



# NDRI

## News

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### From the Director's Desk



*The Hon'ble Governor of Haryana giving inaugural address during XII Agricultural Science Congress*

Nearly 70% of Indian population lives in rural areas. Rural prosperity does not mean only economic growth of people living in rural areas but also includes freedom from hunger, under-nutrition and ill-health. Despite the intensive efforts made by successive governments over the years, the problem of poverty, malnutrition, lack of sanitation and chronic diseases continue to exist in significant proportion of population with higher magnitude in rural areas as compared to urban areas. Report indicate that around 48% children of the country, under the age of five years, have stunted growth. Similarly, the prevalence of underweight children in our country is about 42.5%, which is unfortunately highest in the world. Since about 80% of rural population is dependent on agriculture for their livelihood, development in agriculture and its allied activities, thus, becomes very vital for the rapid development of the rural economy. The total share of agriculture & allied sectors (Including crop, livestock, forestry and fishery) in terms of percentage of National GDP was calculated to be 13.9 % during 2013-14 at 2004-05 prices. The share of livestock sector in agricultural GDP is continuously increasing mainly due to enhanced rate of milk production, which accounts for more than 68% of the total value of output from livestock sector. Thus, dairying is recognized as the major instrument in bringing about socio-economic transformation of rural poor in our country.

Indian dairying is a classical example for 'production by masses rather than mass production'. The dairy sector in India is mainly in the hands of smallholders having mixed crop-livestock farms, which contribute to more than 70% of the total milk production in the country. Dairy animals contribute immensely to the millions of smallholder farmers' livelihood by providing regular, stable and year-round income. For smallholders, the dairy sector acts as a vehicle for poverty alleviation through generation of off-farm jobs (it is estimated that one off-farm job is generated for every 10-20 litres per day of milk marketed), offers environmental benefits through balanced and integrated farming systems, and provides improved household food and nutritional security. However, smallholder milk production system has its own constraints in terms of low productivity, lack of sufficient feed, fodder and animal health care, an inadequate supporting infrastructure, and low level of procurement, processing and marketing of milk.

Empirical evidence, based on the large sample surveys, indicates that level of milk production in 36% households is only  $\leq 500$  litres/annum and in another 27%, the milk production is between 500 and 1000 litres/annum. Such a tiny scale can certainly provide nutritional benefits to the family, but not enough surplus for the market. Only 15% households produce  $>2000$  litres/annum and contribute 50% to the total milk production. Although, the scale of dairy production is positively associated with land ownership, interestingly, a considerable number and proportion of small landholders have taken up dairying as a commercial activity. Among the households producing more than 5,000 litres of milk/annum, more than 54% belong to marginal and small landholders, suggesting that with efficient input and output support services, dairying can be a vital activity for the economic upliftment of these small landholders.

The biggest task before the Indian dairy industry is to transform, gradually and phase by phase, the unorganized dairying into a more organized dairy sector, which ensures the farmer's profit and also safeguards



the consumer's interest both at price and quality level. To bring substantial and sustainable improvement in smallholder dairying, we have to devise the mechanisms and policies to facilitate smallholder's participation in modern dairy supply chains. Meeting the stringent quality standards of modern dairy chains is the biggest challenge before the smallholders, as their production system, at least partly, does not follow the "Clean Milk Production" practices. The concept of "Community Animal Management System" can also be conceptualized for the overall benefit of the small scale farmers and also to fulfill the increasing market demand.

For increasing the production of value added dairy products, the infrastructure will need to be further developed in both the public and private sectors. The Institutes and Universities engaged in dairy education and research need to enhance their efforts to provide high research support and competent human resources, for large scale, diversified and quality production of value-added dairy products. Research input will also need to be provided for formulation of macro, meso and micro level policies and programmes to control the cost of milk production and processing and to facilitate the flow of milk to organized chain. While formulating policies, it should be remembered that any mechanism which ignores livelihood issues of small holder dairy farmers would be inequitable and, therefore, may not find wide acceptance in a country like India.

Considering the importance of the smallholders in the country's development, the National Academy of Agricultural Sciences and ICAR-National Dairy Research Institute organized the 12th Agricultural Science Congress at National Dairy Research Institute, Karnal during 3<sup>rd</sup> – 6<sup>th</sup> February, 2015, on the theme "Sustainable Livelihood Security for Small Holder Farmers". The congress provided a vibrant platform for discussing and exchanging views on contemporary topics of wide range related to "Small Holder Indian Agriculture" including Crop and Vegetable, Animal, Fisheries and related Social Science issues. The deliberations and recommendations have been crystallized in the form of Conference Proceedings and interested readers may be benefitted by referring to the report.

*A. K. Srivastava*  
(A. K. Srivastava)

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## RESEARCH

### Cloned Calf from Somatic Cell Isolated from Urine

(S. K. Singla, M. S. Chauhan, R. S. Manik, P. Palta, S. S. Lathwal, Anuj Raja and Pankaj)

A female cloned calf named 'Aparva' was born on 5<sup>th</sup> February, 2015. The calf was born by normal parturition, and its weight at the time of birth was around 37 kg. The calf is a clone of an elite Murrah buffalo (MU-5345) of NDRI Livestock Farm. Earlier another cloned calf named 'Lalima' was produced from the same buffalo. In the present case, the donor cell was isolated from the urine of the donor animal. To our knowledge, this is the first report in the world, across the species in which cloned embryos have been produced using somatic cells isolated from urine.



### Dietary Supplementation of Probiotic Lactobacilli Fermented Milk Shows Potential to Augment Healthy Aging Through Immune Benefits

(Rohit Sharma, Rajeev Kapila and Suman Kapila)

Daily supplements of the probiotic *Lactobacillus rhamnosus* (MTCC 5897) and *L. fermentum* (MTCC 5898) may alleviate the age-related decline in immune functions in the elderly, and promote healthy aging.

Studies on the lab. mice indicated that the probiotic was associated with improvement in the function of antioxidant enzymes, immune responses, and increased resistance to *E.coli* infection. "The results indicated that probiotic Lactobacilli fermented milk supplementation alleviated immunosenescence, resisted infection, and improved antioxidant capacity, thereby augmenting healthy aging. **The findings of this research work have been published in International Journals namely Nutrition Research and Age published by Elsevier and Springer, respectively.**

#### 'Healthy Aging'

Immunosenescence refers to the inevitable, multi-faceted decline in the functions of the immune system during

progressive aging which makes the elderly more susceptible to infections and the effects of inflammation. A decline in cell-mediated immune response, chronic inflammation and aggravation of humoral immunity was evident through previous research in the laboratory which conclusively suggests a skewed Th2 pathway during aging in mice. A disruption in cellular redox homeostasis is another critical manifestation of aging, which culminates in oxidative damage to cells and tissues. Together, immunosenescence, chronic infections, and oxidative stress constitute a grave threat to the rationale of healthy aging and pose a challenge to public health systems, throughout the world.

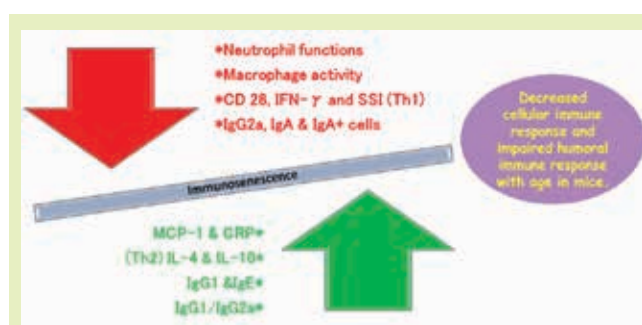


Figure : Age associated imbalance in immunological parameters of mice

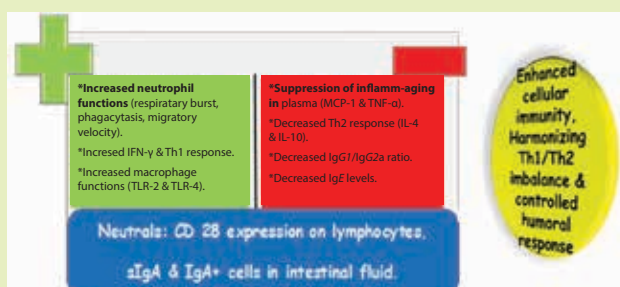


Figure : Anti-immunosenescence potential of probiotic fermented milk during aging

The study was documented by <http://www.nutraingredients-usa.com> (William Reed Business Media SAS) and [www.technology.org](http://www.technology.org) as Breaking News.

