ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

NDRI News

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From the Director's Desk

Sh. Radha Mohan Singh Ji, Hon'ble Union Minister for Agriculture & Farmers Welfare addressing the faculty and the staff of NDRI

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In the present scenario of dairy development, healthy and disease free calves are considered as the worthy possession of a dairy enterprise, as they are the future herd stock. Successful rearing of young calves is the key to the success in dairy farming. Raising healthy calves is a challenging but rewarding job. Calf mortality, especially from 0 to 3 months age, accounts significantly for the total mortality in cattle. It has been roughly estimated that the neonatal calf mortality varies from 12 to 30% in India with a majority of death (80-85%) occurring within one month of age. The economic loss caused by morbidity and mortality of calves was high and estimated to cost the farmer about US $ 62.50 per calf died. The 2007 National Animal Health Monitoring System for U.S. dairy reported that 57% of calf mortality was due to diarrhoea and most cases occurred in calves less than 1 month old. In Norway, it has been estimated that the annual economic loss associated with calf death was approximately 10 million US dollars.

Poor health and mortality of the calves is largely associated with the unhygienic management as growth and productivity rely heavily on nutrition and management practices. Both infectious and non-infectious factors play an important role in increasing the risk of calf mortality. The major organisms associated with calf mortality include bacterial (*E. coli*, *Clostridium perfringes*, *Salmonella* sp etc), viral (mainly Rota virus, Corona virus, Bovine viral diarrhoea, Infectious bovine *rhinotracheitis*), protozoal (*Cryptosporidia*, *Coccidia* and *Eimeria* sp.) and gastro-intestinal parasitism (mainly *Ascaris* Sp). Non-infectious risk factors are also equally important as infectious factors because the newborn animals are vulnerable to environmental stresses; however, these factors are most often neglected by farmers. To produce healthier calves, care should be given when the calf is in fetus stage itself through proper management and feeding of the dam.

The factors that determine the birth of superior calf are genetic potential of the dam and sire as influenced by the environment factors particularly feeding and management. Additional feeding of pregnant cows i.e. "steaming up operation" is important to obtain good quality calf as well as to maximize milk yield. Deficiencies of nutrients particularly protein, vitamin and minerals is likely apparently by affect the pregnant cow and lead to serious abnormalities in the young ones and even death at some times. Pregnant dry cow nutrition also affects colostrum quality. Colostrum is low in vitamin E unless the cow is supplemented. Normally, it is recommended that 1000 IU/day of vitamin E be supplemented during the dry period. Without adequate vitamin E from colostrum, the calf's immune system will suffer.

The birth weight of calf should be at least 6% of the dam's body weight. If the calves are born with low body weight, then their future growth and performance

is affected. Immediately after parturition, due care should be given to make the calf breathe normally and should be moved to a well protected, clean bedded and dry area and navel cord should be cut properly and antiseptic be applied to prevent infection. From birth to about 2 weeks of age or more, the calf is a monogastric, or simple-stomached animal. The abomasum is the only stomach compartment actively involved in digestion, and milk or milk replacer provides nutrients. The calves must get colostrum to acquire passive immunity at birth. It should be ensured that the calf gets adequate quantity of (about 1 litre) first colostrum from its dam within 1/2 -1 hr after birth. Thereafter, the calves may be allowed to get colostrum every 6-8 hrs for first 4-5 days. Total quantity fed during 24 hrs should be about 1/10th of its body weight. To boost disease resistance, supplementation of Iron and vitamins A, D & E orally or by injection soon after birth is recommended. This is especially useful in management of weak/anaemic calves. With proper care and management, majority of calves can be weaned by 4 to 5 weeks of age. The calves can be moved to a new house after a week of weaning and the number of calves in a single pen should be limited. Housing areas must have adequate ventilation to reduce the risk of respiratory infections. In addition, the area should be clean and well bedded to limit exposure to faecal pathogens. The young calves have to be dewormed routinely and vaccinated against important diseases like Foot and Mouth Disease, Haemorrhagic Septicaemia, Black Quarter and Anthrax. The female calves should be vaccinated against Brucellosis also.

Effective control of calf morbidity and mortality requires a thorough understanding of pathogen characteristics, proper and early diagnosis of underlying etiology and best cow-calf management. A thorough understanding of the calf ecology, epidemiology of calf diseases, environmental hygiene, emerging pathogens and instituting an effective therapeutic and management measures will help us control the calf morbidity and mortality.

Srivastava

(A. K. Srivastava)

RESEARCH

Milk-based Smoothie

(Satish K. M. H. and Latha Sabikhi)

Milk-based Smoothie

A ready-to-serve shelf stable beverage combining milk with minor cereals/legumes/pulses, fruit and vegetable solids, has been developed. The cereals and milk complement each other and compensate for the lack of vital amino acids in the former and fibre and iron in the latter. The product is an on-the-run, grab-and-go breakfast option for office goers and children. As the product is expected to be shelf stable for a reasonable duration, no additional refrigeration cost is incurred during storage.

Low Sodium Cheeses

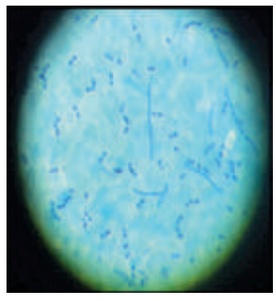
(Yogesh Khetra and S. K. Kanawjia)

Sodium has been reduced considerably in Cheddar and Mozzarella cheese by using taste-taste interactions approach along with conventional salt replacer used as a substitute of sodium chloride. These taste-taste interactions were found to be significantly effective in eliciting saltiness of cheeses prepared using a combination of sodium chloride and potassium chloride. This approach for sodium reduction did not affect the sensory qualities of cheese as well. Sodium content in Cheddar and Mozzarella cheese was reduced up to 75 and 69%, respectively.

Greek-Style Yoghurt with Fast Acidifying Yoghurt Culture

(Surajit Mandal, Joyti and Ravi S. Wankhede)

Greek yogurt, a fermented semi-solid product, is derived from yogurt by draining away part of its water and water-soluble components. Greek yogurts are much thicker in body and heavier in mouth-feel compared to their stirred counter parts. It is also known as Labneh, Turkish yogurt, Yogurt cheese and Yochee in different parts of the world. It is nutritionally enriched with high milk solids, fat and proteins. Greek yogurt can also be prepared by concentrating milk by ultra-filtration or adding milk solids to increase the total solids in final product before fermentation (Greek-style yogurt). A potent yogurt culture has been formulated, which is capable of acidification in milk with high level of total solids. Protocol for preparation of Greek-style yogurt with developed culture has been standardized from milk with adjusted total solids and fat for improved quality product without drainage of whey from curd. This is a well characterized Yoghurt Culture having faster acidification capability in milk with high total solids, suitable for preparation of good quality Greek-Style Yoghurt, free from post acidification and wheying-off, during storage.



