वार्षिक प्रतिवेदन
ANNUAL REPORT
2023

भाकृअनुप-केंद्रीय गोवंश अनुसंधान संस्थान
ग्रास फार्म रोड, मेरठ छावनी 250 001 (उ.प्र.), भारत
ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE
Grass Farm Road, Meerut Cantt.- 250 001 (U.P.), India

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ICAR-Central Institute for Research on Cattle

Grass Farm Road, Meerut Cantt.- 250 001 (U.P.), India

Annual Report 2023

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CONTENTS

PREFACE

Cattle have been an integral part of Indian agriculture for centuries, playing a vital role in the socio-economic development of rural India. The ICAR-Central Institute for Research on Cattle (ICAR-CIRC), Meerut, is dedicated to basic and applied research, striving to enhance the productivity of cattle across India. The reported year was marked with significant milestones and achievements. The breed developed under the All India Coordinated Research Programme on Cattle (AICRP on Cattle), after a systematic cross-breeding programme for 37 years involving more than 20,000 animals maintained at 42 Military Dairy farms Frieswal®, with stabilized inheritance level of Holstein-Friesian (62.5%) and Sahiwal (37.5%) was officially recognized as 1st synthetic breed of cattle by ICAR-National Bureau of Animal Genetic Resources, India. This breed has an impressive yield range of 4000-7000 kg of milk in a mature lactation of 305 days with approximately: 4% milk fat and a maximum recorded peak yield of 45kg. Well acclimatized to all agro-climatic regions of the country, the breed has the potential to be established as a national milch breed of cattle.

The institute has so far produced 56.42 lakhs semen doses, including 49.00 lakhs from Frieswal® and 7.42 lakhs doses from Indigenous cattle breeds viz: Sahiwal, Gir, and Kankrej and using semen from these elite bulls, increase in milk yield by 39.27 % in crossbred cows, 24% in Sahiwal, 33 % in Gir and 44% in Kankrej have been achieved. The state-of-the-art semen freezing laboratory with the institute has an inventory of more than 23.4 lakh frozen semen doses, underscoring the commitment towards cattle development programs.

The institute added two patents and secured copyright for the for institute logo, further enriching the intellectual property portfolio. The successful birth of the first calf using OPU-IVF-ETT complements ongoing advances in assisted reproductive techniques at the institute.

After preliminary studies with available technology for sorted sex semen, the institute initiated a program for indigenous technology. It also joined hands with the Consortia Research Platform on Agrobiodiversity and is creating somatic cell banks for different indigenous breeds of cattle. Experimental trials were continued for the refinement and formulation of herbo-mineral supplements improving the productive and reproductive efficiency of cattle and unconventional feed sources for sustainability. Diverse usage of cow products urine and dung were also explored to ensure the profitability of cattle rearing.

The acquisition of 150 acres of land for establishment of new campus at Babugarh, Hapur is one of the most noteworthy accomplishments. The institute also organized "Pashu Pradarshani and Krishi Mela-2023" in collaboration with DAHD, GoI, held at Muzzafarnagar during 6-7 April 2023 which attracted over 30,000 visitors and featured animal show competitions. Under various schemes, including NEH, SCSP, and TSP, the institute conducted extensive programs and training initiatives across different regions that included programs in North-Eastren states, focusing on livestock development and value addition. Under the Farmer FIRST Programme, the institute played an instrumental role in the formation of four Self Help Groups (SHGs) and one Farmer Producer Organization (FPO).

This annual report encapsulates the significant achievements and activities of ICAR-CIRC in research and extension over the reported period and may serve as a valuable resource for stakeholders actively engaged in cattle research. The institute expresses heartfelt gratitude to the Secretary, DARE and Director General, ICAR, the Deputy Director General (Animal Science), and their team at the ICAR headquarters for their unwavering support and encouragement. The cooperation of the principal investigators of all cooperating centers of AICRP is deeply appreciated. The relentless efforts of the heads of divisions, scientists, administrative, finance, and technical staff of the institute in advancing cattle production are also acknowledged. Special thanks to the core committee for their dedicated work in compiling and preparing this annual report. With ongoing collaboration and innovation, we are committed to meeting the future demands of the country and ensuring sustainable growth in cattle productivity.

JAI HIND!

A K Mohanty
Director

ICAR-CIRC: AN INTRODUCTION

ICAR-Central Institute for Research on Cattle, a premier institute of Indian Council of Agricultural Research (ICAR) is an autonomous organization under Department of Agricultural Research and Education, Ministry of Agriculture and Farmers Welfare, Government of India. The institute formerly known as Project Directorate on Cattle (PDC) was established on 3rd November 1987 at Military Farms School and Research Centre, Meerut by upgrading the status of All-India Coordinated Research Project (AICRP) on Cattle. The Directorate was actively collaborating with the Military Farms, Ministry of Defence to evolve a national milch crossbred cattle "Frieswal" by crossing Holstein Friesian (5/8) with Sahiwal (3/8) cattle. Considering importance of the Indigenous cattle breeds for their adaptability, feed conversion efficiency, disease resistance etc. the Indigenous Breeds Project was started in collaboration with State Agricultural Universities and State Government, Non-Government Organizations and sister ICAR Institutes for conservation and genetic improvement of some of the important indigenous cattle breeds of our country viz., Gir, Sahiwal, Kankrej, Hariana and Ongole. During the 8th Five Year Plan, Field Progeny Testing (FPT) programme was also started to undertake progeny testing of crossbred bulls under field conditions. Considering its sincere research and extension efforts and achievements made in cattle improvement, the PDC was upgraded as Central Institute for Research on Cattle (CIRC) in 2014. Thