2% Tungstophosphoric acid. The TEM images of PCV2d Indian isolate showed typical capsids with average diameters between 17-20 nm. (Magnification 130000x). C. TEM Analysis of 30% sucrose gradient sample of PCV2d Indian isolate expressed in insect cell A038. The unusual honey comb structure were found following visualization 30% peak sucrose gradient visualised under transmission electron microscopy by negative staining with 2% Tungstophosphoric acid. The TEM images of showed unusual honey comb structure in figure a and b (Magnification 130000x). D. PCV2d VLPs were serially diluted to concentrations of 150, 75, 37.5, 18.75, 9.375, 4.688, 2.344, 1.171, 0.589, and 0.293 µg/ml and evaluated using an optimized ELISA method. The OD450 value and Log2 (concentration of serially diluted VLPs) were estimated using a linear equation. The data show the mean standard deviation of triple measurements.

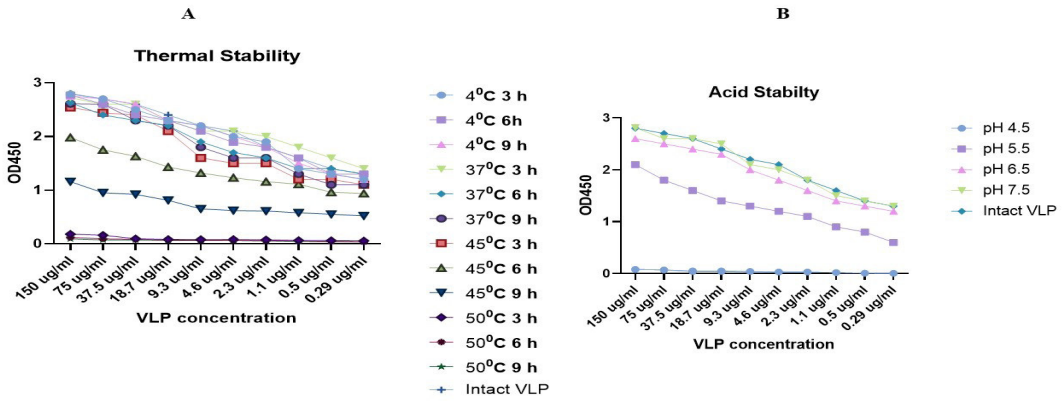


Fig: Qualitat ıtibodies. Serially diluted VLPs were forcefully degraded by heat denaturation and exposed in acidic environment at different pH levels. Intact VLPs were used as control. A: Assessment of thermal stability of the VLPs by forceful thermal denaturation at different temperature ranges. B: Assessment of acid stability, VLPs were exposed in acidic environment at different ranges of pH levels. OD450 values expressed as mean± standard deviation.

External Funded Project (National Livestock Mission): Development of multiserotypic virus-like particle based vaccine candidates against porcine circovirus disease of pig in India

Rajib Deb, Seema Rani Pegu, Swaraj Rajkhowa, Vivek Kumar Gupta, Hemanta Maity (West Bengal University of Animal & Fishery Sciences, Kolkata) and Sachin Kumar (IIT-Guwahati)

A recently reported PCV3 orf2 capsid sequence (ORF2) (Gen Bank: MK934765.1, PCV3/India/Chhattisgarh/SK1/2017) was synthesized with codon optimization for Spodoptera frugiperda cells (total length 776bp). A modified pTruEx-1.1plasmid vector, pOPINE vector (6.1kb) was used as baculovirus transfer vector. Both plasmid vector and PCV3 sequence was flanked by unique restriction sites for BstEII and NotI at the 5' and 3' termini respectively to suit the cloning. The synthesized orf2 sequence of PCV3 was amplified by PCR in with reaction conditions as 95°C for 2 min for initial denaturation, 30 cycles of denaturation at 95°C for 1 min, gradient annealing temperature of 60°C, 64°C and 68°C respectively for 30s, extension 72°C for 1 min and final extension at 72°C for 10 min and stored at 4°C. The amplified product was confirmed by gel electrophoresis using 1.0% agarose gel electrophoresis. The PCR was performed in 25µl reactions by mixing 12.5µl of master mix (HiFi DNA Assembly Master Mix, NEB) to provide a 1X final concentration consisting of 25U/ml Taq polymerase, 200µM of each deoxynucleotide (dATP, dGTP, dCTP, dTTP) and 2.0µM MgCl2 with genomic DNA 20ng, forward and reverse oligonucleotide primers, each at 0.5µM final concentration. The synthesized sequence subsequently inserted into pOPINE vector (6.1kb), by digestion of both pOPINE vector and PCV3 sequence with BstEII and NotI enzyme. The purified digested linearized vector and insert were mixed at a ratio of 1: 3 and 1µl of T4 DNA ligase (5 Weiss unit/µl), 1x final concertation T4 DNA ligase buffer (10X buffer composition 400 mM Tris-HCl, 100 mM MgCl2, 100 mM DTT, 5 mM ATP, pH 7.8 at 25°C) and the final volume adjusted by adding nuclease free water. The reaction conditions were 22°C for 30 min followed by thermal inactivation of the enzyme at 70°C for 5min. The resulting reactions transformed into TOP10 cloning competent cells with selection made for ampicillin resistance. After overnight growth single colonies were picked at random, grown in LB media with ampicillin and plasmid DNA isolated by a miniprep kit (Thermo Fisher). Plasmids containing the PCV3 sequence were confirmed by digestion with BstEII/ NotI. Sample is ready will be send for sequencing.

Institute Funded Project (INFAAR,ICAR): All India Network project on Antimicrobial Resistant (AINP-AMR)

Rajib Deb and Seema Rani Pegu

Antimicrobial resistance (AMR) is a pressing global health crisis, with extended-spectrum β-lactamase (ESBL)-producing bacteria posing significant challenges to effective antibiotic use in both human and animal populations. A culture-free herbal-aided assay developed for rapid detection of extended spectrum β-lactamase producing bacteria in piggery farms and slaughterhouses. The assay leverages the hydrolysis of β-lactam antibiotics by ESBL enzymes, leading to a detectable color change in a starch-iodine complex. A total of 309 samples from piggery farms and slaughterhouses in India were tested, with the assay demonstrating relative sensitivity and accuracy of 91.3% and 85.1%, respectively, compared to the culture-based double antibiotic disc diffusion method. The herbal-aided assay eliminates the need for bacterial culturing, significantly reducing detection time to within three hours. Its concordance with traditional methods reinforces its reliability, making it a valuable tool for AMR monitoring in animal agriculture. The study highlights the assay's potential for broader applications in healthcare, agriculture, and environmental surveillance, enabling timely interventions and improved antibiotic stewardship to combat the spread of AMR.

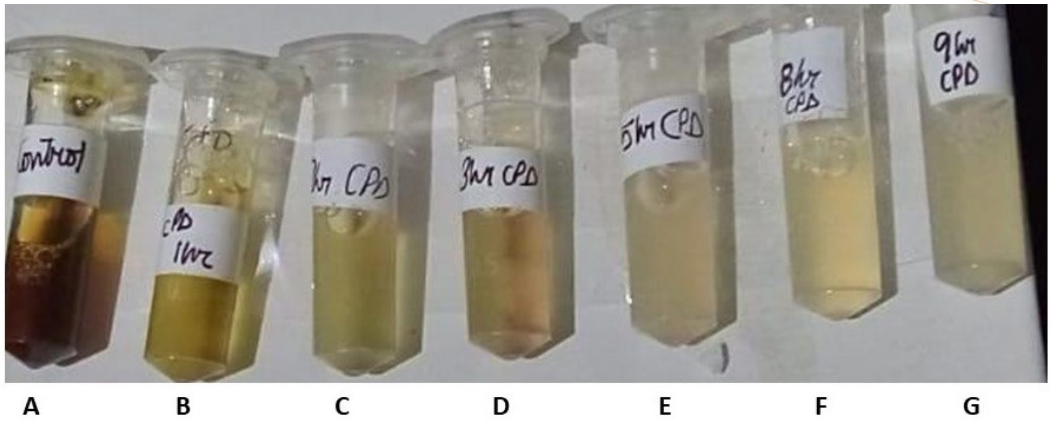
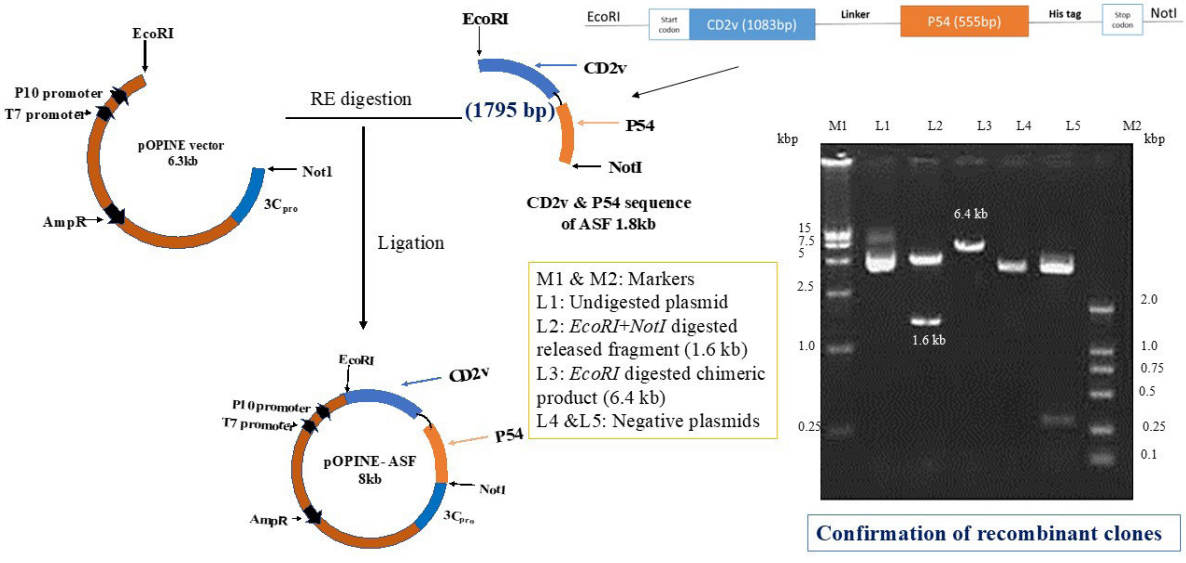


Fig: Incubation hour kinetics for antimicrobial resistant bacteria against beta lactam antibiotics (penicillin, cephalosporin and carbapenem groups of antibiotics) and changes in the dye color. A: Mock control (dye itself); B-G: Changes of color in 1 hr, 2 hr, 3 hr, 5 hr, 8 hr and 9 hr incubation of AMR positive bacterial culture with selective antibiotic pressure

Institute Project: Expression of chimeric proteins of African Swine Fever Virus (ASFV) in Baculovirus expression system

Rajib Deb, Seema Rani Pegu, Swaraj Khowa, Sachin Kumar (IIT-Guwahati, Guwahati), Hemanta Maity (West Bengal University of Animal & Fishery Sciences, Kolkata)

This study focused on the expression of a chimeric protein encoding by African Swine Fever Virus (ASFV) using a baculoviral expression vector system (BEVS) to explore their immunological potential and applications in vaccine development in future. Targeting key ASFV proteins, P54 and CD2v, a chimeric construct was development, codon-optimized, and expressed in insect cells. P54, a structural protein essential for viral assembly and antibody induction, and CD2v, involved in virulence, immune modulation, and strain tracking, were combined to form a ~75 kDa chimeric protein. Expression was confirmed via SDS-PAGE and Western blotting, revealing strong reactivity with anti-his polyclonal sera and sera from ASFV-infected pigs. The chimeric protein retained antigenic determinants, highlighting its potential for immunological assessment in porcine models and vaccine development.



Foreign deputation (21st June, 2024-12th December,2024): Research works carried out during ICMR-DHR International Fellowship Programme for Young Biomedical Scientists 2023-24 under the mentorship of Professor Elma Techillion, Head Mucosal Immunology Laboratory, The Pirbright Institute, Surrey, United Kingdom

Rajib Deb

A. Comparative assessment of 2-12c (human) and pb27 (porcine) monoclonal antibodies against influenza virus among minipigs vs outbred pigs

The study evaluated the pharmacokinetics of two anti-influenza monoclonal antibodies, 2-12C (human IgG1) and pb27 (porcine IgG1), in two pig breeds with differing genetic and physiological traits: minipigs and outbred pigs. Both breeds received 3.5 mg/kg of the respective antibodies via intravenously (IV). Specifically, one group of minipigs and outbred pigs was administered 2-12C, while another group was given pb27. Blood samples were collected at intervals of 2 minutes, 1 hour, and 2 hours post-administration, daily for the first three days, twice weekly for three weeks, and weekly for the subsequent five weeks. Serum antibody concentrations were quantified using ELISA. Despite normalizing the administered antibody doses by body weight, higher antibody concentrations were consistently observed in minipigs compared to outbred pigs for both monoclonal antibodies. These findings diverge from published results (DOI: 10.3389/fimmu.2024.1471412), likely due to prolonged sample storage conditions, experimenter unfamiliarity with the experimental design, technical errors, and mishandling of samples while conducting the assay.

Interestingly, two minipigs administered 2-12C displayed a robust anti-drug response (ADR), evidenced by a sharp decline in 2-12C serum concentrations. This reaction was not observed in other minipigs or outbred pigs. The unique immune traits of minipigs, including variations in immune cell populations and antigen recognition, may underlie this response. Published data reported comparable pharmacokinetics between the breeds, with similar half-lives for pb27 (15.7 days in outbred pigs and 16.6 days in minipigs). However, the half-life of 2-12C was notably shorter in the two ADR-experiencing minipigs, aligning with the presence of anti-drug antibodies, whereas outbred pigs showed no such response. The study concludes that both minipigs and outbred pigs are suitable models for pharmacokinetic studies and monoclonal antibody delivery platform evaluations. However, the immune response differences in minipigs warrant consideration in future studies.

B. Single-Cell transcriptomic profiling of Immune cell dynamics in porcine lung and bronchoalveolar lavage (BAL) cells during early and late porcine corona virus (PRCV) Infection

This study aimed to analyze immune responses in porcine lung tissue and bronchoalveolar lavage (BAL) cells after PRCV infection using single-cell RNA sequencing (scRNA-seq).

Control Group: In healthy lung tissue, a diverse array of structural and immune cells was observed. Epithelial markers (e.g., PDPN, AGER) identified alveolar type 1 cells, while SFTPC and SFTPA1 marked type 2 cells. Macrophages (CD163+ CD14+) and limited lymphocytes indicated baseline immune surveillance without infection.

Day-1 Post-Infection (PI): BAL cells from Day-1 PI exhibited a heightened early immune response characterized by increased macrophages, monocytes, and mitotic CD4+ and CD8+ T cells. Monocyte recruitment (e.g., CSF1R+ FCGR1A+) and NK cell activation (e.g., KLRK1+) were prominent, reflecting robust innate immune activation and early adaptive responses.

Day-20 Post-Infection: By Day 20 PI, the immune response transitioned to a predominantly adaptive phase. Plasma cells (PRDM1+ IRF4+) actively secreted antibodies, while activated B cells (CD19+ PAX5+) indicated memory response development. Regulatory T cells (FOXP3+) were present, suggesting immune regulation to prevent excessive inflammation.

Comparative Insights: Lung tissue primarily contained structural cells with minimal immune activation, whereas BAL samples reflected dynamic immune responses to infection. Early responses (Day 1) were dominated by macrophages and monocytes, while later responses (Day 20) emphasized humoral immunity through plasma and memory B cells.

Discussion: The early immune response demonstrated a swift activation of innate immunity, with macrophages and

NK cells playing key roles, mirroring findings in other respiratory viruses like SARS-CoV-2. Adaptive immunity became dominant by Day 20, with plasma cells and memory B cells providing long-term immunity. The presence of regulatory T cells across both time points underscores their role in mitigating immune overactivation. These findings highlight the value of the porcine model in studying respiratory infections, given its similarity to human immune responses. The scRNA-seq approach offered high-resolution insights into cellular dynamics, which can guide therapeutic and vaccine development for respiratory viral infections, including coronaviruses. Future studies should explore longer-term immune responses, co-infections, and the persistence of inflammation to inform both veterinary and human health strategies.

C. Antiviral effect of Interferon Lamda (IFNL) on porcine epithelial cells

The study aimed to investigate the antiviral potential of Interferon Lambda (IFNL) against swine influenza virus (sfluH7 eGFP) in porcine epithelial cells, specifically IPEC-J2 and BAL cells. The virus was propagated in MDCK H7 cells to generate stocks for these experiments. The primary goal was to assess whether IFNL could inhibit viral replication, exploring its utility for therapeutic and prophylactic applications.

Experimental details: Two experimental setups were performed on IPEC-J2 cells. In the post-priming experiment, cells were infected with the virus and then treated with IFNL (human IFNL1&3 and porcine IFNL3) at different concentrations (100 ng/ml, 50 ng/ml, 25 ng/ml, and lower concentrations). In the pre-priming experiment, cells were exposed to different concentrations of IFNL for various durations (0 h, 24 h, 48 h, and 72 h) before viral infection. These setups were designed to evaluate both the therapeutic (post-priming) and prophylactic (pre-priming) effects of IFNL. Real-time monitoring of viral replication was performed using the IncuCyte platform, which measured eGFP fluorescence as an indicator of viral growth. Parallel experiments in porcine BAL cells involved a 24-hour pre-priming with IFNL at different concentrations (up to 100 ng/ml) followed by viral infection, with replication monitored for 24 hours.

Interpretation: The results were visualized that showed the percentage inhibition of viral replication under different conditions:

1. **Dose-Dependent Inhibition:**
   - IPEC-J2 and BAL cells revealed that IFNL exhibited a dose-dependent antiviral effect. The highest concentration (100 ng/ml) showed the greatest inhibition of viral replication, followed by 50 ng/ml and 25 ng/ml. Lower concentrations exhibited progressively reduced efficacy.
   - In the pre-priming experiment, a scatter plot demonstrated that prolonged exposure to higher IFNL concentrations before infection resulted in marked suppression of viral replication.

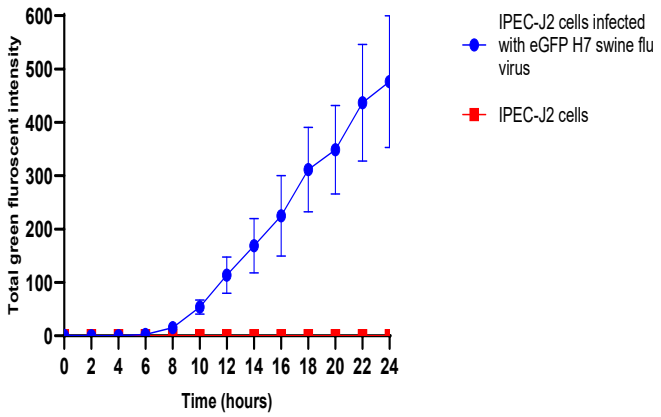


Fig: Propagation of eGFP H7 Swine flu virus in Porcine IPEC-J2 cells

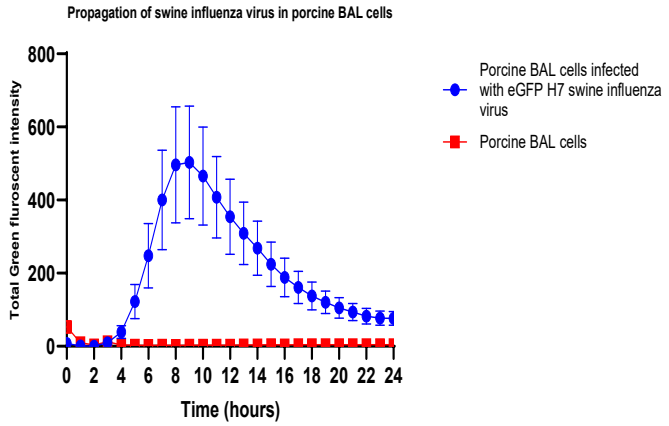


Fig: Propagation of eGFP H7 swine flu virus in porcine primary BAL Cells

The bell-shaped curve in BAL cells reflects an initial burst of viral replication followed by suppression due to cell death or immune response. In contrast, the linear increase in IPEC-J2 cells indicates continuous viral replication with minimal interference. These differences highlight how viral replication can vary dramatically depending on the host cell type.

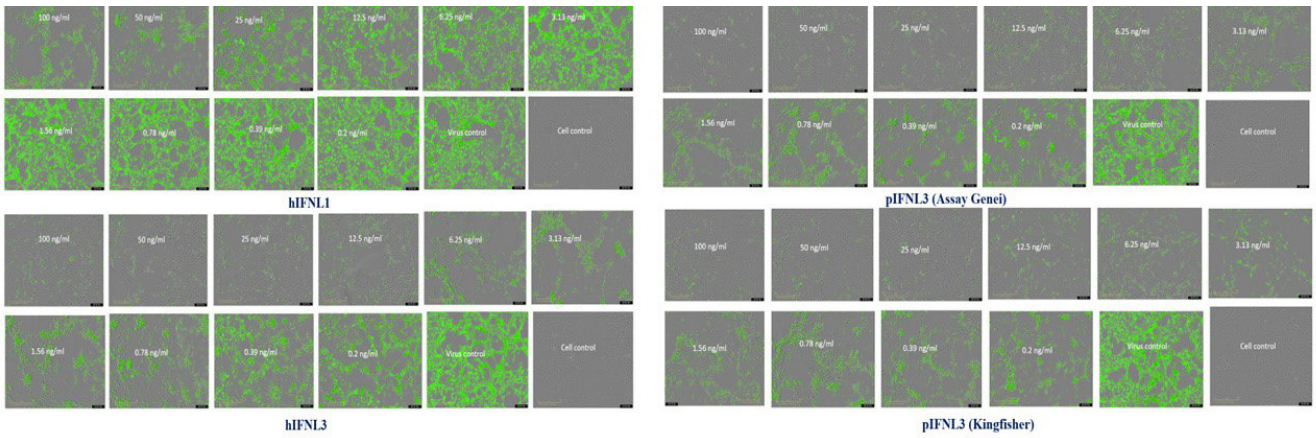


Fig: IncuCyte analysis for real time monitoring on the antiviral effect of IFNL in IPEC J2 cell line

2. **Time-Dependent inhibition:** It was observed that, the different time points of IFNL exposure (0 h, 24 h, 48 h, 72 h) indicated that longer priming times (e.g., 72 h) led to more significant viral inhibition. For post-priming, even IFNL treatment at 24 h post-infection was effective but less so compared to earlier intervention.
3. **Cell line comparison:** In porcine BAL cells, viral replication was seen to start earlier (4 h post-infection) compared to IPEC-J2 cells (6 h post-infection). Despite this, IFNL treatment effectively inhibited viral replication in both cell types. A bar graph comparing percentage inhibition at 100 ng/ml showed similar inhibition levels in BAL and IPEC-J2 cells, with minor differences reflecting cell-type-specific responses.
4. **Cytopathic effect reduction:** Images and data captured in IncuCyte showed reduced eGFP fluorescence intensity in IFNL-treated wells compared to untreated controls, indicating decreased viral replication. This effect was most pronounced at higher IFNL concentrations and longer priming durations.
5. **Porcine IPEC cells sense type-III IFN (IFNλ) and express ISGs:** IPEC cells were seeded in a 6-well plate and treated with human and porcine IFN-λ; untreated cells and H1N1 virus-infected cells served as controls. Western blot analysis of cell lysates using IFIT2 monoclonal antibody, with GAPDH as the loading control, showed no IFIT2 bands in untreated or virus-infected groups, while both human and porcine IFN-λ-treated groups exhibited clear IFIT2 expression.

Conclusion: The study concluded that IFNL has significant antiviral activity in both IPEC-J2 and BAL cells, with its efficacy dependent on dosage and timing of application. Early and sustained exposure to higher concentrations of IFNL yielded the best inhibition outcomes, supporting its potential use as both a therapeutic and prophylactic agent. These findings are crucial for informing future strategies to combat swine influenza and similar viral infections. Further research will aim to identify specific interferon-stimulated genes (ISGs) involved, evaluate combinations with other interferons, and validate results in in vivo swine models

Institute Project: Epidemiology and Molecular Epidemiology of African Swine Fever Virus (ASFV) in North Eastern region of India

Juwar Doley, Gaurav Sharma, Seema Rani Pegu, Pranab Jyoti Das, Swaraj Rajkhowa, NH Mohan, Souvik Paul, Salam Jayachitra Devi, Vivek Kumar Gupta

To assess the prevalence of African Swine Fever Virus (ASFV), 30 tissue samples suspected of ASF, including spleen, lymph nodes, lungs, liver, and small intestine, were collected/received from different districts of Mizoram, Punjab, and Assam. These samples were tested for the presence of the ASFV p72 gene using Polymerase Chain Reaction (PCR) assay. Out of the samples tested, seven were confirmed positive for ASFV.

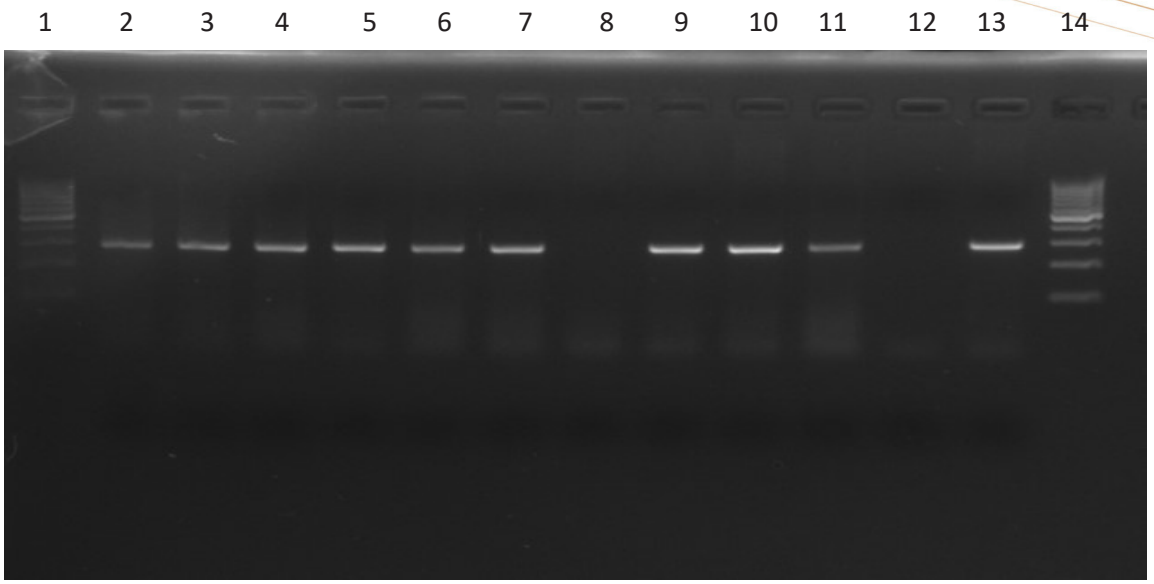


Fig: AGE image PCR amplified product. Lane 1: 100 bp Ladder (Thermo Fisher Scientific);Lane 2-Lane 11 (except Lane 8):10 µl of ASFV positive (p72 gene:299 bp); Lane 12: 10 µl of negative control; Lane 13: 10µl of ASFV positive control; Lane 14: 100 bp Ladder (Thermo Fischer Scientific). The positive samples have been PCR-purified and are being sent for whole genome sequencing of the viral isolates, as per the experimental requirements.

Institute Project: Isolation and characterization of porcine Muscle Stem Cells for development of 3D culture

Juwar Doley, N.H. Mohan, Jaya, Rajendran Thomas, Souvik Paul, Vishal Rai

Samples were obtained from various porcine sources, including muscle tissue, using appropriate collection techniques. The isolated cells were subsequently cultured with suitable cell culture methods. The isolated cells have been cultured using DMEM high glucose with 16% FBS and antibiotic antimycotic (HiMedia, India). An initial characterization of passaged cells was conducted to identify muscle stem cell-specific markers. Total RNA was extracted from the passaged cells using Qiazol (Qiagen, Germany). The quality and quantity of the RNA were first assessed with a small-volume spectrophotometer (Nanodrop, Thermo Fisher Scientific). 2 µg of RNA was then used for cDNA synthesis for a 20 µL reaction. (High Capacity cDNA Reverse Transcription Kit, Applied Biosystems). Real-time PCR amplification was performed for 1 µL of cDNA with a final concentration of 0.7 µM specific primers using a commercial real-time SYBR Green PCR master mix (Qiagen, Germany) in a real-time PCR machine (StepOne Plus, Applied Biosystems, USA). Beta-actin (Integrated DNA Technologies) was used as the endogenous control gene, based on previous studies. The relative expression levels of the target mRNAs were calculated using the $2^{-\Delta\Delta Ct}$ method. Quantitative real-time polymerase chain reaction (qRT-PCR) analysis showed an upregulation of Pax7 transcripts in the passaged cells.

Institute Project: Identification, Isolation and molecular characterization of pork borne zoonotic parasites

Souvik Paul, J. Doley, Jaya, R. Thomas, Vishal Rai

Zoonoses represent 58% of human diseases and 60% of emerging diseases. They represent a serious public health threat and they exert an enormous socio-economic impact. They affect millions of people every year by preventing efficient production of food of animal origin and interrupting trade in animals or animal products. Foodborne zoonoses are defined as diseases naturally transmitted between animals and humans through food. The major meat borne parasites include the protozoa Toxoplasma gondii and Sarcocystis spp., and the helminths Trichinella spp. and Taenia spp. Interestingly, although consumption of other meat types may be a transmission route for some of these parasites, only pork can be a source of all four.

Under this project urban slaughterhouses and peri-urban slaughter points were visited for collection of samples. The carcasses were observed for presence of any cysts mainly in the areas of masseter, intercostal, shoulder muscles, tongue, heart, diaphragm and samples were collected. Because, the cysts are generally found in masseter, heart, tongue, shoulder muscles (*Cysticercus cellulosae*), diaphragm, tongue, larynx, masticatory muscles, intercostal muscles, eye (*Trichinella spiralis*), Brain, heart skeletal muscles (*Toxoplasma gondii*).

The samples were brought in the laboratory and processed as per standard procedure for meatborne parasites. Briefly, at first the muscles were sliced thinly and observed for any cysts, then they were chopped into tiny pieces and pressed between two slides and observed microscopically. Furthermore, the tiny pieces were digested in pepsin-HCl solution for 4 hrs and then the sediment were observed microscopically. Special attention was given to muscle pieces with reddish, red, brownish spots because the cyst when lodge into muscle create a zone of degenerative lysis around them so that the cysts can grow.

Details of samples collected (122)

Area	Samples	Sample types
Beltola	39	Masseter (9), heart (11), tongue (11), shoulder muscles (4), intercostal muscles (4)
Jalukbari/Maligaon	16	Masseter (3), heart (3), tongue (5), shoulder muscles (3), intercostal muscles (2)
Patgaon	4	heart (3), tongue (1)
Sajjanpara	7	heart (3), tongue (4)
Chandubi	3	heart (2), tongue (1)
Moniari	11	Masseter (2), heart (2), tongue (2), shoulder muscles (2), intercostal muscles (3)
Mirza	15	Masseter (2), heart (3), tongue (5), shoulder muscles (3), intercostal muscles (2)
Bijoynagar	27	Diaphragm (11), Masseter (3), heart (5), tongue (4), shoulder muscles (2), intercostal muscles (2)
Total	122	Diaphragm (11), Masseter (19), heart (32), tongue (31), shoulder muscles (14), intercostal muscles (13)

None of the 122 samples showed any presence of cyst(s), of any types. Special attention was given to muscle pieces with reddish, red, brownish spots because the cyst when lodge into muscle create a zone of degenerative lysis around them so that the cysts can grow.

The apparent absence of any cysts of *Cysticercus cellulosae* or *Trichinella spiralis* may be explained with few important facts, which could be better pictured if divided among definitive host factor (human) and intermediate host (pig) factor. Among the definitive host factor firstly, there is an increased awareness among general population over eating raw, dried, smoked or undercooked pork or consumption of game meat, secondly personal hygiene standards have improved over the years and lack of open defaecation is one of the most important factor involved. Among the intermediate host factor, now free range pig rearing is replced either by backyard or commercial farming. Generally, the free ranging pigs have access to garbage dumping areas contaminated with human sewer from where the pick up infection. Now a days even in backyard farming the animals are given swill consisting of kitchen waste and market wastes (fish, chicken) and in farms they are fed commercial feed, due to this the pig have no access to infective stages at firsthand. Additionally, after ASF outbreaks now even in backyard farm the hygiene have improved to a great extent.

Trichinellosis is basically an infection of animals in the wild and that the involvement of man may be considered accidental. The epidemiology of trichinellosis depends on two factors. First, wild animals may become infected from a wide variety of sources, predation and cannibalism being perhaps the most common. Others include feeding on carrion, since the encapsulated larvae are capable of surviving for several months in decomposing flesh, and the ingestion of fresh faeces from animals with a patent infection The second factor is the wide host range of the parasite, infecting

various carnivores and omnivorous mammals. In temperate areas rodents, brown bear, badger and wild pig are most commonly involved. In the sylvatic or feral cycles, man and his animals are only occasionally involved. The domestic or synanthropic cycle in man and the pig is an 'artificial' zoonosis largely created by feeding pigs on food waste containing the flesh of infected pigs; more recently, tail biting in pigs has been shown to be a mode of transmission. Rats in piggeries also maintain a secondary cycle, which may on occasions pass to pigs or vice versa from the ingestion of infected flesh or faeces. Infection in man is acquired from the ingestion of raw or inadequately cooked pork or its by-products, such as sausages, ham and salami. It is also important to realise that smoking, drying or curing pork does not necessarily kill larvae in pork products.

