



## Central Institute for Research on Buffaloes, Hisar

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## National Seminar on Diversity of Buffalo Germplasm in India February 1-2, 2011



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India has more than 105 million buffaloes, comprising of 12 recognized breeds, more than a dozen undefined and huge non-descript stock. This biodiversity has been developed over thousands of years within specific ecological niches through continuous selection and breeding by the visionary and traditional breeders in various parts of the country. Lesser known breeds are required to be identified, characterized, and conserved for saving biodiversity. Origin and evolution of various breeds need to be embarked upon for ambitious biotechnological applications available. The institute organized National Seminar on "Diversity of Buffalo Germplasm in India" during February 1-2, 2011 covering its 26<sup>th</sup> Foundation Day and Year of Biodiversity celebrations, world over, in association with the Indian Society for Buffalo Development. Padam Bhushan, Dr RS Paroda, Chairman, Haryana Kisan Ayog inaugurated the Seminar. Dr AK Srivastava, Director, NDRI, Karnal; Dr VK Taneja, Vice-Chancellor, GADVASU, Ludhiana and Dr Hardeep Kumar, Vice-Chancellor, LLRUVAS, Hisar were the Guests of Honour. Sixty delegates from all over the country participated in the seminar and divulged on current status of buffalo breeding policies for conservation, improvement and propagation of defined breeds and lesser known breeds as well.

Buffalo Mela was organized at the Institute premises on February 1, 2011. About 180 buffaloes owned by the farmers in Haryana villages participated in the competitions of animals held under six categories viz dry and lactating buffaloes, heifers in age group of 1-2.5 years and > 2.5 years and bulls in adult and young age groups. More than 250 farmers took part in the event. Exhibition was also organized during mela in which NRCE, Hisar, NDRI, Karnal, Central Sheep Breeding Farm, Hisar and Punjab National Bank, Sacha Khara, Distt Hisar and other agencies participated.



Dr RS Paroda, Padam Bhushan Planting a sapling at the Institute



Dr VK Taneja Vice Chancellor, GADVASU, receiving Active Service Member Award of ISBD



Dr TK Walli, Ex PS & Head (DCN), Div. NDRI Karnal receiving Lifetime Achievement Award of ISBD



Sahjeevan, NGO from Kutch, Gujarat, felicitated During Buffalo mela



Dr RS Paroda inspecting animals during Buffalo Mela



Dr OP Dhanda, Ex-ADG (AN&P), ICAR distributing prizes to farmers during Buffalo Mela



## EVENTS

### India–Denmark Workshop on Genomic Selection of Cattle and Buffaloes

“India-Denmark Workshop on Genomic Selection in Cattle and Buffaloes” was held on April,11-12, 2011, at the National Agricultural Science Complex (NASC), New Delhi. The workshop was jointly organized by Indian Council of Agricultural Research (ICAR), New Delhi and Aarhus University, Denmark and coordinated by Dr RK Sethi, Director, Central Institute for Research on Buffaloes, Hisar. The Danish delegation of five members was lead by Dr Mogens Sandø Lund, Head of the Department, Genetics and Biotechnology, Aarhus University, Denmark. The purpose of the workshop was to exchange knowledge and enhance cooperation between India and Denmark, focusing on the area of genomic information applied in animal breeding and biodiversity conservation.

The inaugural session was chaired by Dr RM Acharya, Former DDG (AS) ICAR who emphasised the importance and need for genomic selection in Indian livestock.



