एन डी आर आई

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

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From the Director's Desk

India holds around 15% of the world's livestock population in 2% of world's geographical area, resulting in great pressure on land. Presently, India's livestock population is 536.76 million head, which is expected to grow at the rate of 0.55% in coming years and to reach 780.7 million by 2050. The majority of farmers in India are small and marginal, having less than two hectares of land. The average size of landholding in India is agricultural landholding is from 1.08 ha in 2015-16 gradually shrinking to 2.28 ha in 1970-71. It is difficult to achieve livelihood security and sustainability for these farmers with a single farm enterprise without turning to Integrated Farming Systems. These farms need multi-enterprise farming activities that are complementary and technically feasible in the interest of the productivity of the whole farming system. The crop and cropping system based perspective of research needs to make way for farming systems based research particularly with regard to small farmers. In integrated farming system (IFS) research, integration of land-based enterprises such as dairying, aquaculture, poultry, duckery, apiary, field, and horticultural crops within the biophysical and socio-economic environment of the farmers is important to make farming more profitable and dependable. Integration of enterprises helps in ensuring not only food, nutrition and livelihood security but also social, economic and environmental sustainability. For this reason, the IFS model has been suggested by several workers for developing small and marginal farms across the country. IFS aims at least dependence on outside resources and efficient

recycling of available farm resources, as in this system nothing is wasted and the by-product of one system becomes the input for other. Keeping these facts in view, ICAR-NDRI has initiated the research work on "Developing dairy based integrated farming system model for income enhancement of small farmers".

The dairy production tends to be more complex than crop production because animals too often play a pivotal role in the overall farming system. Any constraint imposed on animal may also restrict the system as a whole. In general, the aims of dairy production in integrated farming systems are to (i) raise productivity through better utilization of available resources (ii) recycling and reuse of farm waste within the system, and (iv) optimize the allocation of resources through rational management. The project is laid on an area of 1.00 ha with different sub-components viz., crop production (0.4 ha), fodder production (0.4 ha), dairy production (cattle-3; buffalo-3, goats-10), poultry farming (20 birds), fish pond and vermin-compost pits (0.2ha). The area of each enterprise is calculated based on the potential of the technologies realized by the farmers. The potentially important technologies that could make a significant increase in productivity in IFS are implemented. Since the supply of green fodder throughout the year is a major challenge, hence emphasis is being given on production of quality greed fodder and feeding strategies for dairy animals.

Hybrid Napier and Moringa based model of fodder production has been developed in 0.4 ha for round the year quality fodder availability. About 30 percent of the allocated area is covered under perennial fodder crops (Hybrid Napier and Moringa) and rest of the area (70%) under annual fodder crops like maize + cow pea in summer, cowpea in rainy season and berseem during winter season as intercrop between moringa and napier rows. The average green fodder yield of 1552 q/ha with dry matter yield of 251q/ha has been recorded from four cuttings of hybrid Napier. The animals (three Sahiwal cattle, three Murrah buffaloes and 10 Alpine x Beetal crossbred goats) are maintained on fodder available from the system under cut and carry system and during summer months UMMBs are supplemented.

The total milk production is 7580 liters from buffaloes, 6308 liters from cattle and 6012 liters from goats. Effect of UMMB supplementation on milk production in buffaloes is also assessed. An average increase of 26.95 % in milk yield has been recorded due to its supplementation with cost benefit ratio of 1: 8.23. Similarly, the supplementation of polyherbal mixture in cattle increased milk yield by 21.53. The net return from the whole system is Rs. 3, 91, 760/year. The contribution of dairy component is 59.89%, crop component (wheat, rice and oat) as 32.75 % and subsidiary enterprises (poultry, fishery and vermin-compost, etc) as 7.36 % in total net farm income. Various nutrients viz., 119.8 kg N, 45.3 kg P and 71 kg K are also supplied by the recycling of farm waste, dung and urine in FYM/vermin-compost to the system.

Studies carried out at ICAR-NDRI suggest that dairy based integrated farming system model not only increases the production and profitability but also ensures the food and nutritional security through regular supply of milk and eggs round the year and has potential to increase resource use efficiency and overall resilience of the production system. Hence, emphasis needs to be given on development of dairy based IFS module for different situations to fit into socio-economic realm of small and medium famers. This approach is able to provide income throughout the year on sustainable basis. Availability of key inputs and support services need to be strengthened and improved to enable the small and marginal farmers for dairy based IFS development A favourable policy environment in terms of access to micro-credit and assured market will have to be provided for up scaling the developed models. In other words, future agriculture lies in dairy based integrated farming by marginal and small farmers. Integrated farming system, depending upon the resource availability, can definitely improve their livelihoods and standard of living.

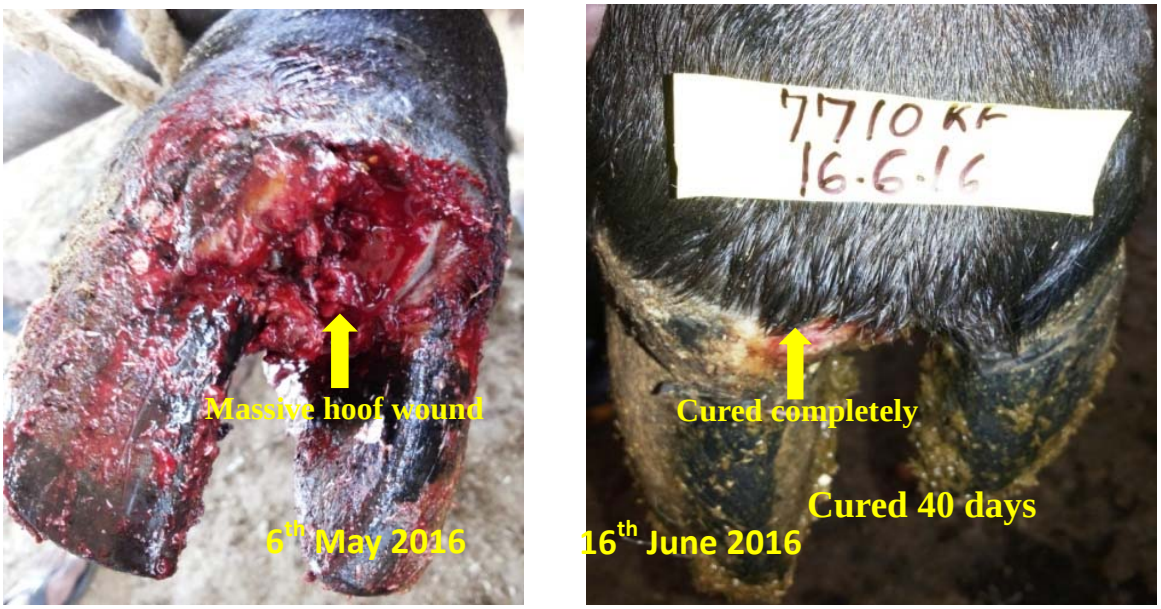
(M. S. Chauhan)
Director-ICAR-NDRI

RESEARCH

Hoof wound control with mesenchymal stem cells in livestock

(Dhruba Malakar, Vinay Bhaskar, Sikander Saini and Satish Kumar)

Mesenchymal stem cells (MSCs)is a new precursor for the treatment of animal diseases like hoof wounds, mastitis, metritis, and reproductive failure in livestock. Farmers of our country, especially the owners of the suffering animals, will be highly benefited as there will be no disease suffering animals after treatment of MSCs as regenerative medicine. Attracting properties of MSCs may act as an alternative strategy for treating these diseases instead of antibiotics. In addition to their ability to differentiate into multiple types of cells, MSCs can orchestrate immune responses and modulate tissue micro-environments. Animals treated with MSCs are found to be healthy and observed to be producing more milk. The economic condition of the farmers will be highly improved in our county. The adipose tissues derived MSCs of cattle were cultured. The MSCs were cultured in a CO2 incubator for 7-10 days for confluence of cells in *in vitro* condition for treatment. The cells were characterized with molecular markers like CD44, CD73, CD90, and CD105 for immuno-staining, and differentiation of MSCs as per the International Society of Cellular therapy. MSCs were also cryopreserved into LN2 and further revival of cells in culture condition for using these cells for the treatment of diseases. The *in vitro* cultured MSCs were collected from the cultured flask and injected around the wound @10^6cells/injection at NDRI, Karnal. The cows were monitored regularly and the photograph was taken 15days internal for documentation. The wound was totally cured in the cows within 40 days. It is inferred that the MSCs can cure the wounds of the cattle and MSCs can be used as regenerative medicine for the treatment of diseases in livestock.

