ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

# NDRI News

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## From the Director's Desk


*Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR New Delhi delivering Dr. Sundaresan Memorial Oration at NDRI, Karnal*

**In this issue...**



ICAR-National Dairy Research Institute is the premier dairy research organization of India mandated to provide Research and Development (R&D) support to the Indian Dairy Industry and meet the Human Resource Development (HRD) needs of various developmental agencies, National Agricultural Research System (NARS) and the industry charged with the responsibilities of implementing dairy development programmes in the country. The Institute had its genesis in Imperial Institute of Animal Husbandry and Dairying established at Bangalore in 1923. Starting from a two-year training course for the award of Indian Diploma in Dairying (IDD) on the lines of National Diploma in Dairying offered by the Royal Agricultural Society of England, the Institute started its flagship programme of B Sc Dairying in 1957, two years after it was shifted to Karnal and rechristened as National Dairy Research Institute. The Institute continues to retain its mother campus as Southern Regional Station (SRS) of ICAR- National Dairy Research Institute at Bengaluru and has opened another regional station as Eastern Regional Station (ERS) at Kalyani, West Bengal for providing region-specific support suited to respective agro-climatic conditions. Over the last nine decades, the Institute has evolved into a Deemed University (conferred in 1989) offering four tier academic programs in various disciplines of Dairy Sciences. NDRI today is perhaps the only Institute in the world where integrated learning of dairy education encompassing dairy production, dairy processing, dairy economics & management and dairy extension is imparted.

The Indian success story in Dairying continues with the country retaining its position as the leading milk producer in the world and contributing about 18.5% to the world milk pool. During 2015-16, milk production in the country registered an impressive growth rate of 6.26% over the previous years vis-à-vis 3.1% in rest of the world. Dairying is being seen as one of the key instruments to propel growth in rural sector particularly the governments' Initiative to double the farmers' income by 2022. It is conspicuous that growth and expansion of the dairy industry will open up vast job opportunities for dairy professionals. There are as many as 700 dairy plants in India and the number is likely to increase sharply. At present, only 35% of the milk produced in India is processed, which is

poised to increase with rapid urbanization. This increase in capacity of the dairy plants and greater demands for innovative and quality dairy foods will increase requirements for a large number of quality graduates and postgraduates in various screams of Dairy Sciences.

ICAR- National Dairy Research Institute has been contributing immensely to the need of quality human resources to man the Indian Dairy Industry, ICAR Institutes, State Agricultural/ Veterinary Universities and other Research & Development institutions since its inception. The flagship educational programme at this Institute has been B.Tech (Dairy Technology) – a four year degree programme. This is a comprehensive programme wherein students are imparted theoretical knowledge in all areas of dairy processing and dairy business management alongwith intensive practical sessions. During the fourth year of the programme, students are exposed to industrial training, which helps them gain real time experience of handling unit operations in the industrial set up. Admission to this prestigious program is offered based on the results of All India Entrance Examination for Admission (AIEEA-UG) conducted by the ICAR, New Delhi. All students who have completed 10+2 level examination with physics, chemistry and mathematics as optional subjects are eligible to choose this programme. The examination is usually announced in the month of February by Agricultural Education Division of ICAR and is conducted in the 2nd week of June every year. A vibrant placement cell at the Institute ensures proper placement of the students. Some of the students join Masters' programme (either at the Institute or abroad) while others opt for the management courses.

Apart from the UG program, the Institute also offers post-graduate programs (Master and PhD)

in 16 disciplines, which include Dairy Technology, Dairy Chemistry, Dairy Microbiology, Dairy Engineering, Animal Biochemistry, Animal Biotechnology, Animal Genetics & Breeding, Livestock Production & Management, Animal Nutrition, Animal Physiology, Veterinary Gynecology& Obstetrics, Dairy Economics, Agricultural Extension Education, Agronomy - Forage Production, Food Safety and Quality Control and Food Science & Nutrition (Masters only). The admission to these courses is offered through entrance examinations. For Masters degree programmes, entrance exam is conducted by Education Division of ICAR whereas for PhD programmes, the entrance exam is conducted by NDRI.

ICAR- National Dairy Research Institute not only strives to offer the students opportunities for achieving academic excellence but also encourages them to develop as good professionals and leaders. The Institute has world class facilities, which include state-of-the-art laboratories, excellent hostels, large sports ground with flood lights for outdoor games and a very unique multi complex indoor sports facility with modern gymnasium. All the students are encouraged to participate in extra-curricular activities. The Institute attracts students from all over India, thus, providing them opportunities for cross-learning. The Institute has been working proactively to bridge the gender gap and now girl students comprise more than 35% of the students' strength. We also host many international students majorly from African nations, South East Asia and Middle East. NDRI has an active NCC wing and in the year 2016, many students received NCC B (17 including 3 girls) and C certificates (18 including 7 girls).

ICAR- National Dairy Research Institute is pragmatic in adopting changes to keep its activities aligned to the trends in global institutions of higher learning. The Institute has embarked on digitization of the entire activities in the Deemed University so as to make it paperless in near future. The Institute is implementing automation of the entire academic activities starting from registration, payment of fees and regulation of progress of academic and research work of the students. The entire admission process including conduct of admission test for Ph. D program has been now made online. The Institute has created Internal Quality Assessment Cell and Student Grievance Redressal Cell to make our activities more participative, transparent and responsive. The Academic Council of the Institute has approved Adjunct Faculty Scheme under which nine outstanding professionals selected from across the globe will be visiting the Institute to teach and mentor the students every year. The Institute has resolved to introduce a 10 day foundation program for the freshers at the start of the semester and before commencement of regular course work to tap the innate talents of the students and nurture them to develop into outstanding professionals and accomplished human beings. The Institute is committed to provide an enabling and vibrant environment to the students to be creative, exuberant, academically accomplished and socially responsive to take up future challenges for fulfilling the nation's dairy dreams.

