भाकृअनुप
ICAR

Annual Report
2008-2009

राष्ट्रीय अश्व अनुसंधान केन्द्र
सिरसा रोड, हिसार–125001 (हरियाणा)

National Research Centre on Equines
Sirsa Road, Hisar-125001 (Haryana)

With Best Compliments From

Director & Staff

NATIONAL RESEARCH CENTRE ON EQUINES

Sirsa Road, Hisar-125001, Haryana, India

www.nrce.gov.in

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Zanskari ponies at Leh, Ladakh

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The achievements and activities of the Centre from April 2008 to March 2009 are presented in this report. Mention of trademark, proprietary product, or firm in the text or figures does not constitute an endorsement and does not imply approval to the exclusion of other suitable products or firms.

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NATIONAL RESEARCH CENTRE ON EQUINES
HISAR 1986

PREFACE

It gives me immense pleasure to present the Annual Report of National Research Centre on Equines for the year 2008-09, which provides an insight in to activities and significant achievements in the mandated areas of the Centre. The saying "A horse is the projection of peoples' dreams about themselves - strong, powerful, beautiful - and it has the capability of giving us escape from our mundane existence" is quite insightful. Relevance of equines to mankind is well documented through the ages of civilization. Equines have played a pivotal role in man's life since antiquity. Horse served the mankind in different capacities *viz.* power for agricultural and commercial pursuits, military purposes, pastime recreation, sports, and as a source for food in a few countries in the world. Besides food, horses were used in wars both as cavalry and to draw carriages. Horses and mules function as tractor in the mountains and can perform the activity which even army jeep cannot perform in these terrains. The mule is being used even today for various army operations including haulage of food and arms and ammunition supplies in extreme geo-climatic conditions.

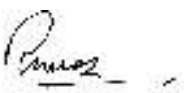
The National Research Centre on Equines has been playing a crucial role -as a technical leader- in the development of equine sector. Our vision of elevation of socio-economic status of under-privileged equine farmers has set our goal of enhanced utilization of equine power in agricultural operations through various R&D programs which encompass the development of novel diagnostics and immuno-prophylactics through the use of modern molecular biological tools. Validation of equine semen cryopreservation, artificial insemination and embryo transfer technology for superior mule production and conservation of indigenous equine germplasm as well as enhancement of performance of working equids through scientific interventions are other R&D areas in equine production. These activities entail the input of indigenous technical know-how and would result in augmented income generation of poor equine owners.

For the last 24 years, the NRCE has been working unremittingly to address various issues and provide solutions to the problems of the end-users related to equine health and production management. The continuous effort of the Centre in monitoring of glanders has paid favourable dividends and no further case of this dreaded zoonotic disease was reported from the country. However, during the period under report, the country experienced the re-emergence of equine influenza outbreak and the Centre with committed and active cooperation and support of the Turf Authorities of India, Indigenous Horse Breeding Society, race/turf club veterinarians, equine breeders, officials of the State Animal Husbandry departments, equine breeders, military establishments, and non-governmental organizations contributed its might in control and containment of this disease. Release of diagnostic kits for rhinopneumonitis and pregnancy diagnosis in mares by Hon'ble Secretary DARE and Director General ICAR was the momentous occasion for the Centre. Scientists of the Centre continue to strive hard to develop similar kits for the diagnosis of rotavirus, Japanese encephalitis, and glanders. Progress in the diagnosis of equine piroplasmosis and trypanosomosis has been appreciably good. Further, the Centre also developed an updated vaccine for equine influenza by incorporating the virus from the recent outbreak. The newly developed technology of *in vitro* culture of *Trypanosoma evansi* has been encouraging and shall be very useful for *in vitro* testing of anti-trypanosomal compounds towards realizing the long-term goal of developing suitable therapeutics.

The equine production thematic received a boost with generation of information on breed-specific phenotypic characters and molecular genetics signatures for indigenous breeds (Marwari, Kathiawari, Manipuri, Spiti and Zanskari) of horses and ponies in India will go a long way in conservation efforts of the precious equine biodiversity. The extensive use of artificial insemination (AI) technology in the field for production of superior ponies, mules and upgraded donkeys is the need of the time and NRCE has now intensified its efforts to give impetus to application of AI at the farmer's door. The initiation of the research work in the area of utilization of equine energy (horse-power) for agricultural operations and transport is another new beginning which envisages efficient utilization of animal energy with optimal feed inputs; improving harness, carts, and agricultural implements; and addressing animal welfare issues; exploring the alternate avenues to conventional energy of fossil-fuel crisis; pollution and global warming as a source of eco-friendly 'tractor' for small and marginal farmers, especially in hilly and arid terrain.

The creation of Veterinary Type Culture Centre (VTCC) -under the aegis of NRCE- has heightened the challenges which reflect its propensity for hard work. The VTCC has started its functioning by occupying a few labs in the existing building of the Centre. The civil work of the first phase of the new building is nearing completion while second phase will commence in 2009. Nevertheless, the pace of the functioning of the scientific activity of VTCC is reflected by sustained strengthening of the culture collection by addition of 22 bacterial isolates to the already existing repository of 68 bacterial cultures, and isolation and reposition of field isolates of camelpox and buffalopox viruses. The functioning of VTCC network including its collaborating sub-centres at NDRI and NIANP and their network laboratories. We, at NRCE, foresee VTCC as a vibrant and truly functional reference Centre in the coming years for all the stakeholders who envisage harnessing microbial prowess for augmenting animal productivity and human well-being.

The short stint so far at NRCE makes me feel good to be part of this Centre which has a lot of promise and challenges which will keep any organization vibrant. The team of young scientists with an average age of 35 years, active force of technical human resource, physical infrastructure set up, the stakeholders of various hues, and the equine industry provide a congenial but challenging work ethos which any individual will envy. Our immediate objectives have been to serve the equine industry by providing efficient service delivery in equine health and production management; developing value-added products and processes; consultancy; policy and planning; enhancing awareness amongst stakeholders about equine sector related issues especially infectious and metabolic diseases of economic significance, biosecurity, production and management systems appropriate to the area; locally available feed and fodder resources for economic feeding of the low income earning equines reared by poorest-of-the-poor; and animal welfare issues. The NRCE is confident to come up to the expectations of the exalted leaders in the system with its sincere and dedicated efforts under the able guidance of our senior professionals and scientific leaders especially the Hon'ble DG (ICAR), DDG (Animal Science), ADG (Animal Health), ADG (AN&P), ADG (Animal Genetics), among others. We are all highly indebted to them for the encouragement and support for the development of the system. While I compliment all of my colleagues at NRCE for their sincere and hard work with high degree of commitment, I also urge them to work still harder with a clear cut program, explicit direction, and focused efforts to fulfill the expectations of the society and their dreams as well.



(R. K. Singh)

EXECUTIVE SUMMARY

National Research Centre on Equines was established on November 26, 1985. The mandate of the centre takes account of research on health, production and management in equines, development of diagnostics/biologicals for major equine diseases, diagnosis, surveillance and monitoring of equine diseases, and provision of diagnostic, advisory and consultancy services.

To accomplish the mandated targets, various demand-driven technologies in the areas of equine health, production and management were developed by the scientists of the centre. A brief account of achievements of NRCE in year 2008-09 is outlined below:

An equine herpes virus-1 (EHV-1) killed vaccine, prepared using indigenous strain of EHV-1 was undertaken for field trial in an organized equine breeding farm at Hisar. A total of 42 equines (36 pregnant mares and 6 naïve fillies) were vaccinated. No post vaccination adverse events (VAEs) were reported in any of the vaccinated fillies or pregnant mares. EHV-1 vaccine developed by NRCE yielded equivalent VN antibody booster response as observed with Pneumabort 'K' (Commercial vaccine).

The Centre is sustainably striving hard towards development and refinement of diagnostics for major equine diseases. In this continuum, type-specific ELISA using EHV-1/4 recombinant glycoprotein G was developed. Multiplex PCR was further validated with 29 clinical samples suspected of EHV1/4 which differentiated the pathogens as EHV-4. Immuno-stick ELISA was developed as a pen-side test substitute to plate ELISA for field diagnosis.

Rhodococcus equi is another major baterial pathogen which causes bronchopneumonia in foals. Three isolates of *R. equi* recovered from nasal swabs of foals with respiratory problems after screening of 51 samples which included samples from foals with respiratory problems, in-contact healthy foals (nasal, faecal) and environment (soil).These were sensitive to five antibiotics (chloramphenicol, erythromycin, ciprofloxacin, neomycin, rifampicin) as against 17 antibiotics (amoxycillin, gentamycin, ampicillin, trimethoprim, chloramphenicol, sulphadiazine, cloxacin, oxytetracycline, amikacin, streptomycin, cotrimoxazole, cephalexin, kanamycin erythromycin, ciprofloxacin, neomycin rifampicin) tested. Further, species specific npf and tra A gene-based PCR has also been developed utilizing primer pairs reported by Arriaga *et al.*, 2002 and Ocampo-Sosa *et al.*,2007, repectively, for diagnosis of *R. equi* infection in field samples which is under validation employing a large number of samples.

The prevalence of JE in equine population in different geographical locations of India was determined. Testing of 889 samples from 6 states *viz.* UP (100), Rajasthan (191), Haryana (61), Madhya Pradesh (258), Himachal Pradesh (161), J&K (118) revealed maximum sero-positivity in Madhya Pradesh (50/258) while no sero-positivity in Himachal Pradesh and J&K. In order to develop a sandwich ELISA, monoclonal antibodies to JEV have been produced and are being evaluated for their usefulness in developing the intended ELISA.

In our nationwide disease surveillance program, during the period under report, sero-survey was conducted in various States/ UTs of India, namely Maharashtra, Rajasthan, Chandigarh, Delhi, Haryana, Punjab, Tamil Nadu, Uttar Pradesh, Karnataka, Andhra Pradesh, Uttarakhand, Madhya Pradesh, J&K, Gujarat, Chattisgarh, Manipur, Himachal Pradesh and West Bengal. A total of 781 serum samples from indigenous equines were tested for detection of antibodies against various diseases and 28 (3.58%) samples for EHV-1, 71 (9.09%) samples for JE, 191 (24.45%) for *B. equi*, were found to be positive. All the above samples when tested for *Salmonella* Abortusequi,

brucellosis, glanders and EIA were negative for antibodies. Besides this, 90 serum samples from various private organizations, quarantine stations and other establishments were also tested for various diseases. A total of 395 samples from animal quarantine centres including 345 vaginal swabs and 50 preputial swabs tested for CEM were negative.

Following the outbreaks of glanders during 2006-2007 and 2007-2008, the surveillance work continued in 2008-2009 wherein testing of 4475 serum samples revealed no sero-positivity indicating that glanders outbreak was over by 2008. It is noteworthy to mention here that the last case of glanders was diagnosed by NRCE in November 2007. The NRCE had played crucial role in diagnosis of glanders during the outbreak period and eventually in containing the disease by identifying the diseased cases and their elimination by "Stamping Out" policy as is in vogue for disposal of glanders cases.

Equine influenza re-emerged in India after a gap of 20 years with initial report of an outbreak of equine influenza in Katra (Jammu & Kashmir) in the months of June to August, 2008 in equines. Later, outbreaks of EI were reported from Uttar Pradesh, Himachal Pradesh, Rajasthan, Uttarakhand, Delhi, Haryana, Gujarat, West Bengal, Andhra Pradesh, Maharashtra and Karnataka. Virus isolated from nasal swabs from Katra and Mysore has been identified as A/Equi-2 (H3N8) and christened A/equine/Jammu-Katra/06/08(H3N8). The complete sequence of the haemagglutinin gene has been analysed establishing it to be belonging to American lineage.

Equine piroplasmosis is an important haemoprotozoan disease of the equids caused by *Babesia equi*. For serodiagnosis of *B. equi*, previously standardized recombinant antigen based-plate ELISA was transformed into the laboratory-oriented kit. The validation of this kit employing OIE-approved CI ELISA kit revealed DSp and DSn values of 0.97 and 0.96 for NRCE kit which were comparable to DSp (0.95) and DSn (0.93) of OIE-approved CI ELISA kit.

Trypanosomosis is an economically important disease of equids which has, of late, gained significance as a zoonotic disease with identification of one case of human trypanosomosis due to *Trypanosoma evansi* in Nagpur District of Maharashtra state in the year 2004 which was confirmed by WHO. Development of an anti-parasitic drug effective against trypanosomes -as in case of other parasites- has been elusive due to lack of understanding of molecular mechanisms of pathogenesis. Centre is engaged in understanding pathogenesis of trypanosomes in rats, mice, rabbit and donkeys and is trying to pin-point a protein which is of universal diagnostic value at all stages of parasitaemia. In this context, studies on infection-specific proetinases have revealed that *T. evansi* releases specific cysteine proteinases during acute as well as chronic stages of infection which could be a putative target for immuno-diagnosis. *In vitro* culture techniques for large-scale cultivation of trypanosomes in culture have been perfected at the Centre which would simplify studies on molecular pathogenesis, screening of drugs/molecules including extracts of indigenous medicinal plants/herbs with potential anti-trypanosomal activities, and preparation of bulk antigen intended for use as diagnostic antigen and also for immuno-prophylaxis.

PCR studies followed by restriction enzyme digestion and subsequent sequencing of four MHC class II loci (DRB3, DRA, DRB2 and DQA) in Marwari horses revealed genetic variability in DRB3, DRB2, DQA loci only.

In an inter-institutional research project on "Characterization of Indigenous Breeds of Horses", recording of 15 biometric indices of 50 unrelated and true-to-breed Zanskari ponies from their home tract in Leh, Ladakh (Jammu & Kashmir) revealed no significant difference in these indices due to sex. Further, genotyping of Marwari and Kathiawari breeds of horses employing 30 fluorescent-labeled microsat pairs in multiplex PCRs showed high heterozygosity which clearly indicated that there is adequate genetic diversity among both the populations. Genetic variability between these breeds is under study by analysis of data generated by multiplex PCRs and sequencing.

In continuing quest of genetic characterization of equines, Toll like receptor 9 (TLR9) was confirmed by transcriptional expression in PBMCs of Marwari breed of horses, Poitu & indigenous donkeys. TLR9 system may provide the molecular basis for preventing or treating a variety of pathological conditions.

Work on non-surgical embryo collection and transfer has been initiated at Equine Production Campus, NRCE, Bikaner. Herein, scientists recovered good-quality embryos from synchronized donor mares which were then transferred to synchronized recipient mares. Presently, one pregnancy of 35 days as on March 31, 2009 with normal embryo growth is continuing in one mare which is being monitored by ultrasonography at regular intervals. After foaling, the parentage will be confirmed by DNA fingerprinting for which technical expertise and facilities are available at the Centre.

During the year, the Veterinary Type Culture Centre (VTCC) also made appreciable progress. Standard Operating Procedures (SOPs) for animal cell culture, bacterial culture, storage of bacterial/viral pathogens, and working guidelines for sample acquisition, characterization, and reposition were developed. A total of 90 bacterial isolates and 6 viral isolates have been preserved at appropriate storage temperatures. Sustained efforts are on to strengthen this repository by adding more and more isolates by isolation from samples collected from field outbreaks as well as acquisition from other ICAR institutes, SAUs, SVUs, and other laboratories. The following year will witness a large-scale expansion of the repository at VTCC.

Package-of-practices, consultancy, and services were extended to stakeholders by NRCE through different equine welfare extension programmes such as animal health camps, group meetings, training-cum-workshops, kisan goshthis under jagrukta abhiyan and farmers field visits for knowledge improvement and economic well-being of equine owners.

The centre has successfully organized four one-week refresher courses on “Equine Disease Diagnosis and Management” for veterinarians during April 28 - May 31, 2008 at NRCE, Hisar. The trainings emphasized on the practical knowledge and hands-on practice on equine disease diagnosis, use of ultra-modern techniques like endoscopy, ultrasonography etc., to detect internal diseases and optimum management system for the sound health of equines.

A short course on 'Use of Ultrasonography, Artificial Insemination and Pregnancy Diagnosis in Equines' was organized at Equine Production Campus, NRCE, Bikaner during May 6-10, 2008. During the course field veterinarians were trained in the use of ultrasound machine and techniques of ultrasonography, artificial Insemination and pregnancy diagnosis through practical trainings as well as theoretical lectures.

Training to fifteen Internship students of Apollo College of Veterinary Medicine, Jaipur was imparted by the scientists at Equine Production Campus of NRCE at Bikaner during June 23-29, 2008 and July 23-29, 2008 regarding equine management, health care, breeding, ultrasonography, technique of artificial insemination and pregnancy diagnosis.

Model Training Course sponsored by Directorate of Extension, Ministry of Agriculture, Govt. of India, New Delhi on “Improved Equine Production through cryo-perservation of semen, artificial insemination and pregnancy diagnosis in equines” was organized during March 23-30, 2009 at EPC of NRCE at Bikaner. The training program covered basic areas in equine husbandry and management which have potential application in the field.

Publications by the scientists of the Centre during 2008-2009 include 26 research articles published in national/international journals, 14 research articles accepted for publication, 9 popular articles, 39 abstracts, and 5 souvenirs/compendia. The scientists of the Centre also participated in 26 seminars/symposia/ conferences, etc.

कार्यकारी सारांश

राष्ट्रीय अश्व अनुसंधान केन्द्र की स्थापना 26 नवम्बर 1985 में हुई। इस संस्थान का उद्देश्य अश्वों के स्वास्थ्य एवं उत्पादन क्षमता में वृद्धि, जैविकी एवं नैदानिक विधियों का विकास एवं संशोधन, देश व्यापी अश्व रोगों की जांच एवं निरन्तर निगरानी और अश्व पालकों के लिए परामर्श उपलब्ध कराना है।

इन उद्देश्यों की प्राप्ति के लिए आवश्यकता के अनुसार अश्व स्वास्थ्य एवं उत्पादन के क्षेत्र में केन्द्र के वैज्ञानिकों ने अनेक तकनीकें विकसित की हैं। वर्ष 2008-09 के दौरान केन्द्र की उपलब्धियों का सारांश इस प्रकार हैं।

इस केन्द्र द्वारा विकसित इक्वाइन हरपीस विषाणु (ई.एच.वी.-1) निष्कृत टीके का परीक्षण किया गया जिसमें देशी विषाणु का प्रयोग किया गया। कुल 42 घोड़ियों को (जिनमें 36 गाभिन व 6 नये बच्चे थे) यह टीका लगाया गया। टीकाकरण के पश्चात गाभिन घोड़ियों व बच्चों में कोई भी अवांछित लक्षण नहीं पाए गए। राष्ट्रीय अश्व अनुसंधान केन्द्र द्वारा विकसित टीका, न्यूमोबोर्ट-के टीके की तरह ही प्रतिरोधात्मक क्षमता विकसित करने में सक्षम पाया गया।

यह केन्द्र अश्व रोगों के परीक्षणों के विकास एवं उनके संशोधीकरण की दिशा में निरन्तर प्रयासरत है। इस श्रृंखला में ई.एच.वी. विषाणु परीक्षण के लिए टाईप स्पेसिफिक एलीसा आधारित एवं मल्टीपलैक्स पी. सी. आर. परीक्षण विधियों का विकास किया गया। इन परीक्षण विधियों से ई.एच.वी.-1 व ई.एच.वी.-4 नामक विषाणुओं में भेद करना सम्भव हो सका है। फार्म स्तर पर प्रयोग हेतु इम्यूनोस्टिक एलीसा परीक्षण विधि का विकास किया गया है।

रोडोकोकस इक्वाई नवजात अश्वों में श्वांस नालियों व फेफड़ों का संक्रमण व न्यूमोनिया रोग करता है। नासिका, मल एवं मिट्टी के 51 नमूनों की जांच में यह रोगाणु श्वांस रोग से ग्रसित तीन अश्व शावकों में से पृथक किया गया। यह जीवाणु सत्रह में से केवल पांच दवाईयों कलोरमफेनीकोल, एरीथ्रोमाईसिन, सिप्रोफलोक्सासिन नियोमाईसिन एवं रिफाम्पीसिन के प्रति संवेदनशील पाया गया। इस रोग की जांच के लिए एलीसा परीक्षण व पीसीआर आधारित परीक्षण विधियों का विकास इस केन्द्र द्वारा किया जा रहा है।

जापानी दिमागी बुखार की विभिन्न भौगोलिक परिस्थितियों में अश्वों में जांच की गई। छः विभिन्न राज्यों से एकत्रित 889 रक्त नमूनों (उत्तर प्रदेश, 100; राजस्थान, 191; हरियाणा, 61; मध्यप्रदेश, 258; हिमाचल प्रदेश, 161; जम्मू व कश्मीर, 118) की जांच में यह पाया गया कि मध्यप्रदेश में अधिकतम 50/258 नमूनों में विषाणु की प्रतिरोधी एन्टीबाडीज पाई गई। जम्मू-कश्मीर के 181 व हिमाचल प्रदेश के 161 नमूनों में से किसी भी नमूने में एन्टीबाडीज नहीं पाई गई। इस रोग की जांच के लिए एलीसा परीक्षण तकनीक विकसित करने हेतु मोनोकलोनल एन्टीबाडीज विकसित की गई।

वर्ष 2008-09 में अश्व रोगों की जांच हेतु देश के विभिन्न राज्यों एवं केन्द्र शासित प्रदेशों में सीरम सर्वेक्षण किया गया। यह सर्वेक्षण महाराष्ट्र, राजस्थान, चण्डीगढ़, दिल्ली, हरियाणा, पंजाब, तामिलनाडु, उत्तरप्रदेश, कर्नाटक, आन्ध्रप्रदेश, उत्तराखंड, मध्यप्रदेश, जम्मू-कश्मीर, गुजरात, छत्तीसगढ़, मणिपुर, हिमाचल प्रदेश एवं पश्चिम बंगाल में किए गए।