Institute Project: Development of recombinant VP2 protein based indirect ELISA for serodiagnosis of Porcine parvovirus

Vishal Rai, Juwar Doley and Seema Rani Pegu

Pig farming is a vital source of livelihood for socio-economically disadvantaged communities, providing both nutritional sustenance and financial stability. However, the success of pig farming is often hindered by the emergence of diseases, a challenge that has become more pronounced over the past two decades. Among these, Porcine Parvovirus (PPV) poses a significant economic threat due to its impact on reproductive health, leading to stillbirths, mummification, embryonic death, infertility, neonatal mortality, and abortions. Currently, there are no established diagnostic tests or vaccines available in the country for effective PPV control. Limited seroprevalence studies on PPV infection have been conducted in a few regions using commercially available ELISA kits, which are highly expensive and impractical for routine serosurveillance in most diagnostic laboratories. Therefore, there is an urgent need to develop an affordable, indigenous serodiagnostic test to facilitate widespread PPV antibody detection across different regions of the country. Therefore, the present study was conducted with this objective in mind.

Initially, various suspected samples collected or received at the Animal Health Laboratory of ICAR-NRCP were screened for Porcine Parvovirus (PPV) detection after genomic DNA extraction using PCR with in-house developed diagnostic primers. The samples that tested positive in PCR were further selected for amplification of the VP2 gene of PPV using expression primers. Following bioinformatic analysis, expression primers for Porcine Parvovirus (PPV) were designed to amplify the target gene for recombinant protein expression. Conserved regions of the PPV genome were identified by aligning available sequences from databases. Primers were then designed with appropriate restriction sites for cloning into an expression vector. The designed primers were validated in silico for specificity, GC content, melting temperature (Tm), and secondary structures to ensure efficient amplification. One of the PCR-confirmed positive PPV DNA samples was used as a template for amplifying the PPV VP2 gene using the newly designed expression primers. To optimize the annealing temperature, a gradient PCR was performed, resulting in the amplification of the VP2 gene at the expected size of ~1020 bp. However, the presence of non-specific bands was observed, and efforts are currently underway to further optimize PCR conditions for improved specificity and efficiency.

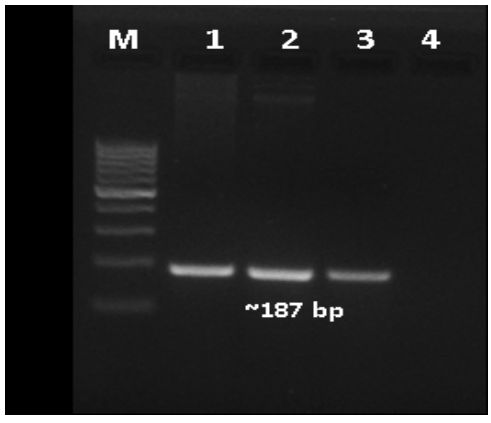


Fig: PCR confirmation of PPV using diagnostic primers (M: 100 bp DNA ladder, 1: Positive control, 2 and 3: test samples, 4: NTC)

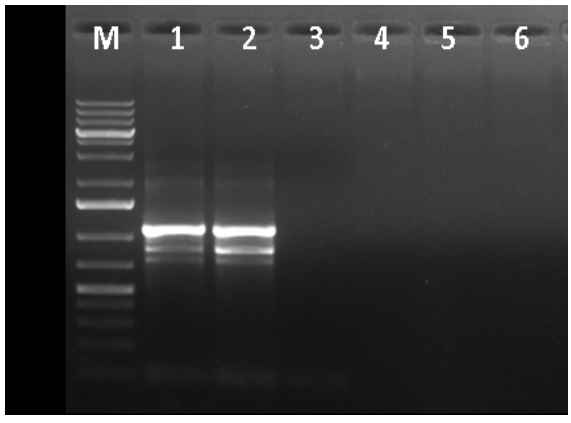


Fig: Gradient PCR to amplify the VP2 gene of PPV using newly designed expression primers (M: 1 kb plus DNA ladder, 1:5 Different annealing temperatures, 6: NTC)

ANIMAL NUTRITION

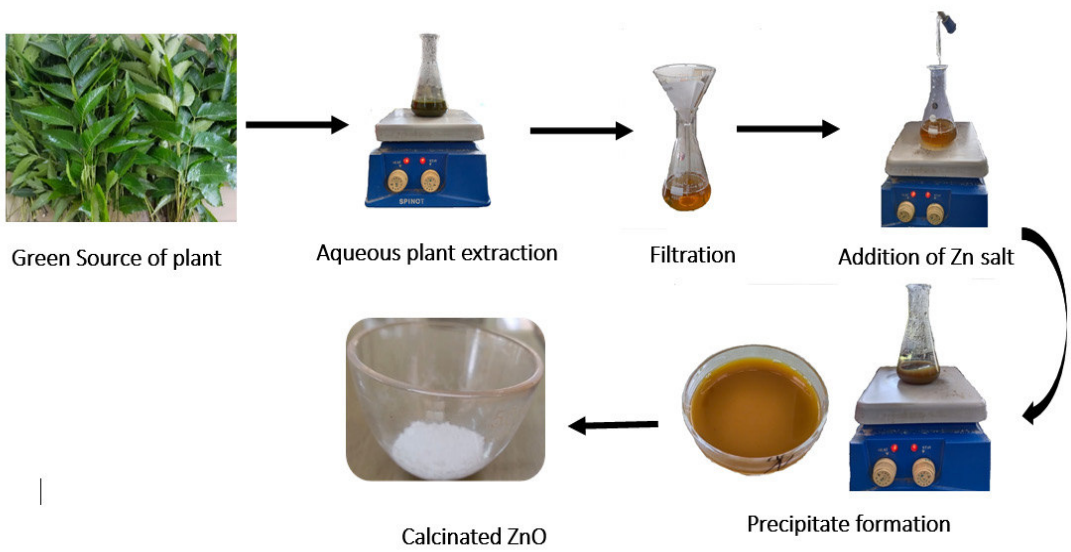
Institute Project: Development, characterization, and validation of nano zinc supplement for improving piglet productivity

Lokesha E, Meera. K, S.R. Pegu, R. Thomas, and Mohan. N.H

Zinc (Zn) is one of the most important trace elements in pig nutrition, second only to iron. Most Indian soils are deficient in Zn; therefore, dietary care must be exercised to avoid Zn deficiency conditions such as parakeratosis in pigs. The Zn requirements in pigs range from 80–100 mg/kg dry matter (NRC, 2012). Pigs have a high tolerance limit for Zn, and dietary concentrations in the range of 2000–4000 mg/kg DM are reported to be safe. Utilizing this unique dietary tolerance for high Zn, experiments have demonstrated improved growth and intestinal health in pigs, making Zn a useful growth promoter in piglets. Reduced incidence of diarrhea and improved intestinal integrity have led to the use of Zn as an alternative to antibiotics. Traditionally, Zn in animal diets is supplemented in the form of inorganic salts such as zinc oxide and zinc sulfate. However, the low digestibility of these inorganic salts results in higher Zn excretion in feces, leading to environmental pollution, such as eutrophication. To enhance absorption and reduce dietary Zn loss, nanotechnology has been adopted. Mineral salts prepared through nanotechnology have a particle size of less than 100 nm. The decreased particle size, increased surface area, and greater chemical stability improve the bioavailability of minerals in animals. Improved health, better nutrient absorption, and enhanced growth rates under high dietary Zn in piglets facilitate early weaning. This project aims to synthesize nano-Zn at the laboratory level as an alternative to pharmacological doses of Zn to manage early weaning-associated diarrhea and improve intestinal integrity in piglets.

Green synthesis of Zn-nano particles

Fresh leaves of plants (neem and curry) were collected and thoroughly washed 3–4 times with running tap water, followed by two washes with double-distilled water. The cleaned leaves were dried at room temperature, and once completely dried, they were ground into a fine powder. The powdered leaves were then stored at 2–4 °C for further use. The preparation of the aqueous plant extract was standardized. Twenty grams of the dried leaf powder was added to 100 ml of double-distilled water and heated at 70 °C for 1 hour with continuous stirring on a magnetic stirrer. The extract obtained was filtered through Whatman No. 1 filter paper and stored at refrigerated temperature. The synthesis of Zn nanoparticles involved the use of 20 ml of the plant extract from the stock solution, which was taken in a 250 ml conical flask and heated with continuous stirring on a magnetic stirrer at 70 °C. A 1M solution of zinc acetate or zinc nitrate was then added drop by drop from the buret to the extract. The resulting precipitate was centrifuged and separated. The collected precipitate was dried and subsequently calcined in a muffle furnace. The final calcined powder was stored in an airtight container for further size confirmation, which is currently underway in the project.



LIVESTOCK PRODUCTS TECHNOLOGY

Institute Project: Development of a Point-of-Care colorimetric method for detection of meat freshness

R. Thomas, J. Doley and V.K. Gupta

Meat freshness can be evaluated using a microbial count; however, this method often requires a longer time to analyze the findings, as a bacterial count usually takes time for the incubation period. The freshness of meat deteriorates due to the degradation of meat commonly caused by microbial, chemical, and pharmaceutical residue contamination. Postmortem reactions, such as glycolysis, proteolysis, and lipolysis, also affect meat quality, usually occurring right after an animal is slaughtered. Although conventional methods are available for analysing meat quality, such as detection of microbial pathogens, antibiotic residues, adulterants and contaminants, hormones, pesticides, etc., these methods are cost- and time-consuming, and require sophisticated instruments and trained personal to yield results. In this context point of care detection methods can play a vital role in detecting meat spoilage due to its specificity, high selectivity and portability. The main advantage of using such devices in the food system is that they are cost effective, easy to operate and gives quick results as compared to conventional methods.

In the current research, development of a Point-of-Care colorimetric method for detection of meat freshness was targeted. Experiments were performed to develop stable colour both in solution as well as in paper medium using ABTS and TMB dyes targeting ATP breakdown products. During this process, five different muscles viz. *Longissimus dorsi*, *Psoas major, Biceps femoris, Trapezius and Triceps brachii* from electrically stunned as well as percussion stunned pigs were evaluated for understanding the postmortem changes pertinent to different physico-chemical parameters pH, sarcomere length, drip loss, colour, ATP concentration etc. The results obtained are presented here under.

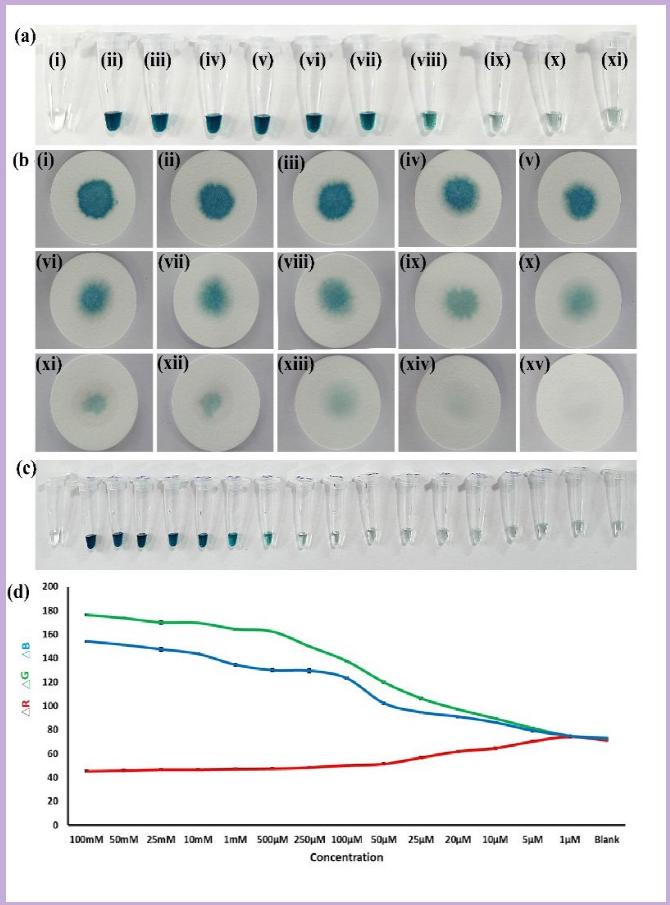


Fig: (a) ABTS dye and HRP enzyme reaction with different concentration of H_2O_2 in liquid medium. (i) Blank (ii) 1Mm (iii) 500μM (iv) 250μM (v) 100μM (vi) 50μM (vii) 25μM (viii)20μM (ix-)10μM(x) 5μM (xi) 1μM

(b) ABTS dye and HRP enzyme reaction with different concentration of H_2O_2 in paper medium. (i) 1mM (ii) 500μM (iii) 250μM (iv) 100μM (v) 90μM (vi) 80μM (vii) 75μM (viii) 50μM (ix) 40μM (x) 30μM (xi) 25μM (xii) 20μM (xiii) 10μM (xiv) 5μM (xv) 1μM

(c) ABTS and HRP enzyme reaction with large range of concentration of H_2O_2 in liquid medium (1mM to 1nM)

(d) delta RGB vs H_2O_2 curve showing the highest green colour intensity and lowest red colour intensity with ABTS at high concentration of H_2O_2.

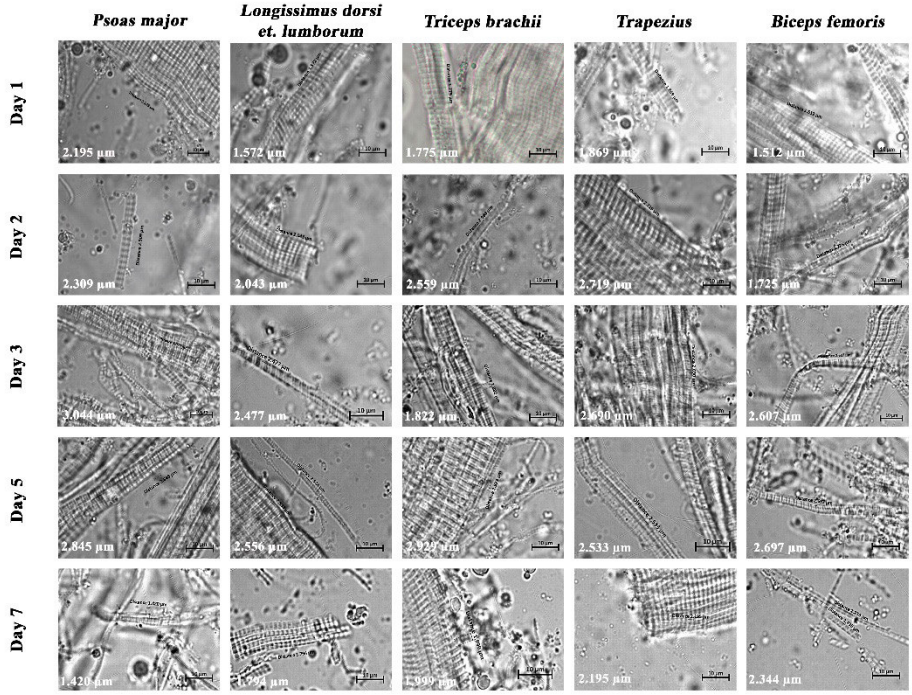


Fig: Changes in sarcomere length of five muscles of mechanically stunned pig during storage at 4°C

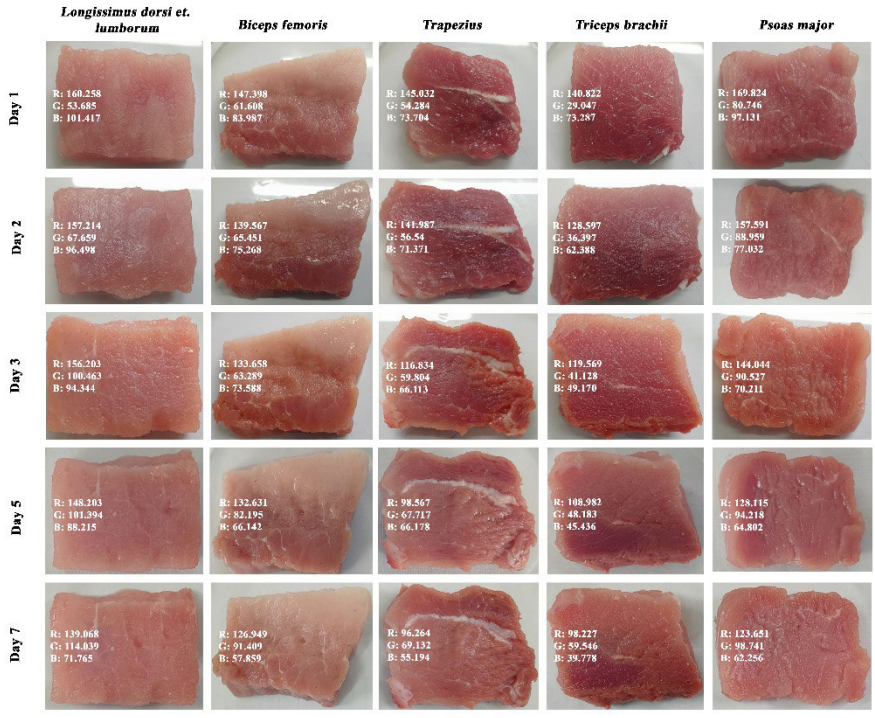


Fig: Changes in colour of five muscles of mechanically stunned pig during storage at 4°C

Significant differences were observed w.r.t. the decline in pH in different muscle types which are generally depend on muscle fiber type, activities of the muscle and other factors. It was observed that glycogen depletion is faster in fast twitch muscles resulting in comparatively for lactic acid which in turn decreases the pH more rapidly. Significant correlation was observed between the Lightness (L*), redness (a*) and yellowness (b*) values acquired from the Color spectrophotometer and the values recorded from analysis of photographs with ImageJ software. The yellowing of meat with passing time was a result of fat oxidation and breakdown of cellular components. Therefore, fat rich muscles tend to increase b* values more rapidly. *Bicceps femoris* had the highest fat content among the five muscles under study, but the expected trend for b* was not observed.

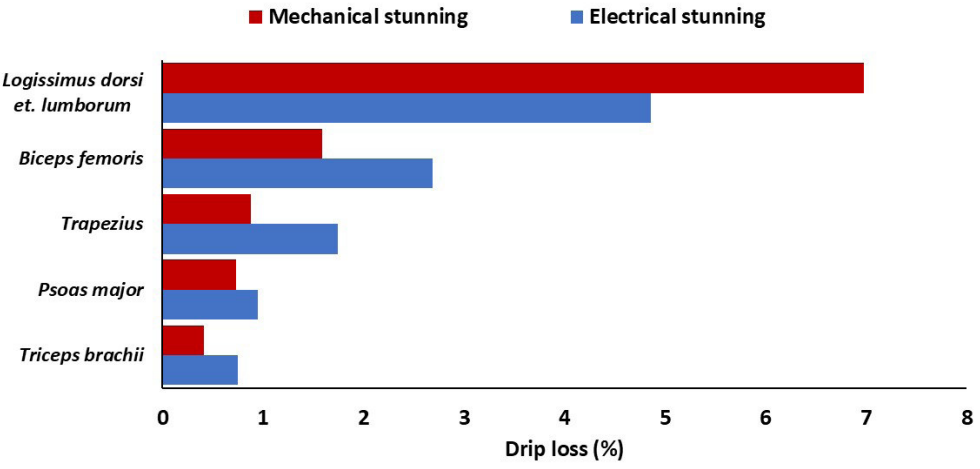


Fig: Percentage drip loss from five pig muscles

In addition, the processed pork products subjected to different processing conditions and temperatures were studied. The processing conditions evaluated include moist heat, dry heat and steam. Further, the effects of hot meat, chilled meat and frozen thawed pork on processing of pork products have evaluated. Microstructure of the above-mentioned pork products were assessed using scanning electron microscopy.

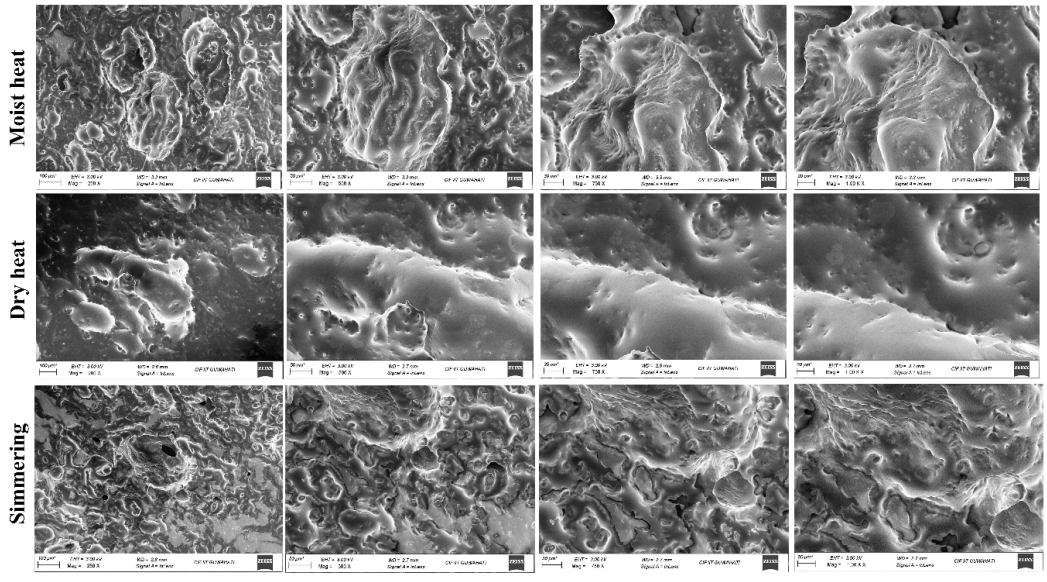


Fig: SEM images of pork products subjected to different heat treatments

External Funded Project (DST): Establishment of STI Hub for Mising and Bodo women of Assam for economic empowerment through technology interventions in the pig value chain

R. Thomas, J. Doley and V.K. Gupta

Institute has organized six numbers of Master Training Programmes for the selected beneficiaries from the STI Extension Hub at Dhemaji and Lakhimpur Districts, during the period. The primary aim of these training programmes was to create master trainers to make skilled enough to train other members in their group. Institute, in collaboration with SAAR Pig Producer Company, has organized multiple field level programs among the STI Hub beneficiaries in Dhemaji and Lakhimpur districts. These programs were organized in different villages where participants from various pig producer groups of took part. The motive of these programs was to have interaction with the beneficiaries of different villages and to distribute the essential inputs for maintaining biosecurity in their pig farms, to the beneficiaries. During the program each member was handed over few essential items for their pig farms such as sprayer machines, shovel, apron, potassium permanganate, bleaching powder, medicine kit bag, pipe, etc. It is through these visits and interactions the actual scenario of the pig rearing systems has been documented. Efforts were taken to enhance biosecurity in the pig farms is one of the important requirements towards avoiding the recurrence of the ASF. Proper awareness has been imparted to the beneficiary groups and people have come forward to adopt the better practices and disease preventive measures. Further, as a precautionary measure, sanitization of pig houses was carried on with disinfectants in villages. Week long programmes were organized to celebrate the Janajatiya Gaurav Diwas/ National Tribal Week at the STI extension hub at Dhemaji and Lakhimpur. The beneficiaries were encouraged to make the best use of the local resources to prepare the silage feed. Some of the locally available resources found used for the making of the feed are- Colocasia leaves, tapioca leaves, banana stem, water hyacinth, rice bran, vegetables like pumpkin, cabbage, etc.

Brief summary of the project

1. Organized Master Training Programmes: Institute has organized six numbers of Master Training Programmes for the selected beneficiaries from the STI Extension Hub at Dhemaji and Lakhimpur Districts, during the period. The primary aim of these training programmes was to create master trainers to make skilled enough to train other members in their group. Six Master Training programmes has been completed with each batch comprising of 25 members. All the participants comprised of women pig rearers of the tribal population from the districts of Lakhimpur and Dhemaji. The training programmes are structured to impart the trainees with knowledge on scientific and hygienic pig rearing practices.

2. Field level training programmes for awareness creation and organizing of Beneficiaries: Field level training programmes, in collaboration with the Master Trainers and the local partner i.e. SAAR PPC, for the beneficiaries were carried out. These programmes were aimed at awareness creation among the beneficiaries related to scientific pig husbandry practices. This interaction session took place mainly in the villages scattered in both the districts of Lakhimpur and Dhemaji. In these sessions the women discuss about their rearing practices which include everything from their housing systems, feeding to taking care of their pigs. It is through these visits and interactions the actual scenario of the pig rearing systems has been documented.

3. Care and management of breeding stock of pigs and sanitization of pig sties for biosecurity: As the project site is one of the worst affected areas of African Swine Fever outbreak in the country during the past three years, utmost importance has been given to enhance the availability of breedable piglets in these districts. Enhancing biosecurity in the pig farms is one of the important requirements towards avoiding the recurrence of the ASF. To meet these needs, medical care has been provided to them by the veterinarian as per requirement and emergency. During the visits the beneficiaries were provided with deworming and liver tablets apart from other treatments such as treatment of hernia, fever, castration of piglets, etc. In addition, proper awareness has been imparted to the beneficiary groups and people have come forward to adopt the better practices and disease preventive measures. Further, as a precautionary measure, sanitization of pig houses was carried on with disinfectants in villages.

4. Imparting hands-on knowledge on Silage-making for formulating economic yet balanced pig rations: Silage is a fermented feed which is prepared using crops, green leaves, vegetables, etc. It is prepared by first allowing the crops or leaves to wilt for few hours to reduce the moisture content to around 60-70%. Hands-on programmes were organized to educate the beneficiaries on silage making methods and with the understanding of importance of silage feeding,

have now started to make silage feed for feeding their pigs. They were encouraged to make the best use of the local resources to prepare the silage feed. Some of the locally available resources found used for the making of the feed are- Colocasia leaves, tapioca leaves, banana stem, water hyacinth, rice bran, vegetables like pumpkin, cabbage, etc.

5. Organizing field level programmes and distribution of essential implements for maintaining biosecurity in the farms: Institute, in collaboration with SAAR Pig Producer Company, has organized multiple field level programs among the STI Hub beneficiaries in Dhemaji and Lakhimpur districts. These programs were organized in different villages where participants from various pig producer groups of took part. The motive of these programs was to have interaction with the beneficiaries of different villages and to distribute the essential inputs for maintaining biosecurity in their pig farms, to the beneficiaries. During the program each member was handed over few essential items for their pig farms such as sprayer machines, shovel, apron, potassium permanganate, bleaching powder, medicine kit bag, pipe, etc. These items were distributed with the aim of inculcating the idea and importance of bio-security in pig farming amongst the village people who have been practicing pig farming since time immemorial in their most primitive style.

6. Development of IndPOtrace platform for ensuring traceability: *indPOtrace* stands for 'Indian Pork Traceability' (www.indpotrace.in). This software has distinct components for 'traceability', 'real time meat inspection' as well as 'Pig help line' to cater the specific needs of stakeholders. It provides specific interaction platforms for pig produces, pork processors, traders, feed suppliers, transporters etc. This Software has been developed to act as the basic platform to document the data pertinent to pig production and management conditions, including GPS identification of premises as well as health management. IoT based remote meat inspection system will be developed and will be placed into operation in the existing pig abattoirs under the control of FPC, with the central database management at ICAR-NRCP. The system supports on-time virtual inspection of slaughter pigs (ante-mortem) and pig carcasses (post mortem) for their suitability for slaughter and subsequent release for human consumption, respectively by a Veterinarian remotely. The first of the kind, a dedicated "Pig Help Line" system has been established at ICAR-NRCP to attend the issues of pig farmers, not only belong to the target group, but also from across the country. The unit acts as a one stop solution to all pig related queries of the farmers/entrepreneurs. It is managed by Veterinarians under the guidance of institute scientists.

http://indpotrace.in

7. Development of MeatSpecs 1.0: MeatSpecs 1.0 is a tool designed to undertake real time virtual antemortom inspection of pigs as well as postmortom inspection of pig carcasses. The purpose of the tool is to ensure safe and wholesome meat to the consumers. Access to this tool is restricted to the registered users.

8. Development of OptiPigRation 1.0: Opti-PigRation 1.0 is a tool designed to optimise the energy-protein ratio in the feeds offered by the farmers to their pigs, especially while using the un-conventional pig feeds. Based on the calculations, the tool provides suggessions for the farmers to optimise the feed offered to the pigs with respect to energy & protein as per BIS recommendations.

Note : Both Meatspecs 1.0 and opti-pigration 1.0 can be accessed from http://indpotrace.in

EXTENSION EDUCATION:

Institute Project: Development of technology transfer models through Participatory Rural Appraisal in the piggery sector

Priyajoy Kar, N.H. Mohan, P.J. Das, K. Dey, N.M. Attupuram, S. Jayachitra Devi

This project aims to identify the key factors that facilitate the adoption of new livestock technologies, as well as the primary challenges hindering their diffusion. The focus will be on addressing the gaps commonly observed in the livestock technology adoption process. Beyond economic implications, the project will also assess the broader impact of these technologies. Through stakeholder assessments, the most significant technologies in various states have been identified.

Correlates of adoption behaviour:

Assuming that adoption is influenced by various socio-personal and economic characteristics of the farmers, correlation coefficient was computed to know the relationship between 15 selected variables of pig farmers with adoption behaviour.

Sl. No.	Independent Variables	Coefficient of correlation(r)
1.	Age(X1)	-0.804**
2.	Education Level(X_2)	0.841**
3.	Family size(X_3)	0.106
4.	Occupation(X_4)	0.164
5.	Operational land holding(X_5)	0.472**
6.	Farm Size (Herd Size) (X_6)	0.694**
7.	Income from Piggery(X_7)	0.783**
8.	Social Participation(X_8)	0.686**
9.	Extension contact(X_9)	0.831**
10.	Farming experience(X_{10})	0.370**
11.	Farm education exposure(X_{11})	0.892**
12.	Scientific Orientation ($_{12}$)	0.659**
13.	Knowledge(X_{13})	0.908**
14.	Training received(X_{14})	0.412**
15.	Financial Help received(X_{15})	0.237*

*** Correlation is significant at the 0.01 level* **Correlation is significant at the 0.05 level*

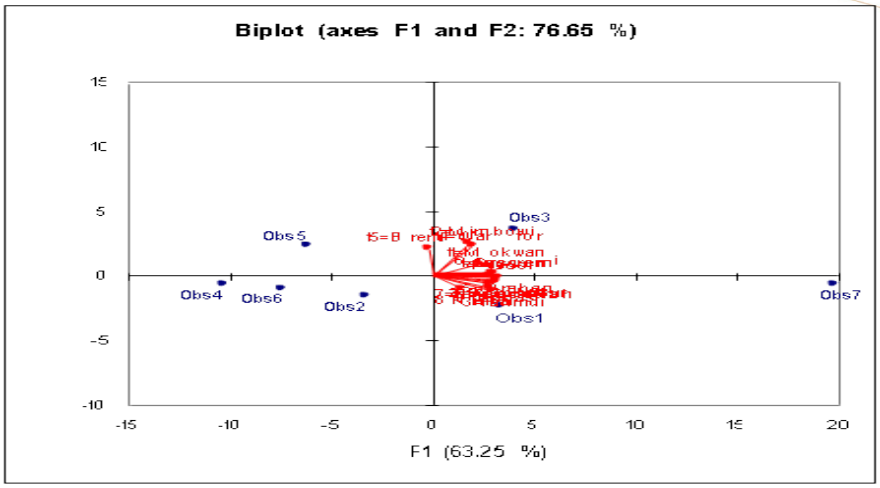
A perusal of Table shows that out of 15 variables taken for analysis of regression, 2 variables i.e. Knowledge and Scientific Orientation were found to have significant contribution at one percent level, 3 variables i.e. Extension contact, Income from piggery, and Farm Education Exposure had significant contribution at five percent level of significance. The coefficient of determination (R^2 value) was 0.92, which indicates that 92.00% variation in the adoption gain in improved technologies in pig farming was explained by these 15 independent variables selected for the study. It was observed that age had a negative and significant relationship with adoption level. It might be because the aged persons were less change prone and reluctant to adopt new technologies in their farms. Knowledge and Scientific Orientation were found to have significant contribution at one percent level, 3 variables i.e. Extension contact, Income from piggery, and Farm Education Exposure had significant contribution at five percent level of significance.

Independent Variable	Unstandardized Coefficients B	Standard Error	Standardized Coefficients Beta	T Value	Sig.
(Constant)	13.772	7.415		1.857	.067
Age (X_1)	-.209	.106	-.115	-1.966	.053
Education Level(X_2)	1.315	1.076	.077	1.222	.225
Family size(X_3)	-.240	.265	-.029	-.909	.366
Occupation(X_4)	-.591	1.015	-.020	-.582	.562
Operational Land holding(X_5)	-.217	.687	-.012	-.316	.753
Farm Size (Herd Size)(X_6)	-7.161E-02	.166	-.022	-.431	.668
Income from Piggery(X_7)	1.333E-04	.000	.145	2.533	.013*
Social Participation(X_8)	2.410	1.406	.075	1.714	.090
Extension contact(X_9)	1.839	.707	.148	2.600	.011*
Farming experience(X_{10})	.242	.173	.048	1.395	.167
Farm education exposure(X_{11})	.815	.401	.159	2.030	.045*
Scientific Orientation ($_{12}$)	.416	.118	.145	3.510	.001**
Knowledge(X_{13})	.297	.096	.253	3.089	.003**
Training received(X_{14})	2.501	1.463	.059	1.710	.091
Financial help received(X_{15})	-1.581	.1.668	-.033	-.948	.346

*Multiple regression analysis of adoption with S-E variables **Significant at 0.01 level *Significant at 0.05 level R^2=0.92*

Axes	Eigen Value	Variability (%)
F1	9.487	63.250
F2	2.010	13.397
F3	1.675	11.164
F4	1.079	7.190
F5	0.593	3.954
F6	0.157	1.045

F1: feeding; F2: breeding; F3: housing materials; F4: reproduction; F5: diseases; F6: information; F7: social



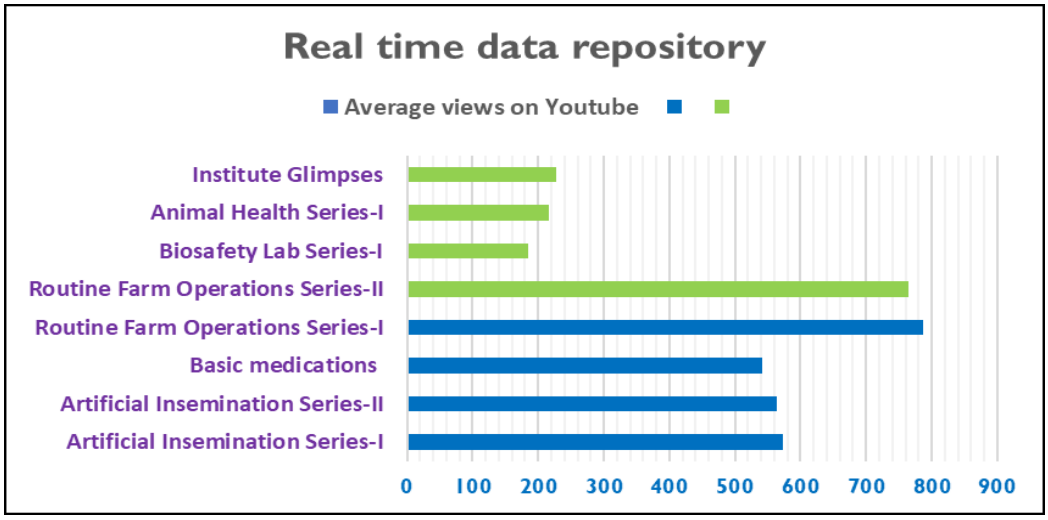
Prior to PCA, clustering analysis using Agglomerative Hierarchical Clustering (AHC) was employed in classifying similarity and dissimilarity parameters into three diagrams based on unweighted pair-group average (UPGA). In Principal component analysis (PCA), we incorporated seven factors (Factor 1-7) consisted of feeding, breeding, housing, reproduction, disease, information and social, respectively.

