

NRCE Newsletter

January to December 2013

Detection of Glanders among indigenous equines in UP, HP and Chhattisgarh in 2013

Burkholderia mallei, the etiologic agent of glanders, primarily infects horses, mules and donkeys. The disease has reemerged in Central and South America, the Middle East, Africa, and Asia, and particularly in India. Detection of the clinical cases of equine glanders in three states during April, 2013 to March, 2014 is reported here. In indigenous equines, outbreaks were observed during the period in Uttar Pradesh, Himachal Pradesh and Chhattisgarh. In continuation with the past years outbreak in Uttar Pradesh, glanders was reported in 7 equines in Hardoi and Badaun district of Uttar

Pradesh during July-August, 2013. Four cases of glanders were also observed in Arki district, Himachal Pradesh in May-June, 2013, while a single case of disease was detected in Raipur, Chhattisgarh in September, 2013. All infected equines were tested serologically positive by CFT (titer 8 to 64). The causative agent *B. mallei* was isolated from two infected mules in Himachal Pradesh. Besides complement fixation test (CFT), the 'gold standard' serological test, in-house developed indirect ELISA, Western blot, and PCR were also used to confirm the *B. mallei* infected equines.



Genetic characterization of Indian horse and pony

Genetic diversity analysis of Indian horse and pony breeds carried out earlier with all the six registered equine breeds along with Thoroughbred horses revealed high values of allele number, observed and expected heterozygosity, polymorphism information content for all Indian breeds except Spiti ponies in comparison to Thoroughbred horses which indicated high genetic diversity in them. Individual assignment indicated admixture in all the breeds except Thoroughbred horses. The neighbor-joining dendro gram using the allele sharing distance clearly defined clusters for most of the breeds, Indian horse and pony breeds clustered separately while Thoroughbred formed a separate out group. Advanced Bayesian analysis using STRUCTURE revealed three distinctive clusters of Indian horse and pony breeds, Kathiawari the most prominent cluster as horse breed. Clustering of one sub-population of Marwari with Bhutia indicated their common ancestries which need further investigations as both these are distinct at phenotypic level and geographically isolated. Kathiawari represents the oldest stock and has contributed to other Indian breeds. Similarity between Kathiawari and Marwari horses is attributed to contiguity of their breeding tracts

Bioinformatic analysis of whole genome sequences of *Pasteurella multocida* and *Salmonella enterica*

Bioinformatic analyses of two sequenced isolates, i.e., *Pasteurella multocida* Strain Bu1, a B:2 serotype strain, Acc No VTCCBAA264 (NCBI Accession No. ALYC00000000), and *Salmonella enterica* sub spp. *enterica* Serovar Gallinarum (Strain Sal40) were completed on RAST platform. This preliminary bioinformatic analysis of *P. multocida* isolate revealed a genome of

22,36,312 bp size, mapped to 59 Contigs after Contiguator analysis with ref. Genomes, and it gave 2183 predicted ORFs (Pegs), and 52 rRNA genes. The *Salmonella Gallinarum* genome of 4,688,112bp size was mapped to 92 Contigs after Contiguator analysis with ref. genomes, and it gave 4707 predicted ORFs (Pegs), and 72 rRNA genes. Antibiotic resistance genes were found in both the pathogenic isolates. A total of 3872 features including virulence, disease and defence; Phages, prophages, transposons and plasmids; Iron acquisition & metabolism were identified RAST analysis. In *P. multocida* genome on several antimicrobial resistance genes were identified.

Survey to study effect of hard/soft pavement on the foot and leg of working horses

The NRCE team surveyed the working equids of Kolkata city (animal working on hard pavement) and Digha beach (200 km from Kolkata city), where animals work on sandy beach. Similar survey was also made in Julana (Haryana). This survey was conducted to assess the prevalence of foot and leg ailments in working equines on hard pavement and to evaluate the effect of paved roads on the health of animals.

Culled horses purchased at cheap rates are being used in Victoria carriages at Kolkata and at Digha beach. There was lack basic amenities, veterinary care, proper housing, access to feed and potable drinking water, saddler, shoeing and farriery whereas animals at Julana are well kept and taken care off. This has led to incidence of lameness in horses at Kolkata while those at Julana are healthy with low incidence of lameness.

