



## Sardar Patel Outstanding ICAR Institution Award Bestowed upon NDRI Karnal

*Hon'ble Prime Minister of India Sh. Narender Modi Presenting "Sardar Patel Outstanding ICAR Institution Award" to Dr A. K. Srivastava, Director, NDRI at the 86<sup>th</sup> Foundation Day and ICAR Award ceremony held on 29<sup>th</sup> July, 2014 at New Delhi.*

## From the Director's Desk

The annual monsoon is key to Indian agriculture, since more than 235 million farmers rely on rain to sustain their livelihood. Thus, the danger of not having seasonal rain can lead to catastrophic outcomes. The India Meteorological Department has forecast a 60% probability of abnormal warming of surface ocean water (El Nino) this year along with a below-normal monsoon projection. Monsoon analysis reveals that some part or the other of the Indian subcontinent has been hit by drought almost every two years. In spite of the fact that the programs designed to mitigate the impact of drought have been in place since 1950s, drought remains prevalent in India, which is a reason for concern. The disastrous effects of subnormal or failed monsoons have been particularly acute in the states of Rajasthan, Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Uttar Pradesh and Orissa. In states like Haryana and Punjab where the irrigation network is very good, the effects of temporary failures of monsoon are effectively mitigated by the farmers, and the severe losses in productivity of crops as well as livestock are not noticed at similar magnitudes as other drought prone states. However, the production costs of crops and livestock products may go up drastically.

Unlike crops, impact of drought on livestock is slow as they are more resilient to drought. However, prolonged drought has adverse impact on all species of livestock due to continuous under nutrition and/or malnutrition. More than feed deprivation, the water deprivation and resultant dehydration cause heavy losses in livestock. Severe decline in production of milk and loss in body weight and body condition may happen in dairy animals during drought. Decrease in milk yield due to heat stress is more prominent in high yielding animals compared to indigenous animals. Poor feeding also leads to reduced immunity, reduced reproductive efficiency and increased susceptibility to diseases and in extreme cases death may occur. For instance, the severe drought that occurred in 1987 at Barmer

district of Rajasthan resulted in loss of 47.17% of the total livestock in the district. Further, the scarcity of drinking water and rising prices of fodder force people to migrate from the drought affected regions in search of these resources or to abandon their cattle and suffer losses. An additional concern for the livestock sector is that about 78.63%, 70.88% and 82.15% of milch buffaloes, crossbred cattle and indigenous/non-descript cattle are in the drought prone area. Even if 10% of the dairy animals in the area are affected, it may lead to 7.5% loss in the country's milk production. All these facts and figures highlight the importance of developing strategic effective drought management and contingent plans to protect the livestock during drought.

To mitigate/moderate the situation and to save the animals, cultivation of drought resistant/low water requiring fodder crops in case of an anticipated monsoon disruption can be promoted. Use of sugarcane tops and dry sugarcane leaves, partially damaged grains, brewery industry waste, urea molasses mineral block lick etc can be advocated for feeding livestock during drought conditions. The complete feed blocks can be transported easily from any part of the country to the drought affected areas. The farmers maintaining high producing stock can purchase these blocks, which may help to tide over the scarcity of green fodders, to maintain the production levels of these stock. The Government can consider offering a part of the cost of these feed blocks as subsidy to the farmers during the drought period. Fodder depots can be established for milch animals and cattle camps can be established for dry and scrub animals. Facilities like storing densified roughages transported from other parts of the country should also be established adjacent to these camps. Other management practices in the drought prone areas include promoting indigenous breeds that require less units of water per unit productivity, morning and evening (during the cooler parts of the day) grazing, indoor housing or in sufficiently

cool shaded places to avoid heat exposure and supplementation with minerals, electrolytes and vitamins. In drought conditions, animals become more susceptible to diseases due to stress and thus, need to be treated for parasitic infestations and vaccinated against major diseases including foot and mouth disease, hemorrhagic septicaemia, black quarter and anthrax.

Currently, the contingent plan for drought management for Animal Husbandry is not well developed and mainly focuses on relief measures that are largely oriented towards organizing relief camps and providing health protection. Immediate and long term strategies for protection of livestock during drought conditions need to be chalked out. Conducting risk assessments of the impacts under different levels of severity of drought as well as development of short and medium term strategies for climate resilient animal rearing will help us effectively manage the livestock during drought conditions.

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

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## RESEARCH

**'Lalima', Cloned Calf of an Adult Murrah Buffalo Born**

(S. K. Singla, M. S. Chauhan, R. S. Manik, P. Palta, Shiv Parsad and Basanti Jyotsana)

Another female cloned calf named '**Lalima**', produced through 'Hand-guided Cloning', was born on May 2, 2014 by normal parturition. Lalima, which had a birth weight of 36 kg, is keeping in good health. It is a clone of an elite Murrah buffalo (MU-5345) of NDRI Livestock Farm. The donor cell was taken from the ear of MU-5345, which produced 2713 kg milk in standard lactation period of 305 days and 3494 kg in total lactation period of 471 days, during her 3<sup>rd</sup> lactation. It is interesting to note that the calf was produced after standard gestation period, was born through normal parturition without any assistance and had normal birth weight. Dr. A. K. Srivastava, Director, NDRI, further emphasized that this technology could go a long way in multiplying the number of best milch buffaloes in India.



*A female cloned calf 'Lalima', born at NDRI on May 2, 2014*

**Aloe vera Supplemented Probiotic Ice Cream**

(Vidhu Yadav and R. R. B. Singh)

Ice cream is a delicious dairy product consumed by people of all ages. Ice cream with a combination of health enhancing ingredients viz. *Aloe vera* and probiotics can fulfill the consumer demand for healthy ice cream. The technology for preparation of *Aloe vera* supplemented probiotic ice cream (ASPIC) was developed by using a probiotic culture, *Aloe vera* juice and whey protein concentrates. The *Aloe vera* probiotic ice cream was evaluated for its immunomodulatory potency using cyclophosphamide induced immunosuppressed model (swiss albino female mice as experimental animal). Animal studies revealed enhanced immunity as shown by higher macrophage count, lymphocyte count, phagocytic activity, lymphocyte proliferation index, IgA content, blood parameters. On storage for 3 months ( $-20 \pm 2^\circ\text{C}$ ), no significant difference in sensory attributes was observed. However, a significant decrease of  $0.88 \log_{10} \text{cfu/g}$  was calculated in *Lactobacilli* count after storage but the ice cream still had higher number of viable organisms throughout 3 months of storage and was above the recommended minimum limits of  $10^6 \text{cfu/g}$ . The proximate composition categorizes the developed product as medium fat ice cream according to FSSAI regulations (2011). Sensorial comparable results were observed when the developed product and standard vanilla flavored ice creams from market were compared. Consumer survey with 150 respondents showed high acceptability for the product indicating it could be successfully

launched. The developed products can be used as functional food with enhanced immuno-modulatory properties.