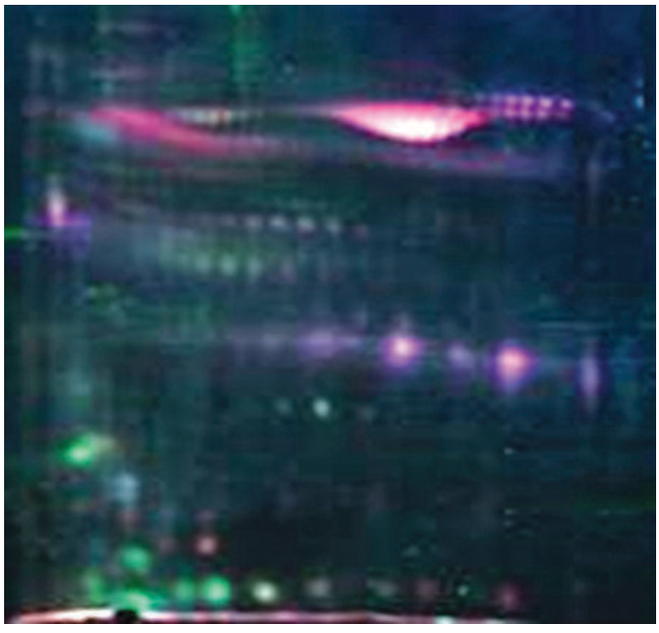
Yoghurt Culture

Greek-style Yoghurt

Identification of Potential Protein Biomarkers for Early Detection of Pregnancy in Cattle Urine using 2D-DIGE and Label Free Quantitation

(A.K. Mohanty)

An early, reliable and noninvasive method of early pregnancy diagnosis is a prerequisite for efficient reproductive management in dairy industry. The early detection of pregnancy also helps to reduce the calving interval and rebreeding time, which is beneficial for farmers and dairy industries. The aim of this work is to identify potential biomarker for pregnancy detection at earlier stages (16-25 days). To achieve this goal, we performed differential in gel electrophoresis (DIGE) and label free quantitation (LFQ) for identification of protein which have significant differential expression during pregnancy. DIGE experiment revealed eleven differentially expressed proteins out of which nine proteins were up regulated having fold change ≥1.5. The LFQ data analysis gave 202 differentially expressed protein out of 30 proteins up-regulated and 40 down regulated having significant fold change ≥1.5 and ≤0.6, respectively. The differentially expressed were actively involved in pregnancy associated events such as embryo implantation, establishment and maintenance of pregnancy. Thus, a set of potential protein biomarkers was identified for early detection of pregnancy which can be further explored for development of urine based pregnancy diagnosis kit.



2-Dimensional Differential-in-Gel electrophoresis (2D-DIGE) showing differentially expressed proteins in urine of pregnant cattle.

Models for Predicting Energy Value of Milk of Murrah Buffaloes

(Arpan Upadhyay and Atish Kumar Chakravarty)

In view of ensuring nutritional security of country through milk, rearing of animals with high energy value of milk needs to be promoted. The present trends of genetic evaluation of dairy animals are focused on milk yield only. Therefore, genetic evaluation of dairy animals based on energy value of milk was taken up. The prediction models for the energy value of milk on the basis of milk constituent viz., fat, solids-not-fat and total solids contents in Murrah buffaloes were developed. These models can be used for genetic evaluation of Murrah bulls as well as for the selection of female Murrah buffaloes based on energy value of milk. Furthermore, the models can be utilized by dairy industry to judge the quality of milk of Murrah buffaloes and help in assessing the nutritional security in any location or village, rearing Murrah buffaloes in the country.

Two Sponsored Dairy Projects Initiated

The Dairy Technology Division received two externally funded research grants. MoFPI is funding a two-year project on the 'Technology of Heart Friendly Herbal-Milk Smoothie with Prophylactic Effects against CVD and Associated Risks' with a grant of Rs. 43.46 lakhs, while the second grant is from ICAR Extra Mural Research Project Scheme. This grant is for Rs. 33.31 lakhs for the two-year project on 'Electrospun Smart O_2 Sensor for Modified Atmosphere Packaged Dairy Products'.

A project on 'Establishment of Agri business incubators (ABI)' was granted by the National Agricultural Innovation Fund for a three year period, with Dr. A. K. Singh, Principal Scientist (DT) in the lead. The project grant is Rs. 79.15 lakhs and will include Entrepreneurship Development Programmes, Business Incubations, Consultancy Assignments, Transfer of Technology, Outreach Programmes etc.

EXTENSION

DAIRY EXTENSION DIVISION

Veterinary Camps

A total number of 9 Veterinary Camps were conducted and 154 cases were treated for various veterinary ailments. Special attention was given to improve the productive and reproductive performance of dairy animals.

Kisan Sangosthies

A total number of 9 Kisan sangosthies were organized at village level. Topics covered were related to measures for control of mastitis in dairy animals; prevention measures for ticks control; role of mineral mixture in animal diet; care and management of calves; clean milk production practices in rural areas.

Empowerment of Farmwomen

Nine women empowerment training and campaigns were organized for 128 farmwomen 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.

Educational Visits and Tours

A total number of 1633 visitors (students & Faculty) from 32 colleges/Institutions/Universities visited the Institute and sensitized about the different research, teaching and extension achievements and facilities available in the Institute.

KRISHI VIGYAN KENDRA

Extension Activities

- A total number of 60 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 were organized for 2351 farmers, women and rural youth from Haryana and other states.
- KVK organized 12 training programmes on scientific dairy farming and clean milk production for 302 farmers, farm women and rural youth from different districts of Bihar and Uttar Pradesh sponsored by State Dairy Development and other agencies.
- KVK also organized 32 exposures cum study visits for 1402 progressive farmers and farm women from different districts of Uttar Pradesh, Punjab, Gujarat, Rajasthan, Haryana, Odisha, Jharkhand, Chhatisgarh, Kerala and Arunachal Pradesh.
- A total number of 169 demonstrations were organized by KVK in various villages of Karnal district.

Field Activities

- A "Rabi Kisan Sammelan" was organized in the KVK on 29th March, 2016 for 120 farmers and farm women from Karnal district apart from 40 farmers from Himachal Prdesh. Ten progressive farmers from Karnal district were also recognized in the sammelan.
- KVK arranged the exposure visit of about 260 farmers from Karnal district to Krishi Unnati Mela at ICAR-IARI, New Delhi on 19th March, 2016.
- KVK organized exhibition on its activities during the celebrations of "Ganna Kisan Mela" at Sugarcane Breeding Institute Regional Centre Karnal on 3rd March, 2016 and at National Horticultural Research and Development Foundation (NHRDF) Regional station Salaru on 09th - 10th March 2016.