Incidence of other conditions (cow hock, rope injury, frog infection, damaged hoof wall, soft non-painful swelling on

fetlock joints, harness injury, contracted heel, splint bone, facial injury) was 31.90% in animals working on hard pavement in Kolkata but these afflictions were not observed in animals working on soft pavement at Digha beach. This was concluded that hard pavement was not good for the horses being used currently for plying Victoria carriages in Kolkata, as use of these horses- majority of which are already having lameness and other foot problems- on hard pavement, is leading to

further deterioration of their foot health. Veterinary care and supervision is non-existent for working equids at Kolkata and Digha beach, while at Julana town these services are in place and equine owners were using it judiciously. Totally sound and healthy horses with proper shoeing, defined hours of work schedule, and vigilant veterinary supervision can be used on hard pavement with least foot damage.



Legs tied with rope



Horses of different size in Victoria cart

Dr. Sanjay Kumar

OIE Twinning Project– equine piroplasmiasis

NRCE successfully completed OIE sponsored Laboratory Twinning Project on Equine Piroplasmiasis and consequently NRCE applied to the OIE, (through Indian OIE delegate) for recommending NRCE as OIE Reference Laboratory for Equine Piroplasmiasis. In the communication received from the OIE, the OIE Biological Commission agreed that Centre is active in the field of equine piroplasmiasis research and diagnostics, and that application revealed its high level of scientific and technical expertise. The Commission pointed out that the laboratory does not have appropriate quality management system equivalent of ISO 17025, which is essential requirement for OIE Reference Laboratory. NRCE is pursuing towards processing the documents for ISO 17025 certification of Equine Piroplasmiasis laboratory.

IMC meeting

The 35th meeting of Institute Management Committee (IMC) was held on April 21, 2013 at NRCE, Hisar under the Chairmanship of Dr R.K. Singh, Director, NRCE, Hisar. The esteemed members of IMC; Dr R. L. Sandal, (Asstt. Director, Animal Husbandry, Himachal Pradesh- Representative of the Director, Animal Husbandry, HP); Dr S.C. Mehta (Principal Scientist, NRCC, Bikaner); Dr R.K. Sawal, (Principal Scientist, Regional Station CSWRI, Bikaner); Dr Yash Pal (Pr. Scientist); Col (Dr) Umaid Singh Rathore; Sh A.P. Sharma (F&AO, IASRI, New Delhi); and Sh R.B. Saxena (Admn. Officer, NRCE, Hisar) attended the meeting. Prof (Dr) R.N. Shreenivasa Gowda, Chairman, QRT and Dr A.K. Gupta, Member Secretary, QRT were special invitees for IMC meeting. The IMC

adopted and confirmed the proceedings of 34th IMC meeting and discussed about the various issues of the Centre.

XVI Research Advisory Committee (RAC) Meeting

The XVI Research Advisory Committee meeting of the Centre was held under the Chairmanship of Dr S.K. Dwivedi, Ex-Director, NRCE, Hisar on June 18, 2013 at NRCE, Hisar for appraisal of the research achievements of the ongoing projects and to consider new research project proposals. The other RAC members included Dr Arun

Varma, Ex-ADG (AN&P); Dr Gaya Prasad, ADH (AH) ICAR, New Delhi; Dr (Professor) Arvind Kumar, College of Veterinary Science, LUVAS, Hisar; Col (Dr) Devender Kumar, Dr R.K. Singh, Director, NRCE Hisar and Dr Yash Pal, Pr. Scientist, I/c PME & Member Secretary. Dr R.K. Singh presented various research activities being carried out at NRCE. The Chairman RAC applauded the scientists for their sincere contribution in the ongoing research programs and other developmental activities of the Centre.



RAC meeting in progress

Institute Research Committee (IRC) Meeting

The annual meeting of Institute Research Committee (IRC) was held under the chairmanship of Dr R. K. Singh, Director, NRCE, Hisar on July 23-24, 2013 at NRCE, Hisar for reviewing the progress of the ongoing research projects and to consider

new research project proposals for the year 2013-14. in the area of Equine Production, Health, Extension, Veterinary Type Culture Collection and Externally Funded Projects. Thorough discussion was done on each project regarding outcomes, shortcomings and future course of work.