**(R. R. B. Singh)**

RESEARCH

## Salivary Fern Patterns and RNAs, New Tools of Estrus Determination in Buffaloes

(Suneel Kumar Onteru and Dheer Singh)

Estrus determination accuracy is only 40% in buffaloes with the current estrus detection methods. Therefore, saliva was tested for estrus determination in buffaloes. A total of 450 saliva samples were collected on daily basis from three buffaloes in two seasons. Estrus was determined by the estrous symptoms, ovarian ultrasonography and the salivary oestradiol levels. Salivary smears were prepared with 20µl of the cell free saliva on clean glass slides. The smears showed different crystallization patterns, including typical fern-like, branch-like, fir-like, combinations of fir-fern-branch, dotted and none at different stages of estrus cycle (Figure 1). Saliva at estrus showed a typical symmetrical fern-like pattern with significantly ($P < 0.05$) lower fractal dimension values. An average period of an estrous cycle was 21.7 ± 2.7 days (n = 18 estrous cycles) in buffaloes based on the distinct salivary crystallization patterns. The proportion (0.84) of oestrus detection by the salivary fern patterns was very significantly ($P < 0.01$) higher than the proportion of oestrus detection (0.5) in the field conditions. Additionally, direct saliva transcript analysis showed a suggestively significant higher expression of the Heat shock protein 70 (*HSP70*) and Toll-like receptor 4 (*TLR4*) at estrus than the diestrous period in buffaloes. Further, there was a significant ($P < 0.05$) increase in the salivary presence of the miR-16, miR-191 and miR-223 on 6$^{th}$ and 18-19$^{th}$ days of the buffalo estrous cycle, but no such significant difference in their levels among estrus (0 day), 10$^{th}$ day and the following consecutive estrus day. These observations may indicate an association between the representative lower presence of these miRNA in saliva and the presence of dominant ovarian follicles. Overall, salivary crystallization or fern patterns, and *TLR4* and *HSP70* transcript levels could be useful for improving estrus determination efficiency in buffaloes along with the currently available methods.

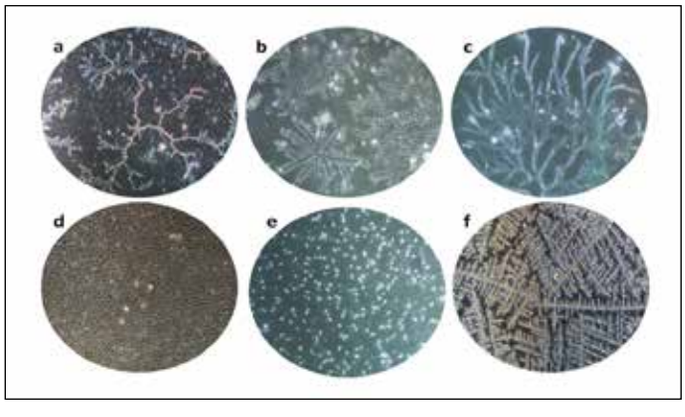
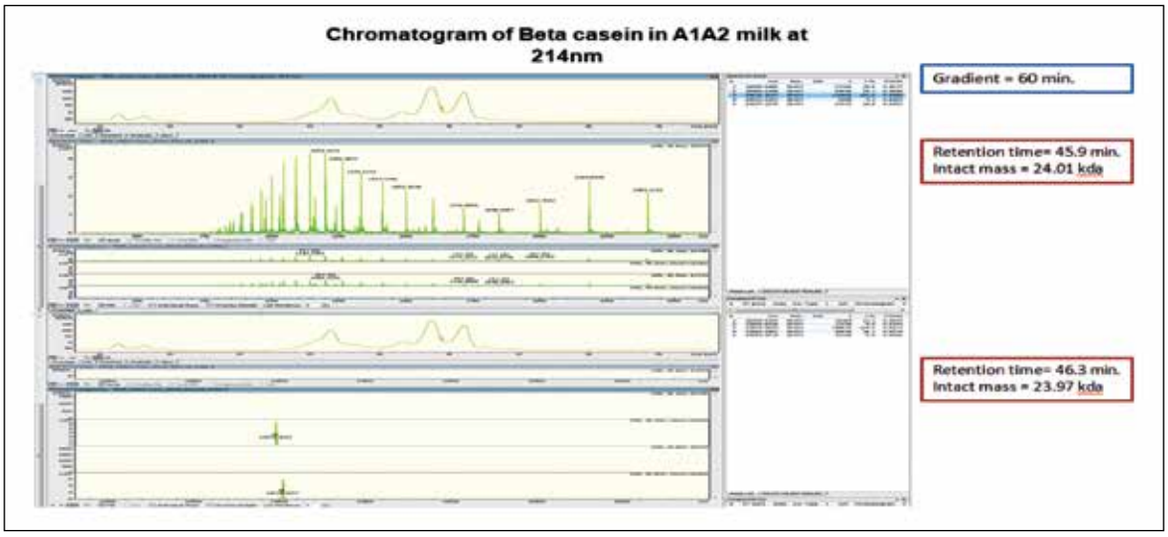



*Figure 1. Different salivary crystallization patterns in buffaloes. a) Branch like b) Fern like c) Fir like d) None e) Dotted f) Typical fern pattern, which is predominantly present at the time of estrus. Magnification 200X*

## Development of a LC-MS Based Method for Typing of A1 and A2 Milk

(Preeti Rawat, Shveta Bathla, Shivam K. Dubey, Sudarshan Kumar, Manishi Mukesh, Monika Sodhi and Ashok K. Mohanty)

Recently, a LC-MS based method has been developed for measuring the intact mass of beta casein variants (A1 and A2 type) in milk on the basis of 40 Da mass differences. This method is used to look at the patterns and masses of the casein proteins in cow milk. The caseins are extracted from milk with a denaturing 8 M urea protocol, which breaks apart the micelles and solubilizes the proteins. Chromatography of the proteins in the urea extract separates the various phosphorylated variants of alpha, beta and kappa forms of casein. Other non-casein proteins from the milk are also observed. Peak identification is based on the protein masses in the deconvoluted spectra.




*Overlay of the deconvoluted spectra of the two beta casein peaks showing that this milk sample contains both of A1 (24,0184 Da) and A2 (23,978 da) variants. The variants are due to a His/Pro substitution differing by 40 Da*

## Preparation and Characterization of Caseinophosphopeptides Mineral Complexes

(Prabin Sarkar, Munmum Sen, Bimlesh Mann, Rajan Sharma, Rajesh Bajaj and Athira S.)

