



NDRI

News

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From the Director's Desk



India is the largest milk producer in the World with 112 million tonnes per annum. In this long journey of becoming number one in the world, NDRI has significantly contributed to enhance the animal productivity by conducting research in animal breeding, nutrition, health and livestock management. Although, enhanced milk production has been the main focus during the last six decades, the quality of milk has not received due attention. Nutritional security and quality food, both are essential for improving the health status of population. The quality of milk has remained a major challenge in this country. High ambient temperature, which is conducive for the growth of micro-organisms and also man made menace of adulteration as well as contamination of milk and milk products with heavy metals, pesticides and antibiotic/veterinary drug residues have been the major factors in this regard.

NDRI is working proactively for developing various analytical techniques and simpler methodologies for the detection of adulteration in milk and milk products. A kit developed at NDRI

for the detection of various adulterants in milk is in high demand among dairymen across the country. The kit contains reagents for detection of 12 adulterants viz., neutralizers, urea, pond water, starch, sugar, glucose, salt, formalin, hydrogen peroxide and hydrogenated vegetable oil in milk. In past, a rapid method developed, at the Institute, for the detection of adulteration of vegetable/refined oil in milk has been validated and adapted by Bureau of Indian Standards (BIS), Govt. of India. Similarly, the qualitative and quantitative methods developed for detection of urea in milk have also been adapted by BIS. Recently, a simple test has been developed for the detection of presence of detergent in milk. This test is available both in qualitative as well as in quantitative format and can be effectively used for detecting the presence of synthetic milk in milk supplies.

The tests have also been developed for the detection of adulteration of milk products such as ghee, khoa etc. Further, for detection of vegetable oil in ghee, a simple chemical method has also been developed. Because of natural variation in composition of milk fat and also because of availability of wide range of cheap adulterants (animal body fats, vegetable oils etc.), not only one test but a combination of tests need to be applied for confirming the purity of milk fat. These include Apparent Solidification Temperature (AST), Opacity Test, TLC, selective enrichment of solid or liquid fraction etc.

For ascertaining the presence of antibiotic residues in milk, NDRI has developed a rapid spore based biosensor method. The developed kit can be used effectively for semi-quantitative detection of antibiotic residues in different types of milk systems within 3 hrs. This technology has already been transferred for commercial application and it is available as "Microbial Drug Residues Test kit (MDR test Kit)" at affordable rate for the use in the dairy industry. The spore based concept has also been extended for the detection of Aflatoxin M1 in milk. A real-time bioassay for the detection at 0.5 ppb aflatoxin M1 within 30-40 min has been developed and patented for its industrial application. Currently work is in progress to extend this concept for monitoring hygiene and safety indicator organisms in milk and milk products. NDRI has also developed PCR based methods for the detection of pathogens in milk. National Dairy Research Institute has been designated as "Centre for Excellence in Milk Safety" by FSSAI Govt of India for providing "scientific inputs/review on current sampling, testing protocol and legal standard for dairy products and development of optimal model for its adoption". Further, NDRI has also initiated a programme to educate the farmers about the importance of Clean Milk Production. Farmers are being educated by the scientists of the Institute at their doorstep for adopting clean milk production practices for quality and safety of milk.

As such, it is imperative that simpler methods for testing quality of milk and milk products need to be developed so that these can be used at household as well as at field level. The Institute has progressed remarkably in this direction and is still making sincere efforts for fulfilling the dairy industry requirements.

A. K. Srivastava

(A. K. Srivastava)

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Composite dairy foods developed
at NDRI

RESEARCH NEWS

A Qualitative and Quantitative Test for Anionic Detergent in Milk

(Amit K. Barui, Rajan Sharma and Y. S. Rajput)

India, the world leader in milk production, currently submerged with a threat named Adulteration. The list of adulterants is increasing day by day. Synthetic milk is the youngest entry among the list of adulterants. Detergent has been considered as the essential component for the synthetic milk preparation. Detection of adulterated milk sample is not always possible due to the unavailability of methods, costly reagents or kits and/or inconvenient methods.

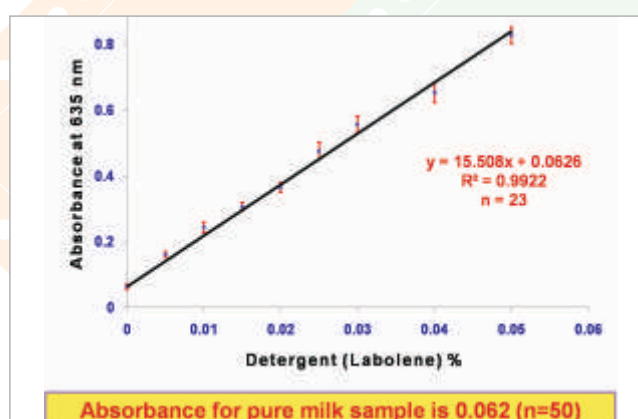
A new method has been developed for the detection and estimation of detergent in milk. The developed method requires addition of only 400 μ l of milk to detecting reagent followed by inverting the tubes 20

times gently. The tube is then kept in upright position and colour of the lower phase is observed. Appearance of purple colour in the lower phase represents pure milk whereas blue colour in the lower phase indicates presence of detergent in milk. The results are available within 100 seconds and it can detect the presence of 10 mg commercial anionic detergent (LABOLENE) in 100 ml of pure milk. This qualitative test can be easily performed at milk collection centres.

The qualitative method has been further modified to suit estimation of anionic detergent in milk in quantitative terms. The developed quantitative method requires spectrophotometer. The colour intensity of lower layer and concentration of detergent in milk exhibits linear relationship with a R^2 value of 0.992. The quantitative test can be adopted at quality control laboratory.