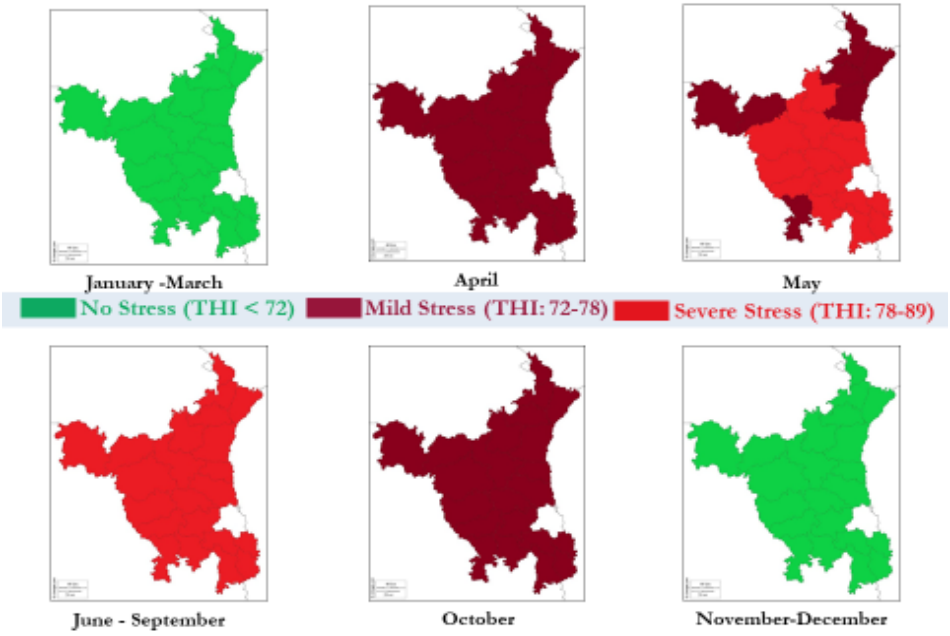


Mesenchymal stem cells successfully used to permanently cure hoof wounds in cattle and buffaloes

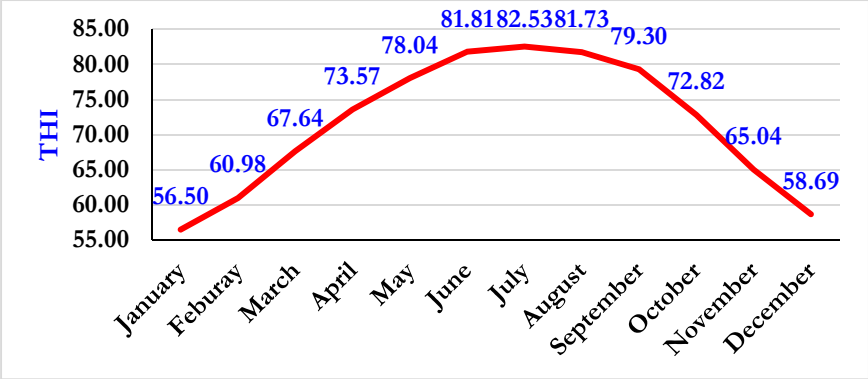
District wise Thermal-Humid Index Map of the Haryana and associated climatic stress on milk production

(Sanjit Maiti S. K. Jha, Sanchita Garai, Anjali Aggarwal, Mukesh Bhakat & Gautam Mondal)

District wise monthly Thermal-Humid Index Map of the Haryana was developed for the last 61 years since 1958 to 2019 as an indicator to appraise the impact of climate change on the milk production. It was found that mild to severe stress was observed during April to October in a year across the districts of Haryana. A fixed effect panel data regression was applied to understand the impact of climate change on the district wise and season wise milk production of the different bovine spp i.e. buffalo, crossbred cow, and indigenous cattle. It was found that climatic parameters like Thermal Humid Index (THI) and Potential Evapo-transpiration (PET) had significant impact on the significant impact on the milk production of crossbred cattle and buffalo.



Thermal Humid Index map of Haryana at the district level during 1961-2019



Month wise average THI of Haryana during 1958-2019

SUCCESS STORY

Commercial Dairy Farming of Indigenous Dairy Cattle as a Profitable Venture - A Success Story of Revnar Dairy Farm, Faridabad

(Gunjan Bhandari, Anil K. Dixit, Ravishankar K.M. and Gaganpreet Bhullar)

Mrs. Milan Sharma, a retired government employee came across articles on declining population of indigenous dairy breeds in social media and decided to do something for their conservation and promotion. To get the know-how of handling the cows, she attended two short term courses on - "Commercial Dairy Development" and "Value Added Products" at ICAR-National Dairy Research Institute, Karnal. Thereafter, she established a commercial dairy farm, namely, Revnar Dairy Farm in Faridabad in 2018. The farm is spread in an area of three acres and has specially rented 2.5 acre area for production of green fodder. It started its operation with five Sahiwal cows and at present owns 70 cows belonging to popular indigenous breeds like Sahiwal, Gir, Tharparkar and Rathi cows along with 42 calves and 2 bulls. The farm initially faced difficulty in finding skilled dairy labor. Thus, Mrs. Sharma utilized the knowledge gained from NDRI courses for training the labors in scientific dairying practices (e.g., clean milking practices). After finding the aforementioned two short term courses of NDRI as extremely beneficial, she further attended a training program on "Marketing Strategies for Promotion of Dairy Products" organized by the Institute in July, 2019.

The farm focused on producing and supplying completely natural and additive-free A2 milk, within the Delhi-NCR region. As an alternative to poly-packs, they started packing their products in glass bottles and provided door-to-door delivery to the customers. Good taste, better digestibility and A2 milk became the USP of their products. They created a strong customer base in South Delhi, Noida, Gurugram (Gurgaon) and Faridabad within a short span of one year. Customer satisfaction and word of mouth helped them in gaining popularity.

Liquid milk, paneer, butter and ghee are the major products being sold by the farm. On an average, they sell around 200 liters of milk per day at a premium price of Rs. 100 per liter. They are also selling Ghee at the rate of Rs.1800/- per kg through Amazon and at the rate of Rs.1600/- per kg through direct marketing. They received an order of 7 kg Ghee from Norway due to its good quality. The farm managed to remain profitable even during COVID-19 lockdown; mainly, due to their loyal customer-base. Though, they faced some difficulty in availing the artificial insemination (AI) facilities as most of the semen stations including ABRC, NDRI were closed for public during that pandemic period.

Since 2018, Ms. Sharma has remained actively associated with ICAR-NDRI. She has attended several events including Dairy Mela organized by the institute in February, 2020. After realizing the benefits from indigenous dairy farm, she is further planning to work on zero budget farming for making organically grown products available in the market. She is also spreading awareness among other local farmers regarding importance of good quality milk and government support programs.

ICAR-NDRI Team visiting Revnar Dairy Farm

Milk packed in glass bottles

Mrs. Milan Sharma attending one of the training programs in ICAR-NDRI, Karnal

Vehicle used by Revnar Farm for door step delivery of milk

EXTENSION

DAIRY EXTENSION DIVISION

Extension Activities /Transfer of Technologies

a) Gender sensitization training was organized for preparation of different dairy based products like paneer, flavoured whey drink, masala paneer, milk cake, gulab jamun, mango lassi, and ghee in Gohana and Murthal, Kathura, Manoli and Agwanpur villages in Sonepat districtas well as Uchani and Bharatput villages in Karnal district during January to March 2021.

b) A three days training programme on "Scientific dairy farming" was organized under Farmers' First project of CSSRI, Karnal entitled Empowering farmers through selective interventions in salt affected agro eco systems of Ghaghar Plains at ICAR-National Dairy

Research Institute, Karnal from March 08-10, 2021 with the intent to disseminate the recent developments in dairy farming. About 16 farmers from Kathura village in Sonepat district of the project from Haryana participated in the programme. The training programme was inaugurated by Dr M.S. Chauhan, Director, NDRI, Karnal on March 8, 2021. He emphasized that farmers should take advantage of various schemes and programmes, recently launched by Government of India for improving their knowledge and skill and thereby their farm productivity and profitability. He advised the farmers to go for farm diversification and high value enterprises to maximize profitability and enrichment of soil and water environment.

KRISHI VIGYAN KENDRA

National Science Day

KVK organized National Science Day on February 28, 2021 at KVK campus. The chief guest of the function was Dr. Anurag Saxena (In-charge, Farm Section, NDRI, Karnal). KVK experts delivered lectures on different aspects of agricultural research. A total of 40 school students of Govt. Sr. Sec. School Dabri participated in the event.

International Women Day

KVK organized International Women Day / Kisan Goshti on March 8, 2021 at KVK-NDRI campus. Smt. Madhu Pathak (Women and Child Welfare Officer) was the Chief Guest, Dr. Kanta Verma (Lecturer and Social Activist) and Dr. Udita Chaudhary, Scientists (DES&M), NDRI were Guests of Honor. Dr. M.S. Chauhan, Director, NDRI presided over the function. A total of 91 farm women and 30 others were present. Farm women who displayed excellent work in conservation agriculture, crop diversification, integrated farming, stitching, dairy farming and milk processing, were honoured by the chief guest.

World Water Day

KVK organized World Water Day on March 22, 2021 at NDRI campus. Dr S K Gupta (EX-PS, CSSRI-Karnal) was the chief guest and Dr. M. S. Chauhan, Director, NDRI presided over the function. A total of 90 farmers and farm women were present.

