

वार्षिक प्रतिवेदन Annual Report 2010-11



केन्द्रीय भैंस अनुसंधान संस्थान
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Preface



India is endowed with substantial and varied bio-diversity of buffalo germplasm which includes about a dozen well defined breeds and a vast population of non-descript and low producer buffaloes, which have played crucial role in augmenting agrarian economy.

Buffaloes contribute about 56 percent of the total milk production in the country and about 1.56 million metric tonnes of meat. To meet the per capita milk requirements of burgeoning population and to uplift the small farmers from poverty line, emphasis has to be given on improvement in overall production performance of buffaloes through optimization of health, reproductive efficiency and nutrient utilization.

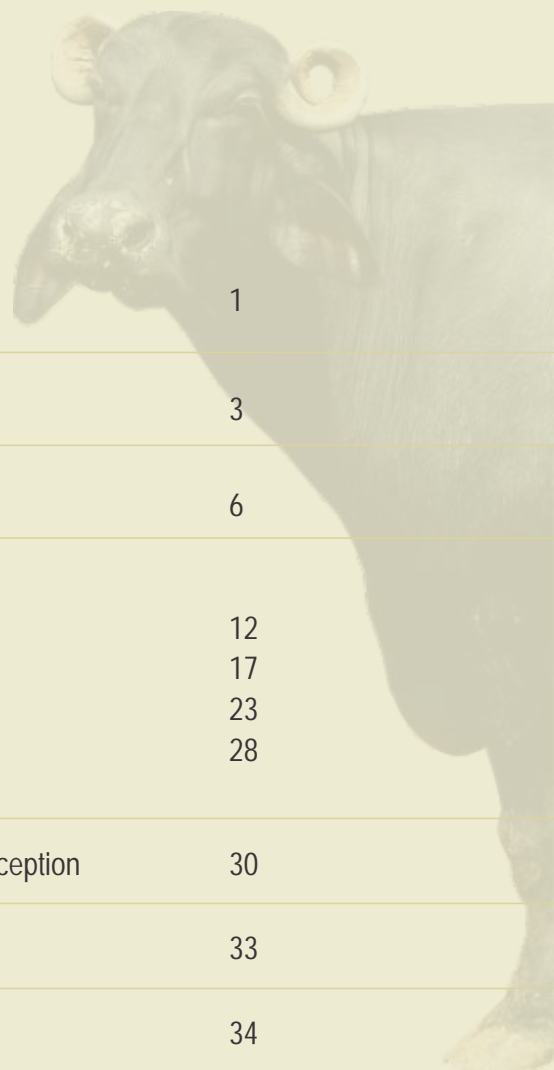
Indian Council of Agricultural Research established the Central Institute for Research on Buffaloes at Hisar in Haryana, the heartland of breeding tract of Murrah breed in 1985. A sub-campus of the institute was also established in 1987 at Nabha in Patiala district of Punjab for conducting research on production aspects of Nili-Ravi buffaloes. Besides, coordinating unit of All India Network Project on Buffalo Improvement has been undertaking breed improvement programme of various breeds of buffaloes through progeny testing involving farmers' animals in different parts of the country.

This report provides a glimpse of the diversified activities of CIRB during the period 2010-11 and will act as an important document for the researchers, extension personnel and policy planners.

Guidance, help and support from the headquarters, especially from Dr S Ayyappan, Secretary, Department of Agricultural Research and Education and Director General, ICAR, Prof KML Pathak, Deputy Director General (Animal Sciences), Dr CS Prasad, ADG (AN&P) and Dr SC Gupta ADG (AP&B) are gratefully acknowledged.


(RK Sethi)
Director

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कार्यकारी सारांश

केन्द्रीय भैंस अनुसंधान संस्थान, हिसार (हरियाणा) की स्थापना 1 फरवरी, 1985 को हरियाणा सरकार की संतति परीक्षण सांड फार्म को अधिग्रहित करके हुई। तदुपरान्त पंजाब सरकार के नीली-रावी फार्म का 1 दिसम्बर, 1987 को अधिग्रहण करके उप-परिसर की स्थापना नाभा (पटियाला) में की गयी। संस्थान का मुख्य ध्यान भैंस उत्पादन के सभी आयामों पर शोधकार्य करने व इसको बढ़ावा देने पर है। वर्ष 2010-11 के दौरान हुए मुख्य शोध कार्यों का कार्यकारी सारांश निम्न है :

वर्ष के दौरान मुरा भैंसों की फार्म पर कुल संख्या 522 थी जिसमें 171 वयस्क भैंसे, 105 दूध पीते बच्चे (< 1 वर्ष), 139 युवा कटड़े व कटड़िया (1-2.5 वर्ष), 86 कटड़िया (> 2.5 वर्ष) और कटड़े प्रजनन योग्य भैंसे (> 2 वर्ष) शामिल है। वर्ष के दौरान नई ब्यांत के कारण 120 बच्चों की संख्या बढ़ी व आयु वर्ग के 130 (47 कटड़े/भैंसा व 83 कटड़िया/भैंस) जानवरों की वर्ष के दौरान मृत्यु दर 4.99 प्रतिशत पायी गयी।

वर्ष 2010-11 के दौरान मुरा भैंसों का वेट और हर्ड औसत क्रमशः 7.45 और 4.69 कि.ग्रा. रहा जो वर्ष 2009-10 से 6.28 और 7.82 प्रतिशत की वृद्धि दर्शाता है। परियोजना के स्थापना होने से अब तक अधिकतम वेट औसत फरवरी, 2011 में 9.50 कि.ग्रा. प्राप्त हुआ। वर्ष 2010-11 में 305 दिन का औसत दुग्ध उत्पादन व कुल दुग्ध उत्पादन क्रमशः 2247 और 2471 कि.ग्रा. रहा। जो पिछले वर्ष की तुलना में क्रमशः 12.63 व 8.14% अधिक था। वर्ष के दौरान औसत शिखर उत्पादन (10.48 कि.ग्रा.) रहा जो पिछले वर्ष के शिखर उत्पादन (9.54 कि.ग्रा.) से अधिक था।

नीली-रावी भैंसों का वर्ष 2010-11 में औसत ब्यांत उत्पादन 2042 कि.ग्रा. था जोकि पिछले वर्ष की तुलना में 125 कि.ग्रा. अधिक है। कुल वेट और हर्ड औसत वर्ष 2010-11 में 7.11 व 4.93

कि.ग्रा. था जोकि पिछले वर्ष के औसतों (वेट औसत-7.0 कि.ग्रा. और हर्ड औसत 4.66 कि.ग्रा.) से अधिक है। यह परियोजना के नाभा परिसर में स्थापना से आज तक का अधिकतम वेट औसत है।

इस वर्ष के दौरान कुल गर्भाधान दर 42.92 प्रतिशत थी। कटड़ियों में गर्भाधान दर 54.80 व भैंसों में 39.0 प्रतिशत थी। वर्ष के दौरान 12वे सेट के 12 टेस्ट सांडों के वीर्य से 3419 कृत्रिम प्रजनन किये गए। कुल 1669 गर्भधारण की पृष्टि की गई और 1279 ब्यांत दर्ज हुए, जिसमें 645 कटड़े व 634 कटड़िया थी। अन्य प्रजनन लक्षण जैसे - पहली ब्यांत के समय आयु, सेवा अवधि और ब्यांत अंतराल क्रमशः 49.92 महीने, 186 दिन और 492 दिन पाये गये। पिछले साल, ब्यांत अंतराल (520 दिन) व सेवा अवधि (212 दिन), की तुलना में इस वर्ष इन दोनों प्रजनन लक्षणों में सुधार हुआ है।

विभिन्न ब्यांत की 102 मुराह भैंसों दुग्ध एवं रक्त नमूनों के लिये चयनित की गयी और साप्ताहिक अंतराल पर दुग्ध मात्रा, दुग्ध प्रोटीन, दुग्ध वसा प्रतिशत व दुग्ध लेक्टोज जांचे गये।

वसा प्रतिशत, प्रोटीन व लेक्टोज की मात्रा में डंकन मल्टीपल रेंज टेस्ट लगाने पर वसा प्रतिशत सर्दियों की अपेक्षा गर्मियों में अधिक पायी गयी। ब्यांत का वसा प्रतिशत पर असर नहीं पड़ा। भैंसों के प्रोटीन प्रतिशत में महत्वपूर्ण अन्तर पाया गया। मौसम व भैंसों का असर दुग्ध में लेक्टोज की मात्रा पर नहीं पड़ा।

कुल 16 भैंसों को प्रेरित या प्राकृतिक मद के बाद एकल व एकाधिक अण्डोत्सर्क के लिए क्रमादेशित किया गया। जिसमें 15 भैंसों से एकल अण्डोत्सर्ग तथा 16 भैंसों से एकाधिक अण्डोत्सर्ग किया गया, जिससे क्रमशः 3 व 23 भ्रूण प्राप्त हुए, जिनमें से 13 भ्रूणों को प्रत्यारोपित करने के बाद पांच भैंसे गर्भित हुईं।

क्लोन कटड़िया/कटड़ा के उत्पादन के लिए उत्तम भैंस और सांड से पैदा हुए बच्चे के कान के टुकड़े से प्राथमिक कल्चर शुरू किया

गया। प्राप्त कोशिकाओं के प्राथमिक कल्चर में सफलतापूर्वक वृद्धि हुई, जिसका 12 चरणों तक कल्चर किया गया। इन कोशिकाओं को 80 प्रतिशत Confluency के बाद गुणित किया गया। विभिन्न स्रोतों से जैसे एमनियोटिक द्रव्य, गर्भनाल और भ्रूण फाइब्रो बलास्ट से प्राप्त कोशिकाएँ Pluripotency के गुण को दर्शाती हैं। इन कोशिकाओं में ट्रांसक्रिप्शनल कारक Oct-4, Nanog और Sox-2 लगभग सभी चरणों में व्यक्त हुये।

किसानों के साड़ों के वीर्य को सफलतापूर्वक हिमिकृत किया गया। मुर्ह प्रजनन क्षेत्र के किसानों के आठ पुरस्कार विजेता मुर्ह साड़ों के 9000 वीर्य Doses हिमिकृत किये गये। इनमें से कुछ साड़ों के वीर्य को नेटवर्क परियोजना के संतति परीक्षण कार्यक्रम में उपयोग किया जा रहा है और साथ ही किसानों को भी मुर्ह नस्ल सुधार के लिए बेचा जा रहा है। इस वीर्य की गांवों एवं संस्थान फार्म पर 'इष्टतम प्रजनन' क्षमता पायी गयी। वीर्य संकलन किसानों के द्वार पर ही किया गया और उसे वीर्य हिमिकरण प्रयोगशाला में हिमिकरण के लिये लाया गया। इसलिए इन वीर्यों में भी पिघलाने के बाद शुक्राणु गतिशीलता प्रयोगशाला में एकत्र व हिमिकृत किये गये वीर्य के बराबर ही पायी गयी।

झोटों के शुक्राणुओं की गतिज एवं जिवितता पर अतिहिमीकृत प्रक्रिया का प्रभाव जानने के लिए 'कासा' से अतिहिमीकृत प्रक्रिया के विभिन्न अवस्था पर अध्ययन किया गया, जिसमें शुक्राणुओं की कुल गति, प्रगतिशील तीव्र तथा जिवितता का प्रतिशत ताजे संग्रहित वीर्य तथा equilibrated वीर्य से Frozen-thowed वीर्य में कम पाया गया। उसके अलावा acrosome को PSA-FITC तकनीक द्वारा ताजा संग्रहित वीर्य तथा equilibrated वीर्य में अवलोकन करने पर 85-90 प्रतिशत अखण्ड acrosome पाया गया जबकि अतिहिमीकृत प्रक्रिया के बाद 70-83 प्रतिशत अखण्ड acrosome पाया गया।

फिल्टर प्रेस अवशिष्ट (FPMW) में अच्छी मात्रा में अपरिष्कृत प्रोटीन व ईथर निष्कर्षण पाया जाता है और यह आवश्यक खनिज जैसे जिंक, मैंगनीज और तांबे में भी समृद्ध होता है। चीनी मिल से इसका खरीद मूल्य लगभग 15 रुपये प्रति क्विंटल+परिवहन खर्च है। इस अध्ययन से यह निष्कर्ष निकला की सूखे रूप में FPMW बढ़ते कटड़ा/कटड़ी के किसी भी राशन में 25 प्रतिशत के स्तर तक बिना किसी बुरे प्रभाव के शामिल किया जा सकता है। इस प्रकार खाद्य लागत को 10-15 प्रतिशत कम किया जा सकता है।

अनॉक्सीकृत कवक के 12 परिचालन वर्गीकरण इकाइयों (OTUs) में से 10 इकाइयां (99 में से 97 क्लोन) जीनस orpinomyces से संबंधित थी, यह दर्शाता है कि फार्ग्लोटोटाईपस (phylotypis) जीनस Orpinomyces भैंसे के रोमन्थ में अनॉक्सीकृत कवक समुदाय का सबसे प्रमुख घटक है।

रेशे को तोड़ने वाले और मीथेन पैदा करने वाले सूक्ष्म जीव की मात्रा का आकलन करने के लिए रियल टाइम पीसीआर की स्थितियों का निर्धारण किया गया, उन्हीं रोमन्थ द्रव्य में रोमन्थी एंजाइम के स्तर का भी आकलन किया गया। इस अध्ययन ने संकेत दिया कि avicelase और acetyl esterase खराब गुणवत्ता वाले रेशेदार चारे, जैसे भूसे को पचाने के लिये महत्वपूर्ण एंजाइम हो सकते हैं।

विस्तार कार्य/गतिविधियां :

संस्थान में नवम्बर 27, 2010 को एक संतति मेला आयोजित किया गया जिसमें संतति परीक्षण परियोजना के अन्तर्गत अपनाये गये गांवों में पैदा हुई 52 कटड़ियों ने भाग लिया। पशुओं की प्रतियोगिता तीन श्रेणियों में आयोजित की गई - दुग्ध देने वाली भैंसे, कटड़ियां 1-2½ वर्ष और 2½ वर्ष से अधिक। तीन सर्वश्रेष्ठ कटड़ियों/भैंसों का प्रत्येक क्षेणी से चुनाव करके पुरस्कार दिया गया। यह मेला गांवों में प्रोद्योगिकी स्थानांतरण के प्रभाव और अच्छी भैंसे पालने में किसानों के लगाव को दर्शाने के लिये आयोजित किया गया।

पिछले वर्षों की भांति इस वर्ष भी भैंस मेले का आयोजन संस्थान में फरवरी 1, 2011 को किया गया। जिसमें अंगीकृत एवं अन्य पास के गांवों से 180 उन्नत पशु लाये गए। पशुओं की प्रतियोगिताओं का आयोजन छः श्रेणियों में किया गया, जिनमें दूध देने वाली व शुष्क भैंसे, 1 से 2½ वर्ष और 2½ वर्ष से अधिक उम्र की कटड़ियां, युवा व व्यस्क सांड सम्मिलित हुए। मेले का सर्वोत्तम पशु भी घोषित किया गया। 500 से अधिक पशु पालकों ने इसमें हिस्सा लिया।

फरवरी 20, 2011 को संस्थान के परिसर में भैंसे मेले का आयोजन किया गया, जिसमें अपनाये गये और आस-पास के अन्य गांवों से 180 उत्कृष्ट भैंसों ने हिस्सा लिया। भैंसों की प्रतियोगिताएं छः श्रेणियों के तहत आयोजित की गयी - सूखी एवं दूध देने वाली भैंसे, कटड़ियां 1-2½ वर्ष और 2½ वर्ष से अधिक; वयस्क और युवा साड़। मेले का सर्वश्रेष्ठ पशु भी घोषित किया गया। मेले में 300 से अधिक किसानों ने भाग लिया।

संस्थान ने साधारण कृत्रिम गर्भाधान कर्ता के लिए भी प्रशिक्षण कार्यक्रम 13-21 सितम्बर, 2010, 21 फरवरी से 4 मार्च, 2011 व 28 मार्च से 7 अप्रैल, 2011 को आयोजित किया, जिसमें क्रमशः 14, 15 व 13 बेरोजगार युवकों ने भाग लिया। पांच पशु स्वास्थ्य जांच शिविर भी पी.एन.बी. कृषक प्रशिक्षण केन्द्र, सच्चा खेड़ा, जीद के सहयोग से हरियाणा राज्य में आयोजित किये गए।



Executive Summary

Central Institute for Research on Buffaloes, Hisar, Haryana was established on February 1, 1985 by acquiring the Progeny Testing Bull Farm of Haryana Government. Subsequently a sub-campus at Nabha (Patiala) was established on December 1, 1987 by acquiring Nili-Ravi Farm of the Punjab Government. The Institute principally focuses on promoting and undertaking research on all aspects of buffalo production. The executive summary of the research highlights during the period 2010-11 is as under :

Total herd strength of Murrah buffalo during the period under report was 522, which included 171 adult buffaloes, 105 suckling calves (< 1 year), 139 young males and females (1-2.5 years), 86 heifers (> 2.5 years) and 16 breeding males (>2-5 years). During the period 120 calves were added due to birth and 130 (47 males and 83 females) animals of different age groups were culled and auctioned. The overall mortality in murrah herd was observed 4.99 percent (females: 4.27 and males 6.88 percent).

The overall wet average and herd average of Murrah herd were 7.45 and 4.69 kg, respectively, which revealed an improvement of 6.28% and 7.82% over the year 2009-10. Highest wet average of the herd was reported 9.50 kg (February, 2011). The overall 305 days lactation milk yield and total lactation milk yield during 2010-11 were 2247 and 2471kg, respectively. The

production performance for lactation milk yield revealed an improvement of 12.63 and 8.14% as compared to the performance of 2009-10. The average peak yield (10.48 kg.) during the year was higher than the previous year peak yield (9.54 kg).

Average total lactation yield of Nili-Ravi buffaloes during 2010-11 was 2042 kg which is 125 kg higher than the previous year average. Overall wet and herd averages during 2010-11 were 7.11 and 4.93 kg, respectively which is also higher than the values observed in the previous year (wet average: 7.0 and herd average: 4.66). This wet average was highest since the inception of the sub-campus.

The overall conception rate in Murrah buffaloes during the period under report was 42.92 percent (heifers: 54.80 and Buffaloes: 39.0 percent). The other reproductive traits viz. age at first calving, service period and calving interval were observed 49.92 months, 186 days, and 492 days, respectively. Reproductive traits significantly improved as compared to last year performance for calving interval (520 days) and service period (212 days).

During the period under report 3419 artificial inseminations were performed under FPT project with the test bulls, semen in nine adopted villages. The semen of 12 bulls of set XII was used for insemination.

In all 1669 pregnancies were confirmed and 1279 calvings were recorded, out of which 645 were males and 634 were females.

Murrah buffaloes (n=102) of different parity were selected for milk/ blood sample collection. Milk data viz. milk yield, milk protein, milk fat percentage, milk lactose were recorded at weekly intervals. Duncan's multiple range test for fat, protein and lactose shows that season wise there is significant difference in fat percentage ($P < 0.05$). It is higher in summer than winter. Parity wise there is no significant difference, the protein percentage significantly differed among animals. In lactose there is no significant difference by season and across animals.

Total 16 donors were programmed for single and multiple ovulations at induced or natural estrus for superovulation. Fifteen donors were flushed for SOET and 16 for MOET; resulted in total recovery of 3 and 23 embryos from SOET and MOET, respectively. Out of these, 13 embryos were transferred and established 5 pregnancies.

The ear pinna of a calf from superior dam and bull was collected to initiate the primary culture. The primary cultures were grown successfully and resulted in cells which could be cultured up to 12 passages. These cells were multiplied after 80% confluency. The cells were frozen in 1ml aliquot in freezing medium for further use as donor cells for production of cloned calf.

The expression of transcriptional factors Oct-4, Nanog, Sox-2, expressed in almost all passages from sources like amniotic fluid, umbilical cord matrix and fetal fibroblast cells, indicate their pluripotency.