Qualitative test for detection of detergent in milk



Standard curve for the quantitative estimation of detergent in milk

Development of a Real Time Spore Based Bioassay for Monitoring Aflatoxin M1 in Milk

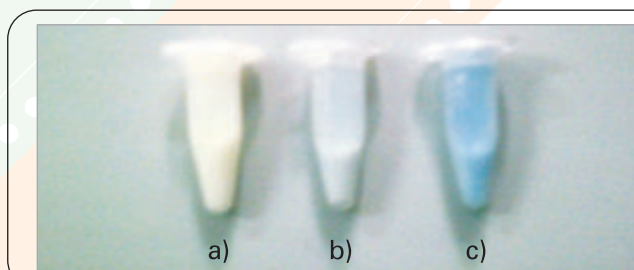
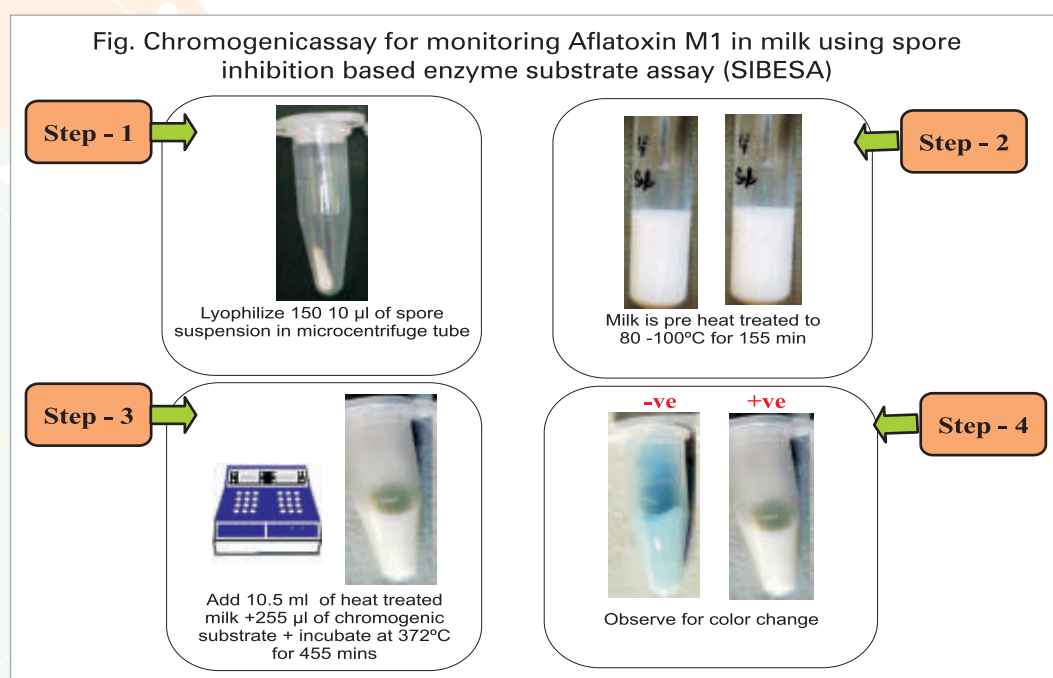
(Naresh Kumar, H. K. Raghu, R. K. Malik, Namita Singh, Nishu Raghav and Vinay Kumar)

Fungi have always benefited mankind over the years but some of them namely *Aspergillus flavus* & *A. parasiticus* produce highly poisonous toxic compounds as secondary metabolites called Aflatoxins which evoke pathological changes in man and animals. The present invention is based on the inhibition mechanism of nano-spore producing micro-organism in presence of specific analyte i.e. Aflatoxin M1. A specific growth medium with

development of nano-spore to an extent of 70-80% was achieved. The media principally contains beef extract, yeast extract, peptone, and sodium chloride as growth promoting components. Selected nano-spores were screened for different enzymes activity namely acetyl esterase, tryptophanase, esculinase, β -galactosidase, β -lactamase, α -amylase and lipase etc. A significantly acetyl esterase / or esculinase activity was established in nano-spores for its application in bio-sensing of specific analyte in milk and milk based products. A cost effective, reproducible, real time & simplified Chromogenic/ or fluorogenic assay in an appendorf tube containing micro quantities of Chromogenic / or fluorogenic substrate with nano-spores was developed based on inhibition by specific analyte i.e. Aflatoxin M1 in milk

and milk products. The working of SIB-ESA was based on release of specific indicator enzyme (s) by active bio-sensing molecules which would act specifically on Chromogenic / or fluorogenic substrate resulting in coloured reaction / or fluorescence as end product which was measured semi-quantitatively by either visually / or using optical system at specific excitation / emission spectra. The end product response was significantly different in milk and milk based products containing specific analyte i.e. Aflatoxin M1. The SIB-ESA exhibited significant correlation with minimal false positive / negative observations at 0.25 ppb or 0.5ppb Codex

limit of Aflatoxin M1 when compared with microbial based receptor assay (modified RIA) and ELISA system. The assay showed excellent performance in natural milk or spiked milk sample with wide range of application with different types of milk and milk products like raw milk (cow, buffalo, mixed), heat treated milk (toned / standardized, double toned, full cream milk) and dried powders (skimmed milk powder, milk powder, infant food etc). The spore inhibition based-enzyme substrate assay (SIB-ESA) has the potential for its commercial application for routine monitoring of milk for Aflatoxin M1 under Indian condition of milk production and processing.