In the four technical sessions presentations were made in the areas of Livestock breeding programmes in India, Genomic selection in animal breeding, Genetics of complex traits and Animal breeding

plans. Based on the panel discussion and deliberations between India and the visiting delegation from Denmark following major recommendations emerged from the two days workshop:

- Traditional selection tools need to be combined with biotechnological tools to have higher rates of genetic improvement. Phenotypic and SNP data have to be combined for selection of animals using multivariate analysis for genomic selection.
- Quality data is a key for the success of genomic selection. More number of sire families need to be developed besides improving the accuracy of performance of recording system.
- Highly skilled manpower in the area of bioinformatics, database development and management needs to be developed under the exchange program.
- Genomic selection can be initiated in India by utilizing reference population of Friesian crosses and indigenous cattle available in various Institutional herds.
- Breeding strategies for genomic selection of cattle and buffaloes in organized herds need to be developed and tested.
- Scientific exchange and joint collaborative research and training programs need to be developed in the areas of Bioinformatics, Association studies and Genome Wide Selection.

### Important Meetings

Meeting	Date
Institute Management Committee	23.02.2011
Institute Research Committee	20.03.2011
Research Advisory Committee	04.05.2011

## HERD PERFORMANCE AT INSTITUTE

Traits	Hisar (Murrah)	Nabha (Nili-Ravi)
Total stock		
Total Buffaloes	162	135
Milch Buffaloes	106	92
Wet Av. (Kg)	8.37	7.32
Herd Av. (kg)	5.66	5.00
Semen doses		
Produced	29698	7768
Supplied/sold	4897/ 23784	3207
Balance	322499	28739

Semen from farmer's bulls having excellent breed characteristics and mothered by high yielding dams was collected and frozen at Nabha



Nili-Ravi bulls from Village Rode, Distt. Moga

## AGRICULTURE FARM PRODUCTION

Crop Production	CIRB Hisar (quintals)	CIRB Nabha (quintals)
Green fodder		
For feeding	22958	21,058
For Silage	4218	1,784
Grain		
Barley	442.10	1550.75
Wheat		1583.00
Oat		200.00
Mustard		49.25
Total		3283.00
Seed		
Chinese cabbage	4.10	
Berseem	2.50	
Installation of tube well	Two tube wells	

## RESEARCH NOTES

### Embryo transfer in buffaloes

Eight Murrah buffaloes between 80-120 days postpartum were selected as donors and inseminated on PG induced estrus (Day 0) using frozen thawed semen. Non surgical embryo collection was carried out on day 5/6 of the cycle. Subsequently, superovulatory treatment was started on day 9 (evening) using Folltropin® administered in 12-hourly descending dose schedule. Injection of PGF2 was given on day 12, morning and evening and donors were inseminated in the morning of day 14 followed by two more inseminations at 12 h interval using frozen thawed semen from progeny tested Murrah bull. Non surgical embryo collection was carried out on day 19/20 with PG injection on day 25. All buffaloes were given one cycle sexual rest after induced estrus. As response during the first SOET-MOET cycle was poor, it was planned to physically remove the inhibiting effect of largest dominant follicle present at the start of superovulatory treatment using ultrasound guided aspiration technique on day 9 of estrous cycle during the second superovulatory cycle. The results revealed that ablation of largest DF prior to start of superovulatory treatment was helpful in recruiting more number of large follicles and their subsequent ovulation. Viable embryo recovery (per dam) for single embryos was 3/16 and for multiple ovulations it was 18/16. Five recipients conceived following transfer in 14 recipients. Six embryos were cryopreserved for future use. All eight donors also conceived within 2-3 inseminations after embryo recovery, with the result that thirteen pregnancies were obtained using embryos from eight elite dams.

### Field progeny testing programme

A total of 1288 artificial inseminations were done in adopted villages with the semen of 12 test bulls of 12<sup>th</sup> set during January-June 2011. The field conception rate in this period was 50.91%. During the period 329 calvings were recorded, out of which 159 were female calves. In this period 2 daughters of 9<sup>th</sup> set and 3 daughters of 10<sup>th</sup> set also calved at various field unit centres and the monthly test day milk recordings are in progress. Nineteen daughters completed the lactation, 12 daughters were sold before lactation was completed and monthly test day milk recording of 20 daughters is in progress. Microchips were fixed in all the progenies available at different field unit centres under FPT Programme for accurate identification.