### Antimicrobial Nano-emulsions for the Delivery of Bioactive Components

(Minaxi, Bimlesh Mann, Rajan Sharma and Rajesh Kumar)

The process for the preparation of clove oil nano-emulsions was optimized using whey proteins. The optimized nano-emulsion was stable for 45 days at 25°C. Particle size distribution and zeta potential of nano-emulsion was  $199.2 \pm 2.28$  nm and  $-36.5 \pm 0.48$  mV, respectively. This nano-emulsion was stable to different food processing conditions like temperature (pasteurization, forewarming, boiling and sterilization), ionic strengths (0.1-1.0 M) and pH (3.0-7.0). Transmission Electron Micrographs confirmed the spherical shape of nanoparticle

and showed that clove oil was protected within coating material of whey proteins. The antimicrobial activity of the prepared nanoemulsion was measured against *E.coli*, *Bacillus subtilis*, *Candida lipolytica*, *Aspergillus flavus*, *Salmonella typhimurium*, *Listeria monocytogenes*, *E.coli* O157:H7 and *Shigella flexneri*. The minimum inhibitory concentration (MIC) of nano-emulsion for *Candida lipolytica*, *Aspergillus flavus*, *Salmonella typhimurium* was 30 µl and for other pathogens, it was found to be 50µl. Mechanism of antimicrobial activity of nanoparticles on the bacterial cell wall was confirmed by Scanning Electron Microscopy against *E. coli* and *Bacillus subtilis*. It was observed that nanodroplets stick on the surface of the bacterial cell wall, readily permeate the cell membrane, create pin holes, and cause shrinkage of cell membrane due to the loss of intracellular material.

### Direct Product Probiotic (DPP) Lactobacillus Culture by Spray Drying

(S. Mandal, Pritee, P. V. Behare, K. Khamrui and S. K. Tomar)

An attempt was made to produce concentrated Direct Product Probiotic (DPP) preparation of a potential probiotic strain

of *Lactobacillus casei* NCDC 298 by producing cell biomass in a formulated cost effective whey based medium (WBM) and preserving the cell biomass by spray drying. Growth performance of the culture was comparable both in WBM (K=0.616) and MRS broth (K= 0.624). Increase in growth rate was observed (K=0.658) when cultured in a fermenter, which further enhanced (K= 0.673) upon optimization of fermentation conditions. Cell biomass was produced in a laboratory scale Fermenter (14 lit capacity) with 5 L working volume (inoculation - 6.0-7.0 log cfu/ ml). Early stationary phase culture (9.0-10.0 log cfu/ ml) was obtained after 10 h at 37°C under optimized conditions and cell biomass was concentrated using microfiltration followed by centrifugation. The cell biomass was preserved by spray drying using a laboratory scale spray dryer and upto 25% cell survival was obtained in optimized drying medium under optimized conditions of drying. Viable counts were in the range of 10-11 log cfu/ g of powder and the viable counts were stable during storage at -20°C till 60 days. The concentrate *Lactobacillus* culture biomass can be used for direct application in value addition to various dairy and food products.

## EXTENSION

### DAIRY EXTENSION DIVISION

#### Dairy Education at Farmers' Door

Dairy Extension Division organized the Extension Education Programme "Dairy Education at Farmers' Door" to strengthen the effective dissemination of dairy production and processing technologies among farming community. Under this programme, a team of NDRI scientists including subject matter specialists from production, processing and management groups visited villages viz. Khrijpur and Wazidpur, Karnal district, on 2<sup>nd</sup> Saturday of every month and obtained the feedback from the participating farmers of these villages. In order to have a wide publicity about the visit of NDRI Scientists in the said villages, announcements were made well in advance.

#### Empowerment of Women and Mainstreaming of Gender Issues

Eight women empowerment trainings and campaigns were organized with the objective to create awareness in the field of dairying and home science and also impart skill in these areas so that farm women could generate more income from dairying and maintain healthy atmosphere in their respective families. In these programmes, a total number of 120 farm women were trained.

#### Farmers' Farm School

A new educational approach "Farmers' Farm School" of NDRI was started in village Gorgarh, Karnal. In this school, a total number of 20 active farmers were registered as students. Subject matter specialists of NDRI took classes regularly on every Friday and Saturday. Basics of animal husbandry alongwith wheat cultivation were covered and at the end of the month, quiz was also organized.

### KRISHI VIGYAN KENDRA

#### Extension Activities

- In all 58 training programmes (On-campus, Off-campus & study visits) on different aspects of dairy production and processing, crop production, crop diversification, bee-keeping, vermicompost and home science were organized in which 1807 farmers, women, rural youth and extension functionaries from Haryana and other states of the country were imparted trainings.
- KVK organized 13 training programmes on Scientific Dairy Farming, Clean Milk Production and Commercial Dairy Farming for 399 farmers, rural youth and extension functionaries sponsored by various state government departments including ATMA. In these training programmes, 190 trainees from Bihar, 91 trainees from Jharkhand 62 from Rajasthan, 33 from Haryana and 23 from Uttar Pradesh were imparted trainings.
- KVK also organized 27 exposure cum study visits for 837 progressive farmers and farm women from different districts of Uttar Pradesh, Madhya Pradesh, Rajasthan, Chhattisgarh, Rajasthan, Haryana and Himachal Pradesh.
- Various Animal Health Management activities were organized through Stockman centers in adopted villages of KVK. At these centers, 309 cattle and 279 buffaloes were artificially inseminated and 452 calves were born. Besides these, 11 animals were treated, 41 calves were dehorned and 07 animals were given infertility treatment.



- KVK team visited various villages of Karnal District to educate farmers on soil health, Swachh Bharat, recourse conservation apart from crop production and animal husbandry.
- Dr. A. K. Singh, DDG (Agri. Extension) ICAR visited KVK, NDRI Karnal on 9<sup>th</sup> March, 2015. He visited the various demonstrations units of KVK and interacted with about 180 beneficiaries of on-going training programmes.

## EVENTS

### Brain Storming Workshop on Optimizing Talent Search for the National Agricultural Research & Education System

A two day brain storming programme "Optimizing Talent Search for the National Agricultural Research & Education System" was organised at ICAR-National Dairy Research Institute, Karnal on 16<sup>th</sup> – 17<sup>th</sup> January, 2015. The brain storming programme was organized by ASRB – an apex body involved in the recruitment of scientists in the country. Shri Radha Mohan Singh, Hon'ble Union Minister for Agriculture inaugurated the workshop. The other dignitaries present during the function were Dr. Sanjeev Kumar Balyan, Hon'ble Minister of State, Agriculture; Sh. Karan Dev Kamboj, Hon'ble Minister of State, Govt. of Haryana; Dr. S. Ayyappan, Secretary DARE and Director General, ICAR; Dr. Gurbachan Singh, Chairman, ASRB; Prof. D. P. Agrawal, Former Chairman, UPSC and Dr. A. K. Srivastava, Director, NDRI, Karnal.



*Hon'ble Union Minister for Agriculture, Shri Radha Mohan Ji  
Releasing ISO Certification Granted to NDRI Karnal*

Union Minister for Agriculture stressed upon the need to attract youth to agriculture and to make the scientist selection process more effective. He also emphasized on the role of local and need based research and said that it should be the

integral part of the career development process of Scientists. He said that in the changing climate, the local breeds of dairy animals are more resilient and thus, more research should be done in this direction. He also proposed the setting-up of two National Breeding Centers – one in Southern India and another in Northern India to augment the breeding of dairy animals in the country. He informed that the infrastructure available at Krishi Vigyan Kendra (KVK) would be strengthened further, as KVKs have important role in the extension of agricultural technologies.

Dr. Sanjeev Kumar Balyan, Minister of State for Agriculture stressed upon the need for attracting researchers/ scientists of Indian origin working in the premier foreign laboratories to the National Agricultural Research & Education System (NARES). The ASRB should frame policies to attract such talent as part of the brain gain. He also called upon the policy makers to raise the standards of education and research in State Agriculture Universities (SAUs) at par with the ICAR Institutes. He encouraged the ICAR-NDRI scientists to work in the area of semen sexing technology to further boost the breeding of elite animals in the country.

Dr. S. Ayyappan, Director General, ICAR stressed that the score card of scientists for career development should be suitably modified from time to time as per the need. Prof. D. P. Agarwal, former Chairman, UPSC also presented his views on the present education system and emphasized that there is a need to work together to find ways to bring in structural reforms in the education system.

Dr. Gurbachan Singh, Chairman, ASRB said that the main aim of brainstorming-cum-workshop is to frame the policies so as to bring the best talent in the National Agriculture Research & Education System. More than 70 experts participated in the two day workshop.

Dr. J. C. Katyal Former-DDG (Education) and Dr. M. L. Madan Former-DDG (Animal Science) made elaborative presentations on score card issues. It was also suggested to involve basic science students in agricultural system in order to make agricultural researches more interdisciplinary in nature.