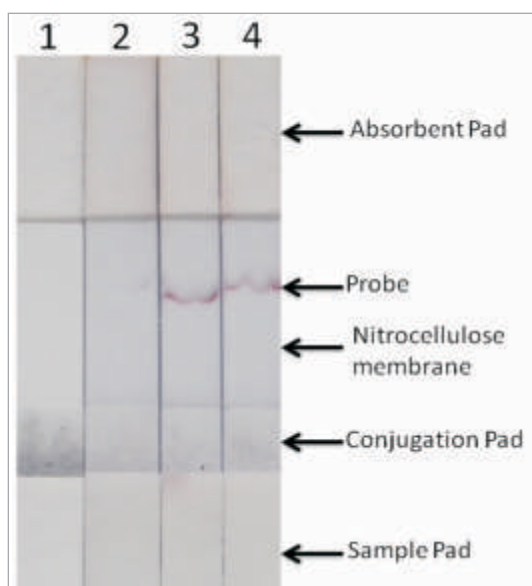
- ≥0.5 ppb of codex limit with no colour change
- 0.25-0.5ppb with slight colour change
- Negative sample with sky blue colour change

Method for Detection of Oxytetracycline based on Nanoparticles, Aptamer Science and Lateral flow System Developed

(S. S. Sonar, Y. S. Rajput and R. Sharma)

The Proof of Principle (POP) of working of detection system for Oxytetracycline (OTC) has been developed. The detection system uses gold nanoparticles (GNP), aptamer and basic concepts of lateral flow system. GNP coated with oligo

nucleotides are made to aggregate using interactions between aptamer and oligonucleotides attached to GNP and aggregated particle fails to enter pores of the nitrocellulose membrane. In presence of OTC, nano particles disaggregates and therefore, are able to move through pores of nitrocellulose membrane. Using the designed probe at defined position on nitrocellulose membrane, the moving GNP are arrested. Since GNPs are red in colour, these can be easily visualized by naked eye. The developed method can detect 0.25 to 0.5 mM OTC.

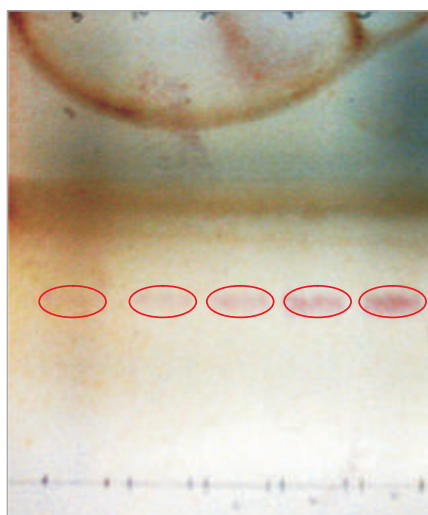


Detection of oxytetracycline by lateral flow method
1, Negative control; 2, 0.25mM Oxytetracycline (OTC) ;
3, 0.5mM OTC; 4, 1.0mM OTC

Method for Estimation of Residual Adsorbent in "Low Cholesterol Ghee"

(Vivek Sharma, Sumit Arora, Darshan Lal, B. K. Wadhwa, G. S. Sharma and Raman Seth)

Reverse Phase Thin Layer Chromatography (RPTLC) method was developed for estimation of pure standard β -cyclodextrin. For development of the plate, Butane-1-ol : Ethyl alcohol : Water in the ratio of 4:3:2 was found to be most suitable solvent system. The development time to reach solvent front was



RPTLC pattern of different concentrations of standard β -cyclodextrin (1) 0.05 μ g (2) 0.1 μ g (3) 0.2 μ g (4) 0.4 μ g (5) 0.5 μ g

observed to be the 30 - 40 min and colour development was done by spraying 15% methanolic H_2SO_4 followed by heating for 15 - 20 min at $100^\circ C$. The RPTLC plates were quantified using Quantity One software. This method showed a very good detection limit of 0.05 μ g for visualizing the bands and 0.1 μ g for quantifying purpose. A method for isolation of residual β -cyclodextrin from low- cholesterol ghee was also developed.

Acidophilus-bifidus Probiotic Dahi Stimulated Immune System in Mice

(Sonal Rajpal and Vinod K. Kansal)

Probiotic dahi was prepared by co-culturing selected strains of *Lactobacillus acidophilus* and *Bifidobacterium bifidum* and dahi culture in buffalo milk and was evaluated for its effect on immune system in mice. Three groups of animals, each consisting of 15 mice, were fed laboratory stock diet *ad libitum* alongwith 5 g supplements of milk, dahi or probiotic dahi per animal per day. Following 2, 5 or 8 d of dietary treatments, peritoneal fluid was collected and tested for lysosomal enzymes and *in vitro* phagocytic activity of macrophages. Macrophages were cultured for 18 h and the activities of lysosomal enzymes secreted in the supernatant were determined. The activities of β -galactosidase increased in peritoneal cavity fluid and also in the supernatant of macrophage culture from all three groups, but probiotic dahi was significantly more efficacious than dahi or buffalo milk in augmenting this lysosomal enzyme activity, and the response was the highest following 2 d of dietary treatment. - Glucuronidase activity increased in peritoneal cavity fluid and in the supernatant of macrophage culture from probiotic dahi fed mice, but not in dahi or buffalo milk fed mice. In probiotic dahi group, the activities of lysosomal enzymes were higher than 0 d level even after 8 d of dietary treatment, while in other two groups, it returned close to 0 d level. Phagocytic activity of macrophages obtained from buffalo milk group decreased following 8 d of milk supplementation. In dahi group, phagocytic activity increased following 2 d of product supplementation, thereafter, it returned close to 0 day level. A substantial rise in phagocytic activity of macrophages was observed on probiotic dahi following 2, 5 or 8 d of product supplementation. The protective effect of probiotic dahi on intestinal infection was investigated in mice fed the test product for 2 or 7 d and then challenged with *Shigella dysenteriae*. The colonization of Shigellae in the intestine, liver and spleen was significantly lower in mice on dahi or probiotic dahi than on buffalo milk.