*Aloe vera supplemented probiotic ice cream*

**Development of Arjuna Herb based Functional Milk Beverage**

(P. D. Sawale and G. R. Patil)

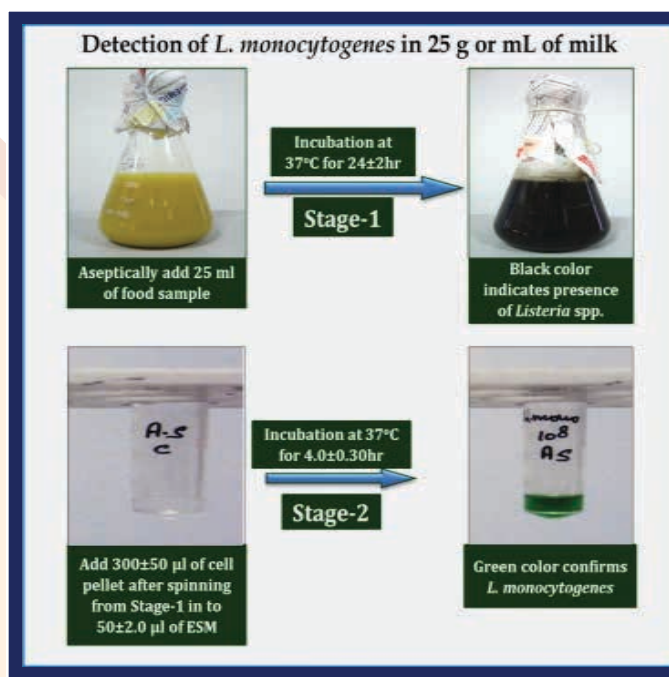
*Terminalia arjuna* (TA), an important medicinal plant is specifically recognized for its recuperative effect on heart ailments. TA extracts possess an unpleasant flavour, bitter taste and abnormal red colour which limit its use in functional food manufacture. The present study was carried out to develop *Arjuna* herb added functional milk beverage. Suitable matrix materials were tried to encapsulate the *Arjuna* herb for reducing its undesirable effect on sensory quality of the milk beverage. Ethanolic extract of *Arjuna* was found to contain total phenolic, tannin and flavonoids contents at 19.49, 7.44 and 2.65% levels, respectively. Functional milk beverages added with encapsulated herb (EHMB), cocoa powder, sucrose and vanilla essence and stabilizer were optimized. Sterilization of these beverages was carried out at  $121^\circ\text{C}$  for 15 min as a part of processing treatment. After sterilization, EHMB obtained significantly ( $p < 0.01$ ) higher polyphenol content and antioxidant activity. Storage and sensory studies revealed that EHMB was acceptable up to 120 days at refrigeration temperature ( $5 \pm 1^\circ\text{C}$ ). Animal studies demonstrated that oral administration of EHMB had shown significantly ( $P < 0.05$ ) lower blood lipid levels (TGs, TC, LDL, VLDL and AI), improved HDL and antioxidant status (as determined by reduced glutathione and TBARS level) in male Wistar rats. Consumer response study revealed that, an overwhelming 72 (i.e. 96 %) respondents showed willingness to buy the product. The net production cost of the product was estimated to be Rs. 85.32/kg. It was concluded that functional milk beverage with better sensory quality, enhanced therapeutic value and reasonable cost can be prepared by addition of encapsulated *Arjuna* herb into chocolate added vanilla flavoured milk beverage.

**Two Stage Enzyme Assay for Detection of *Listeria Monocytogenes* in Milk**

(M. Balhara, N. Kumar, G. Thakur, H. V. Raghu, V. K Singh, R. Lawaniya, A. Khan and S. Kouser)

"Two-stage bio-assay" has been developed for detection of *L. monocytogenes* based on the principle of targeting "enzyme-substrate reaction for specific marker enzyme (s) to release free chromogen that can be visually detected by color change, after initial enrichment of the bacterium in novel selective medium "LSEM" for  $24 \pm 1$  hr followed by 2nd stage reaction on enzyme mixture for  $4.0 \pm 0.30$  min.





#### Novel Features:

- Cost effective enzyme assay (Rs. 75.00 per test against Rs. 762.00 in conventional Method).
- Rapid detection within one working day as against 5-7 days protocol in conventional method.
- Novel LSEM medium with selective growth of *L. monocytogenes* in presence of other contaminants.
- Wide scope of application to raw, pasteurized and dried milks for routine as well as for regulatory standard compliance.
- Third party validation at M/s SGS India Pvt. Ltd. Gurgaon (certificate no SGS GG12-009772.001 dated 09-11-2012).

#### Antimicrobial Activity of Fermented Colostrum

(Asha Sinha and Shilpa Vij)

Colostrum is the first milk produced after calf birth and is particularly rich in immunoglobulins and antimicrobial proteins such as lactoferrin and lactoperoxidase. Colostrum is important for the nutrition, growth, and development of newborn infants and contributes to the immunologic defense of neonates. As the whey proteins in the colostrum milk are very high, the colostrum milk was taken for antimicrobial bioactive peptides production. Colostrum whey was prepared by acid treatment and whey protein fractions of 10 KDa, 5 KDa and 3 KDa were prepared by ultra filtration. Antimicrobial activity of colostrum whey, concentrated whey (10 fold) and protein fractions was evaluated against five pathogen *B. cereus*, *E. coli*, *L. monocytogenes*, *S. typhi* and *S. aureus*. Concentrated colostrum showed antimicrobial activity against *B. cereus* and *E. coli* only. However, different protein fractions did not show any antimicrobial activity. Colostrum whey was fermented by proteolytic *Lb rhamnosus* C6 and *Lb helveticus* 288 and peptide fractions (3, 5, 10 KDa) of fermentate were tested for antimicrobial activity.

Fermented colostrum whey showed maximum antimicrobial activity against all the pathogens (Diameter of zone of inhibition upto 12mm). 10 KDa fractions of the fermentate also showed antimicrobial activity against pathogens. Whey fermentate of C6 had more antimicrobial activity than NCDC 288. Maximum antimicrobial peptide production from colostrum whey was at 37°C incubation temperature, with 2% inoculum level of *Lb rhamnosus* C6 at 4 pH. Colostrum whey fermentate, its concentrate and 10KDa peptides were stable even at 3 pH, temperature of 63°C/30 min, and pepsin and trypsin treatments. Peptides of colostrum whey fermented by *Lb rhamnosus* C6 were also stable for 2-3 weeks at refrigeration temperature.

#### Isolation of Native Strains of Probiotic Bifidobacteria

(Nancy Awasti and Sudhir Kumar Tomar)

Bifidobacteria are gram-positive, non-motile, often branched anaerobic bacteria and are one of the major genera of bacteria that make up the colon flora in mammals. Some strains of Bifidobacteria are being predominantly used globally as commercial probiotic. Bifidobacteria being obligate anaerobes are difficult to isolate and

cultivate under laboratory conditions. Twelve native strains of Bifidobacteria belonging to *Bifidobacterium animalis* (8), *B. breve* (3) and *B. pseudocatenalum* (1) have been isolated, and characterized from human milk, adult and infant feces. These strains have shown promising functional attributes (probiotic, antioxidative, hypocholesterolemic and antimutagenic) by *in vitro* methods. These strains of indigenous origin constitute national bioheritage and can be further explored for their *in vivo* probiotic attributes and commercial adoptions.

#### Part Replacement of Soyabean Meal with *Cassia tora* for Cattle Feed

*Cassia tora* (Panawer) is a common herbaceous annual occurring weed belongs to the family of leguminasae *Cassia tora* seed can be incorporated in concentrate mixture of both cattle and poultry without any adverse effect.