Institute Project: Development of e-learning knowledge products on scientific pig production

Priyajoy Kar, Nitin. M. Attapuram, S. Jayachitra Devi

The project seeks to tackle major challenges in the piggery industry by leveraging digital technology to share knowledge, promote sustainable practices, and empower farmers. It contributes to the modernization of the livestock sector while ensuring the long-term viability of pig farming. By developing e-content, the project facilitates efficient and widespread information dissemination, bridging knowledge gaps and providing farmers with the latest insights. This digital content is accessible remotely on various devices, benefiting those in remote and underserved areas.

The project team is currently creating short video reels (60–90 seconds) that cover various aspects of pig production, processing, and management. So far, 22 videos have been uploaded to the institute's YouTube channel, with production ongoing. Priority content areas have been identified within different components of the pig production system. Additionally, the team is emphasizing the use of vernacular languages in video production. The videos are categorized into different series based on content and viewer preferences. Key topics include biosecurity, feeding, routine farm operations, farrowing, breed identification, training programs, and outreach initiatives by the institute. Moving forward, the team plans to develop a real-time repository of YouTube data analytics to assess audience engagement with the videos.



Inter-Institutional Project: Development of pig seed village in Assam (With ICAR- ICAR-Indian Veterinary Research Institute, Izatnagar, Uttar Pradesh

Priyajoy Kar and Hitu Chowdhury

The expected outcome of the project is the establishment of a Pig Seed Village in Assam. This initiative aims to enhance pig breeding, improve genetic quality, and ensure a sustainable supply of high-quality piglets for local farmers. By strengthening pig production systems, the project seeks to boost rural livelihoods, support small-scale farmers, and contribute to the overall growth of the pig farming sector in the region. This project comprises of organising trainings, distribution of piglets, medicines and other inputs and field demonstrations. As of now, we have organised two training programs entitled "Training on pig health management" and "Scientific pig rearing for quality piglet production" for the stakeholders of piggery ecosystem in Goalpara and adjoining districts. Different inputs related to farm activities were also distributed among the selected beneficiaries. Apart from that we have organised a two-day skill training for the farmers and awareness camps and field visits to the different progressive farms.

COMPUTER APPLICATION AND IT

Institute Project: Machine learning assisted identification of different cells of porcine origin

Salam Jayachitra Devi, Jaya and N. H. Mohan

Multiclass Image Classification Using Convolutional and Recurrent Neural Networks: The research focused on developing and evaluating hybrid deep learning models that integrate Convolutional Neural Networks (CNNs) with Recurrent Neural Networks (RNNs) to enhance image classification tasks. By leveraging the feature extraction capabilities of ResNeXt-50, a state-of-the-art CNN model, alongside recurrent architectures such as BiLSTM and LSTM, we aimed to improve classification accuracy and robustness in complex image datasets. To construct our hybrid models, we utilized ResNeXt-50 as a feature extractor, replacing its fully connected layer with an identity mapping to retain learned features. These extracted features were then processed by BiLSTM and LSTM networks to capture sequential dependencies within image sequences. Additionally, we explored alternative combinations by integrating ResNeXt-50 with DenseNet121 and EfficientNet-B6, assessing their comparative performance. Data augmentation techniques, including resizing and normalization, were applied to enhance the dataset, which comprised various types of cell images formatted in a sequence-based input structure. The models were evaluated using key performance metrics, including accuracy, precision, recall, F1-score, and loss, for both training and validation phases. The research demonstrated that hybrid models effectively enhance classification accuracy over standalone CNN architectures. The four hybrid models assessed were:

- ResNeXt-50 + BiLSTM: Achieved the highest accuracy at 97.3%

- ResNeXt-50 + LSTM: Achieved 93.42% accuracy
- ResNeXt-50 + DenseNet121: Achieved 92.76% accuracy
- ResNeXt-50 + EfficientNet-B6: Achieved 91.76% accuracy

Furthermore, we conducted a comparative analysis against 28 state-of-the-art CNN models, demonstrating that our hybrid approaches outperformed traditional CNN-based classifiers. The results reinforce the effectiveness of combining ResNeXt-50 with BiLSTM, LSTM, DenseNet121, and EfficientNet-B6 for sequential image classification tasks.

Table: Total Trainable and Non-Trainable Parameter

CNNs Models	Trainable parameter	Non-Trainable parameter
Resnext50_32x4d	8196	22979904
DenseNet121	4100	6953856
Resnet34	2052	21284672
Resnext101_32x8d	8196	86742336
Resnet152	8196	58143808
Resnext101_64x4d	8196	81406272
DenseNet169	6660	12484480
Resnet50	8196	23508032
Resnet101	8196	42500160
DenseNet201	7684	18092928
Mobile_v3_large	5124	4202032
GoogleNet	4100	5599904
Resnet18	2052	11176512
Mobile_v2	5124	2223872
VGG16	16388	134260544
DenseNet161	8836	26472000
InceptionV3	777196	24343264
Efficientb2	5636	7700994
Efficientb3	6148	10696232
VGG19	16388	139570240
AlexNet	54550532	2469696
Efficientb0	5124	4007548
Mobile_v3_small	4100	1517856
Efficientb5	8196	28240784
Efficientb1	5124	6513184
Efficientb7	10244	63786960
Efficientb4	7172	17548616
Efficientb6	9220	40735704
ResNeXt-50 + EfficientNet-B6	65946396	0
ResNeXt-50 + DenseNet121	31509188	0
ResNeXt-50 + BiLSTM	25606468	0
ResNeXt-50 + LSTM	24228164	0

The dataset utilized for this study was prepared at the Physiology Laboratory of ICAR-National Research Centre on Pig, India. The sample collection and preparation followed standardized protocols to ensure the quality and integrity of the data. Reproductive tract samples were obtained from cyclic pigs aged 8 ± 1 months, sourced from a slaughter-house and transported to the laboratory within one hour under aseptic conditions in physiological saline containing antibiotics (100 units/mL penicillin, 100 µg/mL streptomycin, and 0.25 µg/mL amphotericin B) at 37°C. Morphological assessment ensured the selection of high-quality samples with rich vasculature for further processing. Luteal tissues, ovarian follicles, and inner oviductal layers were carefully dissected, washed in phosphate-buffered saline (PBS, pH 7.4), and processed accordingly. Luteal cells (LCs) were isolated using collagenase digestion, filtered through a 40 µm pore strainer, and centrifuged at 1600×g for 5 minutes before being cultured in DMEM/F-12 supplemented with 10% FBS and antibiotics at 37°C with 5% CO_2. Granulosa cells (GCs) were extracted from healthy ovarian follicles using aspiration, filtered, and centrifuged, followed by culture in DMEM/High-Glucose with 10% FBS and antibiotics. Oviductal epithelial cells (OECs) were obtained through enzymatic digestion and cultured in DMEM/High-Glucose with 15% FBS. Additionally, PK-15 cells, acquired from the National Centre for Cell Science (NCCS), Pune, were revived and maintained in DMEM-High Glucose with 10% FBS. All cell types underwent viability testing using the trypan-blue dye exclusion method and were regularly monitored for growth characteristics. Cell cultures were maintained under optimal conditions, with media replaced every third day. Once the cells reached 70-80% confluency, they were passaged using trypsinization and imaged using a NIKON TS100 microscope under 20X and 10X magnifications.

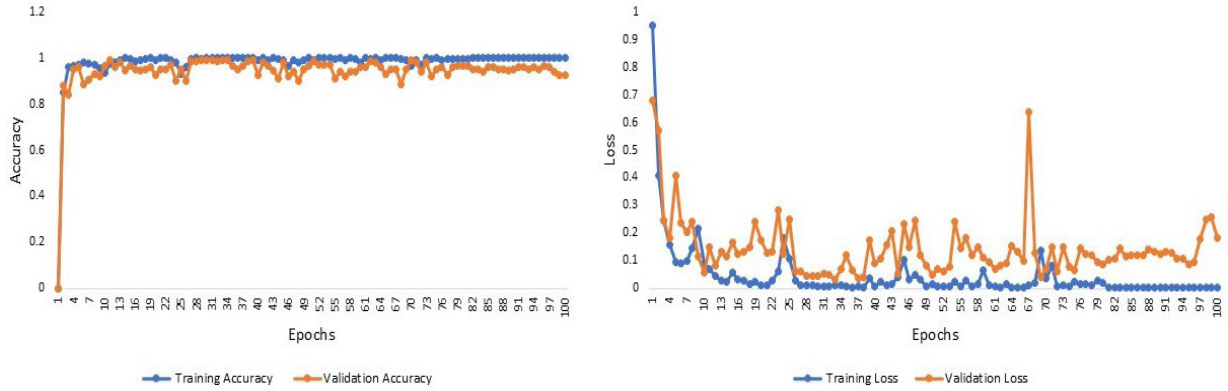


Fig: Plot of model accuracy and loss of hybrid model

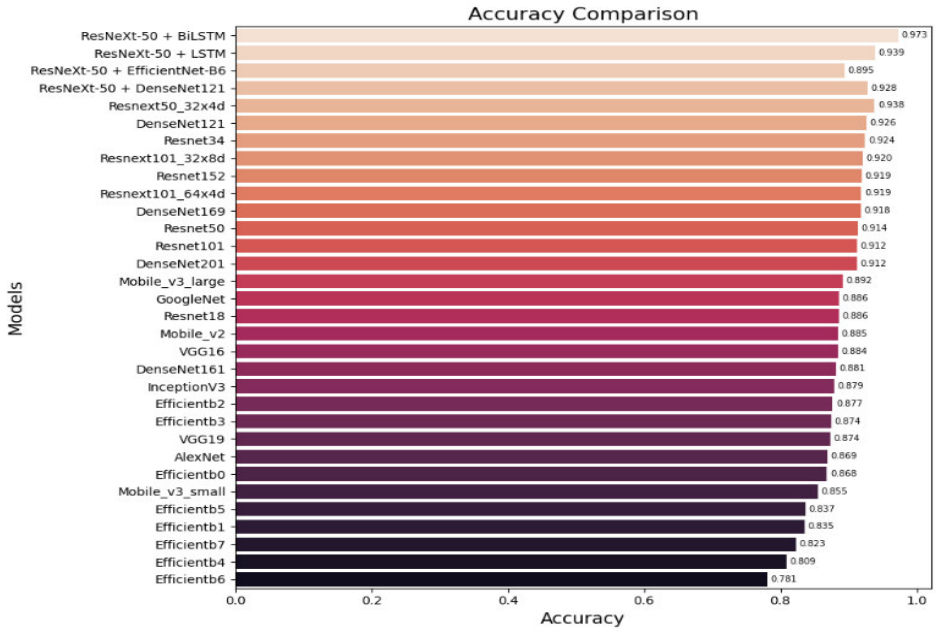


Fig: Comparison of models

ANNUAL REPORT 2024

OUT-REACH PROGRAMMES

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

08 OUTREACH PROGRAMMES

Tribal Sub Plan (TSP)

In charge: Dr. Pranab Jyoti Das, Principal Scientist

The Tribal Sub Plan (TSP) is a strategic approach by the Government of India to ensure that the benefits of national development reach the Scheduled Tribe (ST) population. It involves the earmarking of funds from various central ministries and departments specifically for the welfare and development of ST communities. Essentially, it's a mechanism to channel financial resources to address the unique needs and challenges faced by tribal populations in the Country. The TSP was introduced during the Fifth Five-Year Plan to address the socio-economic disparities faced by tribal communities. It recognizes the need for targeted interventions to bridge the gap between tribal populations and the general population. Pertaining to ICAR-NRC on Pig TSP programs are formulated for holistic development piggery sector of the country helping ST pig farmers. Emphasis is placed on involving tribal communities in the planning and implementing of scientific piggery. In the year 2024, a total of 22 such programs were conducted in the tribal-dominated area of Assam Arunachal Pradesh, Meghalaya and Nagaland, in which a total of 1652 numbers of tribal Pig farmers directly benefited through these programmes. Among these farmers, Pig feed and different small inputs like LED lights, Steel buckets, Gumboots, Pig for breeding, mixer and different scientific leaflets on piggery management in local languages were distributed. Among the 29 capacity-building programs, six nos. of one-day training and demonstration programs, eight nos. of three days residential training programs, one five days program, seven awareness camps and field days program, four Research-Extension-Farmers interface meetings, two Pig Germplasm distribution programs and one health camp. The maximum numbers of the programs were conducted at farmers' fields and scientists and staff of the institute directly interacted with farmers to propagate scientific knowledge among the pig farmers for sustainable scientific piggery development in the region.

Tribal Sub Plan Program 2024

Sl. No	Date	Program Name	Place	Co-ordinators	No. of beneficiaries
1	24.04.2024	Awareness program and input distribution Programme for Pig multipliers	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Sunil Kumar, Dr. P.J.Das	46
2	16.05.2024	Awareness program and input distribution Programme for Pig multipliers	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Sunil Kumar, Dr. P.J.Das	62
3	20.05.2024	Input distribution and Scientific Pig Feed demonstration	KVK, Dhudhnoi, Goalpara, Assam	Dr. S. K Baishya, Dr. Sunil Kumar, Dr. P.J.Das	08
4	29.07.2024 to 31.07.2024	Three Days Residential Training Programme on Scientific Production Practices and health management for profitable pig farming.	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. N.H.Mohan	19

Sl. No	Date	Program Name	Place	Co-ordinators	No. of beneficiaries
5	13.08.2024	Research-Extension-Farmers Interface Meeting and Input Distribution Program	Longleng, Nagaland	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. Satish Kumar	300
6	28.08.2024 to 30.08.2024	Three Days Residential Training Programme on Augmenting of production in by application of Artificial Insemination in pig farms.	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Sunil Kumar, Dr. Rafiqul Islam	13
7	29.08.2024	Research-Extension-Farmers Interface Meeting and Input Distribution Program	Tawang, Arunachal Pradesh	Dr. Pranab Jyoti Das, Dr. Juwar Doley, Mr. Utpal Ghosh	320
8	25.09.2024	One day non-residential Training & demonstration Programme on Skill enhancement of the tribal farmers through demonstration of Artificial Insemination techniques in pigs	Puthimari, Kamrup (R)	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. B.C. Das	84
9	03.10.2024 to 05.10.2024	Three Days Residential Training Programme on Amelioration of Reproductive problems and application of artificial Insemination in Pig Farms	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Sunil Kumar, Dr. Rafiqul Islam	24
10	04.10.2024	Awareness Camp, Green Plantation and input distribution Programme for Tribal women	Paat Gaon, Mataikhar, Kamrup(R)	Dr. S.R.Pegu, Dr. Jaya, Dr. S. J. Devi, Dr. Meera K.	80
11	23.10.2024 to 25.10.2024	Three Days Residential Training Programme on Skill Development in Pig Farming for Livelihood and Nutritional Security	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Satish Kumar, Dr. N.H. Mohan. Dr.N. M, Attupuram	21
12	24.10.2024	Farmers' Interaction and Input Distribution Program with Hon'ble Union MoS for Agriculture and Farmers' Welfare.	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Pranab Jyoti Das, Dr. Kalyan De	22
13	28.10.2024	Awareness Camp on piggery and input distribution	Beberi Para, Dhangar Gaon, Palasbari, Kamrup(R), Assam	Dr. Juwar Doley, Dr.Priyajoy Kar	30
14	11.11.2024 to 13.11.2024	Three Days Residential Training Programme on "Scientific Pig Production and Health Management Practices for Large Scale Pig Farming".	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. S.R.Pegu, Dr. Souvik Paul, Dr. N.H. Mohan	19

Sl. No	Date	Program Name	Place	Co-ordinators	No. of beneficiaries
15	19.11.2024	Research-Extension-Farmers Interface Meeting and Input Distribution Program	KVK, Lower Dibang Valley, Arunachal Pradesh	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. Anil Das	180
16	22.11.2024	One day on Field Training and Technology Demonstration on Scientific Pig Farming	Patharkhmah, Ribhoi district, Meghalaya	Dr. S.R.Pegu, Dr. S. J. Devi, Dr. Sunil Kumar, Dr. Lokesha E	30
17	26.11.2024 to 29.11.2024	Three Days Residential Training Programme on Accelerating income in pig farming through artificial insemination and other management techniques	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Sunil, Dr. Lokesh E, Dr. Rafiqul Islam	21
18	02.12.2024	One day non-residential Training & demonstration Programme on Technology demonstration on silage making and storage for feeding of pigs to the tribal farmers	Garilic Market, Kamrup(R), Assam	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. Lokesha E	30
19	04.12.2024 to 06.12.2024	Three Days Residential Training Programme on “Pig farming for livelihoods and nutritional security of tribal farmers”	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. Prana J. Das, Dr. Jaya, Dr. Meera K.	25
20	09.12.2024	Field day, Awareness Camp on Scientific piggery and Input Distribution Program	Diphu Rongkangthir, Diphu, Assam	Dr. Prana J. Das, Dr. Lokesh, Dr. Vishal Rai.	171
21	19.12.2024	Field day, Awareness Camp on Scientific piggery and Input Distribution Program	Bansbari, Bansbari Range office, Baksa, Assam	Dr. Prana J. Das, Dr. Juwar Doley Dr. V.K.Gupta	95
22	23.12.2024	Open Health Check-up Camp and Health Awareness for Tribal Farmers & Families and Pig Health Kit Distribution program	ICAR-National Research Centre on Pig, Rani Guwahati, Assam	Dr. S.R.Pegu, Dr. Jaya, Dr. S. J. Devi, Dr. Meera K. Ms. Hiramani Thakuria, Ms. Kabyabati Rabha, Ms. Priya Bala, Mrs. Jonali Nath,	52
				Total Program =22	**1652**

Research-Extension-Farmers Interface Meeting and Input Distribution Program, Longleng, Longleng district Nagaland

Field day, Awareness Camp on Scientific piggery and Input Distribution Program, Bansbari, Bansbari Range Baksa District, Assam.

Farmers' Interaction and Input Distribution Program at ICAR-NRC on Pig with Hon'ble Union MoS for Agriculture and Farmers' Welfare.

Scheduled Caste Sub Plan (SCSP)

In Charge: Dr. Kalyan De

The ICAR-National Research Centre on Pig, Rani, actively implemented the Scheduled Caste Sub-Plan (SCSP) this year. The initiatives aimed to alleviate poverty and unemployment among Scheduled Caste (SC) farmers and create income-generating opportunities for the SC farming community. To achieve these goals, the institute carried out a baseline survey, organized awareness camps, held Research-Extension-Farmer interface meetings, celebrated farmers' day and field day, conducted health camps, and distributed inputs. Training programs were also organized with distinguished scientists from the institute offered valuable insights and recommendations., all focused toward mitigating the challenges faced by SC farmers in pig farming.

Additionally, eight input distribution programs were organized across villages in Chirang, Baksa, Dhemaji, Naogaon, Tamulpur, and Kamrup districts. Farmers received various farm tools and gumboots to maintain biosecurity standards on their pig farms. A total of 137 tonnes of pig grower feed and 890 small equipments like emergency light, steel bucket, umbrella, etc. were distributed as key inputs for pig farming. Seven awareness camps were held to educate SC pig farmers on various aspects of pig farming, including housing, reproduction management, feeding practices, market linkages, disease prevention, daily care, and biosecurity measures, particularly to protect against diseases like African swine fever. The sessions also highlighted the use of unconventional and locally available feed resources to reduce farming costs.

As part of efforts to improve germplasm distribution, 42 Rani piglets were given to 21 farmers in Niz Kachula village (Tamulpur district) and Borigaon village (Udalguri district). Two demonstration programs were held this year: one on artificial insemination and one on silage making, reaching 51 farmers in Betagaon (Tamulpur district) and 87 farmers in Rowmari (Chirang district). A comprehensive training program benefited over 44 SC pig farmers from Assam, Manipur, Tripura, and West Bengal through two three-day training sessions. These programs focused on developing human resources for scientific pig farming, artificial insemination, and hygienic pork production. Sponsored by the SCSP, the training included manuals on pig farming, training kits, study materials, and complimentary food and lodging for participants.

Throughout the year, these activities were consistently conducted under the SCSP framework. Through this program, the ICAR-National Research Centre on Pig, Rani, supported over 1054 SC pig farmers by providing critical inputs, knowledge, and technical guidance. This assistance contributed to the development of their pig farms, fostering economic growth within the vulnerable SC community and improving their social standing and quality of life.

List of Activities:

Sl. No.	Date of Program	Program Name	No of Beneficiaries	Venue	Coordinators
1	07/04/2024	Input distribution in NRC on Pig	58	ICAR-NRC on Pig, Rani	Dr. Kalyan De
2	29/04/2024	Input distribution in NRC on Pig	40	ICAR-NRC on Pig, Rani	Dr. Kalyan De
3	05/08/2024	Technical Demonstration on Artificial Insemination in Pig	51	Betagon Village of Tamulpur (BTR)	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. Kalyan De
4	05/08/2024	Pig Health Camp	51	Betagon Village of Tamulpur (BTR)	Dr. Seema R Pegu, Dr. Kalyan De, Dr. Sunil Kumar
5	28/08/2024	Farmers Field Day and Input Distribution Program	128	Chenigaon village of Baksa District	Dr. Priyajoy Kar, Dr. Souvik Paul, Dr. Kalyan De
6	1/10/2024	Pig entrepreneurship development program	25	Gogamukh, Dehmaji	Dr. Nitin Attupuram, Dr. Juwar Doley, Dr. Kalyan De

Sl. No.	Date of Program	Program Name	No of Benefi-ciaries	Venue	Coordinators
7	1/10/2024	Research-Extension-Farmer interface meeting and Input distribution program	440	Silimpur, Gogamukh, Dehmaji	Dr. Juwar Doley, Dr. Nitin Attupuram, Dr. Kalyan De
8	24/09/2024 to 27/09/2024	Training Program on “Sci-entific Production Practices and Application of Artificial Insemination in Pig Farms”	19	ICAR-NRC on Pig, Rani	Dr. S. Jayachitra Devi, Dr. Rafiqul Islam, Dr. Kalyan De


Awareness Camp cum


PIG HEALTH
under
Scheduled Caste
of
Technology Demonstration
on
Artificial Insemination in Pig
under
Scheduled Caste Sub Plan
of
NATIONAL RESEARCH CENTRE ON PIG


PIG GERMPLASM DISTRIBUTION AND
FARMER SCIENTIST INTERACTION PROGRAM
under
SCHEDULE CASTE SUB PLAN (SCSP)


PIG GERMPLASM DISTRIBUTION AND
FARMER SCIENTIST INTERACTION PROGRAM
under
SCHEDULE CASTE SUB PLAN (SCSP)

ANNUAL REPORT 2024

AICRP PROJECT ON PIG

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09 ALL INDIA COORDINATED RESEARCH PROJECT ON PIG

The AICRP on pigs was launched in the IVth Five Year Plan (1970-1971) to study the performance of pigs in different agro-climatic conditions of the country. Subsequently, the project was mandated to develop a region-specific package of practices, including quality germplasm. Few centers are mandated for the conservation of indigenous germplasm. Presently, the programme is continuing in 20 centres across the country.

ICAR-National Research Centre on Pig regularly monitors the progress of the AICRP on Pig project through technical and financial monitoring in consultation with the Council and the conduction of review meetings. The Annual Review Meeting of ICAR-AICRP on Pig and MSP on Pig for the year 2023-2024 was held during 19-20th September 2024 at ICAR-CCARI, Goa under the Chairmanship of Dr. Raghavendra Bhatta, Deputy Director General (Animal Science), ICAR, New Delhi.

ICAR – NATIONAL RESEARCH CENTRE ON PIG, RANI, GUWAHATI

P.J. Das, Satish Kumar, Meera K, Seema Rani Pegu, Kalyan De, Lokesha E, Sunil Kumar, Jaya, R. Thomas, Rafiqul Islam

Executive Summary:

The ICAR-NRCP Unit has made significant paces in achieving its objectives during the reporting year. During the reporting time AICRP, ICAR-NRC on Pig unit focused on enhancing pig production through genomic approaches, sustainable nutrition and management practices, superior germplasm dissemination, human resource development, and integrated farm-to-fork strategies. Key achievements include the initiation of new crossbreeding programs, procurement of new germplasm (Duroc and Tenyi Vo pigs) extensive field artificial inseminations, successful training programs for stakeholders, and significant progress in disease surveillance.

Introduction:

The ICAR-NRCP Unit is committed to improving pig husbandry practices in the region. This annual report outlines our progress towards achieving the core objectives and highlights key accomplishments during the reporting year.

Objectives and Achievements:

Objective 1: To identify superior genotypes with high production potential through genomic approaches for selection and breeding.

New Crossbreeding Programs: Initiated crossbreeding programs involving Large White Yorkshire x Ghoongroo and Duroc x Ghoongroo to develop superior pig breeds adapted to local conditions (Fig.1)

Genomic Exploration: Explored genome-wide selection signatures in Ghoongroo pigs to identify genetic markers associated with desirable traits.

Mitochondrial Genome Analysis: Completed mitochondrial genome sequence analysis of Ghoongroo pigs and their crossbreds, contributing to a deeper understanding of their genetic diversity and evolutionary history.

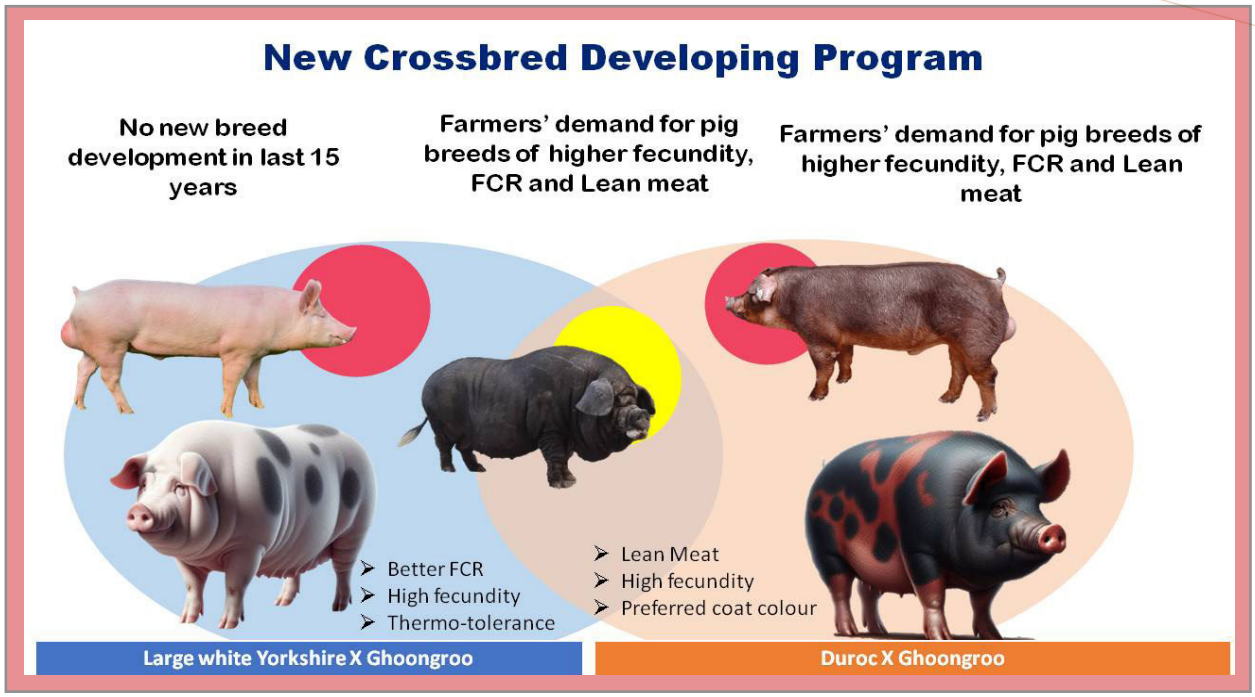


Fig: Schematic diagram of new crossbred developing program

Objective 2: To develop and promote location-specific sustainable nutritional, managemental, and health practices for economic feeding, climate-resilient pig husbandry, and micro-level biosecurity.

Novel Feed Evaluation: Identification and evaluation of corn distiller's grains as an alternative protein source in pig feeding, promoting cost-effective and sustainable nutrition (Table1). Initial analysis Corn distiller's grains shows that it contains of good amount of protein, and good sources of fibre, which can aids in digestion and help to maintain gut health. It has also provided essential amino acids for pig growth and development. Corn distiller's grains will be more cost-effective than traditional feed ingredients like soybean meal, making them a viable option for pig producers. Using domestic maize by-products can reduce reliance on imported feed ingredients, improving feed security.

Table: Identification and evaluation Corn distiller's grains as an alternative source of protein in pig feeding

Proximate composition of Corn distiller's grains		
Sl. No.	Parameter	Corn distillers grains
1	*Moisture (%)*	*9.8*
2	*Crude protein (%)*	*30.8*
3	*Crude fat (%)*	*8.2*
4	*Crude fibre (%)*	*10.3*
5	*Nitrogen-free extract (%)*	*38*
6	*Ash (%)*	*2.9*
7	*Acid insoluble ash (%)*	*0.16*

Biosecurity Promotion: To enhance awareness and implementation of biosecurity measures the "Biosecurity in Scientific Pig Production" brochure was distributed among pig farmers in the North Eastern Region (NER), with a special focus on women farmers. The initiative emphasized the interconnection between animal health, human health, and environmental safety, promoting both safe pig farming practices and personal healthcare awareness for women involved in piggery. Documentary Video film on Biosecurity measures in scientific pig production with special reference to ASF in three languages and demonstrated in the farmers field

Disease Surveillance:

A comprehensive disease surveillance program was conducted, including serological and molecular screening of pig samples:

Serological Screening:

1. A total of 169 pig serum samples were collected from private pig farms (beneficiary of NRCP) in Kamrup, Guwahati, including ICAR-NRC Pig Farm.
2. 8 samples tested positive for Japanese encephalitis virus (JEV) antibody
3. 11 samples were positive for Porcine circovirus type 2 (PCV2) antibody.
4. 5samples were positive for classical swine fever virus (CSFV) antibody.

Molecular Analysis:

1. 57 whole blood samples and 35 tissue samples were analyzed using PCR and Lateral Flow Assay (LFA).
2. 3 samples were confirmed positive for Classical Swine Fever Virus (CSFV).
2. 2 samples were confirmed positive for PCV2.

Objective 3: To drive rapid spread of superior germplasm developed among farmer entrepreneurs through appropriate technological backstopping.

1. Artificial Insemination: Conducted 785 field-level artificial inseminations, exceeding the target of 300, to disseminate superior germplasm.
2. Clean Pork Production: Developed and promoted appropriate practices among stakeholders for clean and wholesome pork production.
3. Value Addition: Promoted value addition in pork through collaboration with livestock products technology, home science departments, and KVKs.
4. Meat Traceability Awareness: Conducted awareness campaigns on meat traceability under field conditions.

Objective 4: To promote human resource development and entrepreneurship among various stakeholders of pig husbandry.

Training Programs: Provided training on various aspects of scientific pig husbandry to 100 stakeholders, enhancing their knowledge and skills.

Objective 5: To develop integrated farm-fork practices for wholesome pork production and value addition at the field level.

Progress was made in developing integrated farm-fork practices, with ongoing efforts to establish comprehensive strategies for wholesome pork production and value addition.

Conclusion:

The AICRP, ICAR-NRCP Unit has demonstrated substantial progress in enhancing pig husbandry practices within the region. Moving forward, the Unit remains dedicated in its commitment to achieving sustainable and profitable pig production. This will be accomplished through the continued refinement of crossbreeding and genomic selection strategies, the fortification of disease surveillance and biosecurity protocols, the expansion of training and entrepreneurial development initiatives, the advancement of value addition and meat traceability, and the further development and implementation of integrated farm-to-fork practices.

ASSAM AGRICULTURAL UNIVERSITY, KHANAPARA, GUWAHATI

The ICAR-AICRP on pig, AAU, Khanapara has played an important role for the development of pig production in the state and neighboring states through dissemination of quality piglets, conducting training, and awareness programs. The centre is maintaining HD-K75 crossbred (75% Hampshire and 25% Desi) with higher productivity, well adapted in the prevailing conditions of Assam and popular among the farming community. The herd strength at the beginning and at the end of the year was 324 and 77 respectively. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight at weaning were found as 7.92 ± 0.45, 8.24 ± 0.86 Kg, 7.21 ± 0.49 and 80.03 ± 0.54 Kg, respectively. A total of 301 piglets were farrowed during the year. A total of 353 piglets were sold to 166 farm families of the different districts of the state, different KVKs of AAU, ICAR-KVK, Dudhnoi, NRC on Pig, Fishery College, AAU, Raha and also KVK of Arunachal Pradesh. The AICRP on Pig, AAU, Khanapara has organized three (03) field level training programme on “Scientific pig rearing” and “Bio-security measures in pig farm” with 90 beneficiaries.

