एनडीआरआई न्यूज़

NDRI News

राष्ट्र के डेरी स्वप्नों को समर्पित
Fulfilling Nation's Dairy Dreams

भाकृअनुप-राष्ट्रीय डेरी अनुसंधान संस्थान, करनाल
ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

www.ndri.res.in

Volume 25 No. 2 | July - September, 2020

From the Director's Desk

ICAR-National Dairy Research Institute (NDRI) is one of the premier Institutes in dairy sector. The Institute has contributed tremendously to the growth of Indian dairy sector and played a crucial role in dairy development programmes of the nation through its research, teaching and extension activities. For translating the research into reality, the Institute has been continuously disseminating the technologies through various outreach activities since 1923. Initially, the programmes were focussed on overall development of farming community by introducing improved agricultural (crop, animal husbandry, vegetable, rural development, etc.) technologies through operational Research Project (ORP), lab to land, Krishi Vigyan Kendra, Trainers training Centre (TTC) Dairy Vikas Kendra, Farming System Research (FSR), IVLP, etc. With the changing times and as per the need of farming community, dairy stake holders and dairy industry, NDRI initiated new Extension approaches and Farmers' First Programme.

Krishi Vigyan Kendra (KVK) at NDRI, Karnal became operational in July 1976 with the aim to accelerate agricultural production and allied activities for improving economic status of farmers and creating job opportunities for the poorest amongst the poor in the rural areas. This Kendra has developed infrastructure to run the need based skill oriented training programmes through "Learning by Doing". Three fundamental principles viz., (i) agricultural production - the prime goal, (ii) work experience - the main method of imparting training and (iii) weaker section of the society - the main target group, are always kept in mind. At KVK, need based training courses are imparted in the area of dairy production, dairy processing and post harvest technologies. While designing the courses, the entire concept of farming system is taken into consideration for making the enterprises economically viable for the farmers.

A temporary extension Service Centre -Model Dairy Centre has been initiated since 2002 at Lalukheri in Muzzfarnagar, Uttar Pradesh and basic facilities have been created for empowering youth and women involved in dairy sector. The artificial breeding programme of dairy animals is being carried out through trained Para vet staff by supplying good quality semen of high pedigree bulls of NDRI.

The innovative Extension approach 'Dairy Education at Farmers' Door' initiated in 2009 by NDRI educates the farmers at their door step. A team of NDRI scientists consisting of specialists from production, processing and management groups visits nearby selected villages on every second Saturday. This programme facilitates effective dissemination of dairy production and processing technologies among farming community. Women Empowerment lab has been established since 2012 to impart skills to women in the field of dairy processing and fruit and vegetable preservation to make them financially independent.

NDRI has initiated a unique programme "Farmers' School" since 2014 for imparting non- formal education to farmers in all the aspects of agriculture. In this School, farmers interact with the scientists of the Research Institutes through class room teaching as well as practical classes. The main aim of Farmers' Farm School is to provide all important and latest information on research related to Dairying, Horticulture, crop farming, etc. to farmers. The video coverage of Farmers Farm School of NDRI was telecast by many channels (Aajtak, DD Kisan, Haryana News, E-tv, etc.) and in print media (English and Hindi newspaper, magazine, etc.). A web enabled NDRI Messaging service portal has been developed and made functional with data base facilities from 7th October 2014.

A new Extension Education Programme "Mera Gaon Mera Gaurav" has been initiated in 2015 to provide the effective dissemination of agricultural information to farming community. Under this programme, a team of NDRI scientists including subject matter specialists from production, processing and management group visits the adopted villages from time to time. Farmers' FIRST project is implemented in five villages of Karnal district namely: Kamalpur Roran, Garhi Gujran. Nagala Roran, Churni and Samora having more than 1000 farm families since 2016. Over 31 technological interventions were implemented among all households, which covered 179.4 hectare area in the crop

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component and over 2870 animals for dairy based interventions. ICAR-NDRI established Krishi and Dairy Vikas Kendra (KDVK) at KVK, Piprakothi, East Charparan (Bihar) in the premises of Dr. Rajendra Prasad Central Agriculture University, Pusa, Bihar in July 2016.

We have a strong Institute Extension Council, a decision making body, for the purpose of assessment and execution of extension programmes. The Council works under the chairmanship of the Director, NDRI and meets twice a year to review the progress of ongoing extension programmes and recommend or modify ongoing extension activities for horizontal and vertical coordination with other Divisions.

All the above said programmes provide a wide base of extension activities in the adopted villages in and around Karnal as well as across the country. NDRI organizes a Three day mega event called "National Dairy Mela" every year. In this Mela, knowledge and developed technologies are disseminated to farmers. The events include animal shows, milk competitions for different breeds and types of animals, exhibition stalls for display & demonstration of new technologies, kisan sangosthies, dairy product making competitions etc. Event prizes/incentives are given to the owners of champion animals. Other ICAR institutes, govt. agencies and private firms in the agri-sector also participate in the Mela and exhibit their products and services. The information on latest technologies is being provided through Dairy Samachar, a quarterly newsletter in Hindi. Dairy calendar containing month wise important information on scientific breeding, feeding, health care and management practices of dairy animals, is also regularly published in Hindi language to educate dairy farmers.

The Dairy Extension Division of the Institute has developed information packages in the form of video films and multimedia packages on clean milk production, hygienic milk processing and packaging and scientific calf rearing based on Information and Communication Techniques (ICT). Mechanisms for transforming the output of R&D efforts into viable technologies are being further strengthened by establishing National Demonstration Centers. Keeping in view the significance of ICT in relation to Transfer of Technology (TOT) in the current scenario, the Agricultural Technology Information Centre (ATIC) of the Institute works as a single window delivery system for all queries related to technologies available at the Institute.

NDRI also runs a 'Technology Business Incubator' and a 'Business Planning and Development Unit' to promote knowledge-based and innovation-driven dairy enterprises. It supports and provides training and facilities required for young budding entrepreneurs. It conducts entrepreneurship awareness camps, entrepreneurship development programmes, training programmes and provides specialized services to existing SMEs and incubation of start-up ventures and mentoring. The Institute continues to share its innovative dairy processing technologies with the Indian Dairy Industry through the Consultancy Processing Cell. From the year 2013-2020, 20 patents have been granted to NDRI in the field of dairy product processing such as rapid tests for detection of adulteration/contaminants in milk; estimation of metabolites in blood and manufacture of various dairy/food products. NDRI organises institute-industry interaction meet in the month of December to present the newly generated technologies so as to transfer them to the industry. So far, the Institute has successfully transferred 88 technologies to Dairy industry and stake holders during the last seven years.

In nutshell, dairy farmers remain the central concern of all the R&D activities of the Institute. NDRI's farming system research approach in adopted villages has made significant contributions to the economic prosperity of the farming communities of our country. Besides working towards improving the socio-economic status of the farmers, NDRI is committed for dissemination of knowledge and commercialization of the newly developed technologies and dairy products to the stakeholders.

(M.S. Chauhan)
Director, ICAR-NDRI

RESEARCH

Development of a Naturally Carbonated Whey Based Probiotic Drink

(Saurabh Kadyan, Gaurav Kr. Deshwal, Rashmi H.M., Diwas Pradhan and Arghya Chaudhari)

A carbonated whey based probiotic drink was prepared using a co-culture of dairy yeast *Kluyveromyces lactis* NCDC 257 and indigenous probiotic strain *Lactobacillus plantarum* MTCC 5690. The developed drink was mildly acidic, slightly alcoholic and sweet in taste with a tingly sensation due to carbon dioxide (CO_2) production. The drink exhibited antioxidative activity as measured by TPC. Besides, the drink showed antimicrobial activity against tested pathogens viz. *Salmonella typhi* ATCC 19430, *Escherichia coli*, *Listeria monocytogenes* ATCC 19112 and *Staphylococcus aureus*. On 21st day of refrigerated storage (6 ± 2°C) of 21 days, the drink had still maintained overall acceptability score of 5.25 ± 2.48 on 9 point hedonic scale and viable probiotic count of 8.08 ± 0.032 log CFU/mL. The developed drink is a ready-to-serve (RTS) beverage, which could be an effective means of utilisation and value addition to dairy by-product 'whey' which is routinely generated in huge amounts during paneer manufacturing, and puts burden on environment in case of its inadequate disposal .