Effect of partial replacement of soyabean meal with cassia tora seed meal on palatability, nutrient utilization and body weight gain in growing male Sahiwal calves was studied. 100 kg of control conc. mixture contained 15 parts of soyabean meal and 3 parts of this was replaced by cassia tora seed meal in group T-1 and 5 parts in conc. mixture of group II. The animals were fed *ad lib* concentrate, wheat straw and green oats in the ratio of 60:20:20 on dry matter basis. %TDN were higher at 5% level of inclusion indicating that cassia tora seed meal can be incorporated up to 5% in the diet of growing calves without any adverse effect and this will reduce the cost of production.

#### Productive performance of Sahiwal Male Calves

Particular	Control	Group I	Group II
Average daily gain (g)	517	524	538
Average DMI/day	3.07	3.07	3.14
% Feed efficiency	16.56	15.98	16.22
% Dry Matter Digestibility	60.48	60.95	63.36
% Organic Matter Digestibility	67.35	67.26	68.07
% Crude Protein Digestibility	65.69	67.57	67.26
% Crude Fiber Digestibility	53.04	53.34	57.79

## EXTENSION

### DAIRY EXTENSION DIVISION

- Dairy Extension Division organized the ongoing Extension Education Programme "Dairy Education at Farmers' Door" to strengthen the effective dissemination of dairy production and processing technologies among farming community. Under this programme a team of NDRI scientists including subject matter specialist from production, processing and management group visited villages viz. Khrijpur and Wazidpur Karnal district on 2<sup>nd</sup> Saturday of every Month during the period under report.
- At 16 Veterinary Camps, 250 cases were treated for reproductive disorders and various Veterinary ailments. Ecto & Endo-parasite control programmes were conducted. Special attention was given to improve the productive and reproductive performance of dairy animals.
- Twelve Kisan sangosthies were organized on the following topics at village level:
  - Control of ecto-parasite infestation
  - Role of mineral mixture in animal diet
  - Care and management of calving animals
  - Heat symptoms and correct time of insemination of dairy animals
  - Clean milk production practices in rural areas
  - Heat stress management
- Eight women empowerment training 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. By these programmes 97 farm women were trained.
- A training programme on "Heat Detection in Dairy Animals" was organized by the Dairy Extension Division from 1.5.2014 to 3.5.2014. Thirty farmers from Kulwehri, Subri and Kunjpura participated in this training programme. Eight specialized lectures were given to the participants by the expert scientists. Practical classes were also conducted at cattle yard of the Institute. The most important aspect of this training was the Question-Answer session in which several farmers took active interest by highlighting their particular problems related to breeding aspects. Dr. G.R. Patil, Joint Director (Academics) chaired the concluding session of the training and emphasized the focus on transfer of technologies for the benefit of the farming community. He also gave away the certificates to the participants.

### KRISHI VIGYAN KENDRA

- A total of 23 training programmes (On-campus and Off-campus & training-cum-visits) on different aspects of dairy production and processing, crop & vegetable production, vermi-culture, bee-keeping and home science were organized in which 786 farmers, women, rural youth and extension functionaries were imparted training.

- Out of the total courses, KVK organized 8 sponsored training programmes on Scientific Dairy Farming, Clean Milk Production, Commercial Dairy Farming, milk processing and vermicompost preparation for 228 farmers, rural youth and extension functionaries. In these training programmes 156 trainees from Himachal Pradesh, 29 from Haryana, 1 from Uttar Pradesh and 42 trainees from Assam were imparted training.
- KVK also organized 3 exposures cum study visits for 111 progressive farmers and farm women from different districts of Uttar Pradesh.
- In organizing the Front Line Demonstrations on Mustard, Pusa Vijay, RH-749 and Pusa Agrani varieties were used. The demonstrations were conducted in 8 hectare area of 20 farmers of Karnal district. On the demonstration plots, an average production of 18.55, 18.69 and 19.70 quintal per hectare was observed, respectively. The overall performance of all the above varieties was found to be good.
- During the Rabi season 2013-14, total 18 FLDs on crop Gram were laid in 3.64 hectare area under irrigated conditions. The varieties BG-1103 and HC1 were used for conducting FLDs. In the demonstration plots, an average production of varieties was observed to be 15.56 and 16.54 quintal per hectare respectively. The overall performance of the above varieties of Gram was found to be good.
- During the reporting summer season 2014, variety MH-421 procured from CCSHAU, Hissar was used in laying 15 demonstrations in 6.0 ha. area of different villages in the district Karnal under irrigated conditions to generate the data.
- During the Rabi season 2013-14, total 10 FLDs on wheat crop were laid in 4.00 hectare area under irrigated conditions. The varieties HD 2967 and HD 2894 were used for conducting FLDs. In the demonstration plot, an average production of varieties was observed to be 55.20 and 52.61 quintal per hectare respectively. The overall performance of the above varieties of wheat was found to be good.
- During the rabi season 2013-14, total 15 FLDs on fodder crop Oats with the variety HJ-8 (multicut) were conducted on 6.00 hectare area under irrigated conditions. The average fodder yield was found to be 517 quintal per hectare. The overall performance of the varieties of oats fodder was found to be good.
- During the summer season 2014, out of the total 63 FLDs, 13 demonstrations on Maize using varieties J-1006 and African Tall in 4.80 ha. area & 18 demonstrations on Jowar fodder crop using hybrid variety Red Chari in 6 ha. area apart from 17 demonstrations on Bajara fodder using variety FBC-16 in 6 ha. area were laid in different villages of Karnal district under irrigated conditions to generate data on yield in farmers' fields.
- During the Rabi season 2013-14, OFTs on Berseem in 5.66 ha. area in 27 locations using varieties BL-42, HB-1 and Mescavi were organized in different villages of Karnal district. In BL-42

average yield 1311.00 Qt/ha whereas in HB-1 it was 1204.00 Qt/ha, in Mescavi it was 1117.00 Qt/ha.

- Various Animal Health Management activities were organized through Stockman centers in adopted villages of KVK. At these centers 467 cattle and 250 buffaloes were artificially inseminated and 471 calves were born. Besides these, 29 animals were treated, 22 calves were dehorned, 29 animals were given infertility treatment.
- KVK and DTC generated revenue of Rs. 5,87,489 (Rs. Five lakh eighty seven thousands four hundred eighty nine only) through its various activities like organization of training programmes and exposure visits and sale of produce from various demonstration units.

### Patent Granted

Application Number allotted by the Patent Office	Title of Patent	Innovator(s)	Patent No. & Date of grant
2134/DEL/2008	A process for commercial manufacture of Kradi	H.A. Punoo, G.R. Patil and R.R.B. Singh	Patent No. 260553 Dt. 07.05.14

### FORAGE PRODUCTION SECTION

- The Forage Production Section is achieving record production per acre in green fodder as well as in seed/grain production. The harvesting of Barley crop yielded around more than 4000 quintals of grain and 2250 qnt of straw, In addition to this, 630 qnts of Oats grain was produced at the NDRI farm. The highest yield per acre for Barley was 22.26q per acre and for Oats, the yield was 10.56q which is a record for Farm Production System.
- Different combinations (Oats + Berseem, Barley + Berseem + Mustard and Berseem + Mustard) of fodder crops were also studied during Rabi 2013 -14.
- The best Combination was found to yield 534.58q per acre (1336.40q per hectare). This combination can be recommended to increase green fodder production in best combination of carbohydrate & proteins to the Farmers.