KERALA VETERINARY AND ANIMAL SCIENCE UNIVERSITY, MANNUTHY

The AICRP unit at KVASU, Mannuthy is maintaining Mannuthy white crossbred pigs. During the year, a total of 708 piglets (75% cross) were distributed to 86 beneficiaries. The centre is maintaining Large white Yorkshire and Ankamali (Desi) crossbreds with 75% inheritance are maintained by inter-se mating. An income of 17.85 lakhs was generated by the centre during the period. Feed conversion efficiency of 3.65 was achieved during the period. The herd strength at the beginning and at the end of the year under report was 343 and 373 respectively. A total of 881 piglets were farrowed during the year and a total of 708 piglets were sold. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 11.30±0.20, 11.10±0.20 Kg, 10.14±0.15, and 81.69±0.50 Kg, respectively. Rain water harvesting systems, costing more than 16 lakhs were established.


SRI VENKATESWARA VETERINARY UNIVERSITY, TIRUPATI

The All India Coordinated Research Project on Pigs, SVVU Centre at College of Veterinary Science, Tirupati is maintaining Large White Yorkshire pigs and its crosses. Presently, performance of only 75% LWY crossbreds by inter se mating is being studied. So far 23 generations of 75% LWY crossbreds was completed. During the year 2017 a variety of 75% LWY crossbred was released by the then DDG and named as SVVU-T 17. During the year 380 piglets were produced, 247 pigs were sold to the farmers. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 9.30±0.27, 9.88±0.34 Kg, 7.30±0.34, and 61.38±2.26 Kg, respectively. Six PG students and 2 PhD student have completed their research work during this period. A detailed study on characterization and registration of Indigenous pigs was conducted in the Rayalaseema region of Andhra Pradesh. An amount of Rs. 10, 18,162 was generated towards the sale of animals and pork during this period.

ICAR-CENTRAL COASTAL AGRICULTURAL RESEARCH INSTITUTE, GOA

The centre has developed crossbreed pig variety “GOYA”. This crossbred has been released by Hon’ble DDG (AS) for the farmer’s field on 19th September 2024. Five breeder farmers developed during 2023-24. Genetic diversity and genomic footprints of purebred Agonda Goan pig studied and published along with other indigenous pig breeds. The herd strength at the beginning and end of the year under report was 114 and 102. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 8.53±0.32, 9.14±0.45 Kg, 8.18±0.37 and 70.75±1.45 Kg, respectively. The molecular characterization of Agonda Goan pigs was completed through microsatellite study. Ear and tail tissues of Agonda Goan pigs were collected and Stem cells were isolated for in vitro preservation in collaboration with ICRA-NBAGR, Karnal.


INDIAN VETERINARY RESEARCH INSTITUTR, IZATNAGAR, UTTAR PRADESH

ICAR IVRI Izatnagar Centre is maintaining crossbreds (75 % Landly x 25 % Desi pigs of Bareilly) Landly. At present this unit has 75 % crossbred pigs, The herd strength at the beginning and end of the year under report was 132 and 153, During this year, a total of 308 CB (75%) pigs were born and a total of 259 Landlly pigs were supplied to different farms, farmers as well as divisions for experimental purpose. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 8.55±0.39, 9.18±0.41 Kg, 8.08±0.47 and 57.74±4.00 Kg respectively. The Landrace herd which was procured from Mannuthy was strengthened with addition of 212 more farm born pigs.




TAMILNADU VETERINARY AND ANIMAL SCIENCE UNIVERSITY, KATTUPAKKAM

TANUVAS centre is maintaining inter-se population of TANUVAS KPM Gold (75% cressbread LWY x Desi) pigs. The herd strength at the beginning and at the end of the year under report was 118 and 265. During the period under report, parent stock was inter-se mated to produce XVI, XVII and XVIII generation progenies. a total of 364 piglets were obtained during the year and a total of 231 piglets were sold. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 8.14 ± 0.193, 10.18 ± 0.4 Kg, 7.76 ± 0.251 and 60.24 ± 2.652 Kg, respectively.

COLLEGE OF VETERINARY SCIENCE, CAU, AIZAWL, MIZORAM

The C.V.Sc & A.H, CAU, Mizoram Centre is maintaining Zovawk pigs, the cross breed population make up for 85 % of the total population, the rest 15 % was of Indigenous pig. The herd strength at the beginning and at the end of the year under report was 102 and 26, a total of 168 piglets were obtained during the year and Zero piglets were sold. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 6.83± 0.44(12), 4.66± 0.31 (12), 6.83± 0.44(12) and 20.31± 1.59 (12) respectively. The basic principle of the project is to start a comprehensive study at institutional level to develop a farmer's friendly package of practices that create more assets and better opportunities for the cash-starved population. Initially, research is being considered to conserve local indigenous pigs for preserving the indigenous gene pool and promote low-input animals for rural and less developed areas.

NAGALAND UNIVERSITY, SASARD, MEDZIPHEMA, NAGALAND

The centre is conserving and propagating Tenyi Vo pig breed through selective breeding. The herd strength at the beginning and end of the year under report was 229 and 221, a total of 175 piglets were obtained during the year and a total of 167 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 6.28±0.19 (32), 3.52±0.17 (24), 5.71±0.49 (28) and 11.22±0.60 (20) respectively. There was no incidence of ASF in the campus farm. ICAR-AICRP on pig, Nagaland Centre, has two hundred twenty one (221) good healthy herd of Tenyi Vo pig. The centre act as genetic improvement unit of Tenyi Vo pig breed.

ICAR-CENTRAL ISLAND AGRICULTURAL RESEARCH INSTITUTE, PORT BLAIR

The AICRP CIARI Port Blair centre maintains pig breeds (Andaman Local pig and Nicobari pig) are produced, maintained and supplied to farmers. The herd strength at the beginning and end of the year under report was 102 and 106, a total of 233 piglets were obtained during the year and a total of 222 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 7.20 ±0.19, 11.29 ± 0.61 Kg, 6.83±0.19 and 43.72 ± 0.83 Kg, respectively.

COLLEGE OF AGRICULTURE, CAU, IMPHAL, MANIPUR

The AICRP centre is maintaining Rani breed. There was an outbreak of African swine fever at Manipur Centre during August, 2021, after which the centre has not maintained any animals to break the disease cycle till January, 2023. Dr. V.K. Gupta, Director, ICAR-NRC on Pig, Rani, Guwahati along with Dr. S. Banik, Principal Scientist & In-charge AICRP have visited the Manipur Centre, CAU, Imphal during January, 2023. During the visit, Director, ICAR-NRC on Pig, Rani, has directed the centre for conservation of Manipuri Black pig. The herd strength at the beginning and at the end of the year under report was 30 and 17, a total of Zero piglets were obtained during the year and a total of Zero piglets were sold, At the end of the reporting year, the centre is maintaining a total of 17 numbers of 2-3 months old Manipuri Black Piglets.

ICAR RESEARCH COMPLEX FOR NEH REGION, BARAPANI

The AICRP on Pig, ICAR-RC for NEH region has successfully developed a crossbred pig variety called “Lumsniang” for better adaptability and performance in hill ecosystem of the north eastern region of India. Under AICRP on Pig, this center has played an important role for the development of pig production in the North-Eastern states through various ways like organizing training, awareness programs at farmer level and distribution of improved piglets as beneficiary to the interested farmers. Artificial insemination was done for crossbreeding/ upgrading of indigenous germplasm at farmers’ doorsteps. The herd strength at the beginning and at the end of the year under report was 175 and 213, a total of 463 piglets were obtained during the year and a total of 189 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 9.28±0.83, 8.70±0.61, 8.17±0.97 and 81.04±0.77. Pig wastewater filtration unit was established for effective recycling of the water. Pig dung based vermicomposting unit has been established under the AICRP on Pig which comprises of three low cost vermin bed. Artificial Insemination (AI) has been carried out regularly at farmers’ door step to produce about 500-700/year crossbred piglets, and obtained farrowing rate of 72-75% and litter size of 8-12 respectively.

ICAR INDIAN VETERINARY RESEARCH INSTITUTE, EASTERN REGIONAL STATION, KOLKATA

The ICAR-AICRP on Pig, Eastern Regional Station of Veterinary Research Institute, Kolkata is maintaining Ghungroo pig, Ghungroo is the best-known Indian pig breed. The productive and reproductive performance of this breed is much better than any indigenous breed as recognized by ICAR-NBAGR. ICAR-IVRI, Eastern Regional Station, Kolkata was entrusted to implement ICAR-AICRP on Pig, by Director, ICAR-NRC on Pig, Rani, Guwahati on 9th October 2014 as an indigenous Ghoongroo pig germplasm conservation centre and to develop an elite flock of Ghoongroo germplasm through selective breeding, propagate and supply the superior germplasm to cliental which will indirectly increase the pork production.Therefore, improvement of this breed through selection, breeding, conservation and propagation are our top most priority. Keeping these in view, The herd strength at the beginning and at the end of the year under report was 125 and 120, a total of 403 piglets were obtained during the year and a total of 343 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 8.97±0.38, 8.35±0.39, 8.526 ± 0.295 and 64.686±3.190 respectively. This centre was made as one of the germplasm conservation centre of Ghoongroo pig breed. Piglets of superior genetic merit (318 piglets) were distributed to progressive farmers through Tribal sub-plan.

KVK, DUDHNOI, GOALPARA, ICAR-NRC ON PIG

The AICRP on Pig unit KVK Goalpara is mandate to conserve Doom Pig of Assam and Maintain it with selective breeding, Doom pig is a unique indigenous germplasm of Assam which is adaptable to local climatic condition and thrives with very low to negligible nutritional input. Further, it has the capacity to survive in migratory scavenging system which makes it very popular among local communities of the state for rearing, The herd strength at the beginning and at the end of the year under report was 65 and 56, a total of 23 piglets were obtained during the year and a total of 2 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 5.40±0.07, 4.24±0.09, 4.16±0.16 and 12.66±0.42 respectively.

GURU ANGED DEV VETERINARY AND ANIMAL SCIENCE UNIVERSITY

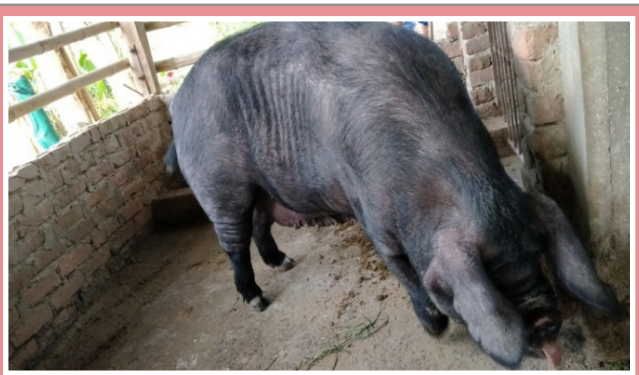
The AICRP on Pig centre GADVASU, Ludhiana is maintaining a total of 152 pig heads including 50 breeding sows and 13 adult boars, The herd strength at the beginning and at the end of the year under report was 62 and 152, a total of 235 piglets were obtained during the year and a total of 142 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 9.3±0.7 (25), 10.7±0.7 (25), 8.9±0.8 (25) and 72.2±2.1 (25) respectively. Strategies of scientific pig farming as approved by the Council have been initiated. There was no incidence of African Swine Fever Disease in the farm in the current year.

BIRSA AGRICULTURAL UNIVERSITY, RANCHI, JHARKHAND

BAU, Ranchi in collaboration with ICAR-AICRP on Pig is dedicated to socio-economic upliftment of farmers through transfer of improved technologies shares great responsibility than others in respect of piggery development work. Birsa Agricultural University with support of NRC on pig has developed JHARSUK variety, this variety was observed to be revolution in pig farming in Jharkhand. The herd strength at the beginning and at the end of the year under report was 65 and 175, a total of 482 piglets were obtained during the year and a total of 292 piglets were sold, The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 6.86±0.17(69), 7.23±0.19(69), 6.57±0.19(69) and 44.68±1.37(69) respectively.


ICAR RC FOR NEH REGION, MEDZIPHEMA, NAGALAND

Pig is one of the most important livestock which plays an important role in improving the socio-economic status of the tribal and weaker section of the society of Nagaland, a number of entrepreneurs have come forward to take up pig breeding and have generated self-employment. Under the program, ICAR Research Complex has conducted awareness campaign, training cum demonstration for promotion of quality germplasm and scientific rearing practices of pig for better income and sustainable production. The artificial insemination technology introduction has also been well received and many rural farmers are happily adopting this technology and partnering with ICAR Nagaland Centre. The herd strength at the beginning and at the end of the year under report was 279 and 288, a total of 679 piglets were obtained during the year and a total of 505 piglets were sold,

ANIMAL RESOURCE DEVELOPMENT DEPARTMENT, TRIPURA, AGARTALA

The Centre was started in 20214 and maintaining Landrace, LWY. A fresh MoU was signed between Director of ARDD, Govt.of Tripura and Director, NRC on Pig, ICAR, Rani on 27thMarch, 2024 to continue the project as AICRP on Pig with approval of the State Government. The herd strength at the beginning and at the end of the year under report was 799

and 190, a total of 370 piglets were obtained during the year and a total of 205 piglets were sold.

ANIMAL HUSBANDRYAND VETERINARY SCIENCES, SIKKIM

The centre is maintaining HD K75, The herd strength at the beginning and at the end of the year under report was 111 and 281, a total of 279 piglets were obtained during the year and a total of 100 piglets were sold.

NANAJI DESHMUKH VETERINARY SCIENCE UNIVERSITY, JABALPUR

The All India Coordinated Research Project on Pigs was sanction by ICAR- National Research Centre on Pig in the year 2023 at Department of Livestock Production and Management, College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterianary Science University, Jabalpur, MP. As per the 2011 census, SCs and STs make up 15.6% and 21.1%, of the state's population. Many communities within these groups rear pigs as their livelihood. Mostly pigs are reared under backyard and scavenging system. A total of 50 pigs were transferred to the AICRP on pigs from the institute pig unit. The herd strength at the beginning and at the end of the year under report was 50 and 82, a total of 34 piglets were obtained during the year and a total of Zero piglets were sold. The average litter size at birth, litter weight at birth, litter size at weaning and litter weight and weaning were found as 8.50±0.29 (4), 9.10±0.31 (4), 8.00±0.41 (4) and 56.82±2.89 (4) respectively.

ANNUAL REPORT 2024

ICAR-KRISHI VIGYAN KENDRA GOALPARA

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

10 ICAR-KRISHI VIGYAN KENDRA GOALPARA

KVK Goalpara carried out different mandated activities through On Farm Testing (OFT) for identifying technologies in terms of location specific sustainable land use system; to organize training to update the extension personnel with emerging advances in agricultural research on regular basis; to organize short term and long term training courses in agriculture and allied vocations for the farmers and rural youths with emphasis on "Learning by doing" for higher production on farms and generating self employment, and organising front line demonstrations (FLDs) on various crops and livestock for large adoption by the farmers. In addition, KVK produces quality technological products (seed, planting material, bio-agents, livestock) and make it available to farmers, organize frontline extension activities, identify and document selected farm innovations and converge with ongoing schemes and programmes within the mandate of KVK. During the reported period from January to December, 2024 the following activities were carried out by the KVK.

1. Capacity development and training programme

For capacity building of farmers, rural youth and extension functionaries, a total of 44 training programmes in horticulture, animal science, home sciences, agri-engineering were conducted covering 1260 number of participants during the year. The training programmes conducted for farmers and farm women were 25 nos. covering 738 participants; training for rural youth were 15 nos. covering 402 participants; training for extension functionaries were 02 nos. covering 74 participants; long duration vocational training were 3 nos. covering 45 participants and skill development trainings were 3 nos. covering 184 participants. .


2. Technology Assessment through on farm testing (OFT)

The On farm Testing conducted by Krishi Vigyan Kendra Goalpara on different agricultural technologies are as follows:

OFT 1: Performance trial of Capsicum F1 Hybrid Arka Atulya

An OFT was conducted on Performance trial of Capsicum F1 Hybrid Arka Atulya to solve the problem of non-availability of suitable hybrid for off season cultivation. The programme is conducted in 03 locations.

Details of Technology

TO1: Arka Atulya

TO2: Indra

Seed rate: 200g/ha, Spacing: 45 cm x 45 cm

Manure and fertilizer: FYM @ 10t, N 120 kg, P_2O_5 60 kg and K_2O 60kg/ha.

Result: The yield obtained for TO1 and TO2 are 11.25 q/ha and 13.6 q/ha respectively. 73.46% incidence of leaf curl viral infection was observed.

OFT 2: Performance assessment of micronutrient formulation-Banana Shakti for higher yield:

An OFT on Performance assessment of micronutrient formulation-Banana Shakti for higher yield is conducted in an area of 0.5 ha in 3 different locations in Goalpara district. The selected locations have been detected with soil status having very low in B (0.21 mg/kg) & low in Mn (1.07 mg/kg) and Zn (0.57 mg/kg). This deficiency in these micronutrients (B, Mn & Zn) leads to poor quality & yield of banana.

Details of Technology

TO1: Banana Shakti: Micronutrient formulation consisting of Iron :4.75%; Zinc: 5.25%; Boron: 2.50%; Manganese: 4.50%; Copper: 2.40%. It increases the availability of macro and micronutrients to banana crop thereby increasing the productivity by 15-20%. Increases the TSS and decreases the acidity of fruit.

Mode of application: 10g Banana Shakti per plant at 3rd, 5th & 7th months after planting.

TO2: Arka Banana Special : a micro nutrient formulation developed by IIHR consist mainly of six micro nutrients viz., zinc, iron, boron, copper, manganese and molybdenum and three secondary nutrients viz., calcium, magnesium and sulphur.

Mode of application: 5g/litre per plant at 5th, 6th & 7th months after planting.

TO3: (Local check) without micronutrient

Parameters of assessment

- Bunch weight
- Hands per bunch
- Yield
- B:C ratio
- Organoleptic test
- Soil status

Results: The OFT is in progress

OFT 3: Assessment of HD-K75 pig breed in Goalpara district

The main objective of this OFT is to assess the production performance of HD-K75 pig breed in Goalpara district to replace the nondescript pig which is available in many pig farms and to make pig farming a profitable one. To assess the HD-K75 pig breed, 7 nos. (5F + 2M) of piglets were distributed to 2 nos. of famers. Body weight at different ages and the reproductive parameters of the HD-K75 pig breed at the climatic conditions of Goalpara district will be assessed. The programme is in progress and till date the following parameters have studied and compared with the nondescript/ crossbred pig.

Sl. No.	Parameters	HD-K75	Undescript/Crossbred
1.	Body weight at 6 months (kg)	51	52
2.	Age at puberty (month)	7.5	8
3.	Litter size at birth (nos.)	7-9	8-10

OFT 4: Assessment of vegetable waste based silage feeding for grower pigs

Out of the total cost of pig farming, almost 70% cost goes to the feed cost which is a major problem for the pig farmers. Moreover, commercial pig feed is not readily available in the rural areas in Goalpara district of Assam. This OFT was carried out to make tapioca and waste vegetables which are available in rural areas into silage to minimise the feed cost and to generate more income from pig farming. 05 nos. of trials have been conducted in different villages and prepared silage.

Details of Technology:

TO1: Silage 15% in basal diet

TO2: Silage 25% in basal diet

TO3: Farmer's feeding practice

Result:

Sl. No.	Parameters	TO1	TO2	TO3
1.	Body weight at 6 months (kg)	47.5	43	40
2.	B:C ratio	1.9	1.6	1.5

It is observed that there is reduction in feed cost of Rs. 4-5 /kg of feed in silage (15%) feeding.

Half dried cut vegetables *Mixing of molasses & salt* *Mehod demonstration*

OFT: 5 Assessment of Rainbow Rooster bird in respect of growth and egg production

An OFT on assessment of Rainbow Rooster bird is conducted to cope up with the problem of minimum growth and egg production of local birds. 600 nos. of chicks have been distributed to 30 nos. of farmers under 15 nos. of trials in different locations of Goalpara district. The average weight of the distributed birds at the age of 2 months 19 days has been recorded as 2.15 kg.

Parameters to be assessed:

- Growth parameters
- Age at first egg laying
- Monthly egg production
- Feed conversion ratio

- Mortality
- BC ratio

Results: The OFT is in progress

Distribution of chicks

Present status

OFT 6: Assessment of Production of low cholesterol eggs

An OFT on assessment of production of low cholesterol eggs under the thematic area "healthy egg production" is undertaken to produce healthy eggs with low cholesterol and tryglycerids. The technology incorporated is feeding the birds with garlic @ of 1% in the feed against normal feeding by farmers. 3 nos. of trials have been carried out in different locations in Goalpara district.

Parameters under assessment:

- Average egg production/bird
- Cholesterol level of egg
- Disease incidence (%)
- B.C. ratio
- Mortality
- Farmers' reaction

Results: The OFT is in progress.

OFT 7: Evaluation of Traditional water harvesting technique-Kur

An OFT on *Kur,* which is an ITK of digging small water harvesting pond in paddy field was conducted with an objective to address the problem of dry spell during monsoon reducing winter rice production. The programme is conducted in 3 locations.

Result

Parameter	Technology	Traditional practice
Moisture content (%)	80.75- 34.19	64.43- 29.75
Yield (t/ha)	3.3 t/ha	3.0 t/ha
BCR	1.10	

OFT 8: Assessment of Posola candy prepared from central core of banana pseudostem

An OFT on assessment of posola candy prepared from central core of banana pseudostem was conducted with the following technology details:

Details of technology

TO1: 2100 gm sugar & 2000 gm cubes + lemon flavor

TO2: 2500 gm sugar & 2000 gm cubes + pineapple flavor

TO3: 2700 gm sugar & 2000 gm cubes + orange flavor

TO4: Farmers practices (Alkaline solution) khar

Results

Treatments	Taste & flavour				Overall acceptability			
	Days after storage							
	Initial	30	60	90	Initial	30	60	90
T1	6.18	6.01	5.84	5.62	6.28	6.09	5.98	5.80
T2	7.12	6.97	6.84	6.71	7.88	7.78	7.68	7.60
T3	7.38	7.26	7.16	8.07	7.97	7.85	7.97	7.75

Parameters	Product recovery (1 kg of posola)	Income	Shelf life	B.C Ratio
Candy	250 gm	Rs.200/-	6 months	3:1

OFT 9: Assessment of iron rich low cost supplementary mix of moringa leaf powder to overcome anaemia prevalence among adolescent girls

An OFT on assessment of iron rich low cost supplementary mix of moringa leaf powder was conducted to overcome anaemia prevalence among adolescent girls.

Technology details

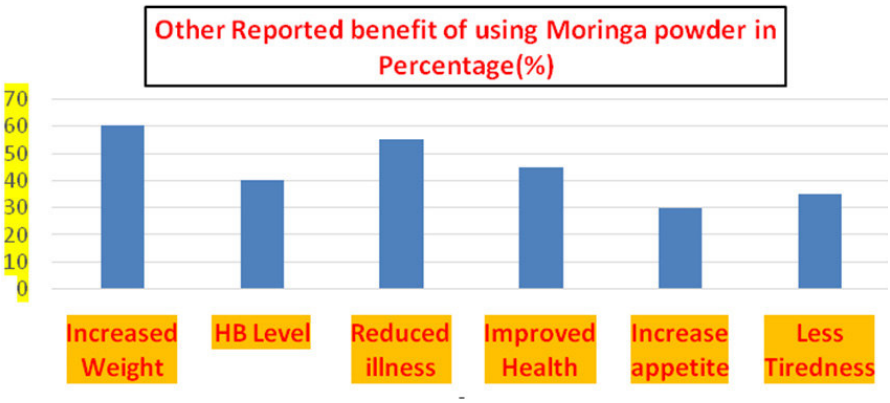
TO1 : Development of products & consumption on daily basis 40-50 gm for 3 months

TO2:Check (without moringa leaf mix)

Results

Status of anaemia indicators 3 months after Implementation:

Site	Variable	Indicator	
		Mean Hb (g/dl) (95% CL)	% Moderate Anaemia
Control	At baseline	12.6	Normal
	After 3 months	11.6	
Intervention	At baseline	10.5	Moderate anaemia
	After 3 months	10.8	



OFT 10: Assessment of handicraft products using traditional design of Rabha tribes of Goalpara district

An OFT on assessment of handicraft products using traditional design of Rabha tribes of Goalpara district was conducted with the following technology details: Home furnishing items such as cushion cover, bed sheet and hand bags developed from traditional Rabha apparels

TO1: Cushion Cover

TO2: Handbags

TO3: (Check): Rabha Scarf

Results

Parameters	Cushion Cover (TO1)	Handbags (TO2)	Scarf (*Pajar*) (TO3)
Design suitability (0-9)	8.5	8.0	-
B C Ratio	2:1	1.6:1	250/pc
Acceptability	Well accepted	Well accepted	Well accepted

3. Demonstration of newly proven technology for large scale adoption through Front Line Demonstration (FLD)

FLD 1: Popularization of Okra F1 hybrid Arka Nikita

The okra hybrid Arka Nikita is an early flowering variety released by IIHR, Bangaluru during the year 2017. It takes 39 days for the first flower appearance and 43 days for first picking of fruits. It produces dark green, medium, smooth and tender fruits which have excellent cooking quality. The crop duration is 125 -130 days. Keeping in view the goodness of the variety a FLD was carried out in 5 different locations in Goalpara district covering an area of 1 ha involving 50 nos. of farmers.

Details of Technology

- Seed rate: 7kg/ha, Spacing: 45 cm x 30 cm
- Nutrient Management: FYM: 10t / ha, NPK: 50:50:50 kg / ha
- Sowing time: May-June
- Potential Yield: 21-24 t/ha.
- Cropping sequence: Brinjal (spring crop) - Okra – Rabi vegetables

Results

Demonstration Yield(t/ha)			Yield of local Check	% increase	Gross Cost (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C Ratio (GR/GC)
H	L	A						
15.6	13.7	14.5	11.6	20	112500	434250	321750	3.86

FLD 2: Popularization of French bean variety Arka Sharath

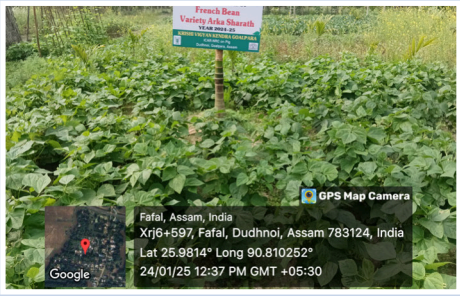
Arka Sharath is a variety developed by ICAR-IIHR Bangaluru in 2018 which is suitable for both rabi and kharif seasons. To harness this characteristic a FLD on Popularization of French bean variety Arka Sharath was conducted in 3 different locations in Goalpara district covering an area of 0.5 ha involving 30 nos. of farmers.

Details of Technology

- Variety: Arka Sharath
- Seed rate: 60 kg/ha,
- Spacing: 45 cm x 30 cm
- Manure and fertilizer: FYM @ 20t, N 30 kg, P_2O_5 40 kg and K_2O 20 kg/ha.
- Sowing time: September-October
- Yield: 18.5 t/ha
- Cropping Sequence: Rice-French bean-Rabi vegetables

Results

Demonstration Yield(t/ha)			Yield of local Check	% increase	Gross Cost (Rs/ha)	Gross Return (Rs/ha)	Net Return (Rs/ha)	B:C Ratio (GR/GC)
H	L	A						
16.9	15.8	16.3	13.4	21	135000	489000	354000	3.62



FLD 3: Popularization of cauliflower cultivation using organic sources of nutrient

A FLD on popularization of cauliflower cultivation using organic sources of nutrient was carried out in 5 different locations in Goalpara district covering an area of 1 ha involving 20 nos. of farmers.

Details of Technology

- ❑ Biofertilizers: Azotobacter and Phosphate solubilizing bacteria @ 7.5 gm each per 100 gm of seeds
- ❑ Manuring: Vermicomposting 5t/ha+Rock phosphate 375 kg/ha
- ❑ Sowing time: September-October

Parameters

1. Av. Curd weight (kg)
2. Yield (q/ha)
3. B:C ratio
4. Shelf life

Results: The FLD is in progress.

FLD4: Popularization of Kamrupa bird for better egg and meat production for livelihood promotion

A FLD on Popularization of Kamrupa bird for better egg and meat production for livelihood promotion under the thematic area breed popularization was undertaken. The main objective of this FLD is livelihood promotion, nutritional security and women empowerment. It was carried out in 20 different locations in Goalpara district covering involving 600 nos. of birds. A Demonstration on preparation of a low cost brooder for rearing of chicks upto 6 weeks was carried out. The average weight of the distributed birds at the age of 1months has been recorded as 337g.

Parameters

i. Growth parameters
ii. Age at first egg laying
iii. Monthly egg production
iv. Feed conversion ratio

v. Mortality

vi. BC ratio

Results: The FLD is in progress.

FLD 5: Demonstration of drone for agricultural operation

An agricultural drone is an unmanned aerial vehicle used in agriculture operations, mostly in yield optimization and in monitoring crop growth and crop production. An FLD was conducted on demonstration of drone for agricultural operation addressing the problem of laborious pesticide application and disease diagnosis.

Results

Parameter	Technology	Traditional practice
Field capacity	0.8 ha/hr	0.0067 ha/hr
Efficiency	99%	100%
Field capacity	1500.00 Rs/ha	7500.00 Rs/ha
Efficiency	In progress	

FLD 6: Demonstration of Shrub Master for weed control

Weed infestation is a major constraint in production of plantation crops. South West monsoon encourages robust growth of weeds during the rainy season June-October. These unanticipated vegetation compete with the cultivated crops resulting in lower yield. Therefore, weeding is a major task of the farmers particularly during the rainy season. Traditionally weeding is done manually. Oil Palm and Banana are two major plantation crops of Goalpara and the farmers have to spend. It was proposed to demonstrate use of Tractor drawn Shrub Master in Oil Palm and Banana plots in 3 selected location in Goalpara district.

Results

Parameter	Technology	Control
Field capacity	0.17 ha/hr	0.005 ha/hr
Field efficiency	100%	100%
Cost of operation (Rs/ha)	2500.00	6428.00
Fuel consumption (lit/ha)	20.59	-
BCR	2.57	

FLD 7: Establishment of Nutrition Garden under Nutri Smart village

A FLD on establishment of Nutrition Garden under Nutri Smart village was undertaken in an area of 0.1 ha covering 25 selected locations involving 80 farmers.

Technology demonstrated

Diversified vegetables cultivation (cucurbits, brinjal,chilli,tomato,okra,bean and Green Leafy Vegetables (Palak,jute etc) with FYM.

Results

Average cumulative productivity (q/ha)		Gross Cost (Rs/ha)	Gross Return (Rs/ha)	B.C Ratio
Demo	Check			
4.5	104.2	68000	183600	2.7

FLD 8: Popularization of Value added products of Banana

Banana is one of the major crop of Goalpara district which occupies an area of 1713 ha with production of 26639 tonnes. It is highly perishable fruit owing to its high moisture content and climacteric nature. Hence, post harvest losses in banana can be reduced by applying appropriate processing techniques converting them to semi perishable products. Keeping this in view, a FLD was conducted for popularization of value added products of Banana in 5 selected locations of Goalpara district involving 25 nos. of farmwomen.

Results

Parameters	Product recovery	Income	Shelf life	B.C Ratio
Banana Flour	500 gm flour/3 kg banana	Rs.200/-	In progress	2:1
Banana Jam	1 kg Jam/kg Banana	Rs.300/-	In progress	1.2:1

Organoleptic Quality

Products	Appearance	Colour	Taste	Flavour	Overall Acceptability
Banana Flour	8.0	7.0	7.5	7.0	8.0
Banana Jam	7.0	7.0	7.5	7.0	7.0


FLD 9: Popularisation of Value added products of Carambola

Value addition for the minor fruit carambola (also known as star fruit) involves processing it into products like pickle, chutney & squash thereby extending its shelf life and creating new ways to consume this underutilized fruit, maximizing its nutritional benefits and market value beyond just fresh consumption. Hence, a FLD was carried out for popularisation of value added products of carambola in 5 selected locations of Goalpara district involving 25 nos. of farmwomen.

Results

Parameters	Product recovery (1 kg fresh Carambola)	Income	Shelf life	B.C Ratio
Pickle	500 gm	Rs.200/-	In progress	2:1
Chutney	500 gm	Rs.200/-	In progress	2:1
Squash	750 ml	Rs. 150/-	In progress	3:1

Organoleptic Quality (9 point hedonic scale)

Products	Appearance	Colour	Taste	Flavour	Overall Acceptability
Pickle	8.5	7.0	7.5	7.0	7.5
Chutney	8.5	8.0	7.5	7.0	8.0
Squash	8.5	8.5	8.0	8.0	8.5

Fisheries Activities

The KVK Goalpara Farm ponds were developed for the composite fish culture practices. First application of cow dung and lime to the pond was done followed by the release of fingerlings of Rohu, Catla, Mrigal, Silver carp, Grass Carp, Common Carp to practice composite fish culture. The fish fingerlings were released on the Month of July and was regularly fed every alternative day with Pelleted fish feed or Wheat Bran and Mustard oil Mixture at the ratio of 1:1 at 2-3% of body weight of fish. The pond was regularly checked for water quality monitoring and Fish growth. On the month of December incidence of algal bloom was observed in water body and was treated with Copper Sulphate and Clinar for improvement of water quality. Finally on the month of January as the water level depleted the fishes were harvested and transferred to another pond of KVK farm where water quality is sufficient enough for fish growth. The highest growth was observed in Catla reaching a size of 1.4 kg followed by Silver Carp reaching to a size of 700g in the period of 6 months interval of culture.

KVK Goalpara demonstration Farm Activities

KVK Goalpara demonstration farm promotes the theme “Healthy food, Healthy life, Healthy land” with the goal to improve agricultural productivity and income for farmers of Goalpara district. It is primarily devoted to showcase various agricultural techniques and technologies, new or improved crops to the farmers. Keeping this in view, a number of demonstration units have been established and maintained at KVK Goalpara farm.

Indigenous Dairy Cattle Unit

During the reporting period, KVK Goalpara has established an indigeneous dairy cattle unit at its demonstration farm involving 3 breeds namely Gir, Sahiwal and Lakhimi. This demonstration unit under natural farming aims to showcase

how to use local cow dung and urine to prepare different natural farming inputs like jivamrit, ghanjivamrit, neemastra, agniastra, brahmastra *etc.* and promote natural farming system among the farmers of the district.