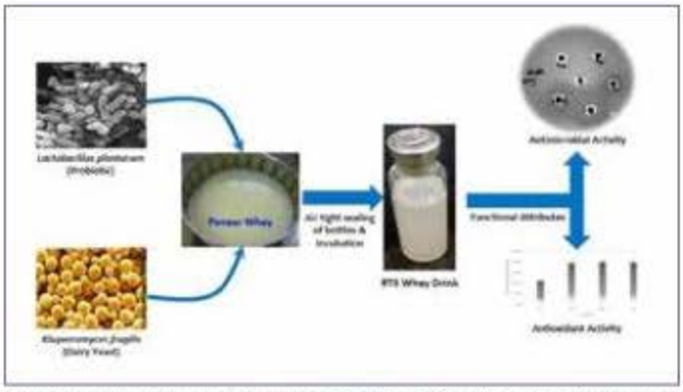


Fig.: Paneer whey fermentation using a co-culture of probiotic and dairy yeast for production of naturally carbonated RTS whey drink and its functional attributes

Metagenomics to Explore the Bacterial Diversity of Traditional *Dahi* from Haryana Region

(Amrita Tigga, E. Shree Niharika, Rashmi H.M., Saurabh Kadyan, Diwas Pradhan and Sunita Grover)

Studies were made to utilize the entire calibre of metagenomics for unravelling the complete microbial signatures of traditional Dahi from Haryana region (Fig.) *Dahi* sample collected from Karnal, Yamuna Nagar and Kaithal district of Haryana region along with the information regarding the preparation of *Dahi* was used in this study. The metagenomic DNA extracted from 12 individual samples of *Dahi* pooled into three main samples were sent for sequencing using Oxford Nanopore technology platform. The bacterial community analysis of metagenomic DNA at phylum level clearly indicated *Firmicutes* as the major phyla (88.32–92.48%) followed by *Proteobacteria* (1.37-5.38%). *Bacteroidetes, Actinobacteria, Cyanobacteria, Acidobacteria, Chloroflexi, Fusobacteria* and *Spirochaetes* were also identified in the traditional *Dahi* samples with lower abundance of <1%. In this analysis, a total of thirteen major genera of bacteria were selected i.e. *Streptococcus, Lactobacillus, Bacillus, Enterococcus, Serratia, Prevotella, Lactococcus, Staphylococcus, Pseudomonas, Oscillospira, Cupriavidus, Bacteroides* and *Clostridium*, which nearly constituted >80% of total bacterial genera present in *Dahi* samples. Higher abundance of *Streptococcus* (62.81%) was detected in *Dahi* samples collected from Yamuna Nagar and *Lactobacillus* was found to be the second highest genera present in all the samples of *Dahi*. At species level, *Lactobacillus delbrueckii* was found to be the major species in all the three regions of Haryana. Overall, lactic acid bacteria genera such as *Lactobacillus, Streptococcus, Lactococcus,* and *Enterococcus* were observed along with the environmental bacteria like *Bacillus, Staphylococcus, Pseudomonas* in all the sequenced metagenomic DNA of *Dahi* samples collected from different areas.

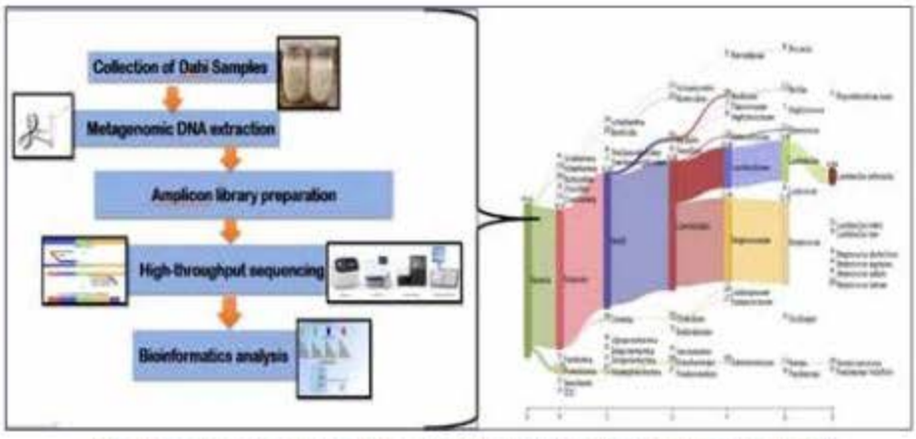
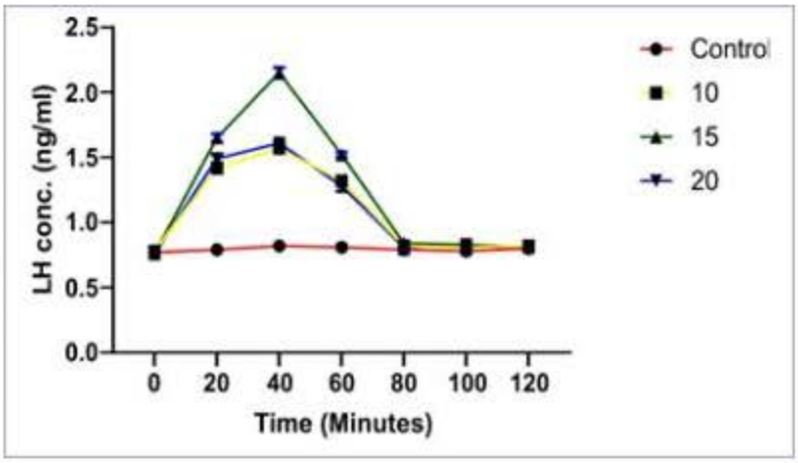


Fig. : Metagenomics approach to explore the bacterial diversity of traditional Dahi

Effect of Synthetic Kisspeptin Administration on Postpartum Anestrus Management in Buffaloes

(Abhijeet Fernandes, Nishant Kumar, R. K. Baithalu and T. K. Mohanty)

Kisspeptin is an important gatekeeper of reproductive maturation and function, sexual differentiation of the brain, puberty onset, regulation of gonadotropin secretion, treatment of infertility etc. The objective of study was to standardize the dosage of Kisspeptin-10 in postpartum anestrus buffaloes, to assess the effect of exogenous Kisspeptin-10 on induction of estrus in postpartum anestrus buffaloes and to find out the effect of exogenous Kisspeptin-10 on folliculo-hormonal and (KiSS1/R) transcript changes during induction of estus. A total of 20 postpartum anestrus buffaloes were selected and divided into four groups (Control, T1, T2 and T3) and Kisspeptin-10 was injected at the dose rate of 10, 15 and 20 µg/kg body weight, respectively in T1, T2, and T3 group and equal volume of NSS was injected in control group. Blood sampling was done at every 20 minutes interval beginning with zero minutes till 2 hours and plasma was analysed for LH concentration. The LH concentration was significantly higher ($p<0.05$) in T2 group. The peak level was recorded at 40 minutes post injection, which reaches basal level after 60 minutes post injection. Therefore, 15 µg/kg body weight dose of kisspeptin-10 was used as standardized dose for experiment. 18 postpartum anestrus buffaloes were selected and divided into three groups (Control, positive control and Treatment; n=6) with 2-4 parity and 520-530 kg body weight. Kisspeptin was administered @15 µg/kg body weight in treatment group at weekly interval, equal volume of NSS was given to control group and OVSYCH+CIDR protocol



was used in positive control group. Five animals from positive control and three from treatment group showed estrus after treatment as compared to control (zero). Expression of KiSS1 gene and KiSS1R was increased significantly ($p<0.05$) at different days. The number of small, medium and large size follicles were significantly more ($p<0.05$) in treatment group. Progesterone and LH concentration also vary significantly ($p<0.05$) at different days. It could be concluded that Kisspeptin was found to be effective in induction of estrus and reduction of prolonged inter-calving period in treatment group, improvement in folliculo-hormonal and gene expression status in postpartum anestrus buffaloes.