Caseinophosphopeptides (CPPs) are multifunctional bioactive peptides derived from milk casein. In the present study, a new method for enrichment of CPPs alongwith mineral (Iron and Zinc) was developed by using ultrafiltration after enzymatic hydrolysis of caseinate. FTIR spectroscopy and UV-Vis spectroscopy confirmed the structural modification upon mineral binding with CPPs. The particle size analysis also showed these CPP-mineral complexes stable at different processing conditions. These samples were purified by RP-HPLC on C18 Column and fractions having higher phosphate protein: ratio, were subjected to LC-MS/MS, nine peptides were identified both from CPP-Fe complex and CPP-Zn complex. Bioavailability of CPP-Fe & CPP-Zn complexes were investigated by *in-vitro* and *in-vivo* studies. The *in-vitro* caco-2 cell model established the effectiveness of these complexes to increase the bioavailability of mineral as compared to mineral salt. CPP-Fe complex showed 80.47% uptake significantly higher than inorganic iron salt (48.26%) and inorganic zinc salt showed 61.46% uptake much lower than CPP-Zn complex (89.12%). The CPP-Fe complex significantly increased ferritin synthesis (41.82 ± 0.79 ng of ferritin/mg cell protein) in caco-2 cell as compared to iron salt (13.54 ± 0.32 ng of ferritin/mg cell protein). These samples were also able to increase serum mineral level in rat model during replanishment in CPP mineral fed group as compared to their respective inorganic salts fed group. The antioxidative enzymes (AOE) viz. catalase, superoxide dismutase (SOD) activities in liver homogenate increased significantly in CPP-Fe and CPP-Zn complex fed groups as compared to their inorganic salts fed group.


*Fig. Effect of Zinc on Dermatological characteristics of rat*

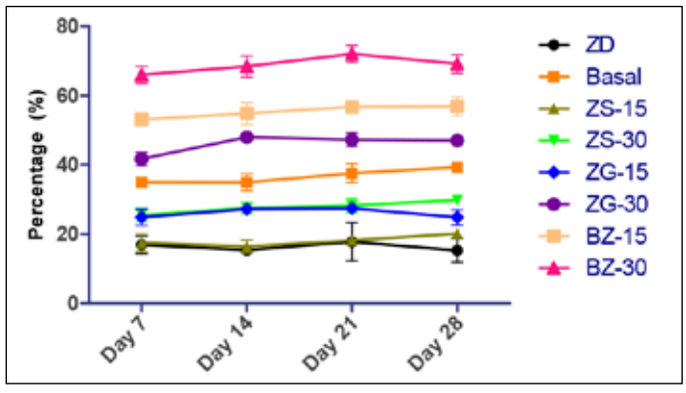
## Zinc Enrichment of Lactic Acid Bacteria and its Bioavailability Evaluation

*(Vaibhao Lule and Sudhir Kumar Tomar)*

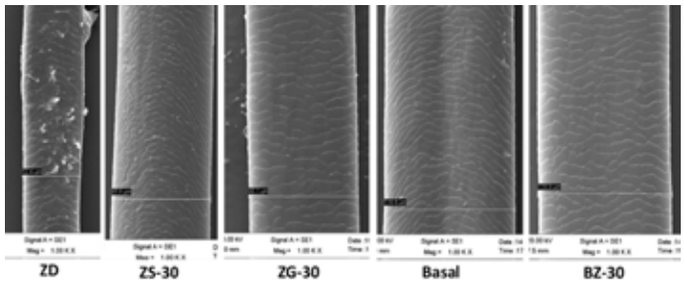
Zn enriched cell biomass was produced with a prolific Zn up-taking cultures of SR4 under optimized conditions at fermenter level followed by cell lysis using ultrasonication (Zn content of lysate, 2.019 ± 0.320 mg/g d.w.). *In-vivo* Zn bioavailability study was carried out in male albino wistar rats using prepared Zn enriched cell lysate of SR4 upto 4 weeks. Significant difference was observed in the diet intake from 1st to 4th week within all groups. Apparent Zn Absorption (ZnAA) between Bacterial Zn (BZ) fed groups and

groups fed with organic (ZG) and inorganic Zn (ZS) was significantly different. Groups fed with bacterial Zn gained significantly higher body weight in comparison to Zn depleted group and groups fed with inorganic and organic Zn. Serum Metallothionein levels were significantly higher in BZ-30 compared to all other groups. Scanning electron microscopy of hairs revealed marked difference in hair characteristics and size of group fed with Zn depleted diet as compared to other groups viz., basal, ZS-30, ZG-30 and BZ-30. Immune cellular response was significantly higher in BZ-30 group as compared to group fed with Zn depleted diet. Significant difference was seen in the antioxidative enzymes (Catalase and SOD) in liver between BZ-30 and ZD groups. The present study establishes the potential of human origin indigenous lactobacilli of accumulating significant amount of Zn in its biomass and ability of delivering the same mineral in a highly bioavailable form. This potent culture can be explored for the development of Zn enriched functional dairy foods and as well as a nutraceuticals.


*Zn enriched biomass production by batch fermentation under optimized conditions*




*In-vivo Zn Apparent Absorption (ZnAA)*




*Effect of zinc on characteristics of rat hair as revealed by Scanning electron microscopy*

Details of groups of rat trials

(ZD: Zn Depleted; Basal: Basal Diet Group; ZS-15: ZnSo4 15 ppm; ZS-30: ZnSo4 30 ppm; ZG-15: Zn-Gluconate 15 ppm; ZG-30: Zn-Gluconate 30 ppm; BZ-15 Bacterial Zn 15 ppm; BZ-30: Bacerial Zn 3- ppm)

# EXTENSION

## DAIRY EXTENSION DIVISION

### Dairy Education at Farmers' Door

Dairy Extension Division organized the ongoing Extension Education Programme "Dairy Education at Farmers' Door" for effective dissemination of dairy production and processing technologies among farming community. 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. The key issues raised by the farmers during interactions were: Management of silent heat in animals; Adulteration in milk; Care management of newly born calves; and Management of berseem and oats crop.

### Kisan Sangosthies

A total number of 12 Kisan sangosthies were organized at village level and the problems discussed were: Control measure of mastitis in dairy animals; Management of silent heat; Role of mineral mixture in animal diet; Care and management of calves; and Clean milk production practices in rural areas.

### Empowerment of Women and Mainstreaming of Gender Issues

Thirteen women empowerment training and campaigns were organized with the objective to create awareness in the field of dairying and home science and also impart skill in these areas so that farm women could generate more income from dairying to cater to the need of their families. In these programmes, 205 farm women and farmers were trained in villages-Gorgarh, Subri, Kulwahri, Dungro and Gumto.

### Educational Visits and Tours

A total number of 2697 visitors (students & Faculty) of 46 Colleges/ Institutions/Universities visited the Institute. The groups were sensitized about the different research, teaching and extension achievements and facilities available in the Institute.