### 12<sup>th</sup> Agricultural Science Congress

12<sup>th</sup> Agricultural Science Congress (ASC) was organized at ICAR-National Dairy Research Institute from 3<sup>rd</sup> – 6<sup>th</sup> February, 2015. ASC is a flag-ship event of National Academy of Agricultural Sciences (NAAS) conducted every alternate year as a meeting of scientific community at large involved in agricultural research cutting across the subject matter specializations. The chosen theme of this year's ASC (XII ASC) was **"Sustainable Livelihood Security for Small Holder Farmers"**. The objective of the Congress was to make

available a vibrant platform for discussing and exchanging views on contemporary topics in Indian Agriculture like the Crop and Vegetable Production, Animal Production Systems, Fisheries Science Technologies and related Social Science issues. The scientific programme of XII ASC was covered under 12 Technical Sessions on Livelihood Security/ Skill & Human Resource Development/ Empowerment of Women/Intensification of Livestock/Attracting Youth/ Group Dynamics of Small Farmers/Linking Small Farmers to



*Dr. S. Ayyappan, President (NAAS) and DG, ICAR appealing to scientific community to work on smart farming during 12<sup>th</sup> ASC at NDRI, Karnal*



*Professor Kaptan Singh Solanki, Hon'ble Governor, Haryana releasing 12<sup>th</sup> ASC Souvenir during inaugural session at NDRI*

Markets/Credit Flow in Agriculture/ Mechanisation & Post Harvest Issue/NRM/Policy Matter issues/ Regional issues like Water Management, Salinity, Draught, Biodiversity etc. Besides the technical sessions, the XII ASC showcased **8 Plenary Lectures, 2 Round Table Meetings on Plant & Animal Science issues, an elaborate poster session, the Inter-Zone Elocution Contest by students, the young scientist presentations by researchers of below 35 Yrs, a specially organized Farmers Session and a grand Agriculture Science Exhibition.** The Congress was attended by more than 1700 participants representing the Faculty & Students from 42 SAUs and 9 Traditional Universities, **32 ICAR Institutes, 600 Farmers, KVKs, ZPDs, NGOs, the World Bank, banking institutions and policy makers from a wide spectrum of institutions.** The international representations in XII ASC included ILRI, CIMMYT, Michigan State University (USA), IFPRI, BISA, Polish academy of Sciences etc.

### Inaugural Session

**Prof. Kaptan Singh Solanki, Hon'ble Governor of Haryana** inaugurated the **XIIth Agriculture Science Conference**. He emphasized that scientific community should take lead in educating the farmers with new technologies for optimum utilization of resources available with such farmers. The

challenge for Indian agriculture is to increase production, while minimizing environmental impact. Hon'ble Governor also presented the Academy Awards and certificates to New Institution Members. In his inaugural address, **President (NAAS) and DG, ICAR, Dr. S. Ayyappan** informed that more than 90% of the farmers have land of less than 2 hectares but 70% of the food produced in India comes from the efforts of this category. Thus, for more sustainable growth, the problems of small farmers need to be addressed specially and they are required to be educated in science and stressed that "robust agriculture can make strong India". He also gave the slogan of "Smart farming for small farmers" and called upon scientists to understand and work on the issues concerning small farmers. **Dr. J. Voegelé, Sr. Director, World Bank, Washington, USA**, the need of second green revolution in the country to meet the demand of growing population stressed upon. **Prof. A. K. Srivastava, Director, NDRI & Convener XII<sup>th</sup> ASC** remarked that the agriculture road map of the country demands special emphasis on small farmers and their problems not only in production but also in marketing their produce, risk cover and policies to ensure their immunity to changing climate. **Dr. David Bergvinson, DG, ICRISAT, Hyderabad** highlighted the need of demand driven innovation to solve the problems of small farmers. **Dr. Jimmy Smith, Director General,**



*Dr. Jimmy Smith, Director General, ILRI, Nairobi, Kenya delivering plenary lecture on livestock, livelihoods and the future of small holder farmers during 12<sup>th</sup> ASC at NDRI*



*Dr. Sanjay Rajaram delivering plenary lecture on emerging technology options for ensuring food, nutrition and energy security during 12<sup>th</sup> ASC at NDRI*



International Livestock Research Institute, Nairobi, Kenya remarked that power of science should be used to address the issues of farmers to face the challenge of climate change. **Prof. R. B. Singh, Vice Chancellor, CAU**, stressed on the need of international cooperation to address the needs of small holder farmers, as more than 75% farmers are small holder farmers in Asia. **Dr. R. S. Paroda, Former-DG, ICAR** emphasized on the need for evergreen revolution and reorienting the efforts to provide right knowledge to the farmers.



*Dr. R.S. Paroda, Chairman, Haryana Kisan Ayog addressing delegates during 12<sup>th</sup> ASC at NDRI*

The scientific programme of the XIIth ASC was deliberated by more than 50 eminent invited and plenary speakers.

The concluding session of XII ASC took place on 6<sup>th</sup> February, 2015. It was chaired by Hon'ble Chief Minister of Haryana Sh. Manohar Lal Khattar. He stressed that small farmers cannot sustain long on the wheat and rice cultivations cycle, and small farmers should go for community and cooperative farming to reduce the input costs. He also stressed on linking the livestock production system as an integral part of agriculture with all its policy incentives. In this conference a record more than 900 poster abstracts were presented.

### Technical Sessions wise Major Recommendations

#### Session 1: Livelihood security for small holder farmers

##### Recommendations

- In order to protect, the interest of small farmers, there is a need to form groups like cooperatives, producers' group and SHG's to realize more profits through establishments of marketing linkages and also creating facilities for timely availability of inputs of seeds, fertilizers or protection measures.
- Agriculture insurance is needed for various crops and should be made essential, based on various climate related issues and spatial yield gaps and community should be involved in adopting crop insurance which should create a trust worthy process between small farmers and insurance companies.

#### Session 2: Attracting and retaining youth in agriculture

##### Recommendations

- The percentage of students pursuing agriculture as an undergraduate subject for further higher studies in India is still the lowest as compared to other fields. The curriculum taught at various universities is required to be updated, both the number and quality of faculty need to be improved and there is requirement of reorienting the agricultural education according to the changing job market at national and international level.
- Agriculture Universities need to introduce 'Entrepreneurship development programmes' in close liaison with the growing industry.
- Inadequate manpower is a serious concern while delivering extension services effectively. In order to overcome manpower shortage in extension and to professionalize extension delivery, central sector scheme of Agri-Clinics and Agri-Business Centres are required to be created aiming at producing self-employed Agripreneurs.
- To make agriculture profitable venture, there is a need to organise farmers' clubs in cooperative spirit. Marginal farmers are to be encouraged to take up advanced and mechanized farming leaving behind the age-old farming practices. Farmers should be familiarized with technology in production planning, consumer access & financial management through computer network of Internet banking and Voice SMSs etc.

#### Session 3: Skill and human resource development for diversification of employment and income opportunity

##### Recommendations

- Qualified agriculture graduates, agri-preneurs are to be trained for establishment of business models to produce value added agriculture/ horticulture/ dairy produce. Such products are to be linked with mass level service delivery programmes like mid-day meals. Simultaneous capacity building of stakeholders, strengthening of marketing system and advertisement for awareness is urgently required.
- Grassroots farmers living in disadvantageous regions of country like North East regions are to be encouraged for skill oriented agriculture (e.g. kiwi production in Arunachal Pradesh). It will require special incentive policies and R&D support like packaging and grading machines, improved training package at Horticulture Universities and their alignment with improved marketing channel in the respective regions.
- While developing agri-prenures, the market system must be of inclusive nature considering farmers as a main chain/ stakeholder. This can further be sustained adopting the PPP mode.
- Formulation and execution of appropriate policy for cooperative animal farming can make wonders if adopted in PPP mode using economically profitable and ecologically sound technologies to conserve indigenous breeds of goat and improve livelihoods of goat farmers.

#### Session 4: Linking small holder farmers with the market

##### Recommendations

- i. Different institutional innovations like cooperatives, self-help groups, producer companies, contract farming, etc have taken place to link small holder to the market but with sporadic success. There is a need for group action and scaling up of these groups. Organised retails (domestic as well as overseas) and integration of linkages (horizontal and vertical) should be promoted to link small holders to the market.
- ii. Small holders could be made economically viable by shifting to the production of high value crops and intensive cultivation. Besides providing incentives in terms of subsidy their skill improvement and matching input supply should be ensured.
- iii. The land-lease market should be legalised to help further diversification of small holder household income and encouraging small holders to engage in other occupations without fear of losing the ownership of land.
- iv. As majority of the farmers are small and they contribute substantially to the marketed surplus especially in dairy and vegetable production, improving the marketing efficiency by attracting investment should receive priority.