Other activities of KVK

Sl. No.	Activities	Place	Number of farmers/ farm women/youth	Date
1)	Drawing competition against crop Residue burning (CRB) and Crop Residue Management (CRM)	Govt. Sr. Sec. School, Gheer	50	22/01/2021
2)	Awareness against CRB and/ or CRM and field visit	Shamgarh	11	30/01/2021
		Khulweri	15	01/02/2021
		Kunjpura	12	04/02/2021
		Kalheri	12	23/02/2021
3)	One day awareness programme on In-Situ CRM	Sahpur	12	04/03/2021
		KVK campus	32	25/03/2021
4)	CRM field Visit	Kamalpur Rodan	14	16/01/2021

Off-campus training

Sl. No.	Title of training	Place	Number of farmers/ farm women/ youth	Date
1)	Off-campus training on weed management in Rabi crop	Kamalpur Rodan	14	16/01/2021
2)	Off-campus training on plant protection in Rabi crop	Shamgarh	11	30/01/2021
		Khulweri	15	01/02/2021

On-Campus Training

Sl. No.	Activities	Place	Number of farmers/farm women/youth	Date
1)	मधुमक्खी पालन	KVK	21	19/03/2021 to 22/03/2021
2)	मत्स्य पालन प्रशिक्षण कार्यक्रम	-do-	19	15/03/2021 to 18/03/2021
3)	फसल अवशेष प्रबंधन एवं रबी फसल उत्पादन की तकनीक	-do-	17	08/01/2021
4)	वैज्ञानिक विधि से पशुपालन में प्रशिक्षण	-do-	30	16/02/2021 to 20/02/2021
		-do-	19	22/03/2021 to 26/03/2021
5)	डेरी प्रसंस्करण प्रशिक्षण कार्यक्रम	-do-	25	17/03/2021 to 21/03/2021

Frontline Demonstrations (FLDs/OFTs)

1) Oilseeds and pulses
KVK, ICAR-NDRI organized FLDs in various villages of Karnal district to encourage farmers to grow oilseeds and pulses. During the Rabi season 2020-21, a total of 125 FLDs of mustard variety CS58 in 50 ha area and 54 FLDs on gram variety H.C.-5 in 20 ha area were laid under irrigated conditions to generate the data.

2) Fodder crop: Berseem
During the Rabi season, 2020-21, 14 FLDs on Berseem fodder variety BL- 43 were conducted in 2.5 ha area of different villages in Karnal district to generate data on the newly released barseem variety.

3) Cereals: Wheat
During the Rabi season 2020-21, total 30 FLDs on wheat varieties i.e. DBW- 187 and HD-3226 were laid in 8 ha area under irrigated condition to generate the data of newly released wheat varieties.

Activities on (FLDs)

Sl. No.	Activities	Place	Number of farmers/ farm women/youth	Date
1)	FLD Mustard field visit	Shamgarh	11	16/01/2021
		Kalheri	12	23/02/2021
		Sahpur	10	04/03/2021
2)	FLD gram field visit organized	Sahpur	10	04/03/2021

Farmers visited Krishi Vigyan Kendra for exposure visit

State	Numbers of farmers	Date
Haryana (Assandh)	80	10/02/2021
Haryana (Assandh)	70	11/02/2021
Haryana (Nissing)	80	11/02/2021
Haryana (Nissing)	52	12/02/2021
Uttrakhand	41	22/02/2021
Haryana (Sonipat)	25	23/02/2021
Madhya Pradesh	12	18/03/2021

INSTITUTE TECHNOLOGY MANAGEMENT UNIT (ITMU)

1. Detail of Patents Filed during January 2021- March 2021: 05

Sl. No.	Title of Patent	Inventors	Date of Filing	Application Number
1)	A process for preparation of milk protein fortified eggless muffins	Kasushik Khamrui, Rishi Kumar Puri and Writdhama G Prasad	03.02.2021	202111004592
2)	Label for indicating freshness of Indian Dairy Products and preparation method thereof	P.N. Raju, Rakesh Kumar Raman, Karpurapu Uma, Ashish Kumar Singh and Sangita Ganguly	03.02.2021	202111004590
3)	Label for indicating freshness of Milk Millet composite complent food and preparation method thereof	P.N. Raju, Rakesh Kumar Raman, Karpurapu Uma, Ashish Kumar Singh and Sangita Ganguly	03.02.2021	202111004587
4)	A process for production of antimicrobial coagulant formulation for making extended self life Paneer	Pradip Vishnu Behare, Rallapalli Vembar Rajanikar, Sudhir Kumar Tomar, Diwas Pradhan, Rajan Sharma and Sanket Borad	23.02.2021	202111007461
5)	Rapid antimicrobial susceptibility assay for Detection of Extended spectrum	Naresh Kumar, Avinash Jaswal, Raghu H. Vishweshwaraiah	23.02.2021	202111007462

2. Detail of Patents granted during January 2021- March 2021: 02

Sl. No.	Title of Patent	Inventors	Date of filling	Application grant number and grant date
1)	Aptamers specific for betacasomorphin-7 (BCM 7)	Y. S. Rajput, Abhishek and Rajan Sharma	18.12.2013	Grant Number:354948 Grant Date:31.12.2020
2)	A new rapid test for detection of detergent in milk	YS Rajput, Gulab Singh and Rajan Sharma	19.03.2015	Grant Number:363588 Grant Date: 30.03.2021
3)	A strip for detection of added urea in milk and process for the same	Rajan Sharma, Panchal Bhavesh Kumar and Y.S. Rajput	29.11.2013	Grant Number:363894 Grant Date: 31.03.2021

3. Detail of Request for Examination for Patent during January 2021- March 2021: 01

Application/ Registration No.	Inventors of the Patent	Name of Innovation/ Technology/ Product/ Variety	Date of Filing / Registration	Remarks
201911032383	Richa Singh, Bimlesh Mann, Sumit Arora, Mitul Bumbadiya, Priyanka Singh Rao and Diwas Preadhan	A Preservative formulation for Milk and Milk Product Samples Stored for Analytical Purpose	09.08.2019	Request for examination filed Indian Patent Office, New Delhi on 23.02.2021

4. Submission of NBA application month of January 2021- March 2021: 01

Name of Institute	Application/ Registration No.	NBA reference number	Inventors of the Patent	Name of Innovation/ Technology/ Product/ Variety	Date of Filing/ Registration	Remarks
ICAR-NDRI	807/DEL/2015	INBA3202102391	Varij Nayan, Suneel Kumar Onteru and Dheer Singh	*Mangifera indica* flower panicles' extract stabilized gold nanoparticles and method for making the same.	24/03/2015	Form III Submitted to NBA on 06-01-2021

5. Filing of Reply of First Examination Report (FERs) of Patents Filed during Jan-Mar 2021: 03

Sl. No.	Title of the application	Patent application number	Date of filing	Date of filing of request for examination	Date of submission of reply to FER	Remark
1.	Antimicrobial Nano emulsion of Clove oil stabilized with milk protein and a process thereof.	913/DEL/ 2015	31/03/ 2015	22/12/2016	20/01/2021	Reply to FER submitted at Patent office Delhi
2.	*Mangifera indica* flower panicles' extract stabilized gold nanoparticles and method for making the same.	807/DEL/ 2015	24/03/ 2015	14/02/2017	20/01/2021	-do-
3.	High fiber reduced calorie biscuits from dairy-multigrain composite	758/DEL/ 2015	20/03/ 2015	10.11.2017	16/02/2021	-do

6. Commercialization of Technologies in the month of Jan-Mar 2021: 03

Sl. No.	Name of the month	Name of the Technology/ Know-How	IP Protection (Yes/ No)	Name of Contracting Party	Mode of Partnership	Date of Licensing	Revenue Earned
1.	**January, 2021**	Preparation of milk-based spray dried nano encapsulated curcumin formulation	Yes	Anthocyanin Naturals Indian Pvt. Ltd, Kerala	License Agreement	04.01.2021 through Agrinnovate	3.00 Lakhs + 18% GST
2.		Process technology for Palada Payasam Mix Preparation by Dry Crystallization Method in a Mechanical Unit.	No	Eastern Condiments Pvt Ltd, Kerala	License Agreement	11.01.2021 through Agrinnovate	-do-
3.	**February, 2021**	Milk Protein-enriched Bajra Snacks	No	Sarvagya Ayur and Pharma (OPC) Private Limited Maharashtra	License Agreement	01.02.2021 (through ICAR-NDRI)	-do-
	Total =03	**Total Revenue Generated = Rs. 7.00 Lakhs excluding GST**					

EVENTS

New Year Address by Director ICAR-NDRI

At the onset of the New Year eve, Dr. Manmohan Singh Chauhan, Director-ICAR-National Dairy Research Institute addressed the staff members in the Dr. D. Sundaresan Auditorium and conveyed his very best wishes for an eventful 2020. Dr. Chauhan said that although the whole world was under the stress of Covid pandemic but NDRI staff have maintained their momentum and actively worked day and night to shape the future of the Institute. Dr. Chauhan added that during the past 12 months, NDRI has been working on the Atmanirbhar Bharat Abhiyan concept and has strictly followed all the Covid guidelines. NDRI was again ranked as the Number one University among all Agricultural Universities. NDRI won several Awards like Dr. P. Bhattacharya Memorial Award, Dr. C. Subramaniam Award, NAAS Award, Jawahar Lal Nehru Best thesis award, ICAR Best Worker Award, Professor Mudgal Award, CSIR Award. NDRI is now working to improve its ranking among various International Universities of the World. NDRI also contributed by providing instruments for COVID testing. Funds were donated under the Prime Minister Relief program and masks were distributed. NDRI has made some noteworthy achievements and has generated more than 2 crores of revenue, commercialized 9 technologies and organized 140 training programmes benefitting over 20,000 farmers. Dr. Chauhan hoped that by working together more will be accomplished in the year to come.

