ICAR-NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL

NDRI News

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From the Director's Desk

Ethiopian delegation visiting Animal Breeding Research Centre, NDRI, Karnal

In this issue...

Globally, in dairy sector bull infertility is a major issue and it is the right time that research should be undertaken to determine the etiology and reasons for the gradual decline in male fertility. It is well understood that several factors can contribute to fertility problems, and an individual case may have a single cause, several causes, or in some cases no identifiable cause. It is generally stated that about a third of infertility problems are due to female infertility, another one third are due to male infertility and in the remaining cases, infertility affects both partners or the cause is unclear.

Although the extensive study on infertility in livestock with large sample size is limited, the available information suggests that the magnitude of infertility is gradually and continuously increasing. There is a long history for associating the greater milk production with reduced reproductive performance in dairy cattle. Over the past 50 years, the percentage of estrus cows that stand to be mounted has declined from 80% to 50% and the duration for detection of estrus has reduced from 15 h to 5 h. This leads to difficulties in identification of animals in estrus and also poses uncertainties in deciding proper timing of insemination. Besides issues of infertility in female cows, the quality of semen with which they are inseminated assumes much significance for achieving higher conception rates. It is noted and widely acknowledged that on an average, every alternate female or more do not conceive with a single insemination. Although females contribute more or less equally to the success/failure of conception through AI, the male assumes much significance in AI, as not all the males yield similar quality of semen and conception rate, and using semen from a sub-/in-fertile bull leads to colossal loss to the farmers.

In crossbred bulls, infertility/sub-fertility is the major problem as compared to pure-bred bulls. In a study conducted at NDRI, it was observed that "acceptable quality semen producing ability" has decreased, over a period, from grandsire through sire to male progeny and the exotic genetic level of CB bull also influenced the semen production ability. The ejaculate rejection rate, owing to poor initial semen quality, is also higher in crossbred bulls as compared to either indigenous cattle or buffalo bulls. However, the reason for production of low quality semen in crossbred bulls, even during the best breeding season, has also not been identified yet. Generally, breeding bulls are selected based on breeding soundness evaluation (BSE) that involves andrological evaluations including routine semen analysis. But also among those bulls that qualified all the BSE examinations, 20-25% differences in pregnancy rates were observed. This clearly indicates that the present system of bull selection

and semen evaluation does not provide ultimate indication about fertility status of bulls. Further, these low performing bulls can only be identified at a very later stage, after large scale AI and subsequent feedback from the field, which is really hampering the genetic progress and economic loss. In spite of enhanced research in this direction, the identification of precise and universal fertility markers in bulls remains elusive.

To maintain the chain for supplying the high quality male germ plasm to end users, it is high time to revisit the BSE methods and to incorporate advanced techniques for precise evaluation of frozen-semen. With the advent of fluorescent microscopy, flow cytometry and advances in molecular biology, now it has become possible to evaluate the spermatozoa in terms of specific functions that are well related to fertility. Detailed studies are also required to correlate several sperm activities with different fertility indices. This would help us to arrive at a battery of tests that could be used to fairly assess the sperm fertility. On the other hand, the need of the hour is to identify precise biomarkers to determine the fertility status of crossbred bulls. The comprehensive analysis of composition of spermatozoa and seminal plasma in cross-bred, exotic and Zebu bulls might reveal some functionally important biomolecules and physiological mechanisms involved in fertilization process, which may help us to identify some factors associated with sub-fertility in crossbred bulls. Basic understanding of testicular biology and spermatogenesis coupled with use of novel genomic, transcriptomic, proteomic, and metabolomic techniques may hold the key to develop tools to identify the superiority of a bull over others, at young age, in terms of future semen production ability and fertility, once identified. Moreover, these biomarkers along with routine semen analysis techniques may check huge wastage of resources and time imposing by the sub-fertile bulls.

Srivastava

(A. K. Srivastava)

RESEARCH

Two-Stage Test for Detection of *E. coli* in Milk

(S. Kadyan, N. Kumar, M. Balhara, S. Kouser, and H. V. Raghu)

Two-stage test has been developed for detection of *E. coli* based on the principle of targeting "enzyme substrate reaction for specific marker enzyme (s) to release free chromogen in stage-1 which can be visually detected by a colour change after 12.0 ± 1.0 h of incubation in *E. coli* selective medium (Fig. 1). In stage-2, using specific enzyme substrate mixture, confirmation of *E. coli* can be achieved within 3.0 ± 0.15 h as shown in Fig. 2. The developed test can be used in dairy industry for routine detection of *E. coli* in milk and milk products for regulatory compliance.