Approximately 9000 semen doses were frozen from eight true to breed prize winner Murrah buffalo bulls kept by the progressive farmers in the breeding tract of Murrah. Semen of some of these bulls is used in network project for progeny testing programme and also for the breed improvement in the field. Semen of farmers' bulls was frozen successfully leading to optimum fertility in the field and at farm. Semen

collection was performed at the farmers' door and then transported to semen freezing lab for cryopreservation. Post-thaw sperm motility was equal to that of semen collected and frozen in the laboratory.

To know the effect of cryopreservation on buffalo bull sperm functionality like sperm motility, kinetic parameters and viability of semen the samples were assessed by CASA during different stages of cryopreservation and found that total motility, progressive motility, rapid motility and viability significantly reduced (54.6%, 24.0%, 41.4% and 69.0% respectively) in frozen thawed semen as compared to fresh (77.8%, 48.3%, 72.3% and 90.5%) and equilibrated semen sample (71.9%, 48.2%, 66.0% and 90.5%). Also acrosome was evaluated by PSA-FITC assay in fresh and equilibrated semen sample showed 85-90% intact acrosome whereas after cryopreservation 70-83% intact acrosomes were recorded.

Filter press mud waste (FPMW) was found to contain good amount of nutrients in terms of crude protein, ether extract and also rich in essential minerals like zinc, manganese and copper. Its procurement price at the sugar mill is about Rs 15/- per quintal besides transport. The study concluded that FPMW in dried form can be incorporated in any conventional concentrate mixture at 25% level for growing buffalo calves without any ill effect on their health, thus reducing the feeding cost by 10-15%

Out of 12 operational taxonomic units (OTUs) of anaerobic fungi, 10 (97 of 99 clones) were affiliated with the genus *Orpinomyces*, indicating that the phylotypes belonging to the genus *Orpinomyces* are the most dominant component of anaerobic fungal community in rumen of buffaloes.

For quantification of fibre degrading microbes and methanogens in buffaloes fed low fibre diet, Real Time PCR conditions were optimized and ruminal enzyme levels of rumen samples were estimated. The study indicated that avicelase and acetyl esterase are likely to be critical enzymes for digestion of poor quality fibrous feeds like straw.

Extension activities

Progeny Mela of daughters born in FPT was organized at the institute on 27th Nov. 2010 in which 52 daughters born in adopted villages under FPT project participated. Competition of animals was held under three categories viz lactating buffaloes, heifers 1-2½ years and >2½ years. Three best calves/heifers were selected in each category to give away the prizes. Show was organized to observe the impact of technology transferred in the field and interest of farmers for rearing quality buffaloes.

Buffalo Mela was organized at the institute premises on February 1, 2011 in which 180 elite buffaloes from adopted and adjoining villages participated.

Competition of animals was held under six categories viz. dry and lactating buffaloes, heifers 1-2½ years and >2½ years, adult and young bulls. Best animal of the show was also awarded. More than 500 farmers participated in the mela.

The Institute also organized training program for layman inseminators from September 13-22, 2010, February 21-04 March, 2011 and March 28-07 April, 2011 in which 14, 15 and 13 unemployed youths participated, respectively.

Five animal health check-up camps were also organized in the Haryana state with the collaboration of PNB Farmers Training Center, Saccha Khera, District Jind, Haryana.



Introduction

India has over 106.63 million buffaloes which is nearly 56.62 % of the total world buffalo population of 188.31 million. The buffalo population has consistently been increasing in the country and a large increase has been recorded in the states which are home tract of well defined superior breeds of buffaloes. The buffalo milk has high fat, protein and mineral content and low cholesterol content - almost half to that of cow milk - which make it a healthier drink for the vast vegetarian population of the country for meeting its animal protein requirement. To meet the per capita milk requirement of vast population and to uplift the small farmer from poverty emphasis has to be given on improvement in overall production performance of buffaloes through optimizing the germplasm health, reproductive efficiency and nutrient utilization. To address these issues, the Central Institute for Research on Buffaloes, was established at Hisar on February 1, 1985. A subcampus was established at Nabha, Punjab to undertake research on different aspects of Nili-Ravi buffaloes.

Institute

The Institute is spread over an area of 1,057 acres out of which about 30 percent of the area is under fodder production. The remaining land is saline, undulating and infested with salt-resistant weeds. The production of fodder crops, at present is primarily dependent on canal irrigation. During the year three tube wells were bored for assured irrigation. Efforts are also being made for reclamation of saline land. A total of 522

Murrah buffaloes and 441 Nili-Ravi buffaloes constitute the breeding herds at Hisar and Nabha, respectively.

Past achievements

- Institute has so far supplied over 432 Murrah bulls and 226 Nili-Ravi bulls of superior genetic merit to various developmental agencies and village Panchayats in the country.
- Breeding programs in Nili-Ravi, Surti, Jaffarabadi, Bhadawari, Pandharpuri and Swamp buffaloes are being undertaken at various centers of the Network Project on Buffalo Improvement.
- RAPD - PCR analysis of buffalo DNA, based on 20 primer sequences revealed that 11 to 35 percent polymorphism obtained in buffalo genome was able to segregate the high and low service period animals with 39 percent dissimilarity by cluster analysis, thereby segregating high and low reproduction performance in terms of SP.
- The Institute has over three lakh doses of frozen semen in its cryobank under progeny testing programme.
- Scrotal circumference measurement at different age and body weights have been established for Murrah buffalo bulls to aid in bull selection.
- Technology for ET was standardized and as a result 16 calves were born through ETT at the Institute.

- Technology for cryo-preservation of buffalo oocytes and embryos was standardized. Achieved success in in-vitro fertilization of buffalo oocytes. The technique of micromanipulation of embryos was also studied in buffaloes.
- The sex of embryos produced through IVF has been successfully predetermined using PCR techniques. Fetal sexing was done with 100% accuracy on day 55 post-AI with ultrasonography.
- Early pregnancy diagnosis was made with sonographic technique. Positive pregnancy diagnosis with this technique was possible as early as day 25 post-insemination.
- A chart of fetal bio-metry for determination of stage of gestation has been developed with high accuracy, using ultrasound technique.
- The technique of ultrasonography was also used for evaluating appropriate therapeutic intervention in anoestrus condition. The technique also allowed monitoring of ovarian response so that optimum time for fixed time insemination of treated buffaloes could be worked out precisely, resulting in good fertility. This also circumvents the need for estrus detection which is rather difficult in buffaloes.
- 'Ovsynch-Plus' protocol was developed for inducing oestrus in summer acyclic buffaloes. It was observed that conception rates are higher when buffaloes develop corpus luteum following both the GnRH injections.
- Technology for improving the nutritive value of poor quality roughages was developed.
- Technology for hay and silage making was standardized and it was concluded that 1.20-1.35 kg of legume hay can replace 1 kg concentrate mixture in ration of buffaloes.
- Enterolobium timbova leaves were successfully used for removal of protozoa from the rumen of buffaloes. It was established that defaunation is beneficial for growth under certain feeding conditions. Defaunation effects of certain agents in the decreasing order were: copper sulphate > sodium lauryl sulphate > Enterolobium leaves > Neem seed kernels.
- Studies have indicated that growing Nili-Ravi heifers require 103.3 - 129.5 K cal/Kg W^{0.75} ME for maintenance at various body weights. Maintenance requirements for CP were in the range of 6.49 - 9.49 g/Kg W^{0.75}. The requirements of ME for each gram of gain in BW were in the range of 6.18 - 12.9 Kcal. The requirements of CP for each gram of gain in body weight were in the range of 0.24 - 0.42 g.
- Two grainless concentrate mixtures, isocaloric and isonitrogenous, were formulated in such a way that cereal maize grain portion was completely replaced with brans of wheat and rice. The study revealed a body weight gain of 500 g/day. The cereal portion of conventional concentrate mixture can be replaced with rice/wheat bran without affecting their growth performance and nutrient utilization.
- Boron as an antidote helped in sub-clinical fluorosis in buffalo calves in terms of better retention of calcium and phosphorus and increased excretion of fluorine from the body.
- Biochemical profiles of various body fluids (blood, milk, colostrum and rumen liquor) have been characterized extensively in relation to buffalo productivity.
- Colostrum feeding during early post-natal life ensures better calf survivability due to absorption of more amounts of immunoglobulins present in the colostrum. The immunoglobulin level at 24 hour may predict the health status of calves. A critical level of these blood proteins has been assessed for survivability of calves. Study also revealed the sex variation in absorption of immunoglobulins.
- Higher risk of disease occurrence in hypogammaglobulinaemic calves was associated with higher incidence of enteritis and pneumo-enteritis during first two weeks after birth.

- Post-digestion trial analyses in early postpartum Nili-Ravi buffaloes to study reproduction-nutrition interactions indicated that the absolute intake of dry matter was maximum in high energy group, followed by medium energy and lowest in the group offered low energy ration (respective values being 14.72, 13.06 and 11.46 Kg per day). A major proportion of this was contributed by the dry matter intake through fodder. The production performance (milk yield and milk fat per cent of the buffaloes under three different levels of energy intake also did not reflect significant differences during the first four months postpartum.
- Studies on artificial induction of lactation were undertaken in buffaloes. In successful cases the peak milk yield ranged between 2.5 to 7.0 litres/day and was attained between 20th to 75th day after start of milking. In poor responders however, peak milk production was restricted at 250 ml and 800 ml only and these buffaloes were dried off after 75 days. No significant differences were observed in the haematological parameters before and after treatment for induced lactation in buffaloes.
- Under field progeny testing programme, since 1998 a total of 14190 artificial inseminations with frozen semen of test bulls have been done with an overall conception rate of 48.96 percent.
- 150 frozen semen samples from 17 breeding bulls were evaluated with CASA for sperm motion attributes. Results revealed that bulls with higher field conception rates had higher values of sperm total motility, progressive motility, rapid motion and viability.
- To establish the basal values of various proteins and calcium, blood samples were collected from peri-pubertal non-pregnant heifers and non-pregnant problem heifers and analyzed for total protein, albumin, globulin and calcium. The proteins, including albumin and globulin, were slightly higher in normal peri-pubertal heifers but calcium was marginally lower as compared to problem heifers. The differences were statistically non-significant.
- Studies on the effect of feeding complete feed blocks on growth and production performance of buffaloes revealed that the average milk yield, fat, SNF and TS percent did not differ ($P < 0.05$) significantly among different groups. Milk yield was 5.27, 5.33 and 5.71 kg/day in control, Wheat straw complete feed blocks (WSCFB) and Bajra kadabhi complete feed blocks (BKCFB) groups, respectively. Similarly, average fat was 7.16, 7.31 and 7.12 percent in control, WSCFB and BKCFB groups, respectively. Respective SNF was 9.84, 9.55 and 9.95 percent and TS was 17, 16.92 and 17.07 percent in these groups, respectively.
- A multi-residue method for three neonicotinoid pesticides viz. imidacloprid, acetamiprid and thiacloprid was developed using HPLC. Percent recovery from 0.5 to 2.0 ppm concentration varied in the range of 81.17 percent to 95.6 percent for imidacloprid, 84.99 percent to 92.76 percent for acetamiprid, and 88.50 percent to 96.96 percent for thiacloprid. The detection limit depending upon the peak to noise ratio was observed to be 5 ppb, 10 ppb and 20 ppb, respectively for imidacloprid, acetamiprid and thiacloprid.
- Test mating from XI set of Murrah bulls was completed and test matings from 15 bulls of XII set was initiated since January, 2010 which is going to complete in June, 2011.
- The Institute organized 16 trainings of 21 days each on Animal Production and Management under NARP Project in which 265 teachers/scientists from SAUs and ICAR Institutes participated.
- The Institute has also organized three summer schools of 21 days each on reproductive aspects of buffalo production. More than 50 scientists/ teachers from different ICAR Institutes and SAUs have participated in these trainings.

- Eleven trainings on 'Improved Package of Practices of Buffalo Husbandry' were also organized at the Institute. More than 230 farmers from Haryana and other states participated in these trainings.
- Seven trainings in buffalo husbandry and artificial insemination were organized, benefitting nearly 100 unemployed educated rural youths to take up if as a vocation for self employment.

Organizational set-up

Director is the executive head of the Institute and is the Chairman of the Institute Management Committee (IMC) which is responsible for all policy and decision making regarding the functioning of Institute. Research Advisory Committee (RAC) reviews the research achievements of the Institute and their consistency in view of the mandate of the Institute and suggests research programmes in the thrust areas based on national/global context. Director is also Chairman of the Institute Research Council (IRC) that monitors the progress of research projects. The research and extension activities at the Institute are looked after by the respective Heads/In-charges of Divisions and by the Officer-in-charge at sub-campus, Nabha. The Institute Joint Staff Council (IJSC) looks after the grievances and welfare of staff members of the Institute. The Institute also has a women cell to address the grievances of the women employees. A staff club is functioning at the institute for recreation and community activities. During the year, the institute also established a Staff Welfare Committee as per ICAR guidelines. The organizational structure of the Institute during the period has been depicted in the adjoining illustration.

Prioritization monitoring and evaluation cell

The PME Cell is responsible for prioritizing research programmes of the Institute. In addition to the report on major actionable points to be submitted to Cabinet Secretary, Govt. of India, it is also responsible for preparation/compilation of monthly, quarterly, six monthly progress reports and annual report etc. of the Institute. The cell is also assigned the duties of arranging IRC meetings of the Institute and maintenance of the Research Projects Files (RPFs) of the scientists.

Forage production and conservation

The Institute is spread over an area of 1,057 acres out of which about 30 percent of the area is under fodder production. During the period, 37,741 qtls of green fodder was produced in Rabi and Kharif seasons, 1,674 qtls of green fodder was purchased, out of which 8,240 qtls of green fodder was used for silage production. At sub-campus Nabha, 33,205 qtls of green fodder was produced and 1,694.1 qtls of dry straw was produced. 3,800 qtls of green fodder was used for silage preparation.

Semen freezing laboratory

A semen freezing laboratory has been established at the Institute having all the internationally acclaimed facilities for collection, processing, freezing and preservation of semen as per OIE guidelines to fulfill the requirements of the Network Project on Buffalo Improvement and to meet the demand for supply of certified Murrah buffalo semen.



AKMU

The AKMU maintains the website (<http://www.cirb.gov.in>) of the Institute and provides computing facilities to the scientific and other staff of the Institute. Apart from this it maintains the Email and internet connectivity. During the year high speed internet connectivity was provided for the scientists and officials. New website of the institute is nearly complete and shall be hosted during the next year.

Library

The Institute has a well maintained library having subscription of 21 Indian and 6 foreign journals related to disciplines of buffalo production, reproduction and health. The Library also contains 906 books on different disciplines of animal sciences including buffalo production, biotechnology, physiology, nutrition, genetics, management, biochemistry, veterinary science and agriculture to meet the requirements of scientists.

Workshop and estate section

The workshop is primarily responsible for maintenance and repair of vehicles and farm implements while estate section is responsible for the repair and maintenance needs of the office building/animal farm and residential complex. Estate section is also responsible for supervising all construction works at the Institute.

Electrical unit

It is responsible for smooth supply of electricity and also for repair/maintenance of all the electrical/electronic items. It has 11 KV sub-station and a 110 KVA generator set that ensures continuous power to the laboratories and offices.

Guest house

The Institute has a Guest House with fourteen well furnished rooms that can accommodate 25 persons. It has a spacious reception with attached well furnished lounge and dining hall to cater to requirements of visitors as well as for get-togethers of Institute fraternity.

Feed unit

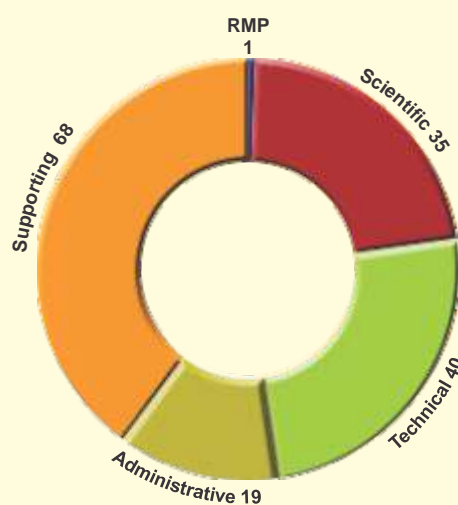
The Institute has facilities to formulate and produce concentrate feed for its livestock as per their specific needs. For this purpose, the unit has fully automatic

feed grinder cum mixer with a capacity of preparing 10 quintals of concentrate mixture/hour. It also has a complete feed block making machine to make complete feed blocks.

Staff position

The staff position of Central Institute for Research on buffaloes (including sub-campus Nabha) as on March 31, 2010 is given in the figure

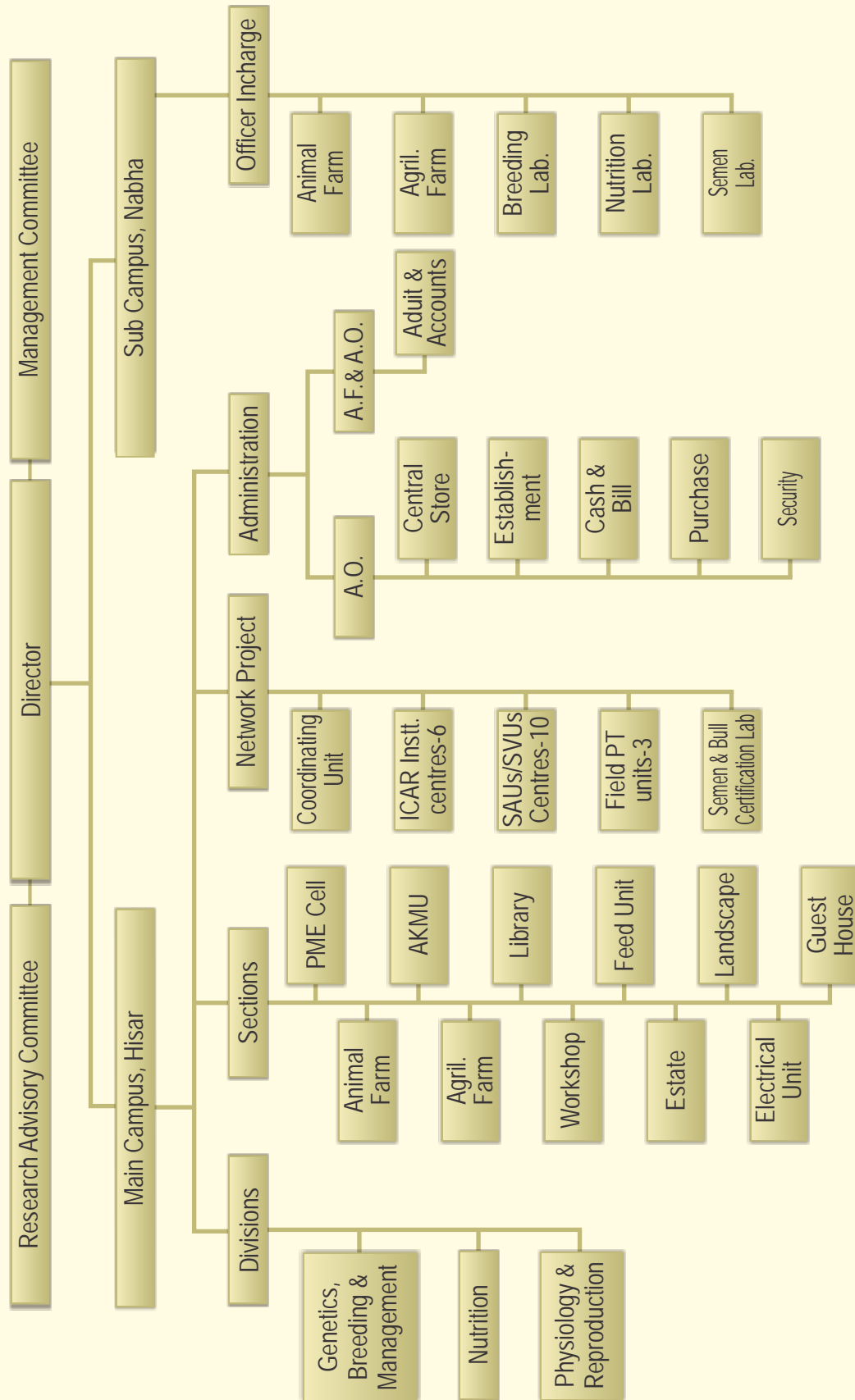
Existing staff strength of the Institute as on 31.03.2011



Financial Outlay

Head	Budget (In lakh)	Non-Plan 2009-10	Plan 2009-10	Total	Non-Plan 2010-11	Plan 2010-11	Total
Institute	Sanctioned	1186.19	250	1436.19	1313	383	1696
	Expenditure	1186.19	250	1436.19	1299.11	383	1682.11
Network Project (B)	Sanctioned	0	250	250	0	295	295
	Expenditure	0	249.98	249.98	0	295	295
Buffalo Genomics	Sanctioned	0	17.81	17.81	0	26.06	26.06
	Expenditure	0	10.37	10.37	0	19.7	19.7
AICRP (Feed res.)	Sanctioned	0	7.48	7.48	0	8.44	8.44
	Expenditure	0	6.39	6.39	0	7.87	7.87
NAIP	Sanctioned	0	60.94	60.94	0	34.94	34.94
	Expenditure	0	52.94	52.94	0	19.4	19.4
DBT	Sanctioned	0	15.29	15.29	0	5.55	5.55
	Expenditure	0	10.73	10.73	0	4.78	4.78
ITM & IPR	Sanctioned	0	5.63	5.63	0	4.38	4.38
	Expenditure	0	0.78	0.78	0	4.26	4.26
Contract Research	Sanctioned	0		0	0	2.51	2.51
	Expenditure	0		0	0	2.07	2.07
Revenue Receipt		162.65	0	162.65	177.15		177.15

Organogram





Research Achievements

Genetic Resource Improvement Programme

India is endowed with substantial gene pool of buffalo germplasm which includes about a dozen well-defined breeds and a vast population of non-descript type. Being a multipurpose animal providing milk, meat and draft, buffalo remains the primary source of livelihood subsistence for millions of small holder farmers in India and also occupies an important place in the economy of several other countries. India has over 106.3 million buffaloes constituting about 57 per cent of the total world population. Despite being less in number than cattle in the country (180 million) buffaloes currently produce 56 million metric tons of milk which is about 52 per cent of the total milk produced from buffaloes (FAO, 2008). Besides milk, 1.62 million metric tons of meat is produced from this animal. Buffalo draft power also accounts for about 10 per cent of the total draft power contributed by the work animals in the country. In addition to milk, meat and draft buffaloes also produce 0.52 million metric tones of skin and hides in the country. Thus, the buffalo, though a neglected animal has a great significance for the country as a whole and for the village community in particular.