#### Session 5: Intensification of livestock production for small holder and land less farmers

##### Recommendations

- i. Reliable market access with fair price should be developed across the country for improving profitability through sale of livestock products by small and landless farmers.
- ii. Outstanding qualities of indigenous breeds should never be overlooked while adopting any breeding strategy. Therefore, more emphasis is needed for improving indigenous livestock available with small and land less farmers by using available technologies and skill development of livestock owners specially women.
- iii. Available biomass in the form of uncounted feed resources like horticulture, industrial waste etc. should be judiciously utilized with their value addition. Proper training and skill development of milk producers for formulation of balanced ration by using locally available ingredients is needed at large scale.
- iv. The produce of backyard poultry farming with indigenous stock is capable of earning premium price. Therefore, Backyard poultry farming requires proper intensification approach for generating sustainable livelihood of smallholders.
- v. Livestock health should be improved in accordance with the international norms so as to improve quality and quantity of livestock products.
- vi. Landless holders keeping livestock should be included in the definition of farmers so that they may get advantages of government policies.

#### Session 6: Group dynamics of small holder farmers

##### Recommendations

- i. The cooperatives and SHGs need to secure forward linkages to cover marketing risk faced by the member farmers.

- ii. For capacity building of small famers to enable establish the producer companies, the NARES Institutions should collaborate with development agencies in the private and public sector.
- iii. For up-scaling and replication of existing success stories of group dynamics in various parts of the country, leadership role should be provided by the Small farmers Agribusiness Consortia Platform recently launched by ICAR.

#### Session 7: Group dynamics of small holder farmers

##### Recommendations

- i. Adoption rate of mechanization in production and post-harvest processing in agriculture and allied sectors especially among small holders is quite low, causing poor realization of targets. Custom hiring of machines and equipment through government supported schemes involving private sector need to be strengthened.
- ii. Farm produce storage infrastructure and package of practices for long-term preservation suitable for small producers are lacking. A concerted effort in this direction is urgently required.
- iii. As majority of food processing is under the domain of "unorganized sectors" and its transformation could be achieved by using the validated technologies developed by R & D institutions meant for small and medium enterprises. The value chain approach would be the best approach to address the deficiencies through best possible interventions to enhance the level of processing and to ensure the delivery of "wholesome" food to consumers.

#### Session 8: Natural resource management & climate change

##### Recommendations

- i. It was recommended that extreme climate situations need to be looked in relation to agriculture production and productivity and suitable models need to be developed for prediction of these events.
- ii. Research efforts should be made to develop site specific problem solving agroforestry systems.
- iii. There should be a project at national level to evaluate the ecological and other services rendered through different agro-forestry systems.
- iv. Integrated farming system should be developed for small holder farmers at village level leading to make it a climate smart village. The concept of Climate Smart Villages must include several risk management interventions and provide an opportunity for building effective resilience strategies.
- v. There is an urgent need to combine the resource conserving technologies with surface mulching and crop rotations, for enhancing crop yields and limiting adverse environmental impacts. Focused research efforts are required to evaluate critical levels for physical and biological indicators for soil quality, which are not available sufficiently at present.
- vi. The important concern in improving soil quality should be improvement of soil structure, increase in soil organic

matter, improving the nutrient cycling, and reduction in compaction, which can be achieved through restorative conservation of agricultural practices.

- vii. There is a need to strengthen soil quality assessment labs in term of infrastructure, capacity for handling large number of samples and availability of adequate skilled manpower.
- viii. Indigenous breeds of cattle should be encouraged in the different agro ecological zones for their resilience to thermal stress, disease and nutrient requirement.
- ix. There is an urgent need to identify the unique traits in indigenous cattle which make them resilient to heat stress, diseases etc.
- x. Estimates on enteric methane production by Indian livestock with special reference to different agro climatic zones should be documented and methane mitigation measures to be identified and documented.

### **Session 9: Policy matter issues for the protection of small holder farmers**

#### **Recommendations**

- i. Location-specific research which ensures livelihood security to smallholders should be accorded high priority.
- ii. Agro-climatic zone wise policies are to be developed to protect the challenges of smallholders and their ability to adapt to climate change.
- iii. Institutional arrangements (Investment priority, self-help groups, cooperatives, integrated/ organic farming, cluster farming, farmer producer organizations) should be developed to increase the agriculture productivity and protect the livelihood security of smallholder farmers.

### **Session 10: Empowerment of women in agriculture**

#### **Recommendations**

- i. Social networks in communities should be mapped and supported by the government through policy interventions for increasing equitable access to resources and opportunities for men and women.
- ii. Empowerment programmes should cover a wide range of areas for enhancing productivity, profitability and sustainability of smallholder farming, providing an integrated and sustained support system to access technology, credit and market.
- iii. Highly motivated women farmers should be identified as Community Resource Persons for promoting the objectives of empowerment programme and ensuring its success.

### **Session 11: Credit flow and insurance support to small holder farmers**

- i. A higher proportion of small farmers should be covered under the Govt. Credit Institutions, it should be made equitable over regional imbalances.
- ii. More focus should be given on inputs than on outputs; large farmers and irrigated areas than small farmers and dry lands; productivity than profitability; consumers than

producers; and production than investment. Policy focus, government schemes and programmes need to be reviewed.

- iii. More funds should be deployed on risk mitigation of small farmers.
- iv. Emphasis should be given on aggressive advertisement of Govt. agriculture insurance schemes to cover wide population of small and vulnerable farmers.



*Shri Manohar Lal Khattar, Hon'ble Chief Minister of Haryana giving away Best Poster Presentation Award during concluding session of XIIth ASC at NDRI, Karnal*

#### **Academic Week Celebrated**

*Dr. D. Sundaresan, Dr. N. N. Dastur & Dr. K. K. Iya Memorial Oration Awards ICAR-National Dairy Research Institute, Karnal*

NDRI conferred Dr. D. Sundaresan, Dr. N. N. Dastur and Dr. K. K. Iya Memorial oration awards to Dr. N. K. Ganguly, Former-Director General, Indian Council of Medical Research, New Delhi; Dr. Harsh Kumar Bhanwala, Chairman - National Bank for Agriculture and Rural Development (NABARD), Mumbai; and Dr. Nagendra P. Shah, Professor, Food Science and Dairy Technology, The University of Hong Kong, respectively.



*Prof. Dr. A. K. Srivastava, Director, NDRI giving a citation certificate of Dr. D. Sundaresan Memorial oration to Dr. N. K. Ganguly, Former-DG, ICMR, New Delhi*

Dr. A. K. Srivastava, Director & Vice-chancellor, NDRI said that the Institute is in an enviable position because of the guidance of luminaries like Dr. D. Sundaresan, Dr. Dastur and Dr. K. K. Iya and read the citations of Hon'ble speakers, Dr. Ganguly, Dr. Bhanwala and Dr. Shah. He also informed that a Prof Chair is



going to be established at NDRI in collaboration with NABARD. Dr. N. K. Ganguly, Former Director General, Indian Council of Medical Research, New Delhi delivered D. Sundaresan memorial lecture on "Probiotics and Vaccine". He elaborated that probiotics have been proven to confer protection against infections, metabolic disorders and also highlighted research developments in probiotics in relation to vaccine developments and their applications. He further informed that Lactobacillus as the versatile delivery vehicle are being used for developing new vaccines for the control of HIV, Malaria and also for the prevention of pneumococcal and many more infectious diseases. Probiotics act on the mucosal immunity and are explored to be used as adjuvants for mucosal as well as parentally administered vaccines.



*Prof. Dr. A.K. Srivastava, Director, NDRI felicitating Dr. Harsh Kumar Bhanwala, Chairman NABARD, Mumbai for Dr. N. N. Dastur Memorial oration*

Dr. Harsh Kumar Bhanwala delivered N. N. Dastur lecture on "Leveraging Animal Wealth for Small Farmers Prosperity". He said that as per the 19<sup>th</sup> All India Livestock Census, the total livestock population in the country in 2012 was over 512 million, the largest in the world. He also said that animal farming supports a sizeable chunk of livelihoods, both in rural and urban areas of the country. Traditionally, livestock farming helped empowering the women, who were primarily engaged in attending the related activities. He also said that animal farming in India is best suited for weaker sections and small farmers to take care of the family and farm needs.



*Prof. Dr. A. K. Srivastava, Director, NDRI giving a citation certificate of Dr. K. K. Iya Memorial oration to Dr. Nagendra P. Shah, Professor, Food Science and Dairy Technology, University of Hong Kong*

Dr. Nagendra P. Shah delivered K. K. Iya lecture on "Improving health functionalities by reducing fat and salt contents in cheeses and using probiotics". He said that full fat Mozzarella

cheese contains approximately 25% fat. However, consumers are becoming health conscious the world over, hence, there has been an interest in developing low fat Mozzarella cheese.