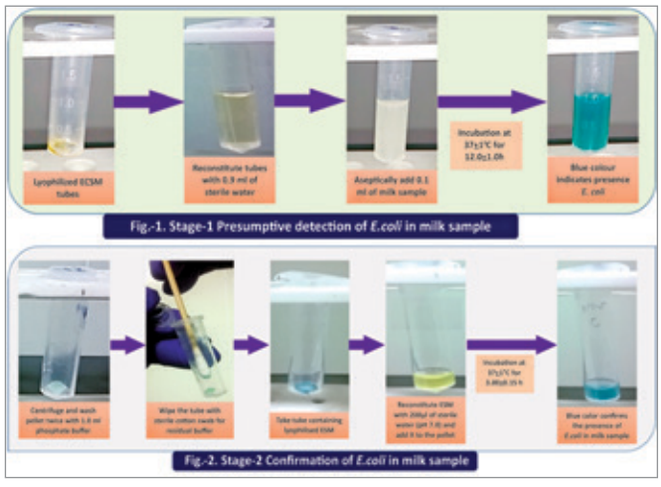


Fig.-1. Stage-1 Presumptive detection of *E.coli* in milk sample

Fig.-2. Stage-2 Confirmation of *E.coli* in milk sample

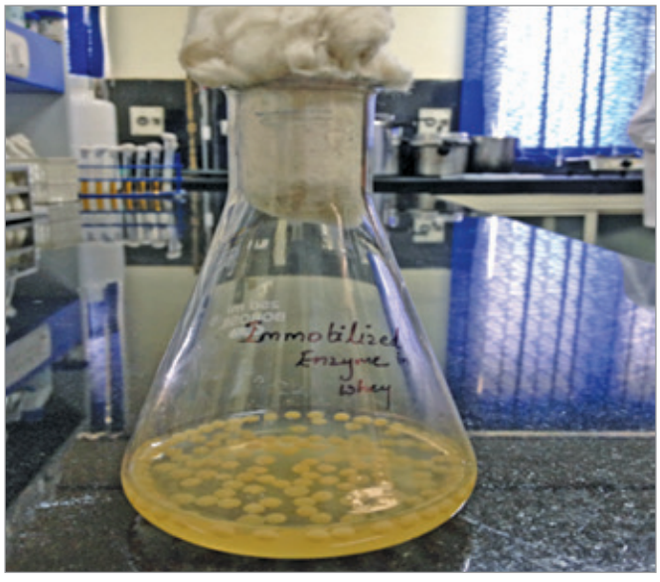
Novel Features

- Rapid detection within 15.0 ± 1.15 h as against 3-5 days protocol in conventional method (IS: 5887 Part-1: 1976).
- Selective inhibition of contaminants like *Salmonella*, *Shigella*, *Citrobacter*, *Enterobacter*, *Proteus*, *Serratia*, *Yersinia*, *Staphylococcus aureus*, *Bacillus cereus.*
- Wide scope of application in raw, pasteurized and dried milks for routine as well as for regulatory standard compliance.
- Lab validation of developed kit with IS: 5887 Part-1:1976 using raw, pasteurized and dried milks.

Whey Utilization for β-galactosidase and Ethanol Production

(Anusha Kokkiligadda, Arun Beniwal, Priyanka Saini and Shilpa Vij)

Whey is a valuable by-product of the dairy industry which has prospects of being used as a source of biofuel. The lactose present in whey is considered as an environmental pollutant and its utilization for fuel using *Saccharomyces cerevisiae*, which may be effective for whey bioremediation. The dairy yeast *Kluyveromyces marxianus* has the ability to utilize the lactose as the major carbon source for the production of enzyme. Five strains were tested for the production of the β-galactosidase using whey. The maximum β-galactosidase activity of 1.74 IU mg^{-1} dry weight was achieved in whey using *K. marxianus* MTCC 1389 under optimized conditions (37°C, pH 7, 100 rpm and 2% inoculum). β- galactosidase was further immobilized on chitosan macroparticles and exhibited excellent functional activity at 35°C. It could hydrolyze 89% of lactose present in concentrated whey and further retain its 89% of the enzymatic activity after 15 cycles of reuse. Finally, two distinct matrices with β-galactosidase immobilized on chitosan and *S. cerevisiae* on calcium alginate were used for the production of ethanol from concentrated whey (100g/l). The maximum ethanol titer of 28.9 g/l was achieved during fermentation at 35°C. The outcome generated from employing two separate matrices will be applicable for the future modelling using engineered *Saccharomyces cerevisiae* in scale up studies.



Ethanol production by immobilized Saccharomyces cerevisiae cells and β-galactosidase

Lateral Flow Assay for Detection of Oxytetracycline Antibiotics Residues in Milk

(Laxmana Naik, Rajan Sharma, Bimlesh Mann, Y. S. Rajput, and Kiran Lata)

A rapid and semi-quantitative lateral flow assay (LFA) was developed to screen the oxytetracycline (OTC) antibiotics residues in milk samples. In this study, a competitive immuno assay format was established. Colloidal gold nanoparticles (GNP) were prepared and used as labelling material in LFA. Polyclonal antibodies were generated against OTC molecule (anti-OTC), purified and the quality was assessed by enzyme linked immuno sorbet assay. Membrane materials components required for LFA for milk system were optimized. GNP and anti-OTC stable conjugate preparation method was standardized, and then these were placed over the conjugate pad. OTC coupled with carrier protein was placed over the test line; species specific secondary antibodies were placed on the control line of the membrane matrix. The assay was validated by spiking OTC to antibiotic free milk samples and results could be accomplished within 5 min. without need of any equipment.

The visual detection limit was 30 ppb. The developed LFA can be used as rapid screening method at farm to fork level.

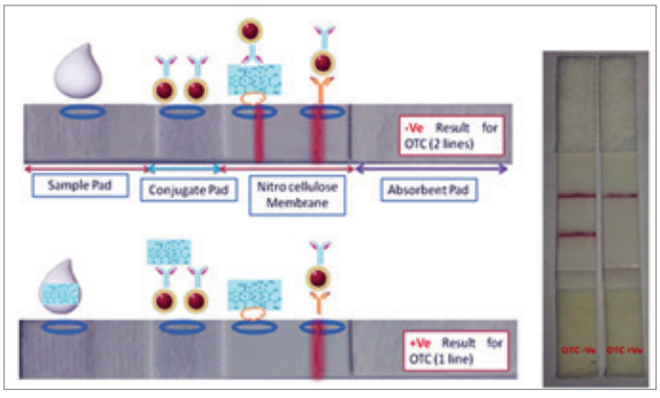


Fig: Lateral flow assay working principle for detection of oxytetracycline in milk

Technology of Cheese Dip

(Venus Bansal, S. K. Kanawjia, Yogesh Khetra)

Cheese, a fermented milk product is being produced and consumed worldwide for its inherent nutritional and health benefits. Cheese dip, which is a variety of processed cheese, has ample potential in Indian market owing to its numerous end use applications. The quality of cheese dip is influenced by many factors like age of cheese, type of cheese, processing and storage conditions, etc. The sensory and functional attributes (viscosity, texture, mouthfeel, etc.) of cheese dip is also affected by the type of ingredients used for manufacturing process. In addition to cheese; a unique combination of emulsifying salts are added to stabilize the emulsion alongwith the addition of hydrocolloids that tend to improve the consistency and shelf life of the cheese dip. However, cheese lacks the functional properties of whey proteins, which are well known for their high nutritional value and functional properties in food products. Therefore, the technology for the manufacture of cheese dip was developed using sodium caseinate, WPC-70, Cheddar cheese and milk fat with the addition of unique combinations of stabilizer and emulsifiers. Further, to enhance the palatability of cheese dip, four different spices were tried at different levels. The process developed for the manufacture of cheese dip has great industrial potential.

