



## ICAR Sponsored Winter School

# Livestock Production, GHG Emissions and Environmental Pollutants: Mitigation and Bioremediation

09 January - 29 January 2024



### Patron

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# About The Institute

ICAR-National Institute of Animal Nutrition and Physiology (NIANP), Bengaluru is a premier research Institute conducting research and imparting education/training in the field of Animal Nutrition, Animal Physiology and Bioenergetics & Environmental Sciences. The Institute is mandated to conduct basic and fundamental research with respect to animal feed resource management using physiological-nutritional approaches to improve animal productivity and profitability of livestock farmers. Within this mandate, various research activities are being conducted to unravel basic principle influencing the productive and reproductive efficiency. the Institute has excellent infrastructure including air-conditioned lecture hall, Internet connectivity, state of art fully air-conditioned auditoriums (250 and 100 sitting capacity) and Guest House facility (with Four VIP suites and 18 AC Rooms). The Institute has earned its unique position in the 'National Agricultural Research System' through its relentless efforts and contributions. The efforts of the scientists are reflected in bagging prestigious awards namely 'Sardar Patel Outstanding Institution Award' twice in the span of past 10 years, 1<sup>st</sup> position in the Swachhata Award among all the ICAR Institutes for clean and green campus and 'Outstanding Institute' Award during 'Outlook Agritech Summit and Swaraj Awards – 2022' on 14 September 2022.

NIANP has a thematic group on the climate change comprising the trained and experienced scientists in the discipline of Animal Nutrition, Animal Physiology, Animal Biotechnology and Livestock Production and Management. The state of art laboratories namely Energy Metabolism, Stress Physiology, Omics, Nutrient Kinetics and Integrative Physiology will be used for the training purpose under the proposed winter school. Apart from these laboratories, the institute has functional international linkages with various reputed organizations such as International Livestock Research Institute (ILRI), Nairobi, Shinshu University, Japan, National Institute of Livestock and Grassland Science (NILGS), Japan, University of Kassel & Georg-August University, Göttingen, Germany, University of Queensland, Australia and International Atomic Energy Agency (IAEA), Vienna. NIANP has successfully completed many projects funded from the ICAR, DBT and DST on the various aspects of enteric methane emission, climate change and resilience in animals and environmental pollutants associated with the livestock production.



ICAR-NIANP



# About the Training

Global demand for livestock products is expected to increase by 60 percent by 2050. The livestock sector is under tremendous pressure to fulfil the increasing demand for safe, nutritious livestock-derived products. Thus, providing animals with adequate, balanced diets free of toxins and contaminants is essential to enhance their productivity and welfare. Due to extremely high feed costs (up to 70–80 percent of the total), it is of utmost importance to ensure that animals get a balanced diet and nothing is wasted. If the animal diet is not properly formulated, a larger portion goes to waste and pollutes the environment. Feeding balanced diets decreases the level of excretion of feed nutrients and thus assists in reducing the environmental pollution caused by animal production.

Climate change, due to its negative impact, is one of the major challenges of recent times and needs to be addressed as a priority. Greenhouse gases (GHGs), due to their large emissions and high warming potential, are recognised as major causes of the rise in global surface temperature. Enteric fermentation is one of the largest sources of methane emissions among the agriculture sector, wherein global livestock annually emit 80–90 Tg (Teragram) of methane per year. India has about 536 million livestock population and is always held accountable for the large enteric methane emissions. A recent estimate of NIANP revealed that Indian livestock annually emit 9.253 Tg of enteric methane, wherein cattle and buffaloes aggregately contribute about 85% of the total enteric methane emissions. In spite of representing one of the production inefficiencies, methanogenesis is generally referred to as a wasteful but necessary process. Methanogenesis acts as a sink for the fermentative H<sub>2</sub> produced in the rumen. In addition to the global warming impact, enteric methane emissions are also held accountable for about 8–12% of the biological energy loss. This significant loss of biological energy in the form of methane is crucial, especially in developing countries such as India, where 85% of the livestock is owned by landless or marginal farmers. A recent estimate confirmed that 23% of total digestible nutrients (TDN) are in deficit in the country compared to the requirements for livestock. This reflects the acute shortage of feed-energy availability in the country. Thus, it is obvious that a reduction in enteric methane emissions to correct the production inefficiency is essentially required. It is well established that a reduction of 15-20% methane without interfering with the rumen fermentation can be achieved with farmers' friendly, low-input-demanding strategies. The institute has state of art facilities for in vitro and in vivo methane measurement, rumen microbiota culturing and molecular analysis. Recently, the methane group also developed and commercialized farmers friendly phyto-based anti-methanogenic products such as Harit Dhara, Tamarin Plus and obtained two patents claiming the methane reduction. In addition, the group also modified the SF<sub>6</sub> gas collection device (product patent applied) enable to detect the immediate leakage and blockage of the halters and record the real time gas collection.

