



Dr. Manmohan Singh Chauhan Takes Over as Director and Vice Chancellor, ICAR- National Dairy Research Institute (Deemed University)



Dr. Manmohan Singh Chauhan, a renowned scientist of International acclaim, took over as Director and Vice-Chancellor of ICAR-National Dairy Research Institute (Deemed University), Karnal on 30th January 2020. Prior to this, he had been holding the position of Director, Central Institute for Research on Goats (CIRG), Mathura from 1st April 2016 to 29th January 2020. Born at Pauri Garhwal, Uttarakhand on 5th January, 1960, Dr. Chauhan obtained his M. Sc. degree in 1981 followed by Ph.D. degree in 1986.

Dr. Chauhan's illustrious research career has been laced with many creditable achievements in the domain of cloning, thus, bringing name and fame to the ICAR and the country in the world arena. His glorious research contributions include production of: World's First buffalo cloned calf; buffalo cloned calf "Garima-II" from embryonic stem cells, India's first OPU-IVF Sahiwal calf; OPU-IVF yak in collaboration with NRC-Yak, Dirang (Arunachal Pradesh); reproducible cloned buffalo "Garima-II" delivered *Mahima and Karishma*; cloned calf "Deepasha" from endangered wild buffalo of Chhattisgarh; GFP expressed cloned transgenic Goat and Buffalo embryos. The hand guided cloning technology developed by him in buffalo has produced many superior genetically cloned buffalo calves (*Garima, Shresth, Swarn, Purnima, Lalima, Rajat, Swarupa*). He is responsible for developing five embryonic stem cell lines in buffalo. These are the only lines available in the world, so far.

Dr. Chauhan has been a brilliant student and scientist throughout his academic career. He has been decorated with numerous prestigious awards including Rafi Ahmad Kidwai Award by ICAR, 2015; ICAR Best Team Award in Animal Sciences, 2014; VII Rao Bahadur Viswanath Award-2016-17; Dr. Labhshweta Award by ISSRF, India 2015; VASVIK Industrial Award in Agricultural Science Research, 2015; Erasmus Mundus Scholarship Awarded by EM-ABG, European Union in 2009; Merit Award for Exemplary Research by Virginia Tech., USA in 1999; Department of Biotechnology

Overseas Fellowship (Long Term) Award by the DBT (Govt. of India) in 1997; and Prof. G. P. Talwar Middle Career Scientist Award by ISSRF; Certificate of Recognition by Hon'ble DG, ICAR, New Delhi; Appreciation Letter by Hon'ble DG, ICAR, New Delhi on production of cloned calf Garima II and Appreciation Letter by Hon'ble Agriculture Minister on production of cloned calf Garima & Mahima. He has received a number of research presentation awards in National & International Conferences.

Dr. Chauhan has handled several prestigious multi-disciplinary and multi-Institute research/network Research & Development programmes as PI of 12 projects including 2 World Bank funded NAIP projects, 10 DBT funded projects, 1 National Fund Project and as Co PI of 9 projects including 1 Indo-German project granted by DST. His persistent scientific endeavours have led to the development of many technologies such as *In vitro* Embryo Production (IVF) technology in goat, Buffalo & Yak, implemented all over the country; New Protocol of Semen cryopreservation using Egg Yok-Tris diluents in Jamunapari Goat; Technology for Transgenic Embryo Production in goat and buffalo using hand guided cloning; Hand Guided Cloning Technology in goat and buffalo; Embryonic Stem Cell Culture Technology in Goat and Buffalo; Ovum-Pick up Technology in Cattle; and Protocol commercialized for Freezing of Goat Semen & Artificial Insemination.

MEET THE NEW DIRECTOR	RESEARCH	EXTENSION	EVENTS	HONOURS AND AWARDS	DISTINGUISHED VISITORS	PERSONALIA	राजभाषा एकक	SOUTHERN CAMPUS, BENGALURU	EASTERN CAMPUS, KALYANI
1	2	4	5	10	10	11	11	12	15

Dr. Chauhan has guided 10 PhD & 9 Masters students in Reproductive Biotechnology area; taught a number of PG courses (PhD & MVSc) at NDRI, IVRI; developed 5 new courses; evaluated 21 PhD theses from different universities; mentored and delivered 35 lectures in DST sponsored INSPIRE programme in Biological Sciences. To his credit, he has more than 138 research publications, 32 popular articles, 6 books, 11 manuals /technical bulletins and 7 compendia. He has delivered 7 Key note addresses, 29 lead lectures and acted as Chairman for several Scientific Sessions in International Conferences and National Conferences.

Dr. Chauhan has been conferred with fellowships by a number of professional bodies and associations such as National Academy of Agricultural Sciences (NAAS), National Academy of Dairy Sciences (NADS), India and Society for Extension Education. Dr. Chauhan has organised the 12th Agricultural Science Congress at NDRI; National Seminar on Small Ruminants, CIRG, Makhdoom 2018; one International Conference ISSRF-2011; one National Conference Reproductive Biology, 2012; 5 Training programmes on Reproductive technologies for faculty/ scientists from State Agricultural Universities, Veterinary Universities, Central Agricultural Universities and 6 National Training Programmes for faculty/ Scientists as Course Director. He has been Course Director of 18 Training Programmes (45 days each) for Biotechnology students from different Institutions/ universities and trained 514 students.

He has held several coveted positions in many professional bodies/societies including President of Indian Society for

Sheep & Goat Production & Utilization (ISSGAPU), Avikanagar; Task Force Member of 3 Research & Development Committees of Department of Biotechnology (Govt. of India), New Delhi from 2012 onwards; Member of Board on Management of NDRI, Karnal and Institute Management Committee, NRC-E, Hisar; Task Force Member of 4 committees in Department of Biotechnology (Govt. India), New Delhi; Member of Indo-US committee, Department of Science & Technology (Govt. India), New Delhi; and Nominee of His Excellency Governor of Punjab for selection of Faculty for PAU, Ludhiana. He has been reviewer of several reputed journals such as *Theriogenology*, *Cellular Reprogramming*, *Reproduction of Domestic Animals*, *Indian Journal of Animal Sciences*, *Indian Journal of Experimental Biology* and *Indian Journal of Biotechnology*.

Dr. Chauhan had been deputed abroad (USA, Germany and Canada) and has extensively travelled different parts of the world in different capacities. For his yeomen services rendered to the nation, he has been duly recognized as **'Kisano ke Mahanayk'** by Delhi Doodarshan and featured in **'Eureka Program'** by Rajya Sabha TV.

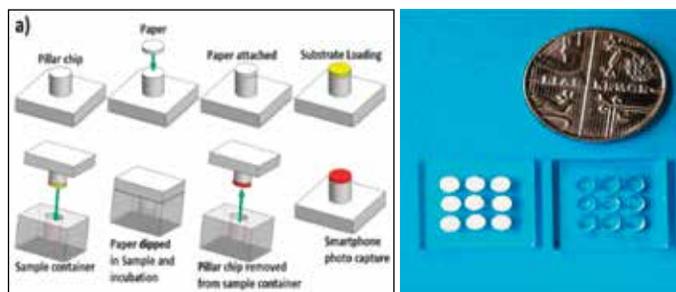
The scientific community and staff members of ICAR-NDRI, Karnal extend a hearty welcome to Dr. M. S. Chauhan on his taking over as Director of this prestigious Institute and wish him grand success in steering the Institute to greater heights of glory and fame.