Institute Technology Management Committee (ITMC)

Institute Technology Management Committee (ITMC) chaired by Director, NDRI. ITMC is the prevailing committee for Patent filing and Technology commercialization at institute level. During the period of January to March 2016, a total of 3 technologies were commercialized to one industry. The details of the commercialized technologies are listed below:

- Whey Based Medium for Lactic acid Bacteria.
- Bioprocess for Direct Vat Set (DVS) Misti Dahi Culture.
- EPS Producing Culture for Preparation of Low-fat Dahi.

Patent Granted

A Process for the preparation of Milk Cake (Anil Kumar, G. R. Patil, A. A. Patel, R. R. B Singh) Patent No. 270312 Grant date: 10/12/2015.

EVENTS

15th Annual Convention of Veterinary Pharmacology and Toxicology

A three day convention was organised on "Nutritional Pharmacology and Toxicology beyond Calories" on 30th December 2015 to 1st June 2016. The convention was inaugurated by Honourable Governor of Haryana, Professor Kaptan Singh Solanki. Dr. Gurbachan Singh, Chairman, Agricultural Scientists Recruitment Board (ASRB) presided over the function. It was emphasized that scientists, veterinarians and policy makers should come together to empower the livestock farmers to produce quality animal products to achieve nutritional security and self-sufficiency for the country. It was felt that livestock health is a key component for the success of animal farm and livestock diseases not only threat national economy but also human health. Honourable Governor also felicitated 11 veterinary scientists of various institutes for their outstanding research contributions. A total of 300 delegates benefitted from 188 presentations containing plenary lectures, 24 invited lectures, 2 oration awards, 21 young presentations, 30 oral and 100 poster presentations. The convention was concluded in the presence of Dr. V. M. Kotoch, Former DG (ICMR) and Dr. N. K. Lohiya Prof. Emeritus, ICMR.

Conference on Animal Feeding and Nutritional Research

A three day conference was organized on "Innovative Approaches for Animal Feeding and Nutritional Research at NDRI from February 6th- 8th, 2016". The conference was inaugurated by Hon'ble Minister of Agriculture, Development & Panchayats, Irrigation, Animal Husbandry & Dairying and Fisheries, Govt. of Haryana. Sh. Om Prakash Dhankar and Dr. Gurbachan Singh, Chairman, Agricultural Scientists Recruitment Board (ASRB) was Guests of Honour. The other dignitaries present during the function were Dr. H. Rahman, Deputy Director General (Animal Sciences); and Dr. Michael Appleby, Chief Scientific Advisor, World Animal Protection and Dr. C. S. Prasad, President of Animal Nutrition Society of India.

The main theme of the conference was to look for alternative approach to increase the fodder production so as to prepare the country for 2050 and beyond that. The issue discussed was related to development of mitigation strategies for emission of methane from enteric fermentation in animals. The conference was attended by 300 delegates from 22 states of the country and about 50 delegates are from various countries including USA, UK, Norway etc.

Visit of Union Minister for Agriculture at NDRI

Hon'ble Union Minister for Agriculture & Farmers Welfare, Govt. of India, Sh. Radha Mohan Singh ji visited NDRI, Karnal. The Minister inaugurated an Indoor Sports Complex (Kalki Bhawan), boys' hostel and Business Planning Development Unit at NDRI campus. Hon'ble Minister also released two recently developed technologies by NDRI for the differentiation of cow and buffalo butter/ghee and for the differentiation of milk of cow, buffalo, goat, sheep and camel. He also released three products developed at NDRI such as Nutrimix, Aloevera whey drink and Mishti Doi.

Later, he addressed the scientists, staff and students of NDRI and other sister institutes located at Karnal. Hon'ble Minister while paying tribute to the farmers said that the condition of our villages have not much improved over the years and all our efforts should be towards improving the life of a farmer. He

Hon'ble Union Minister for Agriculture inaugurating the Indoor Sports Complex

advocated the use of organic farming using bio-fertilizer and the concept of integrated farming to improve the soil health. He cautioned that nutrients are being continuously extracted from the soil and the poor soil health is affecting the well-being of humans as well as livestock. He advised that each ICAR Institute should have demonstrable organic farm model as well as integrated farm model for the benefit of farmers.

While praising the efforts of NDRI in providing superior semen to the farmers, he urged that NDRI should also come forward in providing superior female calves to the farmers. He stressed that dairy processing provides good employment opportunities to younger generation and lauded the efforts of NDRI in establishing the Farmers' Producers Society in Karnal District. He promoted the concept of e-marketing platform wherein 585 markets of the country would be integrated and farmers have the benefit of knowing the price of his produce across the state as well as nation.

44th Dairy Industry Conference

A three day Dairy Industry Conference (DIC) was organised by IDA (NZ) on the theme "Dairying in India by 2030: Make in India" at NDRI from 18th – 20th February, 2016. The Conference was inaugurated by Sh. T. Nanda Kumar, Chairman (NDDB), Anand. Sh. R. S. Sodhi, Managing Director, Gujarat Cooperative Milk Marketing Federation (popularly known as Amul), Anand and Dr. Harjinder Singh, Distinguished Professor & Director Massey Institute of Food Science & Technology, New Zealand were the Guests of Honour. Dr. N. R. Bhasin, President, Indian Dairy Association, presided over the function. Other dignitaries present on this occasion were Dr. A. K. Srivastava, Director, NDRI; Dr. R. K. Malik, Joint Director (Research) NDRI; Dr. R. R. B. Singh Joint Director (Academics) NDRI; Prof. Paul McSweeney, Professor in Food Chemistry in the School of Food and Nutritional Sciences, University of Cork, Ireland;

Dr. Manohar Garg, University of New Castle, Australia and Sh. R. S. Khanna, Vice-President, Indian Dairy Association (NZ). The outstanding rural women entrepreneurs who contributed in the field of dairying were felicitated by the Chief Guest.

The conference was attended by more than 2500 delegates including a large number of dairy farmers from the country and about 50 delegates were from various countries including USA, Russia, UK, Ireland, Coratia, Australia, New Zealand etc.

At the 44th DIC, Dr. S. Ayyappan gave Dr. Verghese Kurien Memorial Oration – 2016 and gave the snapshot of Indian Agriculture with special reference to role of dairying in rural economy. He complimented the Indian Dairy Association for the organization of 44th Dairy Industry Conference as the main aim of the event is to fulfil the dreams of our Hon'ble Prime Minister's mission to promote the "Make in India: concept" in Dairy Industry.