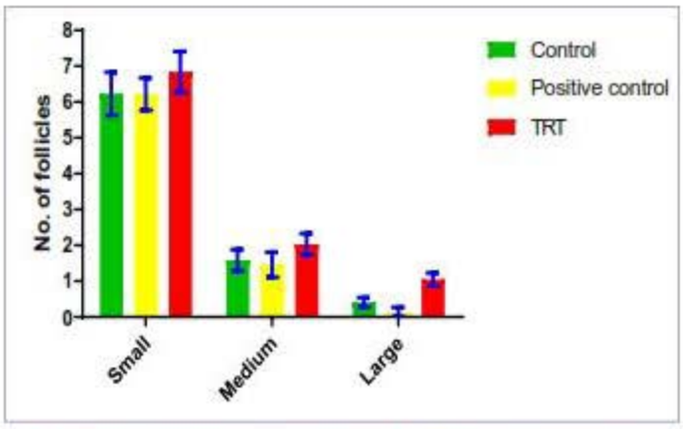
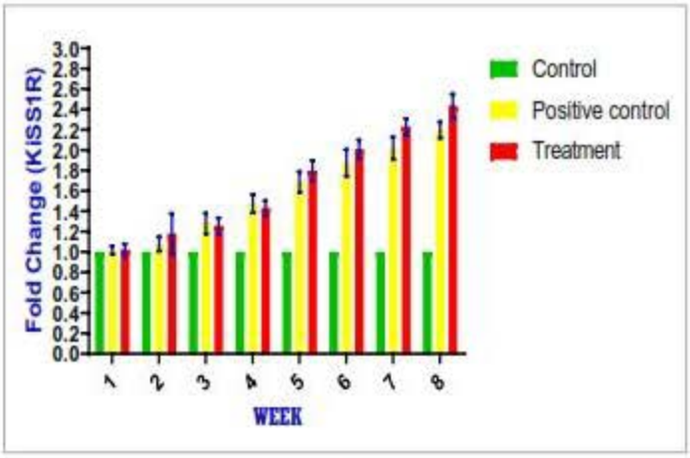


Fig: Mean (±SE) of total number of follicles in control and treatment group of postpartum buffaloes



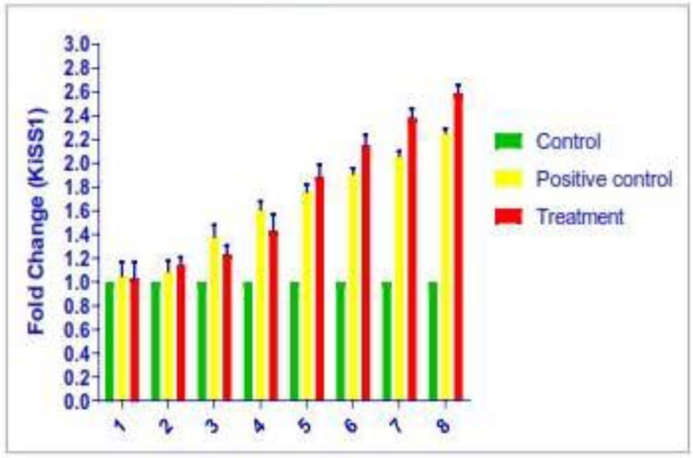


Fig. Mean (±SE) fold change in mRNA expression of KiSS1/KISS 1R gene in postpartum anestrus buffaloes of control and treatment group

Treatment of Wounds of Cattle and Buffaloes with Mesenchymal Stem Cells—A Success Story

Wounded cattle (27 no.) and buffaloes (19 no.) were treated with mesenchymal stem cells from first August 2020 onward. Photographs were taken after 15 and 25 days of treatment. All the treated animals suffering with wounds were cured within 25 days of treatment.

Likewise, a cloned buffalo No. 6923 at ABRC was severely suffering with horn injury and was restless. His horn was broken and maggots observed moving inside the horn. On the request of Incharge ABRC on 17.08.2020, the cloned buffalo was treated with mesenchymal stem cells within FIVE (5) days on 21.08.2020.

Encouraged with the success, hooves and horns of 25 wounded cattle and 18 buffaloes at NDRI herd were treated with *in vitro* culture mesenchymal stem cells from 1st August 2020 onwards. Almost all animals were cured within 15 days.

EXTENSION

DAIRY EXTENSION DIVISION

Field/Farm Technician (FFT) Activity

The Field/Farm Technician (FFT) Laboratory of Dairy Extension Division provides a base for extension work in the adopted villages around Karnal and keeps the records of all extension activities of the division. The FFT Laboratory is operated through Stockman Centre. The Stockmen are the grass-root level workers through whom a live and regular contact between scientists and farmers is established. The major activities being carried out through these Centers are:

Activities Conducted in Adopted Villages from July to September 2020

Sl. No.	Activities Conducted	No. of Cases
1	A.I. in Cows	49
2	A.I. in Buffaloes	15
3	Deworming Cases	56
4	Dehorning	16
5	General Treatment	42
6	Tick Control	20

Dairy Education at Farmers' Door

Dairy Extension Division organized the ongoing Extension Education Programme "Dairy Education at Farmers' Door" to strengthen the effective dissemination of dairy production and processing technologies among farming community. Under this programme, a team of NDRI scientists including subject matter specialist from production, processing and management group visited a new cluster of villages viz. Deepo, Kulwaheri and Bhoji Khalsa in Karnal district on 2nd Saturday of every Month during the period under report. Extension scientists obtained the feedback from the participating farmers. The key points of interactions were: Management of dairy animals, Management of silent heat in animals, feed and fodder Management.

Kisan Sangoshthies

Ten Kisan Sangoshthies were organized at village level to deliberate on various topics comprising: Management of animals, Preparation of ration at home, Care and management of pregnant animals, immunity improvement in dairy animals. Clean India campaign, Preparation of milk products at home during lockdown period and tips for selling of milk-to venders/ consumers, etc.

Farmers' Farm School

Farmers' Farm School (FFS) under educational approach (sixth batch) of NDRI was started in village Bhoji Khalsa, Karnal. A total of 20 farmers were enrolled as students. One day exposure visit and tour was organized at the institute. Regular classes were continuously organized on every Friday and Saturday for educating the farmers in dairy farming and its allied activities.

KRISHI VIGYAN KENDRA

A webinar on "Importance of Weather Forecast for increasing farmers' income" was conducted by KVK in association with IFFCO Kisan on July 27, 2020 in which 450 participants including farmers participated.

On-campus Training

A 200 hours Skill development training on Vermi-compost production was completed at KVK attended by 200 participants.

Celebration and Organization of Poshan Maah

A Lecture was delivered on "Food Security and Nutrition by Kitchen gardening under Poshan Maah on September 1, 2020 at Ghogripur village for 15 village women.

KVK organized three off Campus training-cum-lecture sessions on importance of first 1000 days of human life, nutri-thali, nutri-garden and bio-fortified varieties under Poshan Maah celebration. It was organized at Dahajagir, Kunjpura village and panchayat bhawan on September 17, 2020, September 25, 2020 and September 28, 2020, respectively, in which 69, 57 and 97 anganwadi workers, farm women, pregnant and lactating mothers and adolescent girls participated. The program was attended by Mrs. Madhu Pathak, CDPO, Karnal and Ms. Amrutha, Chief Minister Good Governance Associate and Mrs. Rajbala, DPO.

Field Day

Field day on Sorghum variety CSH 24 was organized by KVK at village Badarpur on September 2, 2020 in which 12 farmers participated and at village Bhenikhurd on September 9, 2020 in which 6 farmers participated.

Lectures Organized and Delivered by KVK

KVK organized World Breast Feeding Day at Barota village on August 7, 2020, in which lecture on importance of breast feeding for both baby and mother was delivered. It was attended by 20 farm women, home-makers and members of SHG. A lecture was delivered on scientific animal management at Kamalpur Rodan on August 25, 2020 participated by 37 farmers.

Off-Campus Trainings Organized by KVK

Sr. No.	Title of the Training	Date	Village	No. of Farmers
1.	Paddy crop protection control measures and fodder crop production	August 5, 2020	Kulvehri	14
2.	Entrepreneurship development for women	August 25, 2020	Daha Jagir	14
3.	Off-campus training on paddy crop protection measures	September 2, 2020	Badarpur and Khera	17
		August 25, 2020	Kamalpur Rodan	37

Awareness Programs Organized by KVK

Sr. No.	Title of the Awareness Program	Date	Village	No. of Farmers
1.	Awareness against crop residue burning and paddy crop residue management	August 11, 2020	Sirsi	16
		August 20, 2020	Sangroha	22
		September 2, 2020	Badarpur and Khera	17
		September 29, 2020	Barotha	27
2.	Awareness against crop residue management	August 25, 2020	Kamalpur Rodan	37

EVENTS

Golden Jubilee Forage Garden

All India Coordinated research project (AICRP) on forage has been celebrating year 2020 as a "Golden Jubilee Year". To create awareness among the dairy stakeholders NDRI established a "**Golden Jubilee Forage Garden"** in the forage production farm at Karnal. The Garden was inaugurated by Honourable Director of NDRI, Dr. Manmohan Singh Chauhan in the presence of Head of Divisions, scientists and other dairy stakeholders on July 3, 2020. Dr. Chauhan emphasized the importance of green fodder and assured that by providing green fodder to dairy animals, the cost of milk production could be reduced. During the inaugural programme, Dr. B. S. Meena, Nodal officer, Forage Garden, explained about planted forage species and future activities of Garden.