इस सर्वेक्षण में 781 सीरम नमूनों की जांच में 28 नमूनों (3.58 प्रतिशत) में ई.एच.वी.-1 विषाणु की एन्टीबाडी मिली, 71 नमूनों (9.09 प्रतिशत) में जापानी दिमागी बुखार व 191 नमूनों (24.45 प्रतिशत) में बैबीसीया इक्वाई की एन्टीबाडीज पाई गई। यह सभी सीरम नमूने सालमोनेला एर्बाट्स इक्वाई, ब्रुसेलोसिस, ग्लैंडर्स व ई. आई. ए. एन्टीबोडीज से मुक्त पाए गये। इसके अतिरिक्त निजी संस्थाओं, क्वारनटाईन केन्द्रों व अन्य स्थानों से भी विभिन्न रोगों की जांच के लिए नमूने एकत्रित किए गए। तीन सौ पिचानवे नमूने परीक्षण के बाद कन्टेजियस इक्वाईन मैटराईटिस रोग से मुक्त पाए गए।

देश में वर्ष 2006-07 व 2007-08 में गलैंडर्स नामक रोग फैलने के पश्चात 2008-09 वर्ष के दौरान 4475 सीरम नमूनों की जांच की गई व कोई भी पशु रोग से ग्रसित नहीं पाया गया। वस्तुतः नवम्बर, 2007 के बाद संस्थान द्वारा ग्लैंडर्स ग्रसित कोई भी पशु नहीं पाया गया। यह दर्शाता है कि रा. अ. अनु. के. के निरन्तर प्रयासों से रोग की रोकथाम सम्भव हो सकी है।

अश्व फ्लू भारत में बीस वर्ष के अन्तराल के बाद पुनः देखा गया। जून से अगस्त 2008 तक कटरा में व जुलाई 2008 के पश्चात् इस

रोग का प्रकोप उत्तरप्रदेश, हिमाचल प्रदेश, राजस्थान, उत्तराखंड, दिल्ली, हरियाणा, गुजरात, पश्चिम बंगाल, आंध्रप्रदेश, महाराष्ट्र व कर्नाटक में दर्ज किया गया। नासिका से लिए गए नमूनों से विषाणु पृथक किए गए व यह Group-2 (H3N8) व A/Equine/ Jammu-Katra/06/08 (H3N8) के रूप में परिभाषित किए गए। विभिन्न जीनों के सीकवैन्स विश्लेषण व उनके वंशावली के अध्ययन से यह पता चला है कि यह विषाणु अमरीकी विषाणुओं के निकटस्थ थे।

अश्व बैबेसियोसिस रोग के निदान हेतु रीकम्बीनैन्ट एन्टीजन आधारित एलीसा तकनीक विकसित की गई। इस तकनीक की संवेदनशीलता को अन्तर्राष्ट्रीय स्तर की तकनीकों के समकक्ष पायी गई।

सर्रा अश्वों की आर्थिक महत्व की बीमारी है। महाराष्ट्र के नागपुर जिले में वर्ष 2004 में एक मनुष्य में ट्राईपेनोसोमा ईवेनसाई द्वारा इस रोग के होने की पुष्टि विश्व स्वास्थ्य संगठन द्वारा की गई, जिससे इस रोग का महत्व बढ़ जाता है। इस रोगाणु को कृत्रिम प्रणाली से शरीर से बाहर उगाने की प्रक्रिया का विकास किया गया। रोगाणु के प्रोटीन समूहों के अध्ययन हेतु विभिन्न तकनीकों का प्रयोग किया गया। चूहों पर किए गए प्रयोगों में यह पाया गया कि ट्रिपैनोसोमा इवैन्साई ऐसे प्रोटीनेसिस उत्पन्न करता है जिनका रोग परीक्षण के लिए सम्भवत: प्रयोग किया जा सकता है।

मारवाड़ी अश्वों के एम.एच.सी.-2 जीन की भिन्नरूपता के अध्ययन में DRB 3, DRB 2 व DQA लोसाई में आनुवंशिक भिन्नता पाई गयी।

अश्वों की देशी नस्लों की विशेषताओं पर जानकारी एकत्रित करने हेतु जांसकारी नस्ल के 50 टटुओं की कद-काठी के मापदण्डों का मूल्यांकन किया गया और यह पाया गया कि लिंग के आधार पर इनमें कोई विशेष अन्तर नहीं है। आण्विक विश्लेषण के आधार पर काठियावाड़ी व मारवाड़ी नस्ल के अश्वों में आनुवांशिक भिन्नता पाई गई।

टी.एल.आर. 9 रिसैप्टर जो CpG के द्वारा प्रतिरोधक क्षमता की वृद्धि में सहायक हैं का विभिन्न अश्व प्रजातियों जैसे मारवाड़ी घोड़े, देशी गधे व विदेशी पायटू गधों में विश्लेषण किया गया है।

केन्द्र द्वारा बिना शल्य क्रिया के भ्रूण एकत्रित करने की विधि विकसित करने हेतु कार्य आरम्भ किया गया है। इस विधि द्वारा केन्द्र के वैज्ञानिकों ने एक घोड़ी को गर्भित किया है।

वैटरनरी टाईप कल्चर केन्द्र में महत्त्वपूर्ण प्रगति की गई। प्रयोगशाला में कार्य हेतु दिशा निर्देश, विभिन्न प्रकार के प्रोफोर्मा तथा मानक कार्यविधियां इत्यादि तैयार की गई। इस केन्द्र द्वारा 90 जीवाणु व 6 विषाणु आइसोलेट्स को संरक्षित किया गया है।

राष्ट्रीय अश्व अनुसधांन केन्द्र द्वारा अश्व पालकों के लिए देश के विभिन्न भागों में अश्व स्वास्थ्य शिविरों, किसान गोष्ठियों, प्रशिक्षण व कार्यशालाओं का आयोजन किया गया जिसमें अश्व पालकों को स्वास्थ्य एवं उत्पादन वृद्धि के विभिन्न पहलुओं के बारे में अवगत कराया गया।

केन्द्र द्वारा उत्तराखण्ड राज्य के पशु चिकित्सकों के लिए एक सप्ताह के चार प्रशिक्षण कार्यक्रम 'अश्व रोग निदान एवं प्रबन्धन' विषय पर 28 अप्रैल से 31 मई, 2008 के दौरान आयोजित किये गए।

अश्व उत्पादन परिसर, बीकानेर द्वारा भी इसी प्रकार का एक प्रशिक्षण कार्यक्रम आयोजित किया गया। इसका विषय था 'अश्वों में अल्ट्रासाऊंड, कृत्रिम गर्भाधान व गर्भजांच' यह कार्यक्रम 6-10 मई, 2008 तक आयोजित किया गया।

अपोलो पशु चिकित्सा महाविद्यालय, जयपुर के पशु चिकित्सा स्नातक छात्रों के लिए अश्व उत्पादन परिसर, बीकानेर में 23-29 जून, 2008 व 23-29 जुलाई, 2008 के दौरान अश्वों के प्रबंधन, स्वास्थ्य, प्रजनन, अल्ट्रसोनोग्राफी, कृत्रिम गर्भाधान व गर्भजांच पर प्रशिक्षण कार्यक्रम आयोजित किये गये।

अश्व उत्पादन परिसर, बीकानेर में 23 से 30 मार्च, 2009 तक विस्तार शिक्षा निदेशालय, कृषि मंत्रालय, भारत सरकार द्वारा प्रायोजित आदर्श प्रशिक्षण का आयोजन किया गया। इस कार्यक्रम के अन्तर्गत अश्व पालन के विभिन्न पहलुओं पर प्रशिक्षण दिया गया।

इस वर्ष के दौरान केन्द्र के वैज्ञानिकों ने अन्तर्राष्ट्रीय एवं राष्ट्रीय तकनीकी पत्रिकाओं में 26 शोधपत्र प्रकाशित किए एवं 14 शोधपत्र प्रकाशन हेतु स्वीकृत किए जा चुके हैं। 9 लोकप्रिय-लोकोपयोगी वैज्ञानिक लेख व 39 संक्षिप्त शोधपत्र भी वैज्ञानिकों द्वारा प्रकाशित किए गए। इसके अतिरिक्त वैज्ञानिकों ने 26 विभिन्न अन्तर्राष्ट्रीय एवं राष्ट्रीय वैज्ञानिक गोष्ठियों एवं परिचर्चाओं में भाग लिया एवं पांच सोवेनिर/ कॉम्पेन्डियम भी तैयार किये गये।

INTRODUCTION

National Research Centre on Equines (NRCE) was established on 26th November 1985 at Hisar (Haryana) under the aegis of the Indian Council of Agricultural Research. Since its inception, NRCE has strived hard for bringing in improvements in health and production of equines in India. A sub-campus at Bikaner -established in 1989- is contributing significantly for upliftment of the landless and marginal farmers by helping in conservation and improvement of the germplasm of indigenous equine breeds, besides disseminating the technologies for the efficient and economically feasible equine production. In a short span, NRCE has been recognized as a premier research centre in the area of equine health and production. The main campus of NRCE is located at Hisar (Haryana) with state-of-the-art laboratories for undertaking research in areas of equine virology, bacteriology, parasitology, immunology, pathology, medicine, biochemistry and biotechnology. In addition, NRCE has a subcampus at Bikaner (Rajasthan) where research laboratories for genetics and breeding, reproduction, physiology and nutrition are established to undertake research on equine production. Veterinary Type Culture Centre has also been established in the year 2005 at NRCE for collection and typing of microbes of veterinary importance with potential for subsequent harnessing of microbial might for animal and human welfare.

Major Historical Landmarks

1985 : National Research Centre on Equines (NRCE) established at Hisar (Haryana) under the aegis of the Indian Council of Agricultural Research, with Prof. Prem Kumar Uppal joining as Founder Director.

1986 : Centre came into functioning effectively at Hisar.

1987 : Outbreak of equine influenza in Northern India.

1989 : Equine Production Campus of NRCE established at Bikaner.

1990 : Exotic donkey germplasm with poitu blood introduced from France.

1991 : AI initiated in equines using fresh extended liquid semen.

1991 : Ultrasonography-based pregnancy diagnosis initiated in equines wherein 15 days pregnancy could be detected.

1994 : AOvAb-based ELISA developed for differentiation of equine influenza vaccinated and infected animals (DIVA).

1995 : CIq-ELISA developed for detection of circulating immune complexes in EIA-infected horses

1995 : Development of field-oriented immuno-stick ELISA kit for detection of EHV-1 and EHV-4 antibodies for better management of latent infection with EHV in Throughbred horses.

1995 : Cryopreservation of Jack semen and technology of artificial insemination (AI) perfected using cryopreserved semen with 40% conception rate.

1996 : Establishment of a nucleus herd of Marwari horses initiated.

1996 : Crystal structure of mare milk lactoferrin deduced by crystallography.

1996 : New carpet fabric developed by blending of donkey and sheep hair (Assheep) under inter-institutional collaboration with CSWRI, Avikanagar

1997 : Equine influenza vaccine using indigenous isolate (A/Equi-2/ Ludhiana/87) released.

2001 : Patent for Complement fixation test based diagnostic (COFEB-Kit) kit for detection of *B. equi* antibodies was filed vide application number 36/Del/2001 on January 19, 2001.

2003 : An Indian patent (55E4 1891278) granted to "A method for preparation of a diagnostic kit useful for forecasting

Equine Herpes Virus-1 disease" on October 25, 2003.

2005 : Veterinary Type Culture Centre established at NRCE.

2005 : Mab-based sELISA for detection of animal rota viruses developed.

2006 : Collection and cryopreservation of stallion semen at Farmer's door-using mobile laboratory.

2006 : World Organization for Animal health declared India free of African horse sickness.

2006 : Re-emergence of glanders

2008 : Re-emergence of equine influenza.

2008 : Equine Herpes Virus-1 diagnosis kit released.

2008 : ELISA -based pregnancy diagnosis kit for pregnancy diagnosis in mares released.

Thrust areas

- Surveillance and monitoring of important equine diseases including emerging and existing diseases with special emphasis on foal mortality and production losses.
- Development of effective and preferably field-based diagnostics and potent immunoprophylactics against major equine diseases threatening equine population in India.
- Development of effective plant-based products for management of some economically important equine diseases and to enhance performance in equids.
- To provide diagnostic and consultancy services for beneficiaries, particularly equine farmers and breeders.
- Propagation of sustainable and economically viable AI technology for mule production in India using cryopreserved jack semen for use at farmers' door
- Perfection and propagation of artificial insemination techniques in horse and pony production using frozen semen of true to breed indigenous stallions for the conservation of threatened breeds in India.
- Breed characterization and *in-situ* conservation of various indigenous breeds of horses.
- Utilizing importance of equine draught power for economically weaker section of the society.
- Extension activities through IT and Institute Development Programmes for the upgradation of the indigenous breeds of equids in the different parts of the country in collaboration with the State Departments.

Mission

- Achieving freedom from dreaded equine diseases through development of modern diagnostics and vaccines.
- Technology transfer for superior mule and true-to-breed indigenous horse production in their home tracts using AI & embryo transfer technology with an aim to establish embryo bank of Marwari and Kathiawari horses to enhance export.
- Enhancing performance of working equids especially in arid, semi-arid and mountainous regions.
- Income generation through market intelligence activities.

Mandate

- To undertake research on health and production management in equines;
- To develop diagnostics/biologicals for major equine diseases;
- To act as National Referral Facility for diagnosis, surveillance and monitoring of equine diseases, and
- To provide diagnostic, advisory and consultancy services.

The centre has made the following salient achievements in a short span since its inception.

Equine Health

Vaccines

The Centre has developed inactivated equine influenza vaccine using indigenous isolate (A/Equi-2/Ludhiana/87) as well as improved bacterin and outer membrane protein-based vaccines for *Salmonella* Abortusequi. Equine herpesvirus-1 vaccine is under field trial in equines.

Diagnostics

The Centre has been recognized as National Referral Centre for diagnosis of important equine infectious diseases by Department of Animal Husbandry, Dairying & Fishery, Ministry of Agriculture (Government of India). The Centre has developed diagnostic kits for equine herpes virus-1 (HERP kit) and *B. equi* (COFEB kit) infections. In addition, the Centre has developed various tests for diagnosis of equine diseases including equine influenza, EHV-1 & EHV-4 infection, equine rotavirus diarrhoea, equine infectious anaemia, equine piroplasmosis, equine viral arteritis, leptospirosis, mycoplasmosis, streptococcal infections, etc.

Disease surveillance and monitoring

NRCE is involved in nation-wide disease monitoring and surveillance of important equine diseases particularly those that are included in *Office International des Epizooties* (OIE) list. Control of EIA in India was done by timely diagnosis and adopting package of practices formulated by NRCE. The disease is not reported from India since 1999 in our active surveillance programme. The centre contributed significantly in the database generated on the prevalence of African horse sickness which helped the OIE -The World Organization for Animal Health- to declare India free of this disease in 2006.

The sustained efforts of NRCE helped in keeping glanders under control till 2005, after which it re-emerged in 2006. Active surveillance, diagnosis and adoption of "stamping out policy" again helped in containing the diseases by the end of 2007 as the last case of glanders was reported in November 2007.

Re-emergence of equine influenza in 2008 posed a challenge on NRCE which put in its best efforts in control and containment of the diseases which continued till March 2009 and beyond.

Equine babesiosis, trypanosomiosis, equine herpes virus and Japanese encephalitis are currently endemic in our country as evident by sero-surveillance in most of the states of the country.

Immunobiologicals

Monoclonal antibodies have been developed for diagnosis and characterization of equine herpes virus, equine rota virus and Japanese encephalitis virus. Similarly, hyperimmune serum and diagnostic antigens have also been prepared by the Centre.

Molecular characterization of pathogens

Molecular epidemiology by sequencing of important genes of equine viruses viz. EHV-1, EHV-4, EIV, Equine rotavirus, and JEV has been the thrust area wherein viral isolates from various geographic locations collected over a long time period have been employed to dissect out molecular evolution trends.

Equine Production

Artificial insemination

Pure germplasm of indigenous breeds of horses and exotic donkeys is being conserved by artificial insemination using frozen semen for production of superior quality Marwari horses, mules and exotic donkeys. AI is also being practised at Farmer's door using frozen semen.

Indigenous breed characterization

Phenotypic and molecular characterization of indigenous breeds of horses has indicated the existence of genetic variability within Marwari and Kathiawari breeds.

Early pregnancy diagnosis

Pregnancy diagnosis between days 14 and 18 post-insemination has been achieved using ultrasonography in donkey and horse mares. An ELISA-based kit for pregnancy diagnosis in mares using serum samples has been developed.

Patents

- Patent has been granted by the Patent Office, Government of India on application entitled *"A method for preparation of a diagnostic kit useful for forecasting Equine Herpes Virus-1 disease"* (2003).
- A patent has been filed for *"Complement fixation test (CFT) based diagnostic COFEB Kit developed for the detection of B. equi antibodies"* (2001).
- The centre has also filed a patent for *"A kit for detection of pregnancy in equines and assay thereof"* (2006).

Services and Consultancy

Disease diagnosis

The NRCE has been recognized as National Referral Laboratory by DAHD&F, MOA, GOI; for diagnosis of equine diseases. Disease diagnostic services for various infectious and non-infectious equine diseases are provided to equine owners, breeders, state animal husbandry departments, police and army horses.

Production of superior quality germplasm

The Centre provides artificial insemination services to equine owners to enhance the production of superior quality Marwari horses, mules and donkeys. Quality jacks and jennies are also supplied to various states, breeding societies and farmers, for production of superior quality mules and donkeys.

Regulation of movement of equines

NRCE is providing health certification for movement of equines within and outside the country. This facility has helped in promotion of export of horses.

Extension activities

Different components of transfer of technology system when placed and harmonized properly result in the flow of technology to the end-users. The scientific and technical staff provides clinical and diagnostic services including pregnancy diagnosis and consultancy to the farmers on demand related to equine health and production. Equine owners are imparted training and supplied educational materials for equine management, production and health. Training are also imparted to field veterinarians to upgrade and refresh their knowledge for improving health and overall productivity of equines in the country.

Organization of equine health camps, Kisan Goshties, Mass Awareness Campaigns, Kisan Darbar, etc. is a regular feature. NRCE scientists also participate in Kisan Melas, Exhibitions, Animal Fairs, Radio Talks and Doordarshan activities which benefits farmers including equine owners.

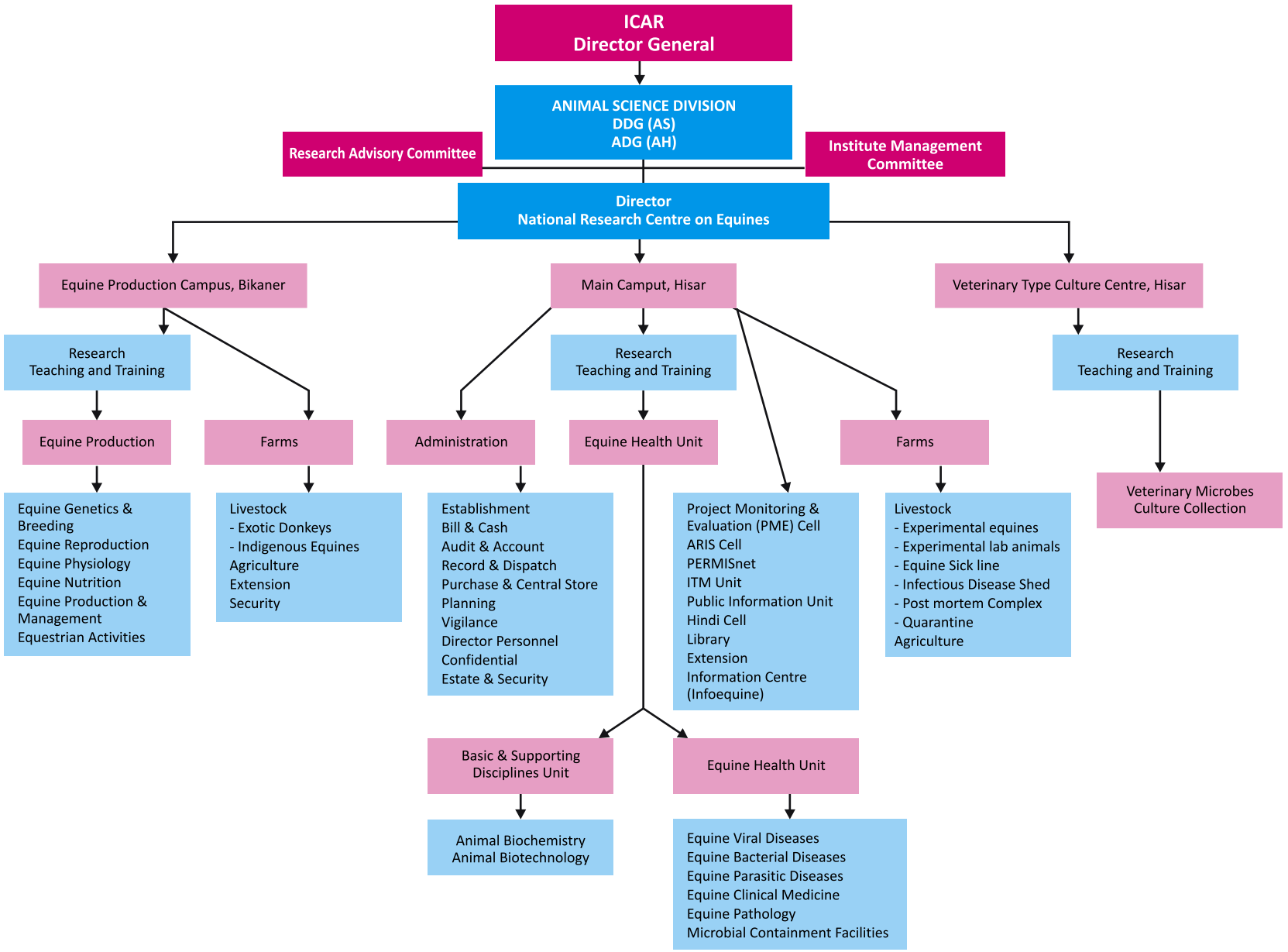
Veterinary Type Culture Centre

Veterinary Type Culture Centre initiated its activities in 2005 at National Research Centre on Equines, Hisar with the primary objective of tapping the vast microbial diversity of animal origin for its utilization in various ways to enhance livestock productivity.