### NDRI Starts a New Master's Programme in Food Science and Nutrition

Keeping in view the expanding needs of the manpower in the area of food processing, a new 2 year Master's course in "Food Science and Nutrition" has been introduced from the forthcoming academic session (2015-2016). The students passing out this course may find very good opportunities in the area of food and health sector. Similarly, a new postgraduate course in Animal Reproduction, Gynecology and Obstetrics has been introduced. The new academic programmes would further help in skill development by the young scholars.

### 13<sup>th</sup> Convocation of ICAR-National Dairy Research Institute (Deemed University), Karnal

NDRI organized 13<sup>th</sup> Convocation on 14<sup>th</sup> February 2015 and Prof. Kaptan Singh Solanki, Hon'ble Governor, Haryana was the Chief Guest on this occasion. Hon'ble Governor conferred Doctor of Science Honoris Causa to Dr. Mangala Rai, Former-DG, ICAR. In all, 43 B.Tech, 110 Masters and 61 Ph.D. scholars were awarded the degrees.



*Release of the newly launched dairy product 'Pinni' during inaugural session of 13<sup>th</sup> Convocation of NDRI Deemed University*

Dr. Mangala Rai, Former-Secretary, DARE and DG, ICAR delivered the 'Convocation Address' and said that NDRI has made contributions in dairy research, education and overall development of dairying in the country. NDRI has achieved landmark success in the area of animal cloning through 'hand guided cloning' technique. During this calendar year, the Institute has been successful in transferring a record number of 13 technologies to dairy and food sector industries. He



*Prof. Kaptan Singh Solanki, Hon'ble Governor, Haryana conferring Doctor of Science 'Honoris Causa' to Dr. Mangala Rai, Former-DG, ICAR during 13th Convocation of NDRI Deemed University*

congratulated all the students, who on successful completion of their studies received hard earned degrees and distinctions for their academic excellence. Dr. Rai motivated the young graduates and the faculty with his inspiring words emanating from his vast experience as an erudite scholar, academician and administrator par excellence.

Dr. A. K. Srivastava, Director & Vice-chancellor, NDRI presented the progress report on the significant achievements made by the Institute during the past one year.

On this occasion, Dr. Mangala Rai, presented Gold Medals for Ph.D., Masters and B.Tech. (DT). Dr. Arvind Kumar, Deputy Director General (Education), ICAR, presented Gold Medal for Best Thesis Research Work in the Production, Processing and Management Group. Similarly, 'Certificate for Best Thesis Research Work' for Master's programme were also presented. Merit certificates to the students were presented by Dr. Gurbachan Singh, Chairman, ASRB, New Delhi.

On this occasion, Dr. K. M. L. Pathak, Deputy Director General (Animal Science), ICAR also presented the best teacher awards for PG & UG to Dr. Sumit Arora, and Er. P. S. Minz, respectively. Certificate of Appreciation for best performance of Southern Regional Station Bangalore and Eastern Regional Station,



*A Student receiving degree from Chief Guest, Prof. Kaptan Singh Solanki, Hon'ble Governor, Haryana*

Kalyani were also presented by him. For overall contribution in research and teaching by the faculty, Animal Biochemistry Division and Animal Biotechnology Centre were adjudged as Best Divisions.

### National Dairy Mela - 2015

National Dairy Mela was organized from 25<sup>th</sup> - 27<sup>th</sup> February, 2015 at NDRI Karnal. Dairy Mela being an annual function of the Institute, provides a platform to the dairy farmers and entrepreneurs to learn more about the dairy related newer technologies and also to the research institutes and dairy industry in showcasing their technologies and products for benefiting the farmers and the dairy industry. This year three day "National Dairy Mela" was inaugurated by Mr. D. V. Suresh Kumar, General Manager, State Bank of Patiala, Chandigarh.

Around 14000 progressive dairy farmers, farm women and dairy entrepreneurs including the visitors from Haryana, Punjab, Rajasthan, Uttar Pradesh, Madhya Pradesh, Uttarakhand, Chhattisgarh and Bihar participated in the Dairy Mela.

Progressive dairy farmers of Haryana, Punjab and Uttar Pradesh brought their best animals for competitions under different categories/ age groups. Nearly 110 exhibition stalls in the Mela to present their latest products, tools and machinery related to dairy, feed processing, animal healthcare and allied agricultural activities. ICAR institutes at Karnal, such as NBAGR, CSSRI and Reional stations of IARI, Sugarcane Breeding Research Institute and CCSHAU, Uchani participated in the Dairy Mela.

Dr. Gurbachan Singh, Chairman, ASRB, New Delhi addressed the gathering as Chief Guest in the valedictory function.



*Sh. D. V. Suresh Kumar, General Manager, State Bank of Patiala, Chandigarh inaugurating "National Dairy Mela" at NDRI*

HF cow of Arvind Khokar of Nalikhurd Karnal yielded 51.764 kg milk, amongst other cross the cow of Rajbir Singh of Dadupur Roran, Karnal yielded 38.952 kg milk, Sahiwal cow of Rajbir Singh of Dadupur Kalan, Karnal yielded 16.849 kg, Desi Cow of Mr. Anil of Bhiwani yielded 17.058 kg milk and Murrah buffalo of Virender Singh of Asandh, Karnal yielded 24.65 kg of milk and these animals were adjudged first in their respective categories of milk yielding competition. The winning dairy farmers who owned these dairy animals were awarded the trophies by the Chief Guest, Dr. Gurbachan Singh. Mrs. Kusum of Daha Jagir



*A view of Dairy Mela*

village and Ms. Mamtesh of Amritpur Kalan were awarded for being best in milking and paneer making competitions respectively. Senior officials of ICAR institutes, NDRI and livestock departments graced the occasion.

### ICAR Inter Zonal Sport Tournament - 2014

ICAR Inter Zonal Sport Tournament was organised at NDRI Karnal from 11<sup>th</sup> - 14<sup>th</sup> March, 2015. It was inaugurated by



Sh. Sudhir Chowdhary, IPS, Director, State Crime Records Bureau, Madhuban, Karnal. He addressed the gathering and encouraged the players to participate in sport tournaments as it develops the feeling of brotherhood and team spirit. A total of 450 players representing 45 teams participated in 10 different sport events covering track & field events, Kabaddi, Football, Volleyball (Shooting & Smashing), Basket Ball, Badminton, Chess, Carom, Table Tennis etc. conducted at different venues of NDRI, Karnal.

At the end of the sports tournament, CPCRI, Kasargod won the overall chairmanship. Ms. Rukamani from NAARM, Hyderabad became the best player of the tournament. Ms. Preeti and Mr. Anish from CPCRI, Kasargod were declared the best athletes of the tournament. Dr. A. K. Srivastava, Director NDRI gave away the prizes to the winners.



*Players of CPCRI, Kasargod with the trophy of overall chairmanship*

### 15<sup>th</sup> All India Inter-Agricultural Universities Festival

15<sup>th</sup> All India Inter-Agricultural Universities Festival was organised from 18<sup>th</sup> -21<sup>st</sup> March, 2015 at NDRI Karnal. It was inaugurated by Chief Guest, Sh. Amrendra Singh, OSD, Chief Minister, Haryana. Approximately, 500 students representing



46 Agricultural Universities across the country participated with full zeal. Dr. A. K. Srivastava, Director, NDRI delivered the presidential address and welcomed the students coming from every corner of the country for showcasing their talent and cultural heritage of different states of the nation. He said that participation in such types of functions certainly develops the feelings of self determination and healthy competitiveness. It is also our responsibility to maintain and preserve art and culture of the nation for the next coming generations.

A beautiful march past was demonstrated by the students bearing colourful dresses representing different cultural hues of India and showing unity in diversity.

Several cultural events were organised covering song, dance, quiz, essay writing, debate, drama, mono-acting, mimicry, painting, collage making, clay modelling, rangoli etc. Students participated in these events with full of enthusiasm and zeal. At the end, NDRI Deemed University became the overall champion of the mega Agricultural Universities Festival – 2015.

The prizes were given away by the Chief Guest Dr. Gurubachan Singh, Chairman, ASRB, New Delhi. He highlighted the motto of this cultural programme i.e. to develop the sense of brotherhood and unity as it is necessary to work together for making India as developed country.



*A few Glimpses of All India Inter-Agricultural Universities Festival - 2015*

## National Science Day

National Science Day was organised by Dairy Technology Division of NDRI Karnal on 28<sup>th</sup> February, 2015. On this occasion, question-answer session, essay writing and poster making competitions were conducted. Competitions on poster making on the theme 'Impact of Science on Rural Development' and Elocution on the topic 'Science and Spirituality' were organized for the students of NDRI. The students of NDRI Deemed University participated in these competitions with full zeal.