Dr. Ayyappan, Director General (ICAR) delivering Dr. Verghese Kurien Memorial Oration 2016 at 44th Dairy Industry Conference at NDRI, Karnal

Dr. S. Ayyappan later inaugurated the International Trade Fair on dairy farming, processing, packaging, distribution & products being organized on the side lines of dairy industry conference. In this trade fair, exhibits from 200 companies around the globe exhibited their products. In this exhibition, there was a live demonstration of packaging machine and analytical dairy equipments.

On the concluding day, Dr. Gurbachan Singh, Chairman, ASRB, New Delhi; Dr. Nico van Belzen, Director General, International Dairy Federation, Belgium; Dr. N. R. Bhasin, President Indian Dairy Association and Dr. A. K. Srivastava, Director, NDRI and Chairman, Indian Dairy Association (NZ) were present. On this occasion, Sh. Ram Chander Chaudhary, Chairman of Ajmer Dairy Union was felicitated and the dairy plant of Nutricia India Pvt. Ltd. was judged as best maintained dairy plant in the country. Young Scientists were also awarded on this occasion.

Academic Week Celebrations

- **Dr. D. Sundaresan Memorial Oration:** Dr. R. B. Singh, Chancellor, Central Agricultural University, Imphal delivered Dr. D. Sundaresan Memorial Oration entitled **"White Revolution for Green Economy"** on 27th February, 2016.
- **Dr. K. K. Iya Memorial Oration:** Dr. Gurbachan Singh, Chairman, Agricultural Scientists Recruitment Board (ASRB), New Delhi delivered Dr. K. K. Iya Memorial Oration entitled **"Talent Search in Agricultural and Allied Sciences: Challenges and Opportunities"** on 29th February, 2016.
- **Dr. N. N. Dastur Memorial Oration:** Dr. B. N. Mathur, Former-Director, NDRI, Karnal and NAARM, Hyderabad delivered Dr. N. N. Dastur Memorial Oration entitled **"Dr. Dastur's legacy: Dairy Education in India and way forward"** on 3rd March, 2016.

14th Convocation of National Dairy Research Institute (Deemed University), Karnal

NDRI organized 14th Convocation on 5th March 2016 and Prof. Kaptan Singh Solanki, Hon'ble Governor, Haryana was the Chief Guest. During his address to students, he said that NDRI has made the nation richer through the human resource development and training the young minds.

Prof. Kaptan Singh Solanki, Hon'ble Governor Haryana addressing the faculty and students

Dr. Jimmy Smith was confered the degree of Doctor of Science (Honoris Causa) on this occasion.

Dr. Jimmy Smith, Director General (ILRI) Kenya delivering the Convocation address

Dr. Jimmy Smith, Director General, International Livestock Research Institute (ILRI), Kenya while delivering the convocation address, congratulated the students for their hard earned degrees and distinctions for their academic excellence. He also called upon all the degree recipients not to be complacent, as having a degree from NDRI will put more responsibility on their shoulders. He expressed his concern that by 2050, producing sufficient quantity and quality of food for over 9 billion people represents a huge challenge. Livestock plays a very important role in livelihood and nutritional security. Globally, animal agriculture accounts for 40% of farm GDP. He stressed that primarily livestock is with smallholders and research efforts should be focused towards the mitigation of drudgery from the lives of such people and make the livestock profession more attractive.

A student receiving degree during 14th Convocation

Dr. A. K. Srivastava, Director & Vice Chancellor, NDRI presented the progress report on the significant achievements made by the Institute during the past year. He informed that NDRI has started two new Masters Programmes in Food Science & Nutrition and Food Safety & Quality Assurance. Degrees were awarded to 90 Ph.D., 111 Masters and 30 B.Tech. Students on this occasion. Dr. A. K. Srivastava, presented Gold Medals for Best Thesis Research Work to the winners during Ph.D. in the Production, Processing and Management Group.

On this occasion, Honourable Governor also presented the NDRI Best Teacher Awards for PG & UG categories to Dr. Suman Kapila, and Dr. Pradeep Bahare, respectively. For overall contributions in research and teaching by the faculty, Dairy Chemistry Division and Dairy Technology Division were adjudged as Best Divisions. Dr. A. K. Singh. Principal Scientist, Dairy Technology Division received Dr. S. K. Sirohi Memorial Award for his contribution in the research.

The other dignitaries included Dr. Rahman, Deputy Director General (Animal Sciences), ICAR; Dr. N. S. Rathore, Deputy Director General (Education), ICAR, Dr. R. K. Malik Joint Director (Research) & Dr. R.R.B. Singh, Joint Director (Academic) NDRI, Karnal.

Training Programme on Emotional Intelligence for Balanced Life

A training programme on "Emotional Intelligence for Balanced Life" was conducted for supporting staff on 1st February, 2016 by Personality Development Cell of NDRI under HRD activities. In this training, a total of 29 employees from various Divisions participated. There were lectures on "Positive Thinking" and "Stress Management". In addition, yoga was demonstrated practically and there was a group discussion also. Certificates were distributed to participants.

Training Programme on Commercial Dairy Farming

A 5 day training programme on commercial dairy farming was conducted at NDRI, Karnal on 15th – 19th March, 2016. In this training programme, a total number of 28 participants from 12 different states of the country participated. Dr. Srivastava gave a lecture for the benefit of the participants and explained the weaknesses and strengths of dairy farming in India. He said that selection of good animals is the first step towards the success of dairy farming. He gave many management tips to the trainees.

Sh. Harvinder Kalyan, Member of Legislative Assembly, Haryana and Chairman, Haryana Cooperative Supply and Marketing Federation Limited giving away certificates to participants

Sh. Harvinder Kalyan, Member of Legislative Assembly, Haryana and Chairman, Haryana Cooperative Supply and Marketing Federation Limited distributed the certificates to the farmers. He said that progress of villages in India only can make India a developed nation. He advised that more dairy processing units should be opened in the rural areas to procure the extra milk from the farmers. He also cautioned that adulteration of dairy products is a curse to the society and appreciated the efforts of NDRI in developing easy methodology to check adulteration. Sh. Kalyan also released a book titled "Calf to Calving – Good Management Practices".

Product Launch Event

A product launch event was organized by Business Planning and Development Cell and Dairy Technology Division on 19th

March, 2016. Sh. Harwinder Kalyan, MLA, Gharaunda, Karnal was the Chief Guest of the event, which was presided over by the Director, NDRI, Karnal, Dr. A. K. Srivastava. The products launched were Frozen yogurt (natural colour and flavour: Mango, Strawberry, Cranberry, Black currant), Ice cream (natural anthocyanin rich - Black carrot) and Yogurt (natural anthocyanin rich - Black carrot).