TECHNOLOGIES COMMERCIALISED

Institute Technology Management Committee (ITMC)

Institute Technology Transfer Committee chaired by the Director, NDRI is the prevailing committee for Patent filing and Technology commercialization at Institute level. During the period April to June 2015, a total of 5 technologies were commercialized to industries and 1 patent was filed. The details are as follows.

Technologies Commercialized by NDRI in the First Trimester (1.04.2015 to 30.06.2015)

Sl. No	Name of the Firm	Date	Commercialized Technology	Price in INR
1.	**Abis Dairy Farm** (A unit of Abis Hatchery Pvt. Ltd.) Indamara village, Pendri Post Rajnandgaon Dist. Chattisgarh	19.05.2015	Technology for the preparation of Improved Textured Dahi	1,50,000
2.	**Abis Dairy Farm** (A unit of Abis Hatchery Pvt. Ltd.) Indamara village, Pendri Post Rajnandgaon Dist. Chattisgarh	19.05.2015	Whey Jaljeera Drink	1,00,000
3.	**Abis Dairy Farm** (A unit of Abis Hatchery Pvt Ltd) Indamara village, Pendri Post Rajnandgaon Dist. Chattisgarh	19.05.2015	Misti Doi with fast acidifying high sugar tolerating lactic culture	1,60,000
4.	**Abis Dairy Farm** (A unit of Abis Hatchery Pvt Ltd) Indamara village, Pendri Post Rajnandgaon Dist. Chattisgarh	19.05.2015	Bajra lassi	1,50,000
5.	**Bhandari Chemical Pvt. Ltd.** C-2, Blue Heaven, Opp. Meghalaya Flats, Naranpura, Ahmedabad-380014	09.06.2015	Strip Based test for Detection of Maltodextrin in Milk	1,50,000
Total Amount INR				7,10,000

12.36% tax has also been paid by Abis Dairy Farm and 14% tax has been paid by Bhandari Chemical Pvt. Ltd.

Technologies Commercialized

1. MoU exchange between **NDRI** and **Abis Dairy Farm** for the technology of "Whey Jaljeera Drink"
2. MoU exchange between **NDRI** and **Abis Dairy farm** for the technology of "Misti Doi with fast acidifying high Sugar Tolerating Lactic Culture(S)"
3. MoU exchange between **NDRI** and **Bhandari Chemical Pvt. Ltd.** for the technology of Strip Based test for Detection of Maltodextrin in Milk.

PATENT FILED

Aptamer Specific for Cefquinome. (Rajan Sharma, Amit Kumar Barui, Y. S. Rajput, Bimlesh Mann), (1775/DEL/2015).

EXTENSION

DAIRY EXTENSION DIVISION

Dairy Education at Farmers' Door

Dairy Extension Division organized the ongoing Extension Education Programme "Dairy Education at Farmers' Door" to disseminate dairy production and processing technologies among farming community. Under this programme, a team of NDRI scientists consisting of subject matter specialists from production, processing and management group visited a new cluster of villages viz. Dhamanheri, Dungro and Dipo in Karnal district on 2nd Saturday of every Month and obtained the feedback from the participating farmers. The points of interaction were:

- **Ecto and Endo-parsitic Problem:** Tick infestation was a serious problem in these villages. However, since this problem had also been reported by the preceding teams under this programme, due action had been taken by the Dairy Extension Division and suitable treatment had been administered on the affected animals.
- **Balanced Feeding of Dairy Animals:** The farmers were educated about the balanced feeding of animals with special attention at the time of achieving peak yield.
- **Service Period:** It was suggested to the farmers for providing balanced nutrition to their animals, so that service period can be minimized.

Field/Farm Technician (FFT) Activity

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

Activity Conducted in Adopted Villages from April-June, 2015

Sl. No.	Activities Conducted	Nos. of Cases
1	A.I. in cows	49
2	Conception rate	40 %
3	A.I. in buffaloes	33
4	Conception rate	35 %
5	No. of crossbred calves born	16
6	No. of buffalo calves born	15
7	General treatment	18

A total number of 6 Veterinary Camps and 101 cases were treated for various veterinary ailments. Special attention was given to improve the productive & reproductive performance of dairy animals.

Kisan Sangosthies

A total number of 6 Kisan sangosthies were organized at village level and following topics were discussed in detail.

- Control of ecto-parasite infestation.
- Role of mineral mixture in animal diet.
- Care and management of lactating animals.
- Heat symptoms and correct time of insemination of dairy animals.
- Clean milk production practices in rural areas.
- Heat stress management.

Empowerment of Women and Mainstreaming of Gender Issues

Ten women empowerment training courses and campaigns were organized with the objective to create awareness in the field of dairying and home science and also impart skills in these areas so that farm women could generate more income from dairying and maintain healthy atmosphere in their respective families. By these programmes, a total number of 143 farm women were trained.

Educational Visit and Tours

A total number of 898 visitors (Students & Faculty) from 21 Colleges/Institutions/Universities visited the Institute which was coordinated by the Division. The groups were sensitized about the different research, teaching and extension achievements and facilities available in the Institute.

Collaborative Extension Work with IARI

NDRI demonstrated the potential of IARI paddy variety PUSA-1509 under the National Extension Programme of IARI at three villages of Karnal District. The programme benefitted the farmers by providing them newer technologies. Ten farmers were provided with seeds of paddy variety PUSA-1509. The suitability and profitability of the variety was compared with existing varieties adopted by the farmers under the field conditions. The average yield was observed 23.22 quintal/ acre and benefit to cost ratio was 5.03. Farmers were satisfied with the variety and wanted to cultivate the same variety in the kharif season of 2015-16 also. Team of scientists from NDRI distributed paddy seeds (variety PUSA-1509) to five farmers of Subri village of Karnal district on 4th June, 2015.

World Environment Day Celebrations

Dairy Extension Division organised the World Environment Day on 3rd June, 2015 at Dilawara and Suhana villages in Karnal district adopted under NICRA project of NDRI on the theme "Seven Billion Dreams, One Planet, Consume with Care". Scientists, research scholars and students participated in the event. In both villages, meetings were organised with farmers, farm women and village youth explaining the importance of the world-wide celebration of the day on 5th June, giving emphasis on maintaining clean environment, healthy lifestyle and sustainable livelihood. Later, participants were sensitized about climate resilient technologies and approaches. The interactions were followed by tree plantations in both the villages.