Genetic improvement of buffalo

Network project on buffalo improvement:

Conservation, propagation and genetic improvement programme of different breeds of Buffalo is continuing under the Network project on buffalo improvement.

During the period under report test mating of 12th set Murrah bulls was in progress at different centres. 13th set of test mating shall start from July 2011. Preliminary selection of 13th set of bull is in progress and it will be finalized in the month of June so that the selected bull can be used for test mating.

8th set progeny test evaluation of bulls is in progress. Top ranked PT bulls will be used for nominated mating from July 2011.

During the period under report the fourth set of Nili-Ravi bulls is being used for breed able females at farm under network programme and performance of progenies is being recorded. Young males screened & preliminary selected for fifth set of Network. Semen from three Nili Ravi bulls collected from the field and processed after routine testing. This will be used along with fifth set of bulls for nominated services. Bulls / Males of Nili Ravi breed with good dam's yield are provided to the farmers as an integral part of this breed improvement programme.

Field progeny testing: Under the FPT programme 14190 artificial insemination were done in Murrah during 2010-11 in adopted village at GADVASU, CIRB and NDRI with the overall conception rate of 38.44 per cent. Milk recording on 357 animals was done. In the adopted village of surti and Pandharpuri 23436 AI were done with 45.69 percent conception rate.

Field performance during the year 2010-11 in Murrah

Murrah unit	AI	PD	Conception rate	Total calving	Daughters born	Daughters calved	Completed Milk Recording
GADVASU	6846	2289	33.44	1277	603	142	79
CIRB	3419	1669	48.81	1279	634	48	65
NDRI	2747	1044*	50.90	1140	517	356	213
Grand Total	13012	5002	38.44	3696	1754	546	357

*PD up to Dec., 10

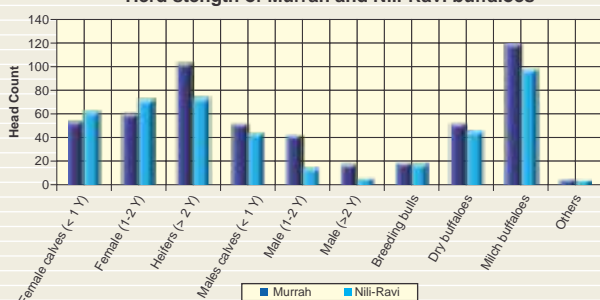
Field performance during the year 2010-11 in other breeds

Other Breed	AI	PD	Conception rate	Total calving	Daughters born	Daughters calved	Completed Milk Recording
Surti	2038	628	30.81	526	223	27	43
Pandharpuri	21398	10079	47.10	6230	2666	64	44
Grand Total	23436	10707	45.69	6756	2889	91	87

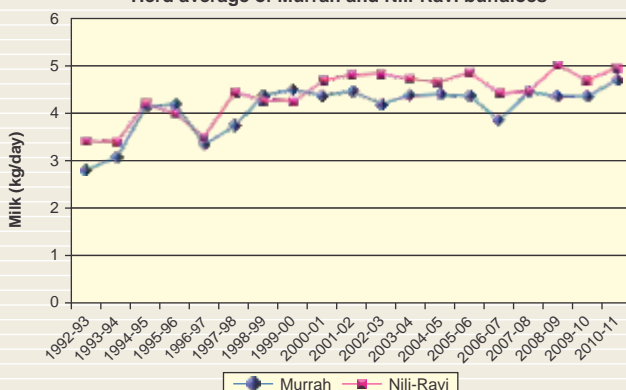
Buffalo herd performance at CIRB

Herd strength: The herd strength of Murrah and Nili-Ravi buffalo is presented in figure below. The herd strength was 522 and 442 animal of Murrah and Nili-Ravi, respectively. During the period of report 120 Murrah calves were added due to birth. A total of 130 (47 males and 83 females) animals of Murrah and 144 animal of Nili Ravi breed were culled/auctioned in 2010-11.

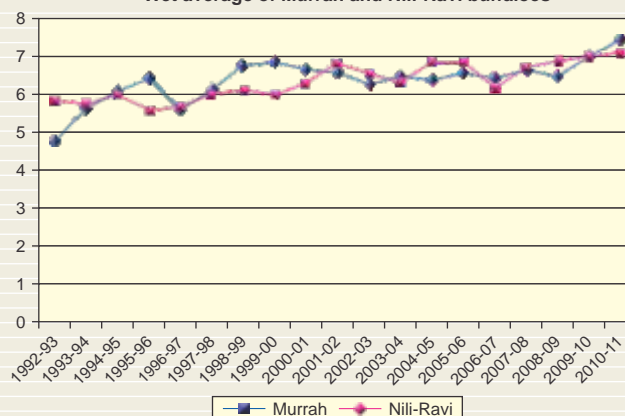
Herd strength of Murrah and Nili-Ravi buffaloes



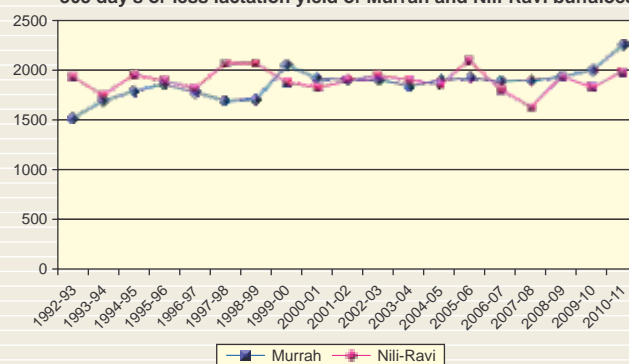
Herd average of Murrah and Nili-Ravi buffaloes



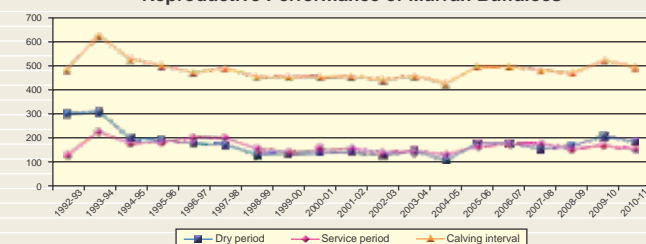
Wet average of Murrah and Nili-Ravi buffaloes

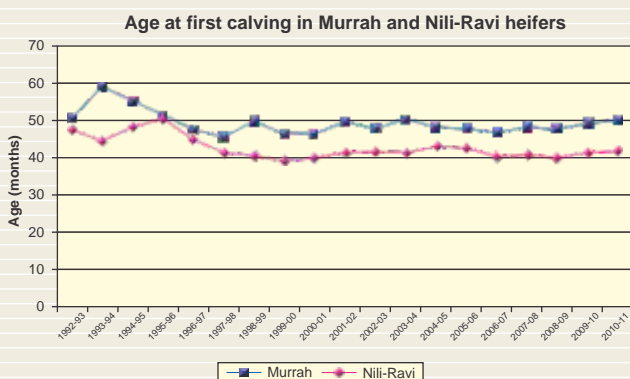


305 day's or less lactation yield of Murrah and Nili-Ravi buffaloes



Reproductive Performance of Murrah Buffaloes





Mortality

The overall mortality was 4.99 (females: 4.27 and males 6.88 percent) and 2.91 percent for the Murrah and Nili-Ravi breeds at the two campuses, respectively.

Milk production performance

Murrah: The overall wet and herd averages were reported to be 7.45 and 4.69 kg, respectively, which showed improvement of 6.28 and 7.82 percent in wet and herd averages over the year 2009-10. Wet average was recorded as 9.50 kg. in the month of February which was highest since inception of the institute against the previous record of 8.8 kg. The overall 305 days lactation milk yield and total lactation milk yield during 2010-11 was reported to be 2247 and 2450 kg., respectively which improved to the tune of 12.62 and 7.18 percent respectively from previous year. The average peak yield (10.46 ± 0.21 kg.) during the year was also higher than the previous year (9.54 kg.). Out of 171 buffaloes, 119 were in milk and 52 were dry.

Nili-Ravi: Average total lactation yield during 2010-11 was 2042 kg which is 125kg higher than the previous year average. Overall wet and herd averages during 2010-11 were 7.11 and 4.93 kg, respectively which is also higher than the values observed in the previous year (wet average: 7.0 and herd average: 4.66). Wet average was highest since the inception of the sub-campus.

Reproductive performance:

Murrah: The overall conception rate during the period under report was 42.92 percent (heifers: 54.80 and Buffaloes: 39.0 percent). The other reproductive traits

Viz. Age at first calving, service period and calving interval were observed to be 49.92 months, 186 days, and 492 days, respectively. Reproductive traits significantly improved as compared to last year performance for calving interval (520 days) and service period (212 days).

The overall mean body weight at birth in male and female calves were observed to be 33.82 ± 0.55 and 31.96 ± 0.52 kg., respectively. Body weight of young and adult animals for males and females were found to be 230.50 ± 17.10 , 314.76 ± 12.48 , 407.55 ± 16.57 and 550.15 ± 8.30 kg., respectively. Nili Ravi females heifers achieved more than 300 kg body weight at 24 months of age.

Nili Ravi: Overall fertility was 38.12 % in females and bull wise it ranged from 15.38 to 100.0 %. The average age at first calving was 41.1 months, which is optimum. Overall service period and calving interval period was 191 and 500 days, respectively. Female conception rate during the period 2010-11 was 38.12%; the majority of buffaloes were conceived during Oct. to Jan.

Progeny testing of bulls under field conditions

Under field progeny testing program (FPT) at CIRB Hisar, semen of test bulls is used from Network Project on Buffalo Improvement on approximately 4000 buffaloes in the adopted villages by the institute. This has to be followed by pregnancy diagnosis, calving of buffaloes and follow up of progenies till the completion of first lactation milk records on the basis of monthly test day recording. In addition to the already adopted villages one more village namely Baado Patti was adopted in May, 2010. During the period under report 3433 artificial inseminations with the test bulls were performed in nine adopted villages. The semen of 12 bulls of set XII was used for insemination. In all 1669 pregnancies were confirmed and 1279 calvings were recorded, out of which 645 were males and 634 were females. Data were also analyzed for bull wise - AI, conception and calvings during the year. The bull wise progenies at different field unit centres were identified. As on 31 March 2011, 728 female progenies were

available at various field unit centres of CIRB Hisar. Out of which 376, 261, and 44 daughters were less than one year, 1-3 years and more than three years of age, respectively. Forty eight daughters calved at various centres during the year. Recording of 35 daughters was in progress, while 13 daughters were sold before the completion of lactation.

Genetic trends in Murrah and Nili-Ravi

Available information on 10634 records during 1966-10 and 4477 records during 1972-10 were collected from Murrah and Niliravi buffalo herds maintained at CIRB, Hisar and its Sub-campus Nabha respectively. The pedigree was structured up to the level of seven generations in both the breeds indicating the specific performance trends of principal individuals' ancestry. The data used for further analysis were adjusted for the Least Squares constants of significant fixed effects.

The estimates of generation interval (GI) were 7.09 years and 5.75 Years in Murrah and Niliravi buffaloes respectively which were equally distributed in both sexes of two breeds.

Assessment of current status of Nili-Ravi breed

Assessment of current status, breed characteristics and genetic structure of Nili-Ravi buffaloes was done in its breeding tract. Detailed survey was conducted in nine blocks in the Nili Ravi tract. During the period survey was carried out in the block(s) of Ajnala in Amritsar, Dera Baba Nanak and Batala in Gurdaspur, Tarn tarn and Patti in Tarn Tarn and Ferozepur, Abohar, Mamdot and Guru Har Sahai in Ferozepur district. Data processed from six blocks indicates that 31 percent buffaloes among 6125 buffaloes were having Nili Ravi characters. Status of Nili Ravi animals with white markings on Forehead, eyes, fore-legs, hind legs, muzzle, chin, tail, entire face and half face found to be 98, 92, 53, 90, 35, 35, 98, 4.4 and 35 per cent in the surveyed buffaloes. Blood samples were collected from the various groups of buffaloes from the field and has been supplied to NBAGR, Karnal for micro satellite genotyping.

Buffalo genomics

Single nucleotide polymorphism study of the leptin, its receptor gene in relation to milk traits viz. milk yields, milk protein, milk fat percentages, milk lactose of Murrah buffaloes (n=102) of different parity were

Average milk constituents (%) of Murrah buffaloes during 2010-11

Month	n	Fat	SNF	Protein	Lactose
April 10	123	8.06 ± 0.08	8.19 ± 0.07	3.45 ± 0.02	4.46 ± 0.03
May 10	121	8.09 ± 0.06	8.28 ± 0.06	3.46 ± 0.02	4.44 ± 0.02
June 10	116	8.21 ± 0.07	8.62 ± 0.07	3.58 ± 0.02	4.61 ± 0.03
July 10	100	8.17 ± 0.08	8.64 ± 0.06	3.57 ± 0.02	4.64 ± 0.03
August 10	95	8.12 ± 0.07	8.64 ± 0.05	3.50 ± 0.02	4.61 ± 0.03
September 10	83	8.19 ± 0.08	8.55 ± 0.06	3.39 ± 0.02	4.54 ± 0.03
October 10	89	7.71 ± 0.12	8.59 ± 0.05	3.47 ± 0.02	4.53 ± 0.03
November 10	100	7.42 ± 0.13	8.52 ± 0.05	3.51 ± 0.02	4.50 ± 0.03
December 10	104	7.48 ± 0.12	8.74 ± 0.06	3.58 ± 0.02	4.60 ± 0.02
January 11	107	7.30 ± 0.10	8.58 ± 0.05	3.50 ± 0.02	4.46 ± 0.02
February 11	106	7.37 ± 0.09	8.53 ± 0.05	3.45 ± 0.02	4.44 ± 0.02
March 11	113	7.60 ± 0.08	8.59 ± 0.04	3.40 ± 0.01	4.44 ± 0.02
Overall	1257	7.81 ± 0.03	8.53 ± 0.02	3.49 ± 0.01	4.52 ±

panel for genotyping, duncan's multiple range tests for fat, protein and lactose showed that season wise there was significant difference in the fat percentage. It was higher in summer than winter. Parity wise there was no significant difference. The protein percentage significantly differed among animals. In lactose there is no significant difference by season and across the animals. However animal no 3414 had the highest lactose percentage (4.90).

Under the buffalo genomics, SNPs identification in the genes related to meat production and their association with meat parameters has also been initiated. In this experiment 29 male calves born during October November and December were selected for feeding trial. Their body wt at birth were recorded. Further body wt at periodic interval will be taken and animals will be fed with high protein and High energy ration for better growth and one control group will also be taken and will be provided with maintenance ration only.

DNA polymorphic sequences in relation to fertility traits in buffalo bulls

Field conception rate is only available tool for fertility assessment in bulls which inherits problems of long interval of maturity attainment in animals and a large variation in field AI success. Identification of biological markers and molecular markers related to the bull conception rate are need of the day. Data on field conception rate of more than 80 bulls was collected from field units reports under Network centres.

Database was prepared on conception rate of bulls since 2000-01 till date and up-dates were made as per the reports of current year. Field conception of buffalo bulls ranged from 17.7 to 74.5 percent. Genotyping of thirty-five buffalo bulls was done. Partial gene product of Seminal plasma proteins was amplified by PCR in bulls categorized under high, medium and low conception rate, using bovine gene sequence based primers. PCR product was polymorphic. Sperm motility, rapid motility and Progressive motility varied from 24 to 64.5, 12.89 to 51.06 and 7.5 to 35.5 percent, as determined by CASA. Sperm head size varied between 4.7 to 12.5 percent. The genetic polymorphism identified in this study has been related with the semen quality attributes and conception rate in bulls. Percent cleavage of the fertilized oocytes was studied using semen from ten of these bulls. In vitro fertilization rate was related with field conception rate. Biochemical profiling (oxidative stress) of semen was done to assess the metabolic status of spermatozoa. Activity of oxidative stress managing enzymes as MDA, GPx and SOD were estimated in a few bulls. Our findings suggest that bubaline seminal fluid protein gene is highly conserved with respect to bovine and PCR product of partial gene is polymorphic with respect to the sperm motility and conception rate in buffalo bulls. Sperm rapid motility, ratio of progressive vs rapid motility are considerable attributes for assessing conception rate and so the fertility in bulls.



Improvement of Reproductive Efficiency Programme

Improvement of reproductive efficiency of buffalo is a major program under which research on both male and female reproductive aspects is undertaken at CIRB, Hisar. This is looked after by scientists in the Division of Buffalo Physiology and Reproduction, through investigations in application of reproductive biotechnology; which include integrated SOET and MOET for faster multiplication of elite buffaloes, cloning for conservation and multiplication of superior buffalo germplasm and stem cell research in buffaloes. These programs are under taken for faster multiplication using modern biotechnological tools with current knowledge.

For increasing reproductive efficiency of female buffaloes efficient estrus detection, early pregnancy diagnosis and prevention and amelioration of infertility including early embryonic mortality are the ongoing research areas.

In the male buffalo's optimum production of quality frozen semen from elite bulls for fast multiplication of superior germplasm and its conservation includes experiments to find more suitable cryoprotectants for semen preservation and to see effect of cryopreservation on integrity of buffalo sperm membrane. As it is known that success of semen freezing depends on numerous factors which are peculiar to each species and optimized according to the type of semen to be preserved. Buffalo spermatozoa are more susceptible to freezing hazards than cattle

spermatozoa. Therefore, studies have been planned to update assays to monitor deterioration in sperm membranes, DNA, presence of apoptotic spermatozoa and its relationship with fertility which may help in selection of breeding bulls. To make best use of the bulls existing with farmers, semen from the champion bulls having prize tag from different competitions is collected at the door of the farmer and is frozen in laboratory of the institute. This semen is made available to the owners of the bull as well as to the interested farmers.