IRC meeting in progress

Secretary DARE and DG ICAR inaugurates sophisticated laboratories and Info-Equine Museum at NRCE, Hisar

Dr S. Ayyappan, Secretary DARE and DG ICAR inaugurated a Microbial Containment Laboratory (BSL-III facility), Veterinary Type Culture Collection (VTCC) Laboratory Complex (Phase I), and Info-Equine Museum at National Research Centre on Equines, Hisar on March 9, 2013. This MCL facility at NRCE is the first BSL-III laboratory in Haryana. VTCC is concentrating on microbial culture collection of animal origin (disease causing microbes including zoonotic pathogens, rumen microbes, and dairy microbes). The Info-Equine Museum has comprehensive information about equines (horses, donkeys, mules, zebra, and

hybrids) depicted through models, murals, diorama, audio-visuals like Press Button Board, Storey Telling Board, Interactive Information Kiosk, etc. The Museum also has collection of statuettes/sculptures (camel bone, Terracotta, wooden, velvet, different metals/alloys, etc), equine-related accessories, and different types of regional feed/fodder/supplements. On this occasion, the Hon'ble Secretary DARE and DG ICAR also laid foundation stone for BSL-III facility of VTCC. This occasion was also graced by Prof. KML Pathak, Deputy Director General (Animal Science), ICAR, New Delhi.



Secretary DARE and DG ICAR inaugurating ATIC and Info-equine Museum



Secretary DARE and DG ICAR inaugurating Microbial Containment Laboratory



Secretary DARE and DG ICAR at ATIC Info-equine Museum

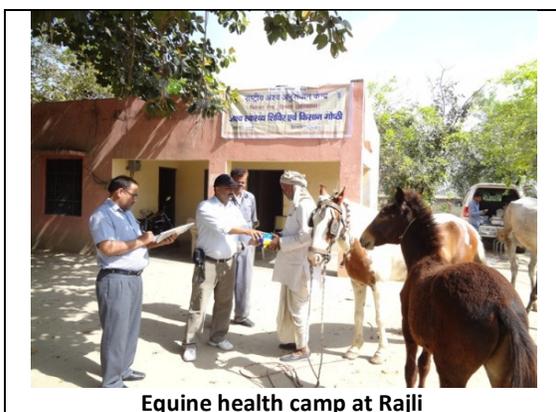


Secretary DARE and DG ICAR inaugurating VTCC Laboratory Complex (Phase I)

World Veterinary Day Celebrated at NRCE

On occasion of World Veterinary Day equine health camp and interactive meet of equine owners was organized by National Research Centre on Equines, Hisar on April 27, 2013 at Rajli and Gurana villages in Hisar. During the health camp equines were examined for various ailments by a multidisciplinary team of scientists and technical officer from NRCE. As the theme for World Veterinary Day 2013 was Vaccination, the equines were vaccinated for tetanus during the camp.

Deworming tablets and mineral mixture were also provided to equine owners free of cost and treatment was given to sick and wounded equines. Pregnancy diagnosis was also done at farmer's door during the camp. Equine owners interacted with multidisciplinary team of scientists from NRCE on various aspects of equine husbandry and management. Information was given to equine owners on deworming schedule, prevention and management of ticks, colic and lameness in equines.



Equine health camp at Rajli



Vaccination at equine owners door

Kisan Call Centre: Toll-free helpline for equine owners inaugurated at EPC Bikaner

Toll-free helpline providing advisory services to equine owners from at EPC, Bikaner on the lines of "Kisan Call Centre" was inaugurated by Hon'ble Dr K. M. L. Pathak DDG (AS) on August 17, 2013. The

EPC, Bikaner toll-free helpline number 1800-180-6225 can be accessed by equine owners from all over the country. The queries of the farmers are addressed by the experts at EPC, Bikaner and relevant advice is provided to equine owners on health and management aspects of equine husbandry.



Hon'ble Dr K.M.L. Pathak DDG (AS) inaugurating Kisan Call Centre at EPC, Bikaner

हिन्दी सप्ताह का आयोजन

केन्द्र में 1-7 अक्टूबर 2013 को हिन्दी सप्ताह का आयोजन किया गया। इस अवसर पर केन्द्र में हिन्दी के अधिकाधिक प्रयोग हेतु हिन्दी भाषा से संबंधित विभिन्न स्पर्धाओं का आयोजन किया गया जिसमें केन्द्र के अधिकारियों, कर्मचारियों व केन्द्र सरकार से संबद्ध अन्य संस्थाओं के कर्मचारियों ने बढ-चढ कर हिस्सा लिया। 7 अक्टूबर 2013 को आयोजित हिन्दी सप्ताह समापन एवं पुरस्कार वितरण समारोह आयोजित किया गया। इस कार्यक्रम में डॉ० पी०एस० लाम्बा, पूर्व उप-कुलपति मुख्य अतिथि के रूप में उपस्थित थे। मुख्य अतिथि ने अपने भाषण में दैनिक कामकाज