Interactive Meeting with Farmers on Good Dairy Farming Practices

An interactive meeting with the dairy farmers was organized on 4th April, 2015 at Balrampur district, Chhattisgarh state. An educational multimedia module on "Good Dairy Farming Practices" developed by NDRI was demonstrated to the tribal dairy farmers. Shri Alex Paul Menon, District Magistrate & Collector of Balrampur-Ramanujganj, Chhattisgarh state in his letter dated 12th May 2015 has expressed his happiness and appreciation to NDRI for organising such a meet benefiting the tribal dairy farmers.

Strengthening Farmers Groups in Dairying

Dairy Extension Division organised an interaction meeting with farmers in Subri village on 2nd June, 2015 in which Mr. Sushil Kumar, District Development Officer, NABARD, Karnal district explained about the procedure of organising Farmers' Club to avail benefits through group approach. The Division provided the ways and means of organised dairy processing activities with men, women and mixed groups including the marketing opportunities.

KRISHI VIGYAN KENDRA

Extension Activities

- In all, 34 training programmes (On-campus, Off-campus & study-cum-visits) on different aspects of dairy production and processing, crop production,

crop diversification and home science were organized in which 1073 farmers, women and rural youth from Haryana and other states of the country were imparted trainings.

- KVK organized 12 training programmes on Scientific Dairy Farming, Clean Milk Production and Commercial Dairy Farming, in which 353 farmers and rural youth from different districts of Bihar sponsored by State Dairy Development Department, Patna were imparted trainings.
- KVK also organized 7 exposures cum study visits for 198 progressive farmers and farm women from different districts of Uttar Pradesh, Jammu & Kashmir, Rajasthan, Haryana and Himachal Pradesh.
- Various Animal Health Management activities were organized through Stockman centers in adopted villages of KVK. At these centers, a total number of 417 cattle and 271 buffaloes were artificially inseminated and 576 calves were born. Besides these, 11 animals were treated, 34 calves were dehorned and 05 animals were given infertility treatment.
- KVK organized 16 front line demonstrations at the farmers fields in different villages of Karnal district.
- KVK produced 1.40 lakh fish seed (fry size) and sold to three fish farmers apart from 4 kg of earthworm also sold to two farmers through the demonstration units of KVK.
- An exhibition of KVK activities was organized in pre-kharif Mela held at KVK Baghara District. Muzaffar Nagar (UP) on 27th June, 2015 and inaugurated by Dr. Sanjeev Kumar Baliyan, Minister of State for Agriculture, Govt of India. It was attended by about 450 farmers apart from officials from ICAR and State Governments.
- Five Social Awareness Programmes against crop residue burning were organized in different villages of Karnal district by KVK attended by 180 farmers and farm women.
- A Social Awareness Campaign week against Residue Burning culminated into event on "Mass Social Learning on Elimination Residue Burning and Promoting Direct Seeded Rice was organized on 1st May, 2015 at Village Beer Narayana, District Karnal. Dr. Alok K. Sikka, DDG (NRM) was the Chief Guest and Dr. A. K. Singh, DDG (Agri Extn), ICAR New Delhi was the Guest of Honour. Dr Rajbir Singh, ZPD Zone I, Director, IIWB, Karnal and State Officials also participated. The function was attended by more than 400 farmers and farm women.
- Dr Rajbir Singh, ZPD, Zone I, ICAR visited KVK and farmers fields in village Dabri, Jundla, Dadupur Rodan of Karnal district on 19th April, 2015 and interacted with 42 farmers and farm women.
- Two Kisan Prashan Manch progammes, one for the farmers from Bihar and other with farmers from Karnal district were organized by the KVK and Dordarshan Kisan, New Delhi did the recording for broadcasting on national network.

Dr. A. K. Srivastava, Director NDRI Addressing Scientific Advisory Meeting of KVK NDRI, Karnal

EVENTS

Sugar Free Kulfi Launched

Real fruits and dry fruits based sugar free kulfi has been developed by the scientists of NDRI, Karnal. This product is 100% natural and free from artificial colours and synthetic flavours.

Sugar Free Kulfi being Launched at NDRI, Milk Parlour

In real fruit category, five flavours have been prepared such as Mango, Cheeku, Banana, Papaya and Black Grapes and in dry fruit category, two flavours named Shahi Anjeer and Dry Fruit Karanch. A new variety having *Jayee* and chocolate flavour has been prepared for children. This product was launched by Dr. A. K. Srivastava, Director, NDRI, Karnal on 1st June, 2015 at NDRI Milk Parlour. BPD and TBI together provide six month training on "Preparation of dairy products" for unemployed youth. NDRI has allowed the trainees to sell their developed dairy products at NDRI Milk Parlour for six months. The developed products meet all the quality standards and are being prepared in the BPD laboratory under the guidance of NDRI scientists.

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

Keeping in view the expanding needs of the manpower in the area of Food Processing, a new 2 year Master's course in

"Food Science and Nutrition" has been introduced from the forthcoming academic session (2015-2016). The course offers very good employment opportunities in the area of food and health sector. Similarly, a new postgraduate course in Animal Reproduction, Gynaecology and Obstetrics has been introduced. The new academic programmes would further help in skill development by the young scholars.

NDRI Gets 34 Gir Breed Cattle to Enhance Milk Yield

NDRI has procured 34 Gir milk cattle from the ICAR-Indian Grassland and Fodder Research Institute (IGFRI), Jhansi in a bid to conserve the Gujarat breed famous for its tolerance to stress and resistance to tropical diseases.

The number of Gir breed is declining and there are only 3000 such animals in the country. It is fact that USA, Brazil, Mexico and Venezuela had earlier procured this breed from India and had doubles their milk production. In Brazil, this breed is giving 3,500 kg of milk per lactation period while it is only 1,590 kg in India.

It is the aim of NDRI to improve the next generation of this breed so NDRI would bring good quality semen from Gir hills and the forests of Kathiawar, including Junagadh. Bhavnagar, Rajkot and Amreli districts of Gujarat.

The physique of this cattle is unique as it has long ears which help it to keep away insects and files. It has a convex forehead which helps it to keep cool and long face. It is tall in comparison to other indigenous breeds. Its horns grow down and backward and it has a big hump.