In the dairy animals milk is the most important product and udder is the site for milk synthesis and its hygienic delivery for human use. In this division udder function, health and hygiene, changes during udder development, changes and function in different phases, gene expression of proteolytic systems and growth regulators in the mammary gland and skeletal muscles of buffalo are also being studied.

The ultimate aim of research is fulfilled when it is transferred to the end users by symbiotic linkages with farmers and field functionaries, publication of scientific literature for farmers and motivation for adoption of modern technologies through trainings in AI and buffalo production. These technologies are transferred through various Kisan Melas, Kisan Gosthis, Clinical Camps and radio / TV talks, as well as through specialized trainings.

Integrated SOET and MOET

Eight donors were programmed for single and multiple ovulations at induced or natural estrus and superovulation during Dec-Jan. Eight donors were flushed for single embryo. Two good quality embryos (Morula and Early blastocyst) were recovered and frozen. Subsequently, donors were administered 580 mg FSH in descending dose schedule. Animals were inseminated thrice with frozen thawed semen of PT bulls. Donors were daily monitored for follicle development and ovulation. The superovulation treatment schedule included.

- Start of SOV: D 9/10 of cycle
- Hormone : FSH (Folltropin V) 20 mg/ml
- 0-5, 5-4, 4-3, 3-2, 2-1(ml, morning and evening) Total dose 580 mg
- PG on day 4 of treatment, AI 48, 60 and 72 h after PG
- Nonsurgical embryo collection on d 6 of superovulated estrus
- Flushing media: DPBS + 0.1% BSA, Holding media: DPBS+0.4%BSA
- U/S Examination daily/ alternate days from start of SOV till flushing

Superovulatory response of treated donors was characterized by:

- 3/8: Mid cycle ovulations within 60 h of SOV - Largest DF at treatment (11.5,13.8,11 mm)
- 3/8: Mid cycle heats with regression of CL during SOV treatment

- 2/8: No asynchronous ovulation
- Embryo recovery is shown in the table.

Donors programming at second cycle:

After a rest of approximately one estrous cycle all eight donors were again put into SOET/MOET cycle. Considering mid cycle estrus during SOV and ovulation of large DF under progesterone dominant environment, it was planned to aspirate large DF before start of FSH treatment. Large DF were ablated using ultrasound guided ovum pickup needle guidance.

Rebreeding of donors for normal pregnancy:

After SOET-MOET cycle, 6/8 donors were inseminated to continue normal reproductive function.

Cloning for conservation and multiplication

Tissue fixation: Plasma is used for fixing tissue for initiation of primary culture to get fibroblast cells. Plasma was harvested from blood collected from healthy animal in tubes containing anticoagulant EDTA or Citrate and stored frozen at -20°C, After thawing plasma tubes on ice, 100µl 0.5M CaCl₂ (1:5) is added to reverse the process for coagulation before usage of the aliquots.

Primary culture initiation: Tiny drops of re-calcified plasma were prepared in 25mm culture flask. Small sub-dermal ear pinna tissue collected from buffalo calves just after birth. After 1-2 days the cells start coming out of the tissues and make primary culture. These cells were passages after getting confluent cultures.

Embryo recovery and transfer with SOET and MOET technologies

Cycle	Technique	Total flushings	Total embryos recovered	Viable Embryos recovered	Remark
1st Cycle	SOET	8	2	2	Frozen
	MOET	8	6	5	4 transfer/1 pregnancy
2nd Cycle	SOET	7	1	1	1Transfer/1 pregnancy
	MOET	8	17	13	8 transfer/3 pregnancy 4 Frozen (1transfer/0 pregnancy)

Cell freezing: The fibroblast was recovered by trypsinization. The time required for cells to detach in the presence of trypsin varies depending on cell density, age of culture and temperature of trypsin. Therefore, instead of providing fixed incubation time in trypsin, frequent checking under microscope was done to assess complete trypsinization. The cells were frozen using three cryoprotectants by using standardized protocol.

Cell culture from superior calf: The ear pinna of a calf from superior dam and bull was collected to initiate the primary culture. The primary cultures grown successful and resulted in cells which could be cultured up to 12 passages. The culture medium used for this purpose was DMEM with 10% serum. These cells were multiplied after 80% confluency. The cells were frozen in 1ml aliquot in freezing medium with three cryoprotectants.

Isolation, culture and characterization of adult stem cells

Histological studies were conducted to see the effect of fetal age (50-100 days of gestation) on composition of mucosubstances in Wharton's Jelly from umbilical cord. Mucosubstances or mucopolysaccharides play role in proliferation of cells. Matrix of umbilical cord at all stages had heterogeneous cell population with round, elongated and fibroblast like morphology. Histological sections show two arteries and two veins in early fetus and one vein starts disappearing as the fetal age increases.

In order to study the effect of growth factors (LIF, EGF and FGF) on multiplication potential and passage time for cells from amniotic fluid, umbilical cord matrix and fetal fibroblast cells it was observed that the cells cultured with growth factors started differentiating after 10 -12 passages and instead of growing for longer time stopped growing after differentiation. In continuation of work on characterization of cell cultures for properties of stemness through physical, biochemical and molecular markers, cells from all sources (remaining) at an interval of five passages were found positive for AP staining. Karyotyping for amniotic fluid cells, umbilical cord matrix cells and fetal explant cells indicate these cells maintain a normal chromosome number up to their respective maximum passage in culture.

Molecular characterization: The expression of transcriptional factors Nanog, Oct-4, Sox-2A and Sox-2B were in rest of the cell passages from all sources in details are presented in the table.

Sequencing: The amplicon sequences were aligned with published sequences from other species and homology was checked using the BLAST. A homology range of 89-100% for all the four respective gene sequences was seen with already submitted sequences of species like *Bubalus bubalis*, *Bos taurus*, *Equus caballus*, *Mus musculus*, *Ovis aries* and porcine and Human DNA sequence.

Real time PCR for relative quantification: Changes in

Presence of transcription factors Nanog, Oct-4, Sox -2 A and Sox -2B in buffalo cells amniotic fluid (AF), fetal explant (FE), umbilical cord matrix & amniotic membrane (AM) at different passages.

Tissue / Cells	Nanog	Oct-4	Sox-2A	Sox2-B
AF P2 to 20	+	+	+	+
AF P22	-	-	-	-
FE P2 to 30	+	+	+	+
FE P35-45	+	+	+	-
AM-Tissue	+	-	+	-
AM-P10	+	+	+	-

relative expression of transcriptional factors were determined by quantitative real time PCR. Real-time quantitative PCR was conducted with Q-PCR 600548 Kit (Stratagene, La Jolla, CA, United States) using SYBR green fluorescence dye. The primers used for Real Time PCR were the same as used for reverse transcription.

Quantitative analysis: In AF cells the expression of Nanog was down regulated in P20 in comparison at P2 cells while there was upregulation of Oct-4, Sox-2 A & B genes cells at P20 in comparison with P2. The relative expression in fetal explant cells showed that Nanog expression was unregulated initially which downregulate at advance stages. On the other hand, expression of Oct-4 and Sox-2 was gradually upregulated.

Plasticity of identified cells: These cells were given differentiation treatment with standard protocols for ES cells for osteogenic, adipogenic, neural cells and pancreatic cells. Morphologically cells have shown characteristics of respective cells. The cells were positive for oilo red and alzirin positive on adipogenic and osteogenic type cells. The molecular expression of the respective cells were not expressed in differentiated cells.

Semen production and dissemination

Semen collection was performed at the farmers' door step and then transported to semen freezing lab for cryopreservation. Under this project ~9000 semen doses were frozen from eight true to breed prize winner Murrah buffalo bulls kept by the progressive farmers. Semen of some of these bulls is being used in Network Project for progeny testing programme and also being sold to the farmers for the breed improvement. Semen of farmers' bulls was having optimum fertility in the field and at institute farm. Post-thaw sperm motility was also equal to that of semen collected and frozen in the institute/laboratory.

Effect of cryopreservation on integrity of buffalo sperm membrane and DNA

Freezing–thawing of buffalo spermatozoa causes considerable damage to motility apparatus, plasma membrane and acrosomal cap, leakage of intracellular enzymes and cause DNA damage in bull sperm. The plasma membrane surrounds the entire sperm cell holding together its organelles and intracellular components and by its semi-permeable features maintains the chemical gradient of ions and other soluble components. If the sperm plasma membrane is not functionally intact the sperm is considered deteriorated (dead) and in vivo is not capable to fertilize. Intact acrosome membrane makes sperm capable of undergoing capacitaion changes and



Evaluation of acrosome integrity through Lectin-FITC assay

thereby allowing the acrosome reaction to occurs. So, in order to know the effect of cryopreservation on buffalo bull sperm functionality, the sperm motility, kinetic parameters and viability was assessed by CASA during different stages of cryopreservation and found that total motility, progressive motility, rapid motility and viability significantly reduced (54.6%, 24.0%, 41.4% and 69.0%, respectively) in frozen thawed semen as compared to fresh (77.8%, 48.3%, 72.3% and 90.5%) and equilibrated semen sample (71.9%, 48.2%, 66.0% and 90.5%). However, analysis of acrosomal integrity during different stages of cryopreservation was performed through Lectin-FITC assay, where intact acrosome showed more intense fluorescence in the acrosome region and lesser label in the remaining head

region and a distinct ring was observed. However the damaged sperm heads were stained throughout with the same intensity and no ring was observed as shown in figure. This assay was performed in fresh and equilibrated semen sample showed 85-90% intact acrosome whereas after cryopreservation 70-83% intact acrosomes were recorded.

Gene expression of proteolytic systems and growth regulators in Mastitis

All the lactating buffaloes of the institute farm were screened for incidence of mastitis with the aid of California Mastitis Test (CMT). A total of 13 lactating buffaloes were found to be positive with CMT. Ten ml milk samples of all positive cases with CMT were immediately sent for Microbiological Culture (in collaboration with HAU, Hisar) for confirmation of mastitis, identification of microorganisms and susceptibility to different antibiotics. A total of 11 samples out of 13 were found to be positive [5-streptococci & Subclinical; 2-streptococci & clinical; 2 mixed (Staphylococci + Streptococci) & sub-clinical and 2 Mixed (Staphylococci + Streptococci) & clinical]. Somatic cell count (SCC) of positive cases was done manually. Based on SCC $>5 \times 10^5$ cases were called clinical and with $< 5 \times 10^5$ cells subclinical. Milk samples (50 ml) were taken from each affected quarter of udder for RNA isolation. Milk samples were then processed for further down-stream processing. Primers were designed and synthesized from Sigma-Aldrich for amplification of genes of proteolytic system (CAPN2, Caspase-3, CTSD, UBC) and Growth regulators (IL-1 β , IL-10, IL-12A and IL-12B).

For RNA extraction, the freshly suspended somatic cells and cells after 2-3 weeks of storage (at -20°C) were used. Almost same yield of total RNA was obtained from both the samples. The yield of total RNA was found between 250-600 ng/ml. The total RNA isolated with this protocol and with acceptable purity (i.e. ratio 1.6-2.2) was used for first strand cDNA

synthesis. RNA integrity and quality was verified by running the samples in 0.8% agarose gel electrophoresis. The RNA samples were then treated with DNase to remove any possible DNA contamination.

Milk composition: Milk composition (fat %, protein%, lactose%, Total Solids, Solid Not Fat) of CMT positive cases were analyzed with automated milk analyzer at different stages and results are shown in Table.

Transcriptional analysis of HSP70 and GHR genes

Buffalo calves were kept on two dietary intake levels. Differential feeding for 90 days was completed with a 90-days realimentation period and three phase muscle biopsies were obtained which were snap-frozen for RNA analyses. RNA extraction using TRIzol method and preparation of cDNA from biopsies was done for Quantitative expression of HSP70 & GHR mRNA (in collaboration with NBAGR). Further column DNase treatment (RNeasy Mini Kit, Qiagen) was done for all the samples. Expression level of selected transcripts in muscle tissues was validated by quantitative real-time PCR using LightCycler 480 SYBR Green I Master Mix (Roche) and analyzed on LightCycler 480 machine. GAPDH was included as internal control for normalization of data. Results were expressed in terms of the crossing point (Cp) of the sample, the point at which the fluorescence of a sample rises above the background fluorescence. Final analysis of the data is being processed.

Identification of early pregnancy biomarkers

Based on farm records, ultrasonographic observations and non-return / return to estrus at the end of normal cycle length, weekly peripheral blood serum samples have been collected from 8 pregnant and 5 non-pregnant buffaloes, on days 0, 7, 14, 21, 28, 35 and 42

Milk composition in subclinical, clinical and normal cases (Mean±SE)

Stage	Density	Lactose%	Fat %	SNF%	Protein%
Clinical (N=11)	30.13±0.48	4.57±0.13	6.74±0.44	9.07±0.18	3.65±0.07
Sub clinical (N=25)	26.88±0.86	4.58±0.05	8.02±0.40	8.52±0.15	3.58±0.03
Normal (N=13)	26.91±1.10	4.73±0.11	8.50±0.72	8.62±0.17	3.64±0.04

of estrus / gestation. The serum was separated after coagulation and stored with protease inhibitor cocktail at -20°C for further analysis. From abattoir genitalia, amniotic fluid, allantoic fluid and uterine cavity fluid were collected from three gravid and two non-gravid uteri. All uteri were associated with corpus luteum bearing ovaries. The samples are kept frozen for further analysis.

Physiological and genomic regulation

process of follicular development, oocyte maturation and embryogenesis

Research was undertaken on follicular profiling in relation to superovulatory treatment of buffaloes including superovulatory response monitoring. The technique of ultrasound guided ovum pickup was standardized and necessary ova, follicular cells and follicular fluids were harvested during different



Improvement of Feed Resources

Buffaloes are typical herbivores and are primarily raised under crop-livestock sustainable production system where crop residues and agricultural by products constitute major available feed resources for livestock. India, with limited feed resources, has to economize feeding of buffaloes by maximizing utilization of feed resources. In order to achieve this objective, this institute has been working on various research projects which can be broadly categorized into following groups: a) determination of critical and limiting nutrients and development of supplementation strategies at farmers' level; b) unraveling diversity of rumen microbes and development of means of rumen manipulation to improve digestion of poor quality crop residues and also to reduce methane emission; c) development of suitable method of processing feed resources and d) determination of requirements of nutrients for economic buffalo production.

Effect of incorporation of limiting amino acids rich supplements on growth and maturity

All animals require amino acids (AA), the building blocks of proteins required for optimal growth, reproduction, lactation, and maintenance. To increase the total AA supply to the small intestine, it has become common practice to include supplemental rumen

undegradable protein (RUP or bypass protein) to rations of animals. Free AA are of little value in ruminant diets because they are degraded rapidly in the rumen. The relative proportions of each of the AA absorbed should exactly match the animal's requirements, because a shortage of one can limit the utilization of others. Lysine and methionine are two limiting amino acids. An alternate approach would be to include those RUP sources which are rich in these limiting amino acids or rumen protected amino acids (RPAA). Therefore, an experiment was planned to study the effect of feeding commercial RPAA *i.e.* lysine and methionine to the growing buffalo calves on growth and nutrient utilization. RPAA were supplemented @ 0.15 % of the DM intake as follows: G-I ration as per requirement, G-II only lysine was supplemented, G-III combination of lysine and methionine and G-IV only methionine was supplemented and the growth trial continued for about four and half months. The values for DM intake per 100 kg body weight were 2.33, 2.40, 2.61 and 2.40 in group I, II, III and IV, respectively. The values of DM digestibility for corresponding groups were 62.6, 65.4, 68.07 and 63.8%, respectively. The growth rate in all the groups also remained comparable and the values were 486, 533, 564 and 515 g/h/day, respectively. The data analysis is in progress

Raising male buffalo calves for meat production

This project was initiated in September, 2010 with the background that the male buffalo calves are let to die or sold at a nominal price by the buffalo owners/dairies. The buffalo owners perceive that the male buffalo calf rearing is not economical and find it difficult to sell the



buffalo calves. The main objective of this project is to evaluate the economical viability of male calf rearing for buffalo broiler production and to improve the profitability of buffalo production at the farmers' doorstep.

Some dairy owners from the peri-urban areas of Hisar district having male buffalo calves were selected for the study. Detailed interview schedule on selected variables-calf management practices, such as calf population, disease pattern, calf mortality, health management practices, feeding management of calves, etc. were recorded. All the constraints were also recorded. Experiment to be continued with more



number of buffalo calves at farmers' doorstep to evaluate the economical viability of male calves for meat and to develop a package of practice (feeding) for rearing these male buffalo calves at farmer's doorstep.

Studies on feeding of filter press mud waste to growing buffalo calves

Filter press mud waste is a byproduct of sugarcane industry. Two experiments on buffalo calves were undertaken to assess the possibility of feeding of filter press mud waste (FPMW) as partial replacement of concentrates mixture and to make the animal ration economical. FPMW was found to contain good amount of nutrients in terms of crude protein, ether extract and also rich in essential minerals like zinc, manganese and copper. Its procurement price at the sugar mill is about Rs 15/- quintal plus transportation cost. The study concluded that filter press mud waste in dried form, can be incorporated in any conventional concentrate mixture at 25% level for growing buffalo calves without any ill effect on their health, thus reducing the feeding cost by 10-15%.

Effect of Fenugreek seed (*Trigonella foenum-graecum*) supplementation

Fenugreek (*Trigonella foenum-graecum*) has been known for a long time for its medicinal properties and in recent years its beneficial effects on health, physiological attributes like galactagogue, digestive stimulant, cholesterol lowering and antioxidant effects have been evidenced in animal studies and human trials. Farmers often supplement fenugreek (methi) to their animals for improving general health status of the animal. However, reliable experimental evidence for dosage regimen and its effect on various physiological attributes are not available in buffaloes, therefore, the present study has been designed to evaluate some of these aspects. Twenty freshly calved buffaloes were selected and divided into two groups *i.e.* control and treatment. Treatment group was supplemented with fenugreek seed powder at the rate of 600 mg/per kg body weight in their conventional farm ration.

Supplementation started soon after calving and continued up to first AI in cyclic buffaloes and up to 60 days in acyclic buffalo. Five ml blood was collected in vacutainer tube containing heparin for hematology analysis and separation of plasma. Observation on reproductive efficiency was done with the help of ultra sonography of reproductive tract at regular interval to see the cyclicity of animal and uterine involution. Health status of experimental buffaloes is being monitored and analysis of data is in progress.

Evaluation of MFSH-4 multicut sorghum fodder

Five varieties of sorghum available in the market namely Ankur safed Sudan (V-1), Nuziveedu 1899 (V-2), Vibha White Pearl (V-3), MFSH-4 (V-4) and Desi Red Jawar (V-5) were sown in 20 acres of land and each variety was sown in 4 acres of land. Seed rate of each variety was 20.0 kg/acre. 25 kg DAP and 25 kg Urea/acre were added as basal dose and 25kg Urea/acre was added as top dressing per cut. The average yield was 183.45, 189.08, 179.20, 225.75 and 166.78 quintals per acre in V-1, V-2, V-3, V-4 and V-5 groups respectively. These five varieties of sorghum were fed to the lactating buffaloes. The experiment was

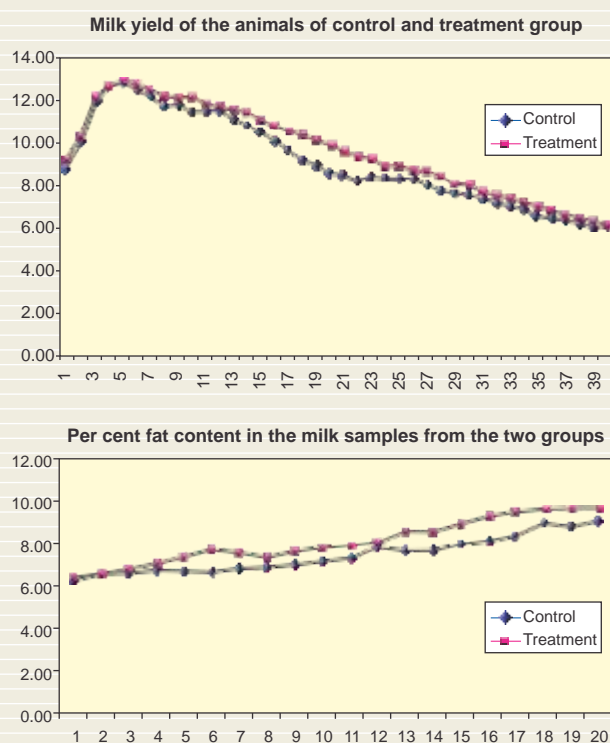
conducted for 4 months. The buffaloes were divided into five groups on the basis of their milk yield. The average milk production during the experimental period was 6.910, 6.825, 6.900, 7.060 and 6.000 kg/day in V-1, V-2, V-3, V-4 and V-5 fed group respectively. Milk fat percentage was 8.15, 7.91, 7.88, 8.04 and 8.38 in the above groups. The data is being analysed

Feeding of protected fat on high yielding buffaloes

An experiment on 24 high yielding buffaloes (Milk Yield > 8 Kg) divided in two groups (treatment and control, 12 each in few dairies in the vicinity of the Hisar district was conducted. The protected fat in powder form was obtained from GADVASU, Ludhiana. This fat is being supplemented to the treatment group @ 1.5% of the milk yield (i.e. 150 g/day to animals yielding 10 kg milk). Most of the buffaloes in the experiments calved in November and December. The recording of milk yield and quality were done for whole lactation. A significant improvement in the production performance was observed in the supplemented group. Further blood samples were collected from five animals each of the two groups and compared them for various blood parameters. No significant effect was observed in the blood profile of the two groups except for few parameters.