Plasma Nitric Oxide Profile in Relation to Pregnancy and Survival of Fetus in Murrah Buffaloes

(Ruokuobeinuo Huozha, Sujata Pandita and Manju Ashutosh)

Nitric oxide (NO) recognised as versatile biological molecule, plays an important role in physiological and pathological functions. It has been reported to be produced by different cells/tissues including lymphocytes and macrophages in bovines and murines. Immunologically, nitric oxide is reported to enhance and suppress T-cell functions and that lymphocyte proliferated cells (T-cell clones) can be activated to produce nitric oxide. However, there are no reports regarding its generation by buffalo lymphocytes and its specific effects to modulate immune cell functions during different stages of gestation in buffaloes. Eight apparently healthy pregnant Murrah buffaloes in each trimester of

pregnancy and another eight animals prior to parturition were selected from NDRI herd. These served as lymphocyte donors. The lymphocytes were subjected to *in vitro* culture for 36h using PHA-P as mitogen. RPMI 1640 media was supplemented with antibiotics and 10% heat inactivated FBS to support culture system. Nitric oxide levels were measured in culture supernatant collected at the end of 36h and blood plasma during different stages of gestation. Plasma nitric oxide did not differ significantly during different trimesters of pregnancy but exhibited a sudden rise prior to parturition ($P < 0.01$). Lymphocytes contributed its share to the total pool of plasma nitric oxide as was evident from *in vitro* production of nitric oxide in culture supernatant (12.5 μM or less) during different stages of pregnancy. Low but nearly steady levels in plasma during pregnancy might be important for maintenance of pregnancy and survival of fetus in this species.

ACADEMIC AFFAIRS/ DEEMED UNIVERSITY NEWS Scholars Qualified for the Award of Ph.D. Degree

Scholar	Guide/ Discipline	Title of Thesis
Ms. Falguni Patra	Dr. S. K. Tomar (Dairy Microbiology)	Mannitol Production by <i>Leuconostoc Spp.</i>
Mr. Thirumeignanam, D.	Dr. S. N. Rai (Animal Nutrition)	Effect of Feeding Acacia Nilotica Pods on Dietary Protein and Amino Acids availability, Nutrient Utilization and Milk Production in Cows.
Mr. Prakash Chandra Sharma	Dr. A. K. Gupta, (Animal Genetic & Breeding)	Genetic Evaluation of Karan Fries Cows for Functional Traits.
Mr. Seyed Hadi Ebrahimi	Dr. Madhu Mohini (Animal Nutrition)	Manipulation of Rumen Microbial Ecosystem using Feed Additives to Mitigate Methane Emission and Enhance Nutrient Utilization in Cattle.
Mr. K. B. Vedamurthy	Dr. J. P. Dhaka (Dairy Economics)	Economic Analysis of Institutional Credit for Farming in Shimoga Milk Zone of Karnataka.
Ms. Ruokuobeinuo Huosha	Dr. Sujata Pandita (Animal Physiology)	Immunomodulatory Effects of Nitric Oxide on Blood Lymphocyte Functions <i>in vitro</i> and its Relation to Plasma Hormone Levels during Pre and Postpartum period in Murrah Buffalo.
Ms. Kanika Pawar	Dr. D. K. Thompson (Dairy Technology)	Formulation of Diabetic Dietary Supplement.
Mr. Biplob Kumar Roy	Dr. Shiv Prasad (Livestock Production & Management)	Body Condition Score in Relation to Certain Physiological and Performance Parameters of Sahiwal and Karan Fries Cows.
Ms. Saroj Rai	Dr. M. L. Kamboj (Livestock Production & Management)	Evaluation of Murrah Buffalo Performance and Milk Quality under Organic and Conventional Production System.
Ms. Radha Rani R.	Dr. Shiv Prasad (Livestock Production & Management)	Studies on Soya Maize based Milk Replacer and Ruminal-Fluid Inoculation on Productive Performance of Crossbred Calves.

TRANSFER OF TECHNOLOGY

Krishi Vigyan Kendra (KVK)

Training Programmes

During the period under report, in all 29 training programmes (On-campus and Off-campus & training-cum-visits) on different aspects of dairy production and processing, crop & vegetable production, vermiculture, bee-keeping and home science were organized in which 782 farmers, women, rural youth and extension functionaries participated.

Out of the total courses, KVK organized 14 sponsored training programmes on Scientific Dairy Farming for 425 farmers rural youth and extension functionaries. KVK also organized 5 exposure and study visits for 107 farmers and farm women from different districts of Uttar Pradesh and Himachal Pradesh states.

Animal Health Management Activities

Various Animal Health Management activities were organized through Stockman centers in adopted villages of KVK. At these centers, 298 cattle and 232 buffaloes were artificially inseminated and as a result 309 calves were born. Besides these, 15 animals were treated, 19 calves were dehorned and 9 animals were given infertility treatment.

KVK Field Activities

- During the Rabi season 2010-11, six hectare area was allotted under oilseed and four hectare area was under pulse crops. KVK had selected 15 farmers for oilseeds, Mustard and 10 farmers for pulse, gram crops. Total 25 demonstrations were organized in various villages of Karnal district.
- Wheat variety DBW-17 and HD-2894 were used on 21 demonstration plots covering 8.45 hectare area under irrigated conditions.
- Three on farm trials on Berseem in 4.8 ha. area using variety Mescavi, BL-42 and HB-1 and 5 on farm trials on wheat in 5.6 ha. area using variety HD-2894, HD-2851, HD-2932, WR-544 and DBW-17 were arranged in different villages of Karnal district.

Women Empowerment Day

- Krishi Vigyan Kendra in collaboration with Rashtriya Yuva Sangthan (NGO) celebrated Women Empowerment Day on 9th March, 2011 at village Dhakwala of district Karnal. Deputy Commissioner Karnal was the Chief Guest of the function. About 500 women from twelve villages attended the function. KVK also put up an exhibition to depict its various activities.