A view of Gir Breed Cattle Herd at NDRI, Karnal

Sh. Ramchander Choudhary, Chairman, Ajmer Zila Dugdh Utpadak Sahkari Sangh Ltd. Ajmer, welcoming Shri Sanwar Lal Jat, Hon'ble Union Minister of State, Water Resources, Govt. of India on 18th April, 2015 at Seminar on "Strategies for Enhancing Milk Production in Rajasthan" organised in collaboration with Indian Dairy Association (North Zone) at Ajmer

Institute Research Council (IRC) Meetings

Institute Research Council (IRC) Meetings of the Institute were held on 21st to 23rd and 25th April, 2015 at NDRI Karnal, 29th April 2015 at ERS, Kalyani and 19th June, 2015 at SRS, Bangalore. A total number of 22 new research projects and 22 number of completed research projects were critically reviewed and monitored during the IRC meetings by the Chairman and Subject Matter Experts nominated by the Council as Nodal Officers (Cattle & Buffalo) from NBAGR, Karnal.

Prof. A. K. Srivastava, Director, NDRI and Chairman, IRC emphasized that the scientists must ensure that new projects being proposed are formulated keeping Vision 2050 of NDRI in mind. He emphasized very categorically that the new research project proposals should be need-based, highly focussed and formulated with due care. There is a need to completely reorganise our research activities by making them result oriented. He said that Director's Nominees should take due care at the Divisional IRC Meetings itself that there is no repetition of research.

The Chairman while outlining the research priorities for the Institute for its dynamic growth and to fulfil the challenges ahead underlined that in the Animal production system, the scientists ought to focus on genomic selection of animals; reproduction related disorders in milch animals; semen sexing; reducing the puberty age, reducing the inter-caving period and bio-marker assisted detection of subclinical mastitis and pregnancy; transgenics; nutrigenomics; enhanced bio-availability of nutrients and minerals; optimal use of damaged crop-residues in animal feed; climate change issues and suggesting region specific economical animal housing systems. Dairy processing group should focus on mechanisms for probiotics, bioactive peptides, nanoparticles and functional foods besides consolidating and upgrading the technologies evolved in the recent past.

He also encouraged scientists to seek funding of research projects from external funding agencies and reduce the number of in-house IRC Research Projects. He suggested generating data on karyotyping of all the animals maintained at NDRI herd as a part of the progeny testing programme. He underlined that the cloning programme will continue. The objective shall be to produce sufficient number of male calves of progeny tested bulls. The group must also compute the cost of cloned animal.

The Livestock Production and Management Division besides coming out with best animal housing shed for animals, must bring out with the package of dairy management practices that are simple and easily adaptable by the farmers. Low cost technologies should be developed to solve the problems of the animal husbandry by focussing on the emerging areas such as reducing the age at puberty, reducing the calving intervals and other such issues that need to be addressed for higher milk productivity.

The priority of Dairy Cattle Nutrition Division should be to compute the feed and fodder requirements of indigenous breeds and buffaloes. They should also work on balancing of ration. Dairy Cattle Nutrition Division and Dairy Cattle Physiology Division should work together for enhancing

the lactation period of Sahiwal Cow and Murrah Buffalo. The projects should not be open ended or individualistic in approach.

The objective of Dairy Chemistry and Animal Bio-chemistry Division must be to give complete profile of all types of milk of different species such as camel, goat etc. across different states of the country. He also said that there is a need to establish toxicological laboratory in NDRI. We must continue our efforts in developing newer rapid detection tests/kits for microbial contaminants. Similar efforts would also continue for detection of chemical contaminants/adulterants in milk and milk products through molecular and nano-technologies.

The Chairman further said that the important findings emanating from research should be properly compiled and disseminated through bulletins and extension literature for use by the farmers. All the guidelines in this regard should be available at NDRI website in the capsule form. Dairy Economics Statistics and Management Division should work out the cost of milk production and processing in different regions.

Dr. R. K. Malik, Joint Director (Research) thanked the Director for his very positive approach, constructive guidance and direction to the Institute research, and also encouraging the scientists for moving ahead. He also appreciated his efforts in bringing in necessary funds for carrying out the research work and building the desired infrastructure. He expressed the hope that the discussions carried out during the IRC meetings would definitely help in improving the outcome of the projects and meeting the objectives and mandate of the Institute.

Yoga Day Celebrated

Yoga Day was celebrated on 21st June, 2015 at NDRI, Karnal. A large number of people participated in this event with great enthusiasm. The methods of all yoga exercises were explained by the invited Yoga experts to the gathering.

Yoga Day being celebrated on 21st June, 2015 at NDRI, Karnal

HONOURS/AWARDS

Dr. M. S. Chauhan, Principal Scientist, Animal Biotechnology Centre and **Dr. Y. S. Rajput, Head,** Animal Biochemistry Division were awarded "**NAAS Fellowship"** whereas **Dr. Kumaresan,** Sr. Scientist, Livestock Production & Management was awarded "**NAAS Associateship"** during the Silver Jubilee Celebration of National Academy of Agricultural Science at Delhi during 2nd – 5th June, 2015.

Dr. Kumaresan receiving NAAS Associateship Award

Trainings Organized

One Day Training Programme was organised for M/s SGS India Pvt. Ltd. Gurgaon on "Advance Techniques for Rapid Detection of Pathogens, Antibiotics and Aflatoxin M1 in Milk" on 30th April, 2015 at National Referral Centre on Milk Quality and Safety, ICAR-NDRI, Karnal.

SINED (TBI) & Business Planning & Development (BPD) Unit of NDRI organized a six day entrepreneurship development programme on "**Commercial Dairy Farming"** from 22nd - 27th June, 2015. The major objective of the training was to impart knowledge to farmers, unemployed youths, entrepreneurs and industry personnel about the practical aspects of commercial dairy farming to adopt the scientific practices for maximizing the productivity and profitability. Thirty participants from 10 states attended the training. The trainees included farmers, professionals, students and businessmen.

Business Planning & Development (BPD) Unit of NDRI organized a five day entrepreneurship development programme on **"Technology of Milk and Milk Products"** for farmers of Lalukheri village from 2nd - 07th June, 2015. The major objective of the training was to impart knowledge to farmers about the practical aspects on milk & milk products processing. A total number of 10 participants attended the training.