Prof. Dr. A. K. Srivastava, Director & Vice-chancellor, NDRI Karnal gave away the prizes to the winners. Dr. Srivastava said that science plays an important role for the all round growth of any nation. He encouraged the students for taking interest in various aspects of science.

## National Training Programme on Advanced Tools for Analysis of Phenomic and Genomic Data

National Training Programme on **"Advanced Tools for Analysis of Phenomic and Genomic Data"** was organized during 5<sup>th</sup> – 25<sup>th</sup> March, 2015 under the Centre of Advanced Faculty Training in Animal Genetics & Breeding at Dairy Cattle Breeding Division, NDRI Karnal.



*A CD containing course material of Training Programme being released*

A total of 22 candidates - Assistant professors from SAUs and Scientists from ICAR Institutes belonging to 11 states viz. Punjab, Haryana, Uttarakhand, Uttar Pradesh, Jammu & Kashmir, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Odisha and Bihar participated in this National Training Programme. The trainees were exposed to various software packages like SAS enterprise Guide, LSML, WOMBAT, PopGene, STRUCTURE, MATLAB, HERDMAN etc. for analysis of phenomic and genomic data during the 21-day training programme.

The training programme was inaugurated by Dr. A. K. Srivastava, Director & VC, ICAR-NDRI on 5<sup>th</sup> March, 2015. Dr. R. K. Sethi, former

Director, ICAR-CIRB Hisar Chief Guest of Valedictory Function on 25<sup>th</sup> March, 2015 distributed the certificates to trainees.

Dr. Rajvir Singh, Former Director, ICAR-CARI, Izatnagar visited NDRI on 22.03.2015 for expert evaluation of the training programme and interacted with the participants for seeking their feedback on technical and other aspects of the training programme.

## Patent Filed

| Invention   | Inventors  | Application No. & Date | Date of Filing |
|---|--|------------------------|----------------|
| High Fiber Reduced Calorie Biscuits from Dairy-Multigrain Composite | Latha Sabikhi<br>Dipesh Aggarwal<br>Ashish Kumar Singh | 758/<br>DEL/2015       | 20/03/2015     |

## Placement Cell Activities

- All the 28 students of B.Tech (Dairy Technology) final year, (Class of 2011-2015) were placed for their internship programme at different dairy or food processing organizations across the country.
- Placement for postgraduate students (2015 batch) is in progress. M/s Tetrapak India Ltd, IDMC, ITC Foods and ABT Foods visited the campus and selected 9 M.Tech students. The average annual salary offered so far is ₹ 5.70 lakhs.
- A one day workshop on Personality Development and Soft Skills was organized for the current B.Tech (Dairy Technology) 3<sup>rd</sup> year students (Class of 2016) on 14<sup>th</sup> March, 2015. The Workshop was conducted by M/s Success Sutra Educational Institute, Delhi.
- The Placement Cell organized a one day workshop for the current B.Tech (Dairy Technology) 3<sup>rd</sup> year students (Class of 2016) on ISO and HACCP, on 29<sup>th</sup> March, 2015. The workshop was conducted by M/s Intertek, Panchkula.

## Trainings Organized

- Business Planning & Development (BPD) Unit of NDRI organized a training on "Milk and Milk Processing" for a group of 8 farmers from Lalukheri (U.P.) during 23<sup>rd</sup> – 28<sup>th</sup> March, 2015.
- Dr. P. N. Raju coordinated an Entrepreneurship Development Programme under SINED TBI on "Basic Aspects of Value Addition of Milk" for an entrepreneur Mr. Imtiyaz Ur Rahman, Proprietor of M/s Desi Fresh Milk from Hyderabad for one week from 9<sup>th</sup> - 15<sup>th</sup> March, 2015.

## HONOURS/AWARDS

**Dr. Sumit Arora**, Principal Scientist, Dairy Chemistry Division got **"Best Teacher Award"** (Post graduate teaching) for the year 2014-15 during 13<sup>th</sup> Convocation of NDRI Deemed University 14<sup>th</sup> February, 2015 at NDRI, Karnal.

**Dr. Rajan Sharma**, Principal Scientist, Dairy Chemistry Division got **"NRDC Meritorious Invention Award – 2013"** for the innovation/invention **"Test for detection of detergent in milk"** by National Research Development Corporation on 25<sup>th</sup> February, 2015.



**Ms. Rishika Vij**, M.V.Sc student under **Dr. Suman Kapila**, Principal Scientist, Animal Biochemistry Division got **"Young Scientist Award"** in the 12<sup>th</sup> Agricultural Science Congress held from 3<sup>rd</sup>-6<sup>th</sup> February, 2015 at NDRI under auspices of National Academy of Agricultural Sciences (NAAS) for paper entitled **"Bioavailability and transepithelial transport of milk derived bioactive peptide"**.

**Mr. Brajesh Kumar** got **"Best M.Tech Thesis Award"** in the processing group during 13<sup>th</sup> Convocation of the NDRI Deemed University held on 14<sup>th</sup> February, 2015. He completed his dissertation under the guidance of Dr. Rajan Sharma, Principal Scientist, Dairy Chemistry Division, NDRI, Karnal

**Mr. S. Kumar, Dr. H. V. Raghu, Dr. N. Kumar, Dr. N. A. Singh and Dr. R. K. Malik** were awarded **"Best Paper Award"** published in the "Dairy Processing Area" in the Indian Journal of Dairy Science for the calendar year 2013 for the paper entitled **"Spore based chromogenic assay for detection of  $\beta$ -lactam antibiotic in milk"** during 43<sup>rd</sup> Dairy Industry Conference on held on 21<sup>st</sup> February, 2015 in the Science City, Kolkata. The award carried a cash prize of ₹ 5,000 and a citation.

**Mr. Vamshi Saliganti**, pursuing Ph.D. under **Dr. Rajeev Kapila**, Principal Scientist, Animal Biochemistry Division was awarded with **"Third Prize"** and cash money of ₹20000/- during the poster display and presentation for the **"Young Investigator Award"** at the symposium, "Probiotics - from bench to community" organized by Yakult India Microbiota and Probiotic Science Foundation on 7<sup>th</sup> – 8<sup>th</sup> March, 2015 at New Delhi.

**Mr. L. Naik, Dr. R. Sharma, Dr. Y. S. Rajput, Dr. Bimlesh Mann, and Dr. K. Lata** (2015) received **"Best Poster Award"** for the poster titled **"Design of lateral flow assay for detection of oxytetracycline in milk"** in the XII Agricultural Science Congress-2015 organized by National Academy of Agricultural Sciences (NAAS) and NDRI at NDRI, Karnal during 3<sup>rd</sup>-6<sup>th</sup> February, 2015

**Mr. Vamshi Saliganti**, pursuing Ph.D. under **Dr. Rajeev Kapila**, Principal Scientist, Animal Biochemistry Division got **"Best Poster Award"** under the category of "Nutrition and Health" in the 12<sup>th</sup> Agricultural Science Congress held from 3<sup>rd</sup>- 6<sup>th</sup> February, 2015 at NDRI under auspices of "National Academy of Agricultural Sciences (NAAS) for the paper entitled **"Impact of feeding probiotic *Lactobacillus rhamnosus* (MTCC 5897) fermented milk on development of newborn's immune system"**.

**Mrs. Nimisha Tehri**, Ph.D. student, Dairy Microbiology Division was given **"Second Best Poster Award"** for the poster entitled **"Expression of marker enzymes during spore's**

**germination for novel application in assay development"** at 12<sup>th</sup> Agriculture Science Congress (ASC), Karnal on 3<sup>rd</sup> - 6<sup>th</sup> February, 2015 under the area of Food safety and quality management.

### Foreign Visit

**Ms. Rashmi. H. M.** visited University of Pretoria, South Africa to participate in research meeting under IBSA (India, Brazil and South Africa) Collaborative project on "Validating procedures for the measurement of heat resistant spoilage and pathogenic bacteria in milk" from 19<sup>th</sup> Jan. to 23<sup>rd</sup> Jan 2015. The acquired skills during the visit will be useful to work in collaboration with Brazil and South Africa countries to develop predictive models (mathematical quantitative risk assessment models based on the generated data) for the three countries.