Commercialization of Low Cholesterol Ghee Technology



Low -Cholesterol ghee Control ghee

- ▲ NDRI - Karnal has developed a process for preparation of Ghee with reduced level of cholesterol by 75-80%
- ▲ The technology for production of Low Cholesterol Ghee has been transferred to M/s KWALITY DAIRY (India) LIMITED through NRDC, New Delhi
- ▲ The Consideration amount Rs.50 Lac. one time payment and royalty @ 1.5% on the total production/sale of the product for ten years.

Popularization, Awareness Programmes and Technology Transfer of Newly Developed Composite Dairy Foods- A Success Story

- ▲ Entrepreneurship development campaign was launched for transferring some of the technologies that have been developed in the field of composite dairy foods. A total 150 women were contacted and workshops were organized to promote the entrepreneurship among them with complete techno-economic feasibility and modalities of technology transfer.
- ▲ A group of 14 women all resource poor villagers with an average monthly income of Rs. 4500/- only was formed and they were trained in for the manufacture of dairy products including the value added dairy products.
- ▲ A processing unit has been established at Amritpur Kalan located near Karnal and commercial production of various composite dairy foods has been started since October, 2010.
- ▲ These women have earned a monthly turnover of Rs. 55000/- through sale of these products and generated a profit of Rs. 1000 per person monthly.

Recent Happenings

Winter School on Chemical Analysis of Value Added Dairy Products and their Quality Assurance

NDRI organized a Winter School on "Chemical analysis of value added dairy products and their quality assurance" from 11th - 31st January, 2011 sponsored by Education Division of Indian Council of Agricultural Research, New Delhi. During inaugural function, Dr. A. S. Bawa, Director, Defense Food Research Laboratory, Mysore highlighted the emerging food technologies for the value addition of foods. Dr. A. K. Srivastava, Director and Vice-Chancellor, NDRI, in his presidential address emphasized the need for the development of designer foods for the targeted group such as children, pregnant women, lactating mothers, elder generation, diabetic people etc. He further added that as the demand for the value added dairy foods is increasing, so is the requirement for developing analytical methodologies for assuring the consumer about the health claims.

The valedictory function was organized on 29th January, 2011. Dr. R. C. Sobti, Vice-Chancellor, Punjab University Chandigarh gave away the training certificates to the participants.

International Conference on Frontiers in Reproductive Biotechnology

A three day International Conference on Frontiers in Reproductive Biotechnology (FRB) and 21st Annual Meeting of the Indian Society for the Study of Reproduction and Fertility (ISSRF) was inaugurated on 9th February, 2011 at NDRI, Karnal by His Excellency Governor of Haryana, Shri Jagannath Pahadia. Around 350 delegates from India, USA, New Zealand, Germany, Italy, Japan, Sweden and other countries



Ceremonial Lamp being lit by His Excellency Governor of Haryana, Shri Jagannath Pahadia

participated in the conference. Sh. Pahadia said that India is facing new challenges in Agriculture sector and country has to have the second green revolution in which the livestock specially the Dairy Sector can play a pivotal role. He said that India has to focus on production of the quality food products so as to provide better nutrition and good food to the Indian people and world at large. He also visited the cattle yard and evinced great interest in Garima and other cloned buffalo calves.

Dr. S. L. Goswami, Joint Director (Res.) of NDRI highlighted various achievements of the Institute. Prof. S. S. Guha, Dr. C. P. Puri and Dr. M. L. Madan were conferred the life time achievement awards by the Society.

Dr. D. Sundaresan Memorial Lecture

Dr. Mangala Rai, Former Secretary, Department of Agricultural Research and Education (DARE) & Director General, ICAR, New Delhi delivered Dr. D. Sundaresan Memorial Lecture 2011 at NDRI on 17th February, 2011. Dr. Mangala Rai said that continuous seed and breed improvement and their complimentary co-evolution would be essential for sustainable agriculture production intensification and it is a urgent need of today to think seriously on evolving newer technologies.

Dr. Rai quoted that leguminous plants and microbes fix 44-66 million tones of nitrogen annually which is nearly 50% of the total nitrogen used in agriculture and added that globally, only 3.0 billion hectares of land is irrigated out of the total water available, 70% is used in agriculture which is likely to reduce further due to its other pressing usages and stressed that the agro-ecosystem must evolve in such a way that all such vital services continue to be received on a long term sustainable basis.



Dr. Mangla Rai, Former Secretary DARE & DG, ICAR delivering Dr. D. Sundaresan Memorial Lecture

Dr. B. Mishra, Vice Chancellor, Sher-e-Kashmir University, Agric. Sci. & Technol., Jammu, presided over the memorial lecture.

Presentation of Academic Achievements and Innovations in Teaching

The Heads of Divisions of NDRI presented the innovations and significant achievements made in the field of education/research and consultancy for the period 2009-10 during Academic Celebrations on 16th February, 2011 before a panel of experts. The panelsits included Dr. J. M. Dave, Dr. R. Sahai and Dr. Raj Vir Singh. The faculty and students participated in the deliberations.

9th Convocation of NDRI Deemed University

NDRI (Deemed University), Karnal had its 9th Convocation on 19th February, 2011. On this occasion, the degrees of Bachelor of Technology, Masters of Technology, Veterinary Science, Science and Doctor of Philosophy were conferred upon the students of NDRI Deemed University.

Padam Bhushan Prof. R. B. Singh, Hon'ble President, National Academy of Agricultural Sciences graced the occasion as the Chief Guest and gave away the degrees and delivered the Convocation Address. The function was presided over by Sh. Ashok Sinha (IAS), Secretary, Ministry of Food Processing Industries, Govt. of India, New Delhi. The grand ceremony was solemnized in the august presence of many luminaries in the area of Animal Science Research and Education such as Dr. B. Mishra, Vice Chancellor, SKUAST, Jammu; Dr M. L. Madan, Former, DDG (AS) ICAR; Dr. M. P. Yadav, Former Director, IVRI; Dr. B. B. Maullick, Former Vice Chancellor, West Bengal University of Animal Sciences and Fisheries; Dr Sushil Kumar, Former Director, NDRI and distinguished members of the Board of Management and Academic Council of NDRI.

