ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

# NDRI News

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## From the Director's Desk


*Hon'ble Union Minister of State for Agriculture and Farmers Welfare Sh. Sudarshan Bhagat addressing the NDRI Faculty*

*Dr. Trilochan Mohapatra, Secretary, (DARE ) & DG, ICAR planting sapling during his visit at Eastern Campus, Kalyani*

**In this issue...**



Although oxytocin is considered as an important drug in medical and veterinary practices, the use of oxytocin (OT) injection for extracting milk from milch animals is prohibited under the Cruelty to Animals Act, 1960. The need of the day is that farmers, medical and veterinary practitioners are to be educated and advised for its judicious use only. Consumers are also to be educated and informed about the myths and facts of oxytocin injection to dairy animals, for letdown of milk. Oxytocin is a nonapeptide hormone, synthesized in hypothalamus of brain and transported to pituitary gland, where it is stored. It is released from the pituitary in response to teat stimulation and causes contraction of myoepithelial cells surrounding the alveoli leading to milk letdown. In addition, it is also released at the time of parturition in animals/ delivery in human beings. In structural terms, in oxytocin, the first cysteine residue is disulphide bonded to the 6th cysteine, thus, creating partial cyclic peptide. The disulphide bridge in OT is essential for its interaction with the receptor and thus, for biological activity. Bovine pituitary has about 800 micrograms of oxytocin and this is about 40 folds more than what is in blood under resting conditions. OT elicits its biological actions by binding to G-protein coupled receptor, which are present only when body is under influence of oestrogen. Whether secreted endogenously in response to natural stimuli or administered exogenously, the effects of oxytocin are same and very fast (within minutes). The biological half life of oxytocin hormone is 3-5 min in humans, 2-3 min in cows and 20-22 min in goats. Oxytocin is metabolized rapidly in liver and kidneys to its inactive products. Further, a circulating enzyme, oxytocinase, also destroys the oxytocin hormone in blood. Oxytocin is digested like any other protein under the action of gut enzymes and gastric acids. It is never absorbed by intestine and is not able to reach in circulating blood intact.

Pharmacologically, oxytocin has many actions like relaxation of the cervix and contraction of uterus during labor, facilitating birth of foetus and bonding between mother and off springs, social recognition, pair bonding, anxiety and maternal behaviors. Therapeutically, it is used for expulsion of fetus and placenta, and for faster involution of uterus in both human and animals. In veterinary practice, OT is also used for the treatment of metritis, mastitis, uterine prolapse and also for letdown of milk in animals with high maternal instinct, in case of death of calf. As such, oxytocin is an essential hormone for normal reproduction, production and milk extraction. Further, continual ejection of milk is dependent on the presence of elevated oxytocin concentrations during the entire milking. The basal levels of oxytocin

concentrations in blood are in the range 4.8 - 6.7 ng/l. The peak concentration can be as high as 90 ng/l, but the normal level during teat stimulation, milking and feeding during milking is about 30 ng/l. In addition, oxytocin also plays an important role in digestion and absorption of nutrients. Oxytocin activates the vagal nerve, which increases the level and activity of gut hormones. Higher levels of gut hormones viz: cholecystokinin and gastnin lead to more efficient nutrients absorption.

Under normal circumstances, administration of only 0.1 - 1.0 IU of Oxytocin is required for milk let-down. Thus, lower doses of the hormone are very unlikely to have any adverse effect on the quality of milk as well as health of the dairy animals. Further, oxytocin was never detected in milk after injecting this low dose. Following administration of very high dose of oxytocin than recommended (several hundred folds), it was detected only in traces. In addition, milk oxytocin gets denatured after boiling/ pasteurization. However, since oxytocin is involved in regulation of lifespan of corpus luteum, sperm transport and several other processes in animal reproduction, theoretically, its regular use for milk letdown may have some implications in the reproductive efficiency of the animals, although, the dose of oxytocin which is used for letdown of milk is very low. Continuous use of oxytocin may also lead to lack of response in animals for normal milk ejection stimuli. The animals regularly exposed to oxytocin become habitual to the drug and letdown of milk without its administration becomes difficult. Repeated injections of oxytocin also interfere with the normal milk secretary activity of mammary epithelium and inhibit normal ejection reflex.

These concerns are further amplified because of use of crude preparations of pituitary extract, in the name of oxytocin, which may contain growth hormone, gonadotropins and few other hormones, having direct/indirect effect on production and

reproduction of the animals. In peri-urban dairy, crude pituitary extract that is readily available at a low cost in the unregulated market is generally used for letdown and to ensure quick and complete evacuation of milk in the absence of calf, which is often sold off very young.

Here, it is important to mention that in cows, 80% of milk is stored in alveolar compartment and only 20% is stored in cistern. In contrast to cows, buffaloes have small udder cisterns and almost 95 percent of milk is stored in alveolar compartment. In sheep and goats cisternal fraction amounts to more than 50%. As such, normal occurrence of "milk ejection reflex" is very crucial for the complete removal of alveolar milk. Animal, in which, there is less/ no secretion of oxytocin during physiological stimulation, milk ejection is inhibited, thus, resulting in production loss. Concomitantly, complete evacuation of the alveolar milk at each milking is a pre-requisite to maintain normal milk synthesis and secretion during lactation, besides reducing the risk of mastitis. To overcome the central inhibition of "milk ejection reflex", it is necessary to elevate oxytocin blood concentrations either by exogenous oxytocin injection or by applying the nervous stimuli such as vaginal stimulation, which are strong enough to induce endogenous oxytocin release.

Further, milk ejection may also be inhibited due to stress on the animal since stress is found to inhibit oxytocin release. The release of epinephrine, norepinephrine and other catecholamines during stress increase the tone of smooth muscle of mammary ducts and blood vessels, resulting in the reduction of oxytocin reaching myoepithelial cells and partial occlusion of mammary ducts. Epinephrine is also known as peripheral inhibitor of milk ejection because it directly blocks the binding of oxytocin to its myoepithelial receptors. As such it is acknowledged and proved that (i) if animals are under stress, even exogenous administration of oxytocin may not result in "letdown of milk", (ii) it is important that the animal should be milked in a stress free environment, (iii) cow's temperament can also contribute to impaired milk ejection, (iv) if animals are milked under stress free environment and are given proper milk ejection stimulus, there is no need to give exogenous oxytocin (v) it should be given only as a medicine in problematic animals under strict veterinary advice, and (vi) Dairy farmers should be educated about its judicious use to ensure clean milk production.