#### Impact of Field progeny Testing Programme in farmers' buffaloes

Duration	AI	Pregnancies	CR%	Calvings	Females Born	Daughters Recorded	Av. AFC (months)	Av. Milk Yield (kg/day)	Daughters Due for Recording
2002-03	540	236	43.70	147	73	12	42.02	7.28	-
2003-04	1001	356	35.56	237	129	14	46.60	6.40	-
2004-05	1298	566	43.61	361	173	21	39.63	6.51	-
2005-06	1999	1009	50.48	744	345	53	42.96	7.74	1
2006-07	2102	1139	54.19	650	305	29	40.79	8.38	28
2007-08	2132	1104	51.78	694	341	5	31.69	8.64	80
2008-09	2176	1086	49.91	955	477	-	-	-	114
2009-10	2803	1450	51.73	1276	627	-	-	-	209
2010-11	3433	1754	51.09	341*	157*	-	-	-	70
Overall	17484	8700	49.76	5405	2627	134	41.85	7.40	502

\* Up to July 2011

A total of 17484 AIs were performed with an overall conception rate of 49.76 per cent since initiation of Field Testing Programme. In all 2627 daughters were born and 134 were recorded for test day milk yield. Number of daughters available for future recordings in different field unit centres is 502. Average milk yield of the recorded daughters is 7.40 kg per day with increasing trend over the years. The overall average AFC for 134 daughters is 41.85 months.

### Effect of cryopreservation on stability of house keeping genes of spermatozoa

Expression of housekeeping genes (HKGs) is often considered ideal internal control owing to their consistency of expression. The common HKGs in eukaryotic system do not always manifest stable expression levels because these genes are not only required in basal metabolism but also

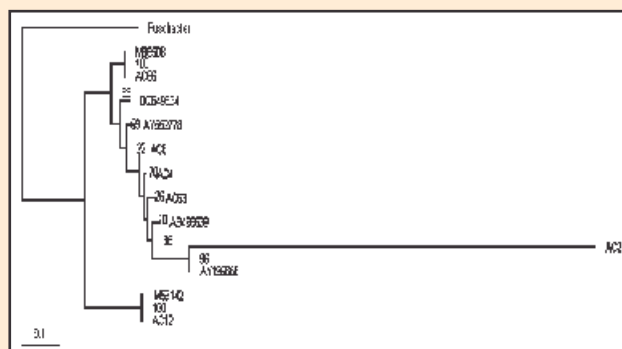
participate in other cellular functions. GAPDH is a key enzyme in glycolysis that plays an important role in energy metabolism, whereas,  $\beta$ -actin is a highly conserved protein involved in cell motility, structure and integrity. In view of the importance of HKGs in survivability of cells, total RNA was isolated from buffalo semen during cryopreservation to perform expression studies on HKGs. On the basis of motility of spermatozoa, samples were classified into two groups, group I: < 70% motility and group II: > 70% motility. Total RNA isolation was performed before and after cryopreservation. On an average, before and after cryopreservation  $117.0 \pm 3.93$  ng/ $\mu$ l and  $108.2 \pm 1.99$  ng/ $\mu$ l RNA was obtained in group I, in comparison to  $371.9 \pm 1.79$  ng/ $\mu$ l and  $299.7 \pm 3.0$  ng/ $\mu$ l RNA in group II, respectively. The results indicate that quantity of RNA was more in highly motile sperm and cryopreservation degraded the RNA.



