

4. Stress and Adaptation

- ✦ Concept and mechanism of multiple stress in livestock
- ✦ Adaptive and ameliorative measures to counter stress
- ✦ Modeling for climate change impacts on livestock farm

Experts/faculty

Well learned and internationally trained scientific experts from ICAR-NIANP and from other institutes will impart theory and practical demonstrations.

International experts

Experts from the Food and Agricultural Organization of the United Nations (FAO) & Global Research Alliance, New Zealand will also make the deliberations and share their experiences with trainees

Participants & Eligibility

The maximum number of participants for the training programme is 20. Each country from SAARC & African Union can nominate a maximum of 2 participants. Assistant Professor/lecturer working in the University or Research Scientists working in the related area are eligible to apply.

Participation fee:

A nominal fee of US\$ 1600 per participant will be charged towards boarding, lodging, training material, compendium, institutional charges and other miscellaneous expenses. Participants are supposed to make their own arrangements for VISA and travel. The bank details for depositing the participation fee is provided below.

A/c Name - ICAR Unit - NIANP; A/c No. 30295508819
Bank Name - SBI- Main branch, St. Marks Road
IFSC Code - SBIN0000813; Swift Code - SBININBB169

Food and Accommodation:

Wholesome meals and refreshments will be served throughout the training period. Accommodation will be provided in the well furnished ICAR-NIANP guest house having wi fi, air conditioning and TV facility.



VISA requirement

If you require an entry visa for India, you must apply for visa personally at the local Indian Embassy or Consulate in your country. Please apply well in advance for obtaining the suitable visa for attending the training programme. For information pertaining to visa type, duration, fee, processing time etc., please visit www.india-visa.com. For selected countries visa on arrival is also available, please contact nearest Indian embassy to check if you are entitled for visa on arrival. If required, an invitation can be issued for VISA purpose

To whom application should be addressed

Applications/nominations (form can be downloaded from institute website www.nianp.res.in) should be sent on or before 30th June 2015 through Head of the institution by email, to any of three coordinators . Confirmed participants will be intimated by 10th July through email/fax.

Important dates:

Announcement: 8th April 2015
Receipt of Application: 30th June 2015
Confirmation of Participation: 10th July 2015
Commencement of SAARC Training: 11th August 2015

Address all correspondence to:

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International Training Programme on

Livestock Methane and Climate Change: Recent Advances in Methane Estimation and Amelioration Strategies

or

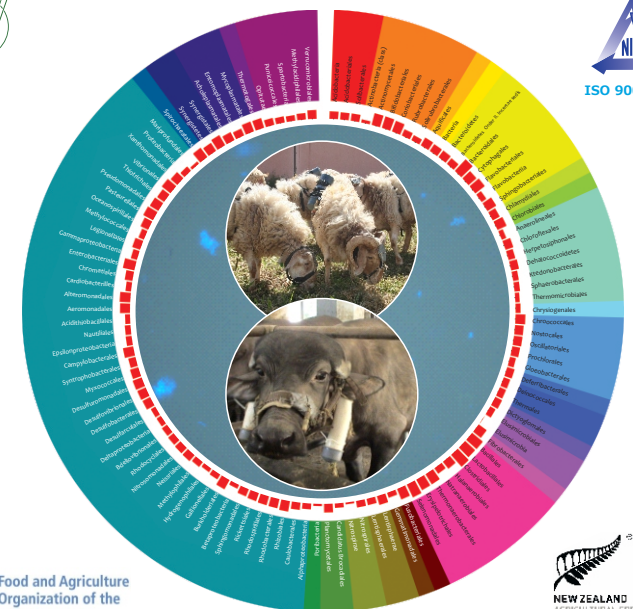
SAARC Countries & African Union

at

ICAR- National Institute of Animal Nutrition and Physiology
Bengaluru

With technical support of
Food and Agricultural Organization of the United Nations (FAO)

“New Zealand Government in support of the
LRG of the Global Research Alliance”