Although there might be some differences in opinion about the use of oxytocin in dairy animals, there are ample evidences from several studies that there is no adverse effect of oxytocin injections on milk quality and its constituents. The milk obtained after administration of oxytocin is no different from the milk that is obtained without exogenous use of oxytocin in terms of quality, composition and its health attributes. However, this statement should not be taken as license to use oxytocin or its crude preparations injudiciously in dairy animals for "letting down" the milk.

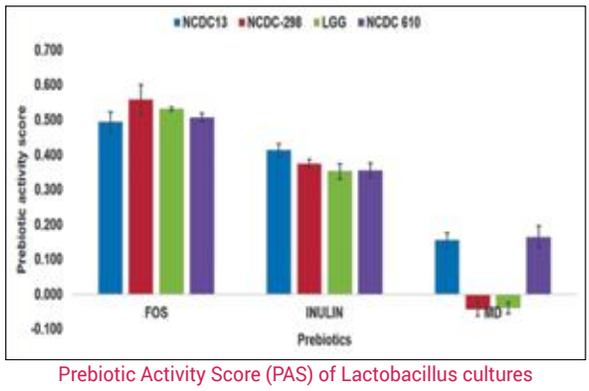
(A. K. Srivastava)

RESEARCH

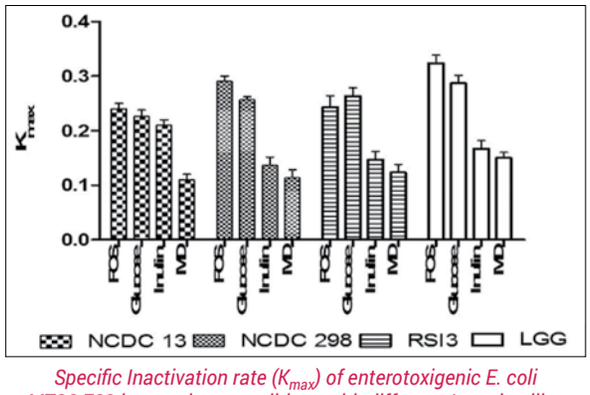
## Combating Secretory Diarrhoea: Formulation of an Effective 'Synbiotic'

*(Santosh Anand and Surajit Mandal)*

Most potent causative agent of bacterial secretory diarrhoea is enterotoxigenic *Escherichia coli* (ETEC). Application of probiotics has gained much attention as an effective alternate in recent years in controlling diarrhoea, which can further be potentiated by suitable prebiotic(s) in combination i.e. 'Synbiotic(s)'. Three *Lactobacillus* cultures viz. *L. rhamnosus* NCDC 298, *L. rhamnosus* NCDC 610 and *L. acidophilus* NCDC 13 were selected on the basis of earlier studies. *L. rhamnosus* GG (LGG) was taken as standard culture. Prebiotics namely fructo-oligosaccharide (FOS), inulin and maltodextrin were selected based on available literature. Enterotoxigenic *Escherichia coli* MTCC 723 (ETEC-MTCC 723) strain was used as a model organism for secretary diarrhoea. *L. rhamnosus* NCDC 298 showed higher antimicrobial activity against ETEC-MTCC 723. FOS rendered highest prebiotic activity score (0.55), auto-aggregation (32.6%) and co-aggregation with ETEC-MTCC 723 (24.2%), when used with *L. rhamnosus* NCDC 298. Deactivation rate of ETEC-MTCC 723 ($K_m$ 0.29) and down regulation of *LT-I* (74.16%) and *ST-I* (48%) toxin genes were maximum in co-culturing with *L. rhamnosus* NCDC 298 in presence of FOS. The combination was also found effective in mitigation of cAMP and cGMP levels in ETEC- infected HT-29 cell lines. Hence, the combination of *Lactobaicllus rhamnosus* NCDC 298 and fructo-oligosaccharides can be an effective 'Synbiotic' in controlling/ preventing secretory diarrhoea.




Prebiotic Activity Score (PAS) of Lactobacillus cultures




*Specific Inactivation rate ($K_{max}$) of enterotoxigenic E. coli MTCC 723 in co-culture conditions with different- Lactobacillus cultures in presence of prebiotics*

## Bioavailabilty of Trace Minerals from Commonly used Feeds and Fodders

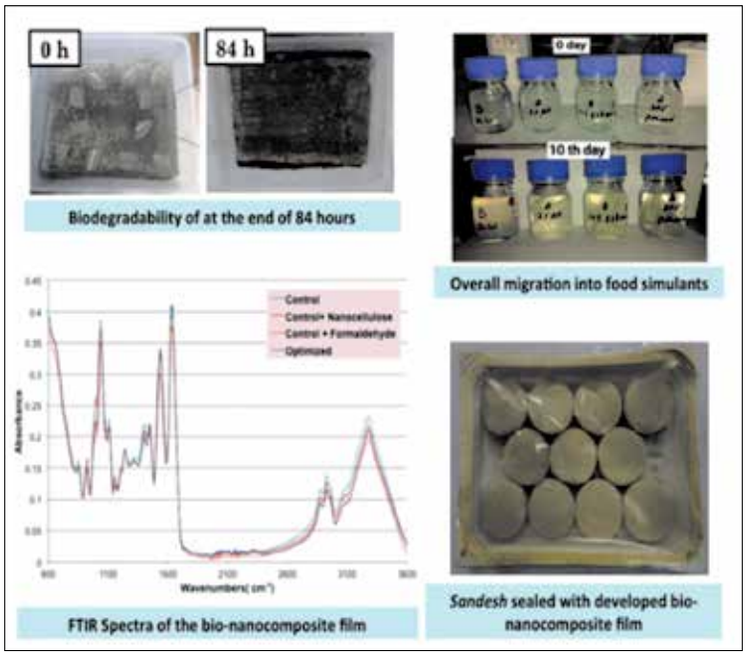
*(Anjila Kujur, Deepti Prihar, Shiva Gupta, S. K. Tomar and Veena Mani)*

Information on the bioavailability of trace minerals from the feeds and fodders is scanty and not well characterized, so attempts were made to assess the bioavailable fraction of trace minerals (Cu, Mn, Fe, Co and Zn) from commonly used fodders (maize, oats and berseem) and oil seed cakes (GNC, SBM, CSC, mustard cake and maize germ meal) by conducting animal experiments. From oats and maize only 2-4% Cu (% total Cu intake) was retained, while the values were comparatively higher i.e. 8-11% from berseem fed group. Co was found to be retained only up to 2% from the two non leguminous fodders while values were in the range of 4.4-6.0% in berseem fed groups. Similarly, Mn retention was in the range of 4-7% in oats and maize group and corresponding values were 8.5-10.8% in berseem fed groups. Fe retention was in the range 3-6% in maize/oats while, it was retained upto 10% from berseem fodders. Retention of Zn was highest among the tested trace minerals range being 14-20% in all the fodders. Cu was retained up to 13-24% in all the five cakes except GNC which showed lower values (only up to 15%). Percent retention of Co was in the range of 2-6 except SBM which had higher values (7-8%). Mn bioavailabilty showed wide variation i.e 1.7-9.1% in all the five cakes except SBM which showed higher values (9.8-11.2%). Similarly, Fe retention % of intake ranged 4-14% and higher values 12.8-14.7% was observed for SBM. Zinc bioavailability was in the range of 12-20% in all the cakes except SBM which had values more than 30%.