### Farmers' Farm School

**Second Convocation of Farmers' Farm School:** The 2nd convocation of Farmers' Farm School was held on 13th January, 2017 at NDRI, Karnal. Dr. A. K. Srivastava, the then Director & Vice-Chancellor of

NDRI awarded the certificates to the qualified candidates. There were 24 candidates from 11 villages of Karnal district who had registered in second batch of Farmers' Farm School and the classes were organized in Gorgarh village from 7th August, 2015 to 29th July, 2016 throughout the year on every Friday and Saturday for three hours. The course curriculum also included a visit to various agricultural Institutes and progressive farms.


*A group of farmers of Farmers' Farm School with the Director, NDRI Karnal*

## KRISHI VIGYAN KENDRA

### Training Programmes

KVK organised 56 training programmes (On-campus, Off-campus & study-cum-visits) on different aspects of dairy production and processing, crop production, crop diversification, fish farming, bee keeping, vermi compost and home science in which 2036 farmers, women and rural youth from Haryana and other states of the country were imparted training.

KVK organized 3 training programmes on Scientific Dairy Farming and Clean Milk Production in which 80 farmers, farm women and rural youth from different districts of Bihar, Uttar Pradesh and Madhya Pradesh sponsored by State Dairy Development and Animal Husbandry Departments.

KVK also organized 42 exposures cum study visits for 1412 progressive farmers and farm women from different districts of Uttar Pradesh, Punjab, Gujarat, Haryana, Odisha, Himachal Pradesh and Jammu & Kashmir.

### Field Activities

- **A Field Day on Gram** was organized for 24 farmers at village Darar on 3rd February, 2017 in which Dr. A. K. Sikka, Former, DDG (NARM) was the Chief Guest.
- **Farmers Scientist Interface on Safe Use of Agro Chemicals in Vegetable Crops** participated by 12 farmers at Manali district Sonepat on 4th February, 2017.
- **Rabi Kisan Mela** at CSSRI, Karnal for farmers of Karnal and Panipat District.
- **A fish farming awareness camp** in collaboration with district Fish Department at River Yamuna, Kurukshetra was organized on 30th March, 2017 participated by 200 farmers.
- Two day programme on **Best Agricultural Practices** was organized in association with National Fertilizers Ltd on 24th -25th March, 2017 participated by 75 farmers.
- **A field day** was organized on oilseed crop on 27th March, 2017 in village Gudha.
- A programme on **Women Empowerment** was organized in association with CIMMYT and CSSRI in village Bastara participated by 180 farm women.

# EVENTS

### Fifteenth Convocation of NDRI Deemed University

Fifteenth Convocation of NDRI Deemed University was held on 4th March, 2017. Professor (Dr.) A. K. Srivastava, Former Director & Vice Chancellor, NDRI and presently the Member of Agricultural Scientists Recruitment Board, New Delhi presided over the Function and Padamshree Dr. Sanjaya Rajaram, Former Director, Wheat Programme, CIMMYT; Former Director, Biodiversity & Integrated Gene Management Program, ICARDA and World Food Prize Laureate, 2014 delivered the Convocation Address. Dr. R. R. B. Singh, Director & Vice Chancellor, NDRI Deemed University presented the Convocation Report. A total of 262 students (including 75 girls) were conferred different degrees i.e. B.Tech. (Dairy Technology) - 22, Master's -148 and Doctoral–92. Besides, Best Division Award for academic achievements and innovations in teaching and Two Best Teacher Awards for undergraduate teaching and post graduate teaching were also given to recoginze and promote teaching excellence and motivate the faculty.

In his Convocation address, Dr. Rajaram emphasized that agriculture including dairy science and animal husbandry, forestry would decide the balance in future of abundance of nutritious foods, and preservation of natural resources including water, soil and biodiversity.

A galaxy of eminent guests including Dr. H. Rahman, Deputy Director General (Animal Sciences), and others graced the occasion.

Three topper students each in B.Tech. (DT), Master's and Doctoral programmes were awarded Director's Gold, Silver and Bronze Medals for overall performance in Course work. Best thesis awards for Master/Ph.D. programmes (one each in Production, Processing and Management group) were also given to the students.

An academic week was also organised before convocation in the last week of February, 2017, In which, presentations were made by HODs for Best Division Award (2015-16) and Ph.D Scholars and M.Sc/ MVSC/M.Tech students gave presentations for Best doctoral and P.G. Thesis Award in the areas of dairy production, processing and management.


*A student receiving degree during 15th Convocation held at NDRI*

## Students Awarded Medals in B.Tech. (Dairy Technology)/M.Sc./M.V.Sc/M.Tech./Ph.D.

| Name of the Student | Discipline | Medal |
|---|---|---|
| **B.Tech. (Dairy Technology)** | | |
| Varun Arora | Dairy Technology | Gold |
| Naincy Saini | Dairy Technology | Silver |
| Shivam Panwar | Dairy Technology | Bronze |
| **M.Sc./M.V.Sc/M.Tech.** | | |
| Priyanka | Dairy Engineering | Gold |
| Sangeeta Bhattacharyya | Agricultural Extension Education | Silver |
| Prabha Karan | Veterinary Gynaecology & Obstetrics | Bronze |
| **Ph.D.** | | |
| Neethu K.C. | Dairy Engineering | Gold |
| Tapas Kumar Patbandha | Livestock Production Management | Silver |
| Rajalaxmi Behra | Ph.D. (Animal Genetics & Breeding) | Bronze |

## Best Thesis Awards

Best Thesis Awards for Masters' theses (one each in Production, Processing and Management Groups) carrying a citation, a certificate and ₹ 5000 were awarded.

## Best Masters' Thesis Awards

| Group | Name of the student | Discipline |
|---|---|---|
| Production | Mr. Saraf Kaustubh Kishor | Animal Reproduction, Gynaecology & Obstetrics |
| Processing | Mr. Surya Kant Verma | Animal Biochemistry |
| Social Science & Management | Ms. Sangeeta Bhattacharya | Agricultural Extension Education |

**Gold Medals** for best thesis research work in Ph.D. Programme of Production, Processing and Management Group were awarded. The award carries Gold Medal, Citation and Certificate.

| Group | Name of the student | Discipline |
|---|---|---|
| Production | Ms. Uttarani Maibum | Animal Physiology |
| Processing | Mr. Mahesh Kumar G. | Dairy Engineering |
| Social Science & Management | Mr. Kale Rajiv Baliram | Agricultural Extension Education |

**Dr. D. Sundaresan Memorial Oration Award-2017** was bestowed on Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR, New Delhi. Dr. Mohapatra delivered the lecture on the topic "**The GM Future: Bright or Gloomy**" at NDRI Karnal on 18th March, 2017. The award carries an amount of ₹ 20,000, a citation, shawl and a certificate.