Fish-Duck-Horticulture Integrated Farming System

An area of 0.15 ha has been utilized for a Fish-Duck-Horticulture Integrated Farming System Unit comprising 800 nos. under composite fish culture, 40 nos. of ducks and horticultural crops like arecanut, coconut, cocoa and banana.

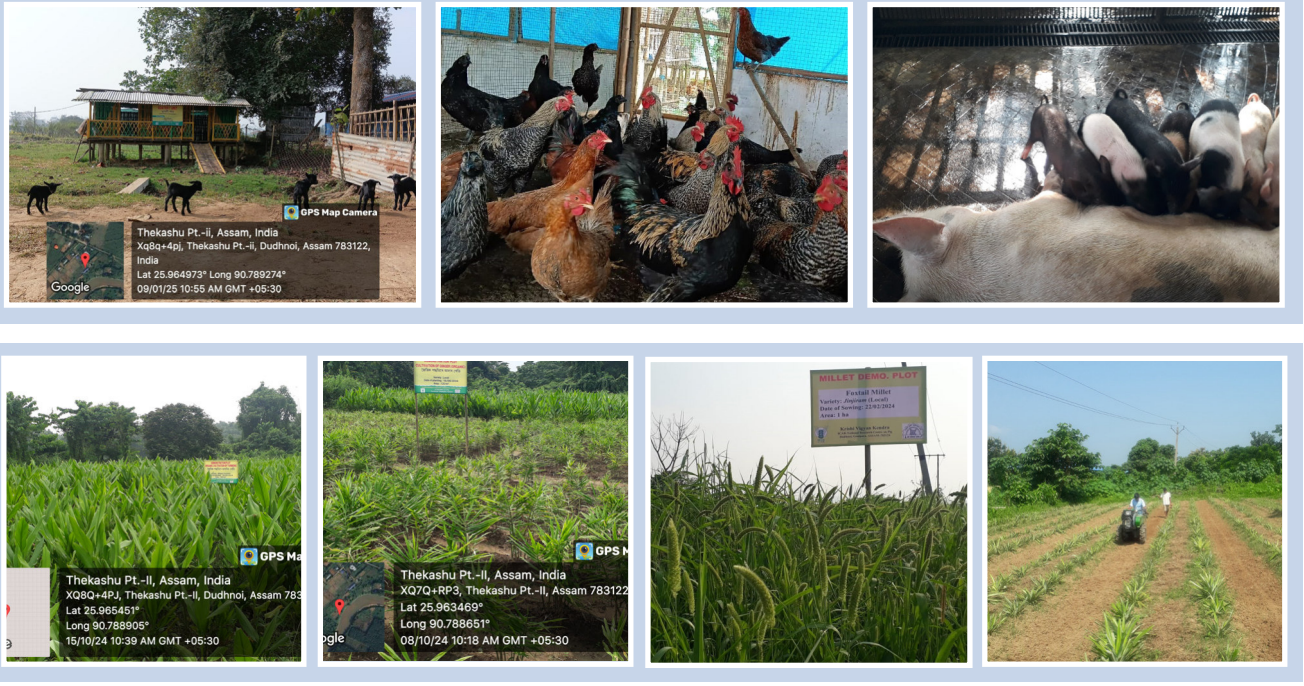
Natural Farming system model

An area of 2 ha has been dedicated for cultivation of crops under Natural Farming which is a chemical free farming system based on livestock and locally available resources and rooted in Indian tradition. A natural farming laboratory has been established to prepare different inputs under natural farming like Jeevamrit, Ghana-jeevamrit, Beejamrit, Neemastra, Agniastra and Brahmastra.

Agri-Eco Park

An agri-eco park named “Pancharatna” was initiated during the year 2023 at KVK Goalpara farm with an objective to develop the farm site as an agricultural, educational, and recreational space and provide a fun farm with seasonal fruits and vegetables grown in open field. During the reported period the foundation of this park was laid by Dr. U.S Gautam, DDG (Agril. Extension) ICAR, on 8th November, 2024. Cultivation in agri Eco park is based on the principles of strengthening organic farming making it sustainable and regenerative, utilize various renewable energy sources and reuse wastes to create a closed-loop system.

The other demonstration units in KVK Goalpara farm are mushroom production unit, vermicompost unit, goatery unit, poultry unit, piggery unit, pineapple cultivation unit, dragon fruit unit, tapioca block, fodder block, orchard block and castor block. Besides these, demonstration on cultivation of pea (var. Arkel), cultivation of potato (var. Kufri pokhraj) and organic cultivation of turmeric (var. Megha turmeric 1) and ginger has also been carried out in the farm.



Moreover, KVK Goalpara is well equipped with a Farm machinery bank and is maintaining a custom hiring centre for greater benefit of the farming community of Goalpara district. Production of seed and planting materials is another important activity of KVK Goalpara. During the reported period, 80 kg of foxtail millet and 30 kg of niger was produced in KVK farm. A total of 5500 numbers of disease free planting materials of tapioca, vegetables and 116 kg of ginger rhizomes were produced in KVK Farm. The total revenue generation from various demonstration units, custom hiring, institutional charges is recorded as Rs. 4, 84,740 /-

4. Other programmes implemented by KVK

i. ***Block level seminar and seedling distribution ceremony***: A Block level seminar and seedling distribution ceremony in collaboration with Coconut Development Board, Guwahati was organized at Rong Rong para village, Goalpara on 21st November, 2024.

ii. **World Environment day:** A plantation drive programme was organised by KVK Goalpara at its premises during the celebration of World Environment day on 05/06/2024. Around 500 nos. of plants like coconut, jackfruit, Indian Gooseberry, mango, guava were planted in different locations of the KVK campus.

iii. **Ek Pedh Maa Ke Naam:** On the occasion of World Environment Day, Prime Minister Narendra Modi launched the 'Ek Pedh Maa Ke Naam' campaign, a unique initiative combining environmental responsibility with a heartfelt tribute to mothers. KVK Goalpara also organised a plantation programme where all the KVK staff members planted a sapling in the name of their mothers.

iv. **Jal Shakti Abhiyan:** KVK Goalpara organised a training programme on water management in paddy cultivation under Jal Shakti Abhiyan on 15/07/2024 at KVK Goalpara premises. 28 nos. of participants were present in the programme.

v. **Celebration of 96th ICAR Foundation Day and Technology day:** KVK Goalpara celebrated the 96th ICAR Foundation Day and Technology day at KVK Goalpara during 15th to 16th July, 2024. During the celebration a series of programmes were organised namely farmers' scientist interaction, showcasing the technologies under Natural Farming, post harvest technologies, scientific livestock management *etc.* which were attended by40 nos. of farmers.

vi. **Foundation lying ceremony of of Agri Ecopark and inaguration of KVK Sale Counter** The foundation of an Agro-Eco park at the riverside of KVK Goalpara was laid by Dr. U.S Gautam, DDG (Agril. Extension) ICAR, on 8th November, 2024. During his visit, DDG (Agri Ext.) also inagurated KVK-G Mart hut situated in KVK campus. He was accompanied by Dr.G. Kadirvel, Director, ICAR- ATARI and other scientist of ICAR- ATARI Zone –VI.

vii. **Celebration of Golden Jubilee year of KVK's(1974-2024)** Under celebration of Golden Jubilee Year, a no. of programmes and events were conducted such as trainings, workshop on Natural Farming, value adddition, demonstration of technoloies in the KVK farm and farmers field. Seeds & seedlings distribution under Nutri Garden ,Poultry distribution, Vermi bed dstribution etc. were also organised to marked the year.

viii. **Orienttion programme for head and SMSs under state Govt.,Govt. of Arunachal pradeshon on 25/11/2024** A group of Head and SMS of 12 nos. of KVKS of Arunachal Pradesh under ICAR- ATARI Zone –VI visted KVK Goal-

para as a part of orientation programmme and exposure visit on 25th Novemer 2024. The participants visited variuos demonstration units of KVK Goalpara and a visit to KVK adopted village at Mazpara.

ix. Workshop and sensitation programme on Zoonotic disease on 30/12/2024 A workshop cum sensitization meeting on zoonotic disease was held at KVK Goalpara on 30th December 2024. The programme was organised by NCDC-National one health programme for prevention and control of Zoonoses, CV.sc., A.A.U, Khanapar, Ghy in collaboration with KVK Goalpara.The programme was attended by 61 numbers. Of ASHA workers, Anganwadi workers, Veterinary field staff, NGO's , farmers and KVK officials. Dr. Dilip kumar Sarmah, Retd. Director, ICAR NRC ON PIG,rani and consultant NCDC had speech about the programme.

x. Celebration of Janajatiya Gaurav Diwas: KVK Goalpara celebrated Janajatiya Gaurav Diwas at Kuchdhowa development block *w.e.f* 15th to 26th November, 2024. A total of 35 nos.of farm women actively participated in the programme.

xi. Celebration of World Sol Day on 5th December 2024: KVK Goalpara celebrated World soil day 2024 under the theme "Caring for soils: Measure, monitor. Manage on 5th December 2024 with students of various institutes. The students were made aware regarding the importance of healthy soil and management of soil resources.

xii. Cluster demonstration on double cropping: KVK Goalpara conducted a cluster Demonstration on double cropping at Dolgoma Kadamtola village, Dudhnoi involving 50 farmers covering an area of 80 bighas.

xiii. **Training on vermicomposting and distribution of vermibed**: KVK Goalpara organised a training programme on vermicomposting and distribution of vermibed in collaboration ICAR-IVRI, Bareilley at Madang pt- II village on 4th July 2024.

5. Extension Activities carried out by KVK Goalpara

A number of extension activities were carried out for dissemination of agricultural technologies and information by the KVK during this period.

Sl. No.	Activity	Nos.
1.	Field Visits	219
2.	Advisory Services	257
3.	Celebration of Important Days	6
4.	Exposure Visits	3
5.	Exhibitions	6
6.	Farmer's Visit to KVK	2640
7.	Field day	2
8.	Awareness camp	35
10.	Newspaper Coverage	9
11.	TV Programme	5
12.	Seed distribution programmes	7
13.	Programme for School Children	15

6. Awards & recognition

Mr. Harkanta Basumatary, a progressive farmer from Goalpara district nurtured under technical guidance of KVK Goalpara received national level Millionaire Farmer of India Award 2024 organised by Krishi Jagaran and ICAR, New Delhi in a programme held at ICAR-IARI, Pusa, New Delhi *w.e.f* 1st to 3rd December, 2024.

7. Publications

Research Paper

i. Abstract on "Sustainable Crop Production through Natural Farming Practices" published in the book of ICSSR sponsored International conference on Climate change & Environmental Sustainabilty In Mountainous & Hilly Landscapes, 30th Sept– 1st October , 2024, Dr. S.K.Baishya, H.C. Kalita, Biswajit Dey, Mousumi Bhuyan

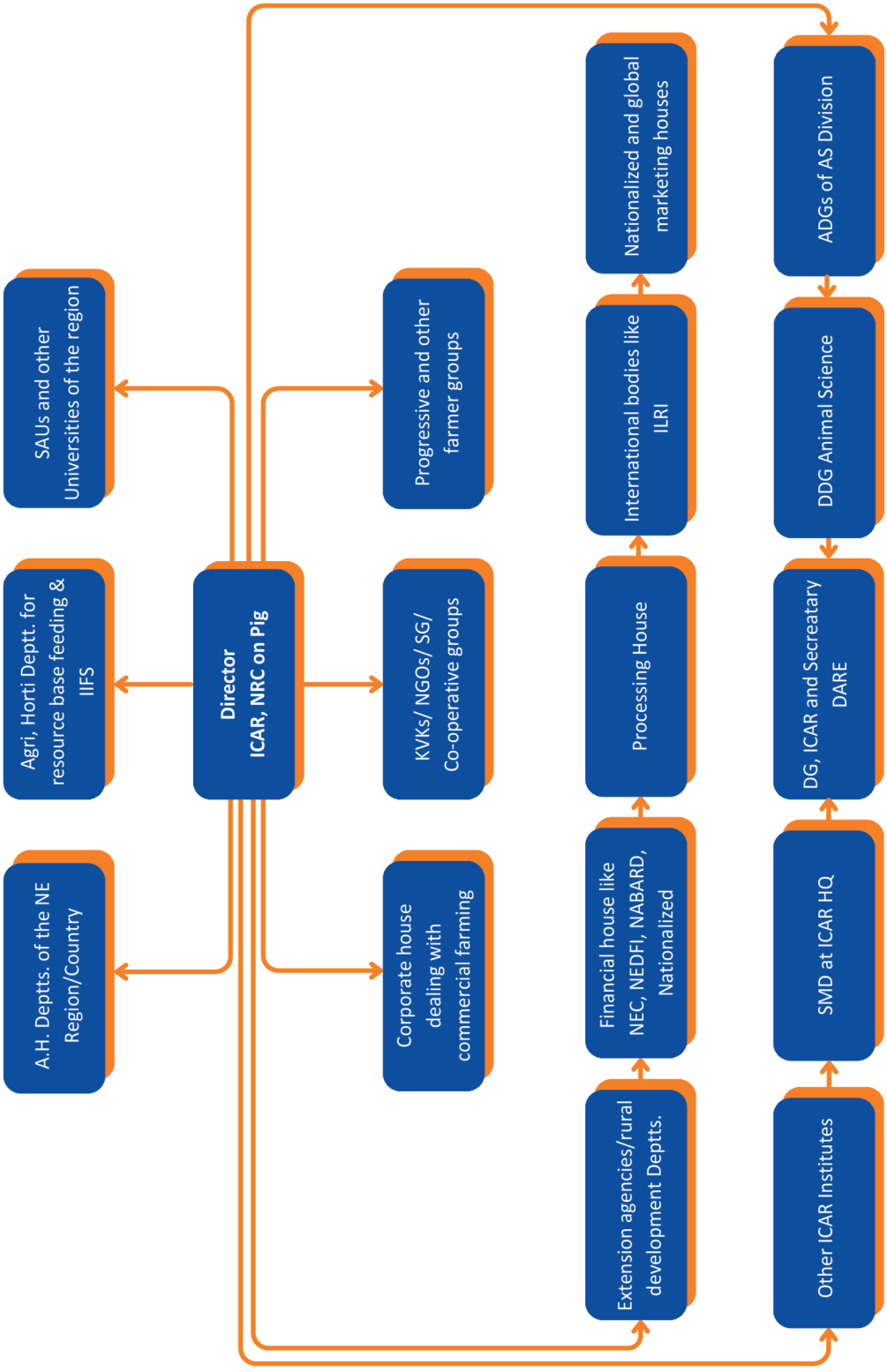
ii. Abstract on "Climate Change & its Consequence on Fish Production in the North Eastern Region" published in the book of ICSSR sponsored International conference on Climate hange & Environmental Sustainabilty In Mountainous & Hilly Landscapes, 30Sept -1 October 2024, Shiva Rajak, Dr. S.K.Baishya.

iii. Abstract on " Agripreneurship development through banana fibre diversified products and efficient marketing : A success story " published in the book of National symposium on " Threads of Heriatage: Exploring Traditional Textiles & Natural Fibres" , 27th -29th January 2025. Poli.Saikia, Minaxi B. Kaman, Dr. S.K. Baishya.

8. Folder

1. Natural farming –A Brief Introduction
   (KVK/GLP/Tech.Bull No.70/2024)
   ByMrs. M.B.kaman,Mrs. M.Bhuyan,Er.B. Kaman, Dr. Biswajit Dey, Mr. Pranjal Dutta, Dr. S.K. Baishya
2. Importance of Moringa leaf & Its Value Addition in regional language
   (KVK/GLP/Tech.Bull No.71/2024)
   By Mrs.P.Saikia, Dr.S.K.Baishya
3. Preservation & value addition of Jackfruit in regional language
   (KVK/GLP/Tech.Bull No.72/2024)
   By Mrs. Poli. Saikia, Dr.S.K.Baishya

11 LINKAGE AND COLLABORATION OF ICAR-NRC ON PIG



ANNUAL REPORT 2024

NAIF SCHEME: ITMU & ABI

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

12 NATIONAL AGRICULTURE INNOVATION FUND (NAIF)

INSTITUTE TECHNOLOGY MANAGEMENT UNIT

In-Charge: Dr. Vishal Rai, Deputy In-Charge: Dr. Lokesha E, PI NAIF: Dr. R. Thomas

During 2024-2025, the Institute Technology Management Unit (ITMU) at ICAR-National Research Centre on Pig has actively pursued technology certification and commercialization initiatives. Supported by the National Agriculture Innovation Fund-I (NAIF-I), ITMU has been proactively working towards securing Intellectual Property Rights (IPRs), including patents, designs, copyrights, and trademarks.

Throughout the year, the institute has successfully developed and granted several technologies, formalized collaborations by signing MoUs with stakeholders and organizations, and participated in four national and regional exhibitions to showcase its innovations. The newly developed technologies across various domains will further strengthen intellectual property management within ICAR, enhance technology transfer, and play a pivotal role in improving the economic status of pig farmers through innovation-driven solutions.

Institute Technology Management Committee Meeting conducted (2024-25): 02

Management of IP portfolio

IPRs	Application/ Registration No.	Name of Innovation/ Technology/ Product/ Variety	Date of Filing/Registration	Application Granted/ Registered**
Patents	201831043234	Pig restraining tool	16.11.2018	Grant No.478346 Granted on 30.01.2024
	201931040074	Lamp primer system for rapidvisual detection of streptococcus suis from pigs and application thereof	03.10.2019	Grant No.495923 Granted on 08.01.2024
	202011004699	A single step nucleic acid based diagnostic for simultaneous detection of nucleocapsid (N), matrix (M) and glycoprotein5 (ORF5) genes of porcine reproductive and respiratory syndrome (PRRS) virus infection in pigs	28.05.2021	Request for Substantive Examination filed at the Patent Office on 18.01.2024
	202311029459	Novel primers for isothermal amplification vis a vis visual rapid detection and quantitative detection of African Swine Fever viral DNA	24.04.2023	Complete specification filed on 24.04.2024
	202311041898	Universal novel single set of primers for specific vis-à-vis simultaneous differentiation of *Escherichia coli* and *Klebsiella* species	23.06.2023	Complete specification filed on 24.06.2024
	202411060519	Development of virus like particle based vaccine against indian isolate of porcine circovirus 2D	09.08.2024	Provisional application filed on 09.08.2024

Trademarks	6339250	"NRCP" INSIGNIA IN CLASS-10	09.03.2024	Registered on 19.09.2024 TM number: 6339250
	6339232	"NRCP" INSIGNIA IN CLASS-42	09.03.2024	Registered on 19.09.2024 TM number: 6339232
	6356890	"FOSARICA"	20.03.2024	Registered on 17.10.2024 TM Number: 6356890
	6728988	MEATSPECS 1.0 (for software being developed for real time aml and pmi under DST STI HUB project)	27.11.2024	Application filed on 27.11.2024
	6728989	OPTI-PIGRATION1.0 (for software being Developed for energy-protein balancing of pig ration under DST STI HUB project)	27.11.2024	Application filed on 27.11.2024
Copyrights	21914/2023-CO/L	LITERARY WORK [PIGGYPLEX (R) ASSAY KIT]	17.08.2023	Granted Registration on 25.01.2024, (L-142041/2024)
	CF 29319/2024-CO/CF	Success stories: scientific pig farming under the initiative of ICAR-National Research Centre on Pig	19.09.2024	Registered on 20.12.2024 (CF-5828/2024)
	33535/2024-CO/L	Boar select aid: smart decision aid for boar selection and furthermore evaluation	24.10.2024	Filed on 24.10.2024
	33533/2024-CO/L	Data card for performance evaluation of growers and finishers	24.10.2024	Filed on 24.10.2024
	33534/2024-CO/L	Sow select-aid: smart decision aid for sow selection and performance evaluation	24.10.2024	Filed on 24.10.2024
	37357/2024-CO/L	Book: Export oriented natural and organic pig husbandry practices and value addition of pork (ISBN:9788195540044)	27.11.2024	Filed on 27.11.2024
	38229/2024-CO/L	Book: Tribal wealth of Dhemaji: a district of upper Assam - its socio-cultural, agriculture and livestock farming perspectives (ISBN: 9788195540013)	04.12.2024	Filed on 04.12.2024
Design	360850-001	Boar semen preservation and transportation box	17.03.2022	Design Registered on 17.05.2024 Design No. 360850-001
	413462-001	Device for manual retort pouch filling	13.04.2024	Application filed on 13.04.2024

Technology certification by ICAR

Following 5 technologies of the institute were given Technology Certification Awarded by ICAR in 2024

1. A Portable Free Standing Small Animal Restraining Tool: Design
2. A Portable Insulated Container For Packed Meat: Model
3. Technology For Development Of Chelated Trace Mineral Mixture To Improve Pig Production: Product
4. Pig Restraining Tool: Design
5. Technology For Micro Pig Abattoir: Model

Professional Services

S No	Name of Institute	Name of Technology/ Know-How/ Service Provided	IP Protection (Yes/ No)*	Name of Contracting Party	Mode of Partnership** Consultancy/ Contract Service & Research)	Date of MoU/ MoA Signing	Revenue Earned (₹)
1	ICAR-NRCP	Exchange of Resources	No	IIT-Guwahati	Co-operation in Education and R&D activities	21.05.2024	NA
2	ICAR-NRCP	Exchange of Resources	No	West Bengal University of Fisheries and Agricultural Sciences	Co-operation in Education and R&D activities	11.06.2024	NA
3	ICAR-NRCP	Exchange of Resources	No	ICMR-National Institute of Virology, Pune	Co-operation in Education and R&D activities	17.09.2024	NA
4	ICAR-NRCP	Exchange of Resources	No	Sri Venkateswara Veterinary University, Tirupati	Co-operation in Education and R&D activities	25.09.2024	NA

Outreach Activities

Training/workshop/Seminar etc.) Attended

Sl. No.	Name of Programme (Training/ workshop/ Seminar etc.) attended	Organized By (Name of Institute)	Days of Programme (Date from - to)	Participant (Name)
1.	Panelist Entrepreneurship Conclave	Livestock and Poultry Show2023-24, AH and Vety. Dept Govt. of Assam	5th January 2024	Dr. Pranab Jyoti Das
2.	SRIJAN: Orientation programme for ICAR ZTMCs/ ITMUs.	IP & TM Unit ICAR, NASC Complex, NewDelhi- 110012	17th -19th January 2024	Dr. Rajib Deb
3.	3rd Edition of Momentum North East	Maniram Trade Centre, Guwahati, Assam	8-10th February 2024	Dr. Priyajoy Kar, Dr. Anil Das, Mr. Rana P. Kakati

4.	Poverty Free and Enhanced Livelihood: Intervention of Pig for NE Region	Zonal Level Workshop on Panchayat Development Index (PDI) with alignment of Localization of Sustainable Development Goals (LSDGs) DK Convention Hall, Itanagar, Arunachal Pradesh organized by Govt. of Arunachal Pradesh	5th -8th Feb'2024	Dr. Pranab Jyoti Das
5.	Annual review meeting of ITMUs/ ZTMCs through Virtual Mode	IP&TM Unit Indian Council of Agricultural Research(ICAR) Krishi Anusandhan Bhawan-I Pusa, New Delhi-110012	24th July 2024	Dr.Vishal Rai
6.	Sensitization to Intellectual Property Rights Issues	ICAR-CIRB, Hisar	13th September, 2024	Dr. Lokesha E Dr. Vishal Rai

Training/workshop/Seminar etc.) Organized

Sl. No.	Name of Programme (Training/ workshop/ Seminar etc.) Organized	Days of Programme (Date from - to)	Participants (No.)	Participant category *
1.	Demonstration of Institute's technologies at Graduation ceremony cum industrial meet on the occasion of foundation day of the Institute	04th September, 2024	50	All visitors
2.	Exposure visit and sensitization program on Intellectual property rights for Downtown University Students, Assam	06th November 2024	45	Faculty & Students
3.	Practical exposure on processing and entrepreneurship development skill	19th November, 2024	39	Faculty & Student
4.	Students exposure program : Food microbiology insights at ICAR-NRCP	26th November 2024	50	Faculty & Student

SRIJAN: Orientation programme for ICAR ZTMCs/ITMUs at IP & TM Unit ICAR, NASC Complex, New Delhi- 110012 (Attended by Dr. Rajib Deb)

Display of Institute's technologies during visit of Hon'ble Minister of State for Agriculture and Farmers Welfare, Govt. of India on 24.10.2025

AGRI-BUSINESS INCUBATION CENTRE

Agri Business Incubation Centre of ICAR-NRCP has offered its entrepreneurs substantial technical assistance during the reported period. In order to facilitate the entrepreneurs to scale up their initiatives, the ABI centre has offered them proactive, beneficial business support in the form of technical consulting, mentor connections, guidance, and trainings to develop contemporary technology-based business ideas and models in business domains. The following figure depicts the number of entrepreneurs availing various technical as well as technological support from ICAR-NRC on Pig.

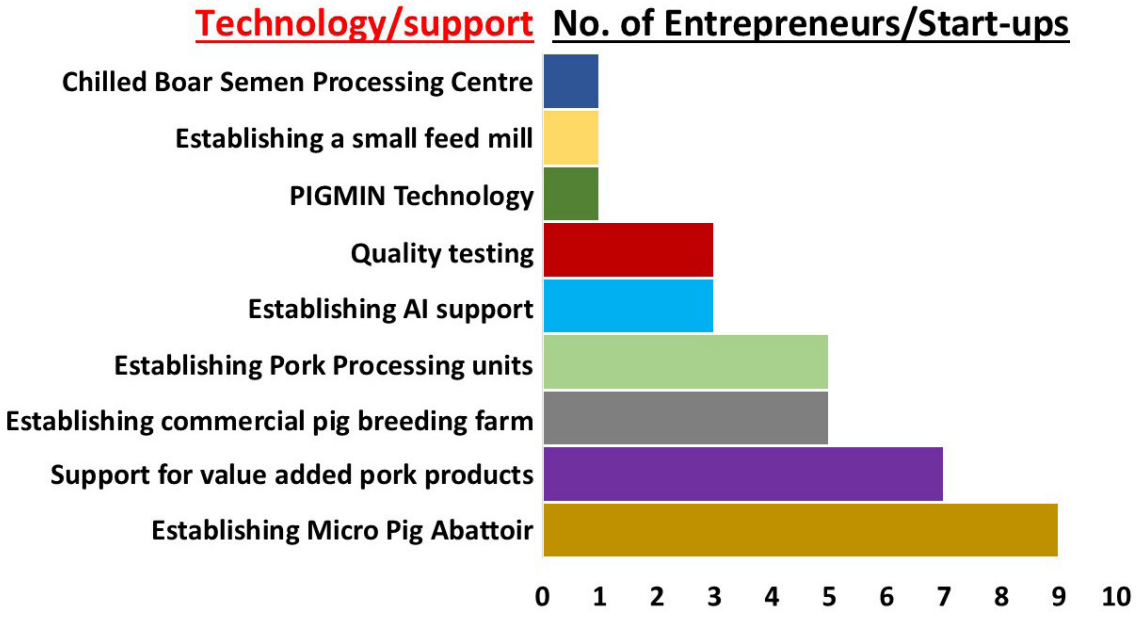


Fig: Technology/support extended to entrepreneurs

Organization of Entrepreneurship Development Programmes

Agri-Business Incubation Unit, ICAR-National Research Centre on Pig, Rani, Guwahati, organizes three-day Entrepreneurship Development Programmes (EDP) on "Scientific Pig Production and Value Addition of Pork". During the year 2024, two numbers of EDPs were organized where a total of 37 participants from 12 states participated. Lectures and demonstrations were done by Scientists and personnel with expertise in their respective areas of scientific pig production, value-addition, marketing, and different issues associated with starting small-scale businesses. The exposure was generally focussed on aspects such as breed selection and breeding strategies, housing, bio-security, artificial insemination, disease management, feeding strategies and approaches in rural areas for commercial pig farming along with addressing specific technological challenges faced by entrepreneurs in the pork value chain. Special sessions were arranged for issues pertinent to FSSAI licensing/registration; NABARD and NLM project guidelines and different funding options available for the entrepreneurs viz. AHIDF, RKVY, Angel investors etc. The participants were also encouraged to join Agri-Business Incubation (ABI) Unit, ICAR-NRC on Pig for incubation of their businesses and ideas.

Graduation ceremony cum Industry meet

The Agri-Business Incubation Unit organized its Graduation Ceremony cum Industry Meet on the sidelines of 23rd Foundation Day of ICAR-NRC on Pig, Rani Guwahati on 4th September, 2024. Institute has awarded graduation certificates to 5 entrepreneurs who have successfully completed their incubation programme with the institute and initiated their business. The programme included interactive sessions between the guests, audience and the graduated entrepreneurs.

Fig: Details of graduated entrepreneurs from ABI unit of ICAR-NRC on Pig

Sensitization programme on agri business incubation

A sensitization programme was held on 31st January, 2024 where the scopes and current status of technology commercialisation via Agri-Business Incubation centre and Institute Technology Management Unit of ICAR-NRC on Pig were discussed in presence of Dr. Shiv Dutt, PS, IP&T, ICAR. Dr. Dutt has provided valuable inputs on streamlining the different activities associated with NAIF scheme.

Initiating specific incubation programme 'SwineNEST 1.0' for entrepreneurs

Institute has initiated a special call for Expression of Interest (SwineNEST 1.0) from interested entrepreneurs (viz. individuals/organizations/SHGs/NGOs and Registered Societies) for Incubator support through Agri-Business Incubation (ABI) centre of the Institute for starting, diversifying and up-scaling of commercial piggery/allied services/pork processing/quality control sectors. Thrust areas were establishment of commercial pig farms, developing allied service sectors, such as artificial insemination service, feed formulations and disease diagnostic support, technical support for setting up of pork processing units and initiating brand building activities, knowledge support in establishing laboratory facilities for testing of pork and pork products and any other mutually agreeable area(s) related to piggery sector.

Initiating specific incubation programme 'StuGNite 1.0' for students

'Stu-GNITE 1.0' was aimed at addressing a plan to foster innovation, creativity, and entrepreneurship among students through the support of Agri Business Incubation Unit of ICAR-National Research Centre on Pig (ICAR-NRCP). The programme was focused to nurture the young aspiring minds by creating a supportive ecosystem where student entrepreneurs can thrive and contribute positively to the economy and society at large. The programme will basically involve

Graduate and/or Postgraduate students of any recognized Institute or University in India for opportunity creation and wealth generation while meeting the immediate and future needs of the society in livestock (especially pig and pork value chain), allied sectors and agriculture industry, alike.

Development of Food Safety Risk Calculator (FoSaRiCa)

A Food Safety & Risk calculator was developed as a platform that ranks the risks of various food by taking into account the interactions between the variables that increase the risk of foodborne illness. The tool has been designed to suit the Indian users and is a simple tool for ranking the risks associated with different foods by considering the interplay of factors that contribute to foodborne disease. The tool can also be used to explore the effect of different risk-reduction strategies, or the extent of change required to bring about a desired reduction in risk in the food. The tool can be used by risk managers, researchers, students and others without extensive experience in risk modelling.

FoSaRiCa
Food Safety Risk Calculator

https://fosarica.in

Coverage of ABI activities in national and regional media

The initiatives of entrepreneurs of ABI unit have been covered by Doordarshan during 2024 and was featured in a programme “Krishi-Startup”.

Fig: Glimpse from DD coverage of M/s Khaisua Foods. for “Krishi-Startup” programme

Fig: Glimpse from DD coverage of M/s Sayuri Farms Pvt. Ltd. for “Krishi-Startup” programme

ANNUAL REPORT 2024

PG DIPLOMA IN PORK VALUE CHAIN MANAGEMENT

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

13 POST GRADUATE DIPLOMA IN PORK VALUE CHAIN MANAGEMENT

Course Director: Dr. Vivek Kumar Gupta, Director, ICAR-NRC on Pig

Course Coordinators: Dr. R. Thomas, Dr. Priyajoy Kar; Dr. Mohan N.H., Dr. Lokesha E and Dr. Nitin M Attupuram

The Post Graduate Diploma in Pork Value Chain Management is a specialized program offered by the ICAR-National Research Centre on Pig (NRC on Pig), located in Guwahati, in collaboration with the ICAR-Indian Veterinary Research Institute (IVRI) in Izatnagar, Bareilly. This unique diploma program provides an in-depth understanding of the pork value chain, focusing on the management, processing, preservation, and quality control aspects of the pork industry. It aims to equip professionals with the necessary skills and knowledge to enhance the pork production, processing, and marketing processes, thus improving the sustainability and efficiency of the pork industry.

The program is designed to span two semesters and covers a comprehensive range of thematic areas essential for developing a holistic understanding of the pork value chain. These thematic areas are structured to provide theoretical knowledge, practical exposure, and skill development in the various aspects of pork production, processing, and value addition.

Semester 1: Foundations of the Pork Value Chain

The first semester of the diploma program focuses on the foundational aspects of pork value chain management, covering critical topics related to pork production and processing. The key areas of study include:

1. **Introduction to Pork Value Chain:** This module provides an overview of the pork value chain, covering the entire process from farm to consumer. It explores the different stages involved in pork production, including breeding, feeding, farming practices, and processing. The course also emphasizes the importance of managing each stage effectively to ensure quality, sustainability, and profitability in the pork industry.
2. **Advancement in Pig Abattoir Practices and Fabrication of Cut:** This area covers the modern practices in pig slaughtering and meat processing. Students are introduced to the latest advancements in abattoir operations, including humane slaughter techniques, hygienic practices, and the efficient fabrication of pork cuts. These skills are essential for improving the overall meat quality and ensuring compliance with health and safety regulations.
3. **Basics of Further Processing and Value Addition of Pork:** Further processing techniques such as curing, smoking, drying, and fermentation are essential to enhance the shelf life and value of pork products. This module covers the basics of these processes, as well as the development of value-added pork products such as sausages, ham, bacon, and other processed meats.
4. **Packaging and Labelling of Pork and Pork Products:** Effective packaging and labelling are key components in ensuring the quality, safety, and marketability of pork products. Students learn about packaging materials, preservation techniques, and regulatory requirements for labelling. This ensures that pork products meet consumer expectations and comply with food safety standards.
5. **Clean Pork Production and Value Addition of Pork:** This module focuses on the importance of maintaining cleanliness and hygiene during pork production, processing, and packaging. Students are introduced to the best practices in maintaining a clean production environment, preventing contamination, and enhancing the quality and safety of pork products.