Staff Position

Name of the post	NRCE			VTCC		
	Sanctioned	Filled	Vacant	Sanctioned	Filled	Vacant
Director	1	1	-	-	-	-
Scientific	25	23	2	10	6	4
Technical	23	22	1	1	1	-
Administrative	11	10	1	-	-	-
Supporting	22	21	1	-	-	-
Total	82	77	5	11	7	4

Organizational Set-up



Expenditure & Revenue

Rs in Lacs

Summary of Expenditure	2007-08	2008-09
NON-PLAN		
1. Establishment charges including LSP/PF, Wages, OTA	181.09	319.37
2. Traveling allowances	3.89	2.88
3. Other including equipments & recurring charges	110.15	116.84
4. Works	24.99	20.00
Total (Non-Plan Expenditure)	320.12	459.09
PLAN		
1. Establishment charges including LSP/PF, Wages, OTA	14.62	23.09
2. Traveling allowances & HRD	2.25	3.95
3. Others including equipments & recurring charges	251.54	205.57
4. Works	139.42	260.49
Total (Plan Expenditure)	407.83	493.10
Total Expenditure (Plan and Non-Plan)	727.95	952.19

Figures in Rs

Summary of Revenue Generation	2007-08	2008-09
NON-PLAN		
1. Sale of farm products & auction of dry trees	-	600.00
2. Sale of livestock	1,02,700.00	4,07,800.00
3. Sale of publication and advertisements	600.00	9,200.00
4. License fee	70,154.00	75,904.00
5. Interest on loans and advances	81,655.00	1,62,286.00
6. Interest on short term deposits	4,84,340.00	5,88,876.00
7. Income from internal resource generation	32,63,221.00	35,14,763.00
8. Receipt from services	3,800.00	54,300.00
9. Other miscellaneous receipts	18,54,396.00	12,19,495.00
Total Revenue	58,60,866.00	60,33,224.00

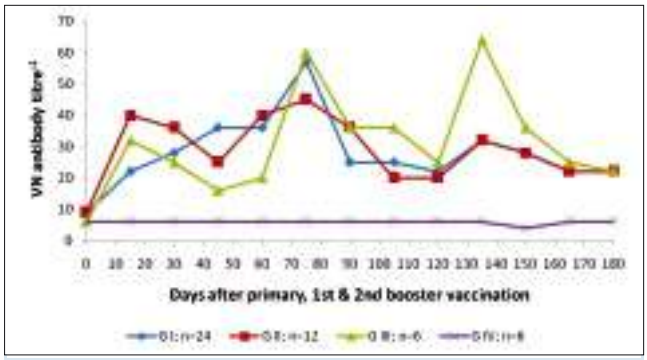
Research Achievements

Equine Health

Field trial of equine herpes virus- 1 vaccine

EHV-1 vaccine developed by the Centre was undertaken for the field trial in an organized farm at Hisar. For this, killed oil emulsion mannide monooleate (OEMM) vaccine in 2 ml dose was inoculated to 24 pregnant mares (5 months) and 6 naïve fillies while 12 pregnant mares were immunized with Pneumabort 'K' (Fort Dodge Animal Health, USA) vaccine. Six fillies were kept as unvaccinated control. The first dose of vaccine was given to pregnant mares at five month of gestation followed by booster dose on seventh month of gestation. The second booster dose was given at ninth month of gestation. No post vaccination adverse effect in any vaccinated pregnant mares and fillies was observed. The NRCE EHV-1 vaccine generated good (VN) antibody booster response that was equivalent to that generated by Pneumabort 'K'. The reciprocal serum VN antibody titre response in mares after initial inoculation and second booster dose vaccination varied from 32 to 128. The same pattern of VN antibody titre was observed in naïve fillies.

Serum samples from these experimental mares were also collected on the day of foaling. Foals born from vaccinated mares acquired significant level of EHV-1 specific maternal antibodies (through colostrums of dam). This antibody titre in these foals was observed by serum neutralization test and no change in VN antibody response was seen after 48 h of the birth.



A comparative primary (0-60 days); 1st & 2nd booster (60-120 days & 135-180 days, respectively) immunization responses of mares vaccinated with NRCE EHV-1 killed vaccine (G I& III) and Pneumabort 'K' (G II).

Out of 24 pregnant mares in group I vaccinated with NRCE vaccine, 21 (88%) gave birth to normal healthy foals. There were 3 abortions amongst which one was unnoticed abortion. Similarly, out of 12 pregnant mares in group II vaccinated with Pneumabort 'K' vaccine 75% gave birth to normal healthy foals. There were 2 abortions in this group also. No infectious agent could be isolated from any of the aborted fetuses. Naïve fillies (6 nos) vaccinated with NRCE vaccine remained healthy and showed good immune response.

This study revealed that vaccine developed by NRCE, did not produce any untoward reaction in pregnant mares after vaccination. The vaccinated mares and produced equivalent VN antibody responses as with Pneumabort 'K' vaccine.

(B.K. Singh, Nitin Virmani & B.R. Gulati)

Development of type-specific ELISA for differentiation of EHV-1 and EHV-4 and its comparison with virus neutralization test

a. Type-specific ELISA using recombinant protein expressed by truncated glycoprotein G gene

Type-specific ELISA using recombinant protein expressed by truncated glycoprotein G gene developed for differentiation of EHV-1 and EHV-4 was compared with virus neutralization test. The serum samples from 142 animals belonging to

different regions of the country were selected and used to compare the results of type-specific ELISA with VNT for EHV-4. Out of 142 samples tested, 118 (83.09%) samples were positive for EHV-4 by type-specific ELISA while 107 (75.35%) samples elicited titres of 1:8 and above in the virus neutralization test. There was 92.5% agreement between the two tests. Sensitivity of type-specific ELISA was 100% while specificity was 76.08% at 1:8 cut off for VNT. Further studies to rule out the false positivity, if any, by ELISA will be done through commercially available kit for EHV-4 diagnosis.

b. Isolation of EHV-4 from the clinical samples

Twenty nine nasal swabs collected from animals suffering from respiratory disorders were examined by multiplex PCR for EHV-1/4 and six were found positive for EHV-4. EHV-4 virus could be isolated from two cases in equine embryonic cells. The identity of isolated virus was established as EHV-4.

c. Immunostick ELISA as a substitute to plate ELISA for the field diagnosis

An immunostick ELISA based on recombinant proteins (from fragment of glycoprotein G earlier developed for plate immunoassay) was standardized as a field based assay for serological differentiation of EHV-1 and 4 infections. The test was standardized on a nylon membrane and the results of the test can be read within 3 hours of employing the test. It requires no equipments as the end result can be read by the naked eyes. The shelf life of the immunosticks coated with recombinant protein was tested for a period of one year and they were found to be working efficiently.

(Nitin Virmani, B.K.Singh & B.R.Gulati)

Re-emergence of equine influenza in India

India experienced epizootic of equine influenza (EI) from last week of June 2008 which spread to various parts of the country. The previous outbreak was reported in 1987 when approximately 83000 equids were affected from the northern and central India. Since then the country had not experienced any outbreak of EI and continuous surveillance had shown no seropositive reactors after 1998.

The first information about the present outbreak was received from Katra (Jammu and Kashmir) in last week of June 2008 wherein approximately 15000 equines largely ponies and mules were living in close proximity. The disease was confirmed on the basis of clinical signs, virus isolation from the nasal swabs (n=5) and EIV positive antibody titres (n=80) in the serum employing haemaggltuinating inhibition (HI) test on 118 serum samples. Subsequently, from July 2008 to March 2009, the disease was reported from different geographical areas of India which includes 9 states of India viz. Jammu and Kashmir, Himachal Pradesh, Delhi, Uttar Pradesh, Haryana, Rajasthan, Maharashtra, Karnatatka and West Bengal. At all the places of outbreak, the clinical signs reported were high fever (>103°F), watery discharge from the nostrils and deep dry cough which exacerbated during the walk and exercise. Within two to three days of illness, the discharge from the nostrils became mucopurulent. The symptoms usually lasted for 5 to 7 days. However, in a few cases, the symptoms of dry cough and mucopurulent nasal discharge persisted in the animals upto 2 weeks.

A total of 2414 serum samples were screened by HI assay and 438 samples (18.14%) were found positive for EIV antibodies. Serum samples tested positive from Jammu and Kashmir, Uttar Pradesh, Himachal Pradesh, Rajasthan, Delhi, Haryana, West Bengal, Maharashtra and Katrnataka.

Five isolates from Jammu and Kashmir (A/eq/Katra-Jammu/08(H3N8) and two from Karnataka (A/eq/Mysore/08(H3N8) were confirmed in the allantoic fluid harvested from the embryonated eggs inoculated with fluid from the nasal swabs. The virus

particles were detected by performing HA test on the allantoic fluid using chicken erythrocytes which gave initial titres in the range of 1:64 to 1:256. The isolates were subjected to HI test using standard serum for H7N7 and H3N8 (A/eq/Prague/56, A/eq/Miami/63, A/eq/Kentucky/1/81, A/eq/Ludhiana/87) and confirmed as H3 subtype.

The Haemaggltuinin gene (1713 bp) of A/eq/ Jammu -Katra/06/08(H3N8) isolate was amplified and cloned for sequencing. The open reading frame of the HA gene was of 1704bp. The representative sequence was submitted to GenBank, NCBI and assigned accession no FJ888344. The deduced amino acid sequence of the precursor HA protein was 567. Upon comparison of amino acid sequences of HA1 protein with other EI virus (H3N8) isolates, the present isolate A/eq/Katra-Jammu/08 (H3N8) shared more than 99% holmology with A/eq/Mongolia/1/08, A/eq/Newmarket/1/07, A/eq/Richmond/1/07, A/eq/Sollihull /1/07, A/eq/Cheshire/3/07, A/eq/ Berkshire/1/07, A/eq/Essex/3/05. The comparison of amino acid sequence homology of precursor HA protein was 98.6% with A/eq/New Market/5/03, A/eq/Bari/05 and 98.23% with A/eq/Kentucky/5/02 isolates.

Antibodies to EI as detected by HI in equines

State	Total Samples	Positive Samples	Percent Positive
J & K	298	102	34.23
Rajasthan	470	97	20.64
U.P.	174	0	0
H.P.	109	18	16.51
Maharashtra	380	108	28.42
Gujarat	634	0	0.00
WB	30	22	73.33
Jharkhand	13	0	0
Karnataka	89	19	21.35
Chattisgarh	8	0	0
Delhi	59	21	35.59
Haryana	150	51	34.00
Total	2414	438	18.14

Phylogenetic analysis of the HA gene confirmed the virus to be of Clade 2 of the Florida sublineage in American lineage. The HA1 gene sequence matched most closely to the isolates from China and that of Mongolia indicating the introduction of the virus in India from northern international borders.

(Nitin Virmani, B.K.Singh, B.C. Bera, K. Shanmugasundaram, B.R. Gulati, S.K. Khurana, Rajesh Vaid, S. Barua & R.K. Singh)

Japanese Encephalitis among equines In India

a. Prevalence of Japanese Encephalitis in equine population

Japanese encephalitis (JE) is a vector-borne disease of humn and equines. To know the status of JE in equines in India, seroprevalence of JE was done in six states. Equine serum samples (889) from six different states were tested for antibodies to JEV by haemagglutination inhibition (HAI) and confirmed by virus neutralization test (VNT). Out of 889 equine serum samples tested, 71 (8%) were positive for JEV antibodies. Maximum number of samples from MP were detected positive (50/258) for antibodies to JEV whereas, none of the samples from Himachal Pradesh (161) and J&K (181) was detected positive.

Results of testing equine sera for JE antibodies

State	Total Samples	Positive Samples	Percent Positive
Rajasthan	191	12	6.28
Haryana	61	4	6.55
U.P.	100	5	5.00
H.P.	161	0	0
M.P.	258	50	19.37
J&K	118	0	0
Total	889	71	7.98

b. Isolation and characterization of JEV from clinical case

JEV was isolated from an equine showing neurological signs. The isolation was done by passaging the specimen from sick animal in suckling mice brain and also in PS cell line. The isolation was confirmed by virus neutralization and RT-PCR using E-gene and 3'NTR primers. The full-length E-gene of the isolated virus has been cloned and sequenced for confirmation of isolates.

c. Development of JEV-specific murine monoclonal antibodies

BALB/c mice were immunized with formalin inactivated partially purified JEV grown in PS cells and hybridomas were raised by fusion of the spleen cells of immunized mice with SP2/0 myeloma cells. The positive hybrids were selected by ELISA employing both mouse brain antigen and recombinant E-protein antigen.

A total of 14 hybridomas giving strong reaction in ELISA were selected and cloned by limiting dilution method. Panels of 14 clones secreting JE-specific monoclonal antibody were amplified and cryo-preserved. Ascites fluid against three of these clones were raised and these monoclonals are further being characterized and tested for their application for development of ELISA for JEV.

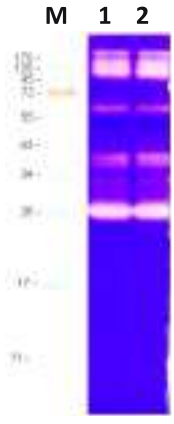
(B.R. Gulati, B.K.Singh, Nitin Virmani & H.S.Singha)

Identification and characterization of cysteine proteinases in diagnosis of trypanosomosis

During the period under report, mice-adapted camel and donkey isolates of *T. evansi* were maintained in laboratory. The several batches of cell-free parasites were purified from infected mice/rats using DEAE-cellulose chromatography. Thereafter, sonicated antigen was prepared by following standard protocol and polypeptide profile was examined using SDS-PAGE. In order to characterize and identify various proteinases further, GS-PAGE was carried on *T. evansi* antigen. The antigen revealed strong proteolytic activity at various zones *in vitro* when incubated with DTT in acidic pH. The prominent zone of clearance were evident at different molecular weights, ranging from 26-28 kDa, 35-41 kDa, 67-69 kDa, 95-170 kDa in form of multiple bands. The proteolytic activity was more intense at 26-28 kDa and 35-41 kDa at pH 5.0.

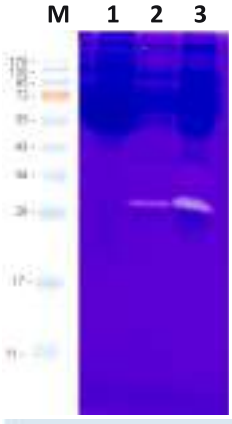
In order to identify infection-specific proteinases, serum samples of rats infected with *T. evansi* were subjected to GS-PAGE along with healthy rat serum. The proteolytic activity was evident only at 26-28 kDa zones. Moreover, other zones of clearance which were seen using antigen GS-PAGE were not visible in rat serum. The preliminary studies revealed that *T. evansi* releases infection-specific cysteine proteases during course of acute and chronic infection and could be a possible putative target for immunodiagnosis.

Further, preliminary experiment was carried out in rabbits experimentally infected with *T. evansi* to study the kinetics of antibody response using ELISA and Western blot. The specific antibodies were



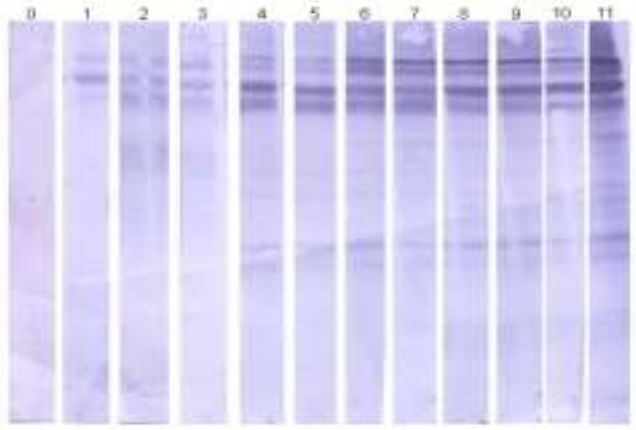
M : Prestained mol. wt. marker
Lane 1-2 : *T. evansi* antigen showing zones of clearance

GS-PAGE of *T. evansi* antigen showing proteolytic activity at different zones.



M : Prestained mol. wt. marker
Lane 1 : Healthy rat serum
Lane 2-3 : Infected rat serum

Gelatinolytic activity of rat serum experimentally infected with *T. evansi* at different dilution using GS-PAGE, alongwith molecular wt. marker



Lane 0 : Pre-infection serum
Lane 1 to 11 : Weekly post-infection serum

Immunoblot depicting humoral immune response in rabbits experimentally infected with *T. evansi.*

detected from 2nd week onwards by ELISA. The antibody titre showed rising trend which was maximum at 7-8 weeks PI, thereafter showed slight decline and further maintained the plateau with high antibody titre till 11th week PI. Western blot studies further revealed that all the infected rabbits strongly recognize polypeptide bands from 2nd week PI onwards in the range of 66-55 kDa (3-4 bands) and reactivity became more intense as the infection progressed. These bands remained visible till 11th week PI. As such, these proteins have potential for use as putative diagnostic antigen which would be evidently clear after further characterization. Moreover, the polypeptide bands in the range of 35-41 kDa recognized antibodies after 5th weeks onwards only and remains observed in circulation upto 11th weeks PI. In other experiment the donkeys were experimentally infected with *T. evansi* parasite and sequential serum samples were collected. These serum samples will be utilized further to study the immunokinetics of different polypeptide bands using western blot analysis.

(S. C. Yadav, Rajender Kumar, Sanjay Kumar & A. K. Gupta)

Development of ELISA for diagnosis of *Trypanosoma evansi* infection by detection of antibodies

a. Experimental infection in donkeys

The female adult donkeys (8 Nos.) were procured from adjoining areas of Hisar. Six out of eight animals were experimentally infected with *T. evansi* infection @ $2x10^6$ parasites per animal subcutaneously and two animals were kept as control. The serum/blood samples were collected at weekly interval for study of haematological, parasitological and serological parameters.

Each donkey in infected group developed subacute to chronic disease. Average prepatent periods/parasitemia of 13-14 and 7 days were observed using wet blood film examination and hematocrit centrifugation techniques, respectively. No correlation was observed between parasitaemia and high body temperature. The main clinical signs observed were intermittent fever, dullness, weakness, emaciation, anaemia, lacrimation in all the six donkeys whereas in two donkeys edema in brisket and vulvar regions, leg weakness, and incoordination in hind quarters were observed. Haematological studies indicated a significant gradual fall of haemoglobin and PCV level in all the six animals of infected group.

b. Standardization of Enzyme-inked Immunosorbent Assay (ELISA)

Whole cell lysate antigen was prepared using purified trypanosomes isolated from infected rat/mice blood. The protein content was determined and adjusted to 1.0 mg/ml. The optimum dilutions of whole cell lysate antigen, serum samples and conjugate were determined by chequer board titration as 1:100, 1:100 and 1:10000, respectively.

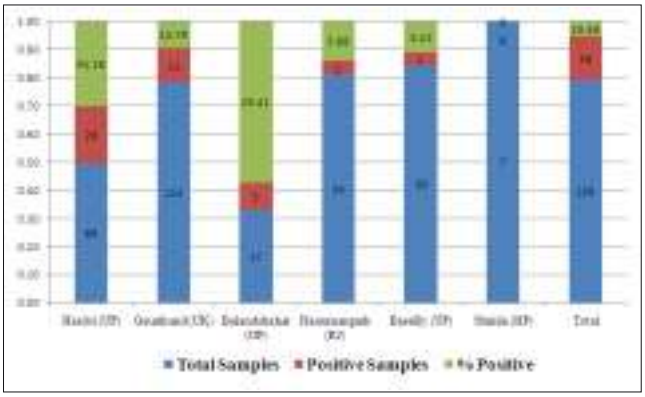
For calculation of titre of various test serum samples, relative percentage of positivity (RPP) according to the relation of OD with the negative control and positive control samples applied on the same ELISA plate was determined using the following formula:

$$\text{RPP of a sample} = \frac{\text{Avg. OD of the sample - Avg. OD of negative control}}{\text{Avg. OD of positive control - Avg. OD of negative control}} \times 100$$

The sample having >15 RPP value was considered as positive.

The mean ELISA absorbance value of sera of control donkeys showed no significant variation during the entire period of study *i.e.* up to 4 months post infection. The serum antibody titre of infected group started increasing from 10 dpi and reached to maximum level on 42 dpi, thereafter antibody plateaued which was maintained up to 4 months post infection (period under study).

A total of 298 samples collected from Uttar Pradesh, Uttrakhand, Himachal Pradesh and Rajasthan were tested for *T. evansi* antibodies using the newly developed ELISA. Fifty eight serum samples were found positive for presence of antibodies against *T. evansi* indicating 19.46% seropositivity.



Sero-prevalence of *Trypanosoma evansi* antibodies using ELISA

(Rajender Kumar, Sanjay Kumar & S.C. Yadav)

Development of diagnostics for *Babesia equi* infection

a. Development of recombinant antigen-based ELISA kit for sero-diagnosis of *B. equi* antibodies

Previously standardized recombinant antigen-based plate ELISA was transformed into the laboratory-oriented kit. The components of the ELISA kit were optimized by incorporating stabilizing agents in buffers/reagents. This kit was validated vis-à-vis OIE approved CI ELISA and respective diagnostic specificity (DSp) and diagnostic sensitivity (DSn) for NRCE kit and CI ELISA were 0.97, 0.95 and 0.96, 0.93. The equine serum samples collected from different parts of the country (781 samples) were tested with ELISA kit and 191 samples were found positive for *B. equi*-specific antibodies indicating overall 24.45 % prevalence.

b. Multiplex PCR

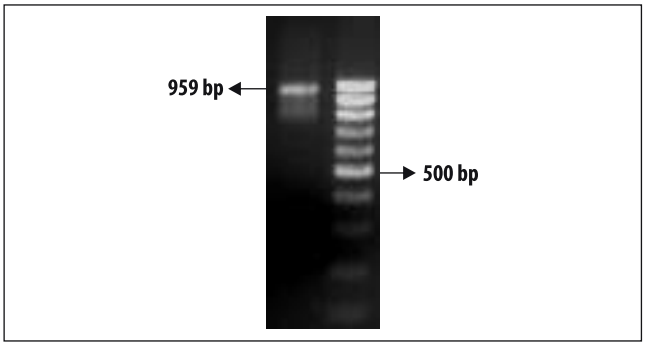
For standardization of multiplex PCR, we cloned and sequenced the EMA-1 and 18sRNA gene from Indian isolates of *B. equi* and *T. evansi.* Nucleotide sequences of 789 bp and 642 bp were obtained from EMA-1 & 18sRNA gene. BLAST analysis showed high homology with the sequences in the database. We designed the PCR primers from these sequences so as to standardize the multiplex PCR reaction.