में हिन्दी के अधिकाधिक प्रयोग पर जोर दिया। कार्यक्रम में मुख्य अतिथि द्वारा विभिन्न प्रतियोगिताओं में पुरस्कार वितरण किया गया। हिन्दी भाषान्तर प्रतियोगिता प्रथम पुरस्कार श्री के.एस. मीणा, द्वितीय पुरस्कार श्री डी.डी शर्मा, तृतीय पुरस्कार श्रीमति शम्मी त्यागी ने प्राप्त किया। निबन्ध प्रतियोगिता में प्रथम पुरस्कार श्रीमति आशमा, द्वितीय पुरस्कार श्रीमति शम्मी त्यागी, तृतीय पुरस्कार श्रीमति पार्वती शर्मा ने प्राप्त किया। केन्द्रीय कर्मचारियों के काव्य पाठ प्रतियोगिता में प्रथम पुरस्कार श्री नरेश शर्मा, द्वितीय पुरस्कार श्री नरेश दत्त व तृतीय पुरस्कार श्रीमति कोमल सरदाना ने प्राप्त किया।



केन्द्र में हिन्दी सप्ताह का आयोजन

Vigilance Awareness Week at the Centre

Vigilance Awareness Week was observed from 28th October to 2nd November 2013. As part of Vigilance Awareness Week celebration Director, NRCE has administered pledge to the scientists and staff of NRCE on October 28, 2013 for honesty and transparency in public life. Director, NRCE in his message also stress on

coordinated efforts for eliminating the menace of corruption from the society. As part of Vigilance Awareness Week Celebration on October 30, 2013, a Lecture by Sh. Patram ji, Superintendent Police Vigilance, Hisar on "Promoting Good Governance- Positive Contribution of Vigilance" was also organized.



Vigilance Awareness Week at the Centre

Foundation Day lecture at NRCE

28th foundation day of National Research Centre on Equines celebrated on November 26, 2013. On this occasion foundation day lecture was organized at NRCE. Maj. Gen. Shri Kant Sharma Vice-Chancellor LUVAS, Hisar delivered a foundation day lecture. Brigadier Desh Raj, Equine Breeding Stud, Hisar and Dr R. K.

Sethi, Former Director CIRB were present on this occasion as guests of honour. In his foundation day lecture chief guest Maj. Gen. Shri Kant said equines had important contribution in Indian culture and history. On this occasion the plantation was also done by the chief guest and other dignitaries near animal shed complex at NRCE.



Foundation Day Celebration at NRCE

EXTENSION NEWS

Equine health camps and *kisan goshtis* organized

Sr. No.	Place	Date	Activities
1.	Jodhpur, Rajasthan	January 10, 2013	During equine health camps the animals were examined for various alignments by the experts from NRCE. Basic treatment was provided to diseased animals and Free medicines, deworming tablets and mineral mixture was provided for to equine owners free of cost at the camp. Pregnancy diagnosis was done during the camps. During <i>Kisan Goshtis</i> Equine owners interacted with experts from NRCE on various issues related to health, production and management of equine and the constraints faced by them in equine husbandry.
2.	Kutch, Bhuj, Gujarat	February 19-20, 2013	
3.	Jodhpur, Rajasthan	April 03-04, 13	
4.	Julana, Haryana	April 05, 2013	
5.	Kolkata, West Bengal	April 10, 2013	
6.	Digha, West Bengal	April 11, 2013	
7.	Rajli, Hisar, Haryana	April 27, 2013	
8.	Gujron ka Mohalla, Bikaner	May 25, 2013	
9.	Ridmalsar, Bikaner	June 28, 3013	
10.	Bundi, Rajasthan	July 04, 2013	
11.	Suratgarh, Rajasthan	July 28, 2013	
12.	Jodhpur, Rajasthan	August 22, 1013	
13.	Tehla, Nagaur, Rajasthan	October 17, 2013	
14.	Degana, Nagaur, Rajasthan	October 18, 2013	
15.	Thanwala, Nagaur, Rajasthan	December 30, 2013	