The renovation work in Farm office building and at different locations in the farm area is under progress to create the storage facilities for grain and crop residues.

## EVENTS

### NDRI Celebrated World Veterinary Day – 2014

NDRI celebrated the World Veterinary Day with the theme "Animal Welfare" on 2<sup>nd</sup> May 2014. Dr. G. S. Jakhar, Director General, Animal Husbandry Department, Government of Haryana in his thematic address informed that the individual animal productivity and overall production status in Haryana is good and this is high time to educate and motivate the farmers about the importance of animal welfare. Dr. A. K. Srivastava, Director of NDRI, during his presidential address informed the house about the recent shift in livestock production systems from traditional human-animal bonded system to commercial animal machinery system. He discussed about the five freedoms of animals and how they are changed under the changing production scenario. He also stressed that the veterinarians and livestock farmers must be committed to promote animal welfare while handling and during different production processes. He also informed that NDRI and WSPA are drafting "Animal welfare Codes" for commercial and semi-commercial dairy farms.



### 19<sup>th</sup> All India Inter University Festival - REVERIE RENAISSANCE – 2014

NDRI organised a three day mega event '19<sup>th</sup> All India Inter University Festival - REVERIE RENAISSANCE – 2014' from April 24 to 26, 2014. A large gathering of students from different institutions/universities of India (GADVASU Ludhiana, SKUAST-J, Jammu, SKUAST-K, Kashmir, College of Dairy Technology, Pusad, IARI, New Delhi, IVRI, Izatnagar, SVPUAT, Meerut, DUVASU, Mathura) participated in a number of cultural events/ activities such as poetry, extempore, essay writing, dance, mime, skit, story writing, choreography, debate, sketching, poster making, songs, mono act, mimicry, quiz etc). to show their extracurricular talent. Dr. A. K. Srivastava, Director and Vice Chancellor NDRI graced the cultural festival as the chief guest. Dr. Gurcharan Singh, Chairman, Agricultural Scientist Recruitment Board (ASRB), New Delhi was the 'Chief Guest' at the 'Valedictory Function'.







### Seminar on Dairy Business 2020

CLFMA (Compound Livestock Feed Manufacturers Association) of India and NDRI, Karnal organized a Seminar on Dairy Business 2020 on 2nd June 2014 at the occasion of "World Milk Day". Prof. (Dr.) A.K. Srivastava, Director & Vice- Chancellor, NDRI delivered the key note speech to a large gathering of farmers, industrialists and scientists. He said that agricultural resources and by-products utilization should be implemented to increase the productivity and profitability of dairy business. He also stressed on increasing the green fodder and water availability, besides better livestock management practices for improved productivity by 2020. In addition, milk processing and quality assurance should also be on the top agenda of dairy sector for developing the value-added dairy products.



Mr Daljeet S Gill, President, Punjab Dairy Farmers Association, also expressed his views on how to improve the dairy business by 2020 in the best interest of farmers.

### Symposium on 'Food-borne Zoonosis'

National Academy of Dairy Science, India celebrated its 4<sup>th</sup> Foundation day at NDRI, Karnal on 26<sup>th</sup> May, 2014. Prof. (Dr.) A. K. Srivastava,



Director & Vice- Chancellor, NDRI, Karnal and President, NADSI was the Chief guest. He said that the mission of NADSI is to achieve the recognition as think tank, which will provide the policy view to promote the scientific and technological talent in dairy industry to enhance the national economy. A symposium on 'Food-borne Zoonosis' was also organised on the occasion. On this occasion, fellowships of the academy were awarded to 29 Fellows and 2 Associate Fellows from the different areas of Dairy science in the country. The first issue of NADSI Newsletter was released by the chief guest and other dignitaries on this occasion.

### Launching of Pizza at NDRI Milk Parlour

Experimental Dairy NDRI started the sale of Pizza from Milk Parlour. Pizza was launched by the Director and Vice- chancellor, NDRI, Karnal on 16<sup>th</sup> June 2014. The sale price of Pizza, having the base of 100g and cheese content of 150g, has been kept as Rs. 150/-. Dr. A. K. Sharma, Dairy Superintendent informed that the sale of Pizza initially will be done on every Sunday from 10:30 AM to 2:00 PM only. However, the time of serving could be expanded based on the response from the customers. He further informed that that only vegetarian Pizza having double mozzarella & cheddar cheese along with capsicum, onion, green pepper will be sold from Milk Parlour counter. At the time of launching, a number of administrative and scientific staff members of NDRI along with students were present to grace the occasion.



### Specialized Training Programme on Technology of Cheese making

Business Planning & Development (BPD) Unit of NDRI organized six days specialized training programme on "Technology of Cheese making" from 2<sup>nd</sup> to 7<sup>th</sup> June, 2014. The major objective of the training was to impart adequate knowledge on various aspects of cheese making and the scientific practices and technologies for maximizing the productivity and profitability. Another attractive component of this program was the opportunity for providing hands-on experience on preparation of various types of cheeses at state-of-the-art facility of NDRI under the guidance

of cheese experts. Twelve participants from different states of India viz. Punjab, Madhya Pradesh, Uttar Pradesh and Gujarat attended the training. The trainees included entrepreneurs, and industry personnel to upgrade their existing business. Besides giving knowledge on basic aspects of Cheese making, various

kinds of cheeses viz. Quarg, Mozzarella, Cheddar, Gouda, Artisan, Processed, and Processed Cheese Spread were discussed and practical sessions were also conducted. Visits of progressive dairy entrepreneurs to NDRI cattle yard, Experimental Dairy, ATIC and dairy plant were also arranged.

## HONOURS/AWARDS

**Dr. S. K. Shelke, Dr. S. S. Thakur and Dr. S. M. Shette** were presented "**Outstanding Research Paper Award (2011-13)**" for their paper entitled "Production and reproduction performance of Murrah buffaloes (*Bubalis bubalis*) supplemented with rumen

protected fat and protein" published in December, 2012 issue of Indian Journal of Animal Nutrition at Global Animal Nutrition Conference 2014 organised by ANSI and NIANP, Bangalore.

## PERSONALIA

### Joining

- **Dr. Laxamana Naik** joined as Scientist, Division of Dairy Chemistry at NDRI, Karnal w.e.f. 08.04.2014.
- **Ms. Indumati K. P. joined** as Scientist, Division of Dairy Chemistry at NDRI, Karnal w.e.f. 08.04.2014.
- **Ms. Priyanka Singh Rao,** joined as Scientist, Division of Dairy Chemistry at NDRI, Karnal w.e.f. 08.04.2014.
- **Ms. Richa Singh** joined as Scientist, Division of Dairy Chemistry at NDRI, Karnal w.e.f. 08.04.2014.
- **Dr. Diwas Pradhan** joined as Scientist, Division of Dairy Microbiology at NDRI, Karnal w.e.f. 08.04.2014.
- **Sh. K.P.S. Gautam,** joined as Chief Admn. Officer at NDRI, Karnal w.e.f. 01.05.2014.
- **Sh. Sukhdev Singh** Joined in ERS, NDRI, Kalyani as AAO w.e.f. 24.04.2014.
- **Dr. Amit Kumar Pandey,** Research Scholar, Animal Biochemistry Division, selected as Assistant Professor in Dept. of Vet. Biochemistry at Rajasthan University of Veterinary and Animal Sciences, Bikaner.