## Development and Evaluation of Milk Protein-Nanocellulose based Biodegradable Packaging Material

*(Kanade Pavan Prakash and Narender Raju Panjagari)*

A study was conducted to use sodium caseinate and starch as composite film forming material for packaging dairy products. In addition, cross linking (formaldehyde) and reinforcing (nanocellulose) agents were used to improve the mechanical properties. The levels of sodium caseinate-starch casting solution blend ratio, formaldehyde and nanocellulose were optimized by using Box-Behenken design of response surface methodology (RSM). The prepared casting solutions showed non-Newtonian, shear thinning behaviour (n<1) and the experimental data were best fitted to the Herschel-Bulkley model. The viscosities of casting solution increased with an increase in the levels of sodium caseinate, formaldehyde and nanocellulose while with increasing temperature they dropped. Higher sodium caseinate levels resulted in higher mechanical properties viz., thickness, tensile strength and seal strength of the nanocomposite film, while higher nanocellulose levels led to high tensile strength only. Swelling ratio and water solubility decreased with increasing levels of formaldehyde and nanocellulose, while the water vapour transmission rate (WVTR) decreased with increasing levels of nanocellulose in nanocomposite film. When Sodium caseinate-starch was blended with formaldehyde and nanocellulose, it was found optimum to produce a biodegradable film with improved tensile strength. The optimized film was characterized for moisture sorption behaviour, extent of biodegradability, FTIR spectra, microscopic structure (SEM) and overall migration. Experimental data of moisture sorption behaviour was fitted to 11 mathematical models and the goodness of fit was evaluated by multiple statistical criteria such as coefficient of determination ($R^2$), reduced chi-square ($\chi^2$) and mean relative percent deviation modulus (P). D'Arcy & Watt model was found to be best fitted for the experimental data. The biodegradability of the optimized film was 100% in two and a half hours and 144 hours by enzymatic method and soil burial test, respectively. The overall migration from the optimized film into different food simulants such as acetic acid, ethanol, distilled water and n-heptane was measured. FTIR spectra revealed slight increase in the peak in the control film with nanocellulose and optimized film which could be attributed to the C–O stretching in nanocellulose. SEM results showed that nanocellulose was homogeneously mixed and dispersed into the control film while, it resulted into a rough surface with some aggregates formation due to the interaction of formaldehyde and nanocellulose. Hard grade *sandesh* packaged in polystyrene trays and sealed with bionanocomposite film (sodium caseinate-starch-formaldehyde and nanocellulose) was acceptable at the end of 10 days of storage at refrigeration temperature.




## INTERNATIONAL COLLABORATION

A project on "Development of goat milk and meat value chain in Bihar and Uttar Pradesh" is being proposed under the joint partnership of ICAR and International Livestock Research Institute (ILRI). The goal of the project is to sustainably improve the socio-economic conditions of goat rearers, traders, butchers and other key actors involved in goat meat and milk value chain in selected districts of Bihar and Uttar Pradesh. A meeting was held on 14th July, 2016 at NDRI, Karnal to finalize the action plan of the project. A team of scientists from NDRI, CIRG (Makhdoom) and ILRI attended the meeting.

# EXTENSION

## DAIRY EXTENSION DIVISION

### Dairy Education at Farmers' Door

Dairy Extension Division organized the ongoing Extension Education Programme "Dairy Education at Farmers' Door" to strengthen the effective dissemination of dairy production and processing technologies among farming community. Under this programme, a team of NDRI scientists including subject matter specialists from production, processing and management group visited a new cluster of villages viz. Dungro, Subri and Pingli in Karnal district on 2nd Saturday of every Month during the period under report. Extension scientists obtained the feedback from the participating farmers. In order to have a wide publicity about the visit of NDRI Scientists in the village, announcements were made in advance. The key point of interactions were:

**Ecto parsitic problem**: Tick infestation was a serious problem in villages. However, this problem had also been reported by the preceding teams under this programme, due action had been taken by the Dairy Extension Division and suitable treatment had been administered on the affected animals.

**Clean milk production :** The farmers were educated about the clean milk production and to check adulteration in milk.

**Management of advanced pregnant animals**: It was observed that some of the farmers were taking the milk from advanced pregnant dairy animals. They were advised that milking should be stopped 60 days prior to calving for better milk yield of animals.

**Care of newly born calves**: Mortality in field conditions was discussed and it was suggested to the farmers that first milk/colostrum should be given to newly born calf within 1 hour of calving.

### Field/Farm Technician (FFT) Activity

A total of nine Kisan Sangosthies were organized at village level on various aspects of animal husbandry under Field/Farm Technician (FFT) programme.

### Empowerment of Farm Women

Seven women empowerment trainings and campaigns were organized with the objective to create awareness in the field of dairying and home science and also impart skills in these areas so that farm women could generate more income from dairying and maintain healthy atmosphere in their respective families. A total number of 143 farm women were trained.

### Educational Visits and Tours

A total number of 1847 visitors (Students & Faculty) from 29 colleges/ Institutions/Universities visited the Institute and were sensitized about the different research, teaching and extension achievements and facilities available in the Institute.

### Farmers' Farm School

NDRI has started Farmers' Farm School (FFS) since 30th August, 2014, with the aim of enhancing the productivity of agricultural practices in the field. A third batch, especially for farm women, was started on 5th August, 2016 and 20 farm women were enrolled as students. A two days training on preparation of paneer and khoa was organized at NDRI Karnal. Regular classes on dairy farming and its allied activities are being continuously organized on every Friday and Saturday for educating the farm women.