The Details of Planted Forage Germplasm

Name of forage	No. of varieties	Name of Variety/species
Napier grass (Pennisetum purpureum)	10	IGFRI-3, IGFRI-6, IGFRI-7, IGFRI-10,NB-21, Thin Napier, CO-3, TSH, Yashwant (RBN-9), Super Napier
Guinea grass (*Panicum maximum*)	3	Hamil, Bundel Buldel Guinea-1, Buldel Guinea-2
Setaria Grass (*Setaria sphacelata*)	1	Nandi
Anjan Grass (Cenchrus ciliaris)	2	IGFRI- 727, IGFRI-3108
Dhaman grass (Cenchrus setigerus)	1	
Butterfly pea (*Clitoria ternatea*)	2	Blue flower, White flower
Ramie (Boehmeria nivea)	1	
Fodder tree & Shurbs	5	Bhimal, Ardu, Hedge Lucerne, Ramie, drum stick

Encouraging Women to be Self-reliant in Dairying

Small group interaction with women SHGs under Department of Science and Technology project was held at Agricultural Technology Information Centre, ICAR-National Dairy Research Institute (NDRI), Karnal on July 20, 2020. Women being the predominant player in dairying, their empowerment in terms of knowledge and skill would bring appreciable dividends for the family, society and the dairy sector as a whole. ICAR-National Dairy Research institute (NDRI), Karnal is always at the forefront in empowering women especially on value addition to milk and milk products. While interaction with women groups formed under the Department of Science and Technology (DST) funded research project namely, "Improving Livelihood of Rural Women through Dairy based Secondary Agriculture", Dr. M. S. Chauhan, Director, NDRI laid emphasis on the concept of Atmanirbhar i.e. self-reliance in dairy production, processing and marketing. He further stated that in times of pandemic like Covid-19 crisis, when everyone fears in moving out for purchase of various household requirements, village level production and distribution would be highly useful. This especially holds good for milk and milk products as they can be easily procured and products can be prepared. In this process, women being the critical worker in dairying activities, they can certainly contribute and fulfill the dreams of self-reliance. He also advised the women groups to train the fellow women so that the scientific message would reach larger audience. Dr. K. Ponnusamy while welcoming the participants informed that out of 27 women groups formed under the DST project, ten groups are efficiently working in three districts of Haryana. He further stated that women groups prepare paneer, whey drink, burfi, gulab jamun, curd and ghee depending upon their demand in their respective areas.

Mr. Abhimanyu, District Development Manager (DDM), NABARD, Karnal stressed upon the utilization of credit facilities from banks for starting and expanding the dairy venture. He further stated that NABARD has launched an App and a retail outlet "Farm Mantra" which would help women SHGs and local farmers to connect with the markets and sell their products through this online outlet. He further stated that women groups can develop the enterprise model and start the outlet for marketing. Dr. Rajeev Gulyani, Retired Principal Scientist from Central Sheep and Wool Research Institute, Avikanagar explained the role of SEED Division of DST and emphasized the hygienic production of milk products which can fetch higher price in the market. He stressed upon the importance of developing the capacity of women to absorb the technologies in right perspective.

Webinar on Far-reaching Impact of the Global Pandemic Corona (COVID-19) on Dairy Farmers

The webinar on 'Far-reaching Impact of the Global Pandemic Corona (COVID-19) on Dairy Farmers' was inaugurated by Dr. M. S. Chauhan, Director, ICAR- NDRI, Karnal on July 29, 2020. Dr. Chauhan called upon scientists for developing farmers' friendly technologies and practices of scientific dairy

farming for increasing the income of dairy farmers. Subject matter specialists of the Institute shared their experiences regarding impact of global pandemic corona on milk production and marketing, demand of milk and milk products, artificial insemination in dairy animals, animal production and management, fodder production and storage, milk processing units at village level for better utilization of milk and milk products in local market.

The progressive farmers and scientists of sister ICAR- Institutes located at Karnal and research scholars participated in this webinar. A question- answer session was also organized for the dairy farmers on problems being faced by the farmers during corona pandemic. The subject matter specialists of the Institute explained the solutions of their problems.

Scientific Meeting of Animal Biotechnology

A scientific meeting was held at ICAR-National Dairy Research Institute, Karnal under the leadership of Dr. M. S. Chauhan, Director, NDRI, Dr. Arun Kumar Rawat, Advisor Department of Biotechnology, India was invited as the the Chief-Guest of the meeting. Dr. Chauhan told that the Department of Biotechnology, New Delhi has been the driving force behind various successful technologies reproductive technologies like embryo transfer technology, *in vitro* fertilization, cloning etc. developed by NDRI. These technologies have helped not only to preserve high genetic potential of animals but have also helped to increase milk production per animal. He told that NDRI is the leading animal institute in animal cloning and now many States Agricultural Universities are learning this technique and DAHD, Govt. of India is establishing ten ETT labs across the country to produce elite ET calves. Dr. Rawat mentioned about the contributions of ICAR and its institutions in enhacing the productivity of livestock. He opined that collaboration between ICAR and DBT has developed a large number of technologies and products being used by user industries. He emphasised on quality research which can directly benefit farming community.

Webinar on Holistic Approach to Overall Well-being

A Webinar on 'Holistic Approach to Overall Well-being' was organised under the aegis of NAHEP and Student Empowerment Unit to commemorate 150th birth anniversary of Mahatma Gandhi (150th *Gandhi Jayanti*) at ICAR-National Dairy Research Institute, Karnal on x September 29, 2020. Dr M. S. Chauhan, Hon'ble Director, ICAR NDRI presided over the programme. The objective of this Webinar was to bring about much needed awareness amongst the faculty and students about maintaining the work-life balance for their holistic development and overall well-being.

Reiterating the Gandhian philosophy, Dr. M.S. Chauhan focussed on strong nation building by following cleanliness mantra; proper sanitation and hygiene; protecting the environment and preserving the *swadeshi* culture. He said 'happiness is when what we think, what we speak and what we do are in complete harmony'. He emphasized that success code includes self-acceptance, personal growth, autonomy, positive relations with others and life satisfaction.

Two eminent personalities, Dr. Ata-Ul-Munim Tak, Deputy Chief Executive Officer, State Health Agency, Ayushmaan Bharat Pradhan Mantri Jan Arogya Yojna, J&K and Ms. Manisha Mehta, Clinical Dietician and Sports Nutritionist acted as resource persons for this webinar. Dr. Tak delivered the talk on 'Successful Life-The Code' and advised the students not to be deterred by failures which are the stepping stone to success. He motivated the students to remain firm even in the tough times and also be ready for taking risks. He urged students to consider this COVID19 pandemic an opportunity to resolve several issues related to dairy and food sector. Ms. Manisha Mehta talked on 'The angles we miss in nutrition' and apprised the students that it is not only the good nutrition that matters but also the exercising at least 4/7 and timely sleep. Ms. Mehta emphasized that our diet should be in sync with our goal; health issues; food choices; taste and gut preferences; work and travel schedules; food availability and cost preferences. She stressed that meal composition is much more important than the meal option. Around 100 participants including the faculty and the students attended the webinar.

HONOURS AND AWARDS

Awards presented by Indian Council of Agricultural Research (ICAR), New Delhi on ICAR Foundation Day on July 16, 2020.