### DISTINGUISHED VISITORS

|            |   |
|------------|---|
| 03.01.2015 | Air Marshal S. Sukumar.   |
| 15.01.2015 | A 33 member delegation from University of Nebraska Lincoln, Nebraska, USA.                        |
| 16.01.2015 | A 13 member delegation from Wyoming Leadership Education and Development Program (L.E.A.D.), USA. |
| 14.03.2015 | Sh. R. Rajagopal, Additional Secretary (DARE) & Secretary (ICAR).                                 |



*Sh. R. Rajagopal, Additional Secretary, ICAR interacting with Director and faculty of NDRI, Karnal during his visit*

|            |  |
|------------|--|
| 28.03.2015 | A 6 member delegation from Nepal.  |
| 30.03.2015 | A 15 member delegation from Afganistan, Bangladesh, Myanmar and Thailand under NDDB Dairy Asia Workshop. |

## PERSONALIA

### Joining

- Dr. O. K. Hooda, Principal Scientist appointed as Acting Head, Dairy Cattle Physiology Division w.e.f. 01.02.2015.
- Dr. B. Surendra Nath, Principal Scientist appointed as Acting Head, SRS of NDRI, Bangalore w.e.f. 25.02.2015.
- Dr. S. K. Atreja, Principal Scientist appointed as Acting Head, Animal Biochemistry Division w.e.f. 01.03.2015.
- Dr. T. K. Mohanty, Principal Scientist appointed to act as Incharge Animal Breeding Research Centre, w.e.f. 16.03.2015.
- Dr. Bimlesh Mann, Head, Dairy Chemistry Division appointed to act as Central Public Information Officer

under RTI Act. w.e.f 19.02.2015.

- Dr. Ajmer Singh, Senior Scientist (Agricultural Economics) joined at NDRI, Karnal on 05.01.2015 after his transfer from Zonal Project Directorate, Zone-I, ICAR, PAU Campus, Ludhiana.
- Dilip Kumar Mandal, Senior Scientist (LPM) joined at ERS of NDRI, Kalyani on 21.01.2015 after his transfer from ICAR Project Directorate on Cattle, Grass Farm Road, Meerut.
- Mr. Vijendra Singh Meena, Sr. Technical Officer (SMS-Agronomy & Soil Science) joined at NDRI Karnal 09.02.2015 after transfer from CMFRI, Narakkal.

### Promotions

- Sh. Sunil Kumar Sharma, Joint Director (Res.) Office, Sr. Technical Assistant (L/T) promoted to the post of Technical Officer (L/T) w.e.f. 01.01.2014.
- Sh. Sita Ram, Experimental Dairy, Sr. Technical Assistant (L/T) promoted to the post of Technical Officer (L/T) w.e.f. 01.01.2014.
- Sh. Sumit Narayan, Sr. Technical Assistant (F/FT) promoted to the post of Technical Officer (F/FT).
- Sh. Rajbir, Sr. Technical Assistant (F/FT) promoted to the post of Technical Officer (F/FT).
- Sh. Mohinder Pal, Sr. Technical Assistant (W/S) promoted to the post of Technical Officer (W/S).

### Retirements

- Dr. G. R. Patil, Joint Director (Academics) retired on superannuation from Council's Service on 31.01.2015.

- Dr. R. C. Upadhyay, Principal Scientist and Head Dairy Cattle Physiology retired on superannuation from Council's Service on 31.01.2015.
- Dr. Y. S. Rajput, Principal Scientist and Head Animal Biochemistry retired on superannuation from Council's Service on 28.02.2015.
- Dr. Vijay Kumar, Principal Scientist retired on superannuation from Council's Service on 31.01.2015.
- Dr. C. N. Pagote, Principal Scientist (SRS, Bangalore) retired on superannuation from Council's Service on 31.01.2015.
- Mr. A. Louis, Technical Officer (L/T) (SRS, Bangalore) retired on superannuation from Council's Service 31.01.2015.
- Mr. Prem Chand, Technical Officer retired on superannuation from Council's Service on 31.01.2015.
- Mr. Karam Singh, Technical Officer (L/T) retired on superannuation from Council's Service on 31.01.2015.
- Mr. Lakhvinder Singh, Technical Officer (W/S) retired on superannuation from Council's Service on 28.02.2015.
- Mr. Ram Chander, Technical Officer (W/S) retired on superannuation from Council's Service on 31.03.2015.

### Demise

- Mr. J. Nageshwara Rao, Senior Technical Officer (W/S) NDRI of SRS, Bangalore passed away on 22.12.2014.

## SOUTHERN CAMPUS, BANGALORE

### RESEARCH

#### Transcriptome Profiling of PBMCs from *Bos indicus* Malnad Gidda Cattle

(Ramesha, K. P., Anil K. Madugundu, Basavaraju M., Akhila Rao, Sreelakshmi S. K., Kataktaaware M. A., Jeyakumar S., Akhilesh Pandey, Aditi Chatterjee, Harsha Gowda and Keshava Prasad T. S.)

Transcriptome profiling of Peripheral blood mononuclear cells (PBMCs) from Malnad Gidda bull was carried out jointly by the researchers from SRS of ICAR-NDRI and the Institute of Bioinformatics, Bengaluru. PBMCs were isolated from blood samples of 7 Malnad Gidda bulls. The PBMCs were snap frozen and stored in -80 °C. The frozen PBMCs were lysed using QIAzol lysis reagent and RNA isolation was performed using the RNeasy Mini kit (Qiagen) as per the manufacturer's instructions. The RNA was eluted in 30 µL of elution buffer and the yield was estimated using Nano Drop. The purity of the RNA isolated was assessed. The library preparation and sequencing was done at SciGenom Labs, Kochi. The RNA library preparation was carried out using TruSeq RNA sample Prep Kits (Illumina) as per the manufacturer's instructions. Post library preparation, paired end runs were performed on the Illumina HiSeq 2500 platform to obtain about 55 million paired-end reads of 100 bp. The RNA-Seq data were further processed to generate FASTQ files.

**RNA-Seq analysis :** Sequencing of mature RNA enriched from the blood sample of one selected Malnad gidda bull carried out resulted in generation of 55 million paired-end reads of 100bp length on the Illumina HiSeq 2500 sequencing platform. Raw sequencing data was cleaned for adapter contaminants and base calling errors. Adapter sequences from the sample preparation at library construction step were clipped and read ends were trimmed for bases with poor quality (Phred<20). Different short read aligners: BWA, Bowtie and TopHat were used to map against the available transcript and whole genome sequence assemblies for *Bos indicus* and *Bos taurus* cattle. Mapping of processed 55 million raw read pairs against the *B.taurus* UMD3.1 genome and annotation information from Ensembl resulted in identification of 9,484 unique protein-coding genes with FPKM (Fragments Per Kilobase of exon mapped per Million fragments Mapped) ≥1.

#### Comparative Analysis of Transcript Assembly against *B. taurus* and *B.indicus* Genomes

The usability of the draft genome assembly of *B.indicus* was determined based on the N50 metric. Mean length of annotated protein-coding genes in *B.taurus* is 39 kb, while N50 of *B.indicus* is only ~28 kb. This disparity in sequence information may prevent the accurate prediction of protein-coding genes in *B.indicus*. The observed percentage of mapped



RNA-Seq reads from this study against *B.taurus* and *B.indicus* genomes is only 71 and 41, respectively. These observations clearly underscore the limited usability of available *Bos indicus* - genome information. To carry out any gene expression studies or mass spectrometry based proteomics studies, there is a need of better genome assembly and annotation for *Bos indicus* cattle.

### Extension Activities

- A total of 457 visitors in 12 batches comprising of students from various educational institutes and entrepreneurs of southern region, visited the institute.
- The 'Dairy Education at Farmer's Door' as a new initiative was organized and visits were made by the multidisciplinary team on Second Saturdays to different villages and technical advice was rendered on various aspects of scientific dairy farming, green fodder production, clean milk production and dairy animal management.

## RECENT HAPPENINGS

### National Seminar on Present Status and Future Prospects of Sexed Semen in India

National Seminar on "Present Status and Future Prospects of Sexed Semen in India" was organised at Hotel Capitol, Raj Bhavan Road, Bengaluru on 24<sup>th</sup> January 2015 jointly by Alumni Association, SRS of ICAR-NDRI, Bengaluru and KMF, Bengaluru. It was inaugurated by Shri T. B. Jayachandra, Hon'ble Minister for Animal Husbandry, Law, Parliamentary Affairs and Muzrai, Govt. of Karnataka in the presence of Shri T. Nanda Kumar, Chairman, NDDB; Dr. A. K. Srivastava Director & Vice Chancellor, NDRI, Karnal; Dr. Suresh Honnappagoul, Animal Husbandry Commissioner, Govt. of India; Sri. P. Nagaraju, Chairman, KMF and Dr. R. S. Gandhi, Assistant Director General, ICAR, New Delhi and many other dignitaries. A large number of researchers, veterinarians, farmers, students and invitees including Shri Padmabhushan

M. Mahadevappa, Dr. K. V. Devaraj, Prof. R. Nagarcenkar and President Prof. Abdul Rehman, President, Commonwealth Veterinary Association participated in the seminar. After presentations by eminent speakers from different parts of the country and detailed deliberations, recommendations including importing of sexed semen were made to encourage the use of sexed semen in India.