Semester 2: Advanced Techniques and Business Opportunities

The second semester of the program delves deeper into the technical, business, and quality control aspects of the pork value chain. The thematic areas in this semester focus on the preservation, spoilage, and quality assurance of

pork and pork products, as well as exploring business opportunities in the pork industry.

1. **Introduction to Spoilage of Pork and Pork Products:** This module educates students about the common causes of spoilage in pork and pork products. It covers microbial spoilage, enzymatic changes, and the factors that contribute to the deterioration of pork quality. Understanding spoilage is crucial for developing strategies to prevent product losses and ensure freshness and safety.
2. **Preservation of Pork/Pork Products and By-Product Utilization:** Preservation techniques such as refrigeration, freezing, curing, and canning are essential for extending the shelf life of pork and pork products. This module also addresses the potential for utilizing pork by-products, which can be processed into a variety of products like pet food, leather, and fertilizers. Students gain insights into optimizing these resources for value addition.
3. **Quality Control and Personnel Hygiene:** This module emphasizes the significance of quality control practices in maintaining the consistency and safety of pork products. It covers the monitoring of quality at various stages of production and processing, as well as the role of personnel hygiene in ensuring a safe working environment. The module introduces HACCP (Hazard Analysis Critical Control Points) and other quality assurance systems.
4. **Business Opportunities Associated with Pork Value Chain:** In addition to technical skills, the program also focuses on the business side of the pork industry. Students learn about market trends, entrepreneurship, and the economic aspects of the pork value chain. This includes opportunities in retail, export, and value-added products, enabling graduates to make informed business decisions and identify growth opportunities in the industry.
5. **Quality Assessment of Pork and Pork Products:** The final module of the program covers the various methods of assessing the quality of pork and pork products. This includes sensory evaluation, chemical analysis, and microbiological testing. Understanding quality assessment techniques is crucial for ensuring that pork products meet the required standards and consumer expectations.

The Post Graduate Diploma in Pork Value Chain Management offers a comprehensive education in all aspects of pork production, processing, and value addition. With its two-semester structure, the program equips students with both theoretical knowledge and practical skills necessary for excelling in the pork industry. Graduates of the program will be well-prepared to contribute to the development and growth of the pork value chain, from production to processing, quality control, business management, and beyond. This program plays a vital role in improving the efficiency and sustainability of the pork industry while creating opportunities for innovation and entrepreneurship in the sector.

Fig. First Batch Students along with Course Director and Course Coordinators

List of Students enrolled in ICAR-NRC on Pig, Rani, Guwahati during 2024

Sl No.	Name of the Student	Name of the Supervisor	Degree Programme	Host Institute
1	Dr. Syed. A. Arif	Dr. Swaraj Rajkhowa Principal Scientist, Veterinary Medicine	Ph.D.	ICAR-Indian Veterinary Research Institute, Izatnagar
2	Dr. Aparajita Nath	Dr. Pranab Jyoti Das Principal Scientist, Animal Genetics & Breeding	MVSc.	ICAR-Indian Veterinary Research Institute, Izatnagar
3	Dr. Laldimaii Damei	Dr. Souvik Paul Senior Scientist Veterinary Parasitology	MVSc.	ICAR-Indian Veterinary Research Institute, Izatnagar
4	Dr. Khumali Debbarma	Dr. Souvik Paul Senior Scientist Veterinary Parasitology	Ph.D.	College of Veterinary Science, Tirupati
5	Dr. Supriya Roy	Dr. Rajib Deb Senior Scientist Animal Biotechnology	MVPh.	All India Institute of Hygiene and Public Health, West Bengal
6	Dr. L. Wilson Varay	Dr. Rajib Deb Senior Scientist Animal Biotechnology	Ph.D.	ICAR-Indian Veterinary Research Institute, Izatnagar
7	Dr. Gyanendra Singh Sengar	Dr. Seema Rani Pegu Senior Scientist Veterinary Pathology	N-PDF	ICAR-National Research Centre on Pig, Rani DST-SERB (Funding Agency)
8	Ms. Dolly Sharma	Dr. R. Thomas, Principal Scientist, LPT	Ph.D.	Assam Don Bosco University, Sonapur

ANNUAL REPORT 2024

SWACHH BHARAT MISSION

राष्ट्रीय सूकर अनुसन्धान केन्द्र
NATIONAL RESEARCH CENTRE ON PIG
RANI, GUWAHATI, ASSAM

भाकृअनुप
ICAR

14 SWACHH BHARAT MISSION

The Swachh Bharat Mission was launched by the Government of India with the aim of achieving a clean India concept with a tagline "Ek Kadam Swachhata Ki Ore (One Step Towards Cleanliness)". The mission emphasizes sanitation, hygiene, and waste management across rural and urban areas. The activities are focused to create a clean and hygienic India by promoting sustainable sanitation practices, reducing waste, and encouraging behavioral change. ICAR-National Research Centre on Pig organized an array of activities under Swachh Bharat Mission on monthly basis to ensure cleanliness inside campus and nearby areas. The institute also undertook campaigns like "Swachhata Hi Seva" and "Swacchata Pakhwada".

Swachhata Hi Seva 2024 campaign

The Swachhata Hi Seva 2024 campaign at ICAR-National Research Centre on Pig, Guwahati, Assam, witnessed a remarkable blend of activities emphasizing environmental cleanliness, social responsibility, and community involvement from 17th September to 2nd October, 2024. From tree plantations, cleanliness drives, and workshops, to public awareness initiatives, the program saw participation from staff, scientists, students, and the community. Notable events like the 'Ek Ped Maa Ke Naam' plantation drive, Eco-art initiative, and outreach programs such as 'Swachhata Ki Pathshaala' highlighted both the qualitative impact on mindset change and quantitative achievements in environmental conservation and public hygiene. The list of activities undertaken in the campaigns are enlisted below.

Sl. No.	Name of Activity	Date	Major Actions Taken
1	'Ek Ped Maa Ke Naam' Plantation Drive	17th September 2024	Planted 50 saplings, including coconut trees along water bodies to enhance green cover.
2	Swachhata Pledge	17th September 2024	Scientists, staff, and trainees took a pledge to maintain cleanliness and promote Swachh Bharat ideals.
3	Campus Beautification	17th September 2024	Cleaning and beautification of common areas, pathways, and surroundings. Landscaping improvements.
4	Banner Display & Selfie Points Installation	17th September 2024	Installed banners and selfie points; encouraged social media participation.
5	Swachhata Ki Pathshaala	18th September 2024	Conducted cleanliness awareness program at government primary school, Andherijuli. Organized a drawing competition, and tree plantation drives.
6	Swachhata Samvad: Clean India Talks	19th September 2024	Organized workshop on cleanliness and waste management; took the 'No Spit Pledge'.

Sl. No.	Name of Activity	Date	Major Actions Taken
7	Eco-Art Initiatives	20th September 2024	Organized 'Trash to Treasure' competition; Best art from waste materials were awarded.
8	Human Chain Formation	21st September 2024	Participants formed a human chain promoting 'Reduce, Reuse, Recycle'.
9	Walk for LiFE: Mission LiFE Fitness Drive	21st September 2024	Promoted healthy lifestyles and environmental sustainability.
10	Sampoorna Swachhata: Shramadaan	22nd September 2024	Cleaned littered public areas at Kopili picnic spot.
11	Cleanathon: Swachhata	23rd September 2024	Outreach in Rani market and market area were cleaned. An awareness programme was organized for public to educate them on safe waste disposal.
12	Mega Cleanliness Drive	24th September 2024	Cleaned black spots and roadside drainage near Rani Forest area.
13	Health Camp	26th September 2024	Conducted health check-up for Safai Mitras and their families (45 beneficiaries).
14	Health Awareness Day	27th September 2024	Focus was given to helping Safai Mitras incorporate good hygiene practices into their personal lives; provided information on Ayushman Bharat Digital Mission.
15	Distribution of Safety Gear & Biosecurity Session	28th September 2024	Distributed PPE kits, gumboots, and sanitizers; conducted a biosecurity session.
16	Session on Social Welfare Linkages for Cleaning Workers	29th September 2024	Educated Safai Mitras on government welfare schemes.
17	Cleanliness Drive at Ganesh Mandir	30th September 2024	A special cleaning event at Ganesh Mandir, Kopili, by shramdaan around the temple premises
18	Gram Sabha: People's Meet	1st October 2024	Organized at Gogamukh in association with the SCSP program of ICAR-NRC on Pig.
19	Swachhata Diwas at ICAR-NRC on Pig	2nd October 2024	Activities included a cleanliness drive and the launch of the Swachh Ghar, Swachh Bharat campaign.

The Swachhata Hi Seva 2024 campaign at ICAR-NRC on Pig concluded with overwhelming success, showcasing a harmonious blend of collective action and creative engagement. With more than 50 saplings planted, extensive public outreach, and multiple community-driven cleanliness initiatives, the campaign not only improved the environmental landscape but also instilled a lasting sense of responsibility among participants. The wide range of activities—from health camps to cultural events—fostered awareness about cleanliness and sustainability, leaving a tangible and impactful legacy in both the campus and local communities.


SWACHHATA HI SEVA 2024

Swachhata Pakhwada – 2024

ICAR NRC on Pig organized Swachhata Pakhwada form 16th -31st December 2024, with a series of impactful initiatives aimed at promoting cleanliness, environmental sustainability, and community awareness. These activities encompassed diverse aspects, including office and farm sanitation, waste management, biosecurity awareness, community engagement, and the promotion of sustainable practices. By involving scientists, staff, students, farmers, and local communities, the campaign fostered a collective responsibility toward a cleaner and healthier environment. The activities are enlisted below.

S. No.	Activity	Date	Details
1	Swachhta Pledge Day	16th December, 2024	Scientists and staff took a Swachhta pledge, administered by the Director, reaffirming commitment to cleanliness.
2	Swachhata Awareness Programme	17th December, 2024	Session on “Piggery Waste to Wealth” discussing waste management, food waste upscaling, and biosafety concerns. Attended by scientists and veterinary officers.
3	Installation of Selfie Point	17th December, 2024	A selfie point was installed at the institute entrance to promote Swachh Bharat. Participants shared photos on social media.
4	Cleanliness Maintenance Drive	18th December, 2024	Scrap disposal and cleaning drive to create additional work spac for improved work environment.
5	Sanitation Drive	19th December, 2024	Cleaning of institute premises, pathways, and pig sheds, ensuring proper sanitation and hygiene maintenance.
6	Act for “Cleaner Environment, Brighter Futures”	20th December, 2024	Clean-up of Jirang Lake and rivulets, raising community awareness on plastic pollution, promoting eco-tourism potential.
7	“Green and Clean” Initiative	21st December, 2024	Tree plantation and campus beautification using upcycled biomass; 50 saplings planted with community participation.
8	Fresh Water Source Reclamation Initiative	22nd December, 2024	Cleaning and restoring ponds, performing water quality assessments, and applying lime for water reclamation.
9	Kisan Diwas	23rd December, 2024	Engaged tribal lady pig farmers, promoting hygiene, sanitation, and sustainable pig farming in collaboration with the Tribal Sub-Plan.
10	Swachh Bhavishya: Swachh Bharat	24rd December, 2024	Conducted essay and drawing competitions at Umsur government school, emphasizing children’s role in cleanliness and hygiene.
11	Biosecurity Pathshala	25th December, 2024	Educated farmers on biosecurity protocols, demonstrating PPE use and safe farm waste disposal. Protective gear was distributed.
12	Swachhata Jagran Initiative	26rd December, 2025	Awareness session and cleanliness drive at Chandubi Lake, with community participation and cultural performances.

13	Shramdaan for Sustainable Environment	27th December, 2024	Scientists and staff engaged in weed removal, painting boundary walls, and site cleaning for a cleaner environment.
14	Plogging Event	28th December, 2024	Plastic waste collection at Kopili Picnic Spot; placement of waste bins to promote sustainable waste management.
15	Community Impact Initiative	30th December, 2024	De-weeding of water flow channels to prevent water logging; cleaning sessions in Loharghat Bagan and nearby market areas; awareness session for tribal women of Rajapara.
16	Laboratory Biosafety Drive	31st December, 2024	Awareness session on laboratory biosafety; proper handling and disposal of biological and chemical waste; cleaning and decluttering of laboratory spaces.

The concerted efforts of ICAR-NRC on Pig not only enhanced cleanliness and hygiene in institutional and public spaces but also strengthened awareness about sustainable waste management, and environmental conservation. Through active participation and strategic interventions, the campaign contributed to long-term behavioral change, demonstrating the power of community-driven action in building a Swachh Bharat (Clean India) and a more sustainable future.

ANNUAL REPORT 2024

MEETING AND OTHER ACTIVITIES

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NATIONAL RESEARCH CENTRE ON PIG
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15 MEETINGS AND OTHER ACTIVITIES

Meeting of Quinquennial Review Team

The ICAR-NRC on Pig submitted the QRT report on November 4, 2024. Dr. V. K. Taneja, Chairman, QRT, presented the report to Dr. Himanshu Pathak, Secretary, DARE and Director General, ICAR in the presence of Dr. Raghavendra Bhatta, Deputy Director General (Animal Science) and Dr. Amrish Kumar Tyagi, Assistant Director General (Animal Nutrition & Physiology). The external members of QRT include Dr. Arjava Sharma, Former Director, ICAR-CIRC, Meerut and Former Director, ICAR-NBAGR, Karnal; Dr. Kusumakar Sharma, Former, ADG (HRD), ICAR; Dr. V.V. Kulkarni, Former Director ICAR-NRC on Meat, Hyderabad; Dr K. K. Datta Former Principal Scientist, NIEP, New Delhi and Dr. S.K. Uppal, Dean, PGS, GADVASU, Ludhiana.

Research Advisory Committee Meeting

Research Advisory Committee meeting was held in virtual mode on 18 June, 2024 under the chairmanship of Dr A. K. Srivastava, Vice-Chancellor, UP Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go-Anusandhan Sansthan and members Dr Dharmeswar Das, Former Joint Director (Acad.) IVRI and Dean, CVSC, Khanapara; Dr Devendra Swarup, Former Director ICAR-CIRG, Makhdum; Dr. D. K. Aggarwal, Former Head, Division of Animal Nutrition, IVRI, Izatnagar; Dr S. K. Mendiratta, Joint Director (Academics), IVRI, Izatnagar; Dr Hema Tripathi, National Coordinator, NAHEP, ICAR and Dr. Amrish Kumar Tyagi, ADG (AN& P), ICAR.

Institute Research Council Meeting

The XVIII Annual Institute Research Council meeting of ICAR-NRC on Pig was held from 1st-3rd July 2024 in the Committee room of ICAR-NRC on Pig under the chairmanship of Dr. V.K. Gupta, Director, ICAR-NRC on Pig, Rani. Dr. Souvik Paul, Member Secretary, IRC and I/C PME Cell of the Institute extended a formal welcome to the Director and scientists of the Institute. In his opening remarks, the Chairman IRC and Director, ICAR-NRC on Pig, Dr. V.K. Gupta emphasized the need for outcome-based research. Each scientist must try to evaluate the research work conducted by himself. He also requested each scientist to publish their tangible research to high-impact factor journals, once the work is over. The chairman informed that project-based budgeting is going to start for institutional projects. Therefore, there is a need to prioritize the institutional projects. During the meeting the outcome of completed projects, the committee critically

evaluated the progress of ongoing projects and suggestions were given for improvement. The technical programs of new project proposals were presented by PIs and thoroughly reviewed.

Institute Management Committee Meeting

Institute Management Committee meeting was convened by the ICAR-National Research Centre on Pig, located in Guwahati, Assam, on 11 December, 2024. The meeting took place in virtual mode and was chaired by Dr. V.K. Gupta, the Director of ICAR-NRC on Pig. Mr. Rupesh Sabharwal, the Administrative Officer of ICAR-NRC on Pig, served as the member secretary. The meeting was attended by members representing different sectors viz. Dr. Arnab Sen, Head of Eastern Regional Station, ICAR, IVRI Kolkata; Dr. Sulip Kumar Majhi, Head of Guwahati Regional Centre, ICAR, CIFRI; Dr. Swaraj Rajkhowa, Pr. Scientist, ICAR – NRC on Pig; Dr. Keshab Barman, Pr. Scientist, ICAR Hqrs; Dr. Jagannath Kalita, Deputy Director, AH & V, Govt. of Assam; Dr. Khanindra Kalita, nominated by President, ICAR; and Shri Gauranga Ghosh, CF&AO, ICAR Research Complex for NEH Region.

Institute Animal Ethics Committee Meeting

The Seventh Institute Animal Ethics Committee (IAEC) meeting of ICAR -NRC on Pig was organised on afternoon session of 21st November 2024 from 2.00 pm to 6.00 pm. The meeting was held at committee room of the institute and was chaired by Dr. Vivek Kumar Gupta, Chairman, IAEC and Director, ICAR-NRC on Pig. In the meeting Dr. Birendra Nath Bhattacharyya (Main Nominee of CCSEA), Dr. Arundhati Phookan, (Link Nominee of CCSEA), Dr. Pavan Kumar Samudrala (CCSEA Nominee), Mr. Bikash Saikia (Socially aware nominee of CCSEA), Dr. Rafiqul Islam (Farm in charge and Member, IAEC), Kalyan De (Scientist from biological discipline and Member, IAEC), Dr. Anil Kumar Das (Veterinarian and Member, IAEC) and Dr. Nitin M Attupuram (Member Secretary, IAEC) participated. The programme began with welcome and introductory remarks. The project wise examination of the research protocols submitted were done with proper discussion and rectifications were suggested. The meeting recommended 29 research project proposals. The meeting concluded with the concluding remarks of Chairman and other CCSEA members. Member Secretary offered vote of thanks to all members present in the meeting of IAEC.

Annual inspection of the CCSEA to experimental pig farm

The annual inspection of the large animal house facility registered with Committee for the Control and Supervision of Experiments on Animals (CCSEA) at ICAR-NRC on Pig (1658/GO/RBi/L/12/CCSEA) was held on 21st November 2024. The CCSEA team comprising of Dr. Birendra Nath Bhattacharyya (Main Nominee of CCSEA), Dr. Arundhati Phookan, (Link Nominee of CCSEA), and Mr. Bikash Saikia (Socially aware nominee of CCSEA) reviewed the pig farm facilities and suggested improvisations required. The documents related with the feeding, care and management were validated and the team interacted with the farm management committee members Dr. Rafiqul Islam (Farm in charge), Kalyan De (Senior Scientist, LPM) and Dr. Nitin M Attupuram (Scientist, LPM). The team interacted with the farm manager Dr. Anil

Kumar Das (Veterinarian and technical officer) during the inspection and reviewed the welfare concerns. The biosecurity facilities were also inspected. The team expressed satisfaction on the pig farm management followed in the large animal facility registered with CCSEA.




Visit of Shri Bhagirath Choudhary Hon'ble MoS for Agriculture and Farmers Welfare, GoI



Shri Bhagirath Choudhary, Honourable Minister of State for Agriculture and Farmers Welfare, Government of India, visited ICAR-National Research Centre on Pig on 24th October 2024. During his visit, he interacted with farmers and scientists, distributing essential resources under the Tribal Sub-Plan program to support pig farmers and improve their livelihoods.

Visit of Shri Ram Nath Thakur, Hon'ble MoS for Agriculture and Farmers Welfare, GoI

Shri Ram Nath Thakur, Hon'ble Minister of State for Agriculture and Farmers Welfare, Government of India, visited the ICAR-National Research Centre on Pig on 17th August 2024. During his visit, he interacted with the scientists, gaining insights into ongoing research and advancements in pig farming.

Interaction with Secretary, DARE and DG, ICAR

Dr. Himanshu Pathak, Honourable Secretary, DARE, GoI & Director General, ICAR visited ICAR-NRC on Pig on 08.01.2024 and interacted with Director & Scientists. Dr. Pathak was accompanied by Dr. V.K. Mishra, Director, ICAR RC-NEHR and Dr. A.K. Mohanty, ATARI Zone VII

Visit of Chairman, Assam Agriculture Commission

Dr. H.S. Gupta, Chairman, Assam Agriculture Commission (AAC) and former Director, ICAR - Indian Agricultural Research Institute, New Delhi visited ICAR-NRC on Pig on March 10, 2024. The Director welcomed him, and discussions were held with the scientists of the Institute on various aspects of agricultural research and development.


Annual Review Meeting of AICRP and Mega-Seed Project on Pig

The Annual Review Meeting of All India Coordinated Research Project on Pig and Mega-Seed Project on Pig for year 2022-23 was organized at the ICAR- National Research Centre on Pig, Rani, Guwahati, Assam during 25-26th April 2024 under Chairmanship of Dr. Raghavendra Bhatta, Deputy Director General (Animal Science), ICAR. Dr. Raghavendra Bhatta, Deputy Director General (Animal Science), ICAR, highlighted the relevance of piggery-based livestock enterprise for food and economic security in the country, especially for the North Eastern region of the country. Dr. Bhatta also emphasized on characterization and conservation of indigenous pig germplasm, especially Doom, Tenyi Vo and Zowak breeds of the country. During the review meet, Dr. G.K. Gaur, Assistant Director General (AP&B), ICAR highlighted for identification and breeding of superior germplasm and increasing substantial increase in the availability of germplasm at field levels. Dr. V.K. Gupta, Director, ICAR-NRC on Pig & Project Coordinator presented the coordinator's report for the year 2022-23 and suggested the AICRP centres to work towards the development of breeder farmers, dissemination of technologies for economic upliftment and livelihood security. The meeting was attended by Principal Investigators of AICRP and Mega-Seed centres spread across the country and Scientists of ICAR-NRC on Pig, Assam.



Interaction with the Delegates from Embassy of France

A team from the Embassy of France visited the institute to discuss potential collaborative projects. They interacted with the Scientists of the institute to explore opportunities for cooperation and research partnerships.

Workshop on Animal Ethics in Scientific Research

The Institute Animal Ethics Committee (IAEC) organised a workshop under the aegis of Human Resource Development (HRD) unit of ICAR -National Research Centre on Pig on the forenoon of 21st November 2024. Dr. Juwar Doley, Nodal Officer, HRD unit, delivered the welcome speech. The session on "Ethics in Animal Experimentation" by Dr. Pritam Mohan, Professor, Department of Pharmacology and Toxicology, Assam Agricultural University comprehensively outlined the practical considerations to be made while performing animal experimentation with respect to the animal ethics concerns. Dr. B.N. Bhattacharrya, Deputy Director of Research (Veterinary), Assam Agricultural University delivered a session on "From Proposal to Approval: Critical Aspects of Animal Ethics". The programme was attended by all scientists, research scholars, senior research fellows, and research associates of the institute. The interactive session focussed on clearing the various doubts while filing applications for IAEC approvals. The programme concluded with a vote of thanks by Dr. Rafiqul Islam, Principal Scientist, ICAR- NRC on Pig.

Annual Review Meeting (2023-24) of AICRP on Pig

The annual review meeting of All India Coordinated Research Project on Pig for the year 2023-24 was organized at ICAR-CCARI, Goa in collaboration with ICAR-NRC on Pig during 19-20 September 2024. The meeting was held under the chairmanship of Dr. Raghavendra Bhatta, DDG (AS). The meeting was attended by Dr. G.K. Gaur, ADG (AP&B), Dr. V.K. Gupta, Director and Project coordinator of AICRP on Pig, and Principal Investigators (PIs) of AICRP centres. Dr.

G.K. Gaur, ADG (AP&B) highlighted the history and achievements of the project from its commencement. He also narrated about importance of genetic improvement in indigenous as well as crossbreds developed to enhance the overall pig productivity through the project. During the inaugural session, the crossbred pig variety GOYA, developed by ICAR-CCARI was released by the DDG (AS) Dr. Raghavendra Bhatta. DDG (AS) highlighted that the AICRP has contributed significantly to the development of pig sector and emphasized on the innovative research to uplift the pig farmers of the country. Dr. N.H. Mohan, Scientist Incharge, AICRP on Pig presented Project Coordinator`s Report with a summary of the achievements and critical evaluation of the progress made by each centre against the targets during 2023-2024. The progress made by the AICRP centres was critically reviewed. Dr. Raghavendra Bhatta, DDG (AS) advised that every centre should compulsorily focus on modern research work along with the increased piglet production. He further emphasized that all units should work for the genetic improvement of indigenous and crossbred pigs.

16 CELEBRATIONS

Republic Day

The ICAR-National Research Centre on Pig celebrated the 75th Republic Day on 26th January 2024. On this occasion, Dr. V. K. Gupta, the Director of the Institute, hoisted the national flag, followed by the singing of the national anthem. The event was attended with great enthusiasm by both scientific and non-scientific staff of the institute, reflecting their patriotic spirit and unity.

International Yoga Day

The ICAR-National Research Centre on Pig joyously observed the 10th International Yoga Day on 21st June 2024. All staff members of the institute engaged in various yoga activities and exercises based on the Common Yoga Protocol provided by the Ministry of AYUSH, Government of India. The event highlighted the importance of yoga in enhancing overall health and fostering a harmonious connection between body, mind, and spirit. This year's theme, "Yoga for Self and Society," emphasized the role of yoga in promoting individual well-being and societal harmony.

Independence Day

The ICAR-National Research Centre on Pig celebrated the 78th Independence Day of the country on 15th August 2024. The staff of the Institute also participated in the “Har Ghar Tiranga” campaign, where all members hoisted the national flag at their homes, showcasing their patriotism and unity. The occasion was marked with enthusiasm, reflecting the institute’s commitment to the spirit of independence and national pride.

Foundation Day

The ICAR-National Research Centre on Pig commemorated its 23rd Foundation Day on 4th September 2024 at the institute campus in Rani. The event was celebrated with enthusiasm, highlighting the institute’s contributions to research and development in pig farming. Distinguished guests graced the occasion, and their presence added to the significance of the celebration.


nrcp
23 वां स्थापना दिवस
23RD FOUNDATION DAY
4th September, 2024
भा.कृ.अनु.प.-राष्ट्रीय शूकर अनुसंधान केन्द्र
ICAR-National Research Centre On Pig
Rani, Guwahati - 781 131 Assam


nrcp
23 वां स्थापना दिवस
23RD FOUNDATION DAY
4th September, 2024
भा.कृ.अनु.प. - राष्ट्रीय शूकर अनुसंधान केन्द्र
ICAR-National Research Centre On Pig
Rani, Guwahati - 781 131 Assam


nrcp
23 वां स्थापना दिवस
23RD FOUNDATION DAY

Vigilance Awareness Week

ICAR-National Research Centre on Pig, Rani, Guwahati, Assam, celebrated Vigilance Awareness Week-2024 from 28th October to 3rd November under the theme "Culture of Integrity for Nation's Prosperity" ("सत्यनिष्ठा की संस्कृति से राष्ट्र की समृद्धि"). The observance began with an integrity pledge by the institute's staff, followed by various activities, including a vigilance awareness programme at Muduki Anchalik Jana Jatiya High School, a workshop on preventive vigilance, and competitions in essay writing and elocution. A grievance redressal camp and an Awareness Gram Sabha at Dhangar Gaon helped educate the public on corruption prevention. Additional awareness initiatives included sensitization programs for farm workers and banner displays in the institute, village, and school. The week-long observance saw enthusiastic participation from all employees, ensuring its success.

17 राजभाषा प्रकोष्ठ

प्रभारी: डॉ सतीश कुमार

राजभाषा हिन्दी के सुचारु रूप से कार्यान्वयन के लिए भा.कृ.अनु.प.-राष्ट्रीय शूकर अनुसंधान केंद्र, गुवाहाटी में एक राजभाषा कार्यान्वयन समिति कार्यरत है। राजभाषा कार्यान्वयन समिति कार्यालय में राजभाषा के सुचारु रूप से कार्यान्वयन एवं राजभाषा हिन्दी के लिए निर्धारित लक्ष्य को प्राप्त करने के लिए निर्देश देती है। राजभाषा कार्यान्वयन समिति की बैठक कार्यालय में प्रत्येक तिमाही को होती है। समिति हिंदी के प्रचार व प्रसार के लिए सुझाव देती है एवं विगत तिमाही की प्रगति रिपोर्ट की समीक्षा करती है। कार्यालय उपयुक्त समय पर राजभाषा विभाग एवं परिषद को तिमाही रिपोर्ट प्रस्तुत करता है। इस वर्ष राजभाषा कार्यान्वयन समिति की चार बैठक का आयोजन किया गया जिसकी अध्यक्षता निदेशक, डॉ. विवेक कुमार गुप्ता जी ने की। बैठक का कार्यवृत्त एवं कार्यवाही परिषद को सूचना के लिए भेजा गया। इसके अलावा संस्थान, गुवाहाटी नगर राजभाषा कार्यान्वयन समिति का सदस्य है एवं संस्थान ने नगर राजभाषा कार्यान्वयन समिति की सभी बैठकों में भाग लिया। संस्थान ने हर तिमाही मे एक राजभाषा कार्यशाला का भी आयोजन किया एवं हिन्दी दिवस के अवसर पर हिन्दी पखवाड़ा 2024 का भी आयोजन किया। राजभाषा विभाग के निर्देशानुसार वार्षिक कार्यक्रमों, राजभाषा अधिनियमों एवं अन्य सभी आदेशों/अनुदेशों का अनुपालन कार्यालय द्वारा सफलतापूर्वक किया गया।

राष्ट्रीय शूकर अनुसंधान केंद्र, राणी, गुवाहाटी में हिंदी पखवाड़ा-2024 का आयोजन

भा.कृ.अनु.प.-राष्ट्रीय शूकर अनुसंधान केंद्र, राणी, गुवाहाटी में 17 सितम्बर 2024 से 01 अक्टूबर 2024 तक हिंदी पखवाड़ा 2024 का सफलतापूर्वक आयोजन किया गया। राजभाषा विभाग के निर्देशानुसार इस वर्ष हिन्दी पखवाड़ा का उद्घाटन गृहमंत्री श्री अमित शाह जी की अध्यक्षता में दिनांक 14.09.2024 को नई दिल्ली में किया गया। केंद्र में हिंदी पखवाडा का शुभारम्भ 17/09/2024 को हिन्दी कार्यशाला के साथ हुआ जिसमे डॉ जया ने हिंदी टिप्पणी लेखन एवं हिन्दी पत्राचार के बारे में प्रतिभागियों को जानकारी प्रदान की। प्रभारी राजभाषा अधिकारी एवं वैज्ञानिक, डॉ सतीश कुमार ने हिंदी पखवाड़ा के दौरान होने वाली विभिन्न प्रतियोगितायों एवं कार्यक्रमों के बार में सभी को जानकारी दी तथा माननीय कृषि एवं किसान कल्याण मंत्री भारत सरकार, श्री शिवराज सिंह चौहान जी का शुभकामना सन्देश पढ़ कर सुनाया गया।

हिंदी पखवाड़ा के अंतर्गत निम्नलिखित कार्यक्रम का आयोजन किया गया

दिनांक	कार्यक्रम	कार्यक्रम समन्वयक
17/09/2024	हिन्दी कार्यशाला विषय: हिंदी टिप्पणी लेखन एवं हिन्दी पत्राचार	डॉ जया
18/09/2024	विद्यार्थियों के लिए वाद- विवाद प्रतियोगिता, स्थान: स्थानीय विद्यालय, रानी	डॉ प्रियाजोय कर डॉ लोकेश ई
20/09/2024	विद्यार्थियों के लिए हिंदी निबंध प्रतियोगिता, स्थान: स्थानीय विद्यालय, रानी	डॉ कल्याण डे डॉ जुवार डोले
23/09/2024	हिंदी निबंध प्रतियोगिता	डॉ विशाल रॉय
24/09/2024	श्रुतिलेख प्रतियोगिता	डॉ सौविक पॉल
25/09/2024	समयस्फूर्त भाषण (Extempore) प्रतियोगिता	डॉ नितिन एम अट्टूपुरम
26/09/2024	काव्य पाठ प्रतियोगिता एवं हिन्दी कार्यशाला (वक्ता: श्री राम एकबाल यादव)	डॉ मीरा के डॉ सीमा रानी पेगु
27/09/2024	टंकण प्रतियोगिता (यूनिकोड से हिंदी टाइपिंग) गूगल फार्म पर	डॉ सलाम जयचित्र देवी
30/09/2024	प्रश्नमंच	श्री उत्तम प्रकाश
01/10/2024	हिन्दी कार्यशाला (वक्ता: डॉ अच्युत शर्मा) एवं समापन समारोह	डॉ सतीश कुमार

हिंदी पखवाड़ा का सफलतापूर्वक समापन दिनांक 01 अक्टूबर 2024 को किया गया। इस समारोह के मुख्य अतिथि गुवाहाटी विश्वविद्यालय के हिन्दी विभाग के पूर्व अध्यक्ष, डॉ अच्युत शर्मा थे। उन्होंने हिन्दी भाषा के योगदान एवं उत्तरपूर्वी भारत में हिन्दी भाषा के विकास की चर्चा की एवं हिन्दी भाषा के उपयोग के विभिन्न पहलुओं पर विस्तार से चर्चा की। उन्होंने हिन्दी भाषा के कवियों एवं लेखकों के योगदान को भी याद किया। उन्होंने हिंदी भाषा के अधिक से अधिक प्रयोग पर बल दिया तथा हिन्दी भाषा में स्थानीय भाषाओं के प्रचलित शब्दों को समाहित करने का सुझाव दिया ताकि हिन्दी को सभी लोगों के बीच लोकप्रियता मिल सके। उन्होंने शोध परिणामों को भी हिन्दी या स्थानीय भाषा में प्रकाशित करने का सुझाव दिया। संस्थान के निदेशक डा. विवेक कुमार गुप्ता ने हिंदी का प्रयोग सिर्फ हिन्दी पखवाड़ा तक सीमित न रखकर उसे वर्ष भर प्रयोग करने का सुझाव दिया, जिससे हिंदी भाषा का अधिक से अधिक प्रसार एवं प्रचार हो सके। उन्होंने हिन्दी पखवाड़ा के आयोजन के लिए आयोजन समिति के प्रयास की सराहना भी की एवं इसे और बढ़ चढ़ आयोजित करने का सुझाव दिया। संस्थान के प्रभारी राजभाषा अधिकारी एवं वैज्ञानिक डा. सतीश कुमार ने हिंदी पखवाड़ा के आयोजन का उद्देश्य हिंदी का अधिक उपयोग कर राजभाषा का विकास करना बताया तथा हिन्दी भाषा को देश के हर भाग से संवाद स्थापित करने का महत्वपूर्ण जरिया बताया। उन्होंने हिंदी पखवाड़ा में बढ़-चढ़ कर भाग लेने के लिए संस्थान के सभी कर्मचारियों एवं वैज्ञानिकों का आभार प्रकट किया एवं राजभाषा के विकास में योगदान देने के लिए सभी को प्रेरित किया। हिंदी पखवाड़ा में विभिन्न प्रकार के प्रतियोगिताओं का आयोजन किया गया जिसमें हिंदी श्रुति लेखन, निबंध प्रतियोगिता, वाद-विवाद प्रतियोगिता, समय स्फूर्त भाषण एवं हिंदी प्रश्नोत्तरी शामिल थे। इसके अलावा तीन हिंदी कार्यशाला का आयोजन किया गया। प्रथम कार्यशाला में डॉ जया द्वारा हिंदी वर्णमाला, कार्यालय आवेदन पत्रों के प्रारूप एवं टिप्पणी लेखन आदि की जानकारी दी गई। दूसरे कार्यशाला के विशेष अतिथि क्षेत्रीय कार्यान्वयन कार्यालय गुवाहाटी के अनुसंधान अधिकारी श्री राम एकबाल यादव जी थे। उन्होंने हिन्दी काव्य पाठ प्रतियोगिता में निर्णायक की भूमिका का निर्वहन किया एवं राजभाषा विभाग के विभिन्न योजनाओं एवं टूल्स के बारे में जानकारी दी। तीसरे कार्यशाला में विशेष अतिथि डॉ अच्युत शर्मा जी ने हिन्दी की यात्रा एवं असमिया भाषा के साथ हिन्दी के सामंजस्य के बारे में व्याख्यान प्रस्तुत किया। संस्थान के निदेशक महोदय ने सभी प्रतियोगिताओं के विजेताओं को प्रमाण-पत्र एवं पारितोषिक देकर सम्मानित किया गया। इस अवसर पर वर्ष भर हिन्दी में कार्य करने के लिए विशेष पुरस्कार योजना के तहत संस्थान से दो कर्मियों को प्रशस्ति पत्र एवं पारितोषिक देकर सम्मानित किया गया। समारोह का समापन धन्यवाद ज्ञापन के साथ हुआ।








18 TRAINING PROGRAMMES ORGANIZED

Nodal Officer: Dr. Rafiqul Islam, Principal Scientist

The ICAR-NRC on Pig, Rani regularly offers training and skill-development programs for the research and teaching faculty, technical staff of the Krishi Vigyan Kendra's, Veterinary Officers, Para-Veterinary Staff, who their parent departments nominate, as well as to farmers, students, and entrepreneurs. The length of the training programs varies according to the participants' training demands, varying from three to ten days. Regular training sessions are held for pig farmers and business owners in the following areas:

a. Scientific management techniques and practices in pig farming
b. Artificial insemination and reproductive management in pigs
c. Pork processing and value additions

Apart from the above highlighted topics, training programs are being planned on other facets of pig health and productivity, taking into account the participants' training requirements.