- **Dr. Rajan Sharma**, Principal Scientist, Dairy Chemistry Division, ICAR-NDRI, Karnal received **"Bharat Ratna Dr. C. Subramaniam Award"** for Outstanding Teachers 2019 and a cash prize of Rs 1 Lakh.
- **Mr. Mohamad Iqbal Bhatt**, Ph.D. student of Animal Biochemistry Division, ICAR-NDRI, Karnal received **"Jawahar Lal Nehru Award"** for his Ph.D. Theses (**Guide: Dr. Rajiv Kapila**).
- Grih Patrika "Dugdh Ganga" published by ICAR-NDRI, Karnal received **"Ganesh Shankar Vidyarthi Hindi Patrika Purasakaar (Second Prize)"** under the category of Large ICAR Institutes presented by Indian Council of Agricultural Research (ICAR), New Delhi.
- **Dr. Uttam Kumar**, Chief Technical Officer, ICAR-NDRI, Karnal received **"ICAR Best Worker Award"** under Technical Category presented by Indian Council of Agricultural Research (ICAR), New Delhi.
- **Mr. Vijender Kumar**, Skilled Supporting Staff, ICAR-NDRI, Karnal received **"ICAR Best Worker Award"** under Supporting Staff Category presented by Indian Council of Agricultural Research (ICAR), New Delhi.
- **Dr. Nishant Kumar**, Senior Scientist and co-workers, LPM Section received **"Best Oral Presentation Award"** in International Webinar on Urban and Peri-urban Agriculture for Livelihood organized by Dr. Ram Avatar Shiksha Samity & ICAR-CAZRI, RRS, Pali, Maewad, Rajasthan from July 29-30, 2020.
- **Mr Girish Rajpurohit**, B.Tech 3rd Year; **Mr Harshal**, B.Tech 1st Year; **Ms Suhani Sharma**, B.Tech 1st Year; **Mr David Haokip**, B.Tech 1st Year and **Mr. Prince Kambo**, B.Tech 1st Year won first prize carrying an award of Rs 15000/- in **National Level Documentary/Short Film Competition on 'High Impact Scientific Interventions for Societal Development'** organized by Indian Institute of Food Processing Technology, Thanjavur for remembering the scientific contributions of Dr A P J Abdul Kalam.

PERSONALIA

Joining/Appointment/Promotion

- Consequent upon his promotion **Sh. Dhiraj Sharma**, joined as Deputy Director (Official Language), ICAR-NDRI, Kamal w.e.f. 10.09.2020.
- **Dr. Raj Kumar**, Senior Scientist, Agricultural Extension, joined his duties in the FN of 17.08.2020 at ICAR-NDRI, Karnal after having been relieved from ICAR-Central Sheep & Wool Research Institute, Avikanagar, Rajasthan in the AN of 14.08.2020.
- **Sh. Subhash Chander**, Assistant promoted to the post of Assistant Administrative Officer w.e.f. 11.08.2020.

Transfers/Retirements/Relieving

- **Dr. Sunita Grover**, Head, Dairy Microbology Division retired from Council's service w.e.f. 31.07.2020.
- **Dr. Mahendra Singh**, Head, Animal Physiology Division retired from Council's service w.e.f. 31.07.2020.
- **Dr. Sujata Pandita**, Principal Scientist, Animal Physiology Division retired from Council's service w.e.f. 31.07.2020.
- **Dr. B. Surendranath**, Principal Scientist, Dairy Chemistry, Southern Regional Station, Bengaluru retired from Council's service w.e.f. 31.08.2020.
- **Dr. Prabhat Palta**, Principal Scientist, Animal Biotechnology Centre retired from Council's service w.e.f. 30.09.2020.
- **Dr. Vedamurthy** G V. Scientist, Animal Bio-Chemistry transferred from ICAR-NDRI, Karnal to Southern Regional Station of ICAR-NDRI, Bengaluru w.e.f. 17.07.2020.

Additional Responsibility

- **Dr. Anil Kumar Puniya**, Principal Scientist Dairy Microbiology Division entrusted with the additional responsibility of Acting Head for a period of six months w.e.f. 1.8.2020.

राजभाषा एकक

संस्थान राजभाषा कार्यान्वयन समिति की तिमाही बैठक

संस्थान के निदेशक डा. एम.एस.चौहान की अध्यक्षता में सामाजिक दूरी मानकों को दृढ़ता से पालने करने हुए पिनाकी सभागार में 9.9.2020 को तिमाही हिन्दी बैठक का आयोजन किया गया। बैठक में समिति के पदाधिकारियों की सर्वसम्मति से निर्णित बिन्दुओं पर समय पर कार्रवाई करने तथा संस्थान में राजभाषा हिन्दी के कार्यान्वयन की गति को बढ़ाने का निर्णय लिया गया।

तिमाही बैठक का सोशल डिस्टेन्सिंग के पालन के साथ आयोजन

हिन्दी पखवाड़ा का आयोजन

संस्थान ने हिन्दी माह अर्थात् 14 सितंबर से 13 अक्तूबर 2020 की अवधि को हिन्दी उल्लास पर्व के रूप में मनाने का निर्णय लिया। इस दौरान संस्थान ने 14 सितंबर 2020 को हिन्दी दिवस कार्यक्रम का वर्चुअल आयोजन किया जिसमें संस्थान के करनाल मुख्यालय एवं बेंगलूरू व कल्याणी केन्द्रों के वैज्ञानिकों ने हिन्दी के महत्व व इसके कार्यान्वयन को बढ़ाने पर अपने विचार रखे तथा हिन्दी कविताओं का प्रस्तुतीकरण भी किया। हिन्दी उल्लास माह के दौरान 16.9.2020 को हिन्दी निबंध लेखन प्रतियोगिता, 18.9.2020 को हिन्दी टिप्पणध प्रारूप लेखन प्रतियोगिता, 21.9.2020 को वर्चुअल हिन्दी कार्यशाला, 25.9.2020 को नगरस्तरीय हिन्दी व्याख्यानामाला, 26.9.2020 को ऑनलाइन हिन्दी शोध–पत्र पोस्टर प्रदर्शन प्रतियोगिता तथा हिन्दी दिवस से प्रारंभ कर मासिक हिन्दी नोटिंग व हिन्दी इन्दराज अभियान का आयोजन किया गया।

वर्चुअल राजभाषा गतिविधियां

संस्थान ने कोविड की रोकथाम संबंधी निर्देशों के अनुसरण में 29.7.2020 को करनाल स्थित भारतीय कृषि अनुसंधान परिषद के संस्थानों–राडेअनुसं, केन्द्रीय मृदा लवणता अनुसंधान संस्थान, भारतीय गेहूँ एवं जौ अनुसंधान संस्थान, राष्ट्रीय पशु आनुवंशिक संसाधन ब्यूरो, गन्ना प्रजनन संस्थान व भारतीय कृषि अनुसंधान संस्थान, करनाल के वैज्ञानिकों व संबंधित संस्थानों से जुड़े प्रगतिशील किसानों के लिए "कोरोना के कारण कृषकों व पशुपालकों पर दूरगामी प्रभाव" विषय पर 181 प्रतिभागियों के लिए एकदिवसीय वैज्ञानिक संगोष्ठी का वर्चुअल वेबिनार के माध्यम से आयोजन किया, जिसमें 12 विषय विशेषज्ञ वैज्ञानिकों के द्वारा दिए गए विषय पर प्रस्तुतीकरण के साथ अपने विचार रखे गए तथा प्रतिभागियों की शंकाओं का समाधान किया गया। 21 सितंबर 2020 को ई–टूल्स के द्वारा हिन्दी का प्रयोग कैसे बढ़ाएं जैसे महत्वपूर्ण समसामयिक विषय पर गृह मत्रालय, राजभाषा विभाग, भारत सरकार के श्री नागेन्द्र सिंह, वरिष्ठ तकनीकी निदेशक ने 98 प्रतिभागियों को वीडियो कॉन्फ्रेन्सिंग के माध्यम से नगरस्तरीय हिन्दी कार्यशाला में प्रशिक्षण प्रदान किया। 25 सितंबर 2020 को 88 प्रतिभागियों के लिए नगरस्तरीय गांधी स्मृति व्याख्यानामाला का वर्चुअल आयोजन किया गया। इसीप्रकार 2 अक्तूबर 2020 को वीडियो कान्फ्रेन्सिंग से 82 प्रतिभागियों ने दिल्ली विश्वविद्यालय के प्रोफेसर सुधीर सिंह द्वारा गांधीवादी दर्शन की वर्तमान समाज में उपयोगिता जैसे अत्यंत उपयोगी व्याख्यान सत्र का भरपूर लाभ उठाया।