A Training Programme on Genetic Evaluation and Multiplication of Superior Germplasm for Genetic Improvement in Livestock

A 21 day training programme on "Genetic Evaluation and Multiplication of Superior Germplasm for Genetic Improvement in Livestock" was conducted at NDRI, Karnal on 9th – 29th March, 2016 under the aegis of ICAR sponsored Center of Advanced Faculty Training in Advanced Genetics and Breeding. Maj. Gen. (Dr.) Shri Kant, Vice-Chancellor, Lala Lajpat Rai University of Veterinary and Animal Sciences (LUVAS), Hisar, Haryana was the Chief Guest. Dr. A. K. Srivastava, Director and Vice-Chancellor, NDRI, Karnal presided over the function. Participants were imparted training related to all aspects of genetic improvement of livestock. The participants also visited private dairy farms situated near Karnal city.

Maj. Gen. (Dr.) Shri Kant, SM, VSM (Retd.), Vice Chancellor, LUVAS, Hisar, distributing certificate to one of the participants

Course Director Dr. A. K. Chakravarty presented the report on training programme. A total of 21 Associates/Assistant Professors from State Veterinary/Agricultural Universities in India belonging to 9 states participated in this training programme. A total of 33 lectures related to various disciplines of animal production were delivered.

Awareness Campaign Initiated for Pradhan Mantri Fasal Bima Yojana

An awareness campaign was initiated for the implementation of *Pradhan Mantri Fasal Bima Yojana* in a Kissan Sammellan organized at NDRI, Karnal on 31st March, 2016. The programme was inaugurated by Sh. Ashwani Chopra, Hon'ble Member of Parliament, Karnal. Sh. Bakhshish Singh Virk, Chief Parliamentary Secretary was Guest of Honour and Dr. A. K. Srivastava, Director, NDRI presided over the function. Sh. Jagdish Rana and Sh. Dharamvir, Member, NDRI Board of Management were also present and interacted with the farmers.

Director NDRI felicitating Sh. Ashwani Chopra, Hon'ble Member of Parliament, Karnal & Sh. Bakhshish Singh Virk, Chief Parliamentary Secretary during inauguration of Awareness Campaign Initiated for Pradhan Mantri Fasal Bima Yojana

Inter-Zonal Staff Sports Tournament

NDRI Football Team has won Inter-Zonal Staff Sports Tournament after 38 years held at CAZRI Jodhpur (Rajasthan) from 8th – 12th February 2016.

Football team of NDRI

- Volleyball (shooting) team won 2nd position in athletics, Sh. Sandeep Deswal got 1st position in Discuss throw and in 1500 m & 800 m race Sh, Rajesh Kumar won 2nd place in 200 m race, Sh. Writdhama Prasad won 2nd position also.

DISTINGUISHED VISITORS

08.1.2016	Three Senior Officers from Food Processing Sector Skill Council (FICSI), FICCI, New Delhi and National Skill Academy for Food and Drink (NSAFD), UK.
19.01.2016	Delegation of Bangladesh Govt. Official.
8, 9-02.2016	Sh Radha Mohan Singh, Hon'ble Union Minister for Agriculture & Farmers Welfare, Govt. of India.
05.03.2016	Prof. Kaptan Singh Solanki, Hon'ble Governor of Haryana.
23.03.2016	Delegation of Afghanistan led by HE Deputy Agriculture Minister and Advisor of Presidents alongwith Policy maker.

HONOURS/AWARDS

- **Dr. Suman Kapila** received **Best Teacher Award 2015** for teaching at PG level at the 14th Convocation of NDRI Deemed University held on 5th March 2016.

- **Dr. Pradip Behare** received **Best Teacher Award 2015** for teaching at UG level at the 14th Convocation of NDRI Deemed University held on 5th March 2016.

- **Ashish Kumar Singh**, Principal Scientist (Dairy Technology) & Head, (Dairy Engineering received **S. K Sirohi Memorial Award for Young Researcher** for the year 2016 at the 14th Convocation on 5th March 2016.

- **Best Division Award** for 2014-15 was given jointly to Dairy Technology and Dairy Chemistry Division of NDRI during 14th Convocation on 5th March 2016.

- **Dr. T. K. Datta**, Principal Scientist (Animal Biotechnology) awarded with the **XVI Hari Krishna Shastri Memorial Award for Outstanding Scientist** in the field of Agricultural Science for the year 2015 by Indian Agricultural Research Institute (New Delhi). The award was given by Hon'ble President of India.

- **Dr. Rishika Vij** received "**INTAS Pharma Young Scientist Award"** during 25th Annual Convention of Indian Society of Veterinary & Toxicology (ISVPT) on Nutritional Pharmacology and Toxicology beyond Calories held from 14th -16th January, 2016 at NDRI, Karnal.
- **Dr. Srinu Reddi** received **"Young Scientist Award"** during **44th Dairy Industry Conference** held from 18th - 20th February, 2016 at NDRI, Karnal.
- **Mr. Prasad Patil** received "**Young Scientist Award"** during **44th Dairy Industry Conference** held from 18th - 20th February, 2016 at NDRI, Karnal.

Best Thesis Awards at 14th Convocation held on 5th March, 2016

Best Ph.D. Thesis Awards			
Group	Name of the student	Name of the Guide	Discipline
Production Group	Dr. Shrabani Saugandhika	Dr. D. Malakar	Animal Biotech.
Processing Group	Dr. Shilpashree B.G.	Dr. Sumit Arora	Dairy Chemistry
Social Science & Management Group	Dr. P. Mooventhan	Dr. K S Kadian	Dairy Extension
Best Masters Thesis Awards			
Production Group	Mr. Mohanned Alhussien	Dr. A. K. Dang	Animal Physiology
Processing Group	Mr. Saurabh Kadyan	Dr. Naresh Kumar	Dairy Microbiology
Social Science & Management Group	Mr.Parameswaranaik J	Dr. R. Senthil Kumar	Agricultural Extension Education

- **Dr. Chand Ram Grover** received **"First Prize"** for best research publication entitled "Cholesterol Assimilation Potential of Probiotic *Lactobacillus* Species in Cream for Production of Reduced Cholesterol Butter" in the "Dairy Processing Area" published in *Indian Journal of Dairy Science* for the calendar year 2014 at the 44th Dairy Industry Conference 2016 held at NDRI, Karnal.
- **Mr. Arun Beniwal, Ms. Priyanka Saini** and **Dr. Shilpa Vij** received "**Best Poster Award"** for their paper entitled **"**Physiological Growth Profile of the Dairy Yeast *Kluyveromyces Marxianus* 6C17 on Galactose during Batch Cultivation (PD-026)" at the 44th Dairy Industry Conference held from 18th - 20th February, 2016 at NDRI, Karnal.

