



Science for Nation Building

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Published by

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Director, ICAR-NIANP



Dear Readers,

It gives me immense pleasure to present the first issue of ICAR-NIANP news and views 2015. The institute continues to maintain excellence in research and other developmental activities. The ICAR result framework document (RFD) has ranked the institute pooled as number one among the animal science Institutes. The research progress of the Institute was evaluated at IRC and RAC meetings. The 'Parliamentary Committee on Agriculture' under the chairmanship of Hon'ble Shri Hukmdev Narayan Yadav visited the institute in February and appreciated the activities of the Institute.

To develop human resource and capacity building in the country, the institute has organized a model training programme on 'Recent developments in animal feeding practices' for the state department officers. Another course was organized for the state veterinarians on 'feed resources and ration balancing for dairy cattle', sponsored by the Karnataka Veterinary Council.

To attract young students and explain the role of science in nation building, the institute observed an open day for school students on the occasion of National Science Day. The students from different Kendriya Vidyalayas visited ICAR-NIANP laboratories. Various competitions such as elocution, quiz and science fair were organized. Simultaneously a field workshop was held for the livestock farmers and imparted training on feeding practices, shelter management. Under swatch Bharat mission, cleanliness drive was organized in Nagenahalli village and educated the farmers on maintenance of hygienic environment for livestock and clean milk production.

For the implementation of national initiative on Swatch Bharat, ICAR-NIANP regularly conducts campus-cleaning drive. The world environment day was celebrated by planting trees in the campus.

I take this opportunity to compliment the staff of ICAR-NIANP, Bengaluru for their efforts and commitment.

Raghavendra Bhatta

Raghavendra Bhatta



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Research News

Replacing feed antibiotic as growth promoter

The growth promoting effect of antibiotics was discovered during 1940s. Subsequently, its application as an animal feed supplement was observed worldwide and became highly popular. Nevertheless, later it was noticed that the extensive use of feed antibiotics over a period of time strongly contributes to the emergence of antibiotic resistant microbes, which is a serious threat to public health. Moreover, antibiotic resistance makes the respective antibiotic useless, leading to a huge economic loss in terms of the investment that was incurred for developing the drug. Consequently, the usage of antibiotics as growth promoters in food animal has been banned by the World Health Organization and European Union. Recently, ICMR, India has also expressed concerns about the presence of antibiotic residues in different livestock food products. However, the restriction on the use of antibiotics as growth promoters in feed has led to substantial increase in the use of antibiotics for therapeutic purpose. Thus, worldwide, researchers are

now investigating to find out suitable alternatives to replace feed antibiotics.

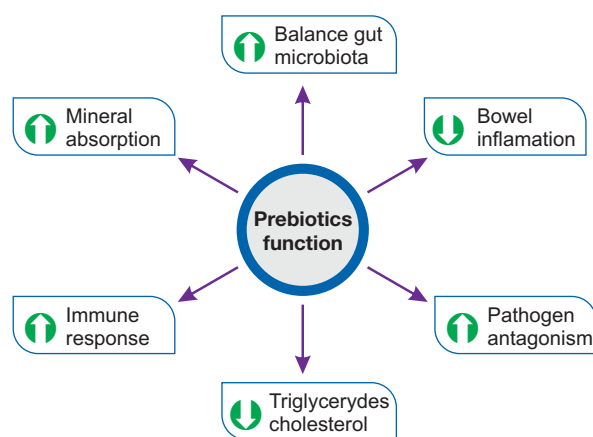
Prebiotics are a group of oligosaccharides bio-molecules, which are capable to promote the growth and multiplication of specific beneficial gut microflora. Although not digestible, they are considered as functional food/feed because of their contribution towards gut health by promoting beneficial gut microflora composition. Interestingly, the concept of functional foods was introduced long ago by the great ancient Greek philosopher Hippocrates "Let food be thy medicine and medicine be thy food". Scientific evidences started to support the above principle only recently through the application of prebiotics for modulating the gut microflora. The term "Prebiotics" was coined by Gibson and Roberfroid in 1995. These molecules, apart from stimulating beneficial gut microflora, also influence various other physiological functions including gut health, higher mineral absorption, lowering of cholesterol, immune stimulation and pathogen exclusion. These molecules hold promise for replacing feed antibiotic supplementation. Similarly, herbal residues are also emerging as front runner for replacing the feed antibiotic usages.