### Promotions

- **Sh. R. Keshavamurthy,** Technical Officer T-5(F/FT) promoted to the post of Sr. Technical Officer T-6(F/FT) w.e.f. 13.01.2013.
- **Sh. Gurunath Gouda Patil,** Technical Officer T-5(F/FT) promoted to the post of Sr. Technical Officer T-6(F/FT) w.e.f. 25.02.2013.

### Retirements

- **Sh. B. R. Srinivasamurthy,** Technical Officer T-5(F/FT) retired from Council's service w.e.f. 31.05.2014.
- **Sh. M. Sreenath,** Chief Technical Officer, T-9(F/FT) retired from Council's service w.e.f. 30.06.2014.

### Transfers

- **Dr. A. Manimaran,** Scientist transferred from NDRI Karnal to SRS, Bangalore w.e.f. 13.06.2014.
- **Mr. H. Yadav,** T-7 transferred to IVRI, Izatnagar and relieved on 12.06.2014.

### Relieving

- **Ms. Sarita Yadav,** Admn. Officer relieved from Council's Services after giving technical resignation on 25.04.2014.

### TRAINING IMPARTED

- **Mr. GBenga Adewumi,** JRD-TATA Fellow from Nigeria worked on a project entitled "Probiotic characterization and safety of Bacillus species isolated from traditional African Condiment" under the supervision of Dr. Sunita Grover at Molecular Biology Unit, Dairy Microbiology Division w.e.f. 15<sup>th</sup> Feb., 2014 to 15<sup>th</sup> May, 2014.

### VISITS ABROAD

**Dr. A. K. Srivastava,** Director NDRI participated in FAO Regional Meeting "Dairy Asia Towards Sustainability to Act as Instrument of Inclusive Economic Development" in Bangkok, Thailand from 21<sup>st</sup> – 24<sup>th</sup> May, 2014.

**Dr. A. K. Chakravary,** Principal Scientist, Dairy Cattle Breeding acted as an expert of Artificial Insemination under the work plan finalized between ICAR Ministry of Agriculture & Fisheries at Oman from 4<sup>th</sup> – 8<sup>th</sup> May, 2014.

**Dr. J. K. Kaushik,** Principal Scientist, Animal Biotechnology Centre received training on "Dairy Science and Food Biotechnology" from 9<sup>th</sup> – 14<sup>th</sup> June, 2014 at Germany.

**Dr. A. K. Mohanty,** Principal Scientist, Animal Biotechnology Centre participated in Joint FAO/IAEA consultants meeting as an expert for presentation and discussion in "Early Pregnancy Diagnosis in the Bovine using Nuclear and Molecular Technique" from 11<sup>th</sup> – 13<sup>th</sup> June, 2014 at Austria.

### DISTINGUISHED VISITORS

16.04.2014	Ms. Winifred Perkins and Mr. Derek Quirke Meet and Livestock, Australia
28.06.2014	Four scientists from IBERS, Aberystwyth University, United Kingdom.
	Dr. Joseph Gallagher, Head of Bioconversion and Biorefining Group
	Dr. Sreenivas Rao Ravella
	Dr. David Neil Bryant
	Dr. A. Maurice Bosch



## SOUTHERN CAMPUS, BANGALORE

### RESEARCH

#### *A Profile Study of Smallholder Dairy Production Systems in Southern Region*

*(M. C. A. Devi, P. K. Dixit and S. Subash)*

The profile study on small holder dairy production systems in the southern region was taken up to analyse selected case studies of successful small dairy farmers of the region and to study the constraints of smallholder dairy production systems in the southern region. The study was conducted in the selected districts of Chittoor in Andhra Pradesh, Kolar in Karnataka, Thrissur in Kerala and Salem in Tamil Nadu. The socio-personal and socio-economic profile of small dairy holders revealed that majority of the respondents were middle-aged (54-68%), gender category of men (54-73%) and 27-43% women, 62-78% of primary & secondary level of education, with a occupational profile of farming and dairying (76-90%), with 10-20 years of farming experience (62-70%) with marginal farm holding of less than one hectare (56-76%). Majority of the respondents possessed 2-5 dairy animals (64-76%). The mass media exposure revealed that 65-67% of the respondents viewed farm telecast and print media utilization ranged from 24-71%. The local milk vendors played an important role in milk collection in the region. The milk procurement price ranged from Rs.18-30/litre in the region while the milk sale price ranged from Rs.30-35/litre. The cost of milk production in the region ranged from Rs.17-23/ litre and feeding cost accounting for 60-70% of the total cost. The conception of dairy animals in the region was mostly in second insemination (40-50%) and the dairy housing profile revealed that majority of the households had 'Kutchra' type of housing (70-75%) which had mud/stone flooring with thatched roof and 25-30% of 'Pucca' housing with stone/coarse cement flooring & tiled or sheet roof. Majority of green fodder feeding comprised of weed/waste grass collected from the agriculture fields/ waste grass and limited of cultivated or purchased green fodder of hybrid napier and fodder maize/sorghum. The average milk yield per animal /per day in the region ranged from 6.0-8.5 kg/day. The milk production in the selected households was upto 10 litres/day in majority of the households in Andhra Pradesh (64%) and Karnataka (60%), which was 11-20 litres/day in Kerala (71%) and Tamil Nadu (68%). The annual income from dairying was up to Rs.50,000 in majority of the households in Andhra Pradesh which was between Rs.50,000 to 1,00,000 in most of the households in Karnataka (72%), Kerala (60%) and Tamil Nadu (61%).

The constraint analysis revealed that the major constraints in dairy farming in the region primarily enveloped acute water shortage, non-remunerative milk procurement price, high cost of cattle feed, non-availability of Green & dry fodder, low productivity of dairy animals, non-availability of farm labour, etc. This indeed warrants suitable technological and governmental intervention for alleviating the problem and providing a fillip to dairy development in the region.

#### **Farmers' Training Programme**

In order to disseminate the technologies, a farmers' training programme on "Scientific rearing and improvement of cattle of Malnad gidra" along with Malnad Gidda cattle show was

organized at Daradahalli, Mudigere Taluk, Chikkamagalore district, Karnataka on 10th June 2014. A large number of farmers attended the training programme. During the occasion a pamphlet in Kannada and English on "Malnad Gidda cattle-characteristics and farming system" was released. Presentations on strategies to improve Malnad Gidda cattle were delivered by experts. On this occasion one of the demands of the farmers for providing frozen semen of Malnad Gidda cattle was met by releasing frozen semen straws from elite Malnad Gidda bulls for field use. Dr. K. Shivakumar, Project Director, KLDA, Dr. Satish Kulkarni, Prof. M.G. Govindaiah, Dr. G. P. Chinnaiah, Prof. M. R. Jayashankar, Dr. T. P. Mallikarjuna along with Principal Investigator Dr. K.P. Ramesha and other project investigators participated as resource persons.