RESEARCH

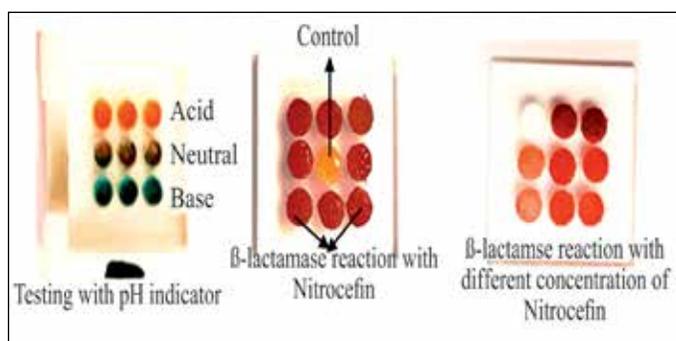
Optimization of a Paper Strip for Detection of β -Lactam Group of Antibiotics in Milk

(Prashant Goel and Naresh Kumar)

A proof of concept has been developed for the detection of β lactam group of antibiotics in milk. The concept was implemented on paper strip for specific detection of β -lactam group of antibiotics as specified in CODEX/FSSAI standards in milk. This device was tested for induction of β -lactamase in the presence of germinating spores for the detection of β -lactam antibiotics in milk. The device gave good colour on the paper, which could be detected by the naked eyes or the colour intensity could be measured by the electronic eye. This device was found suitable for multiple sample analysis in a single trial. This device is easy to operate and inexpensive alongwith smartphone detection has the potential to revolutionise the point of care diagnostics industry for animal health and antimicrobial resistance prevention in humans. Patent filing process has been initiated in collaboration with University of Southampton at UK.



Fabrication of Paper based pillar array device



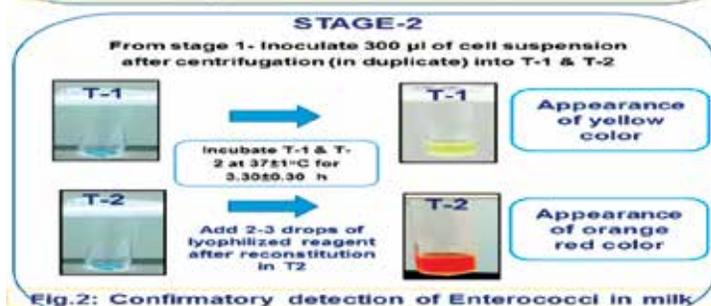
Validation of paper based pillar array device with pure β -lactamase enzyme

Real Time Detection of *Enterococci* in Dairy Foods

(Gurpreet Kaur, Naresh Kumar, Thakur, G., Raghu, H.V., Singh, N., Singh, V. K. and Raghav, N.)

Enterococci are monitored as hygiene indicators in dairy plant using conventional methods. Standards for *Enterococci* have been specified for pasteurized milk, butter, ice-cream and different categories of infant foods whose consumers include highly vulnerable group of society. NDRI has developed a two stage enzyme assay for detection of *Enterococci* within 18 ± 1.0 h of incubation at 37°C .

Patent of the technology has been granted (**Patent No. 325986**) and also licensed to M/s. Neugen Diagnostic Pvt. Ltd Hyderabad in 2013 with revenue generation of 3.5 lakhs.



Two stage enzyme assay for detection of enterococci in milk

Technologies Commercialized/Transferred

S. No.	Name of technology	Name of inventors	Date of licensing	Price of the technology	Name of the firm
1	Paper Strip Based Assay for Detection of Antibiotic Residues in Milk	Naresh Kumar, A Khan, S. Arora, Raghu, H. V., M Balhara, P. K. Sharma and S. Shaikh	01.07.2019 through Agrinnovate India Ltd., New Delhi	Rs. 5.00 Lakhs + 18% GST	Florencer Services Private Limited, New Delhi
2	Paper Strip Assay for Rapid Detection of Pesticide Residues	Naresh Kumar, N. Teri, R. Gopaul, P. K. Sharma, Morab S. and Raghu H. V.	01.07.2019 through Agrinnovate India Ltd., New Delhi	Rs. 5.00 Lakhs + 18 % GST	

Patents Filed

Title of Patent	Inventors	Date of Filing	Application Number
A Preservative Formulation for Milk and Milk Product Samples Stored for Analytical Purpose	Richa Singh, Bimlesh Mann, Sumit Arora, Mitul Bumbadiya, Priyanka Singh Rao and Diwas Pradhan	09.08.2019	201911032383
Paper Striped Based Sensor for Detection of Heavy Metals in Milk	Naresh Kumar and Karan Priya	14.02.2020	202011006420

Patents Granted

Name of Institute	Title of the patent	Patent Number	Date of Filing	Inventors of the Patent	Patent Grant Number	Grant Date
ICAR-NDRI	Casein Hydrolysates Rich in Caseinophopeptides	331/DEL/2013	05/02/2013	Bimlesh Mann, Prerna Saini and Rajesh Kumar	319794	04/09/2019
ICAR-NDRI	Real Time Detection of <i>Enterococci</i> in Dairy Foods Using Spore Germination Based Bioassay	119/DEL/2012	12/01/2012	Gurpreet Kaur, Naresh Kumar, Thakur, G., Raghu, H.V., Singh, N., Singh, V. K. and Raghav, N.)	325986	27/11/2019

Request for Examination for Patent

Application/ Registration No	Name of Innovation/ Technology/ Product/ Variety	Date of Submission
201711023424	The Preparation of Buffalo Milk Casein Hydrolysates with Enriched Antioxidative Peptides and the Process thereof	23/07/2019



EXTENSION

DAIRY EXTENSION DIVISION**Dairy Education at Farmers' Door**

Dairy Extension Division organized an ongoing Extension Education Programme "Dairy Education at Farmers' Door" to strengthen the effective dissemination of dairy production and processing technologies among farming community. Under this programme, a team of NDRI scientists including subject matter specialists from production, processing and management group visited a new cluster of villages viz. Churni, Dhakwala and Jhanjhari in Karnal district on 2nd Saturday of every month. The key point of interactions were related to management of silent heat in animals, adulteration in milk, care of newly born calves and cutting management of berseem and oats crop.

Farmers' Farm School

Under of Farmers Farm School (FFS) started since 2014, fifth batch especially for 20 resource poor marginal and landless women farmers was started in August, 2018. One day exposure visit and tour was organized at the Institute. Regular classes are continuously organized on every Friday and Saturday for educating the farmers in dairy farming and its allied activities in village Deepo. The final Examination of this fifth batch was conducted on July 27, 2019.

Animal Health and Infertility Campaigns

A total number of 11 infertility and veterinary aid campaigns were organized in villages and about 379 animals were treated for reproductive disorders and various other veterinary ailments. Ectoparasitic control campaign and deworming programmes for control of endo-parasites were also conducted. Special attention was given to improve the productive & reproductive health parameters of animals by diagnosis and proper treatment.

Women Empowerment Training Programmes

Women empowerment training and campaigns (three) 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 and maintain healthy atmosphere in their respective families. A total number of 35 farmwomen were trained from Majra, Kulvaheeri and Shubri villages of Karnal district.

Animal Husbandry Extension Activities

Kisan Sangoshthies (twelve) were organized at village level on various aspects of animal husbandry under field farm technician (FFT) programme.