Effect of different treatments on the abundance of microorganisms (T-RFLP). C: Control, T: tetracycline supplementation, G: ginger supplementation, I: inulin supplementation

Treatment combinations						Enzyme	Organism identified [Reference for categorization]
C vs. T	C vs. G	C vs. I	T vs. G	T vs. I	G vs. I		
Beneficial organisms							
↑ *	↑	↑	↓	↓	↑	Mspl	<i>Butyrivibrio fibrisolvens</i>
↑ *	≈	≈	↓	↓ *	≈	Mspl	<i>Parabacteroides distasonis</i>
↑	↑ *	↑ *	↑	↑	↑	Mspl	<i>Bacteroides intestinalis</i>
≈	↑	↑ *	↑	↑	↓	BsuRI	<i>Denitrobacter sp.</i>
↑ *	↑ *	≈	↓	↓	↓	Mspl	<i>Phascolarctobacterium faecium</i>
≈	↑	↑ *	↑	↑ *	↓	BsuRI	<i>Methylobacterium sp.</i>
↓	↑	↑ *	↑	↑ *	↑	Mspl	<i>Eubacterium oxidoreducens</i>
↑ *	↑	↑	↓	↓	↓	BsuRI	<i>Lactobacillus ruminis</i>
↓	↑ *	↑ *	↑	↑ *	↓	Mspl	<i>Selenomonas sp.</i>
↓	↑	↑ *	↑ *	↑ *	↓	Mspl	<i>Selenomonas infelix</i>
≈	↑	↑	↑	↑	≈	Sau3AI	<i>Anaerovibrio lipolyticus</i>
Pathogenic organisms							
↓ *	↓	↓	↑	≈	↓	Sau3AI	<i>Flavobacterium sp.</i>
↑ *	≈	↑	↓	↓	↑	BsuRI	<i>Paenibacillus sp.</i>
↑ *	↓	↓	↓ *	↓ *	≈	Sau3AI	<i>Atopostipes suicloacalis</i>
↑	↓ *	≈	↓ *	↓	↑	Sau3AI	<i>Bartonella quintana str. Toulouse</i>

↑ Increased, ↓ Decreased, ≈ No change, * significant change (p<0.05)

PLOS ONE; DOI: 10.1371/journal.pone.0132961



The major functions of prebiotics

Recently, the scientists of the institute have tried to evaluate the effectiveness of ginger residue, and prebiotic (inulin) as an alternative to antibiotics by comparing fecal microflora composition (PLOS ONE, DOI:10.1371/journal.pone.0132961) using T-RFLP technique. The grower pigs were offered feed containing antibiotic (tetracycline), ginger and inulin separately and un-supplemented group served as control. The study has revealed significant changes in the fecal microbial abundance among the groups. The results indicate a significant increase in the abundance of the beneficial microbes (*Bacteroides intestinalis*, *Selenomonas infelix*, *Selenomonas* sp. and *Eubacterium oxidoreducens*) with inulin or ginger supplementation as compared to control or antibiotic supplementation. Additionally, inulin supplementation alone significantly increased the abundance of the beneficial microbes *Methylobacterium* sp. and *Eubacterium oxidoreducens* as compared to control or antibiotic. Interestingly, a significant reduction in the abundance of the pathogenic microorganisms (*Flavobacterium* sp., *Paenibacillus* sp., *Atopostipes suicloacalis* and *Bartonella aquintana* str. Toulouse) was evident with the supplementation of inulin or ginger as compared to control or antibiotic. These findings indicate that inulin and ginger can be used to replace feed antibiotic and are effective in establishing a favourable gut microbial composition for maintaining a better gut health.

Awards/ Recognitions



PK Malik

Received the 'Australian Ambassador Award' for the year 2015 by the Australian High Commission, New Delhi.