Foundation Lecture of Probiotic Association of India

The Foundation Day of Probiotic Association of India (PAI), was celebrated at National Dairy Research Institute, Karnal on January 23, 2021. The inaugural lecture organized by PAI in association with the Gut Microbiota and Probiotic Science Foundation - India (GMPSF) and NDRI was delivered by Professor A. K. Srivasatava, Member of the Agricultural Scientists Recruitment Board, DARE, Govt. of India, New Delhi. Dr. Jai Kaushik, Principal Scientist introduced the history and mandate of the PAI and its role in promoting the research on probiotics by bringing national and international experts in the area on the platform to deliberate upon the burning issues. Dr. Neerja Hajela represented the GMPSF and its activities in promotion of probiotic science and research. Dr. Srivastava spoke extensively on the "**Know your milk food: Facts and myths of A1 and A2 milk".**

He emphasized the fact that there is no scientific basis to differentiate the health properties of A1 and A2 milk and no breeding policies should be chalked out to breed only A2 milk producing animals. He emphasized that although some research indicate the benefit of A2 milk over A1, but these reports are not beyond doubt and milk should not be consumed on the basis of A1 and A2. He informed that almost all Indigenous cattle, buffalo, goat, sheep and camel produce A2 type milk. He emphasized that apart from being a source of proteins, the milk contains vitamins, minerals, selenium, calcium, carotenoids, conjugated linoleic acid, omega-3 fatty acid and proteins with therapeutic value and all that makes it an excellent food especially for vegetarians and should not be selected based on A1 and A2 milk. Prof. N. K. Ganguly, Padma Bhushan recipient in medicine, emphasized many health benefits of the milk of non-bovine species like goat, lama, camel. Dr. V. Prakash, Former Director of CFTRI emphasized that there

are hundreds of peptides which are beneficial for health and milk should not be typed based on A1 and A2 proteins only. Dr. V. Mohan, Chairman and Chief Diabetologist at the Mohans' Diabetes Specialties Centre, Chennai also emphasized the consumption of beneficial effect of milk because of its therapeutic and protective role in human health. Dr. Manmohan Singh Chauhan, Director, NDRI, Karnal, Dr. Dheer Singh, Jt. Director (Research) and about 300 dignitaries from all over India were present during this presentation.

Republic Day Celebrations

The 72nd Republic day of India was celebrated at ICAR-NDRI with the hoisting of Tricolour in front of Dr. D. Sundaresan Auditorium by the Director, Dr. Manmohan Singh Chauhan under strict Covid control measures. On this occasion, Dr. Chauhan told that Agriculture is the backbone of our country and the Green Revolution in the country has improved the food production significantly and made our nation self sufficient. He added that agricultural growth has reduced poverty directly by raising our farmer's income and indirectly by generating self employment and reducing food prices.

Over the years, besides being the largest producer of milk, India has also become a significant producer of a variety of spices, plantation crops, poultry and fishery products. India is also

expected to achieve the ambitious goal of doubling farm income by 2022 with the support of scientists and farmers. On this occasion the Director facilitated merit students and the staff members of NDRI who worked day and night during the Covid pandemic. Director said that we should not only be self sufficient in food production, but also by generating innovative technologies we should generate surplus of agricultural commodities for increasing our exports.

Webinar on Women Empowerment

A Webinar on **'Women Empowerment'** was organized under the aegis of NAHEP and Student Empowerment Unit at ICAR-National Dairy Research Institute, Karnal on January 28, 2021. **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 towards a safe and nurturing environment for women for the holistic growth of the organization.

Two eminent personalities, **Dr S. Lakshmi Devi**, Honorary Director, Centre for Entrepreneurship and Career Oriented Programs, University of Delhi and **Dr Shiva Durga,** Assistant Professor, GLA University, Mathura were the guest speakers on this occasion. Dr S. Lakshmi Devi, Honorary Director, Centre for Entrepreneurship and Career Oriented Programs, University of Delhi delivered a talk on "Celebrating the Glory of Women". She shared her own experiences of empowering young girls via the applied science based degree programmes. She emphasized on the leadership qualities of women and apprised the audience of several women role models and entrepreneurs. She said that women have an edge over men due to several inherent qualities of women like multi-tasking, team work, self-discipline, compassion, tolerance and high moral values which in turn are responsible for making them effective leaders. She inspired

young ladies through her talk to concentrate on a single idea and work persistently on that idea till it is achieved.

Dr Shiva Durga, Assistant Professor, GLA University, Mathura delivered an exhaustive and thought-provoking talk on "Indian Women Administrators since Ancient Times". History stands testimony to the multi-faceted qualities displayed by women courage, valour, compassion and capabilities beyond extremes of women. She emphasized that women and men should be given equal opportunities to excel and grow.

Dr. M.S. Chauhan during the eye-opening session of women empowerment said that **Women Empowerment** could be at all levels – be it social, educational, economic, political or psychological. When women are empowered, healthy and free from violence and discrimination, they can build a better future for themselves, their families, communities and nation. Dr Meena Malik, Professor (English) and Convener coordinated the webinar and Dr Neelam Upadhyay acted as co-convener of the programme. A total of 125 participants attended the webinar.

ICAR-NDRI Students Donated Prize Money (Rs 50,000/-) to Apna Ashiyana, Karnal

Students of ICAR-National Dairy Research Institute, Karnal bagged First Prize **"Nutri-Scholar Award 2020"** at National level by developing innovative high protein content food product, **"Nutri-Poi with Soymus"** under **QSR (Quick Service Restaurant)** category organized by **"DuPont Nutrition and Health"** for fostering innovations and empowering academia-industry relations. Team NDRI received prize money worth Rs. 50,000/- that was donated to **Apna Ashiyana,** Karnal as a social accountability to the hermitage to provide support for deprived persons.

DuPont called young innovators and students across food science, technology and relevant interdisciplinary fields from Indian academia to implement their innovative ideas. The competition for most innovative and mouth-watering food concepts for the **'High Protein Vegetarian Meals'** across 4 categories of **Nutritious Breakfast, QSR style Lunch & Dinner, Healthy Desserts & Indulgence and 4 pm Savory Snacks**. From a total of 171 nationwide

applications, 20 teams were selected in Phase 1 followed by a three-step assessment (sensory qualities, project report and presentation) in Phase 2. The product '**Nutri-Poi with Soymus'** prepared by the multidisciplinary team of Ph.D. students from Dairy Chemistry and Dairy Microbiology named **Pranali Nikam (Team Leader), Neha, Vaishali Dasariya, Mohammad Rizwan and Khusboo Sao** under the Mentorship of **Dr. Anil Kumar Puniya**, Head, Dairy Microbiology.

Dr. Manmohan Singh Chauhan, Director, ICAR-NDRI, Karnal handed over the cheque to one of the social workers **Mr. Shiv Kumar** of **Apna Ashiyana** while appreciating the gesture of winning team for their remarkable achievement and social commitment. He also assured full support to the scholars and researchers for similar competitions in future.

Dr. Anil Kumar Puniya informed that the prepared product **"Nutri-Poi with Soymus"** is nutritionally dense containing high amount of proteins, dietary fibers, vitamins, minerals etc. having low glycemic index.

World Water Day

ICAR-National Dairy Research Institute, Karnal organized World Water Day on March 22, 2021.The event was organized in collaboration with National Innovation in Climate Resilient Agriculture (NICRA) and Krishi Vigyan Kendra (KVK), NDRI, Karnal. March 22 is declared as World Water Day and is celebrated around the world since 1993. The theme of World Water Day 2021 is "Valuing Water" and has been chosen to highlight the value of water in our daily lives. On this occasion Dr. Manmohan Singh Chauhan, Director, ICAR-NDRI, focused on saving each drop of water in coming future. He emphasized that we have to innovate some new technologies to save water in the era of climate change. Dr. Chauhan said that we should start work on recharging of ground water by implementing rain water harvesting system and our farmers may focus on climate resilient crops because such crops would require less water and will produce high yield to fulfill the demand of food for increasing population. At last, Dr. Chauhan said that we should follow traditional methods for saving water.