A total number of 2317 visitors (students & Faculty) from 34 colleges/Institutions/Universities visited the Institute and they were sensitized about the different research, teaching and extension achievements and facilities available in the Institute.

KRISHI VIGYAN KENDRA**On Campus Training Programmes**

KVK organized 19 training programmers (on-campus), on different aspects of scientific dairy farming, milk product technology, clean milk production, scientific cultivation of rabi crops and fish farming for 646 farmers, farmwomen and rural youth from Haryana and other states of the country.

Exposure Visits cum Short Training Programmes

KVK also organized 36 exposure visits cum short training programmes for 1471 progressive farmers, farm women and rural youth from different districts of Uttarakhand, Haryana, Utter Pardesh, Chhatisgrah, Madhya Pradesh, West Bengal, Himanchal Pardesh, J&K, Gujarat and Punjab.

Campus Training Programmes on Crop Diversification

KVK also organized 3 off campus training programmes on crop diversification, plant protection of paddy crop and sorghum fodder for 35 farmers and farmwomen in 3 villages of Karnal district namely Dahajagir, Dabri and Tikri Kailas.

Field Days

KVK organized two field days on summer moong and sorghum fodder in Sultanpur and Dabri villages on July 8, 2019 and August 9, 2019, respectively. A total number of 28 farmers participated in these field days.

Lecture on Petroleum Conservation

KVK in its training programmes arranged a lecture from Ministry of Petroleum, Petroleum Conservation & Research Association (PCRA) to educate farmers, rural youth and farm women on methods and practices to be followed for saving of oil and petroleum. A total of 1250 farmers participated in the programmes.

Agricultural Mechanization for *In-Situ* Reuse of Crop Residue in the States of NCT Delhi and Haryana

- On the directions from ICAR, KVK is implementing the project on crop residue management in for *in-situ* management of crop residue with the machines in the fields. Two Prabhat Feries were arranged in Bhainikhurd and Sultanpur villages on August 8, and September 3, 2019 respectively. A total number of 352 farmers participated.

- Under Jal Shakti Abhiyan, one awareness programme for 180 school students was participated organised in village Sultanpur to save water in agriculture and household.
- KVK organized two Field days on crop residue management for 48 farmers from the two adopted villages namely Kulwehri and Kunjpura.
- KVK participated alongwith 17 progressive farmers of district, Karnal in a conference on “Crop Residue Management” at NASC Complex, New Delhi on September 9, 2019.



Interaction during crop residue management programme

EVENTS

Training on Marketing Strategies for Promoting Dairy Products

A three-day training programme on “Marketing Strategies for Promotion of Dairy Products” for dairy start-ups, entrepreneurs, marketing executives of cooperatives and private sector was organised at ICAR-NDRI Karnal in collaboration with CCS-National Institute of Agricultural Marketing (NIAM), Jaipur during July 24-26, 2019. In all, 30 participants including dairy entrepreneurs, dairy cooperatives and industry professionals from across the nation attended the programme. This programme was specially designed to enhance the understanding of market and to devise suitable strategies aiming at higher profitability of dairy business with core emphasis on product adoption, distribution strategies, price competitiveness, targeting and segmentation of consumers. Topics such as how to win market, product designing, processing, packaging, e-marketing, dairy value chain and new innovation in dairy sector were discussed. A lecture compendium was released by Dr. R. R. B. Singh, the Director-cum-Vice Chancellor, ICAR-NDRI Deemed University, Karnal.



Dr. R. R. B. Singh, Director NDRI releasing the lecture compendium

International Training on Milk and Milk Products Processing

A 15-days International Training Programme on “Milk and Milk Products Processing” with assistance from Indian Technical & Economic Cooperation (ITEC), programme MEA, Government of India was conducted from July 15-29, 2019 at ICAR-NDRI, Karnal. The programme was intended for farmers and entrepreneurs of Uganda to impart the basic practical skills about different aspects of milk and milk products processing including fermented milk, ice cream, cheddar and processed cheese, product utilization, chemical and microbiological testing, milk and milk products losses, sensory evaluation, basics of milk collection, utility management, clean milk production and conservation techniques, animal breeding and disease management. They also explored possible collaboration between two countries for milk production and processing. Dr. R. R. B. Singh, Director said that this training enriched the knowledge and skill of the participants and India's success in milk production and processing, business planning and development would be a source of inspiration and replication model for development of dairy industry of Uganda to become independent in dairy industry.



A training compendium being released by the Director

Stem Cell Technology Workshop

A workshop on Stem Cell Technology in collaboration with Department of Animal Husbandry, Govt. of Haryana was organized at ICAR-NDRI on September 28, 2019. Veterinarians from different districts of Haryana participated in this workshop. The participants were briefed about stem cell origin, their properties and usefulness. Stem cell are the cells which bear such properties that can be applied to treat various livestock diseases like wound, fracture, mastitis and so more in livestock. Lecture was delivered on their application, their curing time, animals recovering after their application by injecting them at site of injury and any possible risk or side effects were also discussed. Dr. S. K. Gulati, Additional Chief Secretary, Govt. of Haryana, Dr. R. R. B. Singh, Director, NDRI, Karnal and Dr. Prem Singh, Deputy Director, Animal Husbandry Department, Nodal Officer, Ambala were also present on the occasion and shared their views on future applications of stem cells in treatment of livestock diseases.



Dr. R. R. B. Singh, Director, NDRI sharing his views on future applications of stem cells

Foundation Programme for the Freshers

NDRI organized a one month foundation programme for its fresher students under NAHEP-IDP project from August 26, 2019 September 21, 2019 to nurture their soft skills for their inclusive growth and to make them agents of transformation of the dairy industry and society. The students were exposed to multifarious extra-curricular group activities such as Theatre & Dramatics, Dance, Music, Art & Craft, Literary, Soft Skills and Yoga. It was made mandatory for all the new comers to choose and participate in any group activity as per their interest, aptitude and liking, thus, throwing open to them a world of avenues for expressing their hidden talents and creativity. Besides academics, the month long Foundation Program included English & Hindi Diagnostic Tests, Team Building Exercises/Games, Workshops on 'Communication Skills', 'Spoken Communication', 'Power of Words', 'Verbal and Non-verbal Communication', 'Professional Communication', 'Impact of Vedic Principles on Personality Development', 'Creativity Mining', 'Leadership', 'Competition and Excellence', 'Experiential Learning', 'Reading Beyond words: Engaging with the Text'.



Director ICAR-NDRI felicitating Padma Shri Ms Mamta Sodha during the Interactive Session on 'Achieving the Excellence Mantra'

Also several interactive sessions of super achievers with students were conducted such as 'Achieving the Excellence Mantra: Interactive Session with Padma Shri Ms. Mamta Sodha (Mountaineer)', 'In Harmony with Planet: Shri Rajender Singh, Jal purush (Magsaysay Award Winner)', 'Rendezvous with Achievers (Prerana): Distinguished Alumni such as Ms. Purwa Rathi, Mr Deepak Tiwari, Mr. Vageesh Vaidwan, Dr. Deepak Maun, Mr. Babbar Singh, Mr. Manoj Maurya and Mr. Vjay Pal. Free lance budding writers Ms Pratayksha and Ms Vandana Raag mesmerised the students with their sessions on 'Creative Thinking and Writing'. All these sessions aimed at realising the vision of NDRI to produce excellent and accomplished human resource by helping students pursue both their professional and personal goals with greater self-awareness, self-esteem, understanding and focus.