On this momentous occasion, Dr. A. K. Srivastava, Director of the Institute informed that NDRI is again on world map with birth of 'Garima-II' cloned buffalo calf originated from embryonic stem cell and 'Shrestha' cloned buffalo calf produced from ear somatic cells using hand guided cloning technique. Under the aegis of National Agricultural Innovation Project, NDRI is taking lead on research on stem cells, cloning, nanoparticles, functional and probiotic foods, e-learning courses and buffalo reproduction. Recent research at the Institute has resulted in production of herbal ghee, fibre rich dairy foods, acido-bifidus probiotic dahi and the methods for nanoparticle preparation, aflatoxin M1 detection and test for detection of synthetic milk. On this occasion, Dr. Harjit Kaur, Dr. Sumit Arora, Dr. A. K. Singh,

Dr. R. K. Malik, Dr Y. S. Rajput and Dr. Avtar Singh were conferred Alumni Association Awards for their outstanding research work.

A total of 19 B. Tech., 81 Masters and 32 Doctoral degrees were awarded. The Director's Gold Medal was awarded to Geetika Thakur, Yathis HM, Ata-UI-Munim Tak and Nisha Saini for securing highest OGP. The best Ph. D thesis award was earned by Mr. Raj Kumar Duary, Yajuvender Singh and K. B. Vedamurthy and best M. Sc thesis awards were earned by Nidhi Yadav, Sandeep Kumar and Ata-UI-Munim Tak.

National Training Programme on Databases and Softwares for Analysis of Animal Genetic and Breeding Data

A three-week National Training Programme was organized under the aegis of Centre of Advanced Faculty Training (Animal Genetics & Breeding), NDRI Karnal from 10th -30th March, 2011. It was inaugurated by Dr R. K. Sethi, Director, Central Institute of Research on Buffaloes, Hisar.

National Science Day Celebrations

NDRI organised "My Idea" competition to inculcate the spirit of innovation and creative thinking amongst its students on the occasion of National Science Day on 28th February, 2011. Presentations of the best ideas were made by the award winning students. Dishant Malik, Purushotam Inder, Nandini Salaria, M. Jahirudin, Salaria, Subrata Haiti and Chandan Kumar were given the cash prizes and Merit Certificates on this occasion.

International Training Programme on Hands on Training on Stem Cell Research for Quality Animal Production

One of the objectives of the National Agricultural Innovation Project (NAIP) under component-I is learning and capacity building through both National and International trainings in frontier areas of agricultural sciences.

International training programme on Stem Cell Research organised from 17th – 30th March, 2011 aimed at imparting hand on training on various techniques like, *in vitro* embryo production, establishment and characterization of embryonic stem cells, embryo production through handmade cloning using embryonic stem cell as donor cell in buffalo and mouse embryonic fibroblast feeders and flow cytometry etc. For this training, a foreign expert Dr. Franklin D. West from University of Georgia, USA was faculty for imparting training to the participants for ten days besides four guest faculty and core faculty.

National Training Programme on Recent Techniques in Proteome Analysis

Animal Biotechnology Centre organized "National Training Programme on Recent Techniques in Proteome Analysis" from 10th - 30th March 2011. The training programme was sponsored by NAIP, ICAR as a part of the activity under the ongoing NAIP sub project entitled "Analysis of Mammary Gland Transcriptome and Proteome during Lactation and Involution in Indigenous Cattle and Buffalo for Identification of Probable Mammary Biomarkers".

Winter School on Technological Advances in Novel Dairy Foods

Winter School on "Technological Advances in Novel Dairy Foods" was organised from 1st – 21st March, 2011.

Advance Course in Faculty Training on Advances in Processing and Quality Assurance of Dairy Foods

Centre of Advanced Faculty Training (CAFT) at NDRI organised Course in Faculty Training on Advances in Processing and Quality Assurance of Dairy Foods from 22nd March 11th April 2011.

DISTINGUISHED VISITORS

- 26-27.1.2011 Six member delegation from Ethiopian, Institute of Agricultural Research, Ethiopia.
- 16.02.2011 Eleven Member delegation from Gay Lea Foods Co-operative Limited, Canada.
- 17.3.2011 Six member delegation from Life Science and material Sciences, Netherlands led by Sh. Sanjay Kumar Bhattacharjee, Market Development Manager, Dairy and Infant Nutrition, South Asia:
- 23.03.2011 Delegation from Ethiopian of Agricultural Research, Ethiopia. First: High Level Management Group and Pastoral Agro-pastoral Research group.

VISITS ABROAD

- **Dr. B. C. Ghosh**, Principal Scientist, SRS, Bangalore availed Australian Endeavour Executive Award at Victoria University, Melbourne, Australia.
- **Dr. Rajesh Kumar**, Sr. Scientist, Dairy Chemistry Division visited Dublin Institute of Technology, Ireland as Visiting Professor under Erasmus Mundus programme for teaching and research guidance to the International students of European Masters Degree in Food Science and Nutrition from 14th Feb. to 25th March, 2011.

- **Dr. Sumit Arora**, Sr. Scientist, Dairy Chemistry Division got training in the area of "Application of extrusion technology for composite dairy foods" under NAIP Project entitled "Development and commercialization of composite dairy foods with enhanced health attributes" under Component-2, from 25th February to 26th March, 2011 in University of Georgia, Athens, USA.

HONOURS/ AWARDS

Dr. A. K. Singh, Sr. Scientist, Dairy Technology Division was awarded **Dr. P. G. Nair Award** (2005-09) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.

Dr R. K. Malik, Principal Scientist, Dairy Microbiology Division was awarded **Dr. N. N. Dastur Award** (2005-09) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.