(Sanjay Kumar, Rajender Kumar, A.K. Gupta & S.C. Yadav)

Development of diagnostics for *Rhodococcus equi* infection in foals

Samples (nasal, faecal, soil) were collected (51 no.) and tested for presence of *R. equi* by cultural examination. These included 24 nasal swabs including 20 from foals with respiratory problems and 4 from incontact apparently healthy foals. Faecal samples were 24, including 20 from foals with respiratory problems and 4 from incontact apparently healthy foals. Soil samples from infected premises were three. In all, three isolates of *R. equi* were obtained from nasal swabs of foals with respiratory problems. These isolates were subjected to *in vitro* antibiotic sensitivity testing to 17 antimicrobial agents (amoxycillin, gentamycin, ampicillin, trimethoprim, chloramphenicol,

Species specific amplification of 700 bp gene fragment from *R.equi* genomic DNA.
M: 100 bp DNA ladder.



Amplification of 959 bp traA gene from *R.equi* plasmid DNA.
M: 100 bp DNA ladder

sulphadiazine, cloxacin, oxytetracycline, amikacin, streptomycin, cotrimoxazole, cephalexin, kanamycin erythromycin, ciprofloxacin, neomycin and rifampicin) wherein chloramphenicol, erythromycin, ciprofloxacin, neomycin and rifampicin were found to be sensitive.

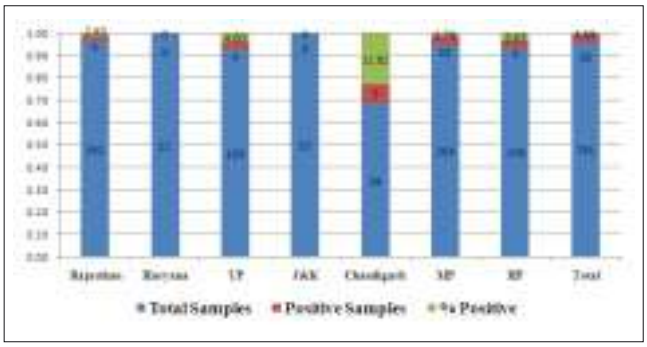
Sonicated *R. equi* antigen from four strains was prepared. Protein profiling was done using SDS-PAGE. Hyperimmune sera (HIS) were raised in rabbits using this antigen. The HIS showed precipitin lines in agar gel immuno-diffusion indicating specificity to *R. equi*.

Further, the genomic DNA from 12 isolates of *R. equi,* and plasmid DNA from 2 isolates of *R. equi.* was isolated and were subjected for PCR amplification using the species-specific primers from non-proprietary fragment (npf) and traA gene targeting genomic and plasmid DNA of *R. equi,* respectively. PCR amplicons of 700bp and 959 bp were obtained from genomic & plasmid DNA, respectively which are specific to *R. equi*. Therefore, this PCR can be used for diagnosis of *R. equi*.

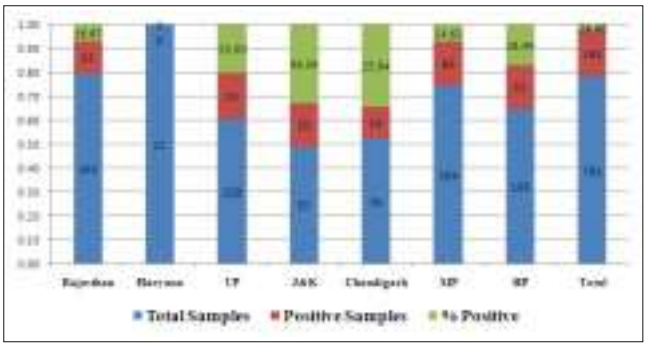
(S. K. Khurana, Praveen Malik & H. S. Singha)

Seromonitoring of important equine diseases

During the period under report, sero-survey was conducted on serum samples received/collected from various States/UTs of India, viz. Maharashtra, Rajasthan, Chandigarh, Delhi, Haryana, Punjab, Tamil Nadu, Uttar Pradesh, Karnataka, Andhra Pradesh, Uttarakhand, Madhya Pradesh, J&K, Gujarat, Chhattisgarh, Manipur, Himachal Pradesh and West Bengal. For EIA, 3907 serum samples from thoroughbred as well as indigenous equines were examined by Coggins test, however, none of the samples tested was found positive. Due to continuous efforts on surveillance and monitoring of



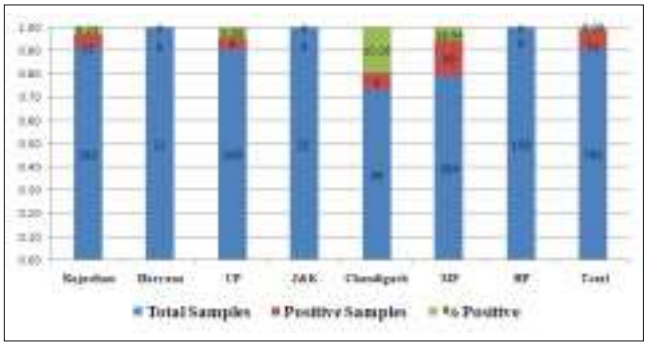
Seroprevalence of EHV-1



Seroprevalence of *Babesia equi*

EIA by NRCE, no positive case has been recorded after 1998-99. HI test for EI was conducted on 781 samples from indigenous equines yielded antibodies in 34 (4.3%) serum samples. Seven hundred Eighty One serum samples tested for *Salmonella* Abortusequi (H antigen), brucellosis, glanders & EIA were negative for antibodies.

A total of 781 serum samples from indigenous equines were tested for detection of antibodies against EHV-1. Of these 28 (3.58%) samples were positive for EHV-1. Besides, serum samples tested for equine viral arteritis turned out to be negative. Various samples were also subjected to virus isolation.



Seroprevalence of JE

In parasitological studies, 781 serum samples (all from indigenous equines) were tested for detection of Babesia equi infection by ELISA wherein 191

Samples processed and their origin

	Rajasthan	TN	Uttrakhand	UP	J&K	Haryana	Delhi	Maharashtra	HP	Total
Vaginal Swab	3	-	-	-	-	5	-	-	2 (1)	10 (1)
Prepucial Swab	-	-	-	-	-	-	-	-	1	1
Nasal Swab	15 (6)	1	11 (7)	1	13 (12)	28 (8)	11	-	3	83 (33)
Eye Swab	-	-	1	-	-	-	-	-	2	3
Tissues (PM)	1	-	-	-	-	9	-	-	-	10
Aborted foetii & contents	-	-	-	-	-	35	-	9	-	44
Faecal Sample	-	-	-	-	-	2	-	-	-	2
Soil Sample	-	-	-	-	-	1	-	-	-	1
Total	**19 (6)**	**1**	**12 (7)**	**1**	**13 (12)**	**80 (8)**	**11**	**9**	**8 (1)**	**154 (34)**

Isolates recovered and their origin

Isolate	Number	Nature of sample	From
Streptococcus equi subsp. *Zooepidemicus*	12	Nasal swab (11), Vaginal swab (1)	J&K (11), HP (1)
Streptococcus equisimilis	1	Nasal swab (1)	J&K (1)
Rhodococcus equi	2	Nasal Swab (2)	Rajasthan (2)
β-hemolytic streptococci	9	Nasal Swab(9)	Haryana (6), Rajasthan (3)
Group D streptococci	2	Nasal swab (2)	Haryana (2)
Micrococci	1	Nasal swab(1)	Rajasthan (1)
Unidentified Gram-negative bacilli	7	Nasal swab (7)	Uttrakhand (7)
Total	**34**	**Nasal Swab (33), Vaginal swab (1)**	**Uttrakhand (7), J&K(12), Himachal Pradesh (1), Rajasthan(6), Haryana (8)**

samples were found positive indicating a rate of infection of 24.45%. Serosurveillance for JEV antibodies in 781 equine serum samples revealed seropositivity of 9.09%. Besides the above, 90 serum samples from various private organizations, quarantine stations and other establishments were tested for various diseases.

Following the outbreak of Glanders during 2006-07 and 2007-08, 4475 serum samples were tested in 2008-09 with no positive samples. This shows that due to continuous efforts of NRCE glanders has been controlled.

Cultural examination

Bacteriological analysis done on 154 samples, including nasal swabs, vaginal/prepucial swabs, aborted foetus and their contents, eye swab, faecal sample, PM tissues and soil sample yielded 34 isolates which included *Streptococcus equi* subsp. zooepidemicus (12), *Streptococcus equisimilis* (1), *R. equi* (2) β-hemolytic streptococci (9), Group D Streptococci (2), Micrococci (1) and Gram-negative bacilli yet to be identified (7). Three hundred ninety five samples from animal quarantine centres including 345 vaginal swabs and 50 preputial swabs tested for CEM were negative.

Antibiotic sensitivity testing of clinical samples was also done and results were conveyed to the concerned stakeholders.

(B.K.Singh, S.K.Khurana, S.C.Yadav, B.R.Gulati, Rajender Kumar, Praveen Malik, Sanjay Kumar, Nitin Virmani, Sanjay Barua, Rajesh Vaid, A. Arangasamy & Ramesh Dedar)

Equine Production

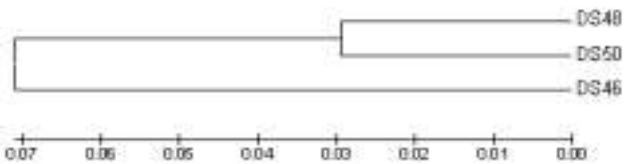
Sequencing of major histocompatibility complex class II genes in Marwari horses

Major histocompatibility complex (MHC) genes play a key role in the regulation of immune response in the animals. It provides a major genetic component of resistance/susceptibility to infectious or autoimmune diseases and regulates the basic immune response in higher animals. MHC in horses, is localised to chromosome 20q14-q22. There are three functional and expressed MHC class II loci (DP, DQ, DR) and each locus contains class II A and B genes. In this study, sequencing of genotypes of Marwari horses in respect of MHC class-II loci was performed to know polymorphism of different loci. In this context, ten samples of each locus were prepared following PCR on optimized conditions and gel testing of PCR products. Sequencing data supplied by above firm in respect of MHC loci were analyzed with the suitable soft wares as follows:

DRB2: Ten sequences of DRB2 locus from the study (DS 1-DS10) and seven sequences downloaded from GenBank were aligned using clustal X. Evolutionary divergence -calculated by MEGA 4 software- was between 2-20% indicating the polymorphism. On phylogenetic analysis, DS-3 and DS-8 formed separate clad and these were 11-19% divergent when compared to DS4, DS7, DS1, DS2 and DS9 and only 7% when compared to each other.

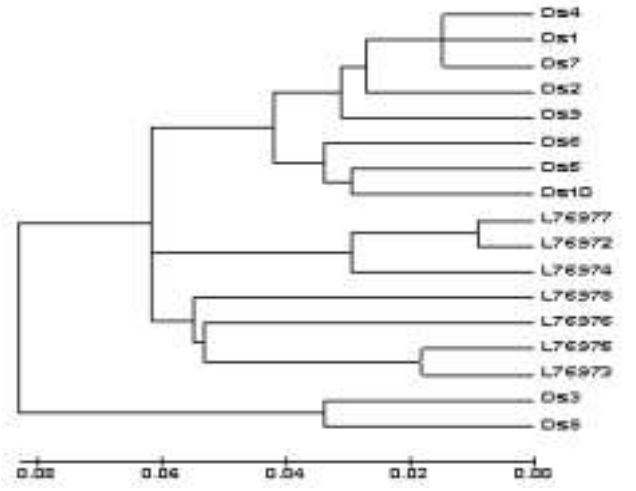
DQA: Three DQA sequences (DS48, DS50, DS46) obtained in the study were aligned using clustal X and MEGA 4 soft wares. DS48 was 6% and 14% divergent in comparison to DS50 and DS46, respectively. Therefore, polymorphism existed in the population on the basis of analysis of DQA gene. The same was confirmed when phylogenetic tree was constructed.

DRA: Eight nucleotide sequences obtained in the study (DS21, DS22, DS23, DS24, DS25, DS26, DS28, DS30) and five sequences downloaded from GenBank were compared. The sequences were aligned using clustal X and evolutionary distances



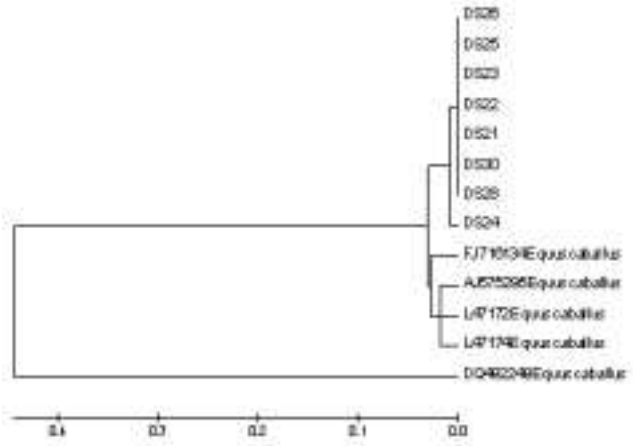
Phylogenetic tree between sequences of DQA gene

were calculated by MEGA 4. There were no differences in the sequences except 2% distance of DS 24 when compared to other samples in the study.



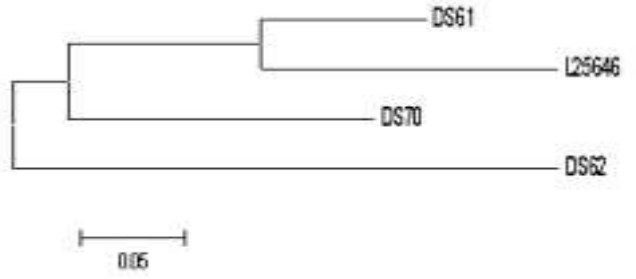
Phylogenetic tree of DRB2 gene

This was also confirmed by phylogenic analyses. No polymorphism in the samples sequenced in the study was observed on the basis of DRA gene.



Phylogenetic tree of DRA gene

DRB3: Three sequences in the study (DS61, DS62, DS70) and one sequence from GenBank were compared using clustal X and MEGA 4 soft wares.



Phylogenetic tree between Sequences of DRB3 gene

There was significant divergence (polymorphism) between the sequences which ranged from 32-46%. This was also confirmed by phylogenetic analysis where DS61, DS70 and DS62 formed separate clads. Digestion of aforesaid fragments with different restriction enzymes resolved different cutting sites and revealed polymorphism in case of DRB2 and DRB3. Results further revealed that RFLP analysis using restriction enzymes has the potential to group the animals into different genotypes.

(R. C. Sharma, S. C. Mehta & Balvinder Kumar)

Housing, feeding and management practices of horses in different parts of Rajasthan

In this study, horse owners of Hanumangarh, Churu and Jhunjhunu were interviewed. The team interviewed 27 horse-owners and examined 91 horses in Hanumangarh district; 9 horse-owners and 18 horses in Churu; 16 horse-owners and 94 horses in Jhunjhunu district, respectively. Details of managemental practices followed were:

Hanumangarh

This district is fully irrigated with canal and river water having rich soil. Main crops grown in this region are wheat, mustard, paddy, cotton, bajra, Lucerne, berseem and jowar. The farmers are maintaining good quality horses in this region. There is a lot of emphasis on white colour (nukra) horses. Price of horses reported by farmers ranged from 60,000/- to 15 lacs. Due to more interest in white colour they are covering animals of close relations which is resulting in inbreeding -a trait not desirable. In this region, most of the farmers are keeping horses for breeding and riding interest.

Housing: Majority of the farmers were keeping their

horses in close housing and kept tied with rope. Most of the farmers were having pucca shelters for horses. Wall and roof were constructed with bricks. Floor was kaccha. Feed manger was made of bricks and cement. In majority of cases, manger height was 3-4.5 feet which is in higher side for horses. Water troughs were not provided in majority of cases. Watering was done in buckets from time-to-time. During winter season, sandy parts of wheat straw were put in sheds for the purpose of drying the floor and no separate bedding material was provided.

Breeding: Only a few farmers were having stallion for breeding their mares. Those who were not having stallion, were availing services of other farmers on hire basis, paying Rs 1500 to 5000 per covering.

Feeding: Majority of farmers were providing ad lib green fodder and dry roughages. They are also providing 3 to 5 kg concentrate daily. Milk, oil & ghee feeding was also common. Locally made masala were fed by most of the farmers.

Churu

This district comes under hot-arid zone. Irrigation facility is not available in most of the area except tube-well irrigation in limited pockets. Rain-fed dry farming is common practice in this region. Main crops grown in this area are bajra, moong, moth, guar in kharif season and gram in rabi season. In tube well irrigated area, wheat and mustard crops are also grown. Farmers are maintaining horses for breeding and ceremonial purposes in this region. There was not much emphasis on white colour (nukra) in this district. Price of horses reported by farmers ranged from 40,000/- to 1.5 lacs.

Housing: Majority of the farmers were keeping their horses in close housing and kept tied with rope. Most of the farmers were having pucca shelters for horses. Walls were constructed with bricks and straight stone patties. Due to high temperature and economic backwardness, roofs were made of tin/asbestos sheets and thatch material locally available. Thatched roof is most suitable for the comfort of horses in this region. Floor was kaccha. In summer season, farmers also keep their animals under the tree shades. Feed mangers were made of bricks and cement and in some cases wooden or tin mangers were also provided. In majority of cases, manger height was 2.5-4.0 feet which is in higher side for horses. Water troughs were not provided in majority of cases. Watering was done in buckets from time-to-time. During winter no bedding was provided in most of the cases.

Breeding: Only a few farmers were having stallion for breeding their mares. Those who were not having stallion were availing services of other farmers on hire basis, paying Rs 1500 to 2000 per covering.

Feeding: Due to nonavailability of green fodder, majority of farmers are providing dry roughages *i.e.* moth chara, groundnut chara, bajra kutar etc. They are also providing 2 to 3 kg concentrate daily. Milk and oil & ghee feeding was also not much common. Locally made masala were fed by most of the farmers.

Jhunjhunu

This district also comes under semi-arid zone. Irrigation facility is limited to some parts of the district. Tube wells are the main source of irrigation. Soil is sandy and main crops grown in this region are wheat, mustard, gram, methi, barley, moong, cowpea, moth, guar etc. Farmers are maintaining medium quality horses in this region. There is not much emphasis on white colour (nukra). However, now-a-days some persons are showing interest in white colour due to demand of white horses in wedding ceremonies and people are ready to pay more for that. Price of horses reported by farmers ranged from 60,000/- to 5.0 lacs. In this region, most of the farmers are keeping horses for ceremonial and breeding purpose. Some farmers are also using their mares for equestrian events, dancing and horse safari for tourists.

Housing: Majority of the farmers were keeping their horses in close housing and kept tied with rope. Most of the farmers were having pucca shelters for horses. Wall and roof were constructed with bricks. Floor was kaccha. Feed mangers were made of bricks and cement and in some cases these are made of wood and also of tin sheet. In majority of cases, manger height was moderate. Water troughs were not provided in majority of cases. Watering was done in buckets from time-to-time. Most of the farmers are not providing any bedding during winter. They are protecting their animals from cold using jhools (blanketing) during winter season.

Breeding: Only few farmers were having stallion for breeding their mares. Those who were not having stallion were availing services of other farmers on hire basis, paying Rs 1500 to 5000 per covering. Farmers reported that some stallion owners used to come with their stallions during breeding season from Haryana and cover the mares on charge basis.

Feeding: Majority of farmers were providing limited green fodder and dry roughages. They are also providing 2 to 3 kg concentrate daily. Milk, oil & ghee feeding was also given by some farmers. Locally made masala and Himalayan batisa was fed by some of the farmers. Very few farmers are providing mineral mixture in horse diet.

(R.A. Legha, P A. Bala & Ramesh Kumar)

Embryo transfer technology in Marwari horses

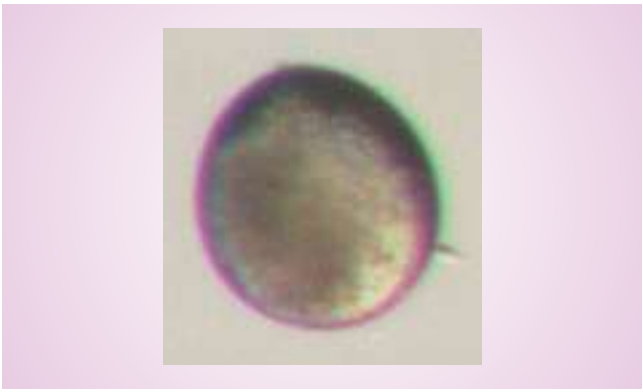
Population of true-to-breed Marwari horses is declining and had reached at alarming stage. Steps to conserve and preserve the majestic breed need to be initiated. Keeping in view the gravity of situation, the project was initiated with the objective to standardize embryo transfer technique in Marwari horses. In this study, non-surgical embryo collection and transfer has been initiated. Attempts were made for embryo collection from four donor mares and collected four embryos successfully. Out of the four embryos, two were successfully transferred to the recipient mares. The transferred embryos failed to develop to further stage and the recipient mares were found to be non-pregnant.

Synchronization of mares for induction of estrus was also carried out by prostaglandin F2 alpha (Lutalyse) injection @ of 10 mg/mare. A total of 10 mares were selected and administered 2ml lutalyse intramuscularly without knowing their cyclical stages. Out of the 10 mares, seven mares responded to the treatment and came into estrus. To the remaining three mares, second dose of prostaglandin F2 alpha @ of 10 mg / mare was administered at 14 days from the first dose of injection and all the three mares responded to the treatment. In the first schedule, out of the seven synchronized mares, two mares responded in two

Embryo of hatched blastocyst stage

days, one mare in three days, one mare in six days and three mares in seven days, respectively. During, the second dose, one mare showed heat in one day, one mare in seven days and one mare in seventeen days, respectively.