*Farm-women taking class in Farmers' Farm School*

## KRISHI VIGYAN KENDRA

### Extension Activities

- In all 35 training programmes (On-campus & study-cum-visits) on different aspects of dairy production and processing, vermi compost and home science were organized in which 1463 farmers, women and rural youth from Haryana and other states of the country were imparted training.
- KVK organized three training programmes on "Scientific Dairy Farming and Milk Products Technology" participated by 101 farmers, farm women and rural youth from different districts of Himachal Pradesh and Uttrakhand.
- KVK also organized 22 exposure cum study visits for 523 progressive farmers and farm women from different districts of Uttar Pradesh, Madhya Pradesh Punjab, Gujarat, Rajasthan, Himachal Pradesh and Uttrakhand.
- Various animal health management activities were organized through Stockman centers in adopted villages of KVK. At these centers, a total number of 167 cattle and 292 buffaloes were artificially inseminated and 147 calves were born. Besides, these, 85 cows and 99 buffaloes were diagnosed for pregnancies.
- As per the directions from ICAR and initiatives from Government of India, KVK team organized a partheniunm awareness week at NDRI from 16th - 22nd August, 2016 to apprise the farmers, farm women and school children about ill effects of weed. The team also visited various villages of Karnal District to educate and bring awareness amongst the farmers on scientific agricultural practices besides soil health, Swachh Bharat and resource conservation.

## INSTITUTE TECHNOLOGY MANAGEMENT COMMITTEE (ITMC)

### Patent Granted

| | | |
|---|---|---|
| Title | : | A kit for detection of adulteration of milk with soymilk |
| Patent Number | : | 275521 |
| Date of Grant | : | 08.09.2016 |
| Inventors | : | Y. S. Rajput, Rajan Sharma and Poonam |

EVENTS

## International Youth Day

International Youth Day (IYD) was organised jointly by YPARD India and NDRI Karnal on 12th August, 2016. The theme for IYD was "The Road to 2030: Eradicating Poverty and Achieving Sustainable Consumption and Production". On this occasion, postermaking competition on the topic 'Youth for Nation Building' and an open QUIZ competition were organised for cementing the bond among the organizers and the hundreds of audience. Dozens of participants took part in each activity enthusiastically showing their extraordinary talent.

After the competition, trophy and certificates were awarded to the winners by the chief guest Dr. R. K. Malik, Joint Director (Research) of NDRI. Dr. Malik emphasized that a country can only be great if the youth is strong both physically and mentally and cited the quotation of Swami Vivakananda "My countrymen should have nerves of steel, muscles of iron, minds like thunderbolt and memory of elephantine".

Mr. Vikas Chaudhary, the YPARD working group member and a progressive farmer displayed his Climate Smart Villages (CSVs) model an integrated community based approach for efficiency, resilience and livelihoods. He also suggested his six-pronged strategy of Weather, Water, Carbon, Nutrient, Energy and Technology Smart Agriculture in the erratic climate.

## 8th National Seminar on Indian Dairy & Food Sector: Way Forward to Meet Future Challenges

A National Seminar on "Indian Dairy & Food Sector: Way Forward to Meet Future Challenges" was organised by NDRI Graduates Association (NGA) in collaboration with NDRI, Karnal on 23rd-24th September, 2016 at NDRI, Karnal. The Chief Guest of the inaugural session was Yogrishi Swami Ramdev Ji, Patanjali Yogpeeth, Haridwar. Dr. A. K. Srivastava delivered the key note address. The Seminar had four technical sessions i.e Panel Discussion on mapping the challenges, availability of quality raw material, innovative technology required to achieve international standards and marketing strategies and consumer perspective. Besides these four technical sessions, one session was devoted to the presentation by three distinguished companies to their experties.

***Recommendations:***

- Continuous development of indigenous breeds and increasing their productivity.
- Setting up large dairy farms, wherever possible and their effective management to reduce production cost of milk.
- Increase in cultivated area for production of green fodder to meet its requirement for increasing milk productivity.
- Emphasis on receiving quality raw milk at village collection centres and subsequently at Dairy Plants.
- Use of latest innovative technologies so as to meet International Standards for dairy and food sector products.
- Development of value added milk products such as fortified products with Iron, Calcium, Vitamins etc. and also to market dairy & food products as required by the consumers.


*Yogrishi Swami Ramdev Ji inaugurating the 8th National Seminar on Indian Dairy and Food Sector at NDRI, Karnal*

The Seminar ended with the valedictory session presided over by Dr. A. K. Srivastava. The Chief Guest of the session was Sh. M. S. Brar, Managing Director, MILKFED, Punjab and Sh. S. Nagarajan, Managing Director, Mother Dairy, Delhi was the Guest of Honour on this occasion.

## Training Programme on Advances in Reproductive Biotechnology

A six day training programme for the officials of South Asian Association for Regional Cooperation (SAARC) Countries was inaugurated at ICAR-National Dairy Research Institute, Karnal on 25th July, 2016 by Prof. (Dr.) Col. A. K. Gahlot, Vice-Chancellor, Rajasthan University of Veterinary and Animal Sciences, Bikaner.

The theme of the training programme was advances in reproductive biotechnology – toward improved animal productivity. There were 20 participants from six SAARC Countries (India, Bangladesh, Pakistan, Bhutan, Nepal, Sri Lanka). These trainees were field level veterinary officers working in Dairy Development Boards of respective countries. The coordinator of training programme was Dr. Md. Nure Alam Siddiky, Senior Programme Officer, SAARC Regional Center, Dhaka, Bangladesh. The participants were exposed to the recent knowledge accumulated in the area of reproduction biotechnology and provided hands on experience on frontier technologies for improving reproduction efficiency in farm animals. A compendium of lectures was also released on this occasion by dignitaries.


*A compendium of lectures being released*

## Training programme on R&D Strategies and Interventions for Effective Agribusiness and Entrepreneurship Development in Dairy and Food Sector

Dairy Technology Division of the Institute organised a CAFT training programme on "R & D Strategies and Interventions for Effective Agribusiness and Entrepreneurship Development in Dairy and Food Sector" from 16th September to 6th October, 2016 at NDRI Karnal. The training was provided to sixteen participants from ICAR Institues and State Agricultural Universities on entrepreneurship development on various aspects of daiying viz processing of milk and milk products, packing of newly development products, issues of daiy nutritional security and validation of developed technologies and effective communication required for boost up the growth dairy sector.