Distinguished Alumni of ICAR-NDRI shared their success stories with Freshers at the session 'Rendezvous with Achievers (Prerana)' during the Foundation Course 2019

World Organ Donation Day

ICAR-NDRI organized an awareness talk on "World Organ Donation" day on August 13, 2019. The lecture was delivered by Mr. Sudhir Dewan, Director- North, Mohan Foundation (A non-profit organization promoting organ donation). The programme was attended by 300 participants including students and staff of the Institute. Dr. R. R. B. Singh highlighted the importance of donating organs to the persons in need and saving precious lives. Mr. Sudhir Dewan sensitized the audience

about how one's decision of donating organs can significantly impact the society as a whole. India despite being largest populated country has dearth of readily available organs for transplants. Mohan foundation established in 1997 has been doing tremendous efforts in this regard. He further emphasized that a person dies every 10 minute due to organ failure and subsequent lack of organ transplant. A person can save life of nine persons by pledging to donate his various organs viz. eyes, kidneys, liver, lung, heart arteries etc. after his death. In nutshell, the event shed light on organ donation as a virtue, the message of which should be spread within the community and future generation should come afore to take the resolution on organ donation for making a difference in the lives of thousands of people awaiting life saving and life enhancing transplants.

National Milk Day

ICAR-NDRI, Karnal celebrated the 97th birth anniversary of Dr. Varghese Kurien on the occasion of National Milk Day on November 26, 2019. All scientists and students paid tribute to Dr. Kurien. Dr. R. R. B. Singh, Director NDRI said that 'Dr. Varghese Kurien is known as Milkman of India and the father of the White Revolution, due to his efforts, today India is ranked first in the world by producing 176.3 million tonnes of milk. He said that at present only 18 percent of India's total production of milk is processed in the organized sector. It needs to be promoted to benefit farmers and livestock farmers. The school children were made aware of the processing of milk and milk products at campus.

Joint Director (Research), Dr. A. K. Tyagi said that Dr. Kurien is remembered for his unprecedented contribution in the field of dairy science. He said that NDRI is committed to transfer the developed technologies to the farmers.



A view of milk day celebrations

N-Reach: A skill Enhancing Program

ICAR-NDRI and Nestlé India jointly organized a skill enhancing program N-REACH for B.Tech (Dairy Technology) students at NDRI campus Karnal during November 27-28, 2019. The objective of the program was to enable the final year students to be more prepared in terms of the challenges which they would face daily on entering the professional world. It was

specifically focused on soft skill enhancement of the students to bring them a step closer to success. The program was a two-day Interactive Workshop having sessions on 'Understanding Business Environment', 'Importance of People's Management', 'Accountability and Ownership', 'Communication and Influencing', 'Emotional Intelligence' and 'Interviewing Skills' besides team building exercises. The sessions were conducted by Mr Rajnish Chadha, Technical Expert, Nestle; Ms. Harmanjot Kaur, HR Executive, Nestle; Mr. Keshab - Sr. Officer, Infant Cereals, Nestle; and Ms. Daisy and Mr. Amit, External Trainers. The student participants were also given case studies as part of the program to put the learnings into practice.



N-Reach workshop in progress

International Workshop on Targeted Proteomics

International workshop on "Targeted Proteomics" was organized at ICAR-NDRI, Karnal under the 11th Annual meeting of Proteomics Society, India during November 28 to December 1, 2019. The Chief Guest for the inaugural function was Dr. A. K Tyagi (Joint Director, Research). The Pre-congress workshop was co-organized by Dr. A. K. Mohanty (NDRI) and Dr. Sanjeev Srivastva from IIT Bombay. The lectures and hands on session were organized by international speakers in the area of Targeted Proteomics, Quantitative Proteomics, Proteogenomics and Metabolomics sessions. About 150 number of participants were from different parts of the country attended the workshop. There were 7 number of International speakers gave lectures on Targeted Proteomics and Skyline.

Dr. R. R. B. Singh, Director, NDRI addressed participants on the concluding day of workshop. He further said that these



Workshop on proteomics in progress

potential biomarkers could play an important role in disease diagnosis as well as early detection of pregnancy in cattle.

International Conference on Proteomics for System Integrated Bio-Omics, One Health and Food Safety

XI International Conference on “Proteomics for System Integrated Bio-Omics, One Health and Food Safety” was organized on December 2-4, 2019 at ICAR-NDRI Karnal. The main theme of the conference was on the application of proteomics on human as well as animal health and food safety. The conference provided the platform for global collaboration as it brought close together eminent speakers, scientists, medicos, industrialist, academicians, students and other stakeholders from across the world.

Dr. Trilochan Mohapatra, Secretary (Department of Agricultural Research and Education) & Director General (Indian Council of Agricultural Research) said that recent years witnessed the contribution of Omics platform in all aspects of life including plant, animal, human and environment. He said that proteomic science is considered as next step in biology and involves identification of proteins in a tissue or cell, and the determination of their function, structure and modifications. In the area of Animal Science, Proteomics holds the potential to unravel the proteome profile of our different indigenous bovine breeds as well as understanding the pathogen-protein analysis and interactions which will yield better strategies to tackle zoonotic diseases.

Dr. Joykrushna Jena, Deputy Director General (ICAR) stressed the need of development of rapid diagnostic methods for addressing the needs of human as well as animal health sector along with issues in food safety. Dr. R. R. B. Singh, Director, ICAR-NDRI said that the deliberations would give a new insight into emerging field of proteomics and systems biology.

A total number of 400 scientists, young researchers and students from more than 10 countries participated in the conference.



Dr. Trilochan Mohapatra, Secretary DARE & Director General, ICAR, New Delhi visiting the exhibition stall



Dr. M. L. Madan, giving away certificates to the participants

Refresher Course on Functional Food Ingredients

Twenty one day Refresher Course on “Technological Advances in Functional Food Ingredients and Validation of Claims” was inaugurated on December 6, 2019 at ICAR-NDRI Karnal. The main objective of this Course was to impart knowledge to the participants about therapeutic role of functional food in improving health of human beings.

Prof. Rajender S. Sangwan, Director, Academy of Scientific & Innovative Research, Ghaziabad, Uttar Pradesh was the Chief Guest for the inaugural session. He delivered a lecture on “Modern Dietary Practices and Eating Attitudes: Challenges of Incorporating Health Equity” and focused on improving human health using functional food as well as good eating habits. Dr. R. R. B. Singh, Director, ICAR-NDRI, Karnal informed that at NDRI, both animal models as well as Cell lines are being used to validate the health claims of functional foods. There were 18 candidates participated from 9 different states of India. The course was designed to cover newer concepts in the development of processed foods containing functional ingredients and various biochemical and instrumental based analytical techniques to validate their nutritional and health claims. Dr. G. S. Rajorhia, President, Indian Dairy Association, New Delhi and Chief Guest of valedictory function highlighted the research achievements of NDRI in the area of functional foods such as bioactive peptides, conjugated linoleic acid, herbal based dairy products etc. and said that such refresher courses would motivate the participants to carry out research in this emerging area.

Seminar on Restructuring of Primary and Secondary Education

National Academy of Agricultural sciences (NAAS), Haryana Chapter, Karnal organized one day Seminar on Restructuring of primary and secondary education to address the issue of education curriculum weaning students from farmers and farming community at ICAR-NDRI, Karnal on December, 20,

2019. The seminar was organized to seek views from subject experts, scientists, educators, school and college teachers, students and farmers for including agriculture as a mandatory subject of study in school curricula in line with other traditional subjects and to create awareness among school children the prospect of agriculture as a future profession.