Nowadays, India, due to climate change, often experiences sudden rises in temperature that lead to an uncomfortable ambience for the livestock inhabiting livestock. Heat stress is one of the major concerns that affects the production potential of dairy animals worldwide. Apart from reducing milk production, heat stress also affects the quality of milk. It is of utmost importance to investigate the influence of animal genetic makeup, feeding, and general management on the adaptation and tolerance mechanisms in livestock to cope with heat stress. In this context, adaptation measures and

strategies are important to sustaining livestock production and productivity; however, their relevance depends on local environmental conditions. In view of the importance of climate change and adaptation, ICAR-NIANP established a state-of-the-art facility, 'Centre for Climate Resilient Animal Adaptation Studies' with unique facilities, which has twenty-four microclimate-controlled chambers of twelve thermo-neutral zones and twelve heating and cooling systems. The climate chamber has the facilities to regulate the desired thermo-neutral zone for small ruminants, in addition to inducing heat stress and cold stress models that can simulate any weather condition across the world.

Environmental pollution is a major threat that has serious health consequences for people and animals in the affected area. Modern technology development, rapid industrialization, and agricultural intensification are among the primary causes of environmental pollution. Pollutants in the environment spread through various channels and may enter the food chain. Some of the most common causes of environmental toxicity in farm animals are pesticides, heavy metals, and other agrochemicals. Heavy metals in feeds and fodder grown for animal feeding are primarily sourced from contaminated agricultural land and water. Plants have an innate tendency to accumulate heavy metals, which are then passed along the food chain. Therefore, there is need for the remediation of these pollutants using physical, chemical, or biological methods. The physical and chemical methods have been used for years but they come with their drawbacks which include the need for an expert and special equipment for the chemical bioremediation procedure while the physical bioremediation procedure is expensive. These drawbacks necessitate the development of a better alternative to biological remediation (bioremediation) for the efficient, environmentally friendly, and cost-effective transformation (degradation) of environmental contaminants. Plants and microorganisms can both be used for biological remediation; however, plants take longer to grow and cannot be easily manipulated like microbes, making microbes preferable.

The training programme comprising a blend of theory and practical demonstrations is designed for the researchers and academicians from the NARS. Following broad areas will be covered under the Winter School on 'Livestock Production, GHG Emissions and Environmental Pollutants: Mitigation and Bioremediation' during 9 – 29 January 2024.

- Greenhouse gas emission (GHGs) emissions from animal-agriculture
- Impact of climate change on production and reproduction
- Environmental pollutants and Anti Microbial Resistance: Implications and Bioremediation
- Uncertainties in GHG quantification from animal-agriculture
- Methodologies for enteric methane measurement
- Methane mitigation approaches
- Models for predicting greenhouse gas emission from animal farm
- Abiotic stress and ameliorative measures
- Nutritional stress and corrective measures
- Molecular methods to explore rumen microbial diversity
- Bioinformatic tools for rumen microbial studies
- Newer feed resources and least cost ration formulation
- Statistical Application for in vitro and in vivo animal studies
- Estimation of volatile fatty acid by gas chromatography
- Pesticides residues and heavy metal analysis using GCMS/MS, LCMS/MS and ICPMS
- Hydroponics and aeroponics cultivation for the quality fodders availability

## Eligibility

The participant should possess minimum qualification i.e. Masters degree in Animal Nutrition, Animal Physiology, Animal Breeding, Livestock Production and Management or other relevant disciplines of Veterinary/Animal Sciences. The applicant should be working not below the rank of Assistant Professor/Lecturer/Scientist in State Agricultural/Veterinary University or an ICAR Institution. Applicants working in the theme area of the winter school programme will be given preference.