VISIT ABROAD

Ms. Namita Rokana, Ph.D. scholar, Dairy Microbiology Division presented paper entitled **"**Impact of probiotic fermented milk formulations on amelioration of *Salmonella* infection through modulation of intestinal barrier function" at International Association for Probiotics and Prebiotics (ISAPP) Students and Fellows Association (SFA)-2015 annual meeting held at Washington DC, USA from 18th – 21st May, 2015. She participated both in oral and poster presentations.

Ms. Kiran Thakur, Ph.D. scholar, Dairy Microbiology Division presented paper entitled "Harnessing Lactobacilli for Riboflavin Production" at International Association for Probiotics and Prebiotics (ISAPP) Students and Fellows Association (SFA)-2015 annual meeting held at Washington DC, USA from 18th – 21st May, 2015. She participated both in oral and poster presentations.

DISTINGUISHED VISITORS

13.04.2015 Five member delegation of International Corporation Agency (JICA).

27.04.2015 Ten member delegation from Ethiopia.

23.06.2015 Twenty member delegation of Experts Group of Conventional & Traditional Gau Krishi Business (Farmers) Social Activist, Scientist & Technicians led by Dr. Vallabhbhai Kathiria, Chairman, Gauseva and Gaucher Vikas Board, Gujrat.

24.06.2015 Four member delegation from Kisan Advisory Board, Jammu & Kashmir led by Sh. Daljit Singh, Vice Chairman (Minister of State).

PERSONALIA

Joining/Appointments

Sh. Sachin Kumar, Scientist (Animal Nutrition) joined at NDRI, Karnal w.e.f. 01.04.2015.

Sh. Gunvantsinh Rathod, Scientist (Dairy Technology) joined at NDRI, Karnal w.e.f. 10.04.2015.

Sh. Writdhanma G. Prasad, Scientist (Dairy Technology) joined at NDRI, Karnal w.e.f. 10.04.2015

Sh. Sanket Girdharbhai Borad, Scientist (Dairy Technology) joined at NDRI, Karnal w.e.f. 10.04.2015.

Ms. Neelam Upadhayay, Scientist (Food Technology) joined at NDRI, Karnal w.e.f. 10.04.2015.

Dr. (Mrs.) Saroj Rai, Scientist (LPM) joined at ERS, Kalyani w.e.f. 15.05.2015.

Sh. S. Saha, Joint Director(Admn. & Registrar) joined his duties at NDRI, Karnal on 25.05.2015.

Mr. Gurunatha Gouda Harakangi, Chief Administrative Officer, after his transfer from ASRB, New Delhi joined at SRS of NDRI, Bangalore w.e.f. 10.06.2015.

Dr. Naresh Kumar, Principal Scientist appointed as Incharge/ coordinator for National Referral Centre on Milk Quality and safety (NRCMQS) w. e. f. 01.03.2015.

Dr. R. K. Sharma, Principal Scientist appointed to act as Acting Head, Animal Biochemistry Division w.e.f. 01.05.2015.

Dr. Rajan Sharma, Principal Scientist, Dairy Chemistry Division appointed Nodal Officer, Press & Media, NDRI, Karnal w.e.f 30.05.2015.

Dr. Jai Kaushik, Principal Scientist, Animal Biotechnology Centre appointed General Secretary, Staff Club, NDRI, Karnal.

Promotions

Dr. Ajoy Monadal, Senior Scientist, ERS of NDRI, Kalyani promoted as Principal Scientist w.e.f. 28.07.2013.

Dr. A. K. Sharma, Senior Scientist, NDRI, Karnal promoted as Principal Scientist w.e.f. 11.08.2013.

Dr. Dilip Kumar Mondal, Senior Scientist, ERS of NDRI, Kalyani promoted as Principal Scientist w.e.f. 21.08.2013.

Dr. S. S. Lathwal, Senior Scientist, NDRI, Karnal promoted as Principal Scientist w.e.f. 3.11.2013.

Dr. Anupama Chattarjee, Senior Scientist, ERS of NDRI, Kalyani promoted as Principal Scientist w.e.f. 21.11.2013.

Dr. Chander Datt, Senior Scientist, NDRI, Karnal promoted as Principal Scientist w.e.f. 14.01.2014.

Dr. Ajmer Singh, Senior Scientist, NDRI, Karnal promoted as Principal Scientist w.e.f. 24.02.2014.

Retirements/Relieved

Dr. Darshan Lal, Principal Scientist, Dairy Chemistry retired on superannuation from Council's service on 30.04.2015.

Dr. Bikram Kumar, Principal Scientist, Dairy Engineering. retired on superannuation from Council's service on 30.04.2015.

Mr. L. Krishnamurthym, Chief Technical Officer, SRS of NDRI, Bangalore retired from Council service w.e.f. 31.05.2015.

Dr. A. K. Puniya, Principal Scientist, Dairy Microbiology Division relieved from his duties at NDRI, Karnal in the afternoon of 27.05.2015 to join the post of Dean, College of Dairy Science and Technology, GADVASU, Ludhiana.

SOUTHERN REGIONAL STATION, BANGALORE

RESEARCH

Genetic Characterisation of Aquaporin 7 Gene and its Association with Semen Quality in Buffaloes

(Ragini Kumari and K. P. Ramesha)

Aquaporin 7 (AQP7) gene, a member of aqua-glyceroporins transports glycerol and water to spermatids. Investigation was carried out to characterise and to detect the association of genetic variants in aquaporin 7 gene with semen quality in Murrah and Surti buffaloes. Genomic DNA was extracted from blood samples of 69 Murrah and 21 Surti bulls maintained by various semen stations in Karnataka state by High Saltmethod. Single Nucleotide Polymorphisms (SNPs) in the entire coding region of aquaporin 7 gene were identified through Polymerase Chain Reaction-Single Strand Conformation Polymorphism (PCR-SSCP) analysis and direct sequencing. Analysis revealed polymorphism in exons 1, 4, 5, 7 and 8 for both Murrah and Surti buffaloes. Exons 1 and 4 in Murrah bulls revealed three unique SSCP band patterns with respective frequencies of 0.5507, 0.2174,