- **Ms. Rinky Gupta, Dr. S. K. Tomar, Mr. Hitesh** and **Dr. Rameshwar Singh** received "**Best Poster Award"** for their paper entitled "Evaluation of Antimicrobial Attributes of Lactobacilli as Protectant for Cottage Cheese (PA-041)" at the 44th Dairy Industry Conference held from 18th - 20th February, 2016 at NDRI, Karnal.
- **Ms. Aiswarya S. Panicker, Dr. Pradip V. Behare** and **Dr. A. K. Mohanty** received "**Best Poster Award"** for their paper entitled "Investigation of Bio-Markers of Bile Tolerance in Putative Probiotic *Lactobacillus Fermentum* by Differential Proteomics (PA-021)" at the 44th Dairy Industry Conference held from 18th - 20th February, 2016 at NDRI, Karnal.
- **Mr. Diwas Pradhan** and **Ms. Aditi Singh** received "**Best Poster Award"** for their paper entitled "Prevalence of Antibiotic Resistance in Dairy Lactococci (QA-002)" at the 44th Dairy Industry Conference held from 18th - 20th February, 2016 at NDRI, Karnal.
- **Mr. Naresh Kumar N., Mr. A. Kalyan, Mr. M. Balhara, Mr. S. Kadyan, Mr P. K. Sharma, Mr. R. Shukla** and **Mr. H. V. Raghu** received "**Best Poster Award"** for their paper entitled "Enzyme Based Concept for Rapid Detection of Hygiene and Safety Indicators in Milk (QA-035)" at the 44th Dairy Industry Conference held from 18th - 20th February, 2016 at NDRI, Karnal.
- **Mr. Darshan GB**, M.Tech student of NDRI was shortlisted and ranked as 10th among top 50 under the Indian Innovation Growth Programme (IIGP) 2016 for his innovation "Cooling Module for Milk and other Fluids".

PERSONALIA

Joining/Appointments

- **Dr. R. R. B. Singh**, Principal Scientist joined his duties as Joint Director (Academic) w.e.f. 15.01.2016.
- **Dr. M. S. Chauhan**, PS, ABTC Division was appointed to join as Director, ICAR-CIRG, Makhdoom, Mathura w.e.f. 30.03.2016.
- **Dr. (Mrs.) Sunita Grover**, Principal Scientist appointed as Head, Dairy Microbiology Division, NDRI, Karnal w.e.f. 17.03.2016.
- **Dr. Dheer Singh**, Principal Scientist appointed as Head, Animal Bio-chemistry Division, NDRI, Karnal w.e.f. 17.03.2016 (FN).
- **Dr. Jancy Gupta**, Senior Scientist, Dairy Extension promoted to the post of Principal Scientist w.e.f. 13.03.2008.
- **Dr. Meena Malik**, Associate Prof. (English) promoted to the post of Professor English w.e.f. 8.7.2011.
- **Dr. Prabhat Palta**, Principal Scientist nominated to act as In-charge, ABTC Division, NDRI Karnal w.e.f. 12.03.2016.
- **Dr. J. K. Kaushik**, Principal Scientist appointed as Chief Hostel Warden, NDRI, Karnal w.e.f. 16.01.2016.
- **Sh. Hardev Ram**, Scientist (Agronomy) joined at NDRI, Karnal w.e.f. 16.03.2016.
- **Sh. Rajesh Kumar Meena**, Scientist (Agronomy) joined at NDRI, Karnal w.e.f.21.03.2016.
- **Ms. Anita Rani**, Personal Assistant promoted to the post of Private Secretary w.e.f. 12.01.2016.
- **Sh. Ajit Singh**, Assistant promoted to the post of Assistant Administrative Officer w.e.f. 01.03.2016.
- **Sh. Chiranjee Lal**, Assistant promoted to the post of Assistant Administrative Officer w.e.f. 11.03.2016.
- **Dr. A. P. Ruhil**, Principal Scientist (Computer Application of Agriculture) joined at NDRI, Karnal on his transfer from ASRB, New Delhi w.e.f. 05.01.2016.
- **Sh. Chitranayak Sinha**, Senior Scientis (Dairy Engineering) joined at NDRI, Karnal on his transfer from SRS, Bangaloe w.e.f 28.03. 2016.
- **Dr. (Mrs.) Sanchita Garai**, Scientist (Dairy Extension) joined at NDRI, Karnal on her transfer from ERS, Kalyani w.e.f. 01.01.2016.

Retirement

- **Mr. M. L. Ghosh**, Asstt. Chief Technical Officer ERS, Kalyani retired from the Council's services w.e.f. 31.03.2016

Launch of Mother Gain Healthy Drink by Dr. A. K. Srivastava, Director, NDRI and Sh. Pankaj Nain, SP Karnal at International Women's Day Celebrations on 8th March, 2016

Car Free Day being observed by students and staff of NDRI on every Tuesday

SOUTHERN CAMPUS, BANGALORE

RESEARCH

Prevalence of Bacteriophages Affecting the Starter Cultures in the Dairy Environment

(S .Varalakshmi and B.V. Balasubramanyam)

The presence of phages in the dairy environment is a major setback for the fermentation industry. In this study, the dairy environment viz, Processing Unit and Livestock Research Centre were screened for the presence of phages using the starter cultures. The isolation of phages was carried out by the turbidity test, spot assay and double layer phage assay, which was standardized. From the dairy processing area, samples like cheese whey, paneer whey, cheese drip solution, paneer dip solution, cheese vats, cheese knives, cheese storage racks were screened. Form the Livestock Research Centre, raw milk, wash water, milking machine – pipe line (swab), milking shed and refrigerated storage room were taken. The samples showed positive for the presence of phages were further processed for the identification by electron microscopic studies. The results showed the presence of tailed phages (Myoviridae) from the samples of cheese section and also in the paneer dip solutions stored in the cheese section. This indicates the probable airborne transmission of phages. So, the preventive measures for the phage contamination of the dairy environment should also focus on the air spray of disinfectants alongwith other control measures.

TRAINING PROGRAMMES

- One week training was conducted on 'Commercial Dairy Production' for 10 candidates from 22nd – 27th February, 2016.
- Three day training was conducted on 'Application of Statistical Techniques in Biological Research' for 17 participants from various parts of the country from 2nd – 4th March, 2016.
- Three days training programme was conducted on "Scientific Dairy Farming" for ATMA Sponsored training programme for farmers from Tamil Nadu at SRS, NDRI from 28th -30th March 2016.