Expression of HKGs,  $\beta$ -actin (lane 2 and lane 4) and GAPDH (lane 3& 5), respectively, in equilibrated and cryo-preserved buffalo semen by RT-PCR. Lane 1 is - 100 bp ladder

## Rumen microbial diversity in domesticated and wild ruminants

Rumen microbial diversity has been studied in domesticated and wild ruminants under NAIP project. Impact of additives on methanogenesis and utilization of poor quality fibrous feeds was studied. 16S rRNA library of 120 archaeal clones was prepared. Sequence data of these clones was subjected to BLAST to assess diversity of archaea in rumen of buffaloes by phylogenetic analysis. Study revealed predominance of Methanobacterium genus in rumen of buffalo. 16S cDNA Clone library of methanogenic archaea and sulphate reducing bacterial has also been prepared from PCR amplified community DNA from rumen. Comparative rumen microbial and fibrolytic enzyme profile was studied in high grain vs. low grain diet fed buffaloes. Effect of dosing lactating buffaloes with superior fibre degrading and sulphate reducing bacteria were also evaluated.



Phylogram of methanogens from rumen of buffalo (500 bootstrap resampling); Clones AC#: AB496639: *Methanobacterium alcaliphilum*; M59142: *Methanomicrobium mobile*; AY52778: *Methanobacterium beijingense*; DQ649334: *Methanobacterium aarhusense*; M36508: *Methanobacterium formicum*; AY196666: *Methanobrevibacter ruminantium*.

## INTERACTION WITH FARMERS/BUFFALO KEEPERS

### Trainings on Buffalo Husbandry and Artificial Insemination

Two trainings on "Buffalo Husbandry and Artificial Insemination", each of 10 days duration, were organized for unemployed rural youth during February 21 to March 4, 2011 and March 28 to April 7, 2011 at the institute. Dr RK Kashyap, Director, Human Resource Management, CCS HAU, Hisar applauded efforts of organizers during his concluding remarks after the first training. He appreciated the endeavor of providing meaningful exposure to educated rural youth to adopt AI as a vocation for livelihood, besides genetic improvement of the buffaloes in their respective regions. A total of 28 youths from Haryana and adjoining states were benefitted from these trainings.

The course curriculum of the trainings included class-room interactions with the trainees on genetics, physiology, nutrition, reproduction, health, pregnancy diagnosis, reproductive disorders, frozen semen, mastitis control, fodder preservation, selection of animals and record keeping. Hands-on practical sessions included palpation of genitalia, AI in cadaver organs and livestock, pregnancy diagnosis; maintenance of reproductive health and production records for buffalo keeping. So far, institute has organized seven such trainings. The concluding function of the second training was graced by Dr Suresh Chander, Dean Post-graduate Studies, LLRUVAS, Hisar. Based on the result of pre and post training tests, significant increase in participants' knowledge was evidenced.



Dr RK Kashyap, Director, HRM, CCSHAU, Hisar at valedictory function of Rural youth training on 4.03.11



Dr. Suresh Chander, Dean Post-graduate Studies, LLRUVAS, Hisar at concluding function of Rural youth training on 7.04.11

## Women and Gender Issues

Contribution of women in most of the buffalo husbandry activities is very well known. It has been observed that in Haryana it is the women who manage and care for their buffaloes. They feed and offer water to the buffaloes, bathe and milk them, clean the sheds and process the milk. Women spend more than 8 hours a day of their total working time, for different buffalo rearing practices. Feeding and milking of animals covered 30 per cent of the time spent, followed by the shed cleaning and dung disposal activity.

Role of women was significant in the popularization of the artificial insemination technique. More than 30 per cent woman had the correct idea of heat symptoms. A sizable proportion of women i.e. 34 per cent knew that the duration of estrus cycle in buffaloes is 21 days. Mucus discharge was also considered as one of the most important heat symptoms by the majority of the women. More than 30 per cent of women had the idea that buffalo should be inseminated about 10-12 hours after onset of heat. In the adopted villages, out of the cases brought for artificial insemination, 38 per cent was found to be the women.