Dr. S. K. Gupta, former Principal Scientist, ICAR-Central Soil Salinity Research Institute (CSSRI) Karnal, mentioned that temperature of earth is continuously increasing and we have to save our soil, water, biodiversity and environment to reduce such climate threat in future. Further, he focused on crop diversification for increasing ground water level and increasing income of farmers.

Dr. Ashutosh, Organizing Secretary informed the farmers that a specific eco-friendly and cost-effective technique has been developed for recycling of waste water at this institute. This system may be installed in cattle yard and Gaushalas for recycling of waste water. A quiz competition among the farmers was also organized for enhancing their knowledge about water saving and climate change. Farmers from different villages appreciated the effort done by the institute and well as Indian Council of Agricultural Research (ICAR) New Delhi in propagating the knowledge and techniques among farmers so that water saving techniques may be more useful in future to save water on the planet. World Water Day was participated by around 120 farmers and all generic guidelines of COVID-19 were followed by all the participants and staff.

Webinar on "Marketing of Agricultural Commodities – Challenges and Opportunities"

Dairy Economics, Statistics and Management Division of ICAR-NDRI organized a webinar on "Marketing of Agricultural Commodities – Challenges and Opportunities" from January 12-14, 2021. Inaugural address of the webinar was delivered by Dr. Ramesh Chand, Member, NITI Aayog.

The webinar deliberations were on the following sub-themes: *a) Minimum Support Prices (MSP): Booster or Deterrent?* (Chairman: Dr. P.C. Bodh, Advisor, Directorate of Economics & Statistics and Speakers: i) Dr. Anuj Kumar, PS, ICAR - Indian Institute of Wheat and Barley Research; ii) Dr. Sukhpal Singh, Professor, and Chairperson, Centre for Management in Agriculture (CMA), IIM-Ahmedabad); *b) Issues and Opportunities in Marketing of Livestock Products* (Chairman: Dr. P.S. Birthal, ICAR-National Professor and PS, ICAR-NIAP and Speakers: i) Dr. R.S. Sodhi, MD, GCMMF (AMUL), ii) Dr. Anjani Kumar, Senior Research Fellow, International Food Policy Research Institute, iii) Dr. D. Bardhan, PS, Agricultural Technology Application Research Institute, Jabalpur and iv) Mr. Kuldeep Sharma, Chief Thinking Officer, Suruchi Consultants); *c) Decoding New Farm Laws* (Chairman: Dr. P.K. Joshi, Former Director - South Asia, International Food Policy Research Institute, New Delhi and Speakers: i) Mr. Devinder Sharma, Food and Trade Policy Analyst, ii) Dr. Raka Saxena, PS, ICAR - National Institute of

Agriculture Economics and Policy Research, iii) Mr. Arabind Das, Chairman and MD, NutriWiz Global Advisory Services, iv) Mr. Vikas Chaudhary, Progressive Farmer and FPO Member, Haryana, and v) Dr. Shivendra Kumar Srivastava, Scientist, ICAR- NIAP); *d) New Avenues in Agricultural Marketing* (Chairman: Dr. P. Chandra Shekara, Director (Agricultural Extension), National Institute of Agricultural Extension Management, Hyderabad and Speakers: i) Dr. Ritambhara Singh, Assistant Professor, International Agribusiness Management Institute, Anand, ii) Mr. Arabind Das, Chairman and MD, NutriWiz Global Advisory Services, and iii) Dr. Sendhil R., Scientist, ICAR - Indian Institute of Wheat and Barley Research); and *e) Marketing and Trade of High Value Crops* (Chairman: Dr. R.S. Pundir, Professor & Head, International Agribusiness Management Institute, Anand and Speakers: i) Dr. Hema Yadav, Director, CCS-National Institute of Agricultural Marketing, Jaipur, ii) Dr. Raka Saxena, PS, ICAR - National Institute of Agriculture Economics and Policy Research, and iii) Dr. Saikat Banerjee, Professor, Indian Institute of Foreign Trade-IIFT). More than 1000 participants from different parts of the country participated in the event.

Kishan Gosthi for SC Farmers

A kishan gosthi for SC dairy farmers was organized on March 6, 2021 at NDRI Farmers Service Center at Lalukheri in district Muzaffaranagr (UP). In this Gosthi, about 40 farmers of nearby villages participated. The farmers were advised by the scientists of NDRI about the scientific methods of rearing dairy animals for better milk production and fertility, particularly the importance of feeding balance ration, mineral mixture and regular treatment to control endo and ecto parasites for enhancing productivity of their animals. The farmers were also provided mineral mixture, medicines for deworming and ecto parasites and refreshment in this gosthi.

Scientists delivering lectures to farmers

Farmers with mineral mixture bags

Programme under SC-SP sub-fund of Network Project on Buffalo Improvement

The Animal Genetics and Breeding Division, NDRI organized an event “Support to the Dairy Farmers” under the SC-SP sub-fund of Network Project on Buffalo Improvement on March 31, 2021 at Garhi Gujran Village of Karnal district. Dr. Vikas Vohra, PI and other project workers distributed general-purpose medicines to about 50 dairy farmers belonging to the SC community of the village. The dairy farmers were also upraised about the scientific breeding and management practices of dairy buffaloes, with special emphasis on the role of calcium supplementation in buffaloes.

Webinar on Metabolomics and Proteomics in Food Science

An International Webinar on "*Metabolomics and Proteomics in Food Science*" was organized under the aegis of IDP (NAHEP) from March 01-03, 2021. Three speakers of international reputation namely Dr. Ranjith Ramanathan, Associate Professor, Oklahoma State University, USA; Dr Emmanuel Hatzakis, Assistant Professor, The Ohio State University, USA and Prof. (Dr). Michelle Colgrave, CSIRO Agriculture and Food, Australia delivered lectures. A total of 150 participants attended the webinar from different parts of the country.

Webinar on Trends in Food Packaging

An international webinar on "*Trends in Food Packaging*" was organized under the aegis of IDP sub-project (NAHEP) on 5th March 2021. Three speakers of international reputation namely Dr. Eva Almenar, Associate Professor, Michigan State University, USA; Prof. Asgar Ali, Nottingham University Malaysia Campus; Prof. B. Kuswandi, University of Jember, Indonesia delivered lectures. A total of 250 participants attended the webinar from different parts of the country.

Workshop on Upscaling of Women Centric Dairy Processing Technologies

An online workshop on Upscaling of Women Centric Dairy Processing Technologies was organized on March 30, 2021. Four experts delivered the lecture and shared their experience in the workshop. Dr. M.S Chauhan, Director, NDRI while presiding over the workshop, stressed upon the significant contribution of women in doubling farmers' income through dairy processing technologies. He reiterated the importance of harnessing physical and intellectual capacity of women so that their income earning capacity can be enhanced. These livelihood

initiatives at grass root level lead to 'women empowerment', which can further facilitate better position for India in Human Development Index, Global Poverty Index, Gender Inequality index as well as in achieving the targets set for the Sustainable Development Goal (SDGs).

Dr. Manmohan Singh Chauhan, Director, NDRI while presiding over the workshop, stressed upon the significant contributions of women in doubling farmers' income through dairy processing technologies. He reiterated the importance of harnessing physical and intellectual capacity of women so that their income earning capacity can be enhanced. These livelihood initiatives at grass root level lead to 'women empowerment', which can further facilitate better position for India in Human Development Index, Global Poverty Index, Gender Inequality index as well as achieving the targets set for the Sustainable Development Goal(SDGs). Dr. K. Ponnusamy, Principal investigator of DST project elaborated the objectives, methodology, salient outputs and strategies for upscaling of success stories.

PERSONALIA

Joining/Appointment/Promotion

- Consequent upon his transfer from ICAR-Central Arid Zone Research Institute, Jodhpur (Rajasthan), Dr. Anurag Saxena, Principal Scientist joined NDRI, Karnal w.e.f. 18.12.2020.
- After having been relieved from ICAR-NAARM, Hyderabad, Mr. Biswajit Sen, Scientist has joined ICAR-NDRI, Karnal w.e.f. 4.1.2021.

- Consequent upon his transfer from ICAR-Central Institute for Research on Baffaloes, Sirsa Road, Hisar (Haryana, Dr. Naresh Lalaji Selokar, Scientist has joined ICAR-NDRI, Karnal w.e.f. 18.1.2021.
- Consequent upon his transfer/ from ICAR-Research Complex for NEH Region, Meghalaya to NDRI, Karnal, Dr. Pankaj Kumar Saraswat, Senior Scientist & Head, KVK-Tamenglong, Manipur joined ICAR-NDRI w.e.f. 20.1.2021.