*Release of frozen semen straw from Malnad Gidda bulls for AI purpose*

#### **Dairy Education at Farmers' Door**

As a new initiative at SRS, the "Dairy Education at Farmers' Door", was organized and visits were made by the multidisciplinary team on second Saturdays to villages in Bangalore South Taluk viz. Immidihalli, Halanayakanahalli, Varthur and Soruhunse. Necessary technical advice was rendered on various aspects of scientific dairy farming, green fodder production, clean milk production and dairy animal management aspects to the needy clientele group at their doorsteps.



*Extension at Farmers' door*



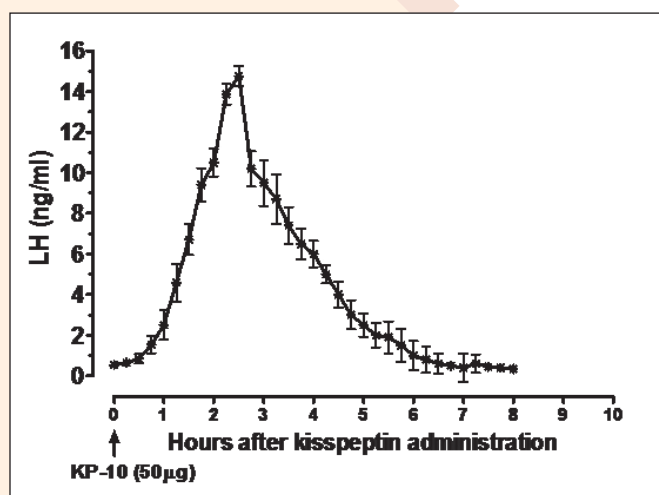
## EASTERN REGIONAL STATION, KALYANI

### RESEARCH

#### Development of intranasal Spray Device and Induction of Estrus in Anestrus Crossbred Cows

(M. Mondal, M. Karunakaran, S. K. Das, A. Mandal, A. Chatterjee, M. K. Ghosh and T. K. Dutta)

Development of intranasal spray devices for Kisspeptin specific to bovine: Kisspeptin-10 (kp-10) is only 10-amino acids long. Therefore, it may easily cross the blood brain barrier and acts on the GnRH neurons located in the central nervous system (CNS). kp-10 in lesser dose through intranasal route than intra venous route can be potent secretagogue for GnRH release; thereby, economic drug for GnRH (and so for LH and FSH) release from CNS. Intranasal spray of kp-10 would also make easier for its application in reproductive physiology in large bovine species. A cheaper intranasal spray device was designed specifically for cattle.



Changes in the plasma LH profile (mean  $\pm$  SEM) in crossbred heifers ( $n=03$ ) after intranasal administration of 50 $\mu$ g of KP-10.

Kisspeptin-10 @ 50 $\mu$ g were administered intranasally in three heifers, using the spray device developed at ERS, to find out whether intranasal spray induces blood LH peaks. Blood samples were collected at 15 min intervals post-KP10 administration for 8 h period. Results revealed that LH peak was induced within two hours after kisspeptin-10 (kp-10) spray and was sustained till 6-h post kp-10 administration. Kisspeptin-10 intranasal spray may, therefore, be used as a potent stimulator of GnRH in bovine. Research with large numbers of animals is going on to prove the further efficacy of intranasal spray of Kisspeptin for reproduction augmentation in bovine species.

#### Induction of estrus in anestrus heifers using OvSynch protocol/Kisspeptin-10

Twelve numbers of anestrus heifers were treated for induction of estrus following Ovsynch protocol (day 0: GnRH, day 7: PGF<sub>2a</sub>, day 9: GnRH). Five animals responded to the treatment. These five animals were inseminated on day 10 of the Ovsynch protocol, of which only three were found to be pregnant. Nine non-responsive/non-pregnant heifers were subjected to modified method of estrus synchronization protocol using Kisspeptin-10. All nine animals responded to the treatment i.e. exhibited estrus. Blood samples were collected from all these animals at regular interval for estimating hormones.

#### Cryopreservation of Fetal Skin Fibroblast Cells

(Surya Bansi Singh, M. Karunakaran, A. Mandal, A. Chatterjee, and S. K. Das)

Importance of fetal skin fibroblast cells as feeder layer in the stem cell production is enormous. The cryopreserved fetal skin fibroblast cells could provide instant availability bypassing fetal skin cell culture frequently. The objective of this study was to cryopreserve fetal skin fibroblast cells. Cattle fetus was obtained from abattoir and skin samples were collected and chopped into small pieces. After 6-7 times washing in DPBS, skin samples were put in digestion media (trypsin-0.5% and collagenase- 0.05% in DPBS) and allowed for stirring on a magnetic stirrer for 15-20 min. After settling down, the supernatant was collected carefully and centrifuged at 1800 rpm/5 min. The cell pellet was then washed 3-4 times in prewarmed DPBS. Finally the cell pellet was re-suspended in culture media and immediately inoculated in gelatin (0.1%) coated T-25 flask containing culture media (TCM-199 +10% FBS + 50  $\mu$ g/ml gentamycin + 1% non essential amino acids), and incubated at 38.5 °C in 5% CO<sub>2</sub> incubator with maximum humidity. After 4-5 days of primary culture set up fibroblast cells monolayer in T-25 culture flask was harvested and washed twice with prewarmed DPBS. The cell pellet was re-suspended in the cryopreservation media (10% Dimethyl Sulphoxide in culture media). The cells along with media were loaded in the 0.25 ml French straw containing 0.5 M sucrose solution in DPBS in both the side. The open side of the straw was sealed with hot forceps and was kept in deep freeze at -20 °C for overnight. After 24 h straws were taken out from deep freeze and immersed into liquid nitrogen directly. After 7 days of storage the straws were taken out from liquid nitrogen and warmed quickly by transferring them into a water bath at about 20 °C for 15-20 sec. The contents were expelled into 15 ml centrifuge tube containing normal medium (without DMSO). Cells were collected by centrifuging at 900 rpm for 5 minutes. The cell pellet was washed 2-3 times with DPBS and after final washing re-suspended in culture medium and plated in gelatin (0.1%) coated T-25 flask with 5-6 ml of culture media and incubated at 38.5 °C with 5% CO<sub>2</sub> in humidified incubator for attachment and growth. Within 2-3 h of primary culture set up the fibroblast cells started growing and on day 4 about 80-90 % confluence occurred. Following cryopreservation the recovered cells were morphologically normal and after incubating, the fibroblast cells attachment and growth started within 3-4 h. However, growth rate was little slow in cryopreserved cells and the monolayer formation occurred (80-90%) on day 5-6. The results show that cattle fetal skin fibroblast cells can be cryopreserved by a simple and rapid technique in a solution of 10% DMSO in culture media for future use.