*Dr. Trilochan Mohapatra, Secretary DARE & DG, ICAR, New Delhi receiving Dr. D. Sundaresan Memorial Oration Award-2017 during 15th Convocation of NDRI*

**Dr. N. N. Dastur Memorial Oration Award-2017** was bestowed on Dr. Subeer Mazumdar, Director, National Institute of Animal Biotechnology, Hyderabad. Dr. Mazumdar delivered the oration on the topic **"Future of Transgenic Farmed Animals and Milk as a Source of Therapeutic Proteins"** at NDRI Karnal on 21st February, 2017. The award carries an amount of ₹ 20,000, a citation, shawl and a certificate.


*Dr. R. R.B. Singh, Director, NDRI Karnal giving Dr. N. N. Dastur Memorial Oration Award to Dr. Subeer Mazumdar during 15th Convocation of NDRI*

**Dr. K. K. Iya Oration Award-2017** was bestowed on Dr. Narendra Singh Rathore, Deputy Director General, (Agril. Education), Indian Council of Agricultural Research, New Delhi. Dr. Rathore delivered the lecture on the topic "**Innovations in Agriculture Education in India"** at NDRI Karnal on 23rd February, 2017. The award carries an amount of ₹ 20,000, a citation, shawl and a certificate.


*Dr. Narendra Singh Rathore, Deputy Director General, (Agril. Education), ICAR, New Delhi receiving Dr. K. K. Iya Oration Award-2017*

## NDRI Inducted Eminent Scientists as Adjunct Faculty

To give more insight, knowledge and personality development attributes to the students of NDRI, a programme was initiated to induct eminent food and dairy scientists working in various International Institutes as adjunct faculty. In this regard, Professor Harjinder Singh, a Distinguished Professor and Director of the Massey Institute of Food Science and Technology, New Zealand gave a talk on Designing Food Protein Nanostructure with Enhanced Functionality. Dr. Singh informed that nanostructure of food proteins can be manipulated by various processing treatment, which ultimately leads to their differential digestibility. He said that this is


*Professor Harjinder Singh, Director, MIFST, Newzealand being honoured by Dr. A. K. Srivastava, Member ASRB New Delhi*

an upcoming area in the food science and growing rapidly in the scientific and industrial communities because of unique perspective in improving the sensory and nutritional qualities of food proteins.

## Training Programmes

- Dairy Technology Division and SINED-TBI organized a training programme on "Milk and Milk Products Processing" during 20th February–1st March, 2017. It was attended by 20 entrepreneurs from various disciplines and few graduate students who were willing to become entrepreneurs.
- Dairy Technology Division and Livestock Research Centre organized a training programme on 'Dairy farm and milk processing plant management' during 22nd February–3rd March, 2017 for technical staff of ICAR.
- A five day training programme on 'Value Addition in Milk and Milk Products' was organised by Business Planning and Development Unit of NDRI during 27th–31st March, 2017. Twenty trainee farmers from different states (Haryana, UP, Bihar, Rajasthan, Delhi and Punjab) of India participated in the training programme. The training programme was sponsored through National Agri-Innovation Fund under Agri Business Incubator scheme.


## Laurels to NDRI Students

A team of 22 students from NDRI participated in 17th All India Agricultural University **AgriUniFest 2016-17** organised by Rajasthan University of Veterinary and Animal Sciences (RAJUVAS), Bikaner from 22nd–25th Feb., 2017. The team performed very well in 18 various cultural, musical, theatre and fine art events. NDRI contingent brought laurels to the Institute by winning gold medal in Extempore and Bronze medal in Skit.


*Winning moments of NDRI students during various competitions in AgriUniFest 2017*

**Mr. Gaurav Kumar Deshwal**, M.Tech. (Dairy Technology) II Year student, represented North Zone under Engineering & Technology Category and received **All India Third Best Project Award** with a Cash Prize of Rs. 25,000/- at National Students' Research Convention (ANVESHAN-2017) sponsored by Association of Indian Universities, New Delhi and organized by Annamalai University, Chidambaram, Tamil Nadu from 27th–29th March, 2017.

NDRI Team of B. Tech DT third year students Sandeep **Baruah, Saurabh Rai** and **Nabil Alam** won First Prize at Zonal level Quiz competition conducted by Haryana State Council for Science & Technology, Haryana Government. The award carried a cash prize of ₹40,000 and merit certificates. The team also participated in the state level quiz competition.

# राजभाषा एकक

## तिमाही हिन्दी बैठक का आयोजन

संस्थान के निदेशक एवं कुलपति महोदय की अध्यक्षता में संस्थान राजभाषा कार्यान्वयन समिति, रा.डे.अनु.सं, करनाल की तिमाही बैठक दिनांक 7.1.2017 को संपन्न हुई। बैठक का कार्यवृत्त सर्वसंबंधितों को सूचना, अनुपालन तथा आवश्यक कार्रवाई के लिए परिचालित किया गया। समिति को गृह मंत्रालय, राजभाषा विभाग द्वारा जारी चालू वित्तीय वर्ष 2016–17 के लिए केन्द्र सरकार के सभी कार्यालयों के लिए मदवार तय किए गए न्यूनतम वार्षिक लक्ष्यों के बारे में विस्तार से जानकारी दी गई। बैठक में हिन्दी पत्रों पर हिन्दी में हस्ताक्षर करने के साथ–साथ अंग्रेजी पत्रों पर भी हिन्दी हस्ताक्षर करने एवं हिन्दी डाक को प्राप्त करते समय हिन्दी में हस्ताक्षर करके हिन्दी के प्रयोग को बढ़ाने के संबंध में निर्णय लिया गया।

सरकारी कामकाज मूल रूप से हिन्दी में करने के लिए प्रोत्साहन योजना वर्ष 2015–16 के लिए संस्थान के 10 कर्मचारियों को पुरस्कृत किया गया।