Transfer/Retirement/Relieving

- Consequent upon his appointment to the post of Director, ICAR-CIRB, Hisar, Dr. Tirtha Kumar Datta, Principal Scientist & Incharge, ABTC was relieved from ICAR-NDRI, Karnal on 15.1.2021 (FN).
- Dr. S. K. Tomar, Principal Scientist, DM Division retired on attaining the age of superannuation on 31.1.2021(AN) from ICAR Services.
- Dr. B. C. Ghosh, Principal Scientist, DT, SRS, Bengaluru retired on attaining the age of superannuation on 31.1.2021(AN) from ICAR Services.
- Dr. Manoj Kumar C. T. was transferred from NDRI, Karnal to SRS, Bengaluru on 4.02.2021.
- Consequent upon his transfer from ICAR-NDRI, Karnal to ICAR-IISWC, Regional Station, Chandigarh, Dr. Sujeet Kumar Jha, Principal Scientist was relieved from ICAR-NDRI on 27.2.2021(AN).
- Dr. I. D. Gupta, Principal Scientist, AG&B Division retired on attaining the age of superannuation on 27.2.2021 (AN) being holiday on 28.2.2021 from ICAR Services.

Additional Responsibility

- Dr. Anurag Saxena, Principal Scientist was entrusted with the responsibility of Incharge, FRMC and FPS, ICAR-NDRI, Karnal w.e.f. 18.12.2020.
- Dr. S. De, Principal Scientist was entrusted with the responsibility of Incharge, ABTC, ICAR-NDRI, Karnal for a period of six months w.e.f. 15.1.2021.
- Dr. A. K. Mishra, PS was entrusted with the responsibility of Acting Head, LPM, ICAR-NDRI, Karnal w.e.f. 8.2.2021.
- Dr. R. R. B. Singh, Principal Scientist was entrusted with the responsibility of Acting Head, DT Division, ICAR-NDRI, Karnal for a period of six months w.e.f. 30.3.2021.

HONOURS AND AWARDS

Mr. Narendra Singh Rohila, Mr. B. P. Singh, Mr. Satyavir and Mr. Lakshman received **"Best Paper Award"** for the presentation of their paper **"Zotero: A Personal Research Assistant for Researchers"** during International Conference on **"Management of Knowledge Resource Centre in the Networked Digital Environment: Trends, Challenges and Opportunities"** jointly organised by University of Agricultural Science and AALDI held at University of Agricultural Science, Bengaluru during 25-26 Feb., 2021.

राज भाषा एकक

संस्थान राजभाषा कार्यान्वयन समिति की बैठकें

संस्थान प्रमुख डा. एम.एस.चौहान, निदेशक एवं अध्यक्ष, संस्थान राजभाषा कार्यान्वयन समिति, भाकृअनुप–राडेअनुसं, करनाल की अध्यक्षता में संस्थान के विभिन्न प्रभागों व अनुभागों में राजभाषा हिन्दी के प्रयोग की स्थिति की समीक्षा हेतु डा. एन.एन. दस्तूर सभागार में संपन्न समीक्षा बैठक में संस्थान के 20 प्रभागाध्यक्ष/प्रभारी/प्रतिनिधि अधिकारी शामिल हुए। इस बैठक में पिछली बैठक के कार्यवृत्त के अनुमोदन के साथ–साथ आगामी तिमाही के दौरान संस्थान में राजभाषा हिन्दी के प्रचार–प्रसार व कार्यान्वयन के संबंध में मदवार चर्चा की गई। चर्चा के उपरांत सर्वसम्मति एवं समिति के अध्यक्ष के अनुमोदन से यह निर्णय लिए गए कि अधिकारियों एवं कर्मचारियों की सेवा पुस्तिकाओं में प्रविष्टियां हिंदी में ही की जाएंगी। संस्थान के सभी अधिकारियों एवं कर्मचारियों के हिंदी ज्ञान से सम्बन्धित रोस्टर को अद्यतन करते हुए उन्हें व्यक्तिशः आदेश जारी किया जाएगा। बैठक में धारा 3(3) के सभी दस्तावेजों को द्विभाषी में जारी किया जाना, संस्थानों के सभी प्रभागों व अनुभागों तथा क्षेत्रीय केन्द्रों के अध्यक्षों के द्वारा अपने स्तर पर जांच बिन्दु बनाये जाने, राजभाषा नियम 5 के अनुसार हिन्दी पत्रों के उत्तर यथावत् हिन्दी में जारी किए जाने, भारत सरकार, राजभाषा विभाग, गृह मंत्रालय के द्वारा समय समय पर जारी किये जाने वाले सभी निर्देशों की अक्षरशः अनुपालना सुनिश्चित करने तथा वार्षिक राजभाषा कार्यक्रम में उल्लिखित लक्ष्यों को प्राप्त करने की दिशा में सार्थक प्रयास किए जाने तथा सभी हिन्दी प्रोत्साहन योजनओं को वित्त वर्ष 2021–22 में नियमानुसार कार्यान्वित करने आदि पर भी निर्णय लिये गए।

2 संस्थान के निदेशक एवं अध्यक्ष, संस्थान राजभाषा कार्यान्वयन समिति डा. एम.एस.चौहान की अध्यक्षता में तिमाही अंत मार्च, 2020 की तिमाही बैठक दिनांक 21.4.2020 को पिनाकी सभागार में आयोजित की गई। भारत सरकार द्वारा कोविड–19 की रोकथाम हेतु जारी दिशानिर्देशों के मद्देनजर इस बैठक में अध्यक्ष सहित 4 पदाधिकारी, श्री विवेक पुरवार, संयुक्त निदेशक(प्रशासन), श्री डी.डी. वर्मा, वित्त नियंत्रक, श्री एस.एम.देब, प्रभारी पुस्तकालय सेवाएं एवं सदस्य–सचिव श्री राकेश कुमार शामिल हुए। बैठक में यह निर्णय लिया गया कि संस्थान के सभी प्रभागों/अनुभागों के आन्तरिक व बाह्य डाक प्राप्ति व डाक वितरण रजिस्टर व पिअन बुक आदि में अधिकाधिक इन्दराज हिन्दी में किए जाएंगे तथा डाक आदि भेजने के लिए केवल द्विभाषी या

हिन्दी कार्यशालाएं, संगोष्ठियां एवं प्रशिक्षण

संस्थान के द्वारा निदेशक, राडेअनुसं, करनाल की अध्यक्षता में दिनांक 16.1.2021 को ''ज्ञान–विज्ञान व तकनीकी लेखन में हिन्दी की भूमिका व संभावनाएं'' विषय पर वर्चुअल माध्यम से एकदिवसीय वैज्ञानिक तकनीकी संगोष्ठी का आयोजन किया गया, जिसमें आईसीएआर के करनाल स्थित सभी शोध संस्थानों व नगर राजभाषा कार्यान्वयन समिति के सदस्य कार्यालयों के 70 अधिकारी एवं 24 कर्मचारी शामिल हुए। संस्थान के राजभाषा विभाग के संयुक्त तत्वावधान में आयोजित इस संगोष्ठी में वैज्ञानिकों ने ज्ञान विज्ञान एवं तकनीकी लेखन में हिन्दी भाषा की महत्वपूर्ण भूमिका के बारे में विचार विमर्श एवं आत्ममंथन किया। अपने अध्यक्षीय संबोधन में निदेशक डा. एम.एस. चौहान ने यह बताया कि संस्थान के द्वारा समय–समय पर वैज्ञानिक संगोष्ठियों का आयोजन किया जाता है ताकि संस्थान के वैज्ञानिकों द्वारा किए गए अनुसंधान व शोध कार्यों को सरल हिन्दी भाषा में डेरी कृषकों, पशुपालकों व जनसामान्य के बीच अधिकाधिक प्रचारित व प्रसारित करने में आने वाली समस्याओं का समुचित निराकरण किया जा सके। उन्होंने यह आह्वान भी किया कि वैज्ञानिकों को डेरी कृषकों व पशुपालकों के लिए नई प्रौद्योगिकियों व अनुसंधानों को विकसित करने के साथ उसे सरल व सुबोध भाषा में प्रचारित व प्रसारित करने पर पर विशेष ध्यान देना चाहिए। केन्द्रीय औषधि अनुसंधान संस्थान, लखनऊ से सेवानिवृत्त संयुक्त निदेशक डा. विजय नारायण तिवारी ने मुख्य वक्ता के रूप में अपने संबोधन से प्रतिभागियों को लाभान्वित किया। इस संगोष्ठी में संयुक्त निदेशक (शैक्षणिक) डा. आर.आर.बी. सिंह, संयुक्त निदेशक (अनुसंधान) डा. धीर सिंह, संयुक्त निदेशक(प्रशासन) एवं कुलसचिव श्री विवेक पुरवार, वित्त नियंत्रक श्री डी.डी.वर्मा, उप निदेशक(राजभाषा) श्री धीरज शर्मा एवं सहायक निदेशक(राजभाषा) श्री राकेश कुमार कुशवाहा, सभी प्रभागाध्यक्ष, प्रभारी, नामित वैज्ञानिक, तकनीकी व प्रशासनिक कर्मचारी व बेंगलूरू तथा कल्याणी क्षेत्रीय केन्द्रों के अध्यक्ष तथा नामित कर्मचारी भी सम्मिलित हुए। इस वर्चुअल कार्यक्रम के अंत में प्रतिभागियों की शंकाओं व प्रश्नों पर भी विस्तारपूर्वक चर्चा की गई।