## FARMERS AND RESEARCHERS VISITING ANIMAL FARM

Date	Organization/Visitor's details	Participants
01.02.2011	Students (3rd year BV Sc), SKUAST, J&K	33
01.02.2011	Farmers from FTC Saccha Khera	17
04.02.2011	Students from Vety College, HAU, Hisar	39
09.02.2011	Women farmers from Siswal Village, Hisar	30
05.03.2011	Farmers from J & K	39
14.03.2011	Farmers from Distt. Jahanabad, Bihar	29
17.03.2011	Farmers from Karauli, Rajasthan under state plan scheme	47
18.03.2011	Scientists, Farmers/entrepreneurs ' meet at Nabha	20
28.03.2011	Farmers from west Godawari Distt. AP	12
10.04.2011	Scientists Delegation from Aarhus University Denmark	5
15.04.2011	Students (final year) Anand Vety College, Gujarat	58
30.05.2011	Farmers from Rohtak, Haryana under RKVY Scheme	15

## PERSONALLIA

<b>Appointments</b>	
Dr (Mrs) Swati Dahiya, Senior Scientist	w.e.f. 26.03.2011
Dr Avijit Dey, Senior Scientist	w.e.f. 17.06.2011
<b>Promotions</b>	
Shri Rajesh Prakash, T-5 to T-6	w.e.f. 23.06.2009
Shri Dharam Chand, T-4 to T-5	w.e.f. 03.02.2010
Shri Krishan Kumar, T-5 to T-6	w.e.f. 31.03.2010
Dr RS Pippal, T-5 to T-6	w.e.f. 20.06.2010
Shri Raj Kumar, T-5 to T-6	w.e.f. 27.09.2010
Shri Abdul Majid, UDC to Assistant	w.e.f. 12.01.2011
Shri Tajender Singh, LDC to UDC	w.e.f. 13.01.2011
Shri Jagjit Singh, AAO to AO	w.e.f. 23.03.2011
<b>Transfers</b>	
Dr SS Paul, Principal Scientist, relieved from Nabha and joined at Hisar	on 31.03.2011
<b>Retirements</b>	
Shri Jagjit Singh, AO	on 31.05.2011
<b>Obituary</b>	
Shri Mehar Chand, SSS expired	on 03.02.2011



## DAIRY SECTOR

Animal husbandry's output is over 30 per cent to the country's agricultural sector. The contribution of livestock and fisheries to the Gross Domestic Product (GDP) had been over 6 per cent. India, the largest milk producer in the world, produced 112.5 million tonnes of milk to which buffaloes contributed more than 55 per cent of the country's total milk production. Productivity per animal is estimated about 987 kg/lactation as against world average of 2,038 kg/lactation. Gradual genetic deterioration and general neglect of animals over the centuries and consequent to the rise in the population of non-descript cows (80%) and buffaloes (50%) caused low productivity. Shortages of feed and fodder due over the past many years in the country coupled with their poor nutritive value and poor fertility of dairy animals add to the low productivity. Hence we have to face a twin challenge: increase milk productivity of animals with the limited resources on one hand and make best use of the available milk.

Source: FnBnews.com August 12, 2011

According to APEDA, the export of buffalo meat has increased from 343817.08 tonnes (value Rs 1536.77crore) in 2003-04, to 483478 tonnes (Rs. 3549.70 crore) in 2007-08.

Source : Referral 2010 Publications Division, Ministry of Information and Broadcasting, Government of India)