Five mares were selected as donor and two mares were kept as recipient. The heat detection was carried out regularly by teasing method with a stallion. Follicle stage was monitored by manual as well as using ultrasound machine everyday from the 3rd day estrus to ovulation. All the donor mares were artificially inseminated with frozen semen at 24 hr interval after attaining follicle size of >35mm to ovulation. The recipient mares were observed for estrus onset and end of the estrus without



6 days old embryo

insemination. Out of the five donors, a total of nine flushings (6-8 days post ovulation) were done by non-surgical method of embryo collection. Two embryos were recovered out of the nine flushings, of which one embryo was of good quality and another embryo of hatched blastocyst stage. The good quality embryo was transferred to one of the donor mare on the same day, due to non-availability of suitable recipient mare on that day. The pregnancy diagnosis was carried out on 14th day and 20th day. There was a twin pregnancy observed on 20th day and, therefore, one of the embryos was crushed manually using ultrasonography while one embryo was allowed to continue for full-term. After foaling, the foal parentage status will be assessed by DNA fingerprinting method to establish whether the embryo is born by embryo transfer technology or through routine AI method.

(A. Arangasamy, T.R. Talluri & R.K. Chaturvedi)

Socio-economic status of equine owners and donkey & mule production system

A total of 146 owners of working donkeys and mules of Haryana and Rajasthan were selected from the villages/places where donkey and mule were densely populated. Data was collected from owners practising different production systems through personal interview.

Majority (56%) of the donkey and mule owners were in middle age group ranging from 30 to 50 years of age with low family educational standard and more than 5 family members in a nuclear family. Majority (76%) of the respondents belong to other backward castes (OBC) and remaining belong to scheduled caste and their main occupation included making earthen pots, rearing sheep and goat, working on brick-kilns in rural areas and working with donkey carts in semi-urban areas. More than 10 to 15 % of the respondents received information related to equine husbandry from progressive equine owners, their relatives and veterinary personnel. Majority (85%) of working donkey owners do not know about infertility, deworming, tetanus, feeding standards and medicines. Price of donkey ranged from Rs 300 to 1200 per donkey. After taking work, donkeys and mules are left free for grazing on their own on pasture and fallow lands and in addition some additional nutritional support is also provided during stall feeding to mule. Mules are kept tied in bada or nearby residence. No systematic breeding is

Women participation in Equine farm activities

adopted by donkey farmers. Donkey breeds while on grazing or wandering open in village. Most of the donkey owners reported that colic is the only major health problem otherwise this animal remains healthy. Some farmers also reported about skin related problems. Mule farmers reported colic, urinary obstruction and strangle as common health problems. Majority (70-80%) of donkey/mule owners were benefited from organization of knowledge awareness camps and health & training camps organized by NRCE. Lack of employment, competition with mechanization, slow speed and power of donkey, social taboo, degradation of common pasture lands were few constraints reported by donkey and mule owners.

(Niranjan Lal, Ramesh Kumar, Praveen Malik & Rajender Kumar)

Veterinary Type Culture Centre

Establishment of a Repository (Culture collection) of Veterinary Pathogens

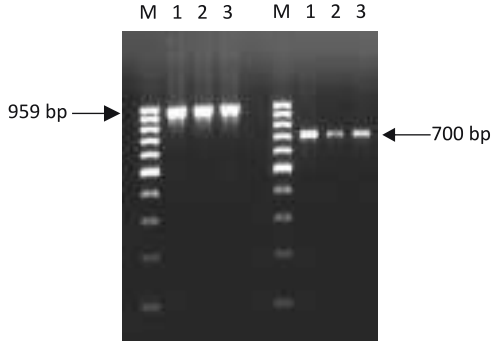
The working guidelines for Veterinary Type Cultures facility have been documented and submitted to the Council. Various proforma for collection of bio-samples, microbial deposits etc have also been developed. Standard Operating Procedures (SOPs) for cultivation and maintenance of primary cell culture, cell lines as well as different bacteria viz. *Streptococcus* spp., *R. equi*, *Corynebacterium* spp. and *Aeromonas* spp. have been prepared. Different cell lines viz., Vero, MDBK, MDCK and RK13 have been propagated and preserved in the repository. The work on collection, processing, isolation, identification and storage of microbial cultures is continuing. Twenty five numbers of standard bacterial cultures have been procured from Microbial Type Culture Collection, Chandigarh. A total of 68 bacterial and 6 viral isolates have been cryo-preserved in the repository. Furthermore, efforts are being made for the procurement and repositioning of viral/ bacterial/fungal isolates from ICAR institutes/ SAUs/SVUs and other accredited organizations into the repository.

(Sanjay Barua, Rajesh Vaid, Mamta Tigga, K. Shanmugasundaram, B.C. Bera & Sarita Yadav)

Collection, preservation and molecular characterization of bacterial pathogens

During the year, thirty bio-samples were collected and processed for bacterial isolation and identification from different livestock species including, equine (14), porcine (14), murine (1) and buffalo (1). A total of 54 isolates were characterized, out of which 23 were Gram-positive, 30 were Gram-negative and 1 was unclassified. *R. equi* isolates from post-mortem samples of foal have been identified by species-specific PCR as well as virulence gene (*cho*E) specific PCR to obtain 700 bp and 959 bp amplicons, respectively. These two genes have been cloned and sequenced.

Identification and characterization of bacterial isolates based on partial sequencing of 16S rRNA genes has led to the confirmation of *Aeromonas* spp., *Bordetella bronchiseptica, Streptococcus* spp., *Corynebacterium* spp., *Pseudomonas* spp., Proteus spp. and α-hemolysine positive Staphylococcus species. A significant finding has been the isolation and identification of *Pantoea agglomerans* strains from cases of equine abortions in Delhi. Photographical database of microbial isolates, depicting their morphological features has been developed from isolates of equines (31), camel (2), buffalo (1) and caprine (11).



M : 100 bp ladder,
Lane : 1, 2 & 3 - amplified products from three strains

PCR on *Rhodococcus equi* samples.

Furthermore, 68 bacterial isolates from equine, porcine and caprine have been cryo-preserved in the repository.

In conclusion, attempt has been made to capture bio-diversity of bacterial pathogens and their *ex-situ* conservation. New epidemiological data on reproductive and infertility problems in mares has been generated. Molecular characterization of virulence genes in *R. equi* isolates will help in understanding the pathogenesis of this disease. Repository is being developed by preservation of characterized isolates.

(Rajesh Kumar Vaid, Sanjay Barua, Mamta Tigga K. Shanmugasundaram & B.C. Bera)

Inter-institutional & Externally-funded Research Projects

Characterization of indigenous breeds of horses

An inter-institutional research project in collaboration with National Bureau of Animal Genetic Resources, Karnal for characterization of indigenous breeds of equines is under progress at the Centre. Characterization of Marwari, Kathiawari and Manipuri, Spiti breed of horses has already been done in previous years.

Biometric characterization of Zanskari breed

Fifty unrelated and true-to-Zanskari breed of horses were selected on the basis of their physical appearance from their home tract in and around Leh, Laddakh (Jammu & Kashmir). Equines of this region have exceptional ability to survive and perform under vary harsh climatic conditions of their high altitude habitat (between 3000 to 5000 meters).

Fifteen different biometric indices of these Zansakri equines were recorded. It was interesting to observe that average height at wither of Zanskari breed was 126 cm which is less than 150 cm (standard height criteria for differentiating horses from ponies) and as such these equines come under the category of ponies. Average animal height was slightly higher in stallions (127.21 ± 7.57) then mares (125.45 ± 4.74 cm) but the differences were non significant. Beside this, average body length (123.07 vs 129.5 cm), heart girth (144.4 vs 148.9 cm), hind leg length (80.11 vs 79.95 cm), canon length (16.18 vs 15.80 cm), height at knee (37.57 vs 36.95 cm), face length (53.79 vs 53.75cm), face width (15.68 vs 15.25 cm), etc. were almost same in both stallions and mares, respectively without any significant difference. Hair coat was thick and quite similar to that of Spiti ponies. Grey was the most prominent coat colour (27) followed by Bay (13) and Black (10).

Genotyping of Kathiawari & Marwari breeds

For genotyping of Kathiawari and Marwari breeds of horse, initially 30 set of fluorescent labeled microsats were taken for PCR reactions with multiplexing of products. PCR products varied from 90 bp (Locus - HTG6, ASB17) to 260 bp (Locus - COR18).

Multiplexed PCR products were genotyped using

Zanskari ponies at Leh, Ladakh

DNA sequencer (3130 Applied Biosystem, USA). Data was collected from DNA sequencer in the form of signal. The same was processed using Gene Mapper software programme and finally by POPGENE software for assessing allele size, allele frequency, heterozygosity, and different equilibrium equations etc.

Allelic frequency and heterozygosity in Marwari population : In total, 288 alleles were detected across the 24 analysed loci. Number of alleles were maximum (24) with TKY333 and minimum (5) with HMS 5 & 6, HTG3 in Marwari population indicating all microsats were polymorphic in nature. The number of alleles at different marker loci served as a measure of genetic variability having direct impact on differentiation of breeds within a species.

The observed (Ho) and expected (He) heterozygosity values ranged from 0.161 (TYK301) to 0.880 (UM32) and from 0.603 (HTG3) to 0.946 (UM32), respectively. The used microsatellites with wide range of heterozygosity reduced the risk of overestimating genetic variability, which might occur with microsatellite exhibiting only high heterozygosity.

The high average estimates of allele diversity (mean number of observed alleles per locus, 12) and genetic diversity (mean expected heterozygosity, 0.824) displayed by panel of 24 microsatellites again implied the presence of substantial amount of genetic variability in the Marwari population.

Allelic frequency and heterozygosity in Kathiawari population : In total, 264 alleles were detected across the 24 analysed loci with Kathiawari breed of horses. All microsats were observed to be polymorphic in nature with maximum number of alleles (23) with HTG 6 and minimum (5) with HMS 6. The number of alleles at different marker loci serves as a measure of genetic variability having direct impact on differentiation of breeds within a species. The observed (Ho) and expected (He) heterozygosity values ranged from 0.170 (ASB2) to 0.763 (ASB17, TKY343) and from 0.441(TKY337) to 0.942 (HTG6), respectively. The high average estimates of allele diversity (mean observed alleles per locus, 11) and genetic diversity (mean expected heterozygosity, 0.788) displayed by panel of 24 microsatellites also indicated the presence of substantial amount of genetic variability in the Kathiawari population.

(A. K. Gupta, S. C. Gupta, S. N. Tandon, Mamta, Neelam Gupta & Anuradha Bhardwaj)

Usefulness of recombinant protein for serodiagnosis of glanders

Glanders is a highly contagious disease of high zoonotic importance and affects primarily the equids. Since it poses a significant human health risk, it is notifiable in India. Although CFT is a gold-standard test for diagnosis of glanders, the inherent problems associated with this test, namely anti-complementary activity in donkey and mule serum and its time-consuming and labour-intensive nature, make it difficult to use in the field which warrants for search of newer, sensitive, specific and rapid tests for diagnosis of glanders amongst equines. Considering this, two recombinant antigens (antigen A and antigen B), developed by Defence Research and Development Establishment (DRDE), Gwalior were evaluated for their diagnostic potential.

The present study was conducted employing four immunoassays viz. Complement Fixation Test (CFT), Indirect Enzyme-linked immunosorbent assay (ELISA), Dot ELISA and Indirect Haemagglutination Test, using different antigens. A total of 1524 known negative samples and 34 known positive samples were used in the study. Variable results were obtained using various combinations of antigen assay system. Using the indirect ELISA, however, recombinant antigen A could differentiate the positive and the negative samples but the difference in ODs was not significant. Rest of the three antigens could differentiate the positive and negative samples and the difference in ODs of positive and negative samples was significant. Although mallein PPD gave good results but sensitivity (91.3%) and

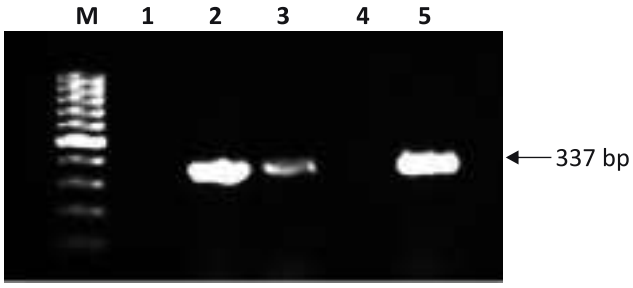
specificity (74.3%) came out to be low. CFT antigen and recombinant antigen B exhibited good results. Sensitivity and specificity (100% and 99.3%) came out to be higher in indirect ELISA using recombinant antigen B as compared to CFT antigen (Sensitivity, 82.6% and specificity 97.4%). Further, CFT uses crude extract @ 1000 ng/well in comparison to 75 ng/well using recombinant antigen B. The results using these antigens in other formats like dot-ELISA, CFT and IHA were also compared. The recombinant antigens were not found suitable for serodiagnosis of glanders in these formats. Thus, it may be inferred that the recombinant antigen B may be successfully used in indirect ELISA. The test appears to be safe, rapid, sensitive and sufficiently specific for use with field equine samples.

(Praveen Malik)

Transcriptional expression of TLR9 in horses and poitu donkeys

Toll-like receptor 9 (TLR9) is critical component in the signaling pathway for cytosine-phosphate-guanine (CpG) mediated activation of the mammalian immune system. Significant structural differences in the extracellular domain of TLR9 account for species-specific recognition of CpG ODN sequences. TLR9 has been extensively studied in humans and mice. Although TLR9 sequences are reported in some animal species including horse but there is no report of TLR9 sequences of Indian breeds of horses and donkeys. During the year, partial TLR9 gene amplicons were amplified using conserved as well as species-specific primers in PBMCs of Marwari horses, Poitu and indigenous donkeys. Trancriptional expression of TLR9 was also observed in PBMCs of equids as well as buffalo using the conserved sequences of 266 bp from nucleotide 1849- 2114. By using *Equus caballus* specific primers, partial amplicons of 337 bp of TLR9, from nucleotide 2826-3139 were obtained only in equids *i.e.* Marwari horses, Poitu and donkey. Transcriptional expression of TLR9 in Marwari horses, poitu and indigenous donkeys was reported for the first time. These PCR amplicons were successfully cloned and sequence was submitted to Genbank database (Accession number: GQ227790).

In the summary, we have confirmed the presence of TLR9 in the PBMCs of Marwari breed of horses, poitu and donkeys. The discovery and functional analysis of TLR9 may provide the first step towards the development of new adjuvant. PAMP, either co-administered together with safe vaccines or co-expressed with an immunogenic protein in the same vector, may be formulated that act on or modulate the immune response via TLR. Thus, our increasing understanding of the TLR9 system could provide the molecular basis for preventing or treating a variety of pathological conditions.



M : Marker (100bp)
Lane 1 : Negative control
Lane 2,3,4,5 : Marwari horses, Poitu, Buffalo, Donkeys, respectively

Partial amplicons of 337 bp of TLR9 using species specific primers

(Anju Manuja, Sanjay Kumar, Balvinder Kumar & H. S. Singha)

Technologies Assessed and Transferred

Secretary DARE dedicates new technologies in the field of equine production & health

eCG-based sandwich ELISA kit for pregnancy diagnosis in mares ready for use

Pregnancy diagnosis at an early gestation is quite important in mares, as gestation period is quite long and breeding season is limited. Secondly, if mare remains non-pregnant due to foetus loss or due to false symptoms of pregnancy then it results in economic loss to equine owner and poor productivity of mares.

To overcome this field-based problem, National Research Centre on Equines developed an indigenous kit for pregnancy diagnosis in mares covered by horse stallion using serum of pregnant mares between 35 to 120 days of gestation. This kit/test is based on detection of a specific hormone known as pregnant mares serum gonadotrophin (PMSG) or equine chorionic gonadotrophin (eCG) which is secreted by endometrial cups in pregnant mares during early gestation. This hormone is detected by sandwich ELISA-based test using a few milliliter of serum from pregnant mares.

The kit has already been tested over more than 4000 serum samples. Internal and external validation of Kit has indicated more than 95% specificity and sensitivity of the Kit. With one kit, more than 70 different serum samples can be tested for pregnancy diagnosis. This kit not only helps in early detection of pregnancy but also confirms viability of foetus after 60-90 days of gestation. This confirmation is quite useful for equine owners whose mare looses foetus either due to early abortion or foetus adsorption, as they can re-cover their mares in the same breeding season for better equine production.

This kit is animal-friendly and economical also as there is no need of transporting pregnant mare to veterinary clinics for examination. This avoids transport stress and expenditure involved in transportation.

This kit is quite useful for equine owners who do not have pregnancy diagnostic facilities like ultra sonography machine and expert veterinarians within their reach for rectal examination of pregnant mares for pregnancy confirmation under field conditions. Equine owners can simply send about 2 ml of serum samples in a clean vial to NRCE or any lab having this type of facility, with little information about date of covering of mare(s), date of collection of serum sample, and type of stallion used etc.

This kit has already been released on August 20, 2008 and this technology is ready for transfer to any private or public organization for commercialization.

Dr Mangala Rai, Secretary, DARE and DG, ICAR releases Kit for pregnancy diagnosis in mares.

B-ELISA kit for diagnosis of EHV-1

Equine rhinopneumonitis (Equine Herpes Virus -1 [EHV-1] infection) in horses causes abortion, stillbirth, foal mortality, respiratory and neurological disease. This virus is responsible for storm of abortions and thus causing heavy economic losses to the equine industry worldwide. The virus usually spreads through aerosols, contaminated feed, water, bedding and other fomites. Healthy horses acquire infection mostly through respiratory tract.

To provide a sensitive, specific and rapid diagnostic to equine industry, National Research Centre on Equines (NRCE) has developed Equiherpes B-ELISA Kit, a monoclonal antibody-based diagnostic kit, for detection of EHV-1 infection/immune status in equines. This Kit is an alternative to virus neutralization test due to addition of neutralizing monoclonal antibody (Mab) in the assay and gives result in 6 hr. This Kit is based on single-well assay. The diagnostic reagents of the kit were stabilized in liquid buffer so that the users can test the serum samples on different days as per the availability of test serum samples. The result obtained by this kit is quantified based on percent inhibition (PI) obtained with test serum because the result of B-ELISA is evaluated by microtitre ELISA plate/strips reader to measure optical density (OD) of the test.

This kit is able to detect seroconversion *i.e.* ≥3-fold seroconversion in terms of increase of PI of OD with single dilution (1:250) of paired serum samples. Serum samples collected on the day of onset of infection and 14-21 days post infection are tested simultaneously to diagnose recent infection of EHV-1. It will be also useful for assessment of herd immunity in equine breeding farms where vaccination is undertaken against EHV-1.

A total of 1224 serum samples from vaccinated (137), unvaccinated (1066) and EHV-1 infected (21) mares has already been tested from 17 states for the validation of Equiherpes B-ELISA Kit. A comparison of the results by the kit and VNT indicated higher positivity (334/1224, 27.3%) by the kit in comparison to VNT (221/1224, 18%). The agreement between results obtained by VNT and Equiherpes B-ELISA Kit for detection of EHV-1 antibody in field sera (n= 1224) was 85.86%.

The Equiherpes B-ELISA Kit was validated in-house and externally in three laboratories (2 SAUs and 1 Govt AHD Lab), each using a panel of 88 horse serum samples. Results revealed more than 95% agreement between their findings, though the agreement of results was 81.18% with one in-house laboratory.

Total cost of one kit for testing 88 serum samples will cost Rupees four thousand (Rs 4000/-) only. The kit is approximately 2.8 times cheaper than any imported commercial diagnostic kit. This kit is not presently being produced by any Institute/Company in India. It was dedicated to the nation on August 20, 2008 by Dr. Mangala Rai, Hon'ble Secretary, DARE and Director General (ICAR).

Dr Mangala Rai, Secretary, DARE and DG, ICAR releases Equine herpes B-ELISA Kit.

Consultancy and Commercialization of Technology

Consultancy

NRCE, being the nodal agency and National Referral Centre of Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture (Govt. of India) for various equine disease diagnoses, offers consultancy and diagnostic services to various stake-holders for disease investigation and testing for health certification in the country. As part of this programme, on-farm visits to different parts of the country are taken by teams of experts from the Centre for attending disease occurrences and outbreaks amongst equines. Besides this, samples submitted by state and regional disease diagnostic labs, regional animal quarantine and certification stations, polo associations, Equestrian Federation of India, field veterinarians and equine owners are analyzed in the labs for various diseases. The results along with the expert and technical advice are communicated to the respective agencies for further necessary action at their ends. If required, the animal husbandry authorities of state or central government are informed accordingly to initiate the treatment, containment and control strategies and/or notification for these equine diseases.

During the period under report, a total of 4004 equine serum samples from various sources were examined for equine infectious anaemia (EIA) by Coggins test. All the samples were negative for EIA. The Centre also tested 4475 equine serum samples for glanders using complement fixation test (CFT). In addition, samples from equines were received for testing of contagious equine metritis (CEM), piroplasmosis, rhinopneumonitis, equine influenza and bacterial infections.

The revenue for the Centre is generated through many activities of which contractual diagnostic services are the major source. During the year, revenue to the tune of Rs.32,42,650/- has been generated through testing of samples for EIA (Rs.12,10,500/-), glanders (Rs 15,60,400/-), CEM (Rs.3,95,000/-), EHV-1 (Rs.16,000/-), piroplasmosis (Rs.26,800/-), dourine (Rs.8,000/-), trypanosomosis (Rs.500/-), equine influenza (Rs.21,500/-), brucellosis (Rs.750/-), Salmonella Abortus equi antibodies (Rs.1,250/-) and bacteriological examination (Rs.700/-). In addition, improved germplasm of french jacks and indigenous (Marwari) horses in the form of cryoprserved semen was also provided to the farmers for superior mule production and conservation of Marwari horses. Artificial insemination services using cryopreserved semen were provided in the field in different states of the country.

Commercialization of Technology

Two kits of commercial potential are released by Hon'ble DG, ICAR on August 20, 2008. While one is used for detection of EHV-1 infection/immune status in mares, the other one is a sensitive, specific, economical and eco-friendly eCG-based sandwich ELISA kit for pregnancy diagnosis in horse mares between 35 to 120 days of gestation. Concerted efforts are being made for its commercialization.