Equine health camp at Jodhpur



Equine health camp at Suratgarh in collaboration with Brooke India



Equine health camp at Kolkata



Interactive meet with equine owners at Digha

NRCE Participation in Exhibitions and Fairs

Sr. No.	Place	Date	Activities
1.	National Livestock Championship Muktasar, Punjab	January 8-12, 2013	Exhibits and extension material on various aspects of equine husbandry and management were displayed for the benefit of equine owners. NRCE video film "Aswa Gatha" was played during the exhibitions. Exhibition stall also displayed different technologies developed at NRCE. Equine owners meet and interacted with scientists on various aspects of equine husbandry.
2.	Lunkaransar, Bikaner Rajasthan	March 17, 2013	
3.	CSWRI Avikanagar, Rajasthan	March 23, 2013	
4.	Marwari horse show, Jodhpur, Rajasthan	April 03-04, 13	
5.	Kisan Mela at Dera Sacha Sauda, Sirsa	September 26-27, 2013	
6.	IIHTC Durgapura Jaipur organized by RAJUVAS, Bikaner	September 28-29, 2013	



NRCE Exhibition stall at Muktasar



NRCE Exhibition stall at Lunkaransar

Exposure Visit of Farmers/ Educational Tours of students/ Study tours & visits during January to December 2013 at NRCE

During 2013 following visitors from different places including farmers, students from SAU's, schools and other visitors visiting NRCE. During visits visitors were briefed about the research activities and

different extension and field activities of NRCE for benefit of equine owners and various on-going programmes of NRCE.

Sr. No.	Details of Visitors	Date	No of visitors
1.	Exposure visit of farmers from Rajasthan	March 6, 2013	41 farmers
2.	Exposure visit of farmers from Haryana	March 15, 2013	16 farmers
3.	Study tour of trainees from CCSHAU, Hisar	April 25, 2013	22 members
4.	Study tour of BVSc. students form LUVAS, Hisar	June 06, 2013	24 Students
5.	Study tour of BVSc. students form CVAS Bikaner	October 11, 2013	28 Students
6.	Exposure visit of farmers from Ellnabad, Sirsa, Haryana	September 13, 2013	26 farmers
7.	Exposure visit of farmers from Suratgarh, Rajasthan	November 27, 2013	18 farmers

Success story of equine owner

Name of Farmer	Shri. Ramesh
Village	Gurana
Block	Barwala
Address	VPO Gurana, Dist. Hisar
Brief profile	Shri Ramesh is a 41 year old equine owner from village Gurana in the Hisar District. Having primary education and a joint family 10 members dependent on him, Ramesh has been involved in equine rearing for the last 22 years and that is the principal source of livelihood for the entire family. He uses his mules and donkeys in cart for transportation of goods and agricultural produce from field to village and market. He also produces mules and sells them to earn money that ensures livelihood of his family. He used to earn Rs-100-150 per day using cart transportation using equines.
Success story	Ramesh purchased a pair of exotic jack and jenny in 2003 and one exotic donkey jenny in 2008 from NRCE and since last 12 years he has been involved in breeding of equines for production of exotic donkeys and mules. Keeping exotic donkeys for mule production brought good economic returns to his family and he has been selling 2-4 mules & donkeys every year at price of Rs 45000-80000 per animal. Presently Ramesh is having 2 exotic jack, 6 exotic jennies, one mule, one horse and 2 mare on his farm. The economic returns from the sale of donkeys and mules ensured sustainable livelihood for him and family members dependent on him. He has also used his jacks covering of mares in the locality for superior mule production by charging a fees and thus earning which is also proving additional income for his family. He also avails Arimifical insemination and pregnancy diagnosis and advisory services for his equines from NRCE. Now besides daily earning of Rs 300-450 per day by using equine cart transportation of goods he is also having income about Rs 1 lakh per year through sale of mules and donkeys. Ramesh has constructed a new house adjacent to his old one and now he is earning more than Rs 1.5 lakh per annum from sale of mules, donkeys and services provided by him to other equine owners using his jack. Equine husbandry helped Ramesh opened new avenues of income generation which helped him to sustain livelihood of his family members.
Impact of success story on other farmers in locality	Looking at the success of Ramesh in mule production his brother and some other equine owners also started producing mules from their mares and selling them for good prices.
Award / reward / appreciation received	Shri Ramesh received Best Exotic Donkey and Best Donkey Foal for his donkeys during Donkey competitions in different categories organized at National Research Centre on Equines, Hisar on May 5, 2011



Ramesh with his donkeys

Visit of dignitaries

- Dr S. Ayyappan, Secretary DARE and DG ICAR inaugurated a Microbial Containment Laboratory (BSL-III facility), Veterinary Type Culture Collection (VTCC) Laboratory Complex (Phase I), and Info-Equine Museum at National Research Centre on Equines, Hisar on March 9, 2013.