Field study on bypass protein supplementation

An experiment on twenty five animals was carried out under the field conditions in three groups. One group was control where the traditional feeding in the farmers field was not disturbed, Second group (treatment group I) where bypass protein material was supplemented @1% of milk yield over and above the traditional feeding. The third group (treatment group II) was replacement group where equivalent amount of traditional cotton seed cake was replaced by 500 gm of bypass protein material keeping the group iso-nitrogenous and iso-energy with the control group. The experiment was conducted for three months and the data were recorded on the milk yield and quality on weekly basis. The data is being analysed.



Studies on environmental pollutants and toxicants

The water samples from sewage waste and canal has been collected on monthly intervals. The analysis for heavy metals viz. Pb, Cr, Co and Cd is to be done. Fodders grown in different seasons have been collected from the fields irrigated with sewage and canal water of our institutes' farm. The samples have already been analysed for sorghum crop and the samples of oats and berseem is being analysed. Micronutrient and heavy metals contents analysis using AAS is yet to be done. For developing the database on aflatoxin contamination in animal feeds and fodder commonly fed to animals 132 samples have been analysed.

Predominant culturable fibrolytic fungi in buffalo rumen

Compositions of Anaerobic fungi in rumen content of buffaloes were evaluated by culture and morphological analysis in straw, berseem, jowar and mustard based diet. In all cases polycentric fungi *Orpinomyces* and *Anaeromyces* were found to be predominant. Similarly, the most predominant phylotype of rumen fungi were identified in buffalo rumen content by culture independent method that is preparation and sequencing of ITS library. Out of 140 sequences, 99 sequences clustered with sequences of strict anaerobic fungi were utilized for further analysis and 41 sequences phylogenetically affiliated to aerobic fungi were excluded. Out of the 12 operational taxonomic units (OTUs) of anaerobic fungi, 10 (97 of 99 clones) were affiliated with the genus *Orpinomyces*, indicating that the phylotypes belong to the genus *Orpinomyces* are the most dominant component of anaerobic fungal community in rumen of buffaloes. Other OTUs were affiliated with genus *Caecomyces* (1 clone) and *Cyllamyces* (1 clone). It was concluded that *Orpinomyces* phylotypes are the most dominant anaerobic fungi in rumen of buffaloes. Effective

strategies can be made to stimulate the growth of *Orpinomyces* phylotypes to increase fibre digestion in rumen of buffaloes.

Rumen microbial diversity and impact of additives on methanogenesis and utilization poor quality fibrous feeds

120 clones of archeal 16sRDNA clone library were sequenced and sequence data were subjected to BLAST and phylogenetic analysis to assess diversity of archea in rumen of buffaloes. The study indicated predominance of *Methanobacterium* genus in rumen of buffalo. For study of diversity of culturable fibre degrading bacteria 60 isolates of fibre degrading bacteria were isolated by repeated subculture and re isolation of colony. The isolates were preserved and genomic DNA of isolates were PCR amplified using universal bacterial primers for 16S rDNA. About 20 clones (each) of bacterial, archeal and SRB 16S rDNA clone library of buffalo rumen community DNA were prepared, plasmid isolated and verified for insert. *In-vivo* rumen fermentation trial and feeding trial has been completed with the best isolates of fibre degrading bacteria and sulphate reducing bacteria. The data of feeding experiments are being analysed.

Studies on the relationship of feed utilization, growth rate, milk production and its composition with genetic improvement

Genetic improvement programme in buffaloes has been going on in the country during the past fifty years under the AICRP and Network modes. As a result large amount of data/information has been generated on various production and reproduction aspects. Improvement in performance, however, has not been related to the nutrient inputs provided to the animals. Neither nutrient utilization studies have been conducted in animals (males as well as females) under specific sets of animals. As nutritional inputs constitute over seventy percent of the buffalo production

are of paramount importance; as improved animals would require quality/specified nutrients to become a more useful asset to their keepers.

The studies being undertaken under the project are, therefore, planned to assess and establish a relationship of nutrition (feed inputs) with performance (improvement) in buffaloes at the institute especially under the network mode (as per the availability of data for various sets over the years and availability of animals of existing sets for conducting digestibility/metabolic studies wherever necessary). During the period under report, data pertaining to the feed consumption (green, dry, concentrate) and milk production (total, per head (overall), herd average and wet average) by the CIRB herds (Murrah at Hisar and Nili-Ravi at Nabha) was mined and tabulated yearwise for the period from 1992-93 to 2006-07. Averages of results of this data were analysed for the three five yearly periods (1992-97, 1997-2002, 2002-07). Further mining of data on production and reproduction parameters is in progress.

Rumen ecosystem and its manipulation

Anaerobic microorganisms (protozoa, bacteria and fungi) inhabiting the rumen possess specific characteristics enabling them to survive and proliferate under various feeding situations. Their cell mass and

the end products from their fermentation are digested and absorbed to nourish the host ruminant. The rumen is still considered as a 'black box' and more so in buffaloes. Therefore, the project aims to gain and further improve the understanding of factors which control digestion and metabolism in ruminant animals especially buffaloes on common farm rations, with reference to the activities and contribution of the three groups of microbes.

Necessary background information/data were gathered and analyzed during the period under report. Further, microbial and biochemical aspects were studied in the rumen of fistulated buffalo steer given diets of 15% concentrate mixture plus 85% wheat straw (poor) or sorghum (medium) or berseem (high quality). Proximate composition of feeds and observations on microbial and fermentation aspects of the rumen on various diets were recorded. Further work (*in-vitro* studies) are being undertaken in the project.

Impact of exogenous enzymes supplementation on the digestibility and growth of buffalo calves

Exogenous enzymes (Cellulase and Xylanase) were supplemented through the diets to the growing heifer. Digestibility trial was conducted on 12 heifers. It was observed that digestibility of DM and OM was improved



Buffalo Management Programme

In this project on development of training modules nine trainings programmes of week's duration were organized for different categories of respondents in which 254 farmers/entrepreneurs/women/youth were trained. Pre and post evaluation of each training programme was done. Training need of different categories of respondents was worked out. On the basis of training need scores training modules for entrepreneurs, farmers, youth and women were developed.

In the training module for entrepreneurs following four items were included as they desired that they should be given information on some new technologies like preparation of mineral mixture, preparation of complete feed blocks, care and management of calves for meat production and importance of reproduction, heat detection and therapeutic control of estrous. They were also given additional information on feeding, care and management of different categories of buffaloes. Their training contents constituted 50% theory and 50% practical. With regard to the training contents for farmers, it was considered that there should be 60% practical and 40% theory. It was also planned to cover almost all the aspects of buffalo husbandry so that they are given comprehensive training on buffalo husbandry

in one week. As far as training contents for youth are concerned they specially desired to include nutrients in concentrate mixture and importance of reproduction in buffaloes. They also wanted that half of the time each should be devoted to theory and practical, respectively. It was also found that majority of the youth were in favor of a duration of 15 days. Perhaps they wanted more information on different topics to pursue it as a full time enterprise. Women also wanted 60% practical and 40% theory. Feeding requirements of dry, milch and pregnant buffaloes, management and reproduction of buffaloes during heat and importance of AI in buffaloes were the topics which were considered most important as they showed keen interest in feeding and reproduction of buffaloes.

The effect of washing frequency on the physiological responses and performance of Nili-Ravi buffalo calves was studied in hot summer. Thirty calves aged 4–6 months were divided into three uniform groups of ten each. The calves of group A, B and C were washed two (9 a.m. and 3 p.m.), three (8 a.m., 12 noon and 4 p.m.) and four (8 a.m., 11 a.m., 2 p.m. and 5 p.m.) times in a day, respectively. They were washed with water for 5 min at a stretch. The results showed that the mean total dry matter intake increased with the increase frequency

of washing. The highest mean daily body weight gain was recorded in group C followed by group B and A. There were statistically significant ($P < 0.05$) differences between the three washing groups. Calves were more comfortable with increase number of washing in a day in hot summer. The rectal temperature, pulse rate and respiration rate also varied significantly ($P < 0.05$) between the three experiment groups. It was concluded that daily four times washing during hot summer months had more beneficial effects over three and two times washing of young Nili-Ravi buffalo calves to decrease rectal temperature, pulse rate and respiration rate and to increase average feed utilization and daily gain under tropical climate.

Impact Analysis of training on calf management practices

Improvement in calf management practices to lower mortality rates and adding new dimensions of rearing calves for meat industry was a need-based issue for farmer's trainings held during current year. Pre and post evaluation of the training programme was conducted. Impact assessment of the training was done by developing a Questionnaire, comprising of 32 questions, as an evaluation tool for farmers trainees / respondent's attitude towards acquisition/adoption of improved scientific buffalo husbandry practices during training. Questions, related to healthy calf management practices for improving survivability rates of calves were attended by the responding buffalo keepers under different age groups before the lectures/discussions on the said issues and after the discussions. Analysis based on the knowledge test and

Judging Scores ascribed to each question revealed that farmers across different age groups differed significantly in opinion in at-least nine calf management practices on colostrum feeding for reducing mortality and wastage of germplasm like age at weaning, time at which solid feeding is initiated, time at start of colostrum feeding, impact of late colostrum feeding, vigilance towards mortality rates in calf and their impact on buffalo husbandry as a whole, etc. Data on colostrum feeding, particularly with respect to their pre-training and post training exposure were analyzed.

Colostrum based dietary formulations for calf health

Surplus colostrums was dried under control temperature and pressure, maintaining the quality by 'Spray Drying' method to improve the keeping quality of nutrient rich base dietary constituent for newly born calves. Optimization of temperatures and pressure conditions for developing moisture free, cream colour dry colostrums powder with maximum yield is done. Incidence of adherence of sticky powder on the wall of drying tower was reduced by 30% to achieve higher yield in dry powder. Dry matter was estimated in buffalo milk. Air-drying under regulated speed of rotation and permissible drying temperature were also tried. Dry colostrums obtained from the two methods are subjected to study quality of powder obtained. Analysis is underway. Physicochemical changes of powder are analyzed using NMR studies. Product will be fed to calves to study its effect on health and body weight. Study may help in developing colostrums bank in future.



Development of Technologies and their Transfer to End Users Since Inception

Production and maintenance of superior germplasm

Murrah and Nili-Ravi bulls of high genetic potential are bred at the Institute and its Sub Campus, Nabha. Young bull calves are selected on the basis of dam's milk yield and reared under intensive management system. The production potential of bulls is evaluated through progeny testing. The Institute has so far sold more than 432 Murrah bulls and 226 Nili-Ravi bulls of high genetic merit to village Panchayats and developmental agencies. These are expected to contribute towards overall improvement. A simple, reliable and economical method for freezing of buffalo semen has been developed. The improved procedure has been shown to be effective even to freeze the static ejaculates successfully a phenomenon specific to buffaloes which greatly reduces the efficiency of utilization of buffalo semen for artificial insemination.

Embryo transfer technology

Efforts have been made in developing and improving the embryo transfer technology for buffaloes which has resulted in the production of 16 calves at this Institute. Technology for large scale production of in-vitro matured and in-vitro fertilized embryos using slaughter house ovaries has been developed. Future projections include production of calves from IVM/IVF embryos and embryo micromanipulation. The embryo cryopreservation technique has also been standardized. For rapid

multiplication of superior female germplasm in buffaloes, the technique of in-vitro fertilization has the potential. This technique has been standardized for in-vitro maturation of oocytes obtained from abattoir ovaries followed by their in-vitro fertilization and culture of the resulting embryos to transferable stage. The technique will be of immense use for faster multiplication of elite germplasm and progeny testing of bulls after collecting oocytes from live animals.

Sexing of IVF produced embryos

Sexing of *in-vitro* produced embryos was successfully done with PCR technique using bovine primers. Micromanipulation of the embryos was done for obtaining biopsy for sexing.

Ultrasonography for monitoring ovarian activity

The non-invasive technique of ultrasonographic scanning was used for diagnosis of ovarian activity in pre-pubertal heifers, peripubertal heifers and parous buffaloes. The technique is very useful for detecting follicular dynamics and luteal structures in ovaries.

With the use of this technique, time of ovulation following estrus induction and synchronization therapy can be predicted very precisely to allow fixed time insemination without the need for estrus detection. This resulted in high fertility at induced estrus in anoestrus buffaloes and buffalo heifers. The technique proved very useful in modifying the conventional treatment

protocols according to the pre-treatment ovarian picture for obtaining maximum success rates for induction of estrus.

Early pregnancy diagnosis and fetal sex determination

Sonographic technique was used for confirmatory diagnosis of pregnancy in buffaloes as early as 25 days post insemination. Furthermore, fetal sex determination was made at day 55 postinsemination based on the location of the genital tubercle.

Estimation of gestational age

By ultrasonography fetal age can also be assessed accurately that is useful in better management of pregnant buffalo at the time of calving. The length of gestation in buffalo can be estimated by following standard chart that is plotted for crown-rump length of buffalo fetus on different days post-insemination. When this plot was used for determining the age of fetus in pregnant buffaloes of unknown mating, the exact date of mating (\pm days) could be predicted using this chart.

Ovsynch plus protocol for estrus induction

Anestrus, either in pubertal heifers or in postpartum buffaloes, is the primary cause for low reproductive output of buffaloes. Anestrus is the state of ovarian acyclicity, reflected by complete absence of sexual activity, with no manifestation of estrus signs. The condition is associated with the presence of static ovaries, and though follicular development may occur, none of the ovarian follicles becomes mature enough to ovulate. In anestrus animals, dominant follicles (DF) underwent atresia instead of ovulations, possibly due to inadequacy of preovulatory LH surge. Analysis of ovarian response of anestrus buffaloes to 'Ovsynch' protocol revealed that only the buffaloes with a large DF (>9 mm) at the time of first GnRH injection respond well to this treatment. However, such an accurate assessment of follicular size is difficult under field conditions with routine per-rectal palpation. Hence, to ensure consistently similar ovarian follicular picture of all anestrus buffaloes at the time of first GnRH injection, we developed a new protocol and named it 'Ovsynch Plus.' In this protocol, an injection of PMSG is administered 72 h prior to first GnRH injection of

Ovsynch treatment, in order to support ovarian follicular development so that at least one large follicle is available 72 h later for responding to the first GnRH injection with ovulation/ luteinization. Resulting luteal structure in the ovary is subjected to luteolysis by PGF given 7 days later. Further administration of GnRH ensures synchronous ovulations of preovulatory follicles to allow fixed time insemination of treated animals.

Induction of lactation

Farmers rear the dairy animals for milk production and livelihood but they are commonly facing the problems of conception failure, long calving interval, anoestrous, cystic ovaries, specific abortions and repeat breeding. They can benefit from the technique by inducing such animals into lactation and reduce herd culling losses and replacement costs by this therapy. The buffalo is weighed and appropriate dose of hormones, Estradiol-17 β and progesterone (Sigma Chemicals Company, USA) each @ 0.1 mg/kg body weight/ day is calculated for seven days therapy. The hormones are dissolved in 7 ml absolute ethanol each and stored in separate tubes. On the day of treatment, 1 ml of each hormone solution is mixed together and 1 ml of this mixture is administered in the morning and evening at an interval of 12 hours subcutaneously. Site of injection is kept alternating from left to right side in the prescapular region. The injection schedule is repeated for seven consecutive days. Thereafter, on day 17, 19 and 21 of treatment, 10 ml Largectil injection and on day 16, 18 and 20, injection of 20 mg of Dexamethasone are also given intramuscularly. From 15th day onwards upto 21st day of the start of treatment, udder massage is given for fifteen minutes each in the morning and evening daily to simulate milk let-down. This practice is followed till the udder is turgid with milk, which is usually around 21st day of treatment, when milking is started. The milk becomes normal in physical and chemical properties within 10 -15 days of start of milking and the amount of milk yield increases with time. Almost 60-75 percent of the buffalo's milk yield potential can be achieved following induced lactation.

Colostrum feeding for higher growth and better calf survivability

Higher levels of absorbed immunoglobulins within 16 h

of birth reduce the mortality in calves and result in faster growth rate by 20-22 percent. High titre of circulating immunoglobulins in calves at an early age of 24 h showed the association with weight gain upto the age of 2 years. Status of immunoglobulin levels at such an early age could also predict the health status of calves. A critical level of these blood proteins required for the survival of calves has been assessed.

Supplementation of antioxidants for higher immunoglobulin production and absorption

The nutritive value of low-grade roughages and straws available in the country can be improved if these straws are given 4 percent urea treatment at 35 percent DM and 65 percent moisture and are ensiled / stacked for a minimum period of 30 days. These can become a complete maintenance ration when fed ad-lib along with 3-5 kg green fodder, 50 g mineral mixture and salt each to the adult buffaloes. Protein content of straw is raised from 3.0 to 7.0 percent and energy content in terms of TDN (Total Digestible Nutrients) is raised from 40 to 50 percent. The technique involves : 4 kg urea dissolve in 200 liters of water and spray it on one quintal of wheat straw and mix it thoroughly just like Sanni is prepared by the farmers. In this way urea treated straw can be ensiled for 30 days. Open the pit after 40 days or stack after 10 days and straw is ready for feeding to adult animals. By feeding ammoniated wheat straw ad-lib + green berseem ad-lib + 1.5- 2.0 kg available grinded cereals like wheat/barley/maize, a body weight gain of 500-600g/h/d can be obtained in growing buffalo calves (6-12 months) and this technology can easily be adopted by the farmers.

Conservation of green forages as hay or silage

The commonly grown fodders in India are legumes like berseem, lucerne or cowpea and non-legumes i.e. maize, bajra (pearl-millet), sorghum, oats, barley, guinea grass, rye grass, napier grass etc. Legumes are recommended for hay making, whereas, nonlegumes are preferred for silage making.

Hay- making

The available legume crops have sufficient protein

content and they can be conserved by drying carefully into good quality hay which can replace the costly concentrate mixture in the growing and lactating buffaloes. The main legume crop is the berseem, which is surplus with the farmers in the month of March and April particularly in Northern India.

Silage making

Silage is generally prepared by wilting non-legume forage crops in the field and then chaffing (if required) the material at 35 percent DM. The fodder is pressed thoroughly and covered properly to create anaerobic environment. The silage is ready after 40 days and has the same nutritive value as the green crop.

Uromol preparation

Uromol is a compound prepared by heating urea and molasses in the ratio of 1 : 3 and then mixing it with equal amount of wheat bran/deoiled rice bran. Four kg urea along with 12 kg molasses is slowly heated in a container for 30 minutes. Then equal amount (16 kg) of wheat bran or deoiled rice bran is mixed in it and the mixture is cooled to room temperature. This material contains 36 percent DCP and 72 percent TDN and can replace conventional compound feeds in the ration of buffaloes yielding 8-10 litres milk/day.