*Dr. A. K. Srivastava, Director and Vice Chancellor NDRI with trainees of CAFT course*

## Basic Training on Routine Chemical Analysis

Dairy Chemistry Division of the Institute organized a six day Basic Training on "Routine Chemical Analysis" from 18th–23rd July, 2016 for technical staff of ICAR Institutes. The training programme was

*A compendium of lectures being released*

designed to impart basic orientation to the technical staff for routine operations in a chemistry laboratory and provide them exposure to usage and maintenance of different instruments in the lab. The training programme was inaugurated by Dr. A. K. Srivastava, Director and Vice chancellor. He also released the training manual. A total number of 20 participants from six ICAR Institutes attended the training programme. The valedictory function was held on 23rd July and the certificates to the successful participants were distributed by Dr. A. K. Srivastava, Director and Vice Chancellor, NDRI Karnal.

## Training-cum-workshop on Inter-personal Skills & Stress Management

Training cum workshop on "Inter-personal Skills & Stress Management" was conducted under "Personality Development Cell" on 3rd August, 2016 at NDRI, Karnal. There were lectures on-Improving Inter-Personal Skills, Anger Management and Positive Thinking for stress free life. In addition, one questionnaire was given to assess the participants. There was group discussion in which all the participants took active part. The certificates to the successful participants were distributed by Dr. A. K. Srivastava, Director and Vice Chancellor ICAR-NDRI. The participants expressed satisfaction for the training programme and rated it excellent in terms of appropriateness of content, effectiveness of trainers/facilitators and overall rating of the programme.

*Dr. A. K. Srivastava, Director and Vice Chancellor NDRI with trainees*

## All India Animal Husbandry Officers Workshop-cum-Training

All India Animal Husbandry Officers Workshop-cum-Training was organized in collaboration with National Institute of Agricultural Extension Management (MANAGE), Hyderabad on the theme "Enabling extension strategies to address field level problems in animal husbandry" during 22nd – 25th August, 2016 at NDRI, Karnal. Dr. A. K. Srivastava, Director and Vice Chancellor, NDRI inaugurated the Workshop. The major objective of this workshop was to highlight the needs and requirements of extension functionaries at field level and to sensitize them on effective management strategies to address the field level problems. About 29 participants from 8 states of India took part in this workshop.

A total of 12 lectures comprising breeding and feeding strategies, infertility management, climate resilient technologies, adulteration

*Dr. A. K. Srivastava, Director NDRI, giving away the certificates to the participants*

detection kits, preparation of bankable projects, extension strategies and case studies, were organised. A field trip was also organised to dairy farms of progressive farmers. A panel discussion on field level problems in animal husbandry recommended the need for having universal breeding policy, streamlining the private extension services, need for giving targets on the basis of calves instead of number of AIs, exploring the use of non-conventional feed resources, preventing indiscriminate use of antibiotics and routine screening of veterinarians for zoonotic incidence.

## राजभाषा हिन्दी चेतना मास

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**Two trainings on "Milk and Milk Products Processing" were organized by Dairy Technology Division and BPD Unit, NDRI during 11th – 20th July and 26th August to 5th September, 2016. These were attended by 24 and 11 participants, respectively.**

### Research Advisory Committee Meeting

The meeting of the Research Advisory Committee of NDRI Karnal was held on 19th -21st September 2016 under the Chairmanship of Dr. M. L. Madan, Ex-DDG (AS), ICAR & Former Vice Chancellor, Dr Panjabrao Deshmukh Agri. Univ, Akola,(MS) and DDUVAS University Mathura (UP) at NDRI Karnal to review the research activities of the Institute. The members who attended the meeting were: Dr. A. K. Srivastava, Dr. O. P. Dhanda, Dr. Kamlesh R. Trivedi, Dr. F. A. Masoodi, Sh. Jagdish Singh and Dr. R. K. Malik as Member Secretary.

## NDRI Students Excel in Thirteenth National Dairy Products Judging Contest and Ninth National Dairy and Food Quiz Contest

SMC College of Dairy Science, Anand Agricultural University (Gujarat) and its Alumni Association jointly hosted the 13th National Dairy Product Judging Contest and 9th National Dairy and Food Quiz Contest from 16th -17th September, 2016 at Anand to provide necessary exposure in sensory evaluation of milk products as well as to offer a platform for knowledge sharing among students and industries. In the judging contest, a team of NDRI students comprising Ms. Pallavi and Ms. Neha Yadav, students of final year B. Tech (Dairy Technology) won the Championship in the team event, while Ms. Pallavi secured first position in individual category. Twenty two teams from all over the country participated in the Judging Contest.

In the National Dairy and Food Quiz Contest, NDRI team comprising Ms. Parul Pathania and Ms. Sonam Jain, students of final year B. Tech (Dairy Technology) were the First Runners Up in the team event. Seventeen teams from various academic institutes in India and different dairy plants from Gujarat took part in Quiz contest. Prof. (Dr.) A. K. Srivastava, Director and Vice-Chancellor of ICAR-NDRI, Karnal congratulated the teams.

### NDRI Students brought laurels in Zonal Level Science Quiz Contest

Six B.Tech (Dairy Technology) students have qualified to participate in the Zonal Level Science Quiz Contest for College Students organised by the Haryana State Council for Science and Technology (Department of Science and Technology). The two teams comprising Nabil Alam, Saurabh Rai and Sandeep Baruah of B.Tech (DT) 3rd year and Neha Yadav, Sonam Jain and Parul Pathania of B.Tech (DT) 4th year stood second and fourth, respectively at the District Level Contest held at Pt. ChiranjiLal Sharma Govt. PG College, Karnal held on 9th September, 2016.

# AWARDS

- **Dr. M. S. Chauhan** was awarded **"Rafi Ahmed Kidwai Award"** for Outstanding Research in Agricultural Sciences 2015 on 16th July, 2016 at Vigyan Bhawan, New Delhi.

- The team of **Dr. S. K. Singla, Dr. M. S. Chauhan, Dr. R. S. Manik, Dr. P. Palta and Dr. Shiv Prasad** received **"ICAR Award"** for Outstanding Interdiciplinary Team Research in Agricultural and Allied Sciences 2013-14 on 16th July, 2016 at Vigyan Bhawan, New Delhi.

- **Dr. A. K. Singh, Principal Scientist,** Dairy Technology Division received **"Bharat Ratna Dr. C. Subramaniam Award"** for Outstanding Teacher-2015 for Natural Resource Management and Agricultural Engineering on 16th July, 2016 at Vigyan Bhawan, New Delhi.

- **Dr. Selokar Naresh Lalaji**, Ph.D. (Animal Biotechnology) student of Dr. S. K. Singla, Principal Scientist, ABTC, received **"Jawaharlal Nehru Award"** for Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2015 for Animal Sciences on 16th July, 2016 at Vigyan Bhawan, New Delhi.