Dr. R. K. Malik receiving Dr. N. N. Dastur Award

Dr. (Mrs.) Harjit Kaur, Principal Scientist, Dairy Cattle Nutrition Division was awarded **Dr. D. Sundaresan Award** (2003-07 & 2004-2008) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.

Dr. Avtar Singh, Principal Scientist, Dairy Cattle Breeding Division was awarded **Dr. D. Sundaresan Award** (2005-09) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.



Dr. Avtar Singh receiving Dr. D. Sundaresan Award

Dr. Sumit Arora, Sr. Scientist, Dairy Chemistry Division was awarded **Dr. K. K. Iya Award** (2003-07 & 2004-2008) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.

Dr. Y. S. Rajput, Principal Scientist, Animal Biochemistry Division was awarded **Dr. K. K. Iya Award** (2005-09) by Alumni Association, NDRI, Karnal on the occasion of 9th Convocation of NDRI Karnal.

Mr. Yajuvendra Singh was awarded **"Best Doctoral Thesis Award 2009-10"** (Production Group) for his Ph.D. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Dr. S. S. Lathwal).

Mr. Raj Kumar Duary was awarded **"Best Doctoral Thesis Award 2009-10"** (Processing Group) for his Ph.D. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Dr. Sunit Grover)

Mr. K. B. Vedamurthy was awarded **"Best Doctoral Thesis Award 2009-10"** (Management Group) for his Ph.D. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Dr. J. P. Dhaka)

Sandeep Kumar was awarded **"Best Masters Thesis Award 2009-10"** (Production Group) for his M.V.Sc. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Dr. T. K. Datta)

Ms. Nidhi Yadav was awarded **"Best Masters Thesis Award 2009-10"** (Processing Group) for her M.Tech. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Dr. Bimlesh Mann)

Mr. Ata-Ul-Munim Tak was awarded **"Best Masters Thesis Award 2009-10"** (Management Group) for his M.V.Sc. Dissertation during 9th Convocation of NDRI Deemed University (Guide : Mrs. Ritu Chakravarty)

Dr. Meena Malik and **Dr. S. L. Goswami** got the **"Best Poster Award"** for the paper entitled "Innovative Technologies Developed at NDRI for Sustainability in Dairy Sector" presented at the XXXIX Dairy Industry Conference held during 4th – 6th February, 2011 at the Eastern Zonal Cultural Centre, Salt Lake City, Kolkata.

The technology of **Dr. V. K. Kansal**, Principal Scientist, Animal Biochemistry entitled "A probiotic dahi for cardiovascular health, protection against cancer and improvement of immunity" presented at Regional Fair at IIT Mumbai on 24th September 2010, and then at National Fair 2010 at IIT New Delhi on 22nd November 2010, organized by Confederation of Indian Industries (CII), Department of Science & Technology-Government of India & Agilent Technologies, was awarded as one of the ten best technologies out of 890 presented at National level.

Dr. R. S. Gandhi, Head, Dairy Cattle Breeding Division

has been nominated as Member, Institute Management Committee, NBAGR Karnal for a term of three years w.e.f. 13.12.10. He has also been elected as Vice-chairman of Indian Dairy Association (North Zone) for a period of three years w.e.f. 01.01. 2011.

Dr. Avtar Singh, Principal Scientist, Dairy Cattle Breeding Division received **"Second Best Paper Award"** for the paper entitled "Dairy cattle crossbreeding in India" published in *Indian Dairyman* for the year 2009 in the "Technical Category" on 6th February, 2011 at Kolkata.

Dr. B. C. Ghosh, Principal Scientist, SRS, Bangalore got the **"Best Paper Award"** for the paper entitled "Preparation and properties of chhana sweets" published in the "Commercial Aspects Area" in the *Indian Dairyman* for the year 2009. The award was presented at 39th Dairy Industries Conference from 4th -6th Feb., 2011 Kolkata.

Vyawahare A. S., Pankaj Madariya and Jayaraj Rao K. got **"Second Best Poster Paper Award"** for their paper "Application of Computer Vision System in Colour Evaluation of Kalakand" presented at 39th Dairy Industry Conference from 4th-6th Feb., 2011 Kolkata.

Prabhakar Padgham, Bimlesh Mann, Rajesh Kumar, Prerna Saini and Anuradha Kumari got **"Second Best Poster Presentation Award"** for their paper entitled "Biofunctional Properties of Traditional Indian Lassi Prepared from Buffalo Milk" presented in the XXXIX Dairy Industry Conference held at Kolkotta from 4th–6th Feb. 2011.

Arora S., Singh V. P., Sharma V., Wadhwa B. K., George V., Singh A. K. and Sharma G. S. got **"JFST Best Paper Award"** for the paper entitled "Analysis of sucralose and its storage stability in burfi." for the year 2009, published in *J. Food Sci. & Technol.* 2009, 46(2): 114–117. Presented in the Annual Award Ceremony held on 25th Jan 2011 IFTTC auditorium, CFTRI, Mysore.

PERSONALIA

Promotions/Joinings

- Sh. Vishal Acharya, AF&AO joined at NDRI, Karnal after transfer from CSSRI, Karnal on 14.03.2011.
- Dr. K. P. Ramesha promoted from Senior Scientist to Principal Scientist w.e.f 03.12.2008.
- Dr. Mukund A. Kataktaaware promoted from Scientist to Scientist (SS) w.e.f 26.02.2008.
- Dr. P. K. Roy, Senior Scientist (LPM) promoted as Principal Scientist w.e.f 27.07 2008 and took over as Officer Incharge, ERS NDRI, Kalyani w.e.f 15.02.2011.