The seminar was convened by Dr. M. L. Madan, Convener, NAAS, Haryana chapter, Karnal. Around 100 participants including NAAS Fellows and Associates of the academy, scientists and students from various local schools participated in the event. The seminar was inaugurated by Dr. Punjab Singh, President NAAS and former DG, ICAR. Dr. R. R. B Singh, Director, ICAR-NDRI, Karnal welcomed the delegates and in his welcome address, he spoke about the importance of integration of agriculture in the school curricula to sensitize the students at primary and secondary schools for taking up agriculture as a profession. Dr. M. L. Madan, spoke on the genesis of the programme and the urgent need for changes in the education system starting from the primary school level and integration of agriculture in school and college syllabus in order to connect students from farming system. Dr. Gurubachan Singh, the guest of honor and Chairman of Foundation for Research, Education and Development, Karnal in his address gave emphasis on inclusion of agriculture at school level and promotion of ecological agriculture, skill and entrepreneurship development in students and marginal farmers. Professor K. P. Singh, Vice Chancellor, CCSHAU, Hisar and guest of honor, in his inaugural address spoke about the need of convincing parents and youths towards agriculture sector as career opportunity and create interest to attract youths towards agriculture sector.

Dr. Panjab Singh, President of NAAS and Chief Guest emphasized that agriculture in present time needs multi-dimensional talented students to meet the gap between future demand and supply as well as for food security. Agriculture scientists, school principals, students and farmers also presented their views. Many school students participated

and presented their views. School representatives emphasized the need to develop agricultural trips for education in schools for creating interest among the students on organic farming and introducing them to farming system games, learning by doing, kitchen gardens, vermicomposting and environmental studies in the school.



Students being honoured by the dignitaries

Workshop on Innovative Tools for Teaching

Workshop on "Innovative Tools for Teaching in Animal Physiology" was organized at ICAR-NDRI, Karnal from December 10-12, 2019. The workshop was attended by 18 scientists/ principal scientists, assistant and associate professors from ICAR institutes and SAUs/ Veterinary colleges. The training programme included lectures and hands on training in efficient methods of communication and skill of teaching. Dr. M. L. Madan, former DDG (AS) delivered the key note address in the workshop. Dr. Sibadatta Das, Associate professor Physiology delivered the lecture on problem based and case based learning methods. Dr. P. Thulsiraman, Assistant Professor BHU, delivered lecture and practical classes on Flip classroom concept, and its application in effective communication. Dr. R. R. B. Singh, Director NDRI emphasized that such training programmes need to be organized to meet the demand and expectation of the students in the prevailing education scenario.



Dr. Panjab Singh, President, NAAS delivering inaugural speech



A group of participants with the Director of the Institute

HONOURS AND AWARDS

- **Mr. Ravi Prakash**, Ph.D. Scholar in Dairy Engineering Section of Southern Regional Station, ICAR- National Dairy Research Institute, Bengaluru was selected as a member of the Indian delegation sent by the Department of Science and Technology for the **4th BRICS-Young Scientist Forum (YSF) – 2019** held on November 6-8, 2019 in Rio de Janeiro, Brazil. Hundred delegates from 5 countries participated in the conclave. Mr. Ravi Prakash presented his research work on an indigenously designed milk cooling pail, which was awarded the **First Place in the BRICS Young Innovator Prize carrying USD 25,000**. The innovation is designed to cool the milk at the field level from its drawing temperature of 37°C to 7°C within 30 min using nano-fluid based phase change materials and is of great socio-economic importance to the small to marginal rural dairy farmers of developing countries by preserving quality and safety of milk just after production. Ravi Prakash was awarded the BIRAC-SRISTI-GYTI-Award-2018 for the concept and is also supported by the India Innovation Growth Programme –University Challenge 2019 to scale up the innovation and test the same at the field level.



Mr. Ravi Prakash, Ph.D. Scholar receiving award

- The work proposed by **Mr. Ravi Prakash** Ph.D. student in Dairy Engineering under the guidance of Dr. Menon Rekha Ravindra was selected as a winner for the University Challenge competition (2019) under the India Innovation Growth Programme 2.0. The award sponsored by DST-Lockheed Martin-Tata Trusts was conferred on July 17, 2019 at New Delhi and includes a research grant of Rs. 10.0 Lakhs.



Mr. Ravi Prakash receiving the award

- **Dr. Mohammad Rayees** Dar, received **“Outstanding/ Best Ph.D. Thesis Award 2019”** from the *Innovations in Plant and Animal Sciences for Sustainable Agriculture and Rural Development* (IPASSARD 2019) in Jaipur (Guide: Dr. Mahendra Singh)
- Model Dairy Plant was awarded **Quality Mark** from National Dairy Development Board, Anand.

DISTINGUISHED VISITORS

DISTINGUISHED VISITORS

- 06.07.2019 Ten member delegation led by Ms. Prema Lhaden, Sr. Programme Officer, Queen's Project of His Majesty's Secretariat of Royal Government of Bhutan (RGOB), Bhutan.
- 30.07.2019 Nine member Brazilian delegation of Brazilian Association of Breeders of Zebu Cattle (ABCZ).
- 31.08.2019 African delegation.

- 12.12.2019 Dr. Olivia MC Auliffe, Principal Research Officer, Cultures, Fermentation and Biotransformation, Teagasc Food Research Centre, Department of Food Biosciences, Moorepark, Fermoy, Ireland.
- 19.12.2019 Prof. Murari Suvedi (US Citizen) Professor, Department of Community Sustainability, Michigan State University (MSU), Michigan, USA.

PERSONALIA

Joining/Appointments/Promotions

- Sh. Abhishek Rana, Sr. A.O. joined w.e.f. 08.07.2019 at NDRI, Karnal after his transfer from CTCRI, Thiruvananthapuram.
- Dr. (Mrs.) Bimlesh Mann, Principal Scientist was given the responsibility as Acting Head, Dairy Chemistry Division for a period of six months w.e.f. 02.07.2019.
- Dr. S. M. Deb, Principal Scientist was given the responsibility as Acting Head, Animal Genetics & Breeding for a period of six months w.e.f. 01.09.2019.
- Dr. Latha Sabikhi, Principal Scientist was given the responsibility as Acting Head, Dairy Technology Division w.e.f. 10.09.2019.
- Dr. A. K. Tyagi, Head, Animal Nutrition Division entrusted the responsibility of Acting Joint Director (Res.) at NDRI, Karnal for a period of six month w.e.f. 29.09.2019.
- Dr. Anil Kumar Puniya, Principal Scientist joined w.e.f. 28.09.2019 after relieving from post of Dean, DS&T from GADVASU, Ludhiana.

- Dr. Pradyuman Barnwal, Principal Scientist was entrusted the responsibilities of Acting Head, Dairy Engineering Division, ICAR-NDRI, Karnal w.e.f. 01.11.2019 for a period of six months.
- Dr. (Mrs.) Rani Alex, Scientist (SS) joined w.e.f. 26.11.2019 at Animal Genetics & Breeding Division, ICAR-NDRI, Karnal.
- Dr. G. R. Gowane, Sr. Scientist joined w.e.f. 02.12.2019 at Animal Genetics & Breeding Division, ICAR-NDRI, Karnal.
- Dr. Sabyasachi Mukherjee, Principal Scientist joined w.e.f. 07.12.2019 at Animal Genetics & Breeding Division, ICAR-NDRI, Karnal.