- **Dr. Monika Saini**, Ph.D. (Animal Biotechnology) student of Dr. P. Palta, Principal Scientist and Incharge, ABTC, received **"Jawaharlal Nehru Award"** for Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2015 for Animal Biotechnology on 16th July, 2016 at Vigyan Bhawan, New Delhi.

- **Sh. Sandeep Khokhar,** Technical Assistant, Animal Genetic & Breeding Division and **Sh. Ram Pal Saini**, Skilled Supporting Staff, Dairy Technology Division bagged **"Best Employee Award"** under cash award scheme for technical and supporting category employees of ICAR, respectively on 16th July 2016.

## DINSTINGUISHED VISITORS

| | |
|---|---|
| 28.08.2016 | **Richard Wanhill from Taratahi.** |
| 17.09.2016 | **Hon'ble Union Minister of State for Agriculture and Farmers Welfare Sh. Sudarshan Bhagat.** |


*Hon'ble Union Minister of State for Agriculture and Farmers Welfare Sh. Sudarshan Bhagat releasing the NDRI Annual Report*

## VISIT ABROAD

### Visit of NDRI Scientists to University of Queensland, Australia

NDRI scientists have initiated a joint research project with researchers of School of Agriculture and Food Sciences, University of Queensland (UQ), Australia. In this regard, seed grant has been obtained from Australia-India Council Grant (2015) for the project titled "Nanotechnology research on buffalo milk". To facilitate the discussion about future research collaboration and also for the current research project, a team of NDRI Scientists from the Division of Dairy Chemistry (Dr. Bimlesh Mann, Dr. Rajesh Kumar and Dr. Rajan Sharma) visited UQ, Australia during 26th September to 1st October, 2016. The Australian researcher team was led by Prof. Bhesh Bhandari and included Dr. Sangeeta Prakash and Dr. Nidhi Bansal.


*Sh. Sudarshan Bhagat, Hon'ble Union Minister of State for Agriculture and Farmers Welfare laying foundation stone of the University Examination Building*

## PERSONALIA

### Appointment

- Dr. Mahendra Singh, Principal Scientist, Animal Physiology Division was appointed as Head, NDRI, Karnal w.e.f. 19.09.2016.

### Retirements

- Dr. R. K. Mehla, Principal Scientist, Livestock Production & Management retired from the Council's services w.e.f. 31.07.2016.
- Dr. Avtar Singh, Principal Scientist, Animal Genetic & Breeding retired from the Council's services w.e.f. 16.08.2016.
- Dr. R. K. Malik, Joint Director (Research) retired from the Council's services w.e.f. 30.09.2016.

*21st IJSC meeting of the Institute was held at NDRI, Karnal under the chairmanship of Director, NDRI Dr. A. K. Srivastava*

SOUTHERN CAMPUS, BANGALORE

## RESEARCH

### Molecular Characterisation of Toll Like Receptor 2 Gene and its Association with Somatic Cell Count in Deoni Cattle

*(U. T. Mundhe and D. N. Das)*

Association of QTNs for TLR2 gene was carried out to investigate genetic polymorphism of TLR2 gene of exon 1 and exon 2 and their association with somatic cell count in Deoni cattle by PCR- RFLP. DNA was isolated by phenol chloroform isoamyl alcohol method. PCR standardization was carried out for amplification of region of exon1, exon 2.2. exon 2.3, exon 2.4, exon 2.5 and exon 2.6 using published primers. PCR – RFLP was carried out using Hae III, Mn II, Hinc II, EcoRV, PSt I and Bsty I restriction enzymes, respectively. Sequence analysis showed 8 single nucleotide polymorphism in the coding region of TLR 2 gene, which includes 5 transitions (G12134A, C12153T, C12260T, T12471C, T12501C exon 2.5) and 3 transversions (G11391T, T11424A exon 2.3), (C12441G exon 2.5). Lack of polymorphism was revealed under exonic regions of studied gene through PCR-RFLP.

### Charcterization and Expression of Corticotrophin Releasing Hormone Gene for Ranking of Deoni Bulls

***(N. Anand Kumar and D. N. Das)***

Quick and precise selection of superior dairy cattle for higher productive performance is very important for a successful and profitable dairy farm enterprise and to augment the milk production of the indigenous animals in the country. The study was taken up on Deoni, medium sized dual purpose indigenous cattle breed of south-western India, maintained at Southern Campus Bangalore. The results revealed that there was absence of genetic polymorphism in CRH gene of Deoni population indicating that the gene is highly conserved. Expression profile of the CRH mRNA revealed declining trend from day of parturition to 60th day post parturition indicating presence of lower levels of stress in the progression of lactation. Association could not be established due to absence of polymorphism in the current population. Breeding value computed based on the first lactation milk yield indicated that bull number 3 ranked first followed by bull number 30 and 24 among the 7 bulls used in the herd.

- Karnataka Milk Federation released 'Nandini Gold' cattle feed during September 2016. The cattle feed formula was based on the advice from the Scientists of Southern Campus, ICAR-NDRI. Farmers realized higher milk yields due to feeding of Nandini Gold.
- A few feed additives viz., B-complex vitamins, energy substitutes, bypass nutrients were recommended by Scientist of the Southern Campus of NDRI depending on the problem. Subsequently, a pre-mix was developed to address the issue. Trials conducted in the livestock research unit are promising to enhance the fat and SNF content in milk and product needs to be validated in the forthcoming summer season.
- Supplementation of Chromium Propionate @ 3mg/ day during winter seasons improved total dry matter intake of Deoni cows.