## राजभाषा संबंधी अन्य गतिविधियाँ

- दिनांक 8.3.2017 को नगर स्तरीय राजभाषा ज्ञान हिन्दी प्रतियोगिता का आयोजन किया गया, जिसमें नराकास के सदस्य कार्यालयों के 20 कर्मचारियों ने भाग लिया।
- दिनांक 9.3.2017 को संस्थान में ''बसन्त का पैगाम, नराकास एवं राजभाषा हिन्दी के नाम'' बैनर तले राजभाषा संगोष्ठी'' एवं हिन्दी कार्यशाला का आयोजन किया गया जिसमें 55 प्रतिभागियों ने भाग लिया।
- संस्थान की वर्ष 2016–17 की वार्षिक गृह पत्रिका ''दुग्ध–गंगा'' पूर्णतः हिन्दी में प्रकाशित की गई है।
- दिनांक 28.1.2017 को केन्द्रीय मृदा लवणता अनुसंधान संस्थान करनाल में नराकास के तत्वावधान में हिन्दी शब्दावली एवं वाक्यांश प्रतियोगिता का आयोजन कराया।
- दिनांक 1.2.2017 को सैनिक स्कूल कुंजपुरा कार्यालय में तिमाही रिपोर्ट आनलाइन प्रेषित करने में राजभाषा विभाग की वेबसाइट पर पंजीकरण में आ रही समस्याओं का निराकरण करवाया।
- दिनांक 3.2.2017 को यूनियन बैंक ऑफ इण्डिया करनाल क्षेत्रीय कार्यालय में कार्यशाला आयोजित करवाई।
- दिनांक 15.2.2017 को एम.एस.एम.ई. विकास संस्थान कार्यालय का औचक निरीक्षण एवं संस्थान के निदेशक महोदय एवं राजभाषा अधिकारी से वार्तालाप कर नराकास करनाल की वैबसाइट को पुनः एक्टिवेट कराने के संबंधी में कार्रवाई शुरू की।
- दिनांक 20.2.2017 को जवाहर नवोदय विद्यालय, सग्गा, करनाल में नराकास द्वारा निरीक्षण किया एवं हिन्दी कार्यशाला आयोजित करवाई।
- दिनांक 22.2.2017 को पंजाब नैशनल बैंक, मंडल कार्यालय, सेक्टर 12, करनाल द्वारा नराकास के तत्वावधान में आयोजित की गई यूनिकोड हिन्दी कंप्यूटर टाइपिंग प्रतियोगिता को आयोजित करवाया।
- दिनांक 8.3.2017 को संस्थान में राजभाषा ज्ञान लिखित प्रतियोगिता में 20 प्रतिभागियों ने बढ़–चढ़ कर भाग लिया।
- दिनांक 9.3.2017 को संस्थान में ''बसन्त का पैगाम, नराकास एवं राजभाषा हिन्दी के नाम'' बैनर तले राजभाषा संगोष्ठी का आयोजन किया गया जिसमें 55 प्रतिभागियों ने भाग लिया।
- दिनांक 10.3.2017 को संस्थान में हिन्दी कार्यशाला का आयोजन किया गया जिसमें 47 प्रतिभागियों ने भाग लिया।
- दिनांक 10.3.2017 को पंजाब एण्ड सिंध बैंक, अंचल कार्यालय, करनाल में हिन्दी कार्यशाला आयोजित करवाई।

*संस्थान में दिनांक 9.3.2017 को आयोजित न.रा.का.स. की राजभाषा संगोष्ठी/ कार्यशाला का दृष्य*

*NDRI IJSC Members with Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR*

# HONOURS/AWARDS

- **ICAR Best Annual Report Award (2015-16)** was given to ICAR-NDRI under large Institute Category for its excellent quality of content, originality and innovativeness in the presentation. **Dr. R. R. B. Singh,** Director NDRI, Karnal received the award from "**Hon'ble Radha Mohan Singh Ji**, Union Minister of Agriculture & Farmers Welfare, Govt. of India in presence of

**Dr. Trilochan Mohapatra**, Secretary DARE & DG, ICAR during ICAR Directors' meeting held on 14th February, 2017.

*Best Annual Report Award Winning Team NDRI with Dr. R. R. B. Singh, Director NDRI & Vice Chancellor and Senior Officers of ICAR-NDRI*

- **"Best Division Award"** for 2015-2016 was presented to **Animal Biotechnology Centre** for academic achievements and innovations in teaching during 15th Convocation of NDRI on 4th March, 2017.
- **Dr. Sudhir Kumar Tomar**, Principal Scientist, Dairy Microbiology Division was conferred **"Best Teacher (PG)"** award for the year 2015-2016 during 15th Convocation held on 4th March, 2017 at NDRI, Karnal.

- **Dr. Yogesh Khetra,** Scientist, Dairy Technology Division was awarded the "**Best Teacher Award"** for the academic session 2015-16 during 15th Convocation of National Dairy Research Institute, Karnal on 4th March, 2017.

- **Dr. Sumit Arora,** Principal Scientist, Dairy Chemistry Division and **Dr. A. K. Singh**, Principal Scientist, Dairy Technology Division were awarded the **"Fellowship of Indian Dairy Association"** during 16th-18th February, 2017 at 45th Dairy Industry Conference, Mumbai.

## DISTINGUISHED VISITORS

11. 01.2017 Twenty Five Member delegation of Washington AgForestory Class 38.

18.01.2017 A delegation of newly recruited faculty members (22 No.) of Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar.

16.03.2017 Ten Student participants of Colorado FFA Class.

29.03.2017 Sh. Mohan Singh Ahluwalia, Hon'ble Member, Animal Welfare Board.

## PERSONALIA

### Appointments

- Dr. A. K. Srivastava, Director NDRI Karnal appointed as Member (Animal Science), ASRB, New Delhi and relieved from NDRI, Karnal on 30.01.2017.
- Dr. R. R. B. Singh, Joint Director (Acedemic) took over the charge of Acting Director, NDRI, Karnal w.e.f. 30.01.2017.
- Dr. T. K. Datta, Principal Scientist entrusted with the responsibility of Acting Head, ERS of NDRI, Kalyani w.e.f. 01.02.2017 as a stop gap arrangement.

### Promotion

- Mr. Om Kumar, Assistant, promoted as Assistant Administrative Officer w.e.f. 02.01.2017.

### Transfer

- Dr. A. Kumarsean, Sr. Scientist transferred from NDRI Karnal to SRS of NDRI, Bangalore & relieved w.e.f. 17.01.2017.