0.2319 for exon 1 and 0.3043, 0.2174, 0.4783 for exon 4. PCR-SSCP analysis of exon 5 showed five unique patterns with frequencies of 0.1015, 0.3623, 0.2029, 0.2029 and 0.1304 for pattern 1, pattern 2, pattern 3, pattern 4 and pattern 5, respectively. In Surti bulls, exons 1 and 8 revealed two unique SSCP patterns *viz.,* pattern 1 and pattern 2 with respective frequencies of 0.3333, 0.6667 for exon 1 and 0.7619, 0.2381 for exon 4. Analysis of exons 4 and 7 showed three unique SSCP patterns *viz.,* pattern 1, pattern 2 and pattern3 with frequencies of 0.3810, 0.2857, 0.3333 for exon 4 and 0.4762, 0.4286, 0.0952 for exon 7, respectively. Sequence analysis revealed twenty four SNPs (11 in exonic and 13 in intronic region) in Murrah bulls and twenty three SNPs in Surti bulls (8 in exonic and 15 in intronic region). Murrah bulls with pattern 2 of exons 1 and 5 produced semen with significantly higher mean sperm concentration ($P \leq 0.01$). SSCP variants of exon 1, 5 and 8 were associated ($P \leq 0.05$) with hypo-osmotic swelling (HOS) reactivity in frozen semen, sperm viability and Post Thaw Motility (PTM), respectively in Murrah bulls. In Surti bulls SSCP variants of exon 1, 5 and 8 were found to have significant ($P \leq 0.05$) effect on HOS reactivity in frozen semen, sperm viability in fresh semen and PTM, respectively. The study indicated high degree of genetic variability in aquaporin 7 gene in buffaloes. The observed SSCP variants having association with semen parameters offer an opportunity towards identification of markers for semen quality traits in buffaloes.

Training Programmes

- One week training was conducted on 'Commercial Dairy Production' for fifteen candidates (20th – 25th April, 2015).
- Six students from Kelappaji College of Agricultural Engineering & Technology, Kerala Agricultural University, Tavanur, Kerala were imparted In-plant Training in Dairy Engineering Section for one month (17th April, 2015 to 16th May, 2015).
- Eight students completed their project work in Dairy Engineering Section for period of two months (18th May, 2015 to 17th July, 2015).
- Fourteen B.Tech Students of College of Agricultural Engineering & Technology Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani received Summer Training for period of one month (1st – 30th June, 2015).
- Twenty three B.Tech students of Department of Farm Structure and Rural Electrification, Dr. Annasaheb Shinde College of Agricultural Engineering, MPKV, Rahuri, were imparted Summer Training for period of one month (1st – 30th June, 2015).

Extension Activities

- A total number of 280 visitors in seven batches comprising students from various educational institutes and entrepreneurs of southern region, visited the institute. The visitors were taken round the Institute to various sections as per their needs and were explained about the ongoing research and extension activities. Advisory services /technical advice was rendered to eleven of the needy clientele during personal visits to the Institute and mail enquires/phone queries on information regarding transferrable technologies for field extension personnel and dairy farmers, training programmes on commercial dairy farming, indigenous dairy products, guidance to set-up a new dairy farm and short-term training programme for students.
- An Orientation Programme was organized on 22nd April 2015 for thirty eight elite farmers, secretaries and directors from Dairy Co-operative Society under ATMA programme of Thrissur, Kerala. The trainees were briefed about the ongoing activities of the institute and given orientation on scientific dairy farming. An interactive session was organised to identify the specific problems in dairying and needed suggestions were provided.
- An exposure training programme was organised for the new recruits /gazetted rank officers (53 nos.) of Karnataka Milk Federation on 28th May, 2015 for orientation towards dairying. Brief-up sessions by production, processing and extension faculties followed by interactive session and visit to production and processing units were organised for the benefit of the trainees.
- An Orientation Programme was organized on 2nd June, 2015 for thirty nine B.Tech. (Agril. Engineering) 25 students from MPKV, Rahuri and fourteen students from VNMKU Parbhani, Maharashtra who were on one month summer training programme.

Dairy Education at Farmers' Door

The 'Dairy Education at Farmers' Door as a new initiative was organized and visits were made by the multidisciplinary team on Second Saturdays to Gundur, Gattahalli and Huskur villages of Bangalore South and North Taluks during April 2015 - June 2015, respectively. The multi-disciplinary team visited individual households and interacted with the farmers regarding dairy farm management and the problems faced in dairy farming. 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 farmers and farm women at their doorsteps.

EVENT

6th International Conference on Emerging Technologies in Food & Nutrition for Health Management (ICETF-2015)

The 6th International Conference on "Emerging Technologies in Food & Nutrition for Health Management (ICETF-2015)" was organized jointly by SRS of ICAR-NDRI, Adugodi, Bengaluru and International Institute of Food & Nutritional Sciences (IIFANS), New Delhi. The conference was

inaugurated by Dr. G. S. Bhat, Former Vice Chancellor, KVAFSU, Bidar on 14th May, 2015. Nearly 130 participants took part in the event. The inaugural session was followed by series of lead presentations and technical presentations. The presentations were made by the eminent speakers of the country and abroad. There were four technical sessions, eleven lead presentations & four poster sessions chaired by noted personalities in the field.

A compendium being released during the inaugural session of the conference

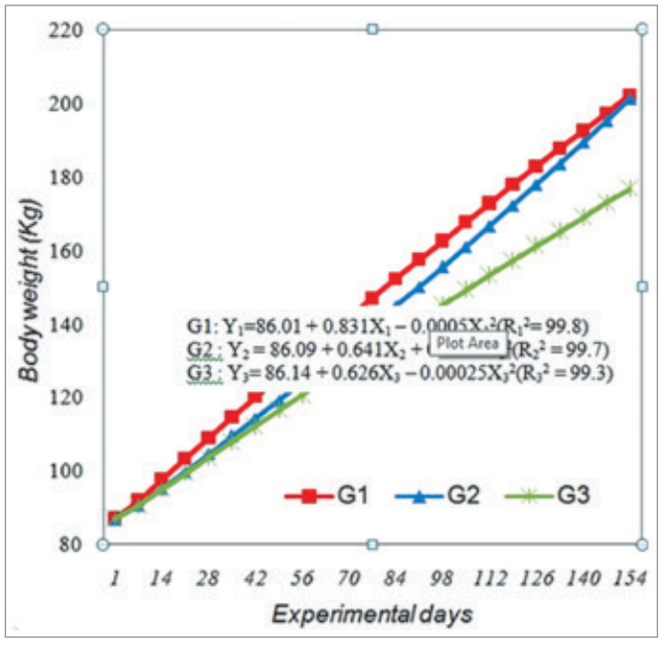
EASTERN REGIONAL STATION, KALYANI

RESEARCH

Growth Performances of Growing Crossbred Cattle Fed Animal Feed Grade Wheat alongwith Paddy Straw