EXTENSION ACTIVITIES

During the period under report, a total of 595 visitors in twelve batches comprising students from various educational institutes, farmers and entrepreneurs of southern region visited the institute. The visitors were taken round the institute to various sections as per their needs and were explained the ongoing activities.

Advisory services were rendered to twenty five clientele during personal visits and mail enquiries to the institute. Information on availability of literature on advanced dairy farming, training programmes for farm families and dairy entrepreneurs on scientific dairy farming aspects were provided as per their queries.

Extension literature on 'Green Fodder Production' was prepared in English and others literatures on clean milk production, indigenous dairy animals and dairy products of the region prepared exclusively for the clientele groups of the southern region was distributed to the needy clientele groups during dairy education at farmers' door programme, exhibitions, visitors and trainees during their visits to the Institute.

Dairy Education at Farmers' Door: The 'Dairy Education at Farmers' Door' as a new initiative was organized and visits were made by the multidisciplinary team on Second Saturdays to Chikkanekundhi, Kanakanapalya villages of Bangalore South Taluks during the period under the report. 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 to the farmers and farm women at their doorsteps.

EVENTS

National Seminar on Quality a Tool for Value Addition of Dairy Foods

Alumni Association of Southern Regional Station of NDRI conducted a National Seminar on "Quality: A Tool for Value Addition of Dairy Foods" during 23rd – 24th January, 2016 at Bengaluru. The objective of the Seminar was to create awareness among the consumers as well as professionals regarding the importance of quality of dairy foods. The Seminar was inaugurated by Dr. Suresh Honnappagol, Animal Husbandry Commissioner, Ministry of Agriculture, Krishi Bhavan, New Delhi. Prof R. N. Srinivas Gowda, former Vice-chancellor of KVAFSU, Bidar and Mr. P. Nagaraju, Chairman, Karnataka Milk Federation, Bengaluru graced the function. A Souvenir and the latest issue of Indian Journal of Dairy and Biosciences (IJDBS) published by Alumni Association of SRS of NDRI, Bengaluru were released on this occasion by the dignitaries. The two day Seminar consisted of four technical sessions and a separate session for post-graduate students' oral presentations. There was also a parallel session of poster presentations. Dr. K. P. Ramesha and his team took the lead role in organising the event.

AWARDS

- **Dr. A. Manimaran,** received "**Prof. V. V. Ranade Young Scientist Award"** in recognition of excellent work and its presentation on "Nutritional Pharmacology and Toxicology Beyond Calories" at XV Annual Convention of ISVPT at NDRI, Karnal during 14th-16th January, 2016.
- **Dr. C. N. Pagote**, and **Mr. P. Nawale**, received **"First Prize"** for best research paper entitled "Standardisation of method of manufacture of Khoa Jalebi" published in Indian Journal of Dairy and Biosciences, vol 24, pp. 25-35, for the year 2014-15.
- **M. P. Rahila**, **B. S. Nath, N. L. Naik, M. Manjunatha**, and **Heartwin A. Pushpadass** received "**Second Prize"** for oral presentation on "Rosemary (*Rosmarinus officinalis*) extract: A source of natural antioxidants to extend the shelf life of ghee" at National Seminar on Quality- A tool for value addition of dairy foods organized by Alumini Association, Southern Regional Station, ICAR-National Dairy Research Institute, Bengaluru, 23rd - 24th January, 2016.

- **Dr. S. Jeyakumar**, Senior Scientist, SRS Bangalore received "**Best Poster Award (First Prize)"** at the 44th Dairy Industry Conference held at ICAR-NDRI, Karnal, 18th-20th February, 2016.
- **N. Veena**, **B. Surendra Nath, B. V. Balasubramanyam** and **Sumit Arora** got "**Best Poster Award (First Prize)"** under the Dairy Product Development category on "Development of functional milk fortified with Omega-3 fatty acids, phytosterols and soluble dietary fibre" at the 44th Dairy Industry Conference held at ICAR-NDRI, Karnal, 18th-20th February, 2016.
- **H. S. Sowmya, B. S. Nath, N. L. Naik, M. Sivaram,** and **Heartwin A. Pushpadass** received "**Second Prize"** for poster presentation on "Validation of formula for solids-not-fat determination of milk: Scope for the development of a new formula" at National Seminar on Quality- A tool for value addition of dairy foods organized by Alumini Association, Southern Regional Station, ICAR-National Dairy Research Institute, Bengaluru, 23rd - 24th January, 2016.
- **Karthik Salish, Heartwin A. Pushpadass, F. Magdaline Eljeeva Emerald** and **N. Sharmada** received **"Third Prize"** in Poster presentation on "Computational fluid dynamics modeling of baking of chhana podo in a convection oven" at National Seminar on Quality- A tool for value addition of dairy foods organized by Alumini Association, Southern Regional Station, ICAR-National Dairy Research Institute, Bengaluru, 23rd - 24th January, 2016.
- **Syed M. Rafiq** and **Bikash C. Ghosh** got "**Best Poster Award (Third Prize)"** on "Development of potato incorporated processed cheese: physico-chemical, textural and sensory characteristics" at the 44th Dairy Industry Conference, National Seminar on "Make in India: Dairying 2030" 18th-20th Feb, 2016, NDRI, Karnal
- **Sathish Kumar, M. H., Latha Sabikhi** and **Heena Lamba** received "**Consolation Prize"** for the Oral Presentation on "Double emulsion technology – potential delivery system for plant bioactives" at National Seminar on "Quality – a tool for value addition of dairy foods" held 23rd -24th January, 2016 organized by Alumni Association of SRS of NDRI, Bangalore.
- **Darshan G.B**, was given **Emerson Cup 2015 Jury Award** for M.Tech research on "Eutectic Module for Milk Cooling" by Emerson Climate Technologies.