2 प्रभारी, राजभाषा एकक तथा उप निदेशक(राजभाषा) श्री धीरज शर्मा ने दिनांक 30.3.2021 को ''संसदीय राजभाषा समिति के निरीक्षण हेतु तैयारी'' विषय पर आयोजित चर्चा संगोष्ठी में संस्थान के 15 अधिकारियों तथा 05 प्रतिभागियों को महत्वपूर्ण मार्गदर्शन प्रदान किया। उन्होंने सभी प्रतिभागियों को संसदीय समिति के द्वारा हिन्दी संबंधी कार्यों के निरीक्षण की प्रक्रिया तथा सभी प्रभागों, अनुभागों व पदाधिकारियों के द्वारा राजभाषा नीति, नियमों व व्यवस्थाओं के अनुपालन हेतु ध्यान में रखी जाने वाली महत्वपूर्ण जानकारी प्रदान की तथा प्रतिभागियों की शंकाओं का समाधान भी किया।

RESEARCH

Glycerol mineral salt lick

Bandla Srinivas, G. Savitha and G.V. Punith Kumar

Purified glycerol based mineral salt licks formulations were standardized and prepared by cold process and made into 500 g, 1 kg and 2 kg blocks. Glycerol, being a glycogenic and lipogenic compound, was selected for its substrate channeling property and compounded with mineral, vitamin and salt supplements. The lick was developed under the DST collaborative project between SRS, ICAR-NDRI and KSCST, IISc, Bengaluru.

(A) (B) (C)

Glycerol-mineral-Salt lick blocks prepared in cold process in different shapes (A) and, ½, 1 and 2 kg sizes (B) and dried and (c) set block lick

Characterization of ghee residue obtained from processing of Deoni and HF crossbred cows' milk

(Amanchi A Sangama, Monika Sharma, Menon Rekha Ravindra, Laxmana Naik N and K Jayaraj Rao)

Ghee residue is a nutrient rich, brownish solid mass obtained as a by-product during the preparation of ghee in the dairy industry. The present study aimed at studying the effect of clarification temperature (110 and 120˚C) and methods of ghee preparation (creamery butter and direct cream) on the physico-chemical characteristics of ghee residue obtained from the processing of milk from indigenous (Deoni) and Holstein Friesian (HF) crossbred cows. Irrespective of the type of milk, it was found that higher fat content was obtained for the ghee residue prepared by direct cream method while the reverse was observed for protein content. With regard to clarification temperature, higher temperatures increased the mineral content, but decreased lactose levels as well as phospholipids in ghee residue. The antioxidant activity at 110°C (30.71 to 67.87%) was higher than 120°C (27.05 to 66.89%) since the phospholipids tend to move from ghee residue to ghee at higher temperatures. Also, the antioxidant activity of Deoni ghee residue (27.05 - 67.87%) was higher than HF crossbred ghee residue (31.25 - 48.65%). It can be concluded that the effect of breed and clarification temperature was evident on various physico-chemical attributes of the ghee residue samples evaluated in the present study.

TECHNOLOGY TRANSFERED

The technology entitled "Process Technology for Palada Payasam Mix Preparation by Dry Crystallization Method in a Mechanical Unit" was transferred to M/s Eastern Condiments (P) Ltd, Idukki, Kerala. Three members nominated by the Industry were trained in the technology at SRS of ICAR – NDRI during 8-10 February 2021 and a Technical Know-how document was also shared with the client.

STUDENT AWARDS

KPIT Sparkle is a platform that in association with Department of Science and Technology, Government of India; Ministry of New and Renewable Energy; ONCG Energy Center; National Institute of Design (NID); All India Council for Technical Education (AICTE), that recognises entrepreneural ideas from student innovators. The theme for 2021 edition of the event was Mobility and Energy for the Future and Team Nano-Fluid from SRS of ICAR–NDRI, Bengaluru was selected for the **Platinum Award – KPIT Sparkle 2021.** The team member from ICAR-NDRI, **Mr. Ravi Prakash**, is a doctoral student in the discipline of Dairy Engineering and is mentored by Dr Menon Rekha Ravindra, Principal Scientist. The student was also awarded for contributing one of the winning ideas in the theme area of **Post-Harvest, Food Technology and Value addition** for the **AgriIndia Hackathon 2020** organized by Pusa Krishi, ICAR - Indian Agricultural Research Institute (IARI), New Delhi.

EVENTS ORGANIZED

Atal Incubation Centre-SRS-ICAR-NDRI Foundation, Bengaluru Inaugurated

Atal Incubation Centre-SRS-ICAR-NDRI Foundation, Bengaluru supported by Atal Innovation Mission, NITI Aayog, was inaugurated at Southern Regional Station of ICAR-NDRI, Bengaluru by Dr Trilochan Mohapatra, Hon'ble Secretary, DARE & Director General, ICAR, New Delhi on March 20, 2021 in the presence of Shri R. Ramanan, Mission Director, Atal Innovation Mission, NITI Aayog & Additional Secretary, Government of India and Dr M. S. Chauhan, Director & Vice Chancellor, ICAR-NDRI, Karnal. After inaugurating the Atal Incubation Centre (AIC), Dr. Mohapatra stated that the concept of innovation is not new to our culture and its importance was realized long back in our country. Director General affirmed that artificial intelligence platforms work on data of high quality. Therefore, proper and accurate data maintenance is the need of the hour. Further, he emphasized on development and adoption of sensor-based technologies in the field of dairying.

Further, he emphasized the need of defining the quality of milk of our Indigenous breeds. Dr. Mohapatra appreciated the work being done at SRS of ICAR, NDRI, Bengaluru. He also appreciated the efforts of Atal Innovation Mission of NITI Aayog, Government of India to promote the entrepreneurship culture among youth and women. Shri R. Ramanan, Mission Director, Atal Innovation Mission, NITI Aayog and Additional Secretary, Government of India delineated the concept of incubation and explained how Atal Innovation Mission has set high standards for all its Incubation centres. He affirmed that the AIM would settle for nothing less than world class incubators. He expected that ICAR-NDRI, Southern Regional Centre would strive to meet the target of establishing a high standard incubation facility in the field of dairying, and assured all possible help from AIM, NITI Aayog. Dr M.S. Chauhan, Director & Vice Chancellor, ICAR-NDRI, Karnal detailed the efforts of ICAR-NDRI in technology development and transfer of technologies to the industry. In his Welcome address, Dr K. P. Ramesha, Head, SRS of ICAR-NDRI, Bengaluru briefed the activities of the Station and welcomed the dignitaries and all the participants to the inaugural function.

Inaugural Program of SCSP Project cum Farmers' Training on 'Scientific Livestock Farming' at SRS of ICAR-NDRI

The Inauguration of SCSP Project and distribution of critical inputs to the farmer-beneficiaries in Kolar District of Karnataka funded by SCSP grants of the institute was held on March 19, 2021 at Karisandra Village of Masthi, Malur Block of Kolar District, Karnataka State. The programme was inaugurated and presided by Dr. M. S. Chauhan, Director and Vice Chancellor, ICAR-NDRI, Karnal in the august presence of Chief Guest of the programme Shri. K. Y. Nanje Gowda, M.L.A & President, KOCHIMUL (Kolar Chikkaballapura Milk Union-KMF), Dr. Thippa Reddy, Managing Director, KOCHIMUL, Dr. K. P. Ramesha, Head, SRS of ICAR-NDRI, Bengaluru, other invitees from KMF and Scientists of SRS of ICAR-NDRI. The Programme was well attended by the target beneficiaries (50 SC farmers) and with the active participation of other farm families. While addressing the gathering, Dr. Chauhan emphasized on overall development of SC community through livestock farming, which would fetch additional income to the farmers to educate their children and also provide nutritional and economic security to their family members.

The Chief Guest, Shri. K.Y. Nanje Gowda, appreciated the technological interventions of SRS-NDRI initiated for the overall development of Karisandra village that comprised 92.00 percent of SC community and requested the farmers to make use this opportunity to adopt the modern scientific livestock farming practices for improved cattle productivity and enhanced income. Dr. K. P. Ramesha briefed about the various outreach activities of SRS-ICAR-NDRI and importance of this programme in improving the socio-economic status of SC farmers through implementation of various technological interventions, trainings and demonstrations. The inputs distributed to the beneficiaries included, improved fodder crops seeds and stem cuttings, vermi compost, concentrate feed, mineral mixtures, UMMBs, Calf starters, CMT Kits, Milk Cans, Rubberized Cow mats, Chicks for backyard poultry farming and extension literature on improved dairy farming practices. After the inaugural session, a training programme session on 'Improved Livestock Farming Practices' was also organized for the benefit of farmer-beneficiaries.