## Application and Selection

The candidates should apply online at the below link:

1. Visit the website <https://cbp.icar.gov.in/> and follow the instructions on how to apply. Detailed information is also enclosed in this brochure in next section.
2. The last date for receiving applications/nominations is **15 December 2023**, the selected candidates will be intimated on **16 December 2023** by E-mail/Whatsapp/mobile. The candidates will have to confirm their participation latest by **20 December 2023**.

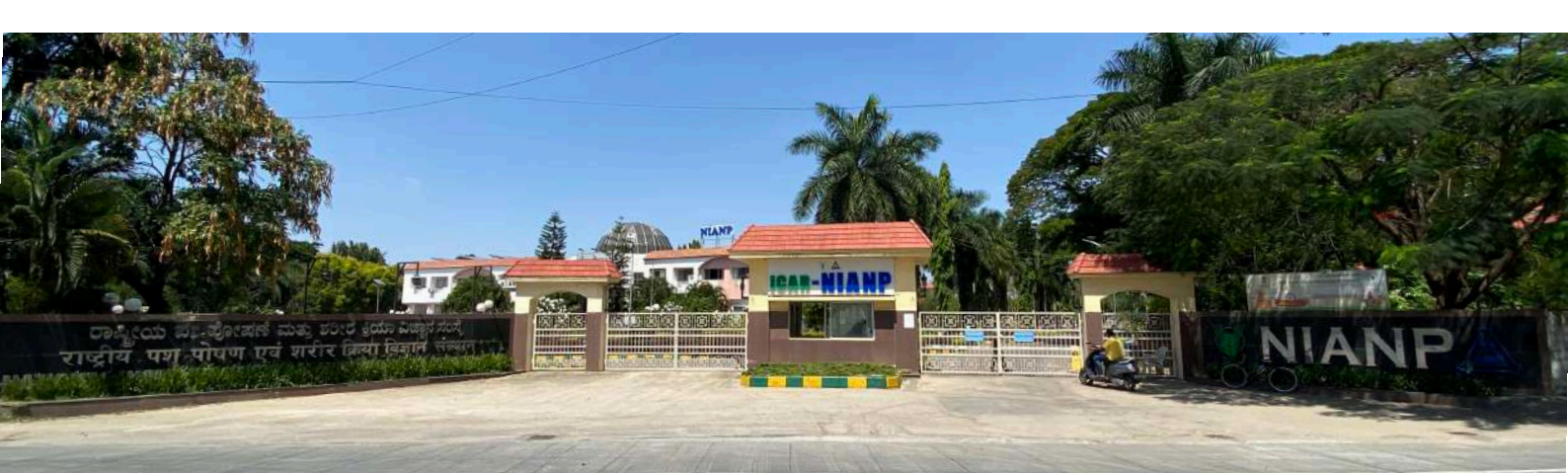
The participants will be paid actual fare as per their entitlement (limited to AC II Tier by shortest route) and ICAR Guidelines for attending the winter school. The claims will be reimbursed for the shortest route on producing the original receipt/ticket.

## Boarding and Lodging

Free boarding and lodging will be provided to the participants of winter school in the Institute guest house on sharing basis. Local participants will be provided lunch and inter-sessional tea. The participants are strictly advised against bringing accompanying family members as the guest house accommodation is limited.

## Weather

The weather is generally pleasant during January with an average 29 degree celsius temperature but by evening the temperature may drop to 17 degree celsius. The morning and evening weather could be colder. The participants are advised to carry light woollen clothes for the protection from sudden fall in temperature.