EASTERN CAMPUS, KALYANI

RESEARCH

Importance of Maternal Effects for Analyzing the Lactation Traits of Crossbred Cattle

(Ajoy Mandal, Poonam Ratwan, Anshuman Kumar, S. Rai, R. Behera, M. Karunakarn and T. K. Dutta)

Data on 1116 records comprising first to thirteen lactations of 319 Jersey crossbred animals, maintained at the Eastern Regional Station, Kalyani, West Bengal, over a period of 39 years (1976-2014) were used to estimate the variance and (co) variance components and genetic parameters of lactation traits of crossbred cattle. The lactation traits viz. 305-days milk yield (MY305D), total milk yield (TMY), peak yield (PY), total milk yield per calving interval (MY/CI), total milk yield per lactation length (MY/LL) and lactation length (LL) of animals were considered for this study. Least-squares analysis of variance was applied to determine the significant non-genetic (environmental) factors to be included in the animal model analysis. (Co) variance components of different lactation traits were estimated by applying a series of univariate animal models using a derivative free REML algorithm (DFREML). By ignoring or including maternal genetic or environmental effects, a total of six animal models were fitted for each trait. Log-likelihood ratio test was applied to select the most appropriate model for each lactation trait. The model which included additive direct, maternal additive effects and also includes the additive direct–maternal covariance (Model 4) was the best fitted model for 305 days milk yield, peak yield and total milk yield per lactation length. For description of total milk yield and lactation length, the model with direct genetic effects (Model 1) was considered the most suitable model in the present data set. The model with only a permanent environmental effect due to the dam (Model 2) was clearly most suitable for MY/CI in this study. Moderate to high direct heritability estimates, ranging from 0.25 to 0.55 under best fitted model for all lactation traits suggests that there is ample scope of improvement through selection for these traits under the prevalent managemental conditions. Maternal heritability was important for 305 days milk yield, peak yield and milk yield per day of lactation in this study, while permanent maternal effect (c^2) due to dam was important for milk yield per day of calving interval. These results also indicate that both direct additive and maternal genetic or permanent environmental effect must be taken into consideration for improving these traits through selection.

Utilization of Rice-based Condensed Distillery Syrup (RCDS) in Lactating Jersey Crossbred Cattle Ration

(Anupam Chatterjee, Arvind Singh Yadav, Dipak Dey, C. Bhakat, A. Mandal, M. K. Ghosh and T. K. Dutta)

The supply of ethanol by-products has greatly increased in recent years with the expansion of ethanol production. Most of the ethanol co-products are currently available as CDS (Condensed Distillery Syrup) and DGS (Distiller's Grain with Soluble). Rice Condensed Distillery Syrup (RCDS) is an important Agro-industrial by-product of the distillery industries in Asian countries. This huge volume of wet Distillery Syrup produced as a by-product may create a serious environmental problem if it is spread outside the fields. However, works on nutritive value of rice based CDS and its utilization in dairy cattle ration are scanty. In the present study efforts have been made to evaluate the chemical composition of Rice-based Condensed Distillery Syrup (RCDS) and the effect of supplementing RCDS on milk yield and milk composition of Jersey crossbred cows. From the present study it can be concluded that RCDS was found to be a good source of protein and a very good source of soluble carbohydrates and there was no adverse effect of replacing part of concentrate mixture (15% on DM basis) by RCDS on palatability, TDMI, Milk Yield, FCM yield and milk composition. Replacement of Concentrate Mixture by RCDS @ 15% (on DM basis) reduced the feed cost without affecting the milk production and composition.

EXTENSION ACTIVITIES

Training Programmes

- Thirty two day training programme on "Artificial Insemination and Veterinary First Aid" was organized during 19th January to 19th February 2016 at the Institute Campus.
- One 4 day training programme on *'Scientific Dairy Farming Practices"* for Tribal unemployed youth' under NEH was organised during 2nd – 5th March, 2016.
- One 6 day training programme on *'Scientific Dairy Farming Practices"* for Tribal unemployed youth' under TSP was organised during 14th – 19th March, 2016.

Animal Health Camps

Sl. No.	Date	Topic	Place	Animals treated	Farmers benefitted
1.	12.01.16	Vaccination, Anoestrous, Deworming Camp & Scientist Farmers Interface (TSP)	Adibasipara, Bijoynagar, Bali-II	615	136
2.	13.01.16	Vaccination, Anoestrous, Deworming Camp & Scientist Farmers Interface (TSP)	Adibasipara, Bali	633	60
3.	13.01.16	Animal Health & Vaccination Camp (TSP)	Ballalguri, Alipurduar	548	38
4.	21.01.16	Animal Health, Vaccination & Fodder Demonstration (N.E.H. Project)	Smit Village (Meghalaya)	645	81
5.	22.01.16	Animal Health, Vaccination & Fodder Demonstration (N.E.H. Project)	Umlyngka (Meghalaya)	724	59
6.	28.01.16	Vaccination & Veterinary Health Camp (TSP)	Shirshi	382	46
7.	05.02.16	Health Camp	Muratipur	53	27
8.	16.02.16	Anoestrous Camp	Muratipur	30	21
9.	01.03.16	Health Camp Cum Vaccination Camp (TSP)	Ajodhya Hill	1080	110
10.	24.3.16	Farmer interaction and animal health camp (NEH)	Bagma, Tripura		48
11.	25.3.16	Farmer Interaction programme (NEH)	Bamutia, Tripura		59

Scientists-Farmers Interaction Session in Meghalaya

ERS of NDRI, in collaboration with ICAR Research Complex for NEH Region, Umiam, organized animal health-cum-vaccination camp, interaction-cum-demonstration session with farmers at Barapani of Meghalaya on 21st January, 2016. The team from ERS of ICAR-NDRI organized animal health-cum-vaccination camp and distributed medicines and mineral mixture for livestock and fodder seeds among the farmers of **Smit** village in Meghalaya on 22nd February, 2016. Another vaccination cum animal health camp, interaction cum demonstration session in **Umlyngka** village of Meghalaya was organized. On 22nd February, 2016, veterinary medicines and fodder seeds were distributed to the farmers.

Scientists-Farmers Interaction Session in Tripura

ERS of ICAR-NDRI, Kalyani in collaboration with ICAR Institute for NEH, Lembuchera, organized animal health camp, interaction cum demonstration session with farmers on 24th March 2016 at Tripura. Medicines/mineral mixtures/fodder seeds were distributed for livestock among the farmers of **Bagma** village in Tripura on 25th March, 2016. Another animal health camp, interaction cum demonstration session in **Bamutia** village of Tripura was organized on 25th March, 2016 and veterinary medicines and fodder seeds were distributed among the farmers. In **lembuchera** village, a total of 500 chicks were also distributed among women farmers.

EXHIBITIONS

- The Institute participated in the Krishi Parban 2016 organised by KVK Goyeshpur during 13th -15th January, 2016.
- One exhibition stall was erected in the Krishi mela organised by Shirshi Farmer's Club in Shirshi, Paschim Medinipur on 28th January, 2016.
- The Institute participated in the Mithun Mela and erected a stall in Pasighat, Arunachal Pradesh on 6th March, 2016.

AWARD

Arvind Singh Yadava, Anupam Chatterjee, Dipak Dey, C. Bhakat, A. Mandal, M. K. Ghosh and T. K. Dutta received **"Best Poster Award (Second)"** for the paper "Effect of supplementing Rice-based Condensed Distillery (RCDS) on milk production of Jersey crossbred cattle" at XVI Biennial Animal Nutrition Conference (ANSICON 2016), ICAR-NDRI, Karnal on 6th – 8th February, 2016.

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