Retirement

- Sh. Ram Prit Shah, T-5 retired from Council service w.e.f 31.1.2011
- Mr. Ramesh Chander, T-5 retired from Council service w.e.f 31.03.2011
- Mr. Inder Lal, T-5 retired from Council service w.e.f 31.03.2011

- Ms. M. Jayalakshmi, PS retired from Council service w.e.f. 28.2.2011

Transfer

- Ms. Sallam, P, Scientist (AS&PE) relieved from NDRI w.e.f. 27.12.2010 to join at Directorate of Floriculture Research, New Delhi

REGIONAL STATIONS

Southern Regional Station, Bangalore

TRAINING PROGRAMMES

- Ten days Training on 'Preparation of Ice-cream and Indigenous Dairy Products' was conducted from 17.01.2011 to 28.01.2011 for eight candidates.
- One week Training was conducted on 'Commercial Dairy Production' from 24.01.2011 to 29.01.2011 for five candidates.
- Five B.Tech Students of Dairy Technology College, Pusad received In-plant training for period of four months from 07.02.2011 to 04.06.2011.
- Eighteen students of Pre-University College, Malladihalli, Chitradurga Dist., Karnataka were trained on 'Scientific Dairy Farming Practices' from 21.02.2011 to 26.02.2011

EXTENSION ACTIVITIES

- During the period under report, 213 visitors in six batches comprising students from various educational institutes of southern region, farmers and entrepreneurs visited the Institute. The visitors were taken round the Station to various sections as per their needs and were explained the ongoing activities.
- Advisory services / technical advice was rendered to six clientele during personal visits to the Station, on training programmes on scientific dairy farming aspects, feasibility of dairy projects, availability of high yielding dairy animals and training programmes for farmers and farmwomen. Extension literature on dairy production and processing was distributed to the needy clientele groups, visitors and trainees during their visits to the Institute.

- Participated in JKM Mela 2011 (Januvaru, Kukkuta and Matsysa Mela) held at Dairy Science College, KVAFSU, Hebbal, Bangalore from 12th-13th February, 2011 organized by KVAFSU, Bidar.
- Participated in exhibition showcasing the technologies developed by ICAR Institutes for the benefit of the farming community. The programme under NAIP Project "Mobilizing Mass Media support in sharing Agro Information" was organized by IIHR held at NIANP, Bangalore on 26th February, 2011. NDRI stall depicted innovative & educative information on dairy production & processing technologies, indigenous breeds of South India and traditional dairy products.



NDRI Stall at Mobilizing Mass Media NAIP Project Meet for farmers & Media

- Regular weekly visits were made by the extension team to the adopted villages under Rural Extension Programme for the benefit of the clientele group in the adopted villages. Necessary dairy extension services were provided in the villages visit.

National Training Programme on Intellectual Property Rights

National Training on "Intellectual Property Rights for Animal Scientists" sponsored by NAIP New Delhi was inaugurated on 9th March 2011. Dr R. N. Sreenivas Gowda, Former, VC of KVAFSU, Bidar, Karnataka inaugurated the training programme and released

the Course Compendium. Dr. R. Nagarcenkar, Former Director, NDRI was the Guest of Honour. Dr. S. L. Goswami, Joint Director (Research) NDRI, Karnal presided over the function and delivered the presidential address. Dr. Mukund Katakaware, presented the vote of thanks. Twenty two trainees from different parts of the country attended the programme.

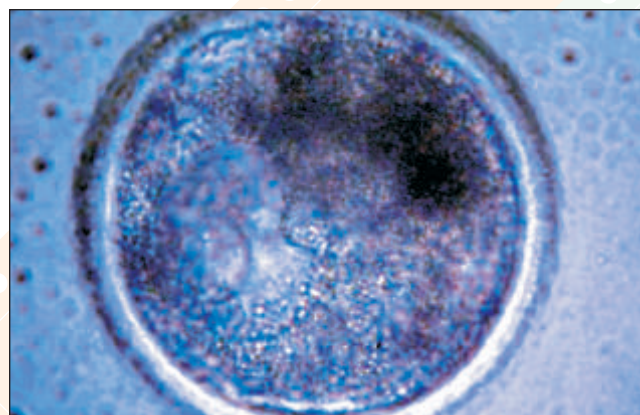
Eastern Regional Station, Kalyani

Research News

Development of Cattle Blastocyst after *In Vitro* Maturation and Fertilization of Oocytes using Oviductal Secretory Proteins as Media Supplement

(S. K. Das, A. K. Mohanty, A. Santra and A. Chatterjee)

Ovaries were collected from local abattoir, Kolkata and brought to the laboratory in normal saline supplemented with streptopenicilline at 30°-35°C. COCs were isolated and washed thoroughly in washing media followed by maturation media (supplemented with cattle oviductal secretory proteins in three different concentrations ie. 10, 50 & 100 µg/ml) and incubated for maturation at 38.5° C in 5% CO₂ with maximum humidity. After 24 h of incubation, COCs were inseminated with capacitated sperm suspension and allowed for fertilization in FBO media (supplemented with cOSP). After 18 h the oocytes were washed and kept in primary culture media (supplemented with cOSP) for cleavage. After 40-42 h, the cleaved oocytes were placed in replacement media (supplemented with cOSP) for further development. The media was replaced after every 24 h with fresh replacement media. The



Cattle blastocyst produced through IVMFC

cleavage rate was observed as 40.9%, 45.58%, 24.24% and 30.0% at cOSP concentrations of 0, 10, 50 and 100 µg/ml, respectively. The blastocyst stage (Fig.) was developed in the control and 10 g/ml group with the 3.7% and 12.90%, respectively.

IRC Meeting held at ERS Kayani

IRC meeting was held at ERS, Kalynai on 4th March, 2011 under the chairmanship of Dr. S. L. Goswami, Joint Director (Res.). The new project proposals and the final progress of the completed projects were discussed. On this occasion, a publication entitled "ERS-NDRI – An Overview" was also released.

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