Education and Training

Refresher Course on 'Equine Disease Diagnosis and Management'

The Centre has successfully organized four one-week refresher courses on "Equine Disease Diagnosis and Management" for veterinarians during April 28 to May 31, 2008. Director of the Centre visited Uttrakhand while glanders cases were occurring in the hilly state and discussed the gravity of situation with Animal Husbandry Minister (Govt. of Uttrakhand) and Secretary (AH), Uttarakhand. As a result, Uttrakhand government took the initiative and requested this premier institution on equines for the capacity building of its veterinary services by training of veterinarians. The training module was specifically designed by Course Directors (Dr Praveen Malik and Dr Rajender Kumar) to meet the requirements of veterinary officers of Animal Husbandry Department (Govt. of Uttarakhand) in the area of equine diseases. Thirty five veterinarians of Uttrakhand representing Tehri, Chamoli, Uttarkashi, Haridwar, Nainital, Dehradun, Champawat, Pithoragarh, Pouri, Almora, Bagheshwar and Udham Singh Nagar districts attended the course in four phases. The veterinary officers were provided detailed information on various important diseases of equines by the experts from NRCE. The trainings emphasized on the practical knowledge and 'hands-on' practical experience on equine disease diagnosis, use of ultra-modern techniques like endoscopy, ultrasonography etc. to detect internal diseases and optimum management system for the sound health of equines. In his key note address, Dr S. K. Dwivedi while emphasizing regular need of such trainings, requested other states to come forward for similar trainings.

Short Course on 'Use of Ultrasonography, Artificial Insemination and Pregnancy Diagnosis in Equines'

A short course on 'Use of Ultrasonography, Artificial Insemination and Pregnancy Diagnosis in Equines' was organized at Equine Production Campus, NRCE, Bikaner during May 6-10, 2008. Five field veterinarians from Haryana and Rajasthan participated in this training programme. Dr K.M.L. Pathak, Director NRCC, Bikaner inaugurated the short course on May 6, 2008 and emphasized on the use of latest techniques for the welfare and betterment of equines. During the course field veterinarians were provided detailed information on the use of ultrasound machine and techniques of ultrasonography, artificial insemination and pregnancy diagnosis through practical trainings as well as theoretical lectures. The course module was designed by Course Director (Dr Yash Pal) to meet the requirements of veterinary officers. Dr S.B.S. Yadav, Director Research, RAU, Bikaner distributed certificates to the participants on successful completion of short course during valedictory function and emphasized on regular organization of such trainings for field veterinarians.

Training imparted to the internship students

Trainings to fifteen Internship students of Apollo College of Veterinary Medicine, Jaipur were imparted by the scientists at Equine Production Campus, NRCE during June 23-29, 2008 and July 23-29, 2008 regarding equine management, health care, breeding, ultrasonography, technique of artificial insemination and pregnancy diagnosis.

Organization of Model Training Course

Model training course on 'Improved Equine Production through Cryopreservation of Semen, Artificial Insemination and Pregnancy Diagnosis in Equines' sponsored by Directorate of Extension, Ministry of Agriculture, Govt. of India, organized at EPC Bikaner (Rajasthan) during March 23-30, 2009. During the course, veterinary officers were trained in techniques of ultrasonography, artificial insemination and pregnancy diagnosis through practical and theoretical lectures.

Participation in Trainings

1. A.K. Gupta, B.K. Singh, Rajender Kumar, R.C. Sharma, and A. Arangasamy participated in training-cum-workshop on "IP and Technology Management in the ICAR systems" organized at CCSHAU, Hisar during May 19 -21, 2008.

2. T.R. Talluri underwent training on Basic Equine Reproduction at Equine Breeding Station, Hisar during May 21-30, 2008.

3. T.R. Talluri, participated in the training programme on "In vitro fertilization and embryo co-culture" organized at Department of Clinics, Madras Veterinary College, Chennai during August 4 - September 3, 2008.

4. H.S. Chahal and R.S. Bansal participated in one day seminar on right to information Act, 2005 organized at Institute of Secretariate Training and Management, Old JNU Campus, New Delhi on Aug. 13, 2008.

5. Baldev R. Gulati, participated in Interactive Meet on "Conservation and Use of Farm Animal and Microbial Genomic Resources" organized by Indian Society of Animal Genetics and Breeding and NBAGR at NASC, New Delhi during August 29-30, 2008.

6. R.K. Vaid and K. Shanmugasundaram participated in National Training Programme on "DNA sequencing and microbial identification" organized at National Bureau of Agriculturally Important Microorganisms, Kusmaur, Distt. Mau Nath Bhanjan during September1-7, 2008.

7. P.A. Bala, participated in Winter School on "Harnessing microbial diversity for use in animal nutrition" organized at NIANP, Bangalore during November 4-24, 2008.

8. A. Arangasamy participated in training programme on Recent development in animal production and reproduction organized by CAS in Veterinary Physiology, Division of Physiology and Climatology, IVRI, Izatnagar during December 3-23, 2008.

9. K.S. Meena attended a Seminar on 'Energy Conservation in Agriculture Sector' organized during Energy Conservation Mela by Dakshin Haryana Bijli Vitran Nigam Ltd., Hisar at Old Government College Ground, Hisar on December 14, 2008.

10. S.K. Khurana participated in training programme in "Refresher Course for researchers and teachers on food safety" organized by Central Institute Research on Buffalo, Hisar (Haryana) during December 15, 2008 - January 3, 2009.

11. B.C Bera and K. Shanmugasundaram, participated in ICAR sponsored winter school on "Molecular diagnostic techniques for zoonotic and foodborne diseases" at the Division of Veterinary Public Health, Indian Veterinary Research Institute, Izatnagar, U.P. during February 7-27, 2009.

12. Anuradha Bhardawaj, attended short term training course in "Recent Advance in Molecular and Immunological Techiques for Diagnosis of Bacterial Diseases of Animals" organized by Department of Veterinary Microbiology, College of Veterinary Sciences and Animal Husbandry, Central Agricultural University, Selesih, Aizawl, Mizoram during March 2-22, 2009.

RAC, IRC and QRT Meetings

Research Advisory Committee Meeting

The 11th meeting of RAC was held under the chairmanship of Dr S. K. Garg on May 7, 2008. The RAC reviewed the research projects of the institute in the areas of equine production, equine health, extension and Veterinary Type Culture. While appreciating the research at the Centre, the Chairman RAC congratulated the Director on egalitarian approach of the Director for the development of Science at the Centre in the best interest of the system. He also applauded the scientists of NRCE for their sincere contribution in the ongoing research programmes and other developmental activities of the Centre. The Chairman also emphasized to work in co-ordination as a team with positive attitude.

Annual IRC Meeting

Annual IRC meeting of NRCE was held on June 20, 2008 at NRCE, Hisar and July 7, 2008 at EPC, NRCE, Bikaner under the chairmanship of Dr S. K. Dwivedi to discuss the progress made in the ongoing research projects and initiation of new projects. The chairman emphasized the need for orientation of research for benefit of end users. Dr Dwivedi pointed out the need for recognition of NRCE labs in the areas of equine rhinopneumonitis, equine piroplasmosis and arboviruses as OIE (World Organization for Animal Health) reference labs. For this, emphasis was laid on developing standard operating procedures (SOPs), other protocols as well as accreditation of the diagnostic labs of NRCE.

Quinquennial Review Team Meeting

The members of QRT visited Equine Production Campus, Bikaner during October 12-14, 2008, the Hisar campus during February 9-12, 2009 and held the final meeting during March 15-17, 2009 at New Delhi under chairmanship of Dr. J. M. Nigam. Brig. (Dr.) N. M. Singhvi, Dr. K. G. Narayan, Dr. M. Rajasekhar were the members. The team visited livestock farm and various laboratories of the sub centre. QRT was of the view that number of animals

QRT Meeting in Progress

available at Equine Production Campus should be increased for tangible research and sustainable equine production. Scaling up of freezing of semen and artificial insemination for public use was also suggested. QRT emphasized that the time has come for NRCE to fructify its research products and go beyond diagnostic services to draw up national programmes for long-term disease prevention, surveillance and disease management strategies. Pragmatic action plans -at least for racing and army sectors- need to be prepared and action initiated. QRT opined that Veterinary Type Culture Centre has immense opportunities to collect and preserve nationally important veterinary pathogens and vaccine strains. Need to orient training programmes with defined objectives and course modules covering both equine health and production was also emphasized by QRT.

Members of Research Advisory Committee

Dr A.T. Sherikar, Ex. VC, MAFSU, Mumbai
Dr R.K. Singh, Director, NRCE, Hisar
Col (Dr) B. Raut, Consultant DRDO, FRL, Chandigarh
Dr R.C. Katoch, Ex. Dean, COVS, CSKHPKV, Palampur
Dr S.N. Maurya, Ex. OSD & VC, (UPDDUPCVVVAS), Mathura
Dr D.V. Rangnekar, Ex-Vice President, BAIF, Pune
Dr Lal Krishna, ADG (AH), ICAR, New Delhi
Sh Shivlal R. Daga, Mumbai
Sh Zavaray S. Poonawalla, Pune
Dr B. R. Gulati, PS & I/c PME Cell, NRCE, Hisar

Workshop, Seminar and Institutional Activities

Equine Health Camps organized

1. Equine Health Camp was organized at Tilwara, Balotra during April 1-4, 2008, where pregnancy diagnosis of mares using ultrasound scanner was performed and deworming of the equines was also carried out. The ailing equines were treated and consultancy regarding health problems and management aspects of equines was provided.
2. Equine Health Camp and Kisan Gosthi were organized at Kirmara (Hisar) on April 30, 2008. Deworming of equines was carried out at the camp. Ailing equines were treated and consultancy regarding health problems of equines was also provided.
3. Donkey Health Camp and Kisan Gosthi were organized at Gurera (Hisar) on May 15, 2008. A total of 42 donkeys were examined and treated in the camp. Deworming of donkeys was also carried out at the camp. Problems raised by the equine owners during Kisan Goshthi were addressed by providing appropriate solutions to them.
4. Equine Health Camp was organized in villages namely Sayara, Bhutala, Gogunda and Jaswantgarh around Udaipur (Rajasthan) during October 15-17, 2008 and carried out pregnancy diagnosis of mares using ultrasound scanner. Deworming of the equines was performed at the camp. The equines were treated and consultancy regarding health problems was also provided.
5. Equine Health Camp and Kisar Goshthi was organized at Nagore, Rajasthan on January 31, 2009, where pregnancy diagnosis of mares was performed using ultrasound scanner and deworming of the equines was carried out at the camp. Ailing equines were treated and consultancy regarding health problems of equines was also provided.Importance of balanced feeding to the equines was emphasized as it is inter-related to work performance, conception and fertility.

Scientists interacting with equine owners

Organization of Vikas Pradarshani

Mrs Vasundhra Raje Scindia, CM, Rajasthan at NRCE Stall

A Vikas Pradarshani was organized by Commissioner, Municipal Council Bikaner on the occasion of State level celebration of Independence Day at Veterinary College Hostel ground, Bikaner on 14.8.2008 and 15.8.2008. Dr Yash Pal and Dr R A Legha represented NRCE. Research activities of the centre were displayed in the stall, which was widely appreciated by the visitors. Mrs Vasundhra Raje Scindia, Chief Minister, Rajasthan inaugurated the function and visited the stall.

अश्व फ्लू रोग के निवारण हेतु जागरूकता अभियान

भारतीय कृषि अनुसंधान परिषद्, नई दिल्ली के निर्देशानुसार 2008–2009 को जागरूकता वर्ष मनाने के सन्दर्भ में अश्व प्रसार कार्यक्रम अयोजित किये गए। राष्ट्रीय अश्व अनुसधान केन्द्र के वैज्ञानिकों द्वारा अश्व चिकित्सा शिविरों एवं अश्व पालक गोष्ठियों के माध्यम से अश्व पालकों को अश्वों के उचित रख–रखाव, प्राथमिक चिकित्सा, प्रसुतिकाल एवं नवजात शिशुओं के बारे में जानकारी प्रदान की गई।

देश के विभिन्न भागों से अश्वों में अश्व फ्लू रोग की सूचना प्राप्त होते ही संस्थान के वैज्ञानिकों की टीम ने तत्परता से अश्व फ्लू रोग से प्रभावित स्थानों जैसे जम्मू–कश्मीर, दिल्ली, उत्तर प्रदेश, हिमाचल प्रदेश, राजस्थान, कर्नाटक, पश्चिम बंगाल, हरियाणा, एवं महाराष्ट्र आदि से रक्त व नासिका स्त्राव के नमूनों से अश्व फ्लू रोग के पाए जाने की पुष्टि की तथा भारत वर्ष के सभी प्रान्तों के पशुपालन विभाग, गैर सरकारी संगठन एवं संगठित उद्यमियों को इस बीमारी के बारे में पूर्व नियंत्रण एवं उपायों से अवगत कराया।

इसी पहल पर राष्ट्रीय अश्व अनुसधान केन्द्र, हिसार के कार्यवाहक निदेशक डॉ. अशोक कुमार गुप्ता के निर्देशन में अश्व प्रसार कार्यक्रम के तहत एवं जागरूकता वर्ष 2008 के अन्तर्गत

वैज्ञानिकगण अश्वपालकों को अश्व फ्लू रोग निवारण व रोकथाम की जानकारी देते हुए

अश्व फ्लू रोग के रोकथाम हेतु दिनांक 18 नवम्बर 2008 को बरवाला तहसील के राजली गांव में, दिनांक 20 नवम्बर 2008 को जुलाना में तथा 22 नवम्बर 2008 को महम क्षेत्र में अश्व फ्लू के निवारण के लिए जागरूकता अभियान शुरू किया गया, जिसमें करीब 62 अश्वपालकों ने हिस्सा लिया।

अश्वपालकों को सामूहिक रूप से अश्व फ्लू रोग के फैलाव के कारण, लक्षण एवं उपचार के बारे में जानकारी भी प्रदान की गई तथा इस रोग के प्रबंधन पर जोर देते हुए अश्वपालक बन्धुओं को सलाह दी गई कि वे कम से कम 8 सप्ताह तक अश्वों का आवागमन न करवायें।

Health Care-cum-Awareness Camps

The equines still retain their position as draught animal and contribute richly to rural economy. Since these animals are mainly reared by resources poor/ deprived community their welfare is often neglected. To fulfill the need of owners, animal health camps, training-cum-Kisan Gosthi & Chuapals

were organized at different places of the district such as in Tilwara (Balhotra) in Rajasthan, Kirmara, Gurera and Rajli village of Haryana and different place in Sandeela in Distt. Hardoi, U.P, where maximum number of equines are routinely used as draught animals. The welfare team not only provided the technical know-how for equine rearing like health care and management practices but also provided the information to recipients in intrusive manner with the minimum support for macro level up-liftment of socio- economic status of equine owners. A total of 325 beneficiaries participated with the animals in off- campus programmes of extension activities. The scientist of the Centre addressed the problems by providing the solution to the equine owners and educated the equine owners for the better adoption of equine practices towards maximum work with minimum stress. Some of the equines were treated for different ailments like wounds, inappetance, lameness, keratitis, debility & weakness and parasite infestations. All animals were dewormed using latest generation anti-parasitic drugs and tetanus toxoid was administered to the working equines. The group of scientists organized on-farm demonstration of equine package of practices based on low external input for sustainable equine husbandry development.

संस्थान में हिन्दी सप्ताह का आयोजन

हिन्दी चेतना मास 2008 के अन्तर्गत राष्ट्रीय अश्व अनुसन्धान केन्द्र में 15 से 19 सितम्बर 2008 को हिन्दी सप्ताह मनाया गया, जिसमें विभिन्न प्रतियोगिताएँ आयोजित की गई। हिन्दी सप्ताह का शुभारम्भ एक कविता पाठ कार्यक्रम से हुआ, जिसमें जीवन बीमा निगम, केन्द्रीय राजकीय फार्म, केन्द्रीय भैंस अनुसन्धान संस्थान, उत्तरी क्षेत्र कृषि यंत्र अनुसन्धान व प्रशिक्षण केन्द्र व राष्ट्रीय अश्व अनुसन्धान केन्द्र के अधिकारियों एवं कर्मचारियों ने सक्रिय भाग लिया। जीवन बीमा निगम के श्री नरेश शर्मा को प्रथम, केन्द्रीय भैंस अनुसन्धान संस्थान के श्री संदीप कुमार को द्वितीय तथा उत्तरी क्षेत्र कृषि यंत्र अनुसन्धान व प्रशिक्षण केन्द्र के श्री नरेश दत्त को तृतीय पुरस्कार प्राप्त हुआ।

कार्यक्रम की श्रृंखला में 17.09.2008 को 'हिन्द में हिन्दी' एवं 'जलवायु परिवर्तन में पशुओं का योगदान' विषयों पर निबन्ध प्रतियोगिता का आयोजन किया गयाए जिसमें श्री दिनेश दत्त शर्मा ने प्रथम, डॉ सरिता यादव ने द्वितीय व डॉ राजेश वैद ने तृतीय स्थान प्राप्त किया। इसके अतिरिक्त केन्द्र के कर्मचारियों के लिए प्रश्नोत्तरी, सुलेख, श्रुतलेख तथा शब्दावली प्रतियोगिताओं का आयोजन किया। हिन्दी अनुवाद प्रतियोगिता में डॉ संदीप खुराना प्रथम, श्री कृपा शंकर मीणा द्वितीय व श्री दिनेश दत्त शर्मा तृतीय रहे। सुलेख व श्रुतलेख प्रतियोगिता में डॉ अनुराधा भारद्वाज ने प्रथम, श्री मनोज कुमार ने द्वितीय व श्री कृपा शंकर मीणा ने तृतीय स्थान प्राप्त किया।

समापन समारोह के उपलक्ष्य में 19 सितम्बर 2008 को एक काव्य गोष्ठी का आयोजन किया गया जिसमें हिसार के गणमान्य कवियों ने हिन्दी भाषा पर अपनी रचनाएँ प्रस्तुत की। कार्यक्रम की अध्यक्षता हरियाणा के प्रथम राज्यकवि श्री उदयभानु हंस ने की। समारोह में डॉ रणधीर सिंह दलाल, कुलसचिव, चौ० चरण सिंह ह० कृ० वि० वि०, हिसार मुख्य अतिथि थे। संस्थान के निदेशक डॉ शैलेन्द्र कुमार द्विवेदी ने हिन्द एवं हिन्दी के विकास के लिए राष्ट्रभाषा का सम्मान करने एवं अपने दैनिक कामकाज में हिन्दी भाषा को अधिकाधिक प्रयोग में लाने के लिए प्रेरित किया।

काव्य गोष्ठी में कविता पाठ करते हुए गणमान्य कवि

स्वतंत्रता दिवस समारोह

राष्ट्रीय अश्व अनुसन्धान केन्द्र के निदेशक डा0 शैलेन्द्र कुमार द्विवेदी ने ध्वजारोहण करके स्वतंत्रता दिवस समारोह का शुभारम्भ किया। इस अवसर पर उन्होंने अधिकारियों एवं कर्मचारियों को स्वतंत्रता दिवस की शुभकामनाएँ देते हुए केन्द्र की गतिविधियों पर प्रकाश डाला और केन्द्र के विकास के लिए राष्ट्रनिर्माताओं एवं महापुरूषों के द्वारा दिखाये गये मार्ग का अनुसरण कर पूरी तरह समर्पित होने का आह्वान किया। इस अवसर पर केन्द्र द्वारा देशभक्ति से ओत-प्रोत कविता पाठ एवं भाषण प्रतियोगिता का कार्यक्रम आयोजित किया गया।

स्थापना दिवस समारोह

दिनांक 26 नवम्बर, 2008 को राष्ट्रीय अश्व अनुसधांन केन्द्र, हिसार के स्थापना दिवस के अवसर पर कार्यवाहक निदेशक डॉ. अशोक कुमार गुप्ता के नेतृत्व में वैज्ञानिकों की एक टीम द्वारा जींद जिले की तहसील जुलाना के गांव पोली एवं इसके आस-पास के गांवों के अश्वों एवं अश्वपालक बन्धुओं के कल्याण हेतु एक अश्व पालक संगोष्ठी का आयोजन किया गया। इस अवसर पर केन्द्र के अधिकारियों एवं कर्मचारियों ने पशुशाला, कृषि फार्म एवं रिहायशी क्षेत्र में पर्यावरण सुधार हेतु पौधारोपण भी किया।

गणतंत्र दिवस पर रंगारंग कार्यक्रम

केन्द्र ने 26 जनवरी, 2009 को 58वां गणतंत्र दिवस मनाया। इस अवसर पर निदेशक डॉ. राजकुमार सिंह ने तिरंगा फहराकर गणतंत्र दिवस समारोह का शुभारम्भ किया। उन्होंने वैज्ञानिकों एवं कर्मचारियों को गणतंत्र दिवस की शुभकामनाएं देते हुए अपने सम्बोधन में केन्द्र की उपलब्धियों का विवरण दिया। निदेशक महोदय ने इस अवसर पर देश के महान् शहीदों एवं संविधान सृजकों को याद किया और कहा कि हमें समय की महत्ता को समझते हुए अनुशासन में रहकर अनुसंधान कार्यों को प्रगति के शिखर पर ले जाना है। इस अवसर पर केन्द्र के द्वारा देशभक्ति से परिपूर्ण रंगारंग कार्यक्रम का आयोजन भी किया गया।

निदेशक राष्ट्रीय अश्व अनुसंधान केन्द्र गणतंत्र दिवस के अवसर पर तिरंगा फहराने के उपरान्त उपस्थित जनसमूह को सम्बोधित करते हुए

Visit of Dignitaries

- Ms. Ranjana Dev Sarmah, Director, Ministry of Information and Broadcasting, GOI, New Delhi, visited NRCE on April 28, 2008 and found this centre extremely interesting and fascinating, when apprised of the research activities of the institute.
- Dr S. Mauria, ADG (IPR and Policy) visited the Centre on May 19, 2008. He visited various labs and interacted with the Scientists and was impressed with the research activities of the centre. He commented that there is strong basis in NRCE in the area of IPR and fruitful technology transfer.
- Dr Mangala Rai, Secretary, DARE and DG, ICAR visited the Centre on August 20, 2008 and congratulated the scientists for remarkable progress which has started paying dividends on technology development front and wished best of luck for future endeavors.
- Dr Michael Wheeler from Canadian Food Inspection Agency, Chavlottetown Laboratory Prince Edward Island, Canada visited NRCE on November 17, 2008 and was impressed with the research and proactive disease control programs.
- Prof Utpal Tatu visited NRCE on December 27, 2008 and was impressed with lab facilities and the research work being carried out at NRCE. In his opinion, the Institute is ideally placed to make impact in research on treatment of infectious diseases in horses. NRCE will undoubtedly bring glory to applied science scenario in our country.