Transfers/Retirements

- Smt. Ritu Dalal, AO relieved from NDRI, Karnal to join at ICAR-CIAE Bhopal w.e.f. 28.09.2019.
- Sh. A. K. Mishra, AO retired from Council's service w.e.f. 31.12.2019.

राजभाषा कार्यान्वयन समिति की बैठक

निदेशक महोदय की अध्यक्षता में संस्थान राजभाषा कार्यान्वयन समिति की तिमाही बैठक दिनांक 16.10.2019 को संपन्न हुई। समिति के पदाधिकारियों द्वारा सभी मुद्दों एवं सुझावों पर महत्वपूर्ण निर्णय भी लिए गए।

हिन्दी कार्यशाला

राजभाषा हिन्दी उल्लास मास के दौरान 28.9.2019 को संस्थान के 30 तकनीकी सहायकों के लिए हिन्दी कार्यशाला का आयोजन किया गया जिसमें उन्हें राजभाषा नीति, नियमों, व्यवस्थाओं, हिन्दी इनपुट टूल्स तथा सेवा संबंधी मूलभूत नियमों आदि की जानकारी प्रदान की गई।

हिन्दी उल्लास माह

संस्थान में हिन्दी दिवस से प्रारंभ करके दि. 14.09.2019 से 14.10.2019 तक की अवधि में हिन्दी दिवस का भव्य आयोजन किया गया। इस माह के उद्घाटन कार्यक्रम व पुरस्कार वितरण समारोह की अध्यक्षता निदेशक महोदय ने की। इस मास में वार्षिक संस्थान राजभाषा गौरव प्रमाणपत्र प्रतियोगिता, वार्षिक नगरस्तरीय व संस्थान राजभाषा गौरव प्रमाणपत्र प्रतियोगिता, नगरस्तरीय हिन्दी गीतगायन प्रतियोगिता (16.9.2019), हिन्दी

राजभाषा एकक

शब्द ज्ञान प्रतियोगिता (18.9.2019), हिन्दी टाइपिंग प्रतियोगिता (20.9.2019), हिन्दी निबंध प्रतियोगिता (23.9.2019), कुशल सहायक कर्मचारी वर्ग की हिन्दी सुलेख प्रतियोगिता (28.9.2019), वैज्ञानिकों की हिन्दी शोध-पत्र पोस्टर प्रदर्शन प्रतियोगिता (30.9.2019), हिन्दी टिप्पणी लेखन प्रतियोगिता (3.10.2019), अनुभव लेखन प्रतियोगिता (5.10.2019), हिन्दी अनुभव लेखन प्रतियोगिता (5.10.2019), संस्थान तकनीकी हिन्दी लेखन अवॉर्ड प्रतियोगिता 2018-19 व वार्षिक मूल हिन्दी टिप्पणी व आलेखन प्रोत्साहन योजना प्रतियोगिता वर्ष 2018-19 के 160 विजेताओं को प्रमाणपत्रों द्वारा सम्मानित किया गया।

नराकास करनाल के अतिरिक्त कार्यों का निर्वहन

संस्थान नगर राजभाषा कार्यान्वयन समिति, करनाल के अध्यक्षीय कार्यालय के रूप में करनाल नगर में स्थित 51 सदस्य कार्यालयों को राजभाषा हिन्दी के प्रचार, प्रसार व कार्यान्वयन की दिशा में मार्गदर्शन प्रदान कर रहा है। रिपोर्टाधीन अवधि में संस्थान के द्वारा 16.9.2019 को नगर स्तर पर हिन्दी गीतगायन प्रतियोगिता, 18.10.2019 को हिन्दी व्याकरण ज्ञान प्रतियोगिता, 23.10.2019 को हिन्दी निबंध प्रतियोगिता, 24.10.2019 को चित्र आधारित कहानी लेखन प्रतियोगिता व 25.10.2019 को स्वरचित हिन्दी कविता पाठ प्रतियोगिता का आयोजन किया गया तथा समिति की 70 वीं छमाही समीक्षा बैठक में विजेताओं को सम्मानित किया गया।

SOUTHERN CAMPUS, BENGALURU

RESEARCH

Alpha Linolenic Acid Fortified Spreadable Butter

(Monika Sharma, Devaraja H.C. and Pandule Vhishal Shrirang)

Butter is a good source of fat and fat soluble vitamins. However, it lacks omega-3 fatty acids and alpha linolenic acid; the functional ingredients with several health benefits. The process for fortifying butter with alpha linolenic acid was optimized by studying the level of fortificant and stage of addition. The fortified butter samples were sensory acceptable. Spreadability of fortified butter samples increased significantly ($p < 0.05$) with increasing level of fortificant. The samples were characterized in terms of thermal properties and solid fat content. The alpha-linolenic acid content was higher in two variants of fortified spreadable butter (3.149% and 3.174%) than control (0.86%) as determined by gas chromatography-mass spectrometry. The optimized spreadable butter samples were examined for oxidative stability during refrigerated and frozen storage period of 90 days and, the values were within the acceptable range. No yeast and mould, coliform count was detected during 90 days storage. Fat content in both the variants of optimized butter samples was more than 85%. Developed butter provides nearly 25% recommended dietary allowance of alpha linolenic acid in one serving (14 g).

Engineering Properties of Dry-Crystallized Palada Payasam Mix Prepared in a Custom Designed Mechanical Unit

(Naveen Jose, Gajanan P. Deshmukh, Menon Rekha Ravindra and B. Surendra Nath)

A mechanical unit was custom designed and developed at the Southern Regional Station, ICAR- NDRI for the dry-crystallization process to prepare a convenience mix for *Palada Payasam*, a traditional dairy product of Kerala. The mix prepared in the unit was comparatively evaluated against a control sample of the dry crystallized mix prepared using the conventional manually stirred process, in terms of its engineering properties and sensory quality.



a. Control Sample



b. Experimental Sample

Analysis of the proximate composition of the samples showed only marginal differences; both samples reported similar water activity in the range of 0.410-0.415. Particle size

analysis revealed the average mean diameter of control and experimental sample to be 2.55 and 2.49 mm, respectively. Colour of the samples determined using image analysis indicated that the control sample had a slightly higher Browning Index (14.08) than the experimental sample (8.11); the difference was, however, not reflected in the colour and appearance scores during subjective evaluation of the reconstituted samples. Both the samples demonstrated near identical flowability. XRD graphs yielded sharp peaks for both the samples indicative of the crystalline nature of sugar, whereas the XRD data for the dry uncooked *ada* flakes confirmed their amorphous nature. The study revealed that the mechanical unit could be used to prepare dry-crystallized *Palada payasam* mix that closely resembled the control samples in terms of its engineering properties and sensory acceptability, in a more controlled and less laborious process.

Development of Universal Disperser for Dairy Processing Applications

(Rupesh P. Datir, Menon Rekha Ravindra, Monika Sharma and M. Manjunatha)

A small volume disperser designed as a jacketed process vessel for heating / cooling support and with multifunctional impellers as attachments was developed as a versatile equipment for performing different unit operations during the processing of common dairy products. The developed unit was tested for preparation of lassi and cheese spread, recombination of milk as well as churning of butter and the process conditions for the above were optimised based on Response Surface Methodology.