### Retirements

- Dr. S. K. Tomar, Principal Scientist, Animal Nutrition Division retired from the Council's services w.e.f. 31.01.2017.
- Dr. R. K. Sharma, Principal Scientist, Animal Biochemistry Division retired from the Council's services w.e.f. 31.03.2017
- Mr. Vikrma, Technical Officer, Animal Genetics & Breeding retired from the Council's services w.e.f. 31.01.2017.
- Mr. Rup Kumar Pal, Technical Officer, Vehicle Pool retired from the Council's services w.e.f. 28.02.2017.
- Mr. Om Kumar, Assistant Administrative Officer retired from the Council's services w.e.f. 28.02.2017.

# SOUTHERN CAMPUS, BENGALURU

## RESEARCH

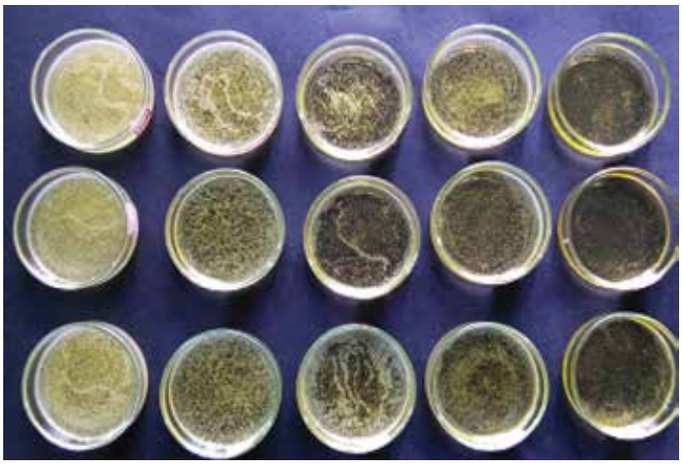
### Scrotal Infrared Thermography in Murrah Bulls

(Maneesh Kr. Ahirwar, Mukund A. Kataktalware, P. Heartwin Amaladhas and K. P. Ramesha)

One hundred and nine Murrah buffalo breeding bulls, maintained at the three commercial semen stations were subjected to scrotal surface and ocular infrared thermography using a FLIR i5 infrared camera following standard procedure, and thermograms were analyzed by FLIR Quick Report v.1.2 SP2 software. The analysis of variance revealed that the semen station, season, Temperature Humidity Index (THI), housing system and the timing of observations had significant effect on scrotal surface and ocular thermal profile of Murrah bulls. The higher THI at the time of recording of observations had significant effect on scrotal surface and ocular temperatures of Murrah bulls as compared to medium and low THI. The testicular gradient of the testes was significantly higher during the low THI period as compared to the medium and high THI. The findings of the present study clearly indicate the utility of THI in conjunction with the infrared thermography in assessing the effects of thermal stress on physiology and health of buffalo bulls.

### Image Analysis of Ghee to Detect Adulteration with Vegetable Fat and Discriminate Ghee Blends

*(P.G. Wasnik, Bhatu V.J., Menon Rekha R., M. Manjunatha, B. Surendra Nath, M. Sivaram, B. V. Balasubramanyam)*



A process protocol to extract mathematical descriptors for image texture and colour parameters was standardized for image analysis of ghee samples. The developed method was applied to detect adulteration of cow ghee with vegetable fat and to discriminate blends of cow and buffalo ghee in varying proportions. Prediction models developed using discriminant analysis and multivariable regression demonstrated the ability to predict the adulteration / discrimination with an accuracy of > 85%.

### Training Programmes

- Southern Campus of NDRI organised a Training Programme on "Farm Business Management" for Animal Husbandry Sector in collaboration with MANAGE Hyderabad during 31st January to–3rd February, 2017. Thirty four participants from Dept. of Animal Husbandry and Milk Federations of Southern States attended the training programme.
- A National Training Programme on "Commercial Dairy Production" for Technical Staff of ICAR was organized at Southern Campus of NDRI, Bengaluru during 27th February to 4th March, 2017.
- A National Training on "Technology Management and Business Planning for Entrepreneurship Development" for the Technical Staff of ICAR Institutes was organized from 13th to 18th March, 2017. Seven Technical Officers from different ICAR organizations participated in the training.
- One week training was conducted on "Commercial Dairy Production" for 17 candidates from 9th–14th January, 2017.

## EXTENSION ACTIVITIES

- A total number of 676 visitors in 18 batches comprising students from various educational institutes, farmers and entrepreneurs of Southern region visited the institute. The visitors were briefed about the ongoing activities.
- Advisory services/technical advice was rendered to sixteen clientele during personal visits and mail enquiries to the institute. The information needs of the advisory services comprised technical advice for initiating a commercial dairy project, training programme for dairy business management and on scientific dairy farming for dairy entrepreneurs.
- Extension literature on 'Green Fodder Production' was prepared in regional languages and literature on clean milk production, indigenous dairy animals and indigenous dairy products of the region prepared exclusively for the clientele groups of the Southern region was distributed to the needy clientele groups during the visits, dairy education at farmers' door programme and exhibitions, visitors and trainees during their visits to the institute.
- An orientation programme was organised for 302 dairy farmers of Karnataka Milk Federation, in 10 batches from Kolar, Tumkur, Bangalore Rural and Urban Districts during March 2017. The trainees were briefed up about the ongoing activities of the institute and were given orientation to scientific dairy farming and clean milk production. The trainees were taken round the Institute to fodder demonstration unit and livestock research unit as a part of exposure programme.
- Participated in ASC India Expo 2017, organised during XIII Agricultural Science Congress, from 21st to 24th February 2017, held at GKVK Campus, UAS, Bengaluru, organised jointly by University of Agricultural Sciences, National Academy of Agricultural Sciences and ICAR SRS of NDRI stall depicted innovative and educative information on recommended scientific dairy farming practices, clean

milk production, indigenous breeds of Southern India and indigenous dairy products of the region for the benefit of the clientele groups.

## HONORS/AWARDS

- Two students from the Southern Campus of NDRI, Bengaluru were honoured as part of the 'Processed Indian Traditional Foods' PhD Research Promotion programme organised by **First** (Business Associate of Giract, Geneva).
- The Doctoral research work of **Mr. Gajanan P. Deshmukh,** Ph.D. Student in Dairy Engineering, entitled "Design and development of mechanical unit for dry crystallization of *Palada Payasam* mix" was selected to receive the Indian Foods Research Bursary of INR 50,000. The award ceremony was held on 8th March, 2017 at the Vivanta-Taj, New Delhi. The ceremony was graced by the sponsors, Nestlé Research and TATA Trusts.