### DISTINGUISHED VISITORS

Date of Visit	Name and Address
01.02.11	Padam Bhushan Dr RS Paroda, Chairman, Haryana Farmers Commission
01.02.11	Dr VK Taneja, Vice Chancellor, GADVASU, Ludhiana
01.02.11	Dr Hardeep Kumar, Vice Chancellor, LLRUVAS & FC& PS to Haryana Govt. Deptt of Animal Husbandry & Dairying
01.02.11	Dr AK Srivastava, Director & Vice Chancellor, NDRI, Karnal
01.02.11	Dr RK Singh, Director, NRCE, Hisar
01.02.11	Dr OP Dhanda, Ex-ADG (AN&P), ICAR, New Delhi
01.02.11	Dr RP Narwal, Director Research, CCSHAU, Hisar
02.04.11	Prof K Pradhan, Ex-Vice Chancellor, Rajasthan Agril. University, Bikaner
04.05.11	Dr SK Ranjhan, Director, Hind-Agro Industries, New Delhi
04.05.11	Prof (Dr) MG Govindaiah, Former Dean, Vety College, KVAFSU (B), Bangalore
04.05.11	Dr TK Walli, Former PS & Head, DCN, NDRI, Karnal
04.05.11	Dr CS Prasad, ADG AN&P, ICAR, New Delhi
16.06.11	Dr Bangali Baboo, National Director, NAIP, ICAR, New Delhi
16.06.11	Dr RC Agrawal, National Coordinator, NAIP, C-4, ICAR, New Delhi

### FOREIGN VISITS



Dr Shyam Sundar Paul, Principal Scientist visited Geneva, Switzerland to attend 4th congress of Federation of European Microbiologists FEMS 2011 held during June 26-30, 2011



Dr Prem Singh Yadav, Principal Scientist visited Germany from 28.12.2010 to 10.02. 2011 during DAAD Research Stay to accomplish objectives of research project entitled "Induced Pluripotent Bovine Stem Cells".



Dr Pawan Singh, Principal Scientist and Dr Navneet Saxena, Senior Scientist visited ANMVI International, Plazzo Trecchi-via Trecchi, for participating in the SIVAR congress on May 6-7, 2011 at CREMONA Italy, as part of International week. These scientists were also invited to attend one day workshop of European Food Safety Authority (EFSA), held at University of Parma, Italy.



## DIRECTOR'S COLUMN

Identification, improvement and propagation of elite buffalo germplasm being the main aim, Institute has initiated research projects in field of developing DNA based identification system for quality germplasm related to milk, meat and fertility traits, conservation and propagation of breeds in their respective home tracts and application of modern technology tools for semen preservation and SOET/MOET for faster multiplication



of the superior germplasm. Growing ability and success in stem cell passages maintenance has created room for future possibilities of triggering germ cells to desired directions. Low cost complete feed development for calves, identification of agro-industrial by-products for replacing costly feed ingredients, application of waste mud from sugarcane industry for calf feeding with 50 % reduction in cost and development of biological feed additives for improved fiber degradation improving feed utilization efficiency in animals are some of the achievements. Identification of inherent bacteria contributing in reducing methane emission has a scope for efficient rumen micromanipulation in buffaloes.

Institute is running a Network Project on buffalo improvement and has established elite herds not only for Murrah, Nili-Ravi, Surti, Pandharpuri, Jaffrabadi, Bhadawari and Swamp buffaloes at it's centres located in different parts of the country where semen freezing facility has been established and FPT Programme is underway in farmer's animals. About 40,000 doses of semen from Progeny tested bulls and more than 3 Laks doses from the test bulls are in stock. Our efforts in the field progeny testing programme have generated the interest of farmers in AI, using the quality semen with high conception rate. Semen collection, freezing and preservation from farmer's breeding bulls is a unique service being rendered by the institute. Nine villages have been adopted adjoining the institute for undertaking the FPT programme.

Tremendous efforts are being made to make 30% of agriculture land arable under fodder cultivation for animals. Institute has reached self-sufficiency in fodder production to meet the requirement of animals. As a result of combined efforts milk production In Murrah buffaloes has increased from 4.8 to 7.5 Kg in Murrah at Hisar and from 5.82 to 7.10 Kg in Nili-Ravi buffaloes at sub-campus. Reproductive efficiency also improved in both the herds in terms of reduced AFC, service period and calving interval.

Institute is making concerted efforts to prioritize and undertake research on climate change aspects, different types of user friendly shelter management practices, heat detection methods, post harvest processing and value addition in products obtained from this species for the XII plan.

Director