11-20th August 2015

Food and Agriculture
Organization of the
United Nations



NEW ZEALAND
AGRICULTURAL GREENHOUSE GAS
Research Centre

Course Director

Dr. Raghavendra Bhatta
Director, NIANP
Bengaluru

Course Coordinators

Dr. P. K. Malik
Dr. Atul P. Kolte
Dr. V. Sejian

About Bengaluru

Bengaluru (previously known as Bangalore) is the capital city of South Indian state Karnataka. It is one of the world's fastest growing cosmopolitan cities and is well known as hub of Indian IT sector. It is amongst the top 10 preferred entrepreneurial locations in the world, and has some of the India's premier scientific establishments and many well recognized educational and research institutions. A demographically diverse city, Bengaluru is a major economic and cultural hub and the second fastest growing major metropolis in India.

The Kempegowda international airport in Bengaluru has many direct international flights and is well networked with all the major places across the globe. The ICAR-NIANP institute is located in the heart of city and 39 km away from the international airport, takes around 45 minutes to reach institute without any hassle. For transportation from airport to NIANP, post paid air conditioned Cab and State Transport buses are available.

The weather in August month is generally pleasant with sporadic rainfall on few days. Day time is bit hot, maximum temperature reaches up to 28°C while nights are generally cold (~19°C).



About the Institute

ICAR-National Institute of Animal Nutrition and Physiology (NIANP) is a premier research institute under the Indian Council of Agricultural Research (ICAR), New Delhi. The

institute is conducting fundamental and basic research with an aim to improve productive and reproductive efficiency of livestock through nutritional, physiological and environmental interventions. The institute is well equipped with state of art laboratories to undertake the research in various emerging thrust areas related to livestock production and climate change. ICAR-NIANP is an ISO 9001:2008 certified institute to cater to the needs of various stakeholders by well trained and experienced scientists. For detailed information about the institute please visit our website www.nianp.res.in

The Training

Climate change is one of the major challenges which needs to be addressed on priority due to its negative impact on the livelihood of poor people especially in developing countries. Greenhouse gases (GHGs), due to their high warming potential, are recognized as one of the major causes for global surface temperature increase. The contribution of livestock to the total GHG emissions is substantial. Livestock emit 103 Tg methane, wherein Indian livestock generate 8-10 Tg. Of the total emissions from the livestock sector, methane constitutes about 44% of the total emission and the remaining is equally shared between N₂O and CO₂.

The enteric methanogenesis revolves around the fermentative H₂ production in rumen, where it is utilized for the reduction of CO₂ into CH₄. Methanogenesis is an obligatory but wasteful process for the host animal to survive and that is why complete inhibition is neither advisable nor practically feasible.

For mitigating the enteric methane emission, our focus should be on improving the fermentative H₂ utilization through other beneficial reductive pathways, targeting methanogens or other H₂ utilizing microbes which are responsible for interspecies H₂ transfer.

This training programme has been designed for the researchers from the countries of South Asian Association for Regional Cooperation (SAARC) and African Union, and is a mix of a series of lectures and practical demonstrations.

Information, knowledge and expertise on methane production and measurements will be shared by experts. Practical demonstration on methane measurement using *in vitro* and *in vivo* techniques will also be provided. In addition, this training workshop will cover strategies to mitigate GHG emissions from the livestock sector and to adapt animals to the ongoing climate changes.

The course content will be covered under four major segments, namely Methane production, Methane estimation, Methane amelioration and Stress & adaptation.

1. Methane production/emission

- ✦ Role of livestock in climate change
- ✦ Enteric & excrement methane from livestock: status and need for amelioration
- ✦ Rumen fermentation pathways and methanogenesis
- ✦ Rumen archaea and methane emissions

2. Methane estimation

- ✦ *In vitro* gas production technique for methane estimation
- ✦ SF₆ tracer technique for measuring *in vivo* methane emission
- ✦ Isolation and characterization of rumen protozoa
- ✦ Isolation and culturing of rumen methanogens
- ✦ Molecular techniques for the identification, diversity analysis and quantification of rumen archaea

3. Methane amelioration

- ✦ Feed based amelioration of enteric methane emissions
- ✦ Alternate H₂ sinks in rumen: opportunities and limitations
- ✦ Biological control of rumen methane emission
- ✦ Breeding and residual feed intake approaches