नगरस्तरीय राजभाषा गतिविधियां

नगर राजभाषा कार्यान्वयन समिति, करनाल के अध्यक्षीय कार्यालय के रूप में संस्थान के द्वारा 4.8.2020 को नगरस्तरीय छमाही समीक्षा बैठक व वार्षिक नराकास पुरस्कार घोषणा कार्यक्रम का डा. एम.एस. चौहान, निदेशक, राडेअनुसं, करनाल एवं अध्यक्ष, नराकास, करनाल की अध्यक्षता व गृह मंत्रालय के उप निदेशक(कार्यान्वयन) श्री के. पी.शर्मा जी के मुख्य आतिथ्य में वीडियो कान्फ्रेसिंग के माध्यम से आयोजन किया गया। इस कार्यक्रम में राजभाषा के क्षेत्र में उत्कृष्ट कार्य करने वाले कार्यालयों के वार्षिक नराकास करनाल के राजभाषा पुरस्कारों के अन्तर्गत केन्द्रीय कार्यालय श्रेणी में 10 सदस्य कार्यालयों को, शोध संस्थान श्रेणी में 6 सदस्य कार्यालयों को, बैंक श्रेणी में 10 सदस्य बैंकों व निगम एवं लिमिटेड श्रेणी में समिति के 6 सदस्य कार्यालयों को सम्मानित करने की घोषणा की गई। इस वर्चुअल बैठक के दौरान ही नराकास करनाल के उत्कृष्ट हिन्दी प्रकाशन वार्षिक पुरस्कार 2018–19 की घोषणा भी की गई, जिसमें उत्कृष्ट हिन्दी गृह पत्रिका श्रेणी में 5 सदस्य कार्यालयों को, उत्कृष्ट वार्षिक प्रतिवेदन श्रेणी में 3 सदस्य कार्यालयों को, उत्कृष्ट समाचार पत्रक श्रेणी में 3 सदस्य कार्यालयों को, उत्कृष्ट हिन्दी तकनीकी पुस्तिका श्रेणी में 3 सदस्य कार्यालयों को व उत्कृष्ट हिन्दी लीफलेटध्फोल्डर श्रेणी में 3 सदस्य कार्यालयों को प्रशस्ति प्रमाणपत्रों से सम्मानित करने की घोषणा की गई। नगर राजभाषा कार्यान्वयन समिति के वार्षिक पुरस्कारों के अंतर्गत हिन्दी कार्यों व हिन्दी प्रकाशन की दिशा में सराहनीय कार्यों के लिए शोध संस्थान श्रेणी में प्रथम पुरस्कार, संस्थान की गृह पत्रिका "दुग्ध गंगा" को प्रथम पुरस्कार एवं त्रैमासिक विस्तार पत्रिका "डेरी समाचार" को तृतीय पुरस्कार प्राप्त हुआ।

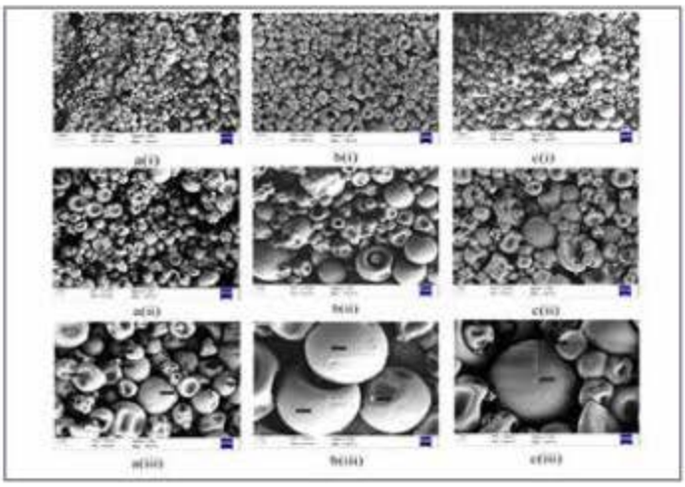
SOUTHERN CAMPUS, BENGALURU

RESEARCH NEWS

Microencapsulation of Curcumin by Spray Drying

(Saurabh Shankar Patel, Heartwin A. Pushpadass, F. Magdaline Eljeeva Emerald and B. Surendra Nath)

Curcumin, a major bioactive component of turmeric (*Curcuma longa*), was microencapsulated by spray drying in the matrix of HI-CAP 100 (resistant starch)/ maltodextrin and whey protein isolate to improve its oral bioavailability and solubility. Taguchi orthogonal array design (L_{18}) was used to optimize the spray drying conditions. The optimal conditions for microencapsulation were inlet drying air temperature of 185°C, feed rate of 6 mL/ min and HI-CAP 100 as wall material. The moisture content,

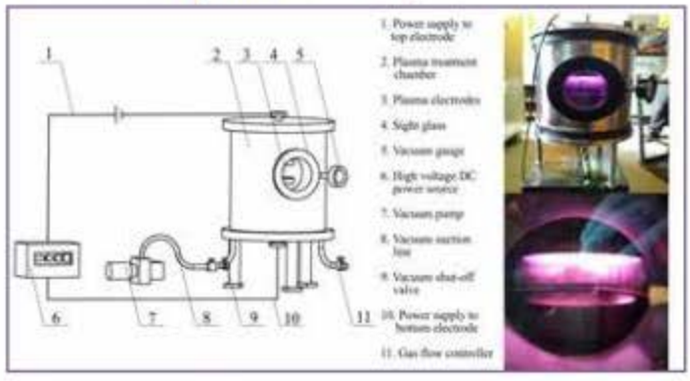


encapsulation efficiency and bulk density at these conditions were 4.65%, 82.42% and 358.40 kg/m^3, respectively. The mean $d_{0.1}$, $d_{0.5}$ and $d_{0.9}$ particle diameters of curcumin microcapsules produced under the optimized conditions were 2.67, 14.10 and 49.36 µm, respectively. The microcapsules had better heat stability and *in-vitro* release as compared to that of pure curcumin. The DPPH free radical scavenging activity of curcumin was largely unaffected after microencapsulation.

Cold Plasma-Vacuum Packaging Treatment for Shelf-Life Enhancement of Indian Cottage Cheese

(Aditya Sukumar P, Heartwin A. Pushpadass, F. Magdaline Eljeeva Emerald and B. Surendra Nath)

Combination of cold plasma treatment and vacuum packaging were used to enhance the shelf life of paneer. A cold plasma unit, which could generate plasma at partial vacuum (630 mm of Hg), operating at voltage levels of 10-30 kV (DC) and 0.01-0.02 A current was fabricated. Paneer cubes of 1, 1.5 and 2 cm sides prepared from cow milk were treated with cold plasma generated at 15, 20 and 25 kV at exposure times of 1, 3 and 5 min. Even though significant moisture loss occurred in the treated paneer (depending on the sample size and exposure time), no major changes were observed in its titratable acidity, whiteness index, hydrolytic rancidity (FFA) and thiobarbituric acid reactive substances (TBARS) value after treatment. The lowest microbial load of 150 CFU/g was reported for 1 cm sized cubes treated at 25 kV for 5 min as compared to 2570 CFU/g in fresh paneer. The cold plasma treatment conditions for paneer were optimized. Paneer treated using the optimized cold plasma conditions were vacuum packed and stored for a period 15 days under refrigerated conditions of 8-10°C. Significant increase in total plate count was observed in the untreated sample, while only a slow and steady increase was observed in cold plasma-treated samples.



TECHNOLOGIES

Milk-Malted Finger Millet Based Composite Probiotic Beverage

(Shubham Kumar, Monika Sharma, Devaraja H. C. and Menon Rekha Ravindra)

Probiotic and synbiotic beverages are one of the promising functional foods. One such composite probiotic beverage was prepared using milk, malted finger millet and two probiotic cultures; *Lactobacillus rhamnosus* RSI3 and *L. casei*. The level of finger millet malt, probiotic cultures, water: curd ratio, impeller speed of the turbo disperser and duration of mixing were various variables. The effect of these process variables was studied

on various quality attributes and based upon the maximum sensory acceptability, optimized product was obtained. The optimized composite beverage had 14.06% total solids, 0.20% fat, 3.01% protein, 1.15% ash, 0.42% crude fiber and 148 mg/100g calcium and 10.49 Log cfu/mL probiotic count. The product kept well for 12 days in PET bottles at 4°C in terms of sensory acceptability and probiotic count.