Urea molasses mineral blocks (UMMB)

Urea molasses mineral blocks are prepared in the same way as Uromol, except with the addition of mineral mixture, salt and binder. By ad-lib feeding these blocks along with other feed ingredients, about 20 percent of the conventional concentrate mixture can be saved. UMMB prepared by the 'cold process' technology has yielded even better results.

Area specific mineral mixture

Surveys of feeding practices carried out in the villages of Hisar district revealed deficiencies of essential minerals like calcium, phosphorus, zinc and manganese in 70 percent buffaloes. These buffaloes were given specially developed mineral mixture in their ration. Seventy per cent of the buffaloes conceived within a period of 2-4 weeks after feeding area specific mineral mixture.

Superior isolates of anaerobic fungus

Superior isolates of anaerobic fungus isolated and



Women and Gender Issues

In Haryana women immensely contribute to animal husbandry activities. In fact, they are the real stakeholders of buffalo husbandry as they devote more than 8 hours of daily productive labour to different activities like feeding, bathing, milking, cleaning and processing the milk. Since, buffalo production takes place around the house, the role of women is paramount. Therefore, in order to popularize improved buffalo husbandry practices among women, a day's programme on Dairy Farming was organized for women of Siswal village on Feb 7th, 2011. In this programme 35 women of the village participated. The women were given lectures on feeding, breeding, colostrum feeding, common diseases in calves and buffaloes by the scientists of the institute. A visit to the animal farm was also

arranged. Question-answer session was also organized during the occasion. Keen interest was shown by the women as they asked questions pertaining to identification of heat symptoms, balanced feeding for different categories of buffaloes, colostrum feeding in calves and health practices.

A similar training programme was organized in village Dabra. In this event 35 women of the village participated. Scientists of the institute delivered lectures on different aspects of buffalo husbandry viz. health and deworming of animals, advantage of artificial insemination, colostrum feeding in calves, balanced feeding for different categories of buffaloes.



Research Co-ordination and Management

Quinquennial Review Team

Indian Council of Agricultural Research constituted QRT for Central Institute for Research on Buffaloes under the chairmanship of Dr VK Taneja Vice Chancellor, GADVASU, Ludhiana to review the research, extension and development activities of the institute for the period from 2006-2010. Dr. SK Jand, Dean, Post-graduate Studies, GADVASU, Ludhiana, Dr. Bhupinder Singh, Ex-Principal Scientist, NDRI, Karnal, Dr. KR Rao, Chief General Manager, NABARD, Mumbai, Dr. AK Sinha, Ex-Dean, Veterinary College, Ranchi, Dr. MK Agnihotri, Jt. Commissioner (M&MP), New Delhi were other members of the QRT team. Dr. Inderjeet Singh, Principal Scientist, CIRB Hisar was member Secretary of the QRT team. After detailed deliberations the final report of the QRT was submitted to the council on February 23, 2011.

Research Advisory Committee

The XIII meeting of RAC was convened on May 7, 2010. Initiating the discussion, Chairman RAC Dr. SK Ranjhan stated that India has come out as a leading exporter of meat and stressed the need to look into the quality aspects of buffalo milk, meat and its products to conform to International standards. Dr. CS Prasad, ADG (AN&P) opined that we must look into the newer

perspective of assessing the feed quality which has been put forth in the feed regulations. Dr. RK Sethi, Director CIRB presented the action taken report on recommendations on XII RAC meeting. The RAC members pointed out that multiplication of Nilli-Ravi germplasm and maintaining the elite herd of animals should be the first and foremost priority of the sub campus.

Institute Research Committee

During the period, first IRC meeting was held on September 10, 2010. In this meeting under Improvement of reproductive efficiency, eight new research projects were approved by the IRC. Under Genetic resource improvement and Feed resources utilization and improvement one project each was approved. Under Improvement of management practices six new projects were approved by the IRC. The completed projects were also discussed by the IRC. The IRC also discussed 16 ongoing projects pertaining to different research programmes of the institute. Second meeting during the period 2010-11 was held on March 25, 2011. In this meeting five completed projects were discussed at length and one new project was also approved. All the 25 ongoing projects pertaining to different research programmes of the institute were also discussed.



Meeting of RAC in progress



Meeting of IRC in progress

Institute Management Committee

The 19th meeting of Institute Management Committee was held on May 07, 2010 at CIRB, Hisar and the 20th meeting was held on February 23, 2011 at NASC Complex, New Delhi. Chairman welcomed all the members of Institute Management Committee and Dr VKTaneja, Vice Chancellor, GADVASU, Ludhiana and Chairman, QRT. Progress made by the Institute in research, infrastructure development (works), human resource development, overall organization/management and audit and accounts during the intervening period was highlighted. The Management Committee was highly satisfied with the achievements performance of the Institute.

Institute management committee

Dr. R.K. Sethi, Director, CIRB, Hisar	Chairman
Director General, Animal Husbandry & Dairying, Haryana, Panchkula	Member
Director, Animal Husbandry, Punjab, Chandigarh	Member
Dean, College of Veterinary Sciences, CCSHAU, Hisar	Member
Shri Chitale Vishwas, Chitale Milk, At Post Bhilawada, Distt. Sangli, Maharashtra	Member
Choudhary Ved Pal, Ex. Dy. Speaker, Haryana Vidhansabha	Member
Dr. Inderjeet Singh, Pr. Scientist, CIRB, Hisar	Member
Dr. S.M. Deb, Pr. Scientist & Officer-in-charge, Sub-campus, Nabha	Member
Dr. V.B. Dixit, Pr. Scientist, CIRB, Hisar	Member
Dr. A.S. Khanna, Head, Animal Breeding, CCSHAU, Hisar	Member
ADG(AN&P), ICAR, Krishi Bhavan, New Delhi	Member
Sr. Finance & Accounts Officer, NDRI, Karnal	Member
Administrative Officer, CIRB, Hisar	Member Secretary





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वीर्य हिमीकरण व हिमीकृत वीर्य का रख रखाव। भैंस पालन एवं कृत्रिम गर्भाधान प्रशिक्षण, फरवरी 21-04, मार्च 2011, पृष्ठ 100-102, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

प्रदीप कुमार, धर्मेन्द्र कुमार, पवन सिंह एवं इंद्रजीत सिंह (2011) तरल नाइटोजन कन्टेनर एवं इसकी देखभाल। भैंस पालन एवं कृत्रिम गर्भाधान प्रशिक्षण, मार्च 28-07 अप्रैल, 2011, पृष्ठ 50-52, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

प्रदीप कुमार, धर्मेन्द्र कुमार, अशोक बल्हारा एवं इंद्रजीत सिंह (2011) भैंसों में टीकाकरण तथा कृमिनाशक दवाइयों का उपयोग। भैंस पालन एवं कृत्रिम गर्भाधान प्रशिक्षण, मार्च 28-07 अप्रैल, 2011, पृष्ठ 109-111, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

Book chapter

Punia BS (2011). The Rumen Microbial Ecosystem and its Manipulation in Animal Nutrition/and Production (under publication).

B o o k / a n n u a l report/compendium/technical bulletin

Das KS, Singh G and Deb SM (2010). Management for better reproduction in dairy buffaloes. Central Institute for Research on Buffaloes, Hisar.

Pandey AK and Sethi RK (2010). Annual report of network project on buffalo improvement, 2009-2010.

Rana N (2011). Package of practices to reduce calf mortality in buffaloes. Central Institute for Research on Buffaloes, Hisar, p1-36.

Sethi RK and Pandey AK (2011). Sire Directory-2011. Central Institute for Research on Buffaloes, Hisar.

Singh G, Das KS and Malik R (2011). Training manual on 'Management strategies for profitable buffalo farming' CIRB, Sub-campus, Bir-

Dosanjh, Nabha.

Yadav SP, Phulia SK, Dixit VB, Sarkar SK, Singh G and Pandey AK (2010). Annual Report (2009-10). Central Institute for Research on Buffaloes, Hisar.

राकेश कुमार शर्मा, सुशील कुमार फुलिया, सुधीर खन्ना, धर्मेन्द्र कुमार, जीरोम ए, प्रदीप कुमार, वारिज नयन एवं इंद्रजीत सिंह। भैंस पालन व कृत्रिम गर्भाधान प्रशिक्षण। सितम्बर 13-22, 2010, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

वारिज नयन, जीरोम ए, राकेश कुमार शर्मा, सुशील कुमार फुलिया, धर्मेन्द्र कुमार, पवन सिंह, सुधीर खन्ना एवं इंद्रजीत सिंह। भैंस पालन व कृत्रिम गर्भाधान प्रशिक्षण। फरवरी 21-मार्च 04, 2011, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

धर्मेन्द्र कुमार, प्रदीप कुमार, जीरोम, वारिज नयन, राकेश कुमार शर्मा, सुशील कुमार फुलिया, इंद्रजीत सिंह एवं पवन सिंह। भैंस पालन एवं कृत्रिम गर्भाधान प्रशिक्षण, मार्च 28-07 अप्रैल, 2011, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार।

Video Film Script/दूरदर्शन/रेडियो वार्ता

Rana N and Dixit VB (2010). Script for Video Documentary Film (*English*) on CIRB, Hisar नीरज राणा (2011). सर्दियों में भैंसों का रख-रखाव एवं रोगों की रोकथाम. फरवरी 9, प्रातः 6.30 बजे, कृषि दर्शन, दूरदर्शन, नई दिल्ली।

नीरज राणा (2011). भैंसों में सुरा रोग - कारण और बचाव. दिसम्बर 20, सायं 6.30 बजे, एफ.एम. 102.3, आकाशवाणी, प्रसार भारती, हिसार।

धर्मेन्द्र कुमार (2010), कृत्रिम गर्भाधान का महत्व, दूरदर्शन केन्द्र हिसार, 6.00-6.15 सायं, 22 जुलाई 2010।

सुशील कुमार फुलिया (2010) गर्मियों में भैंसों की देखभाल। 1 जून 2010 सायं 6.00 बजे। आकाशवाणी हिसार।

Gene bank accession no.

Paul SS and Deb SM : HM 215007, JF 274486, JF 274487, JF 274484, JF 274485, JF 274488, JF

Trainings/Seminars/Symposia/Conferences Attended

Event	Vanue	N a m e o f
participants National conference on medical biotechnology "Vision 2020"	MDU, Rothak, 16- 18 April, 2010	PS Yadav Dharmendra Kumar
Training programme on, 'Creative writing in agriculture'	Indian Institute of Mass Communication, Dhenkanal, Orissa, May 10-15, 2010	N Rana VB Dixit
Training course on, 'Cell culture and molecular diagnostic techniques'	CCS HAU, Hisar, July 15- 4 August, 2010	JK Singh Varij Nayan
Summer school on, 'Impact, vulnerability and adoption of Indian livestock to impending climate changes'	NDRI, Karnal, 31- 20 August, 2010	JK Singh A Jerome
An interactive meet on, 'Consultation on biotechnology research in ICAR'	NASC, New Delhi, July 26-27, 2010	P Sikka, PS Yadav SP Yadav Dhamendra Kumar
Strengthening statistical computing for NARS	NDRI, Karnal, August 2-.8 September, 2010	Sushil Kumar Sarkar
Workshop on, 'Application of molecular biology techniques in reproductive biomedicine'	National Institute of Health and Family Welfare Munirka, New Delhi, 18- 29 October, 2010	Dhamendra Kumar
Technology management visioning and up scaling for livestock production	College of Veterinary Science, Assam Agril. University Khanapara, Guwahati, November 11-13, 2010	Ghansham Singh KS Das
Interactive meet on, 'Information and communication technology in ICAR'	NASC Complex, New Delhi, November 3-4, 2010	Sushil Kumar Sunesh Belhara
Training programme on, 'Soft computing techniques in animal Bioinformatics'	NBAGR, Karnal, November 8-12, 2010	N Rana
Conference on, 'Biotechnologies for optimization of reproductive efficiency of farm & companion animal to improve global food security & human health'	Pant Nagar, November 10-12, 2010	A Jerome
7th Biennial conference 2010 on, 'Animal nutrition strategies for environment protection and poverty alleviation'	Bhubneshwar, December 17-19, 2010	Navneet Saxena Madan Lal BS Punia
Hands-on practical training on, 'Gas chromatography (GC) and atomic	Chandigarh, July 19-23, 2010	Ashok Kumar

absorption spectroscopy (AAS)' 52th symposium on, 'Future of livestock industry'	Chandigarh, August 31, 2010	Raman Malik
Workshop on, 'Advances in the assessment and detection of sperm pathologies'	National Institute of Health and Family Welfare, Munirka, New Delhi, September 20-24, 2010	Pawan Singh
Workshop on, 'In vivo conservation of animal genetic resources'	NASC, New Delhi, October 28-30, 2010	AK Pandey
National symposium on, 'Climate change & livestock productivity in India'	NDRI, Karnal, October 7, .2010	Inderjeet Singh SS Dahiya Pawan Singh
Training programme on, 'Data analysis using SAS' under the NAIP Project 'Strengthening statistical computing for NARS'	Barapani, Meghalya, November 23-27, 2010	Sushil Kumar
Data analysis using SAS	NDRI, Karnal, December 24, 2010	Sushil Kumar
Research stay and study	Farm Animal Genetics, Germany, December 28-10 February, 2011	PS Yadav
National conference on, 'New horizons in animal breeding technology for acceleration livestock production and health'	IVRI, Izatnagar, January 20-21, 2011	RK Sethi
National workshop on, 'Chemistry in our lives'	GJUS&T Hisar, March 14, 2011	Navneet Saxena
International conference on, 'Frontiers in reproductive biotechnology' and 21st annual meeting of the Indian society for the study of reproduction & fertility	NDRI, Karnal, February 9-11, 2011	Inderjeet Singh Pawan Singh Dharmendra Kumar
VIII annual convention of society for conservation of domestic animal biodiversity & national symposium on, animal genetic resources for sustainable livestock sector in India'	Bhubneshwar, Orissa February 18-19, 2011	KP Singh TP Singh RS Pippal
Training programme on, 'Employer's	NAARM, Hyderabad, February 17-19, 2011	RK Sethi

perspective in labour related laws' National seminar on, 'Diversity of buffalo germplasm in India'	CIRB, Hisar, February 1-2, 2011	PC Lailer N Rana, KL Mahrara SS Paul, KS Das Ghansham Singh Raman Malik, TP Singh D Lal, BS Punia Inderjeet Singh SS Dahiya, VB Dixit P Sikka, A Bharadwaj AK Pandey, KP Singh RK Sharma SK Phulia, N Saxena PC Lailer, Ashok Kumar Boora SP Yadav, SK Sarkar Sunesh Belhara Varij Nayan, A Jerome Sudhir Khanna Krishan Kumar ML Sharma Satish Kakkar
National conference on, 'Multidisciplinary approaches in frontier areas of environmental science and engineering (MAFAESE-2011)'	GJU&T, Hisar, 4-5, 2011	AKS Tomer Navneet Sexana
National seminar on, 'Indian dairy & food sector- frontiers road map for sustainable growth'	September 24-25, 2010	PS Oberoi
Training programme on, 'SAS genetics/JMP genomics'	IASRI, New Delhi, October 04-08, 2010	Sushil Kumar
Animal nutrition strategies for environmental protection and poverty alleviation	College of Vety. Science & Animal Husbandry, Orissa University of Agril. and Technology, Bhubaneswar, December 17-19, 2010	SS Paul
National symposium on, 'Conventional and modern breeding technologies for genetic improvement of livestock and poultry in India'	Deptt. of GAB College of Veterinary and Animal Sciences, GBPUAT, Panthnagar, October 22-23, 2011	KP Singh
Symposium on, 'Natural resource management in agriculture'	Rajasthan College of Agriculture, Udaipur, December 10-11, 2010	PC Lailer Surrender Kumar
Lectures on, 'Multivariate analysis	NDRI, Karnal, January 15, 2011	Sushil Kumar Sarkar

using SAS' National training programme on, 'Recent techniques in proteome analysis'	NDRI, Karnal, March 3-23, 2011	SK Phulia Varij Nayan
Training programme on, 'Data analysis using SAS'	CIRB, Hisar, March 7-12, 2011	Sushil kumar Sarkar SS Dahiya, VB Dixit P Sikka, ABharadwaj PS Yadav, Pawan Singh AK Pandey, JK Singh Navneet Saxena PC Lailer, SP Yadav Sunesh Balhara A Jerome Ashok Kumar Boora ML Sharma, BP Singh AKS Tomer Rajesh Parkash Raj Kumar

Participation of Director, Dr RK Sethi in important meetings/workshops and symposia

Programme	Venue	Date/Duration
Brainstorming session on conservation of livestock	NDRI, Karnal	September 9, 2010
Workshop on national strategy for conservation of indigenous breeds of livestock	Yojana Bhavan, New Delhi	September 28, 2010
Interactive meeting of animal sciences division, ICAR for enhancing the role of IASRI in R&D efficacy of ICAR institutes	IASRI, New Delhi	October 27, 2010
National symposium on "Optimizing forage production and arable and non-arable lands for increasing livestock production"	IGFRI, Jhansi	November 12-13, 2010
National conference on new horizons in animal breeding technologies for accelerating livestock production and health and XI annual convention of ISAGB	IVRI, Izatnagar	January 20-21, 2011
Training program on employer's perspective on labour law	NAARM, Hyderabad	February 17-19, 2011
Organized IXth scientist meet of network project on buffalo improvement	CIRB, Hisar	November 27-28, 2010
Organized national seminar on diversity of buffalo germplasm in India	CIRB, Hisar	February 1-2, 2011
Organized buffalo mela	CIRB, Hisar	February 1, 2011

Research Projects

Sr. No.	Project	Investigators	Duration
Genetic Resource Improvement Programme			
1.	Characterization of buffalo bulls using DNA polymorphic sequences in relation to production and fertility traits	P Sikka, P Singh	2007-2010
2.	Field progeny testing programme in buffaloes	A Bharadwaj, VB Dixit, RK Sethi and SR Bhardwaj	2002 Onwards
3.	Genetic improvement of Murrah buffaloes	KP Singh, RK Sethi, P Singh and A Bharadwaj	1987 Onwards
4.	Network project on Bhadwari buffaloes	BP Kushwaha	2001 cont.
5.	Genetic improvement of Nili-Ravi buffaloes	PS Oberoi, G Singh, KS Das and Raman Malik	1989 cont.
6.	Identification of SNPs in gene related to meat production and their association with meat parameters in Buffaloes	AK Pandey, SP Yadav, P Sikka, S S Dahiya and Neeta Khanna	2010-2013
7.	Estimation of genetic trends under selection programme in Murrah and Nili-Ravi herd	SN Kala	2008-2011
8.	Assessment of current status, breed characteristics and genetic structure of Nili-Ravi buffaloes in its breeding tract	G Singh, SM Deb, BP Mishra, RS Kataria, DK Sadana and BK Joshi	2008-2011
9.	Leptin and its receptor gene polymorphism and their association with milk production traits in Murrah breed of buffalo (<i>Bubalus bubalis</i>)	SP Yadav, AK Pandey, P Sikka, D Kumar, PS Yadav and RK Sethi	2010-2013
Improvement of reproductive efficiency			
10.	Identification of early pregnancy biomarkers in buffaloes (<i>Bubalus bubalis</i>)	Inderjeet Singh, A Balhara, V Nayan, P Kumar and SK Phulia	2010-2015
11.	Transcriptional analysis of HSP70 and GHR genes in relation to growth performance of buffalo calves kept on two dietary intake levels	Inderjeet Singh, S S Dahiya, AK Pandey, RC Upadhyay	2008-2010
12.	Effect of trehalose and sericin on freezability of buffalo bull semen	Pawan Singh, P Sikka and P Kumar	2010-2011
13.	Cloning for conservation and multiplication of superior buffalo germplasm	PS Yadav, D Kumar, P Kumar, RK Sharma, A Jerome and B Singh	2010-2014
14.	Integrated SOET and MOET for faster multiplication of elite germplasm.	RK Sharma, IJ Singh, SK Phulia, D Kumar and S Khanna	2010-2013