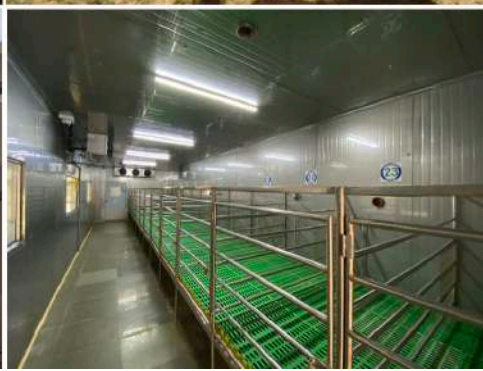


# How to reach ICAR-NIANP?

NIANP is located in the heart of Bengaluru city. The campus is 8 km from city railway station(KSR) station/Majestic Bus station, 15 km from Yeshwanthpur railway station and 40 km from Airport. Pre-paid taxi/auto are available from all the above locations including the app based taxi services. The Institute is situated on the Hosur Road, Opposite Bosch Factory, in Adugodi area.



Location



# Procedure to apply for the Participation in ICAR Sponsored Winter School on 'Livestock Production, GHG Emissions and Environmental Pollutants: Mitigation and Bioremediation' 9 - 29 January, 2024

## A. Create account on CBP vortal, if your account is not created on CBP vortal

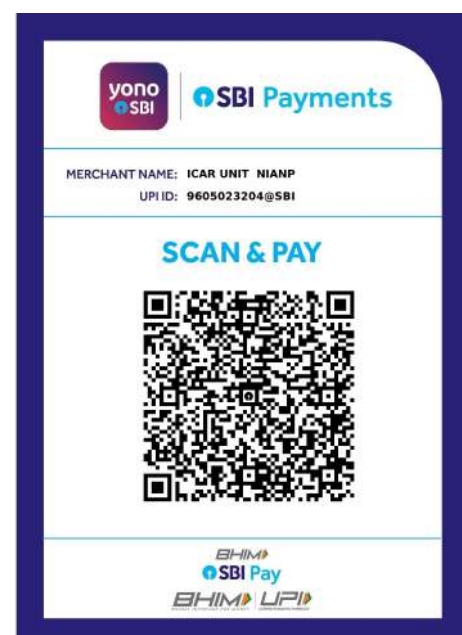
1. Click on 'Create New Account' link on home page.
2. Fill the form.
3. Click on 'Create Account' button. User will get the message 'Successfully created account'.

## B. Login on CBP Vortal

1. Enter the 'User Id' and 'Password' in the candidate login window on the home page.
2. Click on 'Login' button.

## C. Participate in training programme

1. After login, click on 'Participate in Training' button, list of trainings will be displayed, choose Summer/Winter School. Please check the programme title before applying.
  2. Click on the 'Training Title' to view the details of the winter school program.
  3. To apply in training program, click on 'Apply' link in the last column of the table.
  4. A form will open with all your personal details filled in. In case, user want to change any of these information then click on 'update' link and do the desired changes.
  5. Click on 'Save' button to save the information then click on 'Next' button.
  6. Fill the 'Academic details' and 'Experience details' information. Click on 'Next' button.
  7. Fill payment details (the Fee is Rs 50; non-refundable for Winter School) The payment can be made electronically at the QR code of NIANP (given on the last page) . Fill in the details in the respective fields and transaction number in the DD/Postal Order No field, and Click on 'Next' button.
  8. Advance Application form will be generated in system. Take printout of this form by click on 'print' link. Submit this copy in your office for approval of competent authorities. Click submit link to submit the advance copy to the course director of the Winter School.
  9. After approval from competent authorities at your side, scan the performa and upload scanned copy of approved application form. Click on 'Participate in Training' menu. The winter school will be displayed on the top of the table and upload link in the last column of the table.
  10. Click on 'upload' link to submit the approved application form on the portal. This will take you to the page to upload forms. Click "choose file" and upload scanned copy of the Approved Application Form in pdf/doc/jpg/jpeg/docx format and click on the "Submit button" for final submission
  11. 'Successfully applied in training program' message will be shown on the portal.
- In case of any difficulty, please contact the Course Coordinators/Course Director



## Contact for further information

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## Important Dates

Last date for receipt of online applications: **15 December 2023**

Intimation to selected candidates : **16 December 2023**

Confirmation by selected candidates : **20 December 2023**