# EASTERN CAMPUS, KALYANI

## RESEARCH

### Impact of Climatic Stress on Milk Production in Crossbred Jersey Herd in Lower Gangetic Region

(D. K. Mandal, Ajoy Mandal, Champak Bhakat, Anupam Chatterjee, M. Karunakaran and T. K. Dutta)

Environmental factors like temperature, humidity, rainfall etc. are some of important constrains that influence the production and reproduction in domestic animals. Due to rise in environmental temperature and humidity, stress increases and there by cardinal physiological responses are altered. Thermal humidity index (THI) is a combined indicator of environmental variables that gives better precession in judging the alteration in physiological response, voluntary feed intake, body growth and changes in milk production of lactating cows. Impact of THI on production performance of whole herd of Jersey crossbred cows at ERS-NDRI, Kalyani was investigated. Based on THI environment was classified as slight to moderate (THI<80) and high stressful conditions (≥80). When THI exceeded 80, the morning milk yield (kg) and overall herd average (kg/day) were decreased. On overall basis, 66.6% days of the year was low to moderate stressful and rests 33.4% severe stressful. The daily herd average (kg/cow) and percentage of lactating cows in herd between two environmental stress conditions were observed. The study revealed that there was reduction of 170 g milk per cow per day in the herd under high stressful conditions. However, milk fat percentage and solids not fat percentage remained unchanged.

## EXTENSION ACTIVITIES

### Training on Artificial Insemination and Veterinary First Aid

- One 32 day training programme on Artificial Insemination and Veterinary First Aid was organized in the institute during 31st January to 3rd March, 2017. A total number of 13 youths participated in the training programme in which one participant was from Bihar state and rest of the participants was from West Bengal.

### TSP Activities: Veterinary Health Camps and Scientists-Farmers Interaction Sessions

- One veterinary health & vaccination camp was organized on 24th January, 2017 at Manasadwip, Khasmahal Adibasipara in Rudranagar Gram Panchayat and Bamankhali village of Sagar block in South 24 Paragans district of West Bengal. A total of 125 farmers were benefitted from the camp. Another veterinary camp was organised on 9th February, 2017 at Shirshi village in West Medinipur District of West Bengal in which 138 farmers were benefitted. Several inputs like mineral mixture, fodder seeds, veterinary medicines, extension literatures etc. were distributed among the tribal farmers. During both the occasions scientist farmers interaction sessions were organized to sensitize the farmers about scientific dairy farming.

*A team of Eastern Campus Scientists interacting with Tribal Farmers*

- **Krishi-Cum-Dairy Mela and Technology Demonstration:** 'Krishi-Cum-Dairy Mela and Technology Demonstration' was organized at Ghoshaldanga village near Shantiniketan, Birbhum District in collaboration with KVK, Biswa Bharati, Shantiniketan on 28th January, 2017. A total number of 153 farmers participated. Veterinary medicines and other inputs were distributed among the farmers having 416 number of Cattle, 46 Calves, 18 Buffaloes, 412 Goats, 99 Sheep and 606 no of Birds. A cattle show cum competition was organized and prizes were distributed among farmers. Similarly, for agricultural crops, a competition was also held and winners got suitable prizes. One scientists-farmers interaction session was also organized on this occasion. Mineral mixture for dairy animals was distributed among farmers. All the participating tribal farmers got some utensils for dairy farming.
- **NEH Activities:** In the state of Meghalaya four sessions of scientists' interaction with farmers were organized. In these sessions, several inputs were distributed among the farmers. Farmers were exposed to the knowledge of different facets of scientific dairy farming. From the interaction session, 293 farmers were benefitted. Inputs like mineral mixture, cattle feed, veterinary medicines, fodder seeds and extension literature were distributed among farmers. Method of demonstration of azolla production was also organized.

*A method of azolla production being demonstrated to farmers*

- Scientists-farmers interaction session cum veterinary heath camp was organized in the state of Tripura. A total of 94 farmers were benefitted from the camp. Several inputs were also distributed among farmers. Apart from that regular SMS in Bengali language pertaining to various aspects of scientific dairy farming were also sent to the registered farmers from Tripura.
- A veterinary health camp-cum-scientists-farmers interaction session was organized in collaboration with ICAR-National Organic Farming Research Institute, Gangtok, Sikkim. A total of 71 farmers were benefitted. Inputs like mineral mixture, veterinary medicines, cattle feed and extension literatures were distributed among the farmers.

*Dairy farming inputs being distributed to farming community*

## EVENTS

### Sports event organized

Sports event for the students of DAHD course and Post graduation at ERS Campus was organized. Athletic event comprising 100 meter running race, relay race and long jump for both girls and boys were organized on 2nd March, 2017. A series of badminton and cricket matches were also conducted for the students of the campus.

### New Additional Krishi Vigyan Kendra Inagurated

New additional Krishi Vigyan Kendra (KVK) for Nadia district of West Bengal was inaugurated on 19th January, 2017 at Eastern Campus of NDRI, Kalyani, West Bengal. Prof. (Dr.) A. K. Srivastava, Former Director and Vice-Chancellor, NDRI, Karnal presided over the function and ensured that newly established KVK would always help the farming community secure sustainable livelihood. Dr. D. D. Patra, Vice-Chancellor of B. C. K. V. Mohanpur, Nadia and Guest of Honour stressed upon the maintenance of soil health for sustainable crop production. Prof. (Dr) P. Biswas, Vice-Chancellor of WBUAFS, Kolkata and Guest of Honour suggested that linking farmers with market can ensure the higher profitability in agriculture sector and expressed that the newly established KVK will help the farming community to acquire the scientific know-how about the recently developed agricultural technologies. Dr. D. Das, GM, NABARD, opined that the new additional KVK of Nadia district can help in building economic sustainability of the farmers.

Dr. A. Halder, Pr. Scientist of ATARI, Zone-II, Kolkata elaborated several activities performed by KVKs and expressed that the new KVK would cater to the need of the farming community in Nadia District. Deans from WBUAFS, In-charges from several ICAR Institutes and around 100 farmers participated in the programme.

*Dr. A. K. Srivastava inaugurated the additional KVK at Eastern Campus, Kalyani*





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