15.	Proteomic analysis of host defense response to mastitis in buffaloes	SK Phulia, Varij Nayan, RK Sharma and N Rana	2010-2013
16.	Effect of cryopreservation on integrity of buffalo sperm membrane and DNA in relation to fertility	D Kumar, Pawan Singh, and SP Yadav	2010-2012
17.	Gene expression of proteolytic systems and growth regulators in the mammary gland and skeletal muscles of buffalo (<i>Bubalus bubalis</i>)	Varij Nayan, Dheer Singh, SK Phulia, Anuradha Bhardwaj and A Jerome	2010-2012
18.	Polymorphism of candidate genes in association with embryonic mortality in buffaloes.	A Jerome and AK Pandey	2010-2012
19.	Setting baseline profile standards for hematological, hormonal and biochemical parameters in buffaloes	JK Singh and SK Sarkar	2002-2010
Feed resources utilization and improvement			
20.	Raising buffalo boilers under field conditions	D Lal, ML Sharma, Navneet Sexena and VB Dixit	2010-2012
20.	Effect of incorporation of limiting amino acids rich supplements on growth and maturity of male buffalo calves	S S Dahiya, P C Lailer and D Lal	2008-2010
21.	Impact of exogenous enzyme supplementation on the digestibility and growth of buffalo calves fed fibrous feed under wheat paddy grown area	R Malik, G Singh, SS Paul KS Das and SS Kundu	2008-2011
22.	Studies on environmental pollutants and toxicants for ensuring feed quality and safety	Navneet Saxena, PC Lailer, JK Singh, ML Sharma, Krishna Kumar and D Lal	2009-2011
23.	Effect of fenugreek seed supplementation to buffaloes	Ashok Kumar, D Lal, BS Punia, N Rana and JK Singh	2010-2012
24.	Predominant culturable fibrolytic fungi in buffalo rumen	SS Paul, SM Deb and G Singh	2008-2010
25.	Studies on the rumen ecosystem and its manipulation in buffaloes for better environment friendly and economical production commonly fed low medium and high quality diets	BS Punia	2010-2014
Improvement of management practices			
26.	Validation of existing package of practices for raising buffalo calves for new production	D Lal, ML Sharma, N Saxena and VB Dixit	2010-2012
27.	Efficacy of dried colostrum in health of neonatal buffalo calves	P Sikka, S Khanna and D Lal	2010-2012
28.	Molecular epidemiology of methicillin-resistant <i>Staphylococcus aureus</i> isolates from buffalo milk	N Rana and Ashok Kumar	2010-2012

29.	Effect of thermal stress management on the performance of Nili-Ravi buffalo calves in different seasons	KS Das, G Singh, R Malik and JK Singh	2010-2012
30.	Data refinement through buffalo database management system	SK Sarkar, N Saxena and S Belhara	2010-2013
31.	Development of buffalopedia	Sunesh Balhara, VB Dixit, KP Singh, N Rana, SK Sarkar and SS Paul	2010-2012
Development of technologies and their transfer to end users			
32.	Impact of migration of buffaloes on socio-economic conditions and dairy development index of farmers in Haryana	VB Dixit, A Bharadwaj, KP Singh and KV Aneesh	2011-2013
Network/AICRP/External and Collaborative Projects			
1.	Buffalo genomics	RK Sethi, P Sikka, AK Pandey and SP Yadav	2008-2012
2.	AICRP on Improvement of feed resources and nutrients utilization for raising animal production (NIANP, Bangalore).	D Lal and N Saxena	2006-cont.
3.	Elucidating the physiological and genomic regulation process of follicular development, oocyte maturation and embryogenesis in buffalo (NAIP).	Inderjeet Singh and RK Sharma	2008-2012
4.	Isolation, culture and characterization of adult stem cells in buffaloes (DBT)	PS Yadav, Inderjeet Singh and RK Sharma	2007-2010
5.	Isolation and molecular characterization of superior fibre degrading anaerobic fungus and development protocol for their preservation and utilization for increasing digestibility of fibrous feed in buffaloes (NAIP).	SS Paul, SM Deb and BS Punia	2006-2010
6.	Rumen microbial diversity in domesticated and wild ruminants and impact of additives on methanogenesis and utilization of poor quality fibrous feeds (DBT).	SS Paul and SM Deb	2008-2012
7.	Institute technology management unit, for management of technologies and IP (NAIP).	VB Dixit	2009-2012
8.	Evaluation of MFSH-4 (Raseela) multicut sorghum fodder with other popular available sorghum varieties in the market (PPP)	PC Lailar	2010-2011

List of Visitors

S.No	Name of the Visitors	Date of visit
1.	Dr V K Taneja, Vice Chancellor, GADVASU, Ludhiana	June 12, 2010
2.	Dr AK Sinha, Ex Dean, Ranchi Vety. College, Ranchi, Jharkhand.	June 12, 2010
3.	Dr K R Rao, Former CGM, NABARD, Managing Partner, ARDCONS, Hyderabad	June 12, 2010
4.	Dr S K Jand, Former Dean, PGS, GADVASU and Principal Vety. College, Amritsar	June 12, 2010
5.	Dr K M L Pathak, DDG (AS), ICAR, New Delhi	Sept. 21, 2010
6.	श्री आनन्द मुनि, आर्य समाज, हिसार	Sept. 25, 2010
7.	डा रणधीर दलाल, सदस्य सचिव, हरियाणा किसान आयोग, हिसार	Sept. 29, 2010
8.	श्री ए एन मेश्राम, निदेशक टी टी सी, हिसार	Sept. 29, 2010
9.	Dr K S Dangi, Director General (AH&D), Haryana	Oct. 08, 2010
10.	Sh Hanif Qureshi, IPS, SP, Hisar	Nov. 01, 2010
11.	Sh B S Malik, IAS, Commissioner, Hisar Division, Hisar	Nov. 01, 2010
12.	Canadian Delegation	Nov. 20, 2010
13.	Dr S Ayyappan, Secretary, DARE & DG, ICAR, New Delhi	Dec. 09, 2010
14.	Dr K M L Pathak, DDG (AS), ICAR, New Delhi	Dec. 09, 2010
15.	Dr C S Prasad, ADG (AN&P), ICAR, New Delhi	Dec. 09, 2010
16.	Padma Bhushan Dr R S Paroda, Chairman, Haryana Farmers' Commission	Feb. 01, 2011
17.	Dr V K Taneja, Vice Chancellor, GADVASU, Ludhiana	Feb. 01, 2011
18.	Dr Hardeep Kumar, Vice Chancellor, LLRUVAS and Financial Commissioner & PS to Govt., Deptt. of Animal Husbandry & Dairying, Haryana	Feb. 01, 2011
19.	Dr AK Sirvastava, Director, NDRI, Karnal	Feb. 01, 2011
20.	Dr R K Singh, Director, NRCE, Hisar	Feb. 01, 2011
21.	Dr O P Dhanda, Ex-ADG(AN&P), ICAR, New Delhi	Feb. 01, 2011
22.	Dr R P Narwal, Director Research, CCS HAU, Hisar	March 07, 2011

Student Guided

Name of the student	University	Degree	Title of thesis/ Co-Guide	dissertation
Jarnail Singh	PhD	Umbilical cord cell culture	CDLU, Sirsa	PS Yadav
Mrs Sarla	PhD	Molecular characterisation of major candidate gene associated with reproductive traits in buffaloes	GJU&T, Hisar	S K Phulia
TP Singh	Ph.D	Genetical & Non-genetical factors affecting production and reproduction traits in Nili-Ravi buffaloes	Choudhary Charan Singh University Meerut (UP)	SM Deb
Ashok Kumar Balhara	PhD	Proteomic analysis of pregnancy specific serum proteins in buffaloes.	CCS HAU Hisar	Inderjeet Singh
Rajesh Kumar	PhD	Genetic polymorphism of HSP70, LHR, LEPR genes and selective minerals status in postpartum anestrus buffaloes	CCS HAU, Hisar	Inderjeet Singh
Priti Singh	MVSc	Freezing of umbilical cord stem cells – effect of cryoprotectants	CCS HAU, Hisar	PS Yadav
Dr Inderjeet Yadav	MVSc	Therapeutic and ultrasonographic investigations on mastitis in buffaloes	CCS HAU Hisar	S K Phulia
Sandeep Garhwal	MVSc	Follicular dynamics in anestrus murrh buffaloes during cyclicity induction using ovsynch in different combinations	CCS HAU Hisar	R K Sharma
Lalit Mohan Sharma	MVSc	Effect of exogenous insulin on progesterone based	CCS HAU, Hisar	R K Sharma

Trainings Organized

SI. No	Name of training	Duration	Participants	Venue/sponsored	Expert
1.	भैंस पालन व कृत्रिम गर्भाधान प्रशिक्षण	सितम्बर 13-22, 2010	14 किसान हरियाणा व अन्य राज्यों से	केन्द्रीय भैंस अनुसंधान संस्थान, हिसार	राकेश कुमार शर्मा, सुशील कुमार फुलिया
2.	भैंस पालन व कृत्रिम गर्भाधान प्रशिक्षण	फरवरी 21-मार्च 04, 2011	15 किसान हरियाणा व अन्य राज्यों से	केन्द्रीय भैंस अनुसंधान संस्थान, हिसार	वारिज नयन, ए. जीरोम
3.	भैंस पालन व कृत्रिम गर्भाधान प्रशिक्षण	मार्च 28-अप्रैल 07, 2011	15 किसान हरियाणा राज्य से	केन्द्रीय भैंस अनुसंधान संस्थान, हिसार	धर्मेन्द्र कुमार, प्रदीप कुमार
4.	Dairy farmers meet	March 18, 2011	Livestock farmers	CIRB, Nabha	



संस्थान के प्रमुख आयोजन

स्वतंत्रता दिवस पर्व

स्वतंत्रता दिवस का पर्व केन्द्रीय भैंस अनुसंधान संस्थान में बड़े हर्षोल्लास से मनाया गया। यह कार्यक्रम ध्वजारोहण से शुरू होकर बच्चों द्वारा राष्ट्र भक्ति के गीतों व कविताओं की मनमोहक प्रस्तुति के साथ सम्पन्न हुआ। संस्थान के निदेशक डा.रमेश कुमार सेठी ने ध्वजारोहण किया। इस अवसर पर देश के वीरों और शहीदों को याद किया। जिन्होंने अपने बलिदान द्वारा हमें स्वतंत्रता दिलवाई। निदेशक महोदय ने



वैज्ञानिकों/अधिकारियों/कर्मचारियों को संबोधित करते हुए संस्थान में पिछले दिनों हुई विशेष गतिविधियों से अवगत करवाया। उन्होंने अपने संबोधन में इस वर्ष संस्थान द्वारा आयोजित भैंसों पर अन्तर्राष्ट्रीय कांफ्रेंस की सफलता का श्रेय संस्थान के सभी वैज्ञानिकों/अधिकारियों/कर्मचारियों को दिया व कहा कि कोई भी आयोजन सभी के सहयोग से सफल रहता है। उन्होंने आह्वान किया कि हमें संस्थान के उत्थान के लिये व निर्धारित लक्ष्यों की प्राप्ति के लिए सदैव अथक मेहनत, लगन व निष्ठा से निरन्तर कार्यरत रहना है। डा. सेठी ने सभी को विश्वास दिलाया कि यह संस्थान सभी अधिकारियों/कर्मचारियों के सहयोग से प्रगति के पथ पर अग्रसर रहेगा।

नेटवर्क परियोजना की वार्षिक बैठक

केन्द्रीय भैंस अनुसंधान संस्थान, हिसार में भैंस सुधार नेटवर्क परियोजना की नौवीं वार्षिक वैज्ञानिक बैठक नवम्बर 27, 2010 को संस्थान में आयोजित की गई। कार्यक्रम में संस्थान द्वारा परिचालित नेटवर्क परियोजना के अंतर्गत आने वाले केन्द्रों से 17 वैज्ञानिकों ने भाग लिया। बैठक में परियोजना के अंतर्गत हो रहे विकास कार्य की समीक्षा की गई एवं आने वाले साल में भैंस सुधार कार्यक्रम की रूपरेखा तैयार की गई। संस्थान के निदेशक डा. रमेश कुमार सेठी की अगुवाई में भैंस मेले का आयोजन किया गया। जिसका उद्घाटन डा. मोती लाल मदन, भूतपूर्व उपकुलपति, पंडित दीनदयाल उपाध्याय पशु चिकित्सा विश्वविद्यालय एवं गो अनुसंधान संस्थान, मथुरा के द्वारा किया गया। इस अवसर पर डा. कृष्ण मुरारी लाल पाठक,

उप महानिदेशक पशु विज्ञान भारतीय कृषि अनुसंधान परिषद, नई दिल्ली मुख्य अतिथि थे। संस्थान द्वारा आसपास के गांवों में चलाई जा रही प्रक्षेत्र संतति परियोजना के अंतर्गत उत्तम नस्ल के झोटों के वीर्य से उत्पन्न हुई कट्टियों ने भैंस मेले में हिस्सा लिया तथा कट्टियों और जवान झोटियों की विभिन्न श्रेणियों में प्रतियोगिताएं आयोजित की गईं और उन्हें पुरस्कृत किया गया।



उल्लेखनीय है कि भारतीय भैंस अनुसंधान विकास समाज (इंडियन सोसाइटी फार बफलो डेवेलपमेंट) के सौजन्य से मेले के सर्वोत्तम पशु के मालिक को पुरस्कार प्रदान कर सम्मानित किया गया।

इस अवसर पर भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के सहायक महानिदेशक डा. सीएस प्रसाद व डा. एस

सी गुप्ता एवं प्रधान वैज्ञानिक डा. विनीत भसीन तथा डा. राजकुमार सिंह, निदेशक अश्व अनुसंधान केंद्र, हिसार भी उपस्थित थे।

आधुनिक पशुशाला का शिलान्यास

केन्द्रीय भैंस अनुसंधान संस्थान, हिसार में लगभग साढ़े सात करोड़ रुपये की लागत से बनने वाली आधुनिक पशुशाला का शिलान्यास डा.एस. अय्यप्पन, सचिव कृषि शोध एवं शिक्षा विभाग, भारत सरकार एवं महानिदेशक, भारतीय कृषि अनुसंधान परिषद, नई दिल्ली द्वारा संस्थान में विधिवत रूप से किया गया। इस समारोह पर डा. अय्यप्पन ने संस्थान के निदेशक एवं वैज्ञानिकों से आह्वान किया कि इस उद्यम के लिए सामूहिक प्रयास किये जाएँ तो यह आधुनिक पशुशाला अपने ही किस्म की भारत की एकमात्र पशुशाला बन सकती है।

इस अवसर पर उनके साथ डा. के.एम.एल. पाठक, उपमहानिदेशक पशु विज्ञान, डा. सी.एस. प्रसाद, सहायक महानिदेशक भारतीय कृषि अनुसंधान परिषद, नई दिल्ली भी उपस्थित थे। इस अवसर पर महानिदेशक का धन्यवाद करते हुए डा. रमेश कुमार सेठी, निदेशक, केन्द्रीय भैंस अनुसंधान संस्थान, हिसार ने उन्हें यकीन दिलाया कि इस पशुशाला को भारत की सर्वोत्तम पशुशाला बनाये जाने के लिए हर संभव प्रयास किये जाएंगे।





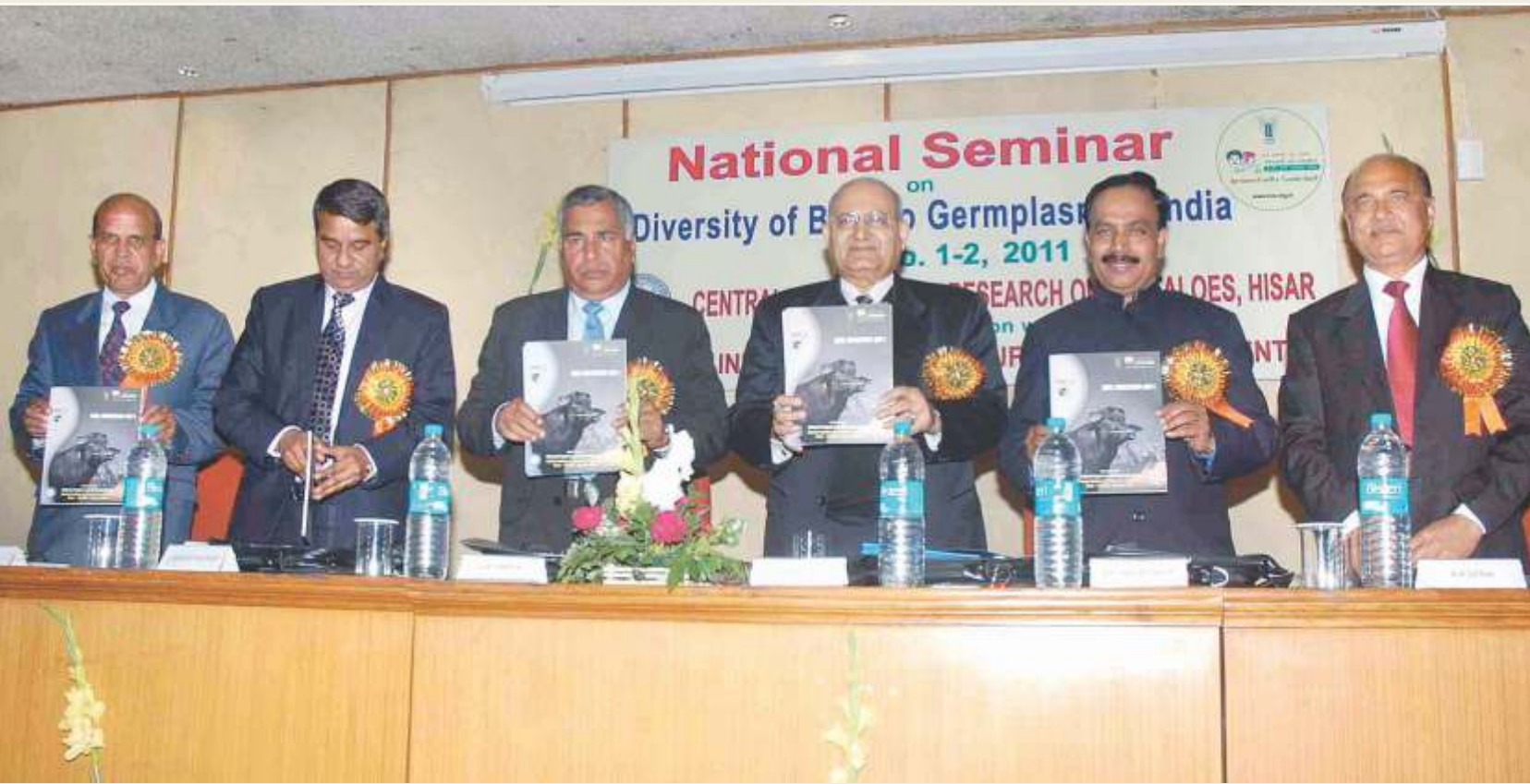
उल्लेखनीय है कि इस आधुनिक पशुशाला में स्वचालित पोषण, सफाई, दुग्ध दोहन तथा आंकड़ा अभिलेखन प्रणाली का प्रयोग किया जाएगा। इस पंचवर्षीय योजना में तैयार की जाने वाली आधुनिक पशुशाला में स्वस्थ दूध उत्पादन की व्यवस्था होगी तथा दुहारों द्वारा दोहन करने की आवश्यकता भी नहीं होगी। मानव संसाधन की बचत होने के कारण उनका सदुपयोग फार्म पर किये जाने वाले अन्य कार्यों के लिए किया जा सकेगा। इसमें 200 भैंसों, 25 कटड़ियों, 15 दूधमुहे कट्टे कट्टियों, 25 जवान कटड़े-कटड़ियों को रखने की व्यवस्था होगी। प्रत्येक पशु के लिए दिन अथवा रात में विश्राम करने के लिए स्वतंत्र इकाइयों की व्यवस्था होगी। पशु की व्यैक्तिक पहचान के लिए उनमें माइक्रोचिपट्रांसपोटर लगाये जाएंगे। एकीकृत प्रणाली पशु को दिए जाने वाली चाट का आंकलन करेगी और जितनी पशु की चाट की आवश्यकता है उतना ही चाट वितरण यन्त्र चाट की मात्रा प्रदान करेगा। पशुओं को नहलाने व बीमार जानवरों की देखभाल के लिए अलग से प्रावधान होगा। 2 लाख लीटर ठंडे पानी तथा 1 लाख लीटर गर्म पानी की टंकियां सभी पशुओं के लिए 5-6 दिन तक पानी उपलब्ध करा सकेंगी। पशुओं को चरम तापमान से बचाने के लिए पशुशाला भवन में विशेष सामग्री लगायी जाएगी। सौर ऊर्जा से गर्म रखने की प्रणाली तथा बायोगैस पर्यावरण हितैषी होगी अवशेष पदार्थों के निष्कासन के लिए पशुशाला में उचित व्यवस्था की जाएगी। रोबोटिक दुग्ध दोहन यन्त्र शीतल इकाई