#### Factors Affecting Incidence of Subclinical Mastitis in Crossbred Dairy Cows

(Pranay Bharti and Champak Bhakat)

The factors affecting the incidence of mastitis in Journey crosses were evaluated. The incidence of sub clinical mastitis (SCM) was increased with the parity of the animals with highest level of somatic cell counts (SCC) in last lactation. The incidence was lowest in the 1<sup>st</sup> lactation of Jersey crossbred cows (27.64%) and increased gradually and highest in 4<sup>th</sup> and above lactation (78.57%). Similar pattern was also found for SCC level, as for SCM incidence in different parity i.e. means of Log<sub>10</sub> SCC increased gradually from the 1<sup>st</sup> parity to 4<sup>th</sup> & and above parity group. The higher incidence of SCM and high SCC in later parities in comparison to earlier

parities animals may be due to the fact that animal's resistance to mastitis might be lowered with advancement of lactation number or age. The udders become more pendulous and more prone to environmental or contagious infection. The higher incidence was observed in hind (59.23%) in comparison to fore (50%) quarter while incidence was found to be almost equally (slightly more for left) distributed between left (55.56%) and right (53.76%) quarters. The per cent quarter wise incidence of SCM in Jersey crossbred was highest in summer season (69.01%) as compared to rainy (46.16%) and winter (45%) season of calving. The season of calving had significant ( $P < 0.01$ ) effect on  $\text{Log}_{10}\text{SCC}$ . The mean  $\text{Log}_{10}\text{SCC}$  of summer calver cows was significantly higher than the rainy and winter calvers; whereas, non-significant difference was found between the mean  $\text{Log}_{10}\text{SCC}$  for rainy and winter season of calving, although rainy season calvers has slightly more SCC level. It can be better explained by the environmental condition of the particular season. Environmental conditions of lower Gangetic plains are hot and humid during the summer and load of heat stress also suppresses the immunity of the animals and numbers of pathogens are higher. Animals calved during rainy season may be out of heat stress but humidity and excess moisture make them more susceptible to infections, having a greater number of somatic cells count level.

### World Veterinary Day Celebrations

World Veterinary Day was celebrated on 26<sup>th</sup> April, 2014 by the ERS-NDRI, Kalyani, with the theme of "Animal Welfare" to create awareness on the importance of animal health and its welfare. The programme was organized with seminar, exhibition and farmers'-scientists' interaction on animal welfare issues prevailing at this region and 100 people including dairy farmers, Students, Trainees, Scientists and Technicians attended the celebrations.

### World Milk Day - 2014 Celebration

World Milk Day was celebrated on 2<sup>nd</sup> June, 2013 by the ERS-NDRI, Kalyani to create awareness on the importance of milk on human

health and nutrition, clean milk production from dairy animals etc. and to publicize the importance of livestock and livestock products in socio-economic upliftment of resource-poor dairy farmers in the region.

## EXTENSION ACTIVITIES

### Feed resource development, vaccination, health and fertility camps in tribal dominated areas in West Bengal

Health, fertility and vaccination camps were organized in the tribal villages of South 24 parganas (Bali Island) of West Bengal. Different dairy production management systems were demonstrated to the livestock farmers. Health and vaccination camps were also organized in the Purulia district of W.B. Some fodder seeds (maize and cowpea) and rooted slips of some fodder grass were also distributed to the farmers who rear livestock. The animals were vaccinated with Triovac for HS, BQ, FMD and also vaccinated for PPR. The seeds of annual fodder crops like Maize, Cowpea, Ricebean, Sorghum-Sudan grass and rooted slips of hybrid Napier grass, Guinea grass, Paragrass etc. have been distributed among about 102 tribal dairy farmers. ERS Carried out interactions with the local people regarding suitable fodder crop production in relation to cost effective dairy farming enterprise. Live demonstrations of *Azolla* production in Farmers' Fields were done. Transplanting of rooted slips / stem cuttings of improved varieties of perennial fodder crops like Hybrid Napier Grass (Var- CO-4), Guinea Grass (Var-Hamil), Para Grass were carried out.

### On Campus Training

One 42 day training course has been started since 03.06.13 at ERS of NDRI, Kalyani on 'Artificial Insemination and veterinary First Aid' for the Tribal unemployed youth of Bali Island, Ayodhya hills of Purulia District and Tarai region of Jalpaiguri District and for the AMUL nominated unemployed youth.

## FEATURE ARTICLE

### Probiotics as Prophylactic and Therapeutic Agents for Better Human Health

(R K Malik and Sheenam Garg)

Dairy Microbiology Division, NDRI)

#### Introduction

The tenet "Let food be your medicine and medicine be your food", espoused by Hippocrates nearly 2,500 years ago, is receiving renewed interest. Probiotic bacteria have become increasingly popular during the last two decades as a result of the continuously expanding scientific evidences pointing to their beneficial effects on human health. The association of probiotics with well-being has a long history. More than a century has passed since Tissier observed that gut microbiota from healthy breast fed infants were dominated by rods with a bifid shape (bifidobacteria) which were absent from formula fed infants suffering from diarrhea, establishing the concept that they played a role in maintaining health. Probiotics are defined as "live microorganisms which when administered in adequate amounts confer a health benefit on the host." In humans, the most frequently used probiotics are bacteria from the genera *Lactobacillus* or *Bifidobacterium*. Since these belong to the indigenous human microflora, they have a

long history of safe use and there are evidences to support their positive roles. Some of these have been designated as GRAS by the Food and Drug Administration (FDA) due to their long history of use in food fermentations.

Modern day consumers are increasingly interested in their personal health and this influences their selection of foods they eat, beyond taste and attractiveness, to a new level of being healthy and safe. One such exciting strategy, which seems to be quite promising and has stimulated lot of interest, is based on probiotic interventions since these food grade organisms have multitude of health promoting bioactive functions to alleviate several metabolic diseases. Probiotic bacteria benefit human beings in a variety of manners. Releasing antimicrobial substances in the body, resisting colonization of harmful bacteria, stopping pathogens from attaching to GI tract, breaking up destructive elements, enhancing the immune system, boosting the activity of brush border enzymes, prevention of cancer, lowering of serum cholesterol, are among probiotics' actions that affect our health and wellbeing. The gastronomical environment and the microflora that live in it play a significant role in maintaining the health of humans. Consumption of probiotics can also enhance the immune response of the gut and improve its function as an important



barrier against harmful bacteria. Certain strains of probiotics have shown immune-modulatory effect. They have been shown to influence selected aspects of immune function involving one or several components of an immune response, e.g., humoral, cellular or non-specific immunity. It has been proposed that the humoral response is mediated due to enhanced production of sIgA on consumption of probiotics. The most intriguing aspect of probiotic modulation of immune response is through its effect on cytokine production. Probiotic bacteria have been shown to influence immune responses non-specifically by enhancing phagocytosis of pathogens as well as modifying cytokine production. Although several *in vitro* and *in vivo* studies on probiotic effects on immunity have been reported, the specific mechanisms of the observed changes remain unclear.

### Lifestyle Disorders

The progress of modern civilization in developed as well as developing countries has resulted in decline in infectious diseases in the last 50-60 years, but there has been a significant increase in chronic non-communicable diseases during this period. Diseases, such as type 2 diabetes mellitus (T2DM), hypertension, cardiovascular diseases (CVD) and certain types of cancer—termed 'Lifestyle diseases' or 'Lifestyle disorders', are related to changes in life style including altered dietary habits, stress and exposure to chemical carcinogens.

Cardiovascular diseases are the world's leading killer, accounting for 17.5 million deaths in 2005, representing 30% of all global deaths (WHO, 2005). The World Health Organization estimates that by 2015, 20 million people will die from cardiovascular diseases. Almost 95% of people across the world who developed a fatal cardiovascular disease had at least one of these major risk factors viz. high blood cholesterol, high blood pressure, diabetes and overweight etc. In recent decades, probiotic applications have emerged as a fascinating strategy to alleviate symptoms of various diseases like CVD and stress that are a consequence of modern life style.