## EXTENSION ACTIVITIES

- Six Students from St. Aloysius College attended a training programme from 11th March to 10th July, 2016.
- Five students pursuing B.Tech (Agril. Engg.) from ANGRAU, A.P, attended a training programme from 16th June to 15th Oct, 2016.
- Seven students from GKVK, Bengaluru attended a training programme from 2nd - 31st July, 2016.
- Eleven candidates attended a training programme on Commercial Dairy Farming from 18th - 23rd July, 2016.
- One student from KCAET, Tavanur of KAU, Kerala attended a training programme from 8th - 28th Sept., 2016.
- Training programme for the technical staff of ICAR Institutes was conducted on "Dairy Farm and Milk Processing Plant Management" at Southern Campus, Bangalore from 19th to 24th September 2016. There were 10 technical officers from 7 different ICAR Institutes of Karnataka, Tamil Nadu, Andra Pradesh, Goa and Kerala.
- A total number of 142 visitors in 6 batches comprising students from various educational institutes and entrepreneurs of southern region, visited the campus. The visitors visited various sections as per their needs and they were explained about the ongoing research and extension activities. Advisory services/ technical advice were rendered to ten of the needy clientele during personal visits to the campus and mail enquires/phone queries on information regarding transferrable technologies for field extension personnel and dairy farmers, training programmes on commercial dairy farming, indigenous dairy products, guidance to set-up a new dairy farm and availability of short-term training programme for students.
- The 'Dairy Education at Farmers' Door' was organized and visits were made by the multidisciplinary team on Second Saturdays to Kimmanahalli and Thimandahalli villages of Varthur block, Bangalore South. The multi-disciplinary team visited individual households and interacted with the farmers regarding dairy farm management and the problems faced in dairy farming. Necessary technical advice was rendered on various aspects of scientific dairy farming, green fodder production, clean milk production and dairy animal management aspects to the farmers and farm women at their doorsteps.
- An exposure training programme was organized for 40 livestock farmers under Agricultural Technology Management Agency (ATMA) Scheme, Thirumarugal Block, Nagapatinam District (for 2 days) and Kallakurichi, Villupuram District, Tamil Nadu on Interstate exposure from 12th-13th July, 2016.
- An exposure orientation programme was also organized for forty livestock Farmers of Tiruvannamalai, Kanchipuram and Thanjavur Districts of Tamil Nadu under ATMA programme during 7th-10th September 2016.
- Exposure visits and field trips were organized for the benefit of farmers to Mega Dairy & Cattle Feed plant of community milking centre, Karnataka Milk Federation (KMF), State Cattle Breeding Farm, GKVK, UAS and Integrated Model Farm.

## EVENTS

**Green NDRI Initiative:** As a part of the inititaive, about 700 tree saplings were planted in the campus. The staff and students took active part in the event. Dr. A. N.Yellappa Reddy, Member, Karnataka High Court of Lok Adalat, as well as the Chief Advisor, Bangalore University Bio-diversity Park, addressed the gathering and highlighted the importance of ecology and fodder trees for animal feed. Dr. Reddy arranged the saplings for planting with the help of Shri. T. C. Ravindra from Indusherbs Organisation. Volunteers from the organisation also participated in the programme. Dr. S. Ayyappan, NABARD Chair Professor, also took part in the event.

**Teachers' Day:** The students of the campus celebrated the 'Teacher's Day' on the 6th September 2016 to show their respect and gratitude towards the teachers. Scientists, technical staff and students attended the event including Dr. S. Ayyappan and Dr. K. P. Ramesha.

**Fresher's Day:** The senior students of the Station celebrated the 'Fresher's Day' on the 6th September 2016 to welcome the I Year's Students to the Institute. The students also performed various cultural activities like singing, dancing, skits etc. to demonstrate their talent and entertain the audience.

**Visit of DDG (AS), ICAR:** Dr. H. Rahman, DDG (AS), ICAR, New Delhi, visited Southern Campus of NDRI, Bangalore on 19th September, 2016 and addressed the Scientists, technical staff and students. He appreciated the contributions of the campus for dairy development in the Southern region.

**Swachha Bharath:** As a part of Swachha Bharath Abhiyan, staff and students carried out cleaning of the premises on every Saturday afternoon, which improved the cleanliness of the campus.

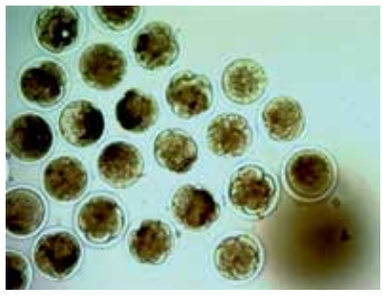
**Hindi Day Celebration:** Hindi day was celebrated on 23rd September 2016 at Southern Campus of NDRI, Bangalore. Dr Arvind Kumar, Jain University, Bangalore was the Chief Guest and Dr. K. P. Ramesha, Head chaired the function. Many competitions were held among Staff & Students to commemorate the occasion. The function was well attended by staff & students.

# EASTERN CAMPUS, KALYANI

## RESEARCH

### *In vitro* Development of Caprine Embryo Using Cryopreserved Black Bengal Buck Semen

*(Rohit Kumar, Prakash Chandra, P. Konyak, M. Karunakaran, A. Santra and Subrata K. Das)*



The present study was conducted to check the competence of cryopreserved black Bengal buck semen to produce goat embryo through *in vitro* fertilization technique. Cumulus oocyte complexes were collected from slaughterhouse ovaries, washed 5-6 times and cultured in maturation media for 27 h. in 5% $CO_2$ incubator at 38.5°C with maximum humidity. Cryopreserved semen straws were thawed and sperms were capacitated *in vitro*. After 27 h of culture cumulus cells were separated from matured oocytes. Denuded oocytes were transferred to acidified Tyrode's medium for zona thinning and were co-incubated with capacitated sperms for fertilization in Fert-BO media at 38.5°C in 5% $CO_2$ in air with maximum humidity. After 5 h of co-incubation, presumptive zygotes were washed and cultured in embryo development media for cleavage. After 40-42 h. embryos were co-incubated with oviductal cells in replacement media for further development. In fresh group overall cleavage rate (%) was 36.05 ± 2.09 and morula formation (%) was 5.65 ± 1.32. However, in frozen group, the overall cleavage rate (%) was 27.39 ± 1.37 and morula formation (%) was 1.23 ± 0.52. These results indicate that cryopreserved black Bengal buck semen have competence to produce embryos and could be used for embryo development through *in vitro* fertilization.

### Effect of Trehalose Supplementation on Cryopreservation of Black Bengal Buck Semen

*(M. Karunakaran, P. Konyak, Mohan Mondal, Ajoy Mandal, C. Bhakat and S. K. Das)*

Various membrane-permeable cryoprotectants such as glycerol, dimethyl sulfoxide, ethylene glycol, and propylene glycol and their combinations, have been tested with buck sperm, but glycerol is the most frequently used penetrating cryoprotectant. Glycerol is commonly used at concentrations of 4% to 8%. The toxicity of glycerol limits the use of high concentration of glycerol in cryoprotective media. Trehalose is a non-penetrating disaccharide that seems to protect cells both by increasing the tonicity of the extender and by stabilizing the plasma membrane, possibly due to direct interaction with phospholipid polar head groups of membrane phospholipids. This experiment was carried out to study the effect of supplementation of trehalose on the *in vitro* sperm characters of Black Bengal buck semen during cryopreservation. Treatment group was supplemented with trehalose @ 50, 100 1nd 150 mM to the cryoprotectant media containing glycerol (5%v/v), while the control group has no trehalose. Results revealed that the supplementation of trehalose did not improve the post thaw recovery of Black Bengal buck semen and the semen samples preserved in media containing only glycerol (5% v/v) had better *in vitro* sperm characters.