एवं दूध के पैकेट बनाने की मशीन आधुनिक पशुशाला का एक महत्वपूर्ण तथा अभिन्न अंग होंगे। इस अवसर पर मुख्य अतिथि ने संस्थान के नवगठित आगंतुक कक्ष का उद्घाटन किया तथा आधुनिक पशुशाला के समक्ष त्रिवेणी का पौधारोपण भी किया। संस्थान के कृषि फार्म, पशु फार्म एवं प्रयोगशालाओं का दौरा करते हुए उन्होंने संस्थान के निदेशक एवं वैज्ञानिकों की भरपूर प्रशंसा की।

भैंस जैवविविधता पर संगोष्ठी एवं भैंस मेला

केन्द्रीय भैंस अनुसंधान संस्थान हिसार में 27वें स्थापना दिवस के अवसर पर भारत में भैंस के जनन द्रव में विविधता विषय पर दो दिनों की संगोष्ठी का शुभारम्भ फरवरी 1-2, 2011 से किया गया। इस अवसर पर संस्थान में मेले का भी आयोजन किया गया। जिसमें आसपास के नौ गांव के 100





से भी अधिक पशुओं ने भाग लिया। मेले एवं संगोष्ठी का शुभारंभ पदम् भूषण डा. आर.एस. परोड़ा, सचिव, हरियाणा कृषि आयोग एवं पूर्व सचिव, डेयेर तथा पूर्व महानिदेशक, भारतीय कृषि अनुसंधान परिषद, नई दिल्ली के द्वारा किया गया। इस अवसर पर विशिष्ट अतिथि के रूप में डा. वी.के. तनेजा, कुलपति, गुरु अंगद देव पशु चिकित्सा एवं पशु विज्ञान विश्वविद्यालय, डा. हरदीप कुमार, कुलपति, लाल लाजपत राय पशु चिकित्सा एवं पशु विज्ञान विश्वविद्यालय, हिसार व वित्तायुक्त एवं प्रधान सचिव, पशुपालन एवं डेयरी विभाग हरियाणा, डा. ए.के. श्रीवास्तव, कुलपति एवं निदेशक, राष्ट्रीय

डेयरी अनुसंधान संस्थान, करनाल भी उपस्थित थे।

डा. ओ.पी. ढांडा, पूर्व अध्यक्ष, भारतीय भैंस विकास समाज, डा. आर.के. सिंह, निदेशक, राष्ट्रीय अश्व अनुसंधान केंद्र, डा. कुलदीप सिंह, कुलसचिव, लाला लाजपत राय पशु चिकित्सा एवं पशु विज्ञान विश्वविद्यालय, डा. सूरत सिंह दहिया कुलसचिव, हरियाणा कृषि विश्वविद्यालय एवं डा. के. परुथी, अधिष्ठाता, पशु चिकित्सा महाविद्यालय, हरियाणा कृषि विश्वविद्यालय, हिसार भी कार्यक्रम में सम्मिलित थे। केंद्रीय भैंस अनुसंधान संस्थान, हिसार के निदेशक डा. आर.के. सेठी ने जानकारी देते हुए बताया कि कार्यक्रम में विभिन्न वर्गों के



पशुओं के लिए प्रतियोगिताएं आयोजित की गईं एवं विजेताओं को पुरस्कृत किया गया।

भारतीय भैंस विकास समाज के सौजन्य से डा. वी.के. तनेजा, उप कुलपति, गुरु अंगद देव पशु चिकित्सा एवं पशु विज्ञान विश्वविद्यालय को भैंस अनुसंधान के क्षेत्र में महत्वपूर्ण योगदान के लिए 'लाइफटाइम' पुरस्कार से सम्मानित किया गया।

डा. टी.के. वल्ली, पूर्व अध्यक्ष, पशु पोषण विभाग, राष्ट्रीय डेयरी अनुसंधान संस्थान, करनाल को भी पुरस्कृत किया गया। गुजरात के कच्छ क्षेत्र में बन्नी प्रजाति की भैंस के विकास के लिए योगदान देने के लिए एनजीओ 'सहजीवन' को भी इस अवसर पर पुरस्कृत किया गया। मुख्य अतिथि द्वारा संस्थान द्वारा प्रकाशित SIRE निर्देशिका प्रक्षेत्र संतति परियोजना पर किए गए कार्य के बुलेटिन एवं वरिष्ठ वैज्ञानिक डा. नीरज राणा द्वारा लिखित कटड़े-कट्टियों में मृत्यु दर कम करने के लिए कार्य प्रणालियों का पैकेज विषय पर बुलेटिन का विमोचन भी किया गया। मुख्य अतिथि ने अपने भाषण में देश में राष्ट्रीय पशु मिशन लागू करने की आवश्यकता पर बल दिया तथा भैंस उत्पादन एवं विकास के लिए किए जा रहे अनुसंधान कार्यों की प्रशंसा की। मेले में केंद्रीय भैंस अनुसंधान संस्थान, हिसार, राष्ट्रीय अश्व अनुसंधान, हिसार, राष्ट्रीय डेयरी अनुसंधान संस्थान, करनाल, भारतीय पशु चिकित्सा अनुसंधान संस्थान, बरेली, वीटा मिल्क प्लांट, हिसार, जींद सहकारिता निगम, महाराष्ट्र हाइब्रिड सीड्स कंपनी, पीएनबी, सच्चाखेड़ा जींद, जैन इरीगेशन सिस्टम, हिसार, कृष्णा उद्योग, हिसार, केंद्रीय भेड़ प्रजनन फार्म, हिसार एवं क्षेत्रीय चारा प्रदर्शन इकाई द्वारा स्टाल भी लगाये गए।

गणतंत्र दिवस पर्व

गणतंत्र दिवस का पर्व केंद्रीय भैंस अनुसंधान संस्थान में बड़े धूमधाम से मनाया गया। ध्वजारोहण से शुरू यह कार्यक्रम सांस्कृतिक कार्यक्रम की मनमोहक प्रस्तुति के साथ सम्पन्न हुआ। संस्थान के निदेशक डा. रमेश कुमार सेठी ने ध्वजारोहण किया तथा इस अवसर पर वैज्ञानिकों/अधिकारियों/ कर्मचारियों को संबोधित करते हुए आह्वान किया कि हम केवल अथक मेहनत, लगन व कार्यनिष्ठा से ही संस्थान व देश को प्रगति के पथ पर ले जा सकते हैं। डा. सेठी ने सभी को विश्वास दिलाया कि यह संस्थान सभी अधिकारियों/ कर्मचारियों के सहयोग से प्रगति



के पथ पर अग्रसर रहेगा। इस अवसर पर बच्चों द्वारा सांस्कृतिक कार्यक्रम भी प्रस्तुत किया गया।

वन महोत्सव

केंद्रीय भैंस अनुसंधान संस्थान द्वारा अगस्त 24, 2010 को वन महोत्सव का आयोजन किया गया। इस अवसर पर संस्थान के अधिकारियों तथा कर्मचारियों ने वृक्षारोपण किया। सभी उपस्थित लोगों ने इस अवसर पर कम से कम एक पौधे का नियमित रूप से ध्यान रखने का संकल्प लिया।



हिन्दी पखवाड़ा समारोह

केन्द्रीय भैंस अनुसंधान संस्थान में हिन्दी-पखवाड़ा का आयोजन सितंबर 14-29, 2010 तक किया गया। दिनांक 29 सितंबर को काव्य पाठ एवं भाषण प्रतियोगिता का आयोजन किया गया। इस अवसर पर डॉ. आर.एस. दलाल, सदस्य सचिव, हरियाणा किसान आयोग, मुख्य अतिथि थे। डा. ए.एन. मेश्राम, निदेशक, टी.टी.सी., हिसार ने भी अपने विचार प्रस्तुत किए। इस दौरान हिन्दी की विभिन्न प्रतियोगितायें आयोजित की



गई। संस्थान के निदेशक, डा. रमेश कुमार सेठी ने सभी कर्मचारियों एवं अधिकारियों को हिन्दी में कार्य करने के लिये प्रेरित किया। विजेता रहे प्रतिभागियों को मुख्य अतिथि ने पुरस्कार वितरित किये।

प्रशिक्षण कार्यक्रम

वर्ष 2010-11 में केन्द्रीय भैंस अनुसंधान संस्थान, हिसार द्वारा अनेक प्रशिक्षण कार्यक्रमों का आयोजन किया गया।



इसमें युवकों को भैंस पालन के विभिन्न पहलूओं जैसे कि भैंस आनुवांशिकी, प्रबंधन, पोषण, शरीर क्रिया विज्ञान, जनन, प्रजनन एवं स्वास्थ्य पर संस्थान के वैज्ञानिकों द्वारा प्रशिक्षण दिया गया। ग्रामीण युवकों के लिए तीन 10 दिवसीय भैंस पालन एवं कृत्रिम गर्भाधान विषय पर प्रायोगिक प्रशिक्षण का आयोजन किया गया। इस प्रशिक्षण कार्यक्रम में संस्थान द्वारा अंगीकृत गांवों व आस-पास के अन्य गांवों से लगभग 40 किसानों ने भाग लिया। संस्थान के वैज्ञानिकों द्वारा कृषकों को भैंस आनुवांशिकी, प्रबंधन, पोषण, शरीर क्रिया विज्ञान, जनन, प्रजनन एवं स्वास्थ्य के क्षेत्र में संस्थान द्वारा अर्जित की गई उपलब्धियों एवं अन्य नवीनतम जानकारीयों से अवगत कराया।

स्वास्थ्य चेतना शिविर

केन्द्रीय भैंस अनुसंधान संस्थान, में अक्टूबर 20, 2010 को स्वास्थ्य चेतना शिविर का आयोजन संस्थान की स्टाफ क्लब द्वारा किया गया। इस अवसर पर डॉ. नरेन्द्र गुप्ता, गुप्ता हस्पताल, हिसार द्वारा संस्थान के कर्मचारियों को स्वस्थ जीवन शैली एवं मद्य निषेध पर व्याख्यान दिया।



CIRB Personnel

GENERAL ADMINISTRATION

Dr RK Sethi	Director
Sh RK Sharma	Administrative Officer
Sh Jagjit Singh	Administrative Officer
Sh Raj Kumar	Asstt Admn Officer
Smt Shammi Tyagi	AF&AO
Sh Joginder Singh	Pvt.Secty.
Sh Ishwar Singh Kundu	Assistant
Sh Narender Kumar	Assistant
Sh Rajesh Kumar	Assistant
Sh Viksit Kumar	Assistant
Sh Girdhari Lal	Assistant
Sh Abdul Majid	Assistant
Smt Indira Devi	LDC
Sh Satbir Singh	LDC
Sh Dharam Pal	LDC
Sh Sunil Kumar	LDC
Sh Mahabir Singh	LDC
Sh Dharambir Singh	LDC

Division of Buffalo Genetics & Breeding

Dr VB Dixit	Pr Sci. & Head
Dr(Mrs) P Sikka	Pr Scientist
Dr Anurag Bharadwaj	Pr Scientist
Dr AK Pandey	Pr Scientist
Dr KP Singh	Pr Scientist
Dr SN Kala	Sr Scientist
Dr N Rana	Sr Scientist
Dr (Mrs) Swati Dahiya	Sr Scientist
Dr SP Yadav	Scientist
Dr Thirumaran SMK	Scientist (on study leave)
Dr Susheel Kumar Sarkar	Scientist
Dr Sudhir Khanna	T-9 (Vety Officer)
Dr SR Bhardwaj	T-9 (Vety Officer)
Sh AKS Tomer	T-6 (Tech Officer)
Sh Balbir Singh	T-4
Sh Baljeet Singh	T-3
Sh Dharam Singh	T-3

Network Project on Buffalo Improvement

Dr RK Sethi	Director & PC(B)
Dr BP Kushwaha	Pr Scientist (IGFRI Jhansi)
Dr AK Pandey	Pr Scientist
Smt Sunesh Balhara	Scientist
Sh Ram Chander	T-4

Division of Buffalo Nutrition

Dr D Lal	Pr Scientist & Head
Dr BS Punia	Pr Scientist
Dr SS Dahiya	Pr Scientist
Dr PC Lailer	Sr Scientist
Dr Ashok Kumar Boora	Scientist
Dr ML Sharma	T-6 (Tech Officer)
Sh Mahender Singh Punia	T-3

AICRP on Improvement of Feed Resources

Dr D Lal	Pr Scientist & PI
Dr N Saxena	Sr Scientist
Sh Krishan Kumar	T-6 (Tech Officer)

Division of Buffalo Physiology & Reproduction

Dr Inderjeet Singh	Pr Scientist & Head
Dr Pawan Singh	Pr Scientist
Dr PS Yadav	Pr Scientist
Dr RK Sharma	Sr Scientist
Dr SK Phulia	Sr Scientist
Dr AK Balhara	Scientist (On study leave)
Dr Dharmendra Kumar	Scientist
Dr Varij Nayan	Scientist
Dr A Jerome	Scientist
Dr Pradeep Kumar	Scientist
Sh Mohinder Singh Kairon	T-4

Project Monitoring & Evaluation Cell

Dr VB Dixit	Pr Scientist & Incharge
Dr RK Sharma	Sr Scientist
Dr N Rana	Sr Scientist
Shri Raj Kumar	T-6 (Tech Officer)

AKMU

Dr Susheel Kumar Sarkar	Scientist & Incharge
Sh Raj Kumar	T-6

Animal Farm Section

Dr KP Singh	Pr Scientist & Overall Incharge
Dr Sudhir Khanna	T-9 & Incharge
Dr Satish Kakkar	T-7(8) (Vety Officer)
Sh Shaitan Singh	T-5
Sh Dharam Chand Verma	T-5
Sh Subhash Chander	T-4

Agricultural Farm

Dr PC Lailer	Sr Scientist & Overall Incharge	Dr VB Dixit	Pr Scientist & Overall Incharge
Dr RAPachori	T-5	Sh VPS Punia	T-6
Sh Sushil Kumar	T-5		

Integrated Farming Unit

Dr PC Lailer	Incharge
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Workshop Section

Sh Surender Singh	T-7(8) & Overall Incharge
Sh Jitender Kumar	T-5 & Incharge
Sh Kuldeep Singh	T-3
Sh Bhim Raj	T-3
Sh Sant Lal	T-3
Sh Mahabir Singh	T-3
Sh Ram Kumar	T-2

Landscape Section

Dr Inderjeet Singh	Pr Scientist & Overall Incharge
Sh Surender Singh	T-7(8)
Sh Baljeet Singh	T-3

Estate Section

Dr S Khanna	T-9 & Overall Incharge
Sh BP Singh	T-6 & Incharge
Sh Om Parkash	T-4

Electricity Unit

Sh RK Sharma	Admn Officer & Overall Incharge
Sh Rajesh Parkash	T-6 & Incharge
Sh Gopal Singh	T-4

Internal Security

Sh AKS Tomer	T-6 & Incharge
Sh Subhash Chander	T-4

Guest House

Sh AKS Tomer	T-6 & Incharge
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Library

Hindi Section

Dr AK Pandey	Pr Scientist Incharge
Sh Sunil Kumar	LDC

PIO/APIO

Dr RK Sharma	Sr Scientist & PIO
Shri Jagjit Singh	Admn Officer & APIO
Sh RK Sharma	Transparency Officer
Dr D Lal	Vigilance Officer

Sub-Campus, Nabha Scientific:

Dr PS Oberai	Pr Scientist and OIC
Dr SS Paul	Pr Scientist
Dr JK Singh	Sr Scientist
Dr Raman Malik	Sr Scientist
Dr Ghansham Singh	Sr Scientist
Dr KS Das	Sr Scientist

Technical:

Dr KL Mehrara	T-9, Senior Vet Officer & Purchase Officer
Sh Jagdish Prasad	T-7/8, Farm Manager (Agri)
Sh Rajiv Mehta	T-6, I/C Estate & Maintenance
Sh TP Singh	T-6, I/C Central store
Sh RS Pippal	T-6, I/C Guest House
Dr AK Saini	T-5 (VO)
Sh Daljit Singh	T-4, & I/C Security
Sh Balwinder Singh	T-4
Sh Mohan Singh	T-3
Sh Virender Kumar	T-2

Administration:

Sh Ashok Kumar	Sr Clerk
Sh Tajinder Singh	Sr Clerk

Personal Milestones

Appointment

1. Dr Varij Nayan, Scientist w.e.f. April 22, 2010.
2. Dr A Jerome, Scientist w.e.f. April 23, 2010.
3. Dr Pradeep Kumar, Scientist w.e.f. May 17, 2010.
4. Dr KP Singh, Principal Scientist w.e.f. July 06, 2010.
5. Dr SS Paul, Principal Scientist w.e.f. Sept. 21, 2010.
6. Dr (Mrs) Swati Dahiya, Sr Scientist w.e.f. March 26, 2011.

Promotions

1. Sh Rajesh Prakash T-4 to T-5 w.e.f. June 23, 1999.
2. Dr PS Oberoi, Principal Scientist w.e.f. July 27, 2006.
3. Sh Rajesh Prakash T-5 to T-6 w.e.f. June 23, 2009.
4. Sh AKS Tomer T-5 to T-6 w.e.f. January 01, 2010.
5. Sh Daljit Singh T-3 to T-4 w.e.f. January 01, 2010.
6. Sh Balwinder Singh T-3 to T-4 w.e.f. February 12, 2010.
7. Sh Dharam Chand T-4 to T-5 w.e.f. February 03, 2010.
8. Sh Jagdish Lal T-4 to T-5 w.e.f. February 03, 2010.
9. Sh Krishan Kumar T-5 to T-6 w.e.f. March 31, 2010.
10. Dr RS Pippal T-5 to T-6 w.e.f. June 20, 2010.
11. Sh Raj Kumar T-5 to T-6 w.e.f. September 27, 2010.
12. Sh Joginder Singh Steno to Pvt. Secretary w.e.f. October 12, 2010.

13. Sh J Ramani AAO to Administrative Officer w.e.f. November 25, 2010.
14. Sh Abdul Majid UDC to Assistant w.e.f. January 12, 2011.
15. Sh Tejinder Singh LDC to UDC w.e.f. January 13, 2011.
16. Sh Jagjit Singh AAO to Administrative Officer w.e.f. March 23, 2011.

Transfers

1. Dr AK Saini, T-5, CIRB, Hisar to Sub-Campus, Nabha w.e.f. June 18, 2010.
2. Sh Sandeep Kumar, LDC on deputation from CIRB, Hisar to NRFMT & TI Hisar w.e.f. July 20, 2010.
3. Sh Virendra Singh, T-9 on deputation from CIRB, Hisar to Ministry of Agril. New Delhi w.e.f. September 20, 2010.
4. Dr SM Deb Principal Scientist CIRB, Nabha to CAZRI, Regional Station, Pali (Raj.) w.e.f. November 08, 2010.
5. Dr JK Singh, Sr Scientist CIRB, Hisar to Sub-Campus, Nabha w.e.f. December 16, 2010.

Retirement

1. Sh Jagdish Lal, T-5 October 31, 2010.
2. Sh J Ramani, Admn. Officer November 30, 2010.

Expired

1. Sh Balbir Singh, SSS October 12, 2010
2. Sh Mehar Chand, SSS February 03, 2011.

Dr Swati Dahiya was awarded three Gold Medals (Dr VD Kashyap Gold Medal for being best PhD research worker, Ms Manju Utreja Memorial Gold Medal for Best PhD research work and Silver Jubilee Gold Medal for Women for best Doctoral thesis during 2003-04) by His Excellency Sh Jagannath Pahadia, Governor of Haryana during the 23rd convocation of CCS HAU, Hisar held on December 10, 2010.



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