Malnad Gidda Farmers Training

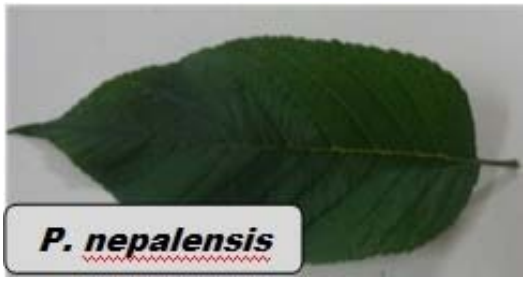
Farmer's training programme on "Malnad Gidda cattle conservation and scientific management (Habba)" was organized at Ashoke, Gokarna, Uttara Kannada on March 26, 2021 under KLDA-MOEF&CC funded project on "Proteo-Genomic approach to elucidate productive & reproductive performance of Malnad Gidda, Amrithmahal & Hallikar breeds of cattle and field performance recording of Malnad Gidda cattle". About 300 people, including farmers, students and entrepreneurs, attended the programme. Further, many more indigenous cow lovers attended the inaugural function and valedictory function. Various topics on health care, fodder development, and Malnad Gidda cattle management, reproductive disorder management, and fertility augmentation techniques were covered by a panel of experts. During the programme, pamphlets on Malnad Gidda breed and training kit were distributed. In addition, inputs viz. mineral mixtures and about 2500 fodder slips/stem cuttings of Sampoorna (DHN6) variety were also distributed to Malnad Gidda farmers.

EASTERN CAMPUS, KALYANI

RESEARCH

Effect of plant containing secondary metabolites as feed additives on *in vitro* ruminal methanogenesis with cattle rumen liquor

S. Chaudhary, A. Santra, S.K. Das, M.K. Ghosh and T.K. Dutta



Production of methane in the rumen of livestock animals, results in not only a significant loss of dietary energy (8 to 12 % of the digestible energy) but also it contributes to green house gases leading to global warming. North-eastern part of India possesses wide variety of tree leaves, which are not yet tested to observe their effect on ruminal methanogenesis as feed additives. Three tree leaves e.g., Parari *(Schefflera wallichiana),* Sohiong *(Prunus nepalensis)* and Daqingshu *(Ficus hookeri)* were collected from Meghalaya for studying their effect as feed additives on ruminal methanogenesis and fermentation pattern *in vitro*. 200 $\pm$ 10 mg of substrate comprising of air dried milled (<1.0 mm) paddy straw and concentrate mixture in 60:40 ratio was used as control for *in vitro* gas production test. In experimental syringes, parts of the control substrate were replaced by 50 and 100 mg of different plant materials e.g., each tree leaves. 30 ml inoculums/incubation media (rumen liquor and buffer in 1:2 ratios) inoculated in each 100 ml calibrated glass syringe by auto-dispenser under anaerobic condition and were incubated for 24 h at 39^0C, with recording of the gas production after 24 h of incubation.

Ruminal gas production was lowered when 25, 50 and 100 mg of control substrate (contained 60% paddy straw and 40% concentrate mixture) was replaced by *Ficus hookeri* tree leaves. Total gas production due to incubation of control substrate was 132.0 ml/g DM/24h where as it was 113.9 ml, 105.6 ml and 89.8 ml/g DM/24 h due to replacement of 25, 50 and 100 mg of control substrate by *Ficus hookeri* tree leaves. Similarly, total gas production per unit digested dry matter also significantly lowered due to replacement of control substrate by *Ficus hookeri* tree leaves. Methane production was significantly low due to replacement of control substrate by *Ficus hookeri* tree leaves. However, supplementation of Parari and Sohiong tree leaves in a straw based diet had no effect on ruminal methane production *in vitro*. Rumen ciliate protozoal number was not influenced by the supplementation of Parari, Sohiong and *Ficus hookeri* tree leaves in the paddy straw based diet/substrate *in vitro*. TVFA production was higher due to replacement of control substrate by *Ficus hookeri* tree leaves followed by Parari tree leaves. *In vitro* true dry matter digestibility (IVTDMD) was highest due to inclusion of Parari tree leaves followed by Sohiong tree leaves in the control substrate whereas IVTDMD was decreased due to inclusion *F. hookeri* tree leaves as feed additive in the incubating. It was inferred that that Daqingshu *(Ficus hookeri)* tree leaves might be used as feed additives to manipulate rumen fermentation for reducing ruminal methanogenesis.

Livestock Development program at Ruppur, Birbhum, West Bengal

One day programme on awareness about goat rearing, demonstrations regarding uses of various inputs along with distribution of various inputs (goats, goat feed, mineral mixures, vitamin supplement and deworming) in a remote village Ruppur of Birbhum district, West Bengal were jointly organized by ICAR-National Dairy Research Institute (NDRI), Eastern Regional Station (ERS), Kalyani, West Bengal in collaboration with Bolpur Manab Jamin on January 30, 2021under TSP Project. A total of 50 black Bengal goats, 1500 kg of

goat mash feed, 27 kg of mineral mixure, vitamin supplement and deworming were distributed among 27 tribal farmers.

On campus scientists-farmers interaction session cum input distribution camps under TSP

A total of 2 on-campus scientists- farmers' interaction session cum input distribution camps under TSP programme were organized during January, 2021 to March, 2021. The first programme was organized on February 10, 2021 and during the programme, 2600 kg pig starter mash, 9700 kg goat mash, 36 piglets and 91 goats were distributed among farmers. Another programme was organized on February 27, 2021 and during the programme 80 goats**,** 2000 kg goat mash, 20 piglets, 1000 kg pig starter mash, veterinary medicine and utensils used for dairy farming were distributed among the tribal farmers.

Livestock Development program at Budbud, Burdwan, West Bengal

One day programme on awareness about goat rearing, demonstrations regarding uses of various inputs along with distribution of various inputs (goats, goat feed, mineral mixures, vitamin supplement and deworming) in Budbud KVK of Burdwan district, West Bengal were jointly organized by ICAR-National Dairy Research Institute (NDRI), Eastern Regional Station (ERS), Kalyani, West Bengal in collaboration with Budbud KVK of Burdwan on February 12, 2021under TSP Project. A total of 56 black Bengal goats were distributed among 14 tribal farmers.

Camps organized at Nagaland

Under NEH projects scientist farmers' interaction session cum input distribution camps were organized at Dungki village, old Jalukie village, Dist Peren, Nagaland. In camps several inputs viz. chicks, poultry feeds, feeders, drinkers, drinkers stand etc were distributed among farmers. In the camp organized at Dungki village and old Jalukie village, Dist. Peren, Nagaland, a total of 5000 chicks, 1750 kg pre-starter feed, 2000 kg starter feed, 100 feeders, 100 drinkers and 100 stands for drinkers were distributed among 116 farmers.

TSP and NEH project activities at Arunachal Pradesh: During the period under report, two visits were organized at Namsai district of Arunachal Pradesh. Through those visits, both TSP and NEH project works were carried out. The first visit was carried out during February19 to 20, 2021. In the visit, scientists farmers interaction sessions were organized and several inputs like veterinary medicines, Poultry Feed (2000 kg), Pig Feed (1500 kg), Chicks (1000 No.), Piglets (30 No.) were distributed under NEH project. Apart from that, 600 Ducklings and 1000 Chicks were distributed to tribal farmers of Arunachal Pradesh under TSP project. During March 26-27, 2021 another visit to Arunachal Pradesh was organized and in that visit, 40 kg Mineral Mixture, Poultry Feed (5000 kg), Pig Feed (129.5 q), 2000 Ducklings. Pig Feed (95.75 Qtl.) and 81 Piglets were distributed to the farmers under NEH project. Apart from that, 496 ducklings and 623 poultry birds were also distributed during the programme.

NEH project activities at Tripura:

Two visits were arranged in Tripura during January, 2021 to March, 2021. The first visit was organized on March 12, 2021 and 60 kg mineral mixture, 1500 kg Pig Feed, 1250 kg Goat Feed, 30 Goats and 30 Piglets were distributed among farmers under NEH project. Another programme was organized at Dhalai KVK of Tripura and one off-campus training programme was organized during the visit. In the programme, veterinary medicine, 108 kg mineral mixture, 110 goats were distributed among farmers under NEH project.

Extension activities under SCSP:

A total of 4 programmes were organized under SCSP programme during January, 2021 to March, 2021. Those programmes were organized in Birbhum district and Nadia district of West Bengal. Scientists-Farmers Interaction Session cum Animal Vaccination, Health and Input Distribution Camp was organized on January 22, 2021 at Super village of Birbhum district and in the camp 50 Goats, 1250 kg Goat Feed and 100 kg Mineral Mixture was distributed among Scheduled Caste farmers. Another Scientists-Farmers Interaction Session and Input Distribution Camp were organized at NDRI-ERS, Kalyani campus on February 10, 2021 and in the programme 50 Goats, 1250 kg goat feed were distributed among farmers. Scientist-Farmers Interaction Session and Input Distribution Camp was organized on February 12, 2021 at Burdwan KVK campus and through the programme 50 Goats, 1250 kg goat feed was distributed among farmers belonging to scheduled caste community. One animal health and vaccination camp was organized under SCSP project on March 9, 2021 at South Chandamari village of Nadia district of West Bengal and in the programme, animal vaccination campaign was carried out at the farmers' door step.

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