The training programmes are conducted under the following categories:

1. **Sponsored Training Programmes:** These initiatives are supported by Government agencies, Krishi Vigyan Kendra (KVKs), non-governmental organizations (NGOs etc. The candidates are selected by the agencies for participating in the training programmes at ICAR-NRC on Pig, Rani. According to the approved rate of the Institute or Indian Council of Agricultural Research (ICAR), the sponsoring organizations are responsible for covering all training expenditures. The candidates are housed during the training days in the Anubrata Bhawan and at a time 20 candidates can be accommodated.

2. **Self-sponsored Training Programmes:** These programs are designed for participants who submit requests at their individual level for training at ICAR-NRC on Pig. The programs typically run for three days. Individual participants are responsible for paying the training costs in accordance with the fee structure of the Institute/ICAR. For a self-sponsored training program to be organized, a minimum of seven candidates are needed. Nonetheless, the Institute may only accept a maximum of 25 applicants for the training course. This category includes both residential and non-residential training programs.

3. **Institute Sponsored Training Programmes:** A few free trainings are offered to farmers and students by the ICAR-NRC on Pigs as part of different projects and programs. To participate in these programs, individuals are not required to pay any fee. Training programs typically last three to fifteen days and are offered to candidates from Scheduled Castes (SC) under the Scheduled Caste Sub Plan (SCSP) and Scheduled Tribes (ST) under the Tribal Sub Plan (TSP). Farmers programmes are mostly limited to three days for ease in participation without affecting their farming activities. Candidates must submit an application to the Institute, together with their caste or category certificate and proof of identity, in order to participate in these programs. This category includes training programs that are both residential and non-residential.

4. **Exposure visits for farmers:** Additionally, the Institute conducts one-day training sessions and exposure visits for farmers. The purpose of this non-residential curriculum is to provide a basic understanding of the management methods and procedures used in organized pig farming. Other organizations generally bear the farmers travel and logistic costs for attending the program.

5. Online Training Programmes: The Institute also offers training in a virtual or online format while keeping the needs of the participants and the organization in mind. The time frame ranges from one to five days.

List of the training programmes conducted in year 2024

Sl. No.	Sponsorship	Name of the Training Program	Date	Name of the Coordinators	No. of Beneficiaries
1	Krishi Vigyan Kendra, Heng-bung, Manipur	Scientific Pig Production Practices and Value Addi-tion of Pork	January 29-31, 2024	Dr. S. Jayachitra Devi, Dr. R. Thomas, Dr. R. Islam	25
2	Institute TSP	Entrepreneurship devel-opment on Pig Produc-tion, Pork Processing and Value Addition	February 5-7, 2024	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. R. Thomas	21
3	Self-Spon-sored, Tamil Nadu	Value Addition of Pork and Artificial Insemination in Pigs	Feb 19-21, 2024	Dr. Sunil Kumar, Dr. R Thomas, Dr. R. Islam	19
4	Self-sponsored	Skill development in pig farming and artificial insemination	March 6-8, 2024	Dr. Priyajoy Kar, Dr. Nitin M. Attupuram, Dr. Rafiqul Islam	19
5	MANAGE, Hyderabad	Training on Pig Farming for Extension Functionar-ies on “Better Livelihoods through Scientific’ Pig Husbandry”	May 14-16, 2024	Dr. Priyajoy Kar, Dr. Nitin M. Attupuram, Dr. Rafiqul Islam	94
6	Self-sponsored	“Scientific practices and techniques in pig farming and artificial insemina-tion”	June 4-6, 2024	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. Salam Jayachitra Devi	23
7	Institute TSP	Scientific production practices and health man-agement for profitable pig farming	July 29-31, 2024	Dr. Juwar Doley, Dr. Priyajoy Kar, Dr. Mohan N.H.	19
8	Institute SCSP	Technology Demonstra-tion on Artificial Insemina-tion in pigs to Scheduled caste Farmers	August 05, 2024	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. Kalyan De	51
9	DST-STI Hub	Master Training (TOT) Programme under DST STI Hub Project	Aug 8-9, 2024	Dr. R. Thomas, Dr. Juwar Doley	24

Sl. No.	Sponsorship	Name of the Training Program	Date	Name of the Coordinators	No. of Beneficiaries
10	EDP-ABI	Entrepreneurship Development Programme on Scientific Pig Production Practices and Value Addition of Pork	Aug 21-23, 2024	Dr. R. Thomas, Dr. Priyajoy Kar, Dr. Lokesha E.	22
11	Institute TSP	Augmentation of production in pig farms by application of artificial insemination in pigs	August 28-30,2024	Dr. Sunil Kumar, Dr. Satish Kumar, Dr. Swaraj Rajkhowa	13
12	VOTI, Govt. of Odisha	"Modern Pig Farming Practices" for Farmers/ Entrepreneurs implementing Piggery Scheme	September 18-20, 2024	Dr. Salam Jayachitra Devi, Dr. Jaya, Dr. Rafiqul Islam	13
13	SCSP	Scientific Production practices and application of Artificial Insemination in pig farms	September 24-27, 2024	Dr. Kalyan De, Dr. Salam Jayachitra Devi, Dr. Rafiqul Islam	19
14	Institute TSP	Skill enhancement of the tribal farmers through demonstration of Artificial Insemination techniques in pigs	September 25, 2024	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. B.C. Das	84
15	SCSP	Promotion of Agri/Pig-entrepreneurship	October 1, 2024	Dr. Kalyan De, Dr. Nitin M. Attupuram, Dr. R. Thomas	25
16	TSP	Scientific production and breeding management techniques for profitable pig farming	October 23-25, 2024	Dr. Satish Kumar, Dr. Nitin M. Attupuram, Dr. B. C. Das	21
17	EDP-ABI	Entrepreneurship Development Programme on Scientific Pig Production Practices and Value Addition of Pork	November 6-8, 2024	Dr. R. Thomas, Dr. Priyajoy Kar, Dr. Lokesha E.	15
18	TSP	Scientific pig production and health management practices for large scale pig farming	November 11-13, 2024	Dr. Souvik Paul, Dr. Seema Rani Pegu Dr. Mohan N.H.	19
19	DST-STI Hub	Master Training (TOT) Programme under DST STI Hub Project	November 21-22, 2024	Dr. R. Thomas	25

Sl. No.	Sponsorship	Name of the Training Program	Date	Name of the Coordinators	No. of Beneficiaries
20	TSP	Accelerating income in pig farming through artificial insemination and other management techniques	November 26-29, 2024	Dr. Sunil Kumar, Dr. Rafiqul Islam, Dr. Lokesha E.	21
21	TSP	Technology demonstration on Silage making and storage for feeding of pigs to the tribal farmers.	December 2, 2024	Dr. Lokesha E., Dr. Juwar Doley, Dr. Pryajoy Kar	30
22	TSP	Organized pig farming for livelihoods and nutritional Security of tribal farmers	December 4-6, 2024	Dr. Jaya, Dr. Meera K., Dr. Pranab Jyoti Das	25
23	VOTI, Govt. of Odisha	"Modern Pig Farming Practices" for Veterinary Officers implementing Piggery Scheme	December 16-20, 2024	Dr. Satish Kumar, Dr. Nitin M Attupuram, Dr. Rafiqul Islam	20
24	VOTI, Govt. of Odisha	"Modern Pig Farming Practices" for Farmers/ Entrepreneurs implementing Piggery Scheme	December 25-27, 2024	Dr. Jaya, Dr. S. Jayachitra Devi, Dr. Rafiqul Islam	13
Total number of participants Trained during 2024					**660**

Krishi Vigyan Kendra, Hengbung, Manipur sponsored Training on "Scientific Pig Production Practices and Value Addition of Pork" for the Farmers of Manipur during January 29-31, 2024

Release of the Technical Publication of the Self-sponsored Training on June 6, 2024 by Dr. V. K. Gupta, Director

Certificate distributed by Dr. V. K. Gupta, Director in the Valedictory Function of the Training on March 8, 2024

Participants of the Self-sponsored Training on "Scientific practices and techniques in pig farming and artificial insemination" conducted during June 4-6, 2024

Institute TSP sponsored Training on "Scientific production and breeding management techniques for profitable pig farming" during October 23-25, 2024

Institute TSP sponsored training on "Scientific pig production and health management practices for large scale pig farming" during November 11-13, 2024

Participants of the Training Programme on "Organized pig farming for livelihoods and nutritional Security of tribal farmers" during December 4-6, 2024

Distribution of certificates to the participants on December 06, 2024

19 WOMEN CENTRIC PROGRAMMES

Programme 1: The women scientists and staff of ICAR-National Research Centre on Pig (NRC), Rani, Guwahati, in collaboration with Marwari Hospital, Guwahati, organized a one-day health check-up camp and health awareness program for tribal women farmers and their families. A dedicated medical team from Marwari Hospital facilitated the health check-up sessions and provided free medicines to the beneficiaries. A total of 33 tribal women farmers engaged in pig rearing from Umsur village, Assam, participated in the program along with their families. The women staffs of ICAR-NRC on Pig played a key role in ensuring the success of the initiative. As part of the program, pig health kits containing six essential veterinary supplies mineral mixture, vitamin supplements, dewormer, antiseptic ointment, potash, and cotton roll were distributed to the tribal women farmers to support the health and productivity of their livestock. This initiative underscored ICAR-NRC on Pig's commitment to empowering tribal women farmers by enhancing health awareness and strengthening their knowledge of livestock management practices.




Programme 2: The women scientists and staff of ICAR-NRC on Pig, Guwahati, organized a day-long "Awareness Camp, Green Plantation, and Input Distribution Programme for Tribal Women Empowerment" under the Tribal Sub-Plan (TSP) at Paat Gaon, Mataikhar, Kamrup, on October 4, 2024. The program emphasized the importance of women in sustainable livestock practices and their role in socio-economic development. A quiz on scientific pig farming was conducted to engage tribal women farmers, with prizes awarded to the winners. An awareness campaign on antimicrobial resistance educated women farmers on responsible antibiotic use. Inputs were distributed among 80 tribal women pig farmers to promote sustainable pig farming. The event also featured a green plantation drive, fostering environmental sustainability. Women staff and research scholars actively participated in this programme.

20 AWARDS AND HONORS

Best Institutional Film Award

ICAR-National Research Centre on Pig, Guwahati, was honored with the Best Institutional Film Award during the MANAGE Agri-Film Festival 2023, held on February 22, 2024. The award-winning film, "Biosecurity in Pig Scientific Production," was conceptualized to promote biosecurity measures at the farmers' level, emphasizing improved farm management practices for disease prevention and sustainable pig production.

Fellow of the National Academy of Agricultural Sciences

Dr. N.H Mohan, Pr. Scientist, received Fellow of the National Academy of Agricultural Sciences

Best oral presentation award

Dr. Pranab Jyoti Das, Principal Scientist has received third Best oral Presentation award for deciphering the Role of Sting and RELA Proteins in the Tolerance of an Indigenous Pig Breed to African Swine Fever. In: First Annual Post Graduate Students National Conference on Organized by College of Veterinary Science Sri Venkateswara Veterinary University, Tirupati, Milestones in Veterinary Research and their Applications for Improvement of Animal Health and Production. Tirupati 11-12th December 2024

ICMR-DHR International Fellowship

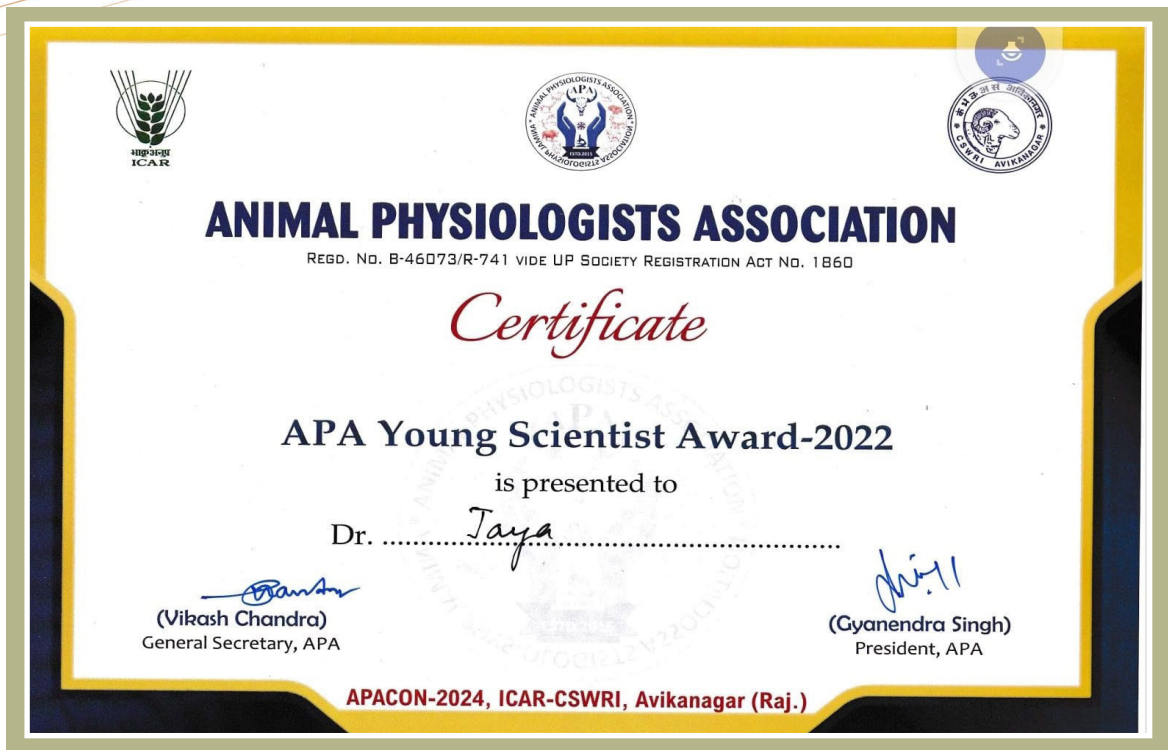
Dr. Rajib Deb, Senior Scientist, has received the Long-term ICMR-DHR International Fellowship for Young Indian Bio-medical Scientists 2023-24.

ISVIB Fellowship

Dr. Rajib Deb, Senior Scientist, has received ISVIB Fellowship conferred by Indian Society of Veterinary Immunology and Biotechnology, India, 2024.

Young Scientist Award

Dr. Jaya, Scientist, has received Young Scientist Award (for the year 2022) by Animal Physiologists Association (APA) at the Annual Convention and National Symposium on “Advanced Physiological Strategies for Sustainable Livestock Production and Reproduction” organized by ICAR-CSWRI, Avikanagar, Rajasthan during 1- 2 March 2024.



ANIMAL PHYSIOLOGISTS ASSOCIATION

Regd. No. B-46073/R-741 vide UP Society Registration Act No. 1860

Certificate

APA Young Scientist Award-2022

is presented to

Dr. Jaya

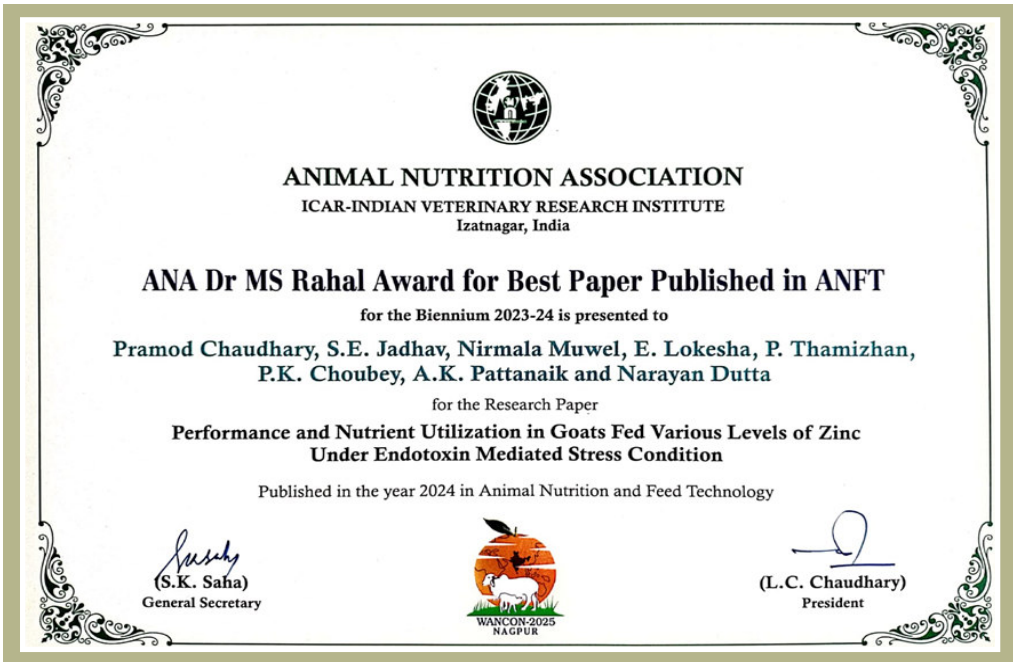
(Vikash Chandra)
General Secretary, APA

(Gyanendra Singh)
President, APA

APACON-2024, ICAR-CSWRI, Avikanagar (Raj.)

Best paper award

Dr. Lokesha E, Scientist, has received Dr MS Rahal Best Research Paper Award 2023-2024 by Animal Nutrition Association for the co-authored research article entitled “Performance and nutrient utilization in Goats fed Various levels of zinc under endotoxin mediated stress condition” in the Animal Nutrition and feed Technology 24(1), pp15-30.



ANIMAL NUTRITION ASSOCIATION

ICAR-INDIAN VETERINARY RESEARCH INSTITUTE
Izatnagar, India

ANA Dr MS Rahal Award for Best Paper Published in ANFT

for the Biennium 2023-24 is presented to

Pramod Chaudhary, S.E. Jadhav, Nirmala Muwel, E. Lokesha, P. Thamizhan, P.K. Choubey, A.K. Pattanaik and Narayan Dutta

for the Research Paper

Performance and Nutrient Utilization in Goats Fed Various Levels of Zinc Under Endotoxin Mediated Stress Condition

Published in the year 2024 in Animal Nutrition and Feed Technology

(S.K. Saha)
General Secretary

WANCON-2025
NAGPUR

(L.C. Chaudhary)
President

Dr. Vishal Rai, Scientist has received Dr. C. M Singh Best research paper award-2024 to G. Mohd., V. Upmanyu, M. M. Rather, T. Pande, V. Rai, et.al… for the paper entitled Quantification and Evaluation of Rabies Virus-Neutralizing Antibody Titers by Modified Rapid Fluorescent Focus Inhibition Test presented by IAVMI at IAVMICON-2024 on 06-07th June, 2024.

Young investigator award

Dr. Lokesha E, Scientist, has received the young investigator award in 18th International Conference on Trace Elements in Man and Animals (TEMA), held at Ramaiah Group of Institutions, Bengaluru, India from 8 -12 November 2024.

Recognitions

Dr. R. Islam

1. Acted as Course Instructor as PG Faculty of ICAR-Indian Veterinary Research Institute (Deemed University), Izatnagar in the discipline of Veterinary Gynecology & Obstetrics (VGO) during Ist and IInd Semester, 2024-25.
2. Attended as a member and nominee of DDG(AS) for the Assessment Committee meeting for CAS for assessment of Scientist (Animal Reproduction and Gynecology) of ICAR-NRC on Mithun, Medziphema, Nagaland on 31.05.2024.
3. Attended the meeting of the assessment committee as a member and nominee of DG-ICAR for considering cases of promotion of scientific staff of ICAR-Research Complex for NEH, Umiam, Barapani on 10.04.2024 at ICAR-RC NEH, Umiam.
4. Attended the 16th Scientific Advisory Committee (SAC) meeting of ICAR-KVK, Goalpara, Dudhnoi on 01st March, 2024.
5. Attended as a member in the selection committee meeting for the selection of Project Staff of ICAR-ATARI, Zone VI, Guwahati during the year.
6. Reviewed 2 manuscripts in 2024 for Veterinary Record Case Reports, Published by Wiley/ British Veterinary Association.
7. Guided one Ph.D. Scholar (Dr. N. Linda) from the College of Veterinary Science, CAU, Aizawl as On Station Guide for her Ph.D. Thesis Research.
8. Editor, Animal Reproduction, Gynecology & Obstetrics Section for "Journal of Advanced Veterinary and Animal Research, https://bdvets.org/JAVAR/editorial-board.html
9. Editorial Board Member for "Asian Pacific Journal of Reproduction", https://www.apjr.net/editorialboard.asp, Official Publication of Hainan Medical University, Hainan -571100, China. Published by Wolters Kluwer – Medknow.

Dr. Pranab Jyoti Das

1. Invited reviewer for Journals Gene, Gene Report, Gene Review, Genomics, Microbial Pathogenesis, Nucleus, PLoS one, Scientific Report, Indian Journal of Animal Science, Animals.
2. Technical committee member for revisiting the Assam Pig breeding Policy-2019, Govt. of Assam.
3. Reviewer certificate awarded in recognition of contribution to reviewing research article in Scientific Reports, 2024-2025.
4. External Expert Member of the Task Force for formulation of National Yak Breeding Policy.
5. Expert for verification of Karkambi pig of Maharashtra for consideration of registration as a breed during 9th -10th February, 2024 and inspected breeding tract of the Karkambi pig Pune, Sholapur districts of Maharashtra
6. Invited Speaker on "Animal Biodiversity and Conservation: A Road Map Phenome to Genome." on 23rd February 2024 in the National conference on "North East India's Traditional Wisdom: Bridging past and present through knowledge system health practice, Agriculture, Arts and Conservation organized by the National Conference hosted by NEMCARE Group of Institutions, Santipur, Mirza, Parlli Part, Assam 781125 from 23rd to 24th February 2024.
7. Attended consultative meeting for "Developing a Roadmap for Supporting and Nurturing Biotechnology in NER by DBT during the next five years (2025-2030)" as an expert, organized by DBT on 21st -22nd June 2024 at CSIR-NEIST, Jorhat, Assam.
8. Invited Speaker on "Different Method of Integrated Fish Farming (Pig cum fish farming, duck cum fish farming, poultry cum fish farming etc.)" in three days Non-Residential Training Program on "Scientific Techniques

in Fish culture, Beel fishery management and promotion of KCC, PMMSY, PM-MKSSY, FIDF, GAIS etc." organized by NFDB-North Eastern Regional Centre, Guwahati in collaboration with District Fisheries, Morigaon, Assam from 7th -9th November 2024.

9. Invited lecture on "Genomic insights into the conservation of wild animal diversity" on 19th November 2024 in the program on "One Week Compulsory Training Course of IFS Officers on "Importance of Forensics in wild animals' conservation and protection" held from 18th -22nd November, 2024 at College of Veterinary Science, AAU, Khanapara, Guwahati.

Dr. R. Thomas

1. Presented R. Thomas and V.K. Gupta. 2024. Present status of pig industry in India: Constraints and future prospects. In: XII Conference of IMSA and National Symposium on "Green and sustainable meat sector: Global game changer" from 26th to 28th September, 2024.

Dr. Seema Rani Pegu

1. Invited lead paper on "Epidemiological Paradigm and transmission dynamics of Japanese Encephalitis in India: Focus on Northeastern region and role of pig and mosquitoes in transmission" in the National Symposium on "Exploring Veterinary Pathology and Diagnostic Innovations in Animal and Poultry Diseases Amidst Climatic Challenges" at Sher-e-Kashmir University of Agricultural Sciences & Technology- Chatha, Jammu, during 28– 30th November, 2024.
2. Invited paper on Epidemiology and Transmission Dynamics of Japanese Encephalitis in India: Role of Pigs, Wild birds and Mosquitoes in the Indian Council of Medical Research (ICMR) Hands-on training programme on "Advances in the diagnosis and research techniques on infectious disease" organized by the Department of Animal Biotechnology, College of Veterinary Science, AAU, Khanapara, Guwahati-781022 from 5th November, 2024 to 4th February, 2025.
3. External examiner for evaluation of M.V.Sc. Thesis of Veterinary Pathology from College of Veterinary Science, Khanapara, Assam.

Dr. Rajib Deb

1. Invited Editorial Board Member- Scientific Reports (Impact factor 3.8)
2. Invited Academic Editor- PLOS ONE (Impact Factor 2.9)
3. Nominated Associate Editor- Heliyon Veterinary Science (Impact Factor 3.4)
4. Standing Committee Member of Indian National Science Academy- as Editorial member of Proceedings of Indian National Science Academy Journal
5. Resource Person- International e-training program on "The Physiology of Reproductive Success in Veterinary Field: Latest Insights and Innovations" organized by the Department of Veterinary Physiology, College of Veterinary and Animal Sciences, Kishanganj, Bihar Animal Sciences University, Patna, Bihar.
6. Nominated evaluator/expert- INYAS National Competition for Research Excellence 2024 organized by Indian National Young Academy of Sciences
7. Contributed insightful take on theme "Community over Commercialization" during the OPEN ACCESS WEEK 2024 organized by Asian Council of Science Editors
8. Nominated International Science Council (ISC) reference group for contribution in SDG 3&17 for the year 2024
9. Editorial Board Member- BMC Veterinary Research (Impact Factor: 2.6); Discover Applied Sciences (Impact Factor: 2.8)
10. Resource person and delivering a talk on "Control and prevention of pig diseases with special reference to ASF" for the professional efficiency development training programme for registered veterinarian on 14th March 2024 organized by ARDD in collaboration with Tripura veterinary council.
11. Expert as reviewer panel member for National comments on ISO 20395:2019 (Bureau of Indian Standards) on Real Time PCR-based diagnosis
12. Contributor for developing SDG-2 profile (Zero Hunger) developed by ESCAP, FAO and other organizations

Dr. Sunil Kumar

1. Invited as reviewer for publications by the Journal, The Haryana Veterinarian, Journal of Animal Health and Production, Reproduction in Domestic Animals
2. Invited as an expert in online progrmme on "शूकर पालन" will be organized by DD Kisan on May, 10, 2024,

Dr. Satish Kumar

1. Rapporteur for two technical sessions in the XVIII Annual Convention of ISAGB and National Conference ISAGBCON 2024 on New Vistas in Harnessing Genetic resources for sustainable Animal Production at BASU, Patna.
2. Invited Peer reviewer for research manuscripts for journals Gene (8), Reproductive Biology (3), Veterinary and Animal Science (1), Indian Journal of Animal Sciences (5)

Dr. Jaya

1. Invited lead paper on "Transcriptomics approach to explore ovarian dynamics in pigs" at the Annual Convention of APA and National Symposium on "Advanced Physiological Strategies for Sustainable Livestock Production and Reproduction" organized by ICAR-CSWRI, Avikanagar, Rajasthan on 1st - 2nd March 2024.
2. Rapporteur for the technical session in the National Symposium on "Advanced Physiological Strategies for Sustainable Livestock Production and Reproduction" organized by ICAR-CSWRI, Avikanagar, Rajasthan on 1st - 2nd March 2024.
3. Recognized Peer reviewer for research manuscripts for journals Gene, Scientific Reports, BMC Biotechnology.
4. Invited as expert in Hello Kisan Programme "शूकर पालन" of Doordarshan Kisan on 26th June 2024 streamed live on DD Kisan at 6:00 – 7:00 pm.
5. Editorial Board Member for the journal "BMC Biotechnology" – I.F. 3.5
6. Academic Editor for the journal "International Journal of Endocrinology" - I.F. 2.3
7. Review Editor for the journal "Frontiers in Veterinary Science" – I.F. 2.6

Dr. S.J. Devi

1. Invited as a reviewer of Scientific Reports and National Academy Science Letters Journals.

Dr. Lokesha E

1. Invited lecture on Feed and feeding management in pig in a training programme on Scientific Pig farming as a means of livelihood held from 02.10.2024 to 25.10.2024 at KVK, Kahikhuchi, Kamrup, AAU, Assam.
2. Invited as a resource person for online lecture on pig nutrition in a training programme on Entrepreneurship Development through Scientific Pig Rearing held from 21st January, 2025 to 30th January, 2025 at KVK, Hailakandi, Assam.
3. Invited Peer reviewer for two research manuscripts for Indian Journal of Animal Science and one manuscript for Animal Nutrition and Feed Technology Journal.
4. Served as a moderator in a scientific session of International Conference on Climate Change and Environmental Sustainability in Mountainous and Hilly landscapes. Held from 30th September to 1st October 2024, at Assam University, Silchar.
5. Invited lead paper on swill feeding in pigs: Challenges and opportunities in India under climate change scenario in the international conference on Climate Change and Environmental sustainability in Mountainous and Hilly landscapes. Held from 30 September to 1st October 2024, at Assam University, Silchar.

Dr. Vishal Rai

1. Contributed in Standard Veterinary Treatment Guidelines for livestock and poultry, published by the Department of Animal Husbandry and Dairying (DAHD), Government of India with support from the Food and Agriculture Organization of the United Nations (FAO) and the United States Agency for International Development (USAID).

21 HUMAN RESOURCE DEVELOPMENT

Dr. Vivek Kumar Gupta

- Attended the meeting at APEDA, New Delhi on 06 February, 2024 to discuss the progress of project on developing e-book on natural and organic pig farming in India.
- Attended the review meeting conducted under Fundamental Rule (FR) 56(j) and Rule 48 of the Central Civil Services (CCS) Pension Rules, 1972 on 07 February, 2024 at ICAR, New Delhi.
- Participated in the Directors' and Vice Chancellors' conference at NASC, New Delhi on 25 February, 2024.
- Chaired the SAC meeting at ICAR-KVK, Goalpara on 01 March, 2024.
- Participated in the Viksit Bharat Meeting at NASC, New Delhi 16 March, 2024.
- Participated in the DBT Agenda Setting meeting at NIEST, Jorhat on 21 June, 2024.
- Participated in the ICAR Foundation day programme and exhibition at NASC, New Delhi during 14-16 July, 2024.
- Attended FAO-CDC meeting held at New Delhi as expert during 27-28 August, 2024.
- Convened the AICRP on Pig Annual Review Meeting at ICAR-CCARI, Goa during 19-20 September, 2024.
- Chaired the technical session at NIAB, Hyderabad during 3-4 September, 2024.

Dr. Swaraj Rajkhowa

- Attended the meeting for promotion of scientists (under CAS) held at ICAR-Research Complex for NEH Region, Umiam, Meghalaya on 10th April, 2024.
- Attended the workshop on "Development of Standard Veterinary Treatment Guidelines (SVTG)" at Crowne Plaza, New Delhi on 8-9 August 2024 organized by Food and Agriculture Organization of the United Nations (FAO) in collaboration with the Department of Animal Husbandry and Dairying, Government of India.
- Attended (as Speaker) the State Level Workshop on Post Flood Management in Agri-allied sector in Assam organized by ICAR-ATARI, Zone VI, Guwahati, in collaboration with the Extension Education Institute NE Region, Khanapara held on 9th September, 2024 at the Extension Education Institute NE Region, Khanapara.
- Attended the meeting of enhancement and price fixation of ASF culling compensation held at the Directorate of AH & Veterinary Department of Assam on 23rd October, 2024.
- Attended National Conference of the Indian Association of Hill Farming (IAHF) on "Hill agro-ecosystem: Challenges and Opportunities for achieving Sustainable Development Goals" on 29-30 November 2024 and delivered a lead lecture on the topic "Challenges for sustainable pig farming vis a vis diseases outbreaks in NER Region.
- Attended 22nd IMC meeting of ICAR-NRC on Pig on 11.12.2024
- Attended the meeting of Expert committee for mid-term evaluation of research proposals funded by DBT held at the Department of Animal Biotechnology, CVSc, Khanapara on 27.12.2024

Dr. Pranab Jyoti Das

- Act as resource person and participated in the Participation in the Regional Agricultural Fair, 2025, held at AAU, Jorhat campus from 4th-6th January, 2025 organized by Directorate of Extension Education, Assam Agricultural University, Jorhat-13.