### AWARDS

- **Dr. K. P. Ramesha** was conferred with "**Sir J. C. Bose Memorial Award – 2014**" by Indian Science Monitor, (Regd.), Chennai, in the 12<sup>th</sup> Annual Sir J. C. Bose Memorial Function on 18<sup>th</sup> January, 2015 held at Bharatiya Vidya Bhavan, Bengaluru.
- **Dr. K. P. Ramesha** received the "**Indian Dairy Association Fellowship Award 2014-15**" on 19<sup>th</sup> February, 2015 at Kolkata during the 43<sup>rd</sup> Dairy Industry Conference from Dr. A. K. Srivastava, Director cum Vice Chancellor, NDRI, Karnal, Haryana for exemplary role and contributions to Indian Dairy Association and to the Indian dairy industry.
- **Dr. K. P. Ramesha** was honoured for his life time achievement during 12<sup>th</sup> Chikamagalur District Kannada Sahithya Sammelana at Chikamagalur on 28<sup>th</sup> February 2015.



Dr. K. P. Ramesha receiving the Award

## EASTERN REGIONAL STATION, KALYANI

### RESEARCH

#### Nutrient Digestibility and Plane of Nutrition in Growing Crossbred Cattle Fed Animal Feed Grade Wheat

(D. Chandrashekhara Keshav, A. Santra, A. Mandal, S. K. Das and T. K. Dutta)

Feed cost accounts for 60-70% of the total cost of animal production, while cereal grains constitute 30-50% of most of the concentrate mixtures fed to different categories of livestock. Quality of a good sizable proportion of wheat grain deteriorated during storage at Food Corporation of India (FCI) due to lack of proper storage facility and declared unfit for human consumption which is designated as animal feed grade wheat (AFW). However, considering nutrient density, the grain is as good as human food grade wheat. Therefore, an experiment was conducted to study the nutrient digestibility

and plane of nutrition in growing crossbred cattle fed graded level of animal feed grade wheat. A total of 12 growing Jersey crossbred male calves were randomly divided into 3 groups (G1, G2 and G3) and were fed individually under stall feeding for 600 g average daily gain as per NRC (2001) requirement. Three types of iso-nitrogenous concentrate mixtures (C1, C2 and C3) were prepared in which, maize grain was serially replaced by animal feed grade wheat (AFW) at 0, 30 and 50 % level in concentrate mixture C1, C2 and C3, respectively. One digestion trial was conducted after 110 days of experimental feeding to study the nutrient digestibility and plane of nutrition.

Animal feed grade wheat (AFW) which was used in the present experiment contained 55 to 70% sound grains. In good quality wheat grain, the OM, CP, EE, NDF, ADF and lignin content were 98.3, 12.7, 2.3, 16.9, 2.2 and 0.4%, while the respective values in animal feed grade wheat (AFW) were 96.8, 17.0,

2.1, 25.5, 4.3 and 1.3%, respectively, on DM basis. Maize grain contained OM 98.2%, CP 9.6%, EE 4.8%, T-CHO 83.8, NDF 19.3%, ADF 2.9% and ADL 0.3% on DM basis. The crude protein (CP) content was 16.6, 16.7 and 16.4% while T-CHO was 72.3, 72.4 and 73.2 % on DM basis in C1, C2 and C3 concentrate mixtures, respectively. Daily DMI of the experimental calves in G1, G2, G3 groups was 3.1, 3.1, 3.0 kg per 100 kg body weight, respectively. Daily intake of different nutrients i.e. OM, CP, EE, T-CHO, NDF, ADF and cellulose were also similar among the calves of three experimental groups. Digestibility of DM, OM, CP, EE, T-CHO, NDF, ADF and cellulose in present study were also not different among the three experimental groups. On an average, digestibility of OM, CP, EE, T-CHO, NDF and cellulose in experimental calves were 64.6, 67.1, 71.6, 66.5, 57.1 and 54.3%, respectively. The DCP and TDN contents of the experimental rations of G1, G2 and G3 group were also similar, amounting to 7.3, 7.4 and 7.4% DCP and 63.2, 63.1 and 62.4% TDN on DM basis, respectively. DCP and TDN intake per unit body weight were 6.9, 7.0 and 7.0 g DCP and 60.3, 59.9 and 58.9 g TDN per kgW<sup>0.75</sup>/d in the experimental calves of G1, G2 and G3 groups, respectively. Similar plane of nutrition among the three experimental groups might be due to similar daily DMI, nutrients digestibility and nutritive value of ration. It indicates digestibility of different nutrients, nutritive value of ration and plane of nutrition was not influenced by the replacement of dietary maize up to 50% level in growing cross bred cattle.

### Preservation of Black Bengal Buck Semen

(M. Karunakaran, M. Mondal, A. Mandal, C. Bhakat, S. K. Das, M. K. Ghosh, S. Naskar and S. Garai)

Attempt was made to preserve Black Bengal buck semen in liquid and frozen conditions. Semen ejaculates (n=72) were collected from Black Bengal bucks by artificial vagina. Fresh ejaculates were characterized with volume of  $0.75 \pm 0.25$  ml, sperm cell concentration  $522 \pm 35.30$  millions/ml, mass activity  $3.8 \pm 0.2$ , progressive forward motility  $85.40 \pm 8.20\%$ , functional membrane integrity  $62.36 \pm 3.46\%$  and normal count  $92.0 \pm 1.90\%$ . Semen samples were preserved in Tris egg yolk citrate buffer at refrigeration temperature. Buck semen samples preserved in refrigeration condition up to four days of storage were used for AI. A total of 50 AI were carried out through AI workers with a non return rate of 66% (33 out of 50). Attempts were made to preserve buck semen in frozen condition using Tris egg yolk citrate buffer with different concentrations of the cryoprotectants- glycerol. 5 and 6 per cent of glycerol (v/v) has given satisfactory results with 34.5% post-thaw motility,  $36 \pm 3.4\%$  acrosome abnormality and  $36 \pm 2.6\%$  functional membrane integrity.

## EXTENSION ACTIVITIES

### Training on Artificial Insemination and Scientific Goat Rearing Practices

Seven days training programme was organized on "Artificial Insemination and Scientific Goat Rearing Practices" from 23.02.2015 to 01.03.2015. Participants from different districts of West Bengal were provided training on scientific housing and management, feeds and feeding practices, disease control measures, estrus detection, artificial insemination and application of biotechnological tools in goat production.

### Training on Scientific Dairy Farming Practices

Ten days training programme on "Scientific Dairy Farming Practices" was organized for educated unemployed youth from 19<sup>th</sup> - 28<sup>th</sup> January 2015. Ten educated unemployed youth from six different district of West Bengal were trained.

### Animal Health Camps Organized

- "Vaccination and Deworming Camp" was organized on 4<sup>th</sup> February, 2015 in the Chatni village of Ayodhya hills.
- "Animal Health & Anestrous Camp" was organized on 9<sup>th</sup> February, 2015 in the Dasnagar village of Sriniketan block of Birbhum District.

### Inter-institution Collaboration Programme

- Two days Orientation /Induction programme on "Dairy cooperatives & advances scientific dairy farming practices" was organized in collaboration with Kishan Cooperative Milk Producers Union Ltd. Krishnanagar from 16<sup>th</sup> March 2015 to 27<sup>th</sup> March 2015. A total number of 128 dairy farmers from different district of West Bengal actively participated the programme in six batches.

### Honours/Awards

- **P. K. Naik, R. B. Dhuri, M. Karunakaran, B. K. Swain, N. P. Singh** were awarded for the "Best Article" published in Indian Dairy Man entitled "Hydroponics technology for green fodder production". The award was presented in the 43<sup>rd</sup> Dairy Industry Conference held during 19<sup>th</sup> - 21<sup>st</sup> February, 2015 at Kolkata.
- **Ansuman Kumar, Ajoy Mandal, M. Karunakaran, Poonam Ratwan and T. K. Dutta** were awarded the "First Prize" for the "Best Poster Presentation" on the topic "Estimates of genetic parameters of days open in crossbred cattle" in the 43<sup>rd</sup> Dairy Industry Conference held during 19<sup>th</sup> - 21<sup>st</sup> February, 2015 at Kolkata.
- **M. Karunakaran and T. G. Devanathan** were awarded the "Second Prize" for the "Best Poster Presentation" on the topic "Effect of heparin binding protein on lipid peroxidation status of bovine sperm cells" in the 43<sup>rd</sup> Dairy Industry Conference held during 19<sup>th</sup> - 21<sup>st</sup> February, 2015 at Kolkata.

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