TRANSFER OF TECHNOLOGY

The technology entitled "*Process Technology for Palada Payasam Mix Preparation by Dry Crystallization Method in a Mechanical Unit*" was transferred to M/s Manjilas Food Tech Pvt. Ltd., Thrissur during March – April 2019. The product was successfully launched in the market during September 2019, coinciding with the festival of Onam and was well received by the consumers.



Technology being transferred to M/s Manjilas Food Tech Pvt. Ltd., Thrissur

EVENTS

Foundation Day Celebrated: Workshop on Quality Assurance and Safety of Dairy Products – An Update on FSSAI Regulations

The 97th Foundation Day of ICAR-NDRI was celebrated on July 1, 2019 at SRS of ICAR-NDRI, Adugodi, Bengaluru under the aegis of Alumni Association, ICAR-NDRI (SRS), Bengaluru. Prof. Alok Dhawan, Director, CSIR-Indian Institute of Toxicology Research (IITR), Lucknow was the Chief Guest and Dr. Suresh Honnappagol, Former Animal Husbandry Commissioner, Govt. of India, New Delhi was the Guest of Honour. Dr. N. Balaraman, Former Joint Director (Res) ICAR-NDRI, Karnal and Former Vice-Chancellor, TANUVAS, Chennai, delivered a lecture on this occasion. Dr. K. P. Ramesha, Head, ICAR-NDRI & President Alumni Association presided over the function. The Inaugural session was followed by the workshop on the theme “Quality Assurance and Safety of Dairy Products – An Update on FSSAI Regulations”. The workshop inaugural address was delivered by Prof Alok Dhawan, who delineated the various activities and achievements of CSIR – IITR in the area of food safety which included ‘KsheerScanner’ a milk analyser for detection of adulterants. Four speakers made presentations on various topics related to quality and safety of dairy products. The workshop was attended by about 100 delegates from various parts of the country.



Prof. Alok Dhawan, Director, IITR, Lucknow delivering inaugural speech

Winter School on Conservation and Improvement of Indigenous Bovine Germplasm

The ICAR sponsored Winter School on “Conservation and Improvement of Indigenous Bovine Genetic Resources through Integrated Omic Approaches and Optimal Resource Utilization” was conducted from November 06-26, 2019 at Southern Campus, ICAR-NDRI, Bengaluru. It was inaugurated by the Chief Guest Sri P. B. Ramamurthy, IAS, Former Additional Chief Secretary, Govt of Karnataka. Sri Ramamurthy highlighted the importance of conservation and genetic improvement of indigenous cattle. Guest of Honor Prof. S. S. Honnappagol, Former, Animal Husbandry Commissioner, Govt. of India informed about various programmes and schemes initiated by the Govt. of India. He emphasised the need for convergence of various technologies for productivity enhancement of indigenous bovines and livelihood security of dairy farmers. During the valedictory function, Guest of Honor Dr. S. K.

Agarwal, former Director of CIRG, Makhdoom, in his address, asked the participants to disseminate whatever the knowledge they gained during the winter school for the benefit of dairy farmers. Fifteen Scientists/ Assistant Professors/ Subject Matter Specialists from ICAR Institutes/SAUs/SVU/ Veterinary Colleges from different parts of country participated in the Winter School.



Flow Cytometry Workshop

Southern Campus of ICAR-NDRI, Bengaluru in collaboration with Beckman Coulter Life Sciences, India organized a workshop on “Application of Flow Cytometer in Animal Biotechnology Research” during November 13-15, 2019. The objective of the workshop was to impart the participants with theory and practical experiments on flow cytometry instrumentation, experiment designing, hands on experiment, data analysis and interpretation of results. A total of 10 participants selected from different parts of the country attended the workshop. During the workshop, expert lectures and hands on exposure on usage of flow cytometry and its application in animal science were provided.

Training Programme on Production of Cheese and Related Products

The training was organised from December 2-7, 2019. Twelve participants from different industries participated. Subject experts delivered lectures and gave hands on exposure on five varieties of cheeses like cheddar, gouda, mozzarella, cottage and processed cheese. The participants were also taught about the importance of microbiological, chemical and sensory quality evaluation of different types of cheeses along with market sample comparisons.

Training Programme on Commercial Dairy Production

An Entrepreneurship Development programme on ‘Commercial Dairy Production’ for prospective dairy entrepreneurs and progressive dairy farmers was organized at SRS of ICAR-NDRI, Bengaluru during December 16-21, 2019. Nineteen participants from Maharashtra, Karnataka, Tamil Nadu, Kerala Andhra Pradesh and Telangana States attended the training. Besides expert lectures, field trips to organized dairy farms and fodder museum were arranged to provide first-hand experience about status of dairy farming in the region. On this occasion, an e-manual of the training was provided to the participants.

National Agricultural Day

A team of scientists from SRS, ICAR-NDRI, Bengaluru apprised the students of Narayana E-Techno School, Koramangala, on the importance of agriculture education. The team informed the students about NARS system and academic programmes offered at the Deemed Universities under the ICAR and the State Agricultural Universities. The mode of admission to these programmes and career opportunities available were also highlighted and pamphlets on relevant information were distributed among the students.

National Milk Day

National Milk Day was organized on November 26, 2019 by Alumni Association, ICAR-NDRI (SRS), Bengaluru in association with SRS, NDRI to mark the 98th birth anniversary of Dr. V. Kurien. Dr. R. P. Aneja, former Managing Director of NDDB and one of the close associates of late Dr. V. Kurien was present as Guest of Honour. Being himself involved in shaping up of Operation Flood, he enthralled the audience with the story behind Operation Flood. He opined that Co-operative system of the federation is strong enough to withstand forays of influential and rich multinational companies into Indian dairy industry.

Constitution Day

Constitution Day was observed on November 26, 2019 to bring awareness about adoption of Indian Constitution. On this occasion, Justice Dr. S. B. N. Prakash, Member of Panel of Arbitrators set up by Karnataka High Court and Adjunct Professor at National Law School, Bengaluru made an emphatic speech on Indian constitution. He dwelt at length on Article 48 of Indian constitution which states that the State shall endeavour to organize agriculture and animal husbandry on modern and scientific lines and shall, in particular, take steps for preserving and improving the breeds, and prohibiting the slaughter of cows and calves and other milch and draught cattle. He informed that Constitution Day is being observed to celebrate the fact that it was adopted in 1949 by the people of India. He briefed how the Indian constitution, longest in the world, was written by Committee chaired by Dr. B. R. Ambedkar and struggles of other persons in creating the Constitution after studying the constitution of 60 countries. Explaining the Preamble of the Constitution, he exhorted all those present on the occasion to properly discharge duties of citizen conferred by the Constitution.

EXTENSION ACTIVITIES

- Advisory services were rendered to 49 clientele during their personal visits to the Institute. The advisory profile comprised technical advice for dairy start-ups, quality cattle feed, processing of indigenous dairy products, hydroponic fodder cultivation and silage making.
- A total number of 736 visitors in 12 batches comprising farmers, students and field extension/veterinary officers from the southern region and other states visited the

Institute. The visitors were briefed on the research and extension activities.