Poly-lactic Acid and Coconut Shell Powder Based Composite for Biodegradable Rigid Container Development

(Darshan H. K., Sathish Kumar, M. H. and S. S. Chauhan)

Efforts were made to develop bio-degradable composite using poly-lactic acid (PLA) and coconut shell powder (CSP). The PLA-CSP blends with three different weight proportions (70:30, 75:25, and 80:20), along with ploye thyleglycol-400 (PEG-400) and maleic anhydride (MA) were prepared. The pre-determined proportions of PLA, CSP, PEG-400 and MA amounting to 2 kg material for every batch was compounded as per asymmetric factorial design, compounded, extruded, pelletized and injection moulded to dumbbell and cylindrical shaped specimen for evaluating tensile and flexural properties, respectively. Addition of CSP, PEG decreased the tensile strength (TS) of the composites. The elongation at break (EB) also decreased with addition of CSP. The MA addition increased EB of the composite. Based on better elongation at break and less water absorption 25% CSP + 5% PEG + 1% MA was suggested to prepare biodegradable injection moulding containers to be used in packaging of solid dairy products.

Fig Injection moulding process [A. Compounding, B. Extrusion, C. Pellets, D. Injection moulding and E. Testing Specimens]

EVENTS ORGANIZED

98th Foundation Day of ICAR-NDRI Celebrated in Virtual Mode

The 98th Foundation Day of ICAR-NDRI was celebrated on July 1, 2020 in virtual mode hosted by SRS of ICAR-NDRI, Adugodi, Bengaluru with the support of Alumni Association, SRS of ICAR-NDRI, Bengaluru. Dr. K. P. Ramesha, Head of SRS welcomed all the participants and complimented all the staff on the occasion of 98th Foundation Day of NDRI. He recalled that the Institute was established at Bengaluru way back in 1923 and since then contributed immensely to the dairy sector of the country. He also mentioned the association of great personalities like Mahatma Gandhi and Dr. V. Kurien with this Institute. This was followed by a detailed presentation by Dr. R. R. B. Singh, Joint Director-Academic on the achievements and contributions of ICAR-NDRI in dairy research and education. Dr. B. N. Tripathi, Deputy Director General (AS), ICAR, New Delhi, in his address congratulated ICAR-NDRI on the occasion of 98th Foundation Day and hoped that the Institute would continue to contribute to the progress of Dairy Sector in the country. He recalled the contributions of SRS of ICAR-NDRI, Bengaluru. He also enlisted the thrust areas for research for ICAR-NDRI. Shri R. Ramanan, Additional Secretary to GOI & Mission Director, Atal Innovation Mission, NITI Aayog, New Delhi, delivered Foundation Day Lecture. He complimented the Institute on the Foundation Day and hoped that SRS-NDRI, Bengaluru would establish a world class Atal Incubation Centre at the earliest in its campus. Being at the helm of prestigious Atal Innovation Mission of NITI Aayog, he delineated the importance of incubators, and stressed that these would immensely contribute to building self-reliant India. Dr. A. K. Srivastava and Dr. R. K. Singh in their remarks complimented the Institute on the occasion of 98th Foundation Day and extended all the support to the efforts of the Institute to boost the dairying in the country. Dr. M. S. Chauhan, in his presidential address, expressed gratitude to

the earlier Directors for their contributions and stressed that we have more responsibility to work towards betterment of dairy farmers especially in the present crisis situation. The programme was also participated by distinguished personalities, Staff and students of ICAR-NDRI, Karnal, SRS, Bengaluru and ERS, Kalyani as well as Alumni. The Programme concluded with the Vote of thanks proposed by Dr. Dheer Singh.

Flow Cytometry Webinar

Theriogenology Laboratory of Southern Campus of ICAR-NDRI, Bengaluru in collaboration with Beckman Coulter Life Sciences, India organized a paid webinar on "Application of Flow cytometer in Semen Analysis" during July 21-22, 2020. The objective of the workshop was to impart the participants with knowledge on flow cytometry instrumentation, experiment designing, flow cytometry analysis of sperm quality, data analysis and interpretation of results. A total of 101 participants from different parts of the country attended the webinar. During the workshop, expert lectures from the company and from SRS were arranged and participants were appraised about the basics and concepts of flow cytometry applications. Besides the lectures, experiments on flow cytometric assessment of sperm viability, intracellular calcium, reactive oxygen species, acrosomal integrity etc were demonstrated using previously recorded video. Dr. A. Kumaresan from SRS of ICAR-NDRI, Mr. Mukund Joshi, Mr. Jitin C Mohan, Ms. Pooja Dalvi and Mr. Kaushik De from Beckman Coulter Life Sciences were the resource persons for the webinar. During the valedictory function held on July 22, 2020, Dr. K. P. Ramesha, Head, SRS urged the participants to use the knowledge and skills acquired through the webinar in day to day use of the machine and stressed for collaborative research and development. Mr. Niraj Khurana, National Marketing Manager, Beckman Coulter Life Sciences explained how best the flow cytometry could be useful for research and diagnostic applications and appraised the participants about the developments in flow cytometry. Dr. A. Kumaresan, Principal Scientist (Animal Reproduction) was the coordinator for the webinar.

Webinar on "Stray Cattle: Strategies and Challenges"

Stray Cattle has emerged as an important issue in view of the damage to the environment, transport system and general living of people besides public health concerns. Keeping in view the seriousness of the issue, Southern Campus of ICAR-NDRI in association with the National Academy of Dairy Sciences (India) organized a National Webinar on "Stray Cattle: Strategies and Challenges" on September 5, 2020. The issue

was flagged off by Dr. A. K. Srivastava, Member, Agricultural Scientist Recruitment Board, New Delhi & President of NADS(I). He emphasized the problems associated with stray cattle, both on human beings as well as on animal welfare at country level and felt an ardent need for a proper policy for management of the stray cattle. He said if rearing of these animals is made remunerative by utilizing these cattle for "dry dairying", then the problem of stray cattle will substantially be reduced. Dr. Vallabhbhai Kathiria, the Chairman of Rastriya Kamdhenu Aayog, in his keynote address stressed the importance of utilizing the so-called stray cattle as a resource for livelihood improvement of farmers by implementing co-operative model for utilization of byproducts from cattle. He drew the attention of the webinar attendees to brainstorm the issue among policy makers, scientists and stakeholders to develop an effective and implementable policy to reduce the stray cattle population. Dr. B. N. Tripathi, Deputy Director General (Animal Sciences), ICAR reiterated that a comprehensive policy paper needs to be formulated on this aspect and submitted to the Government for implementation. Dr. M. S. Chauhan, Director, NDRI presented the usefulness of Ovum Pick-up and IVF technology for effective utilization of stray cows as surrogate mothers. Dr. K. P. Ramesha, Head, SRS of ICAR-NDRI and the convener of the webinar informed that several studies showed that the dry dairying ventures can prove rearing of the so called 'useless stray cattle' as economically viable. He stated that the stray cattle can be converted into resource by providing a sustenance diet for producing fuel, bio-fertilizers, bio-pesticides and other value-added by-products. The presentations and lectures were followed by the comments and expert opinion of a galaxy of scientists including several vice-chancellors, Directors and other eminent personalities in the chosen area. More than 180 persons across the country attended the webinar. The webinar ended with vote of thanks by Dr. S. Jayakumar.

Webinar on "Contaminants in Milk and Milk Products"

A webinar on "Contaminants in milk and milk products" was organized by Alumni Association, SRS of ICAR-NDRI, Bengaluru on August 28, 2020. Dr. Manoj Kudupoje, Research Scientist, Alltech, USA who worked several years on food contamination and amelioration delivered the talk. Dr. K. P. Ramesha, President, Alumni Association and Head, SRS welcomed all the participants to the guest lecture. Dr. M. S. Chauhan, Director, ICAR-NDRI, Karnal in his opening remarks stated that the topic chosen is appropriate to the context and urged scientists and industry to work together in producing and marketing safe dairy products in the country. Dr. Manoj Kudupoje in his lecture gave an overall view of food contamination in India vis-a-vis other countries which suggested India needs improvement. Then, he systematically brought out various sources of contaminants in milk and milk products and categorized them as microbial, chemicals like pesticides, antibiotic, heavy metals, additives and mycotoxins. He has also cited some of the recent data on the contaminants in milk. He further cautioned that in India there are high chances of contamination of food in general and milk and milk products in particular. Dr. Kudupoje struck a positive note by suggesting that we need to be more vigilant and alert and argued for emphatic role of organizations like FSSAI, NGOs and consumer forums. The webinar/guest lecture was

attended by over 190 participants including scientists, alumni, former vice chancellors, students, professionals from industry such as Heritage Dairy, Dodla dairy etc.