A number of studies have indicated that oxidative stress also has a role in initiating numerous diseases, including cardiovascular disease, hypercholesterolemia, atherosclerosis, and hypertension. High blood pressure or hypertension is the leading risk factor for CVD, which remains one of the most important public health problems in the world. Because of serious health implications associated with CVDs and stress effective treatment is extremely important to save the life of human population from these fatal diseases. Although, drug based therapy is presently used for disease management all over the world, it is quite expensive and hence is not easily affordable and also suffers from undesirable side effects. Fermented milks containing high number of peptides, among them are ACE-inhibitory peptides and thus antihypertensive. These peptides are produced by proteolytic strains of lactic acid bacteria (LAB) - the probiotic organisms which produce inhibitors of the ACE enzyme and thereby regulating the hypertension. Some strains of probiotic LAB bacteria even produce  $\gamma$ -amino butyric acid (GABA) which has also been reported to reduce blood pressure.

Diabetes is a looming epidemic worldwide, affecting almost all major sections of society, creating burdens on global health and economy. The onset of T2DM is associated with a poor inflammatory status of the individuals who consume high-fat diets

over prolonged periods. There is a complex relationship between insulin resistance diabetes and essential hypertension. An induction in insulin resistance often leads to diabetic dyslipidemia, represented by low levels of high density lipoprotein (HDL) cholesterol; high levels of plasma total cholesterol, LDL cholesterol, and very low density lipoprotein (VLDL) cholesterol. Studies have also shown that *Bifidobacteria* can reduce the intestinal endotoxin levels and improve mucosal barrier thus reducing systemic inflammation and subsequently reducing the incidence of diabetes. The consumption of probiotics is a new therapeutic strategy in preventing or delaying the onset of diabetes and subsequently reducing the incident of hypertension. Probiotics have proven to be useful in alleviating type I and type II diabetes. There is a hope that the use of probiotics may alter the type of bacteria in the gut, thereby preventing type I diabetes.

Cancer, usually defined as "uncontrolled cell growth", is one of the leading causes of death worldwide. As many human cancers are caused by preventable factors such as infection, inflammation, smoking and diet; preventive strategies might be the most effective to reduce cancers. A proper diet may be one of the critical strategies for reducing the risk of cancers. Lactic acid bacteria (LAB) have been shown to be effective chemo-preventive food ingredient against many cancer types including colorectal, bladder, liver, breast and gastric cancer. The polysaccharide component of bacterial cell wall or bacterial metabolites of LAB are known to mediate a non-specific host immune modulation and control the growth and inhibit cancer cells. These effects act via diverse mechanisms including alteration of gastrointestinal microflora, enhancement of the host's immune response, anti-oxidative and anti-proliferative activities. In view of the role of diet in chronic diseases, such as cancer, the potential of dietary probiotics in preventing cancers is promising and thus is of great interest.

### NDRI, Karnal Signs Memorandum of Understanding with Riddet Institute, New Zealand to promote research and academic collaborations



*From back left: Distinguished Professor Harjinder Singh, Distinguished Professor Paul Moughan, Massey International Relations Director Michael O'Shaughnessy*

*Bottom row: Professor AK Srivastava, Director and Vice-Chancellor of the National Dairy Research Institute, Massey University Vice-Chancellor Steve Maharey.*

## Role of Gut Microbiota

Our digestive tract is at the interface of the food we ingest and our metabolism. During the last few decades, it became clear that the human body lives in close harmony with the complex ecosystem that is composed of more than thousand different bacterial species inhabiting the oral cavity, upper respiratory tract, gastro-intestinal tract, vagina and skin. Each human body is host to about millions and trillions of microbes which play an important role in human gut. There are, on an average about half a million bacterial genes in contrast to 23,000 genes of the human genome. The gut microbiota changes continually through life, possibly being most stable in adults. This mutualistic association of humans and microbes is derived from long co-evolution, and the balance of the gut microbiota is a key to the maintenance of health and well-being. A large number of human functions are modulated by the microbiota. The balance between beneficial and aggressive microbes that is maintained in the healthy gastrointestinal tract may be significantly altered in disease and this alteration of balance is referred to as gut dysbiosis.

Several animal studies have shown that the changes in the microbiota are correlated with the development of obesity, insulin resistance, and diabetes. The plausible mechanisms include the ability of the microbes to extract energy from the diet, altered fatty acid metabolism within the adipose tissue and liver, changes

in the intestinal barrier integrity. Therefore, modulation of gut flora composition represents a potentially attractive treatment option against obesity and diabetes. Because of the intricate relationship between the gut microbiota and the innumerable human host functions, microbiome manipulation in humans is now emerging as an increasingly important treatment modality. The approaches investigated in this direction include prebiotic and probiotic interventions and the use of faecal transplants or antimicrobials to eliminate pathogens for the favourable manipulation of the gut microflora.

Increasing incidence of chronic life style disorders may actually be attributed to the altered balance of gut microbiota. Advances in understanding of the gut microbiome and evidence from randomized controlled trials have led to the microorganism based interventions for preventive healthcare & diseases. Prebiotics and probiotics are becoming increasingly popular worldwide for offering health benefits. Probiotic diet interventions have marked their excellence in combating these disorders by various mechanisms. Future trends envisage their increased inclusion in dietary supplements and functional foods targeting diverse preventive health maintenance needs. In the present scenario there is requirement of functional foods like probiotics to maintain a good health & well being and cope with the life style disorders.

## Forthcoming XII Agricultural Science Congress at NDRI from 3<sup>rd</sup> to 6<sup>th</sup> February, 2015

National Academy of Agricultural Science (NAAS), New Delhi is organizing the XII Agricultural Science Congress (XII ASC) 2015 at National Dairy Research Institute (NDRI), Karnal during 3<sup>rd</sup> – 6<sup>th</sup> February, 2015. Considering the importance of the subject, the theme of the Congress has been chosen as “Sustainable Livelihood Security for Smallholder Farmers”. The Congress will provide a very vibrant platform for discussing and exchanging views on contemporary topics in Indian Agriculture like the Crop & Vegetable Production, Animal, Poultry & Fish Production Systems and related Social Science issues. A large number of delegates across the globe are expected to attend this meeting covering the cream of academia, entrepreneurs, policy makers, farmers, financial institutions, students and others who are important stakeholders in shaping up the robust agricultural economy of India.

Parallel to the 12<sup>th</sup> ASC, the ASC India Expo will be a major attraction, providing an excellent platform to all the stakeholders connected with the agriculture industry exploring opportunities

to show case their products, services, technologies & initiatives to the policy makers, corporate, R&D experts and thousands of farmers. The expo shall bring together wide spectrum of participants from sericulture, floriculture, plasticulture, dairy, poultry, farm practices, equipments, fertilizers, pesticides, seeds, irrigation, food processing etc. along with lab chemicals and analytical equipment for laboratory research.

The diaspora of people attending the XII ASC will work to evolve means and strategies to effectively combat the poverty and hunger and search for a rural development system while respecting the environment and biodiversity; specially focusing on the “Smallholders Farmers”.

### Dates to Remember

November 30, 2014	Early Bird Registration Closes
December 15, 2014	Abstract Submission Closes
January 1, 2015	Online Registration Closes

## Editorial Board

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