- A Model Training Course on “Good Dairy Management Practices (GDMP) for Sustainable Dairy Farming” sponsored by Directorate of Extension, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, New Delhi, was organized during September 23-30, 2019. The training programme aimed towards enabling the field extension officials to update the recent advancements in dairy development and also to sensitize the field extension functionaries in dissemination of GDMPs among the stakeholders. The training was attended by 24 officials from the Department of Animal Husbandry and Veterinary Services and State Dairy Federations representing nine different states viz., Himachal Pradesh, Punjab, Madhya Pradesh, Assam, Uttarakhand, Telangana, Karnataka, Kerala and Tamil Nadu.



Participants receiving certificates

- Participated in Dairy Tech India 2019, International Exhibition on Dairy Products & Technology was held during August 30 to September 1, 2019 (5 days) at Bangalore International Exhibition Centre (BIEC), Bangalore. SRS, ICAR-NDRI Exhibition Stall depicted dairy processing technologies developed and standardized at the institute alongwith information on Indigenous breeds of South India and recommended dairy management practices for the benefit of the clientele groups. The exhibition was well attended by dairy entrepreneurs, research scholars and industrialists from all parts of the country and abroad.
- Extension activities under the farmer first programme were conducted comprising interventions with facilitation of green fodder production through

distribution of seeds and stem cuttings of improved fodder varieties among the selected beneficiaries. Institute interventions for mastitis management, an essential problem of focus included, screening of animals for mastitis detection with California Mastitis Test Kits (CMT kits) in the dairy animals of farm beneficiaries.



A group of farmers at Southern Campus of ICAR-NDRI, Bengaluru

- The outreach programmes and rural extension activities were organised in the new cluster of villages in Devanahalli taluk of Bangalore Rural District which included awareness campaigns and interactive sessions among clientele groups and field extension officials on good dairy management practices.
- A team of Scientists and Technical officers actively participated in the Krishi mela 2019 at UAS, GKVK, Bangalore held from October 24-27, 2019. SRS-ICAR-NDRI Stall focused on need-based knowledge sharing in the event to benefit farming community of the region.
- An Animal Health & Infertility Camp was organised to celebrate Kisan Divas on December 23, 2019 in the villages adopted under Farmers' FIRST project for the benefit of clientele groups.

EASTERN CAMPUS, KALYANI

RESEARCH

Himalayan Tree Leaves as Herbal Feed Additives to Improve Calf Growth

(A. Santra, S. K. Das and T. K. Dutta)

North-eastern part of India possesses a wide variety of tree leaves which are not yet tested as feed additives to improve animal productivity. Kamela (*Mallotus philippensis*) tree leaves were collected from Agartala, Tripura and sun dried ground (2 mm size) leaf meals were used as feed additive for conducting the experiment. Ten numbers of growing Jersey male crossbred calves (about four months of age) were randomly divided into two equal groups (G1 and G2) and were fed individually under stall feeding on a mixed ration containing 50% paddy straw and 50% concentrate mixture for 140 days. Two types of iso-nitrogenous concentrate mixtures (C1 and C2) were prepared. Wheat bran in concentrate mixture (C2) of test group (G2) was partially replaced (4 parts w/w) with Kamela leaf meal.



Final body weight, average daily body weight gain and feed conversion efficiency were higher for the calves supplemented with Kamela leaf meal as herbal feed additive than the non-supplemented calves. Feed conversion efficiency in terms of DM, DCP and TDN intake per kg body weight gain was also higher for the calves supplemented with Kamela leaf meal as herbal feed additive (G2) than the non supplemented calves (G1). Feed conversion efficiency of the calves in control (G1) and test group (G2) was 13.9 and 14.7%, respectively.

Therefore, dietary supplementation with Kamela leaf meal as herbal feed additive improved body weight gain and feed conversion efficiency of growing crossbred calves.

Herbal Fly Control Measures on Udder Health and Milk Production

(Tripti Kumari, Champak Bhakat, D. K. Mandal, A. Mandal, A. Chatterjee, A. Mohammad, S. Rai and T. K. Dutta)

Suitable herbal mixture (*Acorus calamus* root + charcoal of coconut shell + Turmeric powder + Neem oil) was prepared and it was packed in coconut leaf ball and such 4 balls were arranged/stitched in a piece of cotton cloth which was put as neck belt of individual cows. The coconut tree leaves was specially designed to form a ball (container) to hold this mixture in such porous container which liberated smell in and around by which fly may repel from body parts of 6 experimental (treatment) cows. Overall milk somatic cell count was significantly reduced in cows of treatment than control group (under regular farm practice) during overall lactation period. Different diagnostic parameters (MCMT, MWST, pH, electrical conductivity, SFMT) of subclinical mastitis indicated significantly lower (acceptable) values in treatment than control group.. The milk quality was significantly better



Herbal fly control coconut leaves balls to repel the attack

Jersey crossbreed cows bearing neck belt of herbal fly control coconut leaves to repel fly attack

in treatment than control group. Fly repelling/defensive behavioral parameters (viz: tail flicking, skin twitching, striking, kicking, head throwing, ear flicking) indicated that treatment group spent significantly less time than control group which revealed that less fly attack in treatment than control group. It may be concluded that fly control measures with herbs was having positive influence on milk production by maintaining good udder health status of Jersey crossbred cows.

EXTENSION ACTIVITIES

- In the adopted villages of ERS, several extension interventions were provided like organizing veterinary health camp, providing regular animal health check up and artificial insemination of cattle etc. Treatment of animals in the adopted villages was done free of cost. A total of 429 livestock was treated through the 'Dairy Vikas Kendra' located at the adopted village. Artificial Insemination facility was provided to 42 crossbred cows. One veterinary health camp was organized in the adopted village on September 4, 2019 in which 129 cattle and 144 goats were treated and vaccinated.



Veterinary services being rendered in adopted villages

- Three training programmes were organized July 1-7, 2019 on "Scientific Dairy Farming Practices for 54 Tribal Unemployed Youth".



A view of veterinary camp in adopted villages

- Under TSP programme one training programme was organized on "Scientific Goat Farming & Artificial Insemination" during

September 24-28, 2019. A total number of 9 participants from different parts of West Bengal participated.

- Under TSP programme, two veterinary animal health-cum-input distribution camps were organized. The first camp was organized on July 25, 2019 at Paruldanga village of Bolpur in Birbhum district of West Bengal. A total number of 131 farmers got benefit and a total of 779 animals were treated by the team of ERS of ICAR-NDRI. A total number of 52 Black Bengal goats and 145 kg of mineral mixture was distributed among the tribal farmers. Another camp was organized on August 28, 2019 at Raipasa, Kamalachara, Nityadaspara of Tripura district. In which, 25 Black Bengal goats and other inputs were distributed among the tribal farmers.



Black Bengal goats being distributed among farmwomen

- Under NEH programme, a total of 2 Scientists-farmers interaction sessions-cum-input distribution camps were organized. The first camp was organized on August 28, 2019 at Tripura and from the camp 25 goats, 1000 chicks and 100 kg mineral mixture was distributed among the 125 farmers. Another camp was organized on September 26, 2019 at Martan Village of Sikkim state and from the camp 4100 kg animal feed and 319 kg mineral mixture was distributed among 68 farmers. One on-campus training programme was organized during August 6-9, 2019 on the topic 'Scientific Dairy Farming for Farmer's from North Eastern States' and 17 farmers from Meghalaya participated in the training programme.



Extension team with farmers

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Tel.: 0184-2252800 | Fax: 0184-2250042 | E-mail : dir@ndri.res.in | Gram : DAIRYRESEARCH