Plantation by Dr S. Ayyappan, Secretary DARE and DG ICAR

- Prof. K.M.L. Pathak, Deputy Director General (Animal Science), ICAR, Dr. D.K. Sharma, Director, CSSRI, Karnal, and Dr. Indu Sharma, Project Director, DWR, Karnal visited NRCE on March 9, 2013 during the inauguration of various facilities at NRCE.
- Dr A.K. Dahama Vice-Chancellor, Swami Keshwanand Rajasthan Agricultural University, Bikaner visited NRCE on March 10, 2013. He visited ATIC Info-equine museum, VTCC and animal shed complex at NRCE.



Dr A.K. Dahama Vice-Chancellor, Swami Keshwanand Rajasthan Agricultural University, Bikaner at animal shed complex

- Sh. D. S. Nehra, DG Audit Central, Chandigarh, visited NRCE on April 12, 2013. He visited ATIC, BSL III laboratory, animal shed complex, VTCC and different labs at the centre.
- Prof Dr RNS Gowda, Ex. VC, KVAFSU, Bidar, Karnataka and Chairman QRT team NRCE visited NRCE on April 21, 2013. Prof Gowda visited ATIC, BSL III laboratory, animal shed complex, VTCC and different labs at the centre and interacted with scientist at NRCE.
- Dr Ram Lal Sandal, Asst Director, Animal Health/Breeding Spiti at Kaza, Dist. Lahul Spiti visited NRCE on April 21, 2013.
- Dr Deepak Choudhari, Project Coordinator (Utilization of Animal Energy), CIAE, Bhopal visited NRCE on September 3, 2013 to participate in meeting on AICRP on Utilization of Animal Energy at NRCE. During his visit he visited ATIC, BSL III laboratory, animal shed complex, VTCC and different labs at the centre.
- Sh. Arvind Kaushal, Secretary, ICAR & Addl. Secretary DARE visited NRCE on September 13, 2013. He visited ATIC, BSL III laboratory, animal shed complex, VTCC and different labs at the centre. Director NRCE briefed him about the various ongoing research and extension activities at NRCE. During the visit at NRCE Addl. Secretary DARE & Secretary, ICAR also addressed the staff of NRCE and CIRB. Plantation was also done in the NRCE campus on this occasion by Addl. Secretary DARE & Secretary, ICAR.



Sh. Arvind Kaushal, Secretary, ICAR & Addl. Secretary DARE at VTCC



Plantation by Sh. Arvind Kaushal, Secretary, ICAR & Addl. Secretary DARE

- Dr B. Meenakumari, DDG (Fisheries) visited NRCE on October 19, 2013. She visited ATIC, BSL III laboratory, animal

shed complex, VTCC and different labs at the centre.



Dr B. Meenakumari, DDG (Fisheries) at VTCC

- Prof Heinrich Neubauer and Dr Mandy Elschner OIE experts FLI Germany visited the NRCE, Hisar during December 10-15, 2013. During visit

they visited ATIC, BSL III laboratory, animal shed complex, VTCC and different labs at the centre.

At EPC, Bikaner

- Dr S.P.S. Ahlawat, Former Director, IVRI, Izatnagar along with his QRT team of NRCC Bikaner visited EPC Bikaner on January 31, 2013 and interacted with the

scientists of the Centre. They all appreciated the campus including the animal and agriculture farm.



Dr S.P.S. Ahlawat with his team at EPC Bikaner

- Dr S.M.K. Naqvi, Director, CSWRI Avikanagar visited EPC Bikaner on February 11, 2013 and interacted with

scientists and shown keen interest in the ongoing research and development activities of the sub campus Bikaner.



Dr S.M.K. Naqvi, Director, CSWRI Avikanagar at EPC Bikaner

- Hon'ble Dr. K. M. L. Pathak, DDG (AS) visited EPC, Bikaner on August 17, 2013. During visit he inaugurated Kisan Call Centre (Toll free helpline for equine owners No. 1800-180-6225) at EPC Bikaner.
- Dr. S. K. Garg, Former VC, DUVASU, Mathura visited EPC Bikaner on November 28, 2013. During his visit he interacted with scientists at EPC, Bikaner and visited different laboratories and animal shed complex.



Dr. S. K. Garg at EPC Bikaner

NRCE

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