Dr Mangala Rai, Secretary, DARE and DG, ICAR interacting with the scientists

Prof Utpal Tatu being felicitated at NRCE

Infrastructure Development

1. BSL-3 Laboratory construction nearing completion

The work on the construction of bio-safety level 3 facilities at Hisar campus started in 2007 to house state-of-the-art laboratory and lab animal facility. The basic structure has been constructed and various components installed in the BSL-3 laboratory like heating, ventilation & air-conditioning (HVAC), access system, biosafety cabinets, autoclaves, biological liquid effluent decontamination (BLED) plant, etc are being installed. The process of validation is likely to be completed before the end of 2009. Once validated, the BSL-3 laboratory will cater to the need of working on highly infectious animal diseases that can spread rapidly from animals to animals and also on diseases that can be transmitted from animals to humans. The facility is essential for safety of laboratory workers and to prevent the lethal pathogens handled in the facility escape from the laboratory.

2. Agricultural Technology Information Centre

Agricultural Technology Information Centre for NRCE has been constructed at Main Campus, Hisar. The facility was developed to provide information and services under one roof besides developing a central exhibition to depict scientific and general aspects of equines and equine husbandry. The facility comprises an audio-video room, sale/enquiry counter and farmer's interaction room. The facility would be utilized to develop a central unit for interaction with equine farmers away from the main research labs wherein all activities of the centre can be depicted along with significance of equine farming. Consultancy services to equine farmers will also be provided though this unit.

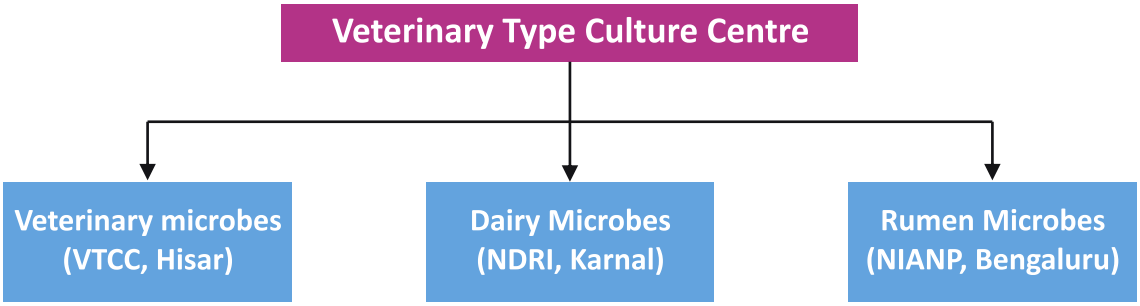
3. Veterinary Type Culture Centre (VTCC)

Veterinary Type Cultures facility initiated its activities in 2005 at National Research Centre on Equines, Hisar with the primary objective of tapping and utilizing the vast microbial diversity of animal origin to enhance livestock productivity. In XI Plan, National Centre for Veterinary Type Cultures has been approved as network with Veterinary Type Culture Centre at NRCE being the lead Centre with two Coordinating Centers (on rumen microbes at NIANP, Bengaluru and dairy microbes at NDRI, Karnal) and their 17 co-operating centers (7 for veterinary, 7 for rumen and 3 for dairy microbes). The activities of VTCC comprise collection, identification, characterization of animal microbes, microbial repository management system and microbial resource database system for animal microbes.

Dr Mangala Rai, Secretary, DARE and DG, ICAR lays Foundation Stone of VTCC building

The VTCC facility is being developed as a state-of-the-art culture collection centre with the major emphasis on creation of a strong infrastructural base. In this endeavor, construction of the first phase of the VTCC laboratory building was initiated in 2006 with a total outlay of 149.48 lakhs, which is nearing completion. The internal layout of the different laboratories has been finalized. The second phase of the laboratory building with a total sanctioned outlay of 491.59 lakhs is likely to be initiated shortly to integrate the structure. Other works viz.,

Organizational Set-up



NETWORK UNITS/ COOPERATING CENTERS

Veterinary Microbes

- Veterinary Type Culture Centre (Hisar) - Lead and Coordinating Centre
  - IVRI, Izatnagar/Mukteswar/Bhopal
  - NRC on Equines, Hisar (Haryana)
  - CSWRI, Avikanagar, Jaipur (Rajasthan)
  - CIRG, Makhdoom, Mathura (UP)
  - COVS, GBPUA&T, Pantnagar (Uttarakhand)
  - COVAS, AAU, Khanapara (Assam)
  - COVAS, SKUAT, (Jammu & Kashmir)
  - COVAS, TANUVAS, Chennai (Tamilnadu)

Rumen Microbes

- NIANP, Bengaluru - Coordinating Unit
  - NDRI, Karnal (Haryana)
  - IVRI, Izatnagar, Bareilly (UP)
  - CIRG, Makhdoom, Mathura (UP)
  - CSWRI, Avikanagar, Jaipur (Rajasthan)
  - NRC on Yak, Dirang (Arunachal Pradesh)
  - NRC on Camel, Bikaner (Rajasthan)
  - NRC on Mithun, Medziphema (Nagaland)

Dairy Microbes

- NDRI, Karnal - Coordinating Unit
  - COVAS, AAU, Anand (Gujarat)
  - COVS, GBPUA&T, Pantnagar (Uttarakhand)
  - Dairy Science College, UAS, Hebbal, Bengaluru (Karnataka)

construction of boundary wall, garage/parking space and internal roads have been initiated to make the facility functional at an early date. The construction of Bio-safety level-III facility is also envisaged to be initiated in near future for the safe handling of hazardous infectious and contagious animal microbes. This facility would be integrated with the BSL-II laboratory complex and shall encompass approx. 1000 square meters of BSL-III area. Although VTCC has already initiated its function within the limited space of existing labs at NRCE, the creation of these facilities would be helpful in strengthening the Centre towards the fulfillment of the mandate of VTCC.

4. Coverage of drain passing through the Centre by RCC box-type

The drain passing through the main campus very close to the lab building was creating a lot of environmental pollution and was a potent hazard to employees and residents of the Centre. A need was felt to cover this drain to provide clean and pollution-free environment to the Centre, which is working on many infectious diseases of national importance. It was proposed to be covered by construction of RCC box-type drain within the premises. The work was sanctioned to be executed through the Public Health Engineering Division of PWD (Haryana) during March 2007 and has been completed in this year for a total cost to the tune of Rs.56.14 lakhs. The coverage of drain resulted into the drastic reduction of pollution, solution to the problem of shallow water table and availability of more space near the building for plantation. This activity not only helped in face-lifting of the campus, but also in reducing the hazards of the various infections to the employees and general public.

Agricultural Farm Production

During the period under report, the quantity of fodder crops produced during Rabi and Kharif season at the agricultural farm at Main Campus, Hisar and EPC, Bikaner is summarized in the Table. A total of 1755Q fodder, 18 Q oat straw and 13.90 Q oat grain was produced by the Centre.

Fodder Production at NRCE (Hisar and Bikaner)

	Main Campus, Hisar		EPC, Bikaner		Total
Area under cultivation	17 acres	5 hectares			
	Production (in Quintals)				
Fodder	Produce	Area	Produce	Area	
Lucerne	73	½	551	2	624
Oat	199	4	96	1	295
Bajra	-	-	354	2	354
Barseem	22	1	-	-	22
Maize+Cowpea	127	2½	-	-	127
Sorgum sudan grass	181	5	-	-	181
Sorgum sudan grass+ Cowpea	152	5	-	-	152
Total	**754.00**	**-**	**1001**	**-**	**1755.00**
Oat straw	18	4	-	-	18
Oat grain	13.90	4	-	-	13.90

Livestock

The Centre has got a nucleus herd of Marwari and Kathiawari horses and exotic donkeys both at Hisar and Bikaner campuses. The mules produced at the farm and ponies are also maintained by the Centre. The stallions maintained at Bikaner campus are used for collection of semen for use in the artificial insemination after cryopreservation, which is exploited for superior mule production and propagation of indigenous germplasm in the field. Another effort for extension of services is achieved through sale of equines at Bikaner campus, sales touched Rs.4,07,800.00 during the period under report.

Equine Herd Strength at Production Campus, Bikaner

Category	Horses		Exotic donkeys		Mules		Total
	Male	Female	Male	Female	Male	Female	
Stock as on 01.04.2008	15	31	17	22	3	2	90
Births during the year	3	4	-	2	-	-	9
Purchased during the year	-	6	-	-	-	-	6
Deaths during the year	2	-	-	2	-	-	4
Sold during the year	4	2	5	4	-	-	15
Transferred to Main Campus, Hisar	-	-	1	3	-	-	4
Balance as on 31.03.2009	12	39	11	15	3	2	82

Equine Herd Strength at Main Campus, Hisar (As on 31.03.2009)

Category	Horses		Non-descript ponies	Mules	Donkeys	Total
	Marwari	Others				
Adult Male	1	2	0	1	2	6
Adult Female	9	1	2	1	3	16
0-3 years	8	0	1	1	0	10
Total	18	3	3	3	5	32

List of Publications

Research Articles

Published Research Articles

1. Arangasamy, A. 2008. Effect of seminal plasma proteins on hypo-osmotic swelling test of stallion spermatozoa. *The Indian Veterinary Journal*, 85(12): 1278-1280.
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3. Chauhan, Mamta and Gupta A. K. 2008. Genetic diversity within and among three important Indian horse breeds. *In*: International Conference on Novel Approaches for Food and Health Security in

High Altitudes at FRL, DRDO, Leh, Ladhakh (Sep. 6-10, 2008).

4. Gulati, B. R. and Singh, B. K. 2008. Equine viral diseases in India: An overview. *In*: 18th National Conference of Indian Virological Society at PGIMER, Chandigarh (Dec. 11-13, 2008).
5. Gulati, B. R., Sidhu, P. V., Singh, B. K. and Yadav, R. R. 2008. Passive transfer of rotavirus antibodies to neonatal foals confers protection against rotaviral diarrhoea. *In*: 18th National Conference of Indian Virological Society at PGIMER, Chandigarh (Dec. 11-13, 2008).
6. Gulati, B. R., Singha, H. and Singh, B. K. 2009. Development of RT-PCR for specific diagnosis of Japanese encephalitis in equines. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
7. Gupta, A. K. 2008. Equine Influenza in India: Molecular characteristics. *In*: National Symposium on Resurgence of equine influenza in India: Strategies for its control at NRCE, Hisar (Nov. 29, 2008).
8. Gupta, A. K. 2009. Genetic characterization of indigenous equids: Molecular techniques (Invited lecture). *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
9. Gupta, R., Chauhan, J, and Lal, N. 2009. Factors responsible to influence the entrepreneurial growth of trained farm women. *In*: 5th National Extension Education Congress: Extension perspective in changing Agri-rural Environment organized by Society of Extension Education at CSAUA&T, Kanpur (Mar. 5-7, 2009).
10. Kumar, B., Prasad, M., Gulati, B. R., Manuja, A. and Prasad, G. 2009 Comparative efficacy of immunological, molecular and culture assays for detection of group A rotavirus from faecal samples of buffalo calves. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
12. Kumar, B., Prasad, M., Manuja, A., Gulati, B. R. and Prasad, G. 2009. Comparative efficacy of different assays for detection of group A rotavirus from faecal samples of buffalo calves. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
13. Lal, N. and Dedar, R. K. 2008. Equine energy utilization: A sustainable rural livelihood. *In*: 22nd Indian Social Science Congress, Jamia Millia Islamia, New Delhi (Dec. 17-22, 2008).
14. Lal, N., Malik, P, Kumar, R. and Dedar, R. 2009. Equine farmers find solution to equine ailments with the use of indigenous knowledge. *In*: 5th National Extension Education Congress: Extension perspective in changing Agri-rural Environment organized by Society of Extension Education at CSAUA&T, Kanpur (Mar. 5-7, 2009).
15. Legha, R. A., Yash Pal and Tandon, S. N. 2008. Mule production in field using frozen semen. *In*: National Symposium on Recent Trends and Future Strategies for Improved Reproduction

of Livestock, Companion and Wild Animals at Bangalore (Dec. 11-13,2008).

16. Malik, A., Malik, P. and Kalidhar, S. B. 2008. Antifungal property of various extract/ fractions of *Prosopis cineraria* seeds. *In*: National Seminar on Multidisciplinary Approach to Environment at FC College for Women, Hisar (Nov. 5-6, 2008).
17. Malik, P. 2008. Environmental PollutionA Global Problem. *In*: National Seminar on Multidisciplinary Approach to Environment at FC College for Women, Hisar (Nov. 5-6, 2008).
18. Malik, P. 2009. GlandersPast and present status. *In*: Compendium - One-day workshop on Emerging diseases of equines at Regional Disease Diagnostic Laboratory (Western Zone), DI Section, Department of AH (Maharashtra), Pune (Jan 17, 2009).
19. Malik, P., Kumar, S., Sonia, Raj, S. M. P., Kumar, Subodh, Verma, S. K., Agarwal, G. S. and Rai, G. P. 2009. Comparative evaluation of three antigens of *Burkholderia mallei* for diagnosis of glanders in equines. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
20. Manuja, A., Dhingra, M. and Kumar, B. 2009. Different tissues of *Bubalus bubalis* exhibit variable gene expression of TLR 9. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
21. Manuja, A., Kumar, S., Kumar, B., Dhaka, V., Kumar, S. and Singh, R. K. 2009. Transcriptional expression of TLR9 in horses and poitu donkeys. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
22. Manuja, A., Manchanda, S., Kumar, B., Khanna, S. and Sethi, R. K. 2009. Evaluation of different methods of DNA extraction from semen of buffalo (*Bubalus bubalis*) bulls. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
23. Nagaleelavathi, S. P., Gulati, B. R. and Garg, S. R. 2008. Comparative evaluation of HI and SNT for Japanese encephalitis antibody detection in swine population. *In*: VII Annual Conference of Indian Association of Veterinary Public Health Specialists (IAVPHS) at College of Veterinary & Animal Sciences, Pantnagar (Nov. 7-9, 2008).
24. Nagaleelavathi, S. P., Gulati, B. R. and Garg, S. R. 2008. Seroepidemiological studies on Japanese encephalitis among animals in Haryana, India. *In*: VII Annual Conference of Indian Association of Veterinary Public Health Specialists (IAVPHS) at College of Veterinary & Animal Sciences, Pantnagar (Nov. 7-9, 2008).
25. Shanmugasdundaram, K., Abraham, M. J., Vijayan, N. and Nair, N. D. 2008. Pathology of utero-ovarian disorders in cow. *In*: Silver Jubilee Annual Conference of Indian Association of Veterinary Pathologist and International Symposium on Quality Assurance in Pathology and Disease Diagnosis at Indian Veterinary Research Institute, Izatnagar (Nov. 10-12, 2008).
26. Sharma, R. C., Khanna, A. S., Kanaujia, A.S. and

Sethi, R. K. 2009. Bending technique for different type of selection indices in Murrah buffaloes. *In*: Proceedings of National Symposium on Livestock Biodiversity Conservation and Utilization: Lessons from Past and Future Perspectives at NBAGR, Karnal (Feb. 12-13, 2009).

27. Sharma, R. C., Mehta, S. C. and Bansal, R. S. 2009. RFLP analysis of ELA-DRB2 genes in Marwari horses of Rajasthan. *In*: Proceedings of National Symposium on Livestock Biodiversity Conservation and Utilization: Lessons from Past and Future Perspectives at NBAGR, Karnal (Feb. 12-13, 2009).
28. Singh, B. K., Virmani, N. and Gulati, B. R. 2009. Current scenario of equine herpes viral infections in India. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
29. Singh, B.K. and Virmani, N. 2009. Status of equine herpes virus-1 in India: Research Update. *In*: Compendium - One-day workshop on Emerging diseases of equines at Regional Disease Diagnostic Laboratory (Western Zone), DI Section, Department of AH (Maharashtra), Pune (Jan 17, 2009).
30. Talluri, T. R., Arangasamy, A., Singh, J. and Tandon, S. N. 2008. Scrotal biometry studies in Marwari stallions. *In*: 24th Annual Convention and National symposium on Recent Trends and Future Strategies for Improved Reproduction of Livestock, Companion and Wild Animals organized by Indian Society for Study of Animal Reproduction at Bangalore (Dec. 11-13, 2008).
31. Vaid, R. K., Tigga, M., Khurana, S. K., Sundaram, S., Bera, B. C., Virmani N. and Barua, S.. 2009. Phenotypic characterization of virulent *cho*E gene positive *Rhodococcus equi* isolates. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).
32. Virmani, N. and Singh, B. K. 2008. Current status of respiratory infections in equines in India with focus on rhinopneumonitis and influenza. *In*: XXV Annual Conference and National Symposium on Quality Assurance in Pathology and Disease Diagnosis organized by Indian Association of Veterinary Pathologists at Centre for Animal Diseases Research and Diagnosis, IVRI, Izatnagar (Nov. 10-12, 2008).
33. Virmani, N., Singh, B. K. and Gulati, B. R. 2008. Sero-epidemiological studies based on type specific enzyme immunoassay using recombinant protein to know the status of EHV-4 in the country. *In*: XXV Annual Conference and National Symposium on Quality Assurance in Pathology and Disease Diagnosis organized by Indian Association of Veterinary Pathologists at Centre for Animal Diseases Research and Diagnosis, IVRI, Izatnagar (Nov. 10-12, 2008).
34. Virmani, N., Singh, B. K. and Gupta, A. K. 2009. Status of equine influenza in India. *In*: Compendium - One-day workshop on Emerging diseases of equines at Regional Disease Diagnostic Laboratory (Western Zone), DI Section, Department of AH (Maharashtra), Pune (Jan 17, 2009).
35. Virmani, N., Singh, B. K., Bera, B. C., Gupta, A. K., Gulati, B. R. and Singh, R. K. 2009. Resurgence of equine influenza in India. *In*: XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and

Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).

36. Yadav, S. C., Kumar, R., Kumar, S. and Gupta, A. K. 2008. Identification and characterization of cysteine proteases of *Trypanosoma evansi. In:* Proceedings of 20th National Congress of Parasitology on Food-borne Zoonoses of Parasitic Origin: Molecular Taxonomy and Epidemilogy at Deptt. of Zoology, North-Eastern Hill University, Shillong (Nov. 3-5, 2008).
37. Yadav, S. C., Kumar, R., Kumar, S. and Gupta, A.K. 2009. *Trypanosoma evansi* infection specific cysteine proteinase in serum of experimentally infected rats. *In*: Proceedings of XIX National Congress of Veterinary Parasitology and National Symposium on National Impact of Parasitic Diseases on Livestock Health and Production at Deptt. of Veterinary Parasitology, GADVASU, Ludhiana (Feb. 3-5, 2009).
38. Yash Pal, Arangasamy, A., Legha, R. A., Singh, J., Bansal, R. S., Khurana, S. K. and Tandon, S. N. 2008. Freezability and fertility of stallion semen. *In*: 24th Annual Convention and National Symposium on Recent Trends and Future Strategies for Improved Reproduction of Livestock, Companion and Wild Animals organized by Indian Society for Study of Animal Reproduction at Bangalore, (Dec. 11-13, 2008).
39. Yash Pal. 2009. Status and scope of utilization of draught equines. *In*: XI Biennial Workshop of the All India Coordinated Research Project on Utilization of Animal Energy with Enhanced System Efficiency (UAE) at OUAT, Bhubaneswar (Feb. 13-15, 2009).

Compendia / Souvenir

1. Khurana, S. K., Malik, Praveen, Kumar, R. and Kumar, S. (eds.) 2008 Compendium- Refresher course on Equine Disease Diagnosis and Management, National Research Centre on Equines, Hisar.
2. Yash Pal and Legha, R. A. (eds.) 2008. Compendium of Short Course on Use of Ultrasonography, Artificial Insemination and Pregnancy Diagnosis in Equines held at Equine Production Campus, NRCE, Bikaner.
3. Gupta, A. K., Virmani, N. and Singh, B. K. (eds.) 2008. Equine influenza in India. Past and Present Scenario. National Research Centre on Equines, Hisar.
4. Kumar, A., Ravat, J. and Gulati, B. R. (eds.) 2009. Souvenir-cum-abstracts for XV Annual Convention & National Symposium, Indian Society for Veterinary Immunology and Biotechnology, Hisar.
5. Sharma, R.C., Arangasamy, A., Legha, R.A. and Jitendar Singh (eds.) 2009. Compendium of Model Training Course on Improved equine production through cryo-preservation of semen, artificial insemination and pregnancy diagnosis in equines sponsored by Deptt. of Extension, MOA, Govt. of India, organized at NRC on Equines, EPC Bikaner.