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

Quality of a good sizable proportion of wheat grain deteriorated during storage at Food Corporation of India due to lack of proper storage facility and declared unfit for human consumption which is designated as animal feed grade wheat. However, considering nutrient density, the grain is as good as human food grade wheat. Therefore, an experiment was conducted to study the growth performance of growing crossbred cattle fed graded level of animal feed grade wheat. Twelve growing Jersey crossbred male calves about 7-8 months of age, were randomly divided into 3 groups (G1, G2 and G3) of 4 animals each, so that average body weight of each group was similar. These animals were maintained under individual feeding for 154 days on roughage (paddy straw) and concentrate based ration under stall feeding to meet out maintenance and growth (600 g average daily gain) requirement (NRC, 2001).



Body weight changes of growing crossbred calves fed different levels of animal feed grade wheat

Roughage and concentrate mixture were offered separately and their ratio was tried to maintain at 40:60 throughout the experimental period. Three types of iso-nitrogenous concentrate mixtures (C1, C2 and C3) were prepared in which, maize grain was serially replaced by animal feed grade wheat at 0, 30 and 50% level in concentrate mixture C1, C2 and C3, respectively. Animal feed grade wheat which was used in the present experiment contained 55 to 70 % sound grains. The study indicated that 30% replacement of dietary maize grain by animal feed grade wheat (AFW) does not affect daily body weight gain and feed conversion efficiency in growing calves.

Nutritional Evaluation of Some Feed Resources from Ayodhya Hill of Purulia District

(Ritika Gupta, T. K. Dutta, A. Chatterjee, M. Karunakaran, A. Mandal and S. S. Kundu)

Twelve samples of tree leaves were collected from Ayodhya Hill of Purulia District, West Bengal. Mean values for CP, EE, TA, AIA, NDF, ADF and Lignin in tree leaves on DM basis, respectively were 12.94 ± 1.31, 3.85 ± 0.46, 10.13 ± 0.84, 0.88 ± 0.16, 44.02 ± 2.24, 30.04 ± 1.86 and 5.54 ± 0.53 %, respectively. Four tree leaves were selected i.e. *T. tomentosa* (Tr. A), *B. variegata* (Tr. B), *L. leucocephala* (Tr. C) *and B. monosperma* (Tr. D) (on basis of comparative chemical composition) to make TMR in which selected tree leaves were at three levels i.e. 5%, 7.5% and 10% . *In vitro* analysis was done in terms of IVDMD, IVOMD, TVFA, IVFA, TN, Total NH_3-N, TCA precipitable N, total gas and methane. The pooled mean of IVDMD (%) and IVOMD (%) was significantly ($P<0.05$) higher for Tr. B and Tr. C and was lowest for Tr. D. The

average total gas production (ml/200g DM) was significantly (P<0.05) higher for Tr. B and Tr. C. There was no significant difference among the TMRs for other rumen metabolites. TMR with *B. variegata* showed better results and was selected in the *in vivo* study. A growth trial of 105 days was conducted using twelve crossbred divided in (T_0) and (T_1). Two iso-nitrogenous concentrate mixtures were prepared, replacing 50% of wheat bran with dried *B. variegata* leaves. Fortnightly DMI kg/day, CPI (g/day), TDN (kg/day) did not differ significantly between the two groups. ADG was 663.5 ± 55.01 (T_0) and 698.41 ± 40.96 (T_1) and they did not differ significantly amongst each other. NDF digestibility and hemicellulose digestibility were found higher in the treatment group (P<0.05) while for other parameters like DM, OM, CP, EE, ADF and NFE did not differ significantly. Blood parameters were within the normal range and significantly not-different. Thus, it was concluded that *B. variegata* leaves could replace wheat bran in concentrate mixture of growing calves up to 50% level without any adverse effect on growth, nutrient intake, nutrient utilization and blood parameters.

EXTENSION ACTIVITIES

Training programme

- Forty-three day training programme on "Artificial Insemination & Veterinary First Aid" was organized at ERS, NDRI for selected farmers from three districts of West Bengal 13th April 2015 to 25th May 2015. Dr. T. K. Dutta, Head, ERS briefed about the usefulness of the training. Dr. Sanchita Garai, Scientist & organizer of this training programme delivered a Key Note presentation on "*Artificial Insemination and Veterinary First aid*" which was followed by detailed interaction with the trainees and all scientists and technical officers shared their knowledge & hands on tools with the trainees.

- A total number of 4 animal camps were organised on "Anoestrous and Deworming" at Murtipur, Dakshin Chandamari and Charbirpara villages of Nadia district. A total number of 106 farmers attended these camps with 236 animals for treatment on 21st , 28th April, 2015 and 5th May, 2015, respectively.
- A "Vaccination Camp" was organized on 19th June, 2015 in the Muratipur village of Nadia District. Total Sixty six (66) farmers came with one hundred forty eight (148) animals for treatment.

Veterinary services being given in village

- Team of ERS, ICAR- NDRI participated in Exhibition organized by National horticultural board from. 27th-28th June 2015 at Barhi, Hazaribagh, Jharkhand.
- Two days Orientation/ Induction programme on "Dairy cooperatives & advances scientific dairy farming practices" was organized in collaboration with Kishan cooperative milk producers Union Ltd. Krishnanagar from 4th - 18th June 2015. A total number of 55 dairy farmers from different district of West Bengal participated.
- One day exposure visit was organized on 23rd April 2015. A total number of 43 B.V.Sc. & A.H. 1st year students from Department of Livestock Production Management West Bengal University of Animal Sciences Faculty of Veterinary and Animal Sciences, Mohanpur, Nadia, visited ERS, NDRI.