CONSULTANCY

Yoghurt drink mix homogenization trials were carried out for M/S Thinking Forks, Indiranagar, Bengaluru earning revenue of Rs 18,880/- in September, 2020.

EASTERN CAMPUS, KALYANI

RESEARCH NEWS

Utilization of North Eastern Himalayan Forest Tree Leaves as Herbal Feed Additive to Improve Growth Performances of Growing Calves

(A. Santra, S. K. Das, D. K. Mandal, T. K. Dutta and M. K. Ghosh)

Chemical feed additives proved very effective in reducing dietary energy and protein losses; however, contemporary biosecurity threats have restricted their use in the animal diets. Very often residue of the chemical feed additive was detected in animal products like meat and milk leading to unfit or harmful for human consumption. Therefore, there has been an increased interest to use natural products containing plant secondary compounds like tree leaves, instead of chemical feed additives to modify rumen fermentation for improving feed utilization and productive performance of ruminant animals. North-eastern part of India posseses wide variety of tree leaves, which are not yet tested as feed additive to improve animal productivity. Lutekhanew (*Ficus clavata*) tree leaves were collected from Gangtok, Sikkim during the month of September and sun dried grounded (2 mm size) leaf meals were used as feed additive for conducting the animal growth experiment. Twelve numbers of growing Jersey male cross-bred calves (about six months of age) were randomly divided in to three equal groups (G1, G2 and G3) and

Ficus clavata

were fed individually under stall feeding on a mixed ration containing 50 % paddy straw and 50 % concentrate mixture for 140 days. Three types of iso-nitrogenous concentrate mixtures (C1, C2 and C3) were prepared. Wheat bran in concentrate mixture C2 and C3 of test groups (G2 and G3) was replaced with Lutekhanew (*Ficus clavata*) leaf meal @ 4 and 8% (w/w), respectively.

Dietary supplementation of Lutekhanew (*Ficus clavata*) leaf meal as herbal feed additive did not have any effect on voluntary feed intake. On an average the calves of G1, G2 and G3 groups consumed 3.2, 3.3 and 3.3 kg DM per 100 kg body weight per day, respectively. Average daily body weight gain and feed conversion efficiency were higher for the calves supplemented with Lutekhanew (*Ficus clavata*) leaf meal as herbal feed additive (G2 and G3) than the non supplemented calves (G1). The calves of G1, G2 and G3 group consumed 102.5, 107.7 and 104.2 g DM, 7.6, 7.9 and 7.9 g DCP, 60.6, 65.5 and 65.4 g TDN per kg metabolic body size per day and had an average daily gain of 525.7, 557.8 and 597.1 g, respectively. Feed conversion efficiency in terms of DM, DCP and TDN intake per kg body weight gain was also higher ($P<0.01$) for the calves supplemented with Lutekhanew (*Ficus clavata*) leaf meal as herbal feed additive (G2 and G3) than the non supplemented calves (G1). Feed conversion efficiency of the calves in control e.g., G1grou and test groups e.g., G2 and G3 groups was 13.9, 14.7 and 15.9%, respectively. Further, average daily body weight gain and feed conversion efficiency were better in calves supplemented with Lutekhanew (*Ficus clavata*) leaf meal @ 8% in the concentrate mixture than the calves supplemented with Lutekhanew (*Ficus clavata*) leaf meal @ 4% in the concentrate mixture. The result of the study showed that dietary supplementation with Lutekhanew (*Ficus clavata*) leaf meal as herbal feed additive improved body weight gain and feed conversion efficiency of growing crossbred calves on a paddy straw based diet.

Growth Performance of Black Bengal Goats on Dietary Supplementation of Zinc Nanoparticles

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Nanotechnology bears a lot of promise for its application in nutritional science. Nanoparticles of minerals have been reported to have higher bioavailability due to their greater surface area, high catalytic efficiency and stronger absorption capability than its normal-sized particles. The present study was conducted to evaluate the effect of supplementation of nano zinc on growth performance, digestibility of nutrients and blood parameters in Black Bengal goat kids. The growth experiment was done for 120 days on 24 growing Black Bengal goat kids (4-6 month) divided into four equal groups.

The control group was fed basal diet (mixed forage + conc. Mixture @ 55:45 ratio) in which the mineral mixture used was devoid of zinc. The treatment groups were supplemented with 30 ppm Zn as ZnO (T1), and @ 30 and 15 ppm nano Zinc (30 nm size) in groups T2 and T3, respectively. The blood samples were collected at 0 and 120 day of experiment and different blood metabolites and serum enzymes were analyzed. A digestibility trial of seven days was also conducted at the end of the growth experiment. During growth trial, there was no significant difference in intake parameters. The digestibility of most of the nutrients (DM, CP, EE, NDF, ADF, TCHO, and OM) was positively influenced by supplementation of zinc irrespective of source and level. Blood metabolites such as serum glucose, serum albumin, serum globulin and serum total protein were not affected by zinc supplementation. Blood enzyme (AST, ALT and ALP) profile was also not affected by zinc supplementation. Average daily gain (g/d/kid) was significantly higher ($P<0.05$) in both the nano-Zn supplemented groups (T_2 and T_3) than control group. There was no significant difference ($P>0.05$) among the treatment groups (T1, T2, T3), indicating that nano zinc supplementation @ 15 ppm is sufficient to sustain the growth rate and feed conversion efficiency obtained for zinc supplementation @ 30 ppm. Total body weight gain was improved by around 12 per cent in nano zinc supplemented groups (T_2 and T_3) and by 6 percent in case of T1 (inorganic zinc @ 30 ppm) compared to the control group. The Feed conversion efficiency was significantly ($P<0.01$) higher in case of zinc supplemented groups than the control group. Finally, it can be concluded that supplementation of nano zinc @ 15 ppm over the basal diet (having around 33 ppm zinc) can significantly improve the digestibility of nutrients, growth rate and feed conversion efficiency of Black Bengal kids without any adverse effect on intake and blood parameters.

EXTENSION REPORT

Training Programmes Organized for Migrant Labours

Four off campus training programmes were organized for capacity building of the migrant labourers migrated from the place of their jobs to their native places due to Covid-19. They were trained in the field of scientific dairy farming. A series of four training programmes was organized on July 28, 2020, September 8, 2020, September 15, 2020 and September 22, 2020 from which 40 migrant labourers got benefitted. The training programmes were organized in North Chandamari, South Chandamari and Muratipur villages.

Celebration of 'Poshan Maah-2020' in the Month of September

One online training programme was organized on September 17, 2020 to sensitize the anganwadi workers and farm women

about the importance of nutritive food and value of balanced diet in growth and development of human being as a whole and children in particular. During the occasion seed packets containing 5 vegetable seeds were distributed among the participants for promoting the concept of kitchen garden. In the month long programme, a total of 89 seed packets were distributed among the farm women and anganwadi workers.

Extension Activities at Adopted Villages

Due to Covid-19 situation and lockdown imposed by local administration, the 'Dairy Vikas Kendra' located at Muratipur village was closed for some time and after the relaxation of the restriction, the centre has regularly provided the 'artificial insemination of cattle' and veterinary health care facility to the villagers. Through this centre a total of 9 artificial inseminations were carried out and 71 cases of livestock ailments were attended during the period under report. From these interventions a total of 40 farmers got benefitted.

Veterinary Health cum Vaccination Camp

Four veterinary health cum vaccination camps were organized on July 27, 2020, September 8, 2020, September 15, 2020 and September 22, 2020 in North Chandamari, South Chandamari and Muratipur villages. Through those camps 544 animals were vaccinated as well as treated and 155 farmers got benefitted.

Apart from that, another camp was organized on September 29, 2020 at 5 no Adibasipara, Kalyani under TSP project and from the camp 90 animals of 40 tribal farmers got vaccination and veterinary health care facility.