Dr. Seema Rani Pegu

- Attended National Symposium on "Exploring Veterinary Pathology and Diagnostic Innovations in Animal and Poultry Diseases Amidst Climatic Challenges" at Sher-e-Kashmir University of Agricultural Sciences & Technology-Chatha, Jammu, during 28– 30th November, 2024.
- Attended International Symposium on Zoonotic and transboundary Diseases: Breaking the Chain through Multidisciplinary Approach and XVIIIthAnnual Conference of Indian Association of Veterinary Public Health Specialists

(IAVPHS) organized by ICAR Research Complex for NEH Region in collaboration with ILRI from 1st -2nd December 2024.

Dr. Rajib Deb

- Attended FAO certified courses- African Swine Fever introductory course, 23 July 2024
- Participated in virtual learning course on "Use of FAO assessment tools for laboratories and AMR surveillance system (FAO-ATLASS) For ATLASS laboratory focal points" organized by FAO, UN (2024)

Dr. Sunil Kumar

- Participated in the training program on DNA Sequencing Using Ion Torrent NGS Platform and Data Analysis will be conducted at ICAR-CIFE, Mumbai (4-11 Dec., 2024).
- Participated in the Training Program on Laboratory Quality Management System and Internal Audit as per IS/ISO/IEC 17025:2017 organized by NITS, Noida during 9-12th Sept 2024
- Coordinated the field visit Third party Evaluation of ICAR-NRC on Pig for the period 2017-18 to 2023-24.

Dr. Satish Kumar

- Attended the training programme on "Statistical and computational advances for bioinformatics data analysis in agriculture: practical aspects" organized by CAFT, ICAR-IASRI during Jan 02-22, 2024.

Dr. S. J. Devi

- Attended Nari Shakti programme "Empowering Women as Leaders and Innovators" as a part of India International Science Festival (IISF) held at IIT Guwahati from November 30 to December 3, 2024.
- Attended workshop on "Animal Ethics in Scientific Research" organised by HRD unit of ICAR-National Research Centre on Pig, Rani Guwahati on 11th November 2024.

Dr. Lokesha E

- Participated in a workshop on sensitization to intellectual property rights issues on September 13, 2024, organized by ICAR- central Institute for Research on Buffaloes through virtual mode.

Dr. Meera K

- Attended Nari Shakti programme "Empowering Women as Leaders and Innovators" as a part of India International Science Festival (IISF) held at IIT Guwahati from November 30 to December 3, 2024.
- Attended 3 days online training programme on "Characterization, Documentation and Sustainable Utilization of Indigenous Livestock and Poultry Genetic Resources" conducted ICAR-National Bureau of Animal Genetic Resources, Karnal in collaboration with MANAGE, Hyderabad from November 27-29, 2024.

Dr. Vishal Rai

- Attended workshop as a delegate on "Stakeholders consultation on Emerging viral infections: Response and research Priorities" organized by Indian Council of Medical Research-National Institute of Virology, Pune (Field unit Dibrugarh) on 19th-20th March, 2024 at Guwahati.
- External expert in interview panel for various project posts at the Indian Council of Medical Research-National Institute of Malaria Research (ICMR-NIMR), Guwahati field unit, on the 13th and 14th of June, 2024.
- Nominated as observer for ICAR entrance examinations on 29th June, 2024.
- Attended Workshop for development of standard veterinary treatment guidelines organized by FAO in collaboration with DAHD, Govt. of India on 8-9 August, 2024 at New Delhi.

22 RESEARCH PROGRAMMES AND PROJECTS

The Priority Setting, Monitoring and Evaluation (PME) Cell is a critical component of the ICAR-National Research Centre on Pig. It plays a strategic role in ensuring the effectiveness and relevance of research programs. The PME Cell coordinates and synthesizes the recommendations of the Quinquennial Review Team (QRT), Research Advisory Committee (RAC), Institute Research Council (IRC), and the Vision documents of the institute to recommend research priorities and shortlist researchable problems at the institutional level. The PME Cell is also responsible for annually updating and presenting reports to the Director for the assignment of research projects. It coordinates and arranges the annual monitoring of ongoing projects and the evaluation of completed projects through internal and external experts. Additionally, the PME Cell facilitates the validation and/or impact assessment of successful technologies claimed by scientists, again through internal and external reviews. It also maintains a comprehensive database of all publications, technologies developed, IPRs, consultancies, past and ongoing research projects, thereby serving as a valuable resource for research planning and evaluation.

Institute Funded Research Projects 2024

Research programmes of the institute are organized under the following 04 major programmes:

1. Conservation, breeding and management of pig genetic resources.
2. Nutritional, physiological and reproductive interventions for improving efficiency of pig production.
3. Monitoring, development of diagnostics and management protocols for pig diseases for achieving one health.
4. Value addition, farm to fork management for food safety, entrepreneurship and skill development among stake-holders.

S. No.	Project name	PI	CoI
1.	Exploration of Genome-Wide Selection Signatures in Ghoongroo and Doom Pigs of India	Satish Kumar	P.J. Das, Jaya
2.	Performance Evaluation of a Novel LWY (male) X Ghoongroo (female) Crossbred Pig	Satish Kumar	P.J. Das, Kalyan De, Jaya, R. Islam, R. Thomas
3.	Performance Evaluation of a Novel Duroc(male) X Ghoongroo (female) Crossbred Pig	Meera, K	PJ Das, NM Attupuram, Satish Kumar, N.H. Mohan, R. Islam, R. Thomas, Lokesha E
4.	Performance Evaluation of a Novel LWY (female) X Ghoongroo (male) Crossbred Pig	Kalyan De	Satish Kumar, NM Attupuram, R. Islam, Jaya, R. Thomas
5.	Performance Evaluation of a Novel Duroc(female) X Ghoongroo (male) Crossbred Pig	N.M. Attupuram	Kalyan De, Satish Kumar, Meera K, PJ Das, R. Islam, R. Thomas, Lokesha E
6.	Physic-genomic responses and MCT profiling of exotic and Indigenous pig breeds in heat stress during different seasons	B.C. Das	N.H. Mohan, Jaya, K. De, J. Doley, A. Paul, N.M. Attupuram
7.	Functional characterization of genes regulating reproduction in sows	Jaya	B.C. Das, N.H. Mohan, Satish Kumar

S. No.	Project name	PI	CoI
8.	Design of recombinant multi-epitope protein(s) and their expression for assay development	N.H. Mohan	V.K. Gupta, Jaya, S. J. Devi
9.	Development of proteomic and transcriptomics atlas of porcine olfactory system	N.H. Mohan	Jaya, S. J. Devi, N.M. Attupuram
10.	Development, characterization, and validation of nano zinc supplement for improving piglet productivity.	Lokesha E.	Meera K, S.R. Pegu, Rajendran T, Mohan N.H
11.	Development of technology transfer models through participatory rural appraisal in the piggery sector.	P. Kar	N.H. Mohan, P.J. Das, Kalyan De, N.M. Attupuram, S. J. Devi.
12.	Development of e-learning knowledge products in scientific pig production.	P. Kar	N.M. Attupuram, S. J. Devi
13.	Development of Maize hybrids for enhancing productivity and ensuring nutritional security in the North Eastern Hill states (collaborative ICAR- IIMR)	P. Kar	Lokesha E.
14.	Preservation of boar semen using different additives in liquid and frozen state	R. Islam	Sunil Kumar
15.	Service project: Artificial Insemination in Pigs	R. Islam	Sunil Kumar
16.	Propagation of Artificial Insemination for establishment of multiplier units and optimizing reproductive efficiency in pigs at farmers' field	Sunil Kumar	R. Islam, P.J. Das
17.	Hormonal and herbal intervention for optimizing eutocic farrowing in pigs	R. Islam	Sunil kumar, Jaya, Lokesha E.
18.	Association of farrowing and piglet traits vis-a-vis colostrum characteristics with neonatal performance in pigs.	Kalyan De	N.M. Attupuram, Jaya, Lokesha
19.	Assessment and optimization of the water footprint in pig production and processing	N. M. Attupuram	K. De, R. Thomas, N.H. Mohan
20.	Dynamics of gut microbiome to dietary management and antibiotic treatment in pigs	N. M. Attupuram	K. De, R. Thomas, S.R. Pegu, R. Islam, N.H. Mohan
21.	Design and development of Image based growth rate estimation algorithm for different categories of pigs.	S. J. Devi.	Kh. M. Singh, R. Islam, Sunil Kumar, J. Doley.
22.	Machine learning assisted identification of different cells of porcine origin	S. J. Devi.	Jaya, N. H. Mohan
23.	Development of a point-of-care colorimetric assay for detection of meat freshness	R Thomas	J. Doley, V.K. Gupta
24.	Service Project: Surveillance and monitoring of swine diseases in NER	S.R.Pegu, S. Rajkhowa, R. Deb, S.Paul and J. Doley	
25.	Indentificatrion, Isolation and molecular characterization of pork borne zoonotic parasites.	S. Paul	J. Doley, Jaya, R. Thomas, Vishal Rai

S. No.	Project name	PI	CoI
26.	Epidemiology and Molecular Epidemiology of African Swine Fever Virus (ASFV) in North-Eastern region of India	J Doley	Gaurav Kumar Sarma, S R Pegu, P.J. Das, S. Paul, S.J. Devi, N H Mohan and S. Rajkhowa
27.	Expression of chimeric proteins of African Swine Fever Virus (ASFV) in Baculovirus expression system	R. Deb	H.M. Maity, S.R. Pegu, S. Rajkhowa, V.K. Gupta
28.	Isolation, Characterization of Porcine Muscle Stem Cells for development of 3D culture	J. Doley	NH Mohan, Jaya, R. Thomas, Souvik Paul and Vishal Rai
29.	Development of recombinant VP2 protein based indirect ELISA for serodiagnosis of Porcine parvovirus	V. Rai	Juwar Doley, S.R Pegu

Externally Funded Research Projects 2024

Sl. No.	Project Title	PI	CoIs	Funding
1.	Traceable Value Chain for safe pork in North Eastern Region of India	P.J. Das	R. Thomas, S.R. Pegu, Satish Kumar, B.C. Das, V.K. Gupta	ICAR-NASF
2.	Cataloguing of genomic and transcriptomic signature in indigenous pig tolerant to African swine fever virus	P.J. Das	S.R. Pegu, Rajib Deb, Swaraj Rajkhowa, Satish Kumar, V.K. Gupta	
3.	Development of thermo-tolerant pig through biomarker assisted selection	Mohan. N.H		ICAR-NF
4.	Technical Advisory Services for Piggery Value Chain Improvement in Assam, under the World Bank financed Assam Agribusiness and Rural Transformation Project	R. Thomas	S. R. Pegu, Sunil Kumar, S. Rajkhowa	APART
5.	SWINOSTICS: A platform for development and validation of on-field diagnostics of important pig pathogens in NE Region of India for commercial exploration	S R Pegu	S.Rajkhowa, P.J.Das, R. Deb and V.K.Gupta	DBT
6.	Establishment of a Consortium for One Health to address Zoonotic and Transboundary Diseases in India including North-East Region	S Rajkhowa	S.R. Pegu, J. Doley, R. Deb, S Paul	DBT
7.	Development of a virus like particle- based vaccine against Indian isolate of Porcine Circovirus	R. Deb	S. Rajkhowa, J. Doley, Hemanta Kumar Maity (WBUAFS), Aditya Pratap Acharya (WBUAFS), Sachinandan De (NDRI)	DBT
8.	Outreach Programme on Monitoring Drug Residues and Environmental Pollutants (ORP-MDREP)	R. Thomas	N. M. Attupuram	ICAR

Sl. No.	Project Title	PI	CoIs	Funding
9.	Biotech- KISAN Development and promotion of atmnirbhar pig production scientific intervention	B.C. Das	P.J.Das, S.R. Pegu, S. Paul,K. De, R. Deb, Sunil, Kumar, Jaya, N.M. Attupuram, S.J. Devi, S. Baishya, H. Choudhary, A. Debnath, S. Das, E. Debbarman, S. Roy, T. Bhowmik	DBT
10.	Establishment of STI Hub for Mising and Bodo women of Assam for economic empowerment through technology interventions in pig value chain	R. Thomas	J. Doley, V.K. Gupta	DST
11.	Self-sustainable Cooperative Models for Propagation of Liquid Semen Artificial Insemination and Envisaging Cryopreservation of Spermatozoa in Pig	Sunil kumar	Rafiqul Islam, V.K. Gupta	NLM
12.	Augmenting pig production by accretion of reproductive efficiency and AI for generation of livelihood security and entrepreneurship in NER	Sunil Kumar	R Islam, P.J. Das, N.H. Mohan, V.K. Gupta	DBT
13.	Indian Network for Fisheries and Animal Antimicrobial Resistance	R. Deb	SR Pegu	ICAR
14.	Development of multi-serotypic virus like particle-based vaccine against porcine circovirus disease of pig in India	R. Deb	S.R Pegu, S. Rajkhowa, V.K Gupta, H.M. Maity (WBAFSU), Sachin Kumar(IIT-G)	NLM
15.	NPGET- Generation of sex-specific phenotypes in pig using genome editing	N.H. Mohan	Jaya, Juwar Doley, Rafiqul Islam, Sunil Kumar, P.J. Das, V.K. Gupta	ICAR
16.	NPGET-Production of broiler pig using CRISPR technology	Jaya	NH Mohan, Satish Kumar, R.Islam, Sunil Kumar	ICAR
17.	All India Network Programme on Challenging and Emerging Diseases of Animals (AINP-CEDA)	Seema Rani Pegu	Juwar Doley, Vishal Rai, Souvik Paul	ICAR

23 PERSONNEL

RMP AND SCIENTIST CADRE

Dr. Vivek Kumar Gupta
Director

Dr. Bikash Chandra Das
Principal Scientist (Animal Physiology)

Dr. Swaraj Rajkhowa
Principal Scientist (Veterinary Medicine)

Dr. Mohan N.H
Principal Scientist (Animal Physiology)

Dr. Rafiqul Islam
Principal Scientist
(Animal Reproduction & Gynaecology)

Dr. Pranab Jyoti Das
Principal Scientist
(Animal Genetics and Breeding)

Dr. Rajendran Thomas
Principal Scientist
(Livestock Products & Technology)

Dr. Seema Rani Pegu
Senior Scientist (Veterinary Pathology)

Dr. Rajib Deb
Senior Scientist (Animal Biotechnology)

Dr. Juwar Doley
Senior Scientist (Animal Biotechnology)

Dr. Souvik Paul
Senior Scientist (Veterinary Parasitology)

Dr. Kalyan De
Senior Scientist
(Livestock Production Management)

Dr. Sunil Kumar
Scientist
(Animal Reproduction and Gynaecology)

Dr. Jaya
Scientist (Animal Physiology)

Dr. Satish Kumar
Scientist (Animal Genetics & Breeding)

Dr. Salam Jayachitra Devi
Scientist (Computer App. And IT)

Dr. Nitin M. Attupuram
Scientist
(Livestock Production Management)

Dr. Priyajoy Kar
Scientist (Agricultural Extension)

Dr. Lokesha E
Scientist (Animal Nutrition)

Dr. Vishal Rai
Scientist (Veterinary Microbiology)

Dr. Meera K.
Scientist (Animal Genetics and Breeding)

ADMINISTRATIVE CADRE

Shri. Utpal Ghosh
Finance and Accounts Officer

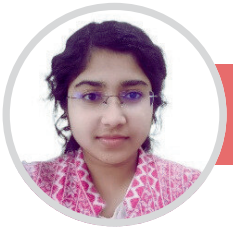
Shri. Rupesh Sabhrawal
Administrative Officer

Shri. Uttam Prakash
Assistant Administrative Officer

Ms. Hiramoni Thakuria
Personal Assistant

Mrs. Kabyawati Rabha
Personal Assistant

Shri Kundan Kumar
Assistant



Ms. Priyabala
Assistant

Smt. Jonali Nath
Upper Divisional Clerk

Shri. Ratul Baishya
Lower Divisional Clerk

TECHNICAL CADRE

Dr. Rajib Kumar Das
Technical Officer

Dr. Anil Das
Technical Officer

Dr. Gagan Bhuyan
Technical Officer

Sri Siba Chandra Deka
Senior Technical Assistant

Sri Rana Pratap Kakati
Technical Assistant

Sri Kailash Choudhury
Sr. Technician

SUPPORTING STAFF CADRE

Sri Naren Chandra Deka
Skilled Supporting Staff

KRISHI VIGYAN KENDRA, GOALPARA

Dr. Santosh Kumar Baishya
Principal Scientist and Head
(Animal Reproduction and Gynaecology)

Dr. Hitu Choudhury
SMS/ACTO (Animal Science)

Dr. Biswajit Dey
SMS/ACTO (Horticulture)

Mrs. Poli Saikia
SMS (Community Science)

Mr. Shiva Rajak
SMS (Fisheries Science)

Mrs. Mousumi Bhuyan
Technical Officer (Horticulture)

Er. Benjamin Kaman
Technical Officer
(Soil & Water Conservation Engineering)

Mrs. Minakshi Borah Kaman
Technical Officer (Community Science)

Mr. Jayanta Choudhury
Sr. Technician

Sri Jitumoni Kalita
Skilled Supporting Staff

Sri Drubha Lochan Rabha
Skilled Supporting Staff

24 PUBLICATIONS

Research Articles

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Jogi, H.R., Yadav, A.K., Bhatt, M., Einstein, C., Revathi, A., Thakur, R.K., Rai, V., Singh R.P., and Rajak, K.K. Canine Distemper: An Insight into Current Indian Scenario Perspectives. Introduction to Infectious Viral Diseases of Animals (ISBN 978-93-5919-302-1)

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Abstract in Conference Compendium

Aderao, G. N., Jadhav, S. E., Pattanaik, A. K., Lakesha, E., Choudhary, P., Dutta, N. and Singh, G. (2024). Higher dietary selenium levels improve antioxidant and immune response and trace mineral metabolism in goats under heat stress condition. In Sustainable Animal Nutrition for Global Health and Production: Innovations and Directions -ANACON 2024, 23 rd -25 th January, 2024, MVC, Chennai, 25th January 2024, RN_056.

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SOCIAL MEDIA

STATE

ICAR-NRCP distributes piglets to beneficiaries from four districts

Officials of ICAR Jharnapani and ICAR-NRCP along with the beneficiaries during the pig germplasm distribution and awareness camp on scientific piggery in Jharnapani on Friday.

Our Reporter

Dimapur, Feb. 7 (EMN): To support farmers with a source of livelihood and encourage breeding, the ICAR-National Research Centre on Pig (NRCP), Guwahati, in collaboration with ICAR- Jharnapani, distributed two piglets each to 40 beneficiaries at ICAR, Jharnapani on Friday.

The event was organised by ICAR-NRCP under the Tribal Sub Plan (TSP) programme. The piglets were provided to beneficiaries from four districts including Wokha, Peren, Chümoukedima and Dimapur.

During a short interaction programme with the farmers, Dr. Homeswar Kalita, ICAR head of regional centre, Nagaland, encouraged and advised the beneficiaries to show success by providing positive stories. He said such financial support would take place only if the farmers share successful stories.

Dr. Sajib Deb, senior scientist at ICAR-NRCP, told Eastern Mirror that the team, through TSP, has provided piglets to beneficiaries from Assam, Arunachal Pradesh, Tripura and Nagaland. He informed that ICAR-NRCP also organises awareness programmes and demonstrations in various parts of the region.

He shared that TSP programme sponsored by ICAR allocates funds and assistances to develop the tribal areas. TSP was introduced in 1974 to provide financial support to tribal people in proportion to their population.

The scientist also highlighted that ICAR-NRCP is the only institute in India that carries out various researches on pigs, be it for nutrition, reproduction, animal health or livestock production technology.

"Since we do not have an indigenous vaccine, a team of scientists are presently working on developing a vaccine for pigs to fight against series of diseases," Dr. Deb said.

He further told the beneficiaries that the piglets were provided to rear and not for 'consumption'.

Dr. Ebibeni Ngullie, chief technical officer at ICAR- KVK, Dimapur, said that a total of 80 piglets were provided to the beneficiaries either in sow and boar or two sows but not two boars as the objective of the distribution was to promote breeding in order to meet the demand and supply.

She maintained that for self sustenance and to meet the deficit demand of pigs in the state, breeding process is important and propagating the process is the main purpose.

At the distribution programme, Dr. Rajib Kr. Das, technical officer at ICAR-NRCP, advised the beneficiaries not to overfeed the sows if they plan to generate piglets.

Echo of Arunachal
First Newspaper From The State
Established 20th Feb 1966

GENERAL

ICAR-NRCP bid to assist tribal farmers of WK

ITANAGAR, Feb 1: A day long programme on 'Pig germplasm distribution and awareness camp on scientific piggery' was held at the premises of ICAR-NRC on Yak, Dirang in West Kameng district on Friday.

The programme was organized by Dr Pranab Jyoiti Das, Principal Scientist and In-charge Tribal Sub Plan (TSP), Dr Juwar Doley, Sr Scientist, Dr Priyajoy Kar, Scientist and Dr Lokesha E, Scientist under leadership and support of Dr Vivek Kumar Gupta, Director ICAR-National Research Centre on Pig (NRCP), Rani, Guwahati, Assam under TSP programme of the Institute.

Research-extension-farmers interface meeting and input distribution program under Tribal Sub Plan(TSP) of ICAR-National Research Centre on Pig, Rani Guwahati in collaboration with ICAR-KVK Longleng was held on August 13 at KVK Longleng office premises. The meeting was attended by Deputy Commissioner, Longleng W Manpai Phom, Deputy Commissioner, Longleng, Dr Juwar Doley, Senior Scientist, Dr Satish Kumar, Scientist and Dr Priyajoy Kar, Scientist from ICAR-NRC on Pig, Rani, Guwahati. During the programme, 50 tons of pig feeds and 300 numbers of milk cans were distributed to 250 farmers assisted by the subject matter specialists and staff of KVK Longleng.

Manas Tiger Reserve
@manasnptr

@manastr proud to collaborate with ICAR National Research Centre on Pig, Rani to support our local farmers in organising an awareness meeting on scientific piggery and inputs distribution to beneficiaries from various EDCs under Bansbari and Bhuyanpara Range! #ManasMitra

Assam Forest Department and 3 others

5:55 AM · Dec 20, 2024 · **288** Views

KVK Longleng organises input distribution programme

Published on Aug 15, 2024
By EMN

Share

W Manpai Phom along with other officials of KVK Longleng during the farmers interface meeting and input distribution programme in Longleng town on August 13.

DIMAPUR — Under Tribal Sub Plan (TSP) of ICAR-National Research Centre on Pig, Rani, Guwahati, the Krishi Vigyan Kendra (KVK), Longleng, organised a research-extension-farmers interface meeting and input distribution programme at its office premises on August 13.

An update from KVK Longleng stated that the programme was held in the presence of the deputy commissioner of Longleng, W Manpai Phom; senior scientists including Dr. Juwar Doley, Dr. Satish Kumar, Scientist and Dr. Priyajoy Kar. The programme was chaired by Dr. Lily Ngullie, ACTO KVK Longleng.

In his welcome speech, Dr. Hari C Kalita, senior scientist-cum-head of KVK Longleng, thanked the director of ICAR-NRC on Pig, Dr. Vivek Kumar Gupta and the scientists for taking the initiative to benefit the Longleng farmer community and look forward for more collaboration in the days to come.

The scientists, in their speeches, highlighted various challenges and opportunities faced by pig farmers and encouraged the gathering to take up scientific pig farming for entrepreneurship development. They also highlighted different skill oriented training programmes available at ICAR-NRC for pig farmers.

The chief guest of the programme, Manpai Phom, thanked the ICAR-NRC on Pig and KVK Longleng for conducting such programme in the district. He encouraged the farmers to work hard for self sustenance instead of waiting for grant from the government.

The DC further encouraged the gathering to avail the opportunities to develop skills in the area of pig farming.

Report stated that 50 tons of pig feeds and 300 numbers of milk cans were distributed to 250 farmers assisted by the subject matter specialists and staff of KVK Longleng during the programme.

গোগামুখত গাহৰি পালকক উদগনিমূলক আঁচনিৰ সামগ্ৰী বিতৰণ

বিশেষ বার্তা, গোগামুখ, ২ অক্টোবৰ ঃ ভাৰতীয় কৃষি গৱেষণা সংস্থানৰ অন্তর্গত ৰাষ্ট্রীয় গাহৰি অনুসন্ধান প্রতিষ্ঠান, ৰাণী গুৱাহাটীৰ ফালৰ পৰা গোগামুখ অঞ্চলৰ অনসূচিত জাতিৰ প্রায় ৩৫০গৰাকী গাহৰি পালকৰ মাজত গাহৰি দানা, বাল্টি, গাম বুট, ছাতি বিতৰণ কৰা হয়। গাহৰি পালনক জীৱন-জীৱিকাৰ বাবে ব্যৱসায়িক ভিত্তিত বৈজ্ঞানিক পদ্ধতিত অনুসূচিত জাতিৰ মানুহৰ মাজত প্রচাৰ আৰু উদগনিমূলক আঁচনিৰ কালিৰ সামগ্ৰী বিতৰণ অনুষ্ঠানত অংশগ্রহণ কৰে মিচিং স্বায়ত্তশাসিত পৰিষদৰ মুখ্য কার্যবাহী সদস্য পৰমানন্দ চায়েঙীয়া, কার্যবাহী সদস্য জহান দলে, সাধাৰণ সদস্য ৰাজু পেগু, গোগামুখ ৰাজহ চক্র বিষয়া ডাঃ অনামিকা গগৈ, সমাজসেৱক ৰাজেন শইকীয়া, শৰৎ চুতীয়া আদিয়ে। ৰাষ্ট্রীয় গাহৰি অনুসন্ধান সংস্থানৰ জ্যেষ্ঠ বিজ্ঞানীদ্বয় ডাঃ কল্যাণ দে, ডাঃ জুৱাৰ দলে, ডাঃ নীতিন অন্নপুৰা, ভাৰতীয় কৃষি গৱেষণা প্রতিষ্ঠান, গোগামুখৰ বিজ্ঞানী ডাঃ মনীষ পাণ্ডে আদিয়ে। গোগামুখ ৰাজ্যিক পশু চিকিৎসালয়ৰ পশু চিকিৎসা বিষয়া ডাঃ অনিল পেগুৰ তত্ত্বাৱধানত অনুষ্ঠিত কালিৰ সভাত মুঠ ৩৫০গৰাকী গাহৰি পালকৰ মাজত গাহৰি দানা (৫০ টন), বাল্টি (৩২০টা), গাম বুট (৩০০টা) আৰু ছাতি (২০টা) বিতৰণ কৰা হয়। সঞ্চালক ড° বিবেক কুমাৰ গুপ্তাৰ তত্ত্বাৱধানত গোগামুখ পশু চিকিৎসালয়ত উদগনিমূলক আঁচনিৰ কালি সামগ্ৰী বিতৰণ কৰা হয়। ৰাষ্ট্রীয় গাহৰি অনুসন্ধান সংস্থান, ৰাণী, গুৱাহাটীৰ সঞ্চালক ডাঃ বিবেক কুমাৰ গুপ্তাৰ তত্ত্বাৱধানত অনুষ্ঠান সম্পন্ন হয়।

ICAR-National Research Centre on Pig, Gu... @nr... · Mar 1, 2024

ICAR-NRC on Pig, Guwahati bags Award for the Best Institutional Film during MANAGE Agri-Film Festival – 2023 on 22.02.24. The award-winning film "Biosecurity in Pig Scientific Production" was conceived for promoting biosecurity at farmers' field.@icarindia @ManageHyd @MundaArjun

1 92

ICAR-National Research Centre on Pig, Gu... @nr... · Oct 24, 2024

Honourable Minister also visited exhibition stall showcasing products/technologies developed by ICAR-NRC on Pig and KVK, Goalpara. @icarindia @mpbhagirathbjp

37

ICAR-National Research Centre on Pig, Gu... @nr... · Apr 30, 2024

Annual Review Meeting of "AICRP and Megaseed Project on Pig" organized at ICAR- National Research Centre on Pig from 25-26 April 2024. @icarindia

1 · 2 · 175

ICAR-National Research Centre on Pig, Gu... @nr... · Jan 9, 2024

Dr.Himanshu Pathak,Honourable Secretary,DARE,GoI & Director General,ICAR visited ICAR-NRC on Pig on 08.01.2024 and interacted with Director & Scientists.Accompanied by Dr.V.K.Mishra and Dr.A.K. Mohanty, Director,ICAR RC NEHR and ATARI Zone VII, respectively @icarindia @icar_neh

122

ICAR-National Research Centre on Pig, Gu... @nr... · Jul 4, 2024

Inviting Applications for Entrepreneurship Development Programme @icarindia

1 · 69

ICAR-National Research Centre on Pig, Gu... @nr... · Jan 20, 2024

ICAR-NRC on Pig conducted farmer interaction and input distribution programme under Tribal Sub-Plan in collaboration with Mising Autonomous Council at Kamala Miri Janajati ME School, Garamur, Majuli, Assam on 19.01.2024 @icarindia @mac_assam

1 · 1 · 107

ICAR-National Research Centre on Pig, Gu... @nr... · Jan 20, 2024

ICAR-NRC on Pig conducted farmer interaction and input distribution programme under Tribal Sub-Plan in collaboration with Mising Autonomous Council at Karatipar Bahumukhi Banpani Ashray Sibir, Majuli, Assam on 19.01.2024 @icarindia @mac_assam

101

ICAR-National Research Centre on Pig, Gu... @nr... · Dec 20, 2024

ICAR-National Research Centre on Pig,Guwahati organized Field Day, Awareness Camp on Scientific Piggery and Input Distribution Program under TSP in collaboration with Manas Tiger Reserve, Bansbari Range Office at Bansbari and Bhuyanpara Range
@icarindia
@ChouhanShivraj
@dare_goi

> **Manas Tiger Reserve** @manasnptr · Dec 20, 2024
> @manastr proud to collaborate with ICAR National Research Centre on Pig, Rani to support our local farmers in organising an awareness meeting on scientific piggery and inputs distribution to beneficiaries from various EDCs under Bansbari and Bhuyanpara Range! #ManasMitra

33

ICAR-National Research Centre on Pig, Gu... @nr... · Sep 4, 2024

ICAR-National Research Centre on Pig celebrated 23rd Foundation day on 4th September 2024 @icarindia

37

ICAR-National Research Centre on Pig, Gu... @nr... · Sep 4, 2024

ICAR-National Research Centre on Pig celebrated 23rd Foundation day on 4th September 2024 @icarindia

32

ICAR-National Research Centre on Pig, Gu... @nr... · Sep 4, 2024

ICAR-National Research Centre on Pig celebrated 23rd Foundation day on 4th September 2024 @icarindia

31

ICAR-National Research Centre on Pig, Gu... @nr... · Sep 4, 2024

ICAR-National Research Centre on Pig celebrated 23rd Foundation day on 4th September 2024 @icarindia

44

ICAR-National Research Centre on Pig, Gu... @nr... · Aug 30, 2024

ICAR-NRC on Pig, Guwahati in collaboration with KVK, Tawang conducted Research Extension Farmers Interface Meeting and input distribution under TSP Programme at Kyidphel @icarindia

> **Diprotawang** @diprotawang · Aug 30, 2024
> @nrcpig Guwahati in collaboration with KVK Tawang today conducted research extension farmers interface meeting and input distribution under tribal sub plan at Kyidphel
>
> After the interaction programme 1000bags of animal feed and 250 no...
> Show more

1 1 40

ICAR-National Research Centre on Pig, Gu... @nr... · Aug 15, 2024

ICAR-NRC on Pig celebrates Independence Day.
@icarindia
#HarGharTiranga

1 39

ELEGANCE IS NOT BEING NOTICED, IT'S ABOUT BEING REMEMBERED

Sitting (L to R): Dr. Seema Rani Pegu (Sr. Sci.), Dr. Souvik Paul (Sr. Sci.), Dr. Rajib Deb (Sr. Sci.), Dr. Juwar Doley (Sr. Sci.), Dr. Rajendran Thomas (Pr. Sci.), Dr. Mohan N.H. (Pr. Sci.), Dr. Swaraj Rajkhowa (Pr. Sci.), Dr. V. K. Gupta (Director), Dr. B. C. Das (Pr. Sci.), Dr. Rafiqul Islam (Pr. Sci.), Dr. P. J. Das (Pr. Sci.), Shri Utpal Ghosh (F&AO), Shri Rupesh Sabharwal (AO), Dr. Kalyan De (Sr. Sci.), Dr. Anil Kumar Das (TO)

Standing (L to R): Shri Ratul Baishya (LDC), Smt. Jonali Nath (UDC), Smt. Priya Bala (Assistant), Dr. Jaya (Sci.), Dr. Salam Jayachitra Devi (Sci.), Dr. Meera K. (Sci.), Dr. Nitin M. Attupuram (Sci.), Dr. Sunil Kumar (Sci.), Dr. Vishal Rai (Sci.), Dr. Satish Kumar (Sci.), Dr. Rajib Kumar Das (TO), Dr. Priyajoy Kar (Sci.), Dr. Lokesha E. (Sci.), Shri Kailash Choudhury (Sr. Technician), Shri Kundan Kumar (Assistant), Shri Rana Pratap Kakati (Technical Assistant), Shri Uttam Prakash (AAO), Shri Siba Chandra Deka (Sr. Tech. Assistant), Dr. Gagan Bhuyan (TO), Shri Naren Chandra Deka (SSS)

भाकृअनुप
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0361-2847195
0361-2847195
www.nrcp.icar.gov.in
nrcponpig@rediffmail.com