Participation in Conferences and Symposia

1. Dr Ramesh Kumar and Dr. Niranjan Lal participated in workshop on hoof care, shoeing and dentistry organized by Indigenous Horse Society of India at Dundlod, Rajasthan (Apr. 5-7, 2008).
2. Dr R.K. Vaid attended the Workshop on Consortium for e-Resources in Agriculture (CeRA) at Unit of Simulation and Information, IARI, New Delhi (Apr. 30-May 1, 2008).
3. Dr Sanjay Kumar participated in the EU-INDIA Grid Workshop on Applications in Computational Biology (under TEQIP) organized by Maulana Azad National Institute of Technology, Bhopal (May 5-9, 2008).
4. Dr S.N. Tandon, Dr B. R. Gulati, Dr Sanjay Barua, Dr R.K. Vaid participated in two-days interactive meet on Conservation and Use of Farm Animal and Microbial Genomic Resources organized by Society of Animal Genetics and Breeding and NBAGR at NASC, New Delhi (Aug. 29-30, 2008).
5. Dr A. K. Gupta participated in International Conference on Novel Approaches for Food and Health Security in High Altitudes (NAFHSHA) organized at Field Research Laboratory, DRDO, Leh (Sep.6-10, 2008).
6. Dr Yash Pal participated in the workshop on To draw future strategies for both adaptation and mitigation due to impending climate changes on livestock organized at National Dairy Research Institute, Karnal (Sep. 20, 2008).
7. Dr Rajender Kumar and Dr P. Bala attended National Seminar on Non Biological Contaminants in Food, Feed and their Safety Standards organized by Ganesh Scientific Research Foundation and Ayurvet Research Foundation, New Delhi at India International Centre, New Delhi (Sep. 23-24, 2008).
8. Dr S.N. Tandon and Dr R. C. Sharma participated in Brain Storming workshop on Conservation of Farm Animal Genetic Resources: National Issues in Global Context organized by Society of Animal Genetics and Breeding and NBAGR at NASC, New Delhi (Oct. 29-30, 2008).
9. Dr S.C. Yadav participated in the 20th National Conference of Parasitology organized by North-Eastern Hill University, Shilong from (Nov. 3-5, 2008).
10. Dr R.A. Legha participated in National Seminar organized by NDRI, Karnal (Nov. 6-7, 2008).
11. Dr Nitin Virmani, Dr Mamta Tigga and Dr K. Shanmugasundaram participated in Silver Jubilee Conference of Indian Association of Veterinary Pathologist and International Symposium on Quality assurance in Pathology and Disease Diagnosis at CADRAD, IVRI, Izatnagar (Nov. 10-12, 2008).
12. Dr Sanjay Barua participated in the Brain Storming Session on Microbial Structural and Functional Genomics; Microbes as Nutrient Mobilizer; Bio-fuel and Bio-energy; Role of microbes and Agro-waste Management, at New Delhi (Nov. 11, 2008).
13. Dr A. K. Gupta, Dr S. K. Khurana, Dr Anju Manuja, Dr Praveen Malik, Dr Nitin Virmani, Dr Sanjay Barua, Dr R.K. Vaid, Dr Mamta Tigga, Dr K. Shanmugasundaram and Dr B. C. Bera attended National Symposium on Resurgence of equine influenza in India: Strategies for its control at NRCE, Hisar (Nov. 29, 2008).
14. Dr B. R. Gulati participated in 18th National Conference of Indian Virological Society, PGIMER, Chandigarh (Dec. 11-13, 2008).
15. Dr Yash Pal, Dr R. A. Legha, Dr T. R. Talluri and Dr R. S. Bansal attended for XXIV Annual Convention of the Indian Society for Study of Animal Reproduction and National Symposium on Recent Trends and Future Strategies for Improved Reproduction of Livestock, Companion and wild Animals, held at Veterinary College, KVAFSU, Bangalore (Dec. 11-13, 2008).

16. Dr Niranjan Lal participated in 22nd Indian Social Science Congress, Jamia Millia Islamia, New Delhi (Dec. 17-22, 2008).
17. Dr B. K. Singh, Dr Rajender Kumar, Dr Praveen Malik and Dr Nitin Virmani participated and delivered invited lectures during one-day workshop on Emerging diseases of equines organized by Regional Disease Diagnostic Laboratory (Western Zone), DI Section, Department of AH, Maharashtra, Pune (Jan. 17, 2009).
18. Dr A. K. Gupta, Dr S. K. Khurana, Dr Anju Manuja, Dr Sanjay Barua, Dr R.K. Vaid, Dr Mamta Tigga and Dr B. C. Bera attended and interacted during One-day Workshop on Strategies for Equine Influenza vaccinology at NCRE, Hisar (Jan. 24, 2009).
19. Dr B.K. Singh and Dr S. K. Khurana participated in National Conference of CPCSEA held at Hyderabad (Jan. 29-30, 2009).
20. Dr S. C. Yadav participated in XIX National Congress of Veterinary Parasitology and National Symposium on National Impact of Parasitic Diseases on Livestock Health and Production organized by Department of Veterinary Parasitology, College of Veterinary Science, GADVASU, Ludhiana (Feb. 3-5, 2009).
21. Dr A. K. Gupta, Dr B. R. Gulati, Dr S. K. Khurana, Dr Yash Pal, Dr Anju Manuja, Dr Sanjay Barua, Dr R. K. Vaid, Dr Mamta Tigga and Dr B. C. Bera, attended Interactive workshop between NRCE and EBS, Hisar for Optimizing Collaborative Research Programme at NRCE, Hisar (Feb. 5, 2009).
22. Dr R. C. Sharma participated in 6th National Symposium on Livestock Biodiversity Conservation and Utilization: Lessons from Past and Future Perspectives organized by National Bureau of Animal Genetic Resources (NBAGR), ICAR, Karnal (Haryana) (Feb. 12-13, 2009).
23. Dr R A Legha participated in XI Biennial Workshop of the All India Coordinated Research Project on Utilization of Animal Energy with enhanced system efficiency (UAE) at OUAT, Bhubaneswar (Feb. 13-15, 2009).
24. Dr R.K. Singh participated in ANA World Conference-2009 on Animal Nutrition Preparedness to Combat Challenges held at NASC Complex, New Delhi (Feb. 14-17, 2009).
25. Dr R. K. Vaid participated in Workshop-cum-Training programme on Krishi-Prabha: India Agricultural Doctoral Dissertation Repository at Nehru Library, CCS HAU, Hisar (Feb. 24-25, 2009).
26. Dr A.K. Gupta, Dr B.K. Singh, Dr B. R. Gulati, Dr Yash Pal, Dr Praveen Malik, Dr Nitin Virmani, Dr Sanjay Barua, Dr R.K. Vaid, Dr Balvinder Kumar, Dr Anju Manuja, Dr Mamta Tigga, Dr Harishankar Singha, Dr B. C. Bera and Mrs Sonia attended XV Annual Convention and National Symposium on Recent Approaches in Veterinary Immunology and Biotechnology for Animal Health and Production organized by Indian Society for Veterinary Immunology and Biotechnology at College of Veterinary Sciences, CCS HAU Hisar (Feb. 26-28, 2009).

Personnel Milestones

Joinings

1. Dr R. K. Singh took over the charge of National Research Centre on Equines as Director on 24.12.2008 after getting relieved from the charge of Station Incharge, Indian Veterinary Research Institute, Mukteshwar Campus consequent upon his selection for the post by ASRB.
2. Dr Anju Manuja joined National Research Centre on Equines as Senior Scientist (Veterinary Medicine) on 08.08.2008 upon selection by ASRB. She completed PhD (Veterinary Medicine) in 2002 from CCS Haryana Agricultural University, Hisar.
3. Dr Balvinder Kumar joined National Research Centre on Equines as Senior Scientist (Animal Biotechnology) on 13.08.2008 upon selection by ASRB. He completed PhD (Animal Biotechnology) in 2008 from CCS Haryana Agricultural University, Hisar.
4. Dr Sarita Yadav joined National Centre for Veterinary Type Cultures as Scientist (Veterinary Microbiology) on 15.05.2008 after completion of foundation course at NAARM. She completed MVSc (Veterinary Virology) in 2006 from Indian Veterinary Research Institute, Mukteshwar.
5. Dr H. S. Singha joined National Research Centre on Equines as Scientist (Animal Biotechnology) on 16.05.2008 after completion of foundation course at NAARM. He completed PhD (Animal Biotechnology) in 2006 from Indian Veterinary Research Institute, Izatnagar.
6. Dr Anuradha Bhardwaj joined National Research Centre on Equines as Scientist (Animal Biochemistry) on 16.05.2008 after completion of foundation course at NAARM. She completed PhD (Biochemistry) in 2006 from National Dairy Research Institute, Karnal.
7. Dr Shanmugasundaram joined National Centre for Veterinary Type Cultures as Scientist (Veterinary Pathology) on 16.05.2008 after completion of foundation course at NAARM. He completed MVSc (Veterinary Pathology) in 2006 from Kerala Agricultural University.
8. Dr T. R. Talluri joined National Research Centre on Equines as Scientist (Animal Reproduction) on 16.05.2008 after completion of foundation course at NAARM. He completed MVSc (Animal Reproduction and Gynaecology) in 2006 from College of Veterinary and Animal Sciences, Tirupati.
9. Dr B.C. Bera joined National Centre for Veterinary Type Cultures as Scientist (Animal Biotechnology) on 04.07.2008 after completion of foundation course at NAARM. He completed PhD (Animal Biotechnology) in 2006 from Indian Veterinary Research Institute, Izatnagar.
10. Sh Raj Kumar Dayal joined National Research Centre on Equines as T-3 (Lab Technician) on 17.06.2008 consequent upon appointment through direct recruitment.
11. Sh Manoj Kumar joined National Centre for Veterinary Type Cultures as T-3 (Lab Technician) on 19.06.2008 consequent upon appointment through direct recruitment.

Promotions

1. Sh Om Parkash,T-2 (Tractor Driver) has been promoted as T-3 (Tractor Driver) w.e.f. 23.10.2007
2. Sh Rajendra Singh, T-1 (Lab Technician) has been promoted as T-2 (Lab Technician) w.e.f. 23.08.2008

Superannuation

1. Dr S. K. Dwivedi, Director superannuated on 31.10.2008 after rendering dedicated and distinguished services to the Centre for a period of more than 7½ years since April 2001 and serving ICAR for more than 32 years.

2. Sh Shankar Lal, T-2 (Driver) retired from ICAR services from NRCE on 31.12.2008 after 18 years of dedicated, untiring and committed service.

Obituary

1. Sh Balwan Singh, SSG-II left us for heavenly abode on 08.04.2008.

Awards and Recognitions

- Dr Praveen Malik elected as Fellow, National Academy of Veterinary Sciences (India) in 2008.
- Dr Sanjay Kumar selected as Member, National Academy of Veterinary Sciences (India) in 2008.
- Dr Anju Manuja awarded GADVASU Woman Scientist award by Indian Society for Veterinary Immunology and Biotechnology during symposium at CCS HAU, Hisar, during Feb. 26-28, 2009 for TLR 9 studies in equines.
- Dr Balvinder Kumar, Dr Anju Manuja and Dr B.R. Gulati were conferred upon Scientist Award comprising Gold Medal (to first author) and Certificate for best research paper entitled A novel genomic constellation (G10P[3]) of group A rotavirus detected from buffalo calves in northern India from Indian Society for Veterinary Immunology and Biotechnology (ISVIB) during National symposium at CCS HAU, Hisar during Feb. 26-28, 2009.
- Dr R. K. Vaid, Dr M. Tigga, Dr S. K. Khurana, Dr S. Sundaram, Dr B. C. Bera, Dr N. Virmani and Dr S. Barua were awarded the Best Poster presentation-II award in XV Annual Convention and National Symposium on Recent approaches in Veterinary Immunology and Biotechnology for Animal Health and Production from Indian Society for Veterinary Immunology and Biotechnology (ISVIB) at CCS HAU, Hisar during Feb. 26-28, 2009.

Staff at NRCE

Director

Dr R. K. Singh

Scientific Staff

Hisar Campus

1. Dr A.K.Gupta	Principal Scientist
2. Dr B. K. Singh	Principal Scientist
3. Dr S. C. Yadav	Principal Scientist
4. Dr B. R. Gulati	Principal Scientist
5. Dr S. K. Khurana	Senior Scientist
6. Dr Yash Pal	Senior Scientist
7. Dr Rajender Kumar	Senior Scientist
8. Dr Praveen Malik	Senior Scientist
9. Dr Nitin Virmani	Senior Scientist
10. Dr Sanjay Kumar	Senior Scientist
11. Dr Mamata Chauhan	Senior Scientist
12. Dr Anju Manuja	Senior Scientist
13. Dr Niranjan Lal	Scientist
14. Dr H. S. Singha	Scientist
15. Dr Anuradha Bhardwaj	Scientist

EPC, Bikaner

1. Dr S.N.Tandon	Principal Scientist & I/c EPC
2. Dr R. C. Sharma	Senior Scientist
3. Dr R. A. Legha	Senior Scientist
4. Dr Balvinder Kumar	Senior Scientist
5. Dr A. Arnagasamy	Scientist (SS)
6. Dr Ramesh Kumar	Scientist
7. Dr Prokasananda Bala	Scientist
8. Dr T. R. Talluri	Scientist

VTCC, HIsar

1. Dr Sanjay Barua	Senior Scientist & I/c VTCC
2. Dr Rajesh Vaid	Senior Scientist
3. Dr Mamta Tigga	Scientist
4. Dr B. C. Bera	Scientist
5. Dr K. Shanmugasundaram	Scientist
6. Dr Sarita Yadav	Scientist

Administrative Staff

Hisar Campus

1. Sh R.A.Parashar	AF&AO
2. Sh Hawa Singh	AAO
3. Sh Ram Pal	Assistant
4. Sh S. P. Kaushik	Assistant
5. Sh Ashok Arora	Stenographer, Gr-III
6. Sh Subhash Chander	UDC
7. Sh Pratap Singh	LDC
8. Sh D. D. Sharma	LDC
9. Sh Om Prakash	LDC

EPC, Bikaner

Sh Mahender Singh	LDC

Technical Staff

Main Campus, Hisar

1. Sh R.K.Chaturvedi	T-6 (Technical Officer)
2. Sh K.S.Meena	T-5 (Farm Manager)
3. Sh P.P.Chaudhary	T-5 (Technical Officer)
4. Sh Ajmer Singh	T-4 (Livestock Assistant)
5. Sh D.D.Pandey	T-4 (Lab Technician)
6. Sh Sita Ram	T-4 (Lab Technician)
7. Sh Sanjeev Kumar Chhabra	T-4 (Lab Technician)
8. Sh Joginder Singh	T-3 (Lab Technician)
9. Sh Mukesh Chand	T-3 (Lab Technician)
10. Sh Raj Kumar	T-3(Lab Technician)
11. Sh Sajjan Kumar	T-3 (Driver)
12. Sh Suresh Kumar	T-3 (Driver)
13. Sh Arun Chand	T-2 (Tractor Driver)
14. Sh Raghubir Singh	T-1 (Driver)

EPC, Bikaner

1. Dr R.S.Bansal	T-9 (Farm Manager)
2. Sh K.K.Singh	T-5 (Technical Officer)
3. Dr Jitender Singh	T-5 (Veterinary Officer)
4. Sh Brij L:al	T-4 (Livestock Assistant)
5. Sh N.K.Chauhan	T-4 (Farm Technician)
6. Sh Om Prakash	T-3 (Tractor Driver)
7. Sh S.N.Paswan	T-2 (Livestock Assistant)
8. Sh Rajendra Singh	T-2 (Lab Technician)

VTCC, Hisar

1. Sh Manoj Kumar	T-3 (Lab Technician)

Skilled Supporting Staff

Main Campus, Hisar

1. Sh Ishwar Singh	10. Sh Deepak Kumar
2. Sh Guru Dutt	11. Sh Sant Ram
3. Sh Jai Singh	12. Sh Satbir Singh
4. Sh Ramesh Chander	13. Sh Hanuman Singh
5. Sh Mardan	14. Sh Subhash Chander
6. Sh Mahabir Prasad	15. Sh Ishwar Singh
7. Sh Desh Raj	16. Sh Ram Singh
8. Sh Ishwar Chander	17. Smt Ram Kali
9. Sh Om Prakash	18. Smt Santra

EPC, Bikaner

1. Sh Gopal Nath	3. Sh Mahabir Prasad
2. Sh Raju Ram	

Ongoing Research Projects

Research Project	Investigators	Period	
		From	To
EQUINE HEALTH			
Development of vaccine(s) against equine herpes virus-I infection	B.K. Singh*, B.R. Gulati and N.Virmani	June, 2003	May,2009
Development of diagnostic tests for equine trypanosomosis (Surra)	Rajender Kumar*, Sanjay Kumar & S.C.Yadav	June, 2003	March,2009
Development of sensitive and specific diagnostic tests for detection of equine piroplasmosis	Sanjay Kumar*, Rajender Kumar, A.K. Gupta & S.C. Yadav	May, 2004	March,2009
Studies on the improvement of the diagnostics for differentiation between EHV-1 & 4 infections employing molecular techniques	Nitin Virmani*, B.K. Singh & B.R.Gulati	May, 2004	March 2009
Development of diagnostics for *Rhodococcus equi* infection in foals	S. K. Khurana*, Praveen Malik	May, 2004	March,2009
Development of sensitive and specific diagnostics for Japanese encephalitis in equines	Baldev R.Gulati*, B.K.Singh, N.Virmani & H.S.Singha	Oct., 2006	Sept.,2009
Epidemiological studies on emerging and existing diseases of equines	B.K. Singh*, S.K. Khurana, S.C. Yadav, Baldev R. Gulati, Rajender Kumar, P. Malik, Sanjay Kumar, Nitin Virmani, Sanjay Barua, Rajesh Kumar Vaid, A. Arangasamy & Ramesh Dedar	April, 1995	Continuous Service Project
Usefulness of recombinant protein for serodiagnosis of glanders	Praveen Malik*	Oct., 2006	May,2009
Cysteine proteinase,a defined antigen of *T. evansi* for control of trypanosomosis	S.C. Yadav*, Rajender Kumar, Sanjay Kumar & A.K. Gupta	Sept. 2008	Aug.2010
EXTENSION			
To study the existing donkey and mule production system in three states Haryana, Rajasthan and U.P.	Niranjan Lal*, Rajender Kumar, Ramesh Kumar, P. Malik & Rajnikant Chaturvedi	July, 2006	May,2009

Research Project	Investigators	Period	
		From	To
VTCC			
Establishment of a repository (culture collection) of veterinary pathogens: processes & procedures	Sanjay Barua*, Rajesh Kumar Vaid, Mamta Tigga, Sarita Yadav, Shanmugasundaram & B.C. Bera	June, 2007	May 2010
Isolation, maintenance and characterization of bacterial pathogens and their molecular identification	Rajesh Kumar Vaid*, Sanjay Barua, Mamta Tigga, Shanmugasundaram & B.C.Bera	June, 2007	May, 2010
EQUINE PRODUCTION			
RFLP-based genotyping of major histocompatibility complex class II genes in Marwari horses	R.C.Sharma* & S.C.Mehta	Oct., 2004	Oct., 2008
Molecular characterization of indigenous breeds of horse for genetic diversity within and between different breeds	A.K. Gupta*, S.C. Gupta, S.N. Tandon, Mamta & Neelam Gupta	Oct., 2006	Sept., 2009
Cryo-preservation of embryo for conservation of Marwari Horse	A. Arangasamy*, Thirumala Rao & R.K.Chaturvedi	April, 2008	March, 2009

*Principal investigator

राष्ट्रीय अश्व अनुसंधान केन्द्र समाचार पत्रों में

अश्व रोग निदान व प्रबंधन पर प्रशिक्षण शुरू

Horse flu resurfaces after decades

Hisar centre team collects samples from Jammu, Katra

पशु चिकित्सा दिवस मनाया

हरियाणा कृषि विश्वविद्यालय तथा राष्ट्रीय अश्व अनुसंधान केंद्र में हुए कार्यक्रम

पशुओं के परिवहन नियम कड़े हों-द्विवेदी

हिसार, 31 जुलाई (निस): तमिलनाडु पशु चिकित्सा महाविद्यालय में तमिलनाडु पशु चिकित्सा एवं पशुपालन विश्वविद्यालय (तानुवा) द्वारा जर्मनिया टैक यूएसए के सहयोग से पशुजनित संक्रामक रोग और इसके इलाज में बायोटेक्नोलॉजी की भूमिका विषय पर आयोजित दो दिवसीय अंतर्राष्ट्रीय सम्मेलन के उद्घाटन पर अध्यक्षीय भाषण देते हुए राष्ट्रीय अश्व अनुसंधान केंद्र, हिसार के निदेशक डॉ सौलेन्द्र कुमार द्विवेदी ने कहा कि देश में संक्रामक रोगों से पीड़ित पशुओं को एक स्थान से दूसरे स्थान पर भेजे जाने पर रोक लगाई जानी आवश्यक है और सरकार को अपनी नियमन प्रक्रिया इसके लिए कड़ी करनी होगी। उन्होंने बताया कि मौसम परिवर्तन के कारण पशुओं में संक्रामक रोगों की तीव्रता भी बढ़ी है। उन्होंने पशु चिकित्सकों को आपदा प्रबंधन के साथ-साथ मौसम परिवर्तन, नए रोगों के संक्रमण और पुराने रोगों के फिर से पनपने की संभावना आदि चुनौतियों से निपटने के लिए तैयार रहने के

अश्व रोग निदान पर प्रशिक्षण का समापन

Horse flu attacks India after 20 yrs

Hisar, August 1

Equine influenza or horse flu has re-emerged in India after a gap of 20 years, affecting hundreds of civilian horses, ponies and mules. According to equine experts here, horses and mules in the Vaishno Devi shrine had been hit the most.

A team of experts from the National Research Centre on Equines (NRCE) examined and collected serum samples and nasal swabs of affected animals, which confirmed that hundreds of civilian horses, ponies and mules serving pilgrims visiting the Vaishno Devi shrine were suffering from equine influenza.

The authorities had been advised to quarantine the animals suffering with the highly contagious viral disease presently confined to Jammu's Katra region, said the NRCE director, Dr S.K. Dwivedi.

As many as 80 per cent of the ponies and mules in Katra, which had an equine population of at least 18,000, were showing clinical signs of equine influenza, which had earlier struck the country in 1987, when around 15,000 animals suffered in central and north India, he said.

Horse flu spreads very fast and the animal, which gets the disease, has to be given adequate rest and symptomatic treatment for the relief from the disease otherwise secondary bacterial complications may occur.

The centre had developed an indigenous vaccine for prevention and control of the disease, which could be prepared fast on a limited scale on demand.

However, any government or non-government veterinary biological house could avail of this technology for wide scale manufacture and commercial marketing of the vaccine, he said. — UNI

EPC, Bikaner

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