### Environmental Factors Influencing the Test Day Milk Yields of Jersey Crossbred Cattle

*(Ajoy Mandal, G. K. Verma, M. Karunakaran, S. Rai, R. Behera, S. K. Das and C. Bhakat)*

Data on test day milk yield (TDMY) of Jersey crossbred cattle, maintained at the Eastern Campus, Kalyani over a period of 35 years (1980-2014) were used to study the effect of genetic and non-genetic factors on different test day milk yield of cattle. A total of 10 classes of Test-Day Milk Yields (TDMY1–TDMY10) recorded at an interval of 30 days were considered for this study. Least-squares analysis of variance with fitting constant was applied to determine the effect of genetic and non-genetic factors on different TDMY of animals. In the present study, the least squares means of different test milk yield (TDMY1-TDMY10) were 10.48, 10.19, 9.30, 8.54, 7.99, 7.26, 6.67, 6.17, 5.45 and 4.72 kg, respectively. Co-efficient of variations for all the TDMYs (TDMY1-TDMY10) ranged from 32.5-43.6%. The study revealed that the random effects of sire had significantly ($P<0.01$) influenced on all the TDMYs of animals. Period of calving had significant influence only TDMY6, TDMY7, TDMY9, TDMY10 in the present study. Significant effect of period on different traits may be attributed to differences in management, selection of sires and different environmental conditions such as temperature, rainfall, humidity etc. Season of calving had highly significant ($P<0.05$) effect on all test day milk yields under study. Animals calved in rainy season produced less milk as compared to the animals calved in winter and summer season, which may be due to the fact that the cows that calved in rainy season pass through a period with unfavorable climate, when good quality pasture was not available. Effect of parity was found to be non significant on all test day milk yields except TDMY1. Age group of animal didn't influence the different test day milk yield in the present study. However, animals having lower age produced less milk as compared to the animals which were in higher age groups. Significant ($P<0.01$) effect of genetic group of animals was observed for all the traits under this study. Animals having genetic group ½ Jersey × ½ Red Sindhi and ½ Jersey × ½ Tharparkar produced higher yields in all test days as compared to animals of other genetic groups in this study.

## EXTENSION ACTIVITIES

### Scientists-Farmers Interaction Meet in Arunachal Pradesh under NEH Project

A team of scientists and a technical officer from Eastern Campus of NDRI, Kalyani visited Arunachal Pradesh and by collaborating with

NRC on Yak, Dirang, organized animal (piglet) distribution camp, distributed supplements/ medicines, concentrate mixture for livestock, interaction-cum-demonstration session with tribal farmers in Yewang village, Dirang (26-27/9/2016). Both Eastern Campus of NDRI, Kalyani and NRC on Yak, Dirang have distributed 150 piglets (4 female+1 male/per farmer) to 30 farmers in the same village. Discussions and interactions were carried out on various topics viz: health management, various livestock production system and its constraints, solutions etc in depth during the interaction session.

## Training Programme on Scientific Goat Rearing Practices and Artificial Insemination

A training programme on "Scientific Goat Rearing Practices and Artificial Insemination" was organized from 22nd - 24th August, 2016. A total number of 15 participants from different districts of West Bengal participated in the programme. Scientists of the campus provided the training on scientific housing and management, feeds and feeding practices, fodder cultivation practices, disease control measures, estrus detection and artificial insemination in goats.

## Dairy Education at Farmers' Door

Dairy Education at Farmers, Door programme is organized on 2nd Saturday every month by team of Scientists and Staff at NDRI-Eastern Campus, Kalyani. The team visited village Charsarati, Kalyani, West Bengal on the 10th of September 2016. The main theme of the programme was to educate the farmers on Scientific Dairy Farming practices including goat farming. At least 15 dairy cattle, heifers and calves were attended. The village lacked the basic knowledge on scientific feeding, cleanliness and other managemental practices. The team gave useful advices on feeding practices of both the large and small ruminants, cleanliness of animals and cattle sheds, disease and vaccination awareness and good housing system of the animals etc. The animals were also vaccinated against HS and FMD. Deworming of animals was also done and mineral mixture and vitamins were also distributed to the villagers.

## Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR visited Eastern Campus of NDRI, Kalyani

Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR visited Eastern Campus of NDRI Kalyani, West Bengal on 16th June, 2016. He visited different laboratories, cattle yard, forage farm and interacted with the Scientists of the Campus. Dr. T. K. Dutta, Head of the Eastern Campus presented the overall activities as well as research achievements of the Campus. During the interaction session with scientists, other staff and students, he emphasised on the need for transfer of proven dairy production technologies to the farmers in liaison with the state governments and creating entrepreneurship who can aptly adopt those technologies of this region. He also stressed on the significance of linking farmers directly with the processing units

while interacting with dairy farmers/tribal animal rearers separately. He also emphasised on the integration of different agricultural enterprises which can augment the livelihood of the farmers. On this occasion, Dr. J. K. Jena, DDG (Fisheries Sciences) delineated the ways to get prosperity in agriculture. Dr. A. K. Srivastava, Director, NDRI briefed the audience about various pioneering initiatives taken by the Institute for securing better livelihood of dairy farmers.

## Forthcoming Events

- Training Programme on "Good Laboratory Practices" (17th – 22nd October, 2016)
- Brainstorming Session on "Quantifying the Indicators of Model Village" (4th November, 2016).
- CAFT Programme on "Probiotics: The Therapeutics of 21st Century" (8th - 28th November, 2016).
- National Training Programme on "Hands on Training on *In Vitro* Fertilization Technology" (15th - 24th November, 2016).
- Training Programme on "Technology Management and Businees Planning for Entrepreneurship Development in Dairying" (21st - 26th November, 2016).
- Training Programme on "Commercial Dairy Production" (28th November to 3rd December, 2016).
- International Workshop on "Milk Naturally Nanostructured Food" (30th November, 2016).
- Training Programme on "Reproductive Health Management of Dairy Animals" (15th - 21st December, 2016).
- 8th Institute – Industry Meet on (17th December, 2016)



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