M Chandrasekharaiah

Selected as a Fellow of the 'Animal Nutrition Association of India', 2015.

Received the 'Bharat Shiksha Ratan Award' for the achievements in research and extension by the 'Global society for Health and Educational Growth'.

Visits abroad

Raghavendra Bhatta, Director

Participated in the 6th Pan Commonwealth Veterinary Conference and the 27th Congress of the Veterinary Association of Malaysia held from 23rd to 26th March 2015 at Kuala Lumpur, Malaysia.

Participated in the Seventh Meeting of Global Research Alliance Livestock Research Group at Lodi, Italy on 23rd June 2015, and Joint Livestock Research Global Research Alliance Networks Meeting at University of Reading, U.K. on 25th and 26th June 2015

Events



Pongal celebration
on 16-1-2015



Republic Day Celebration
on 26-1-2015



Republic Day Sports Events
on 21-1-2015



Republic Day Rangoli Competition
on 23-1-2015



Visit of Hon'ble Members of
Parliamentary committee on
Agriculture on 2-2-2015



KVC sponsored Training valedictory
Function on 7-2-2015



Inauguration of Model training
course on 13-1-2015



IJSC Meeting
on 3-3-2015



Annual IRC Meeting
on 1-5-2015



One day Workshop on NIRS under
ARCh_NET Project
on 30-4-2015



RAC Meeting
on 27-2-2015



National Science day celebration
on 28-2-2015



National Science day celebration
on 28-2-2015



National Science day celebration
on 24-2-2015



World Environment Day
celebration on 5-6-2015



Inauguration of Industrial
Experience Training Programme
on 10-6-2015



Staff Welfare Club
on 24-6-2015



Women's Day Celebration
on 31-3-2015

Seminars/Lectures/Others

Date	Events
13.01.2015	Talk on Response of super dosing of phytase in normal or low phosphorus-calcium diet of broiler chicken
13.02.2015	A lecture cum demonstration of software Electronic Laboratory Notebook
10.03.2015	Talk on Isolation of methylotrophic methanogens from pasture fed sheep

Field workshops

- ICAR-NIANP scientists were interacting with the farmers of the Karepura village, Doddaballapura Taluk, about the reproductive problems in their village, importance of improving reproductive performance in animals and possible nutritional and hormonal interventions for improving fertility in dairy animals in the village
- Animal health camp was conducted at Belalkere, Davanagere District by the ICAR-NIANP scientists to assess the reproductive problems in cattle and measures to improve fertility in dairy animals
- The reproductive problems of cows were identified in Charvaka village, Puttur Taluk and suspected mineral deficient animals were advised to supplement mineral mixture, which were distributed to the farmers for improving fertility of animals
- ICAR-NIANP scientists in collaboration with Subject Matter Specialist from KVK, Doddaballapur demonstrated farmer-friendly-technologies such as urea molasses feeding, silage making and azolla cultivation.



Visitors



Prof. Ellen Hoffman,
University of Kassel, Germany
visited on 25-4-2015



Dr. Ben Sakker Kelly
visited on 3-6-2015

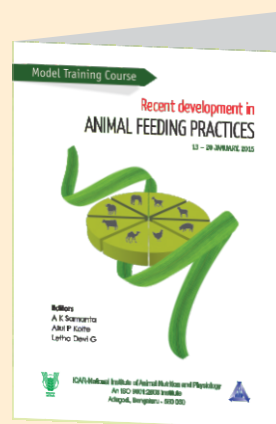
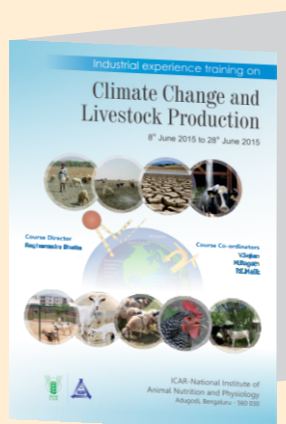
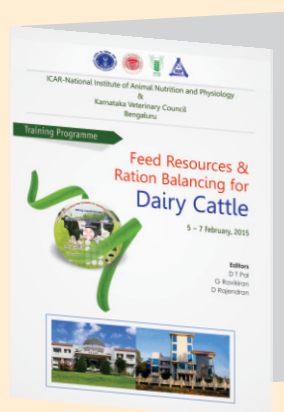


Dr. C.N. Ravishankar,
Director, CIFT
visited on 8-5-2015

Personnel

Shri. K M Kamalesh, joined as Technical Assistant T-3 (Electrical Foreman) on 29-01-2015
Shri Sashtri S, SSS, superannuated from the council's services on 31-05-2015
Shri Nataraj, Assistant, superannuated from the council's services on 30-06-2015

Publications



Laboratory Profile

Reproductive Physiology Laboratory

Reproductive Physiology laboratory was established for conducting studies on male and female infertility, with special emphasis on improving semen quality. The laboratory infrastructure is strengthened with Computer Assisted Semen Analyzer, cell culture incubator, phase contrast and fluorescent microscopes, viscometer and cold handling cabinet for the semen analysis. Apart from semen analysis, the lab is equipped with realtime PCR, 2D electrophoresis, microtome, cryotome, electrophoresis, blotting apparatus and chemidoc image analysis for transcriptomics and proteomic studies. The laboratory is a hub of scientific activity with scientists from all the divisions of the institute, the postgraduate students from various institutions including ICAR-IVRI, ICAR-NDRI, KVAFSU, TANUVAS, KVASU, Jain university and postdoctoral fellows conducting their research work using the expertise and the facilities of the laboratory.



The research projects in this laboratory are funded by AICRP (Nutrition-Physiological interventions), National Agricultural Innovation Project, National Fund for the Basic and Strategic Research in Agriculture, DBT, DST INSPIRE and UGC women postdoc fellowship.

Some significant research investigations in the laboratory include:

- Transcriptomic and proteomic profiling of spermatozoa for developing bull fertility signatures
- Nutrition-reproduction interaction and their modulation in reproductive process
- Role of minerals in regulating male fertility
- Assessment of semen quality and subfertility in bulls to improve male fertility
- Understanding molecular mechanisms of ovarian follicular growth and apoptosis
- Antiluteolytic strategies-studied modulators of progesterone production in buffalo CL.
- Mechanism of action of toxic elements on male fertility
- Skewing sex ratio in animals through nutritional approach
- Spermatogonial stem cells culture for unravelling the molecules regulating male fertility

Some salient output of research in the laboratory:

- The hypoosmotic swelling-giemsa test and synthetic media for sperm penetration test developed in this laboratory could be used to assess semen quality.
- For the first time, the presence of TIP39 protein in buffalo seminal plasma was demonstrated. TIP39 positively influences the sperm functional parameters and fertilizing ability.
- The imbalance in the occurrence of acidic and basic sperm proteins might influence the sperm fertility and surmised the influence of sperm PDC-109 expression levels on bull fertility.
- A specific methodology was developed to isolate bull sperm RNA. The spermatozoa transcripts could be used to identify a panel of signatures for assessing bull fertility.
- The accelerated rate of follicular atresia could be one of the major causes for the low reproductive efficiency in buffalo. Studies on follicular growth and regression revealed the following facts: The atresia in the tertiary follicles of around 5mm diameter takes place in a faster pace and for better ovulatory response, manipulation of this phase is important, as dominance may occur at this stage of follicular development. The IGF-I and BMPs are important survival factors in buffalo ovarian follicle
- Characterized the buffalo CL at morphological, cellular and molecular levels for understanding factors influencing CL function. IGF-1 increased progesterone secretion in luteal cells signifying its application in the improvement of luteal functions for enhancing embryonic survival.
- Studies in mice demonstrated that maternal consumption of calcium and magnesium prior to and during breeding skewed offspring sex ratio towards females. Feeding calcium and magnesium rich diet reduced serum testosterone levels and changed in follicular fluid protein composition and genes expression pattern in oocytes. This opens up the possibilities of manipulating sex at the time of fertilization by changing the microenvironment.



*“It does not require money,
to live neat, clean and dignified..”*

Mahatma Gandhi



एक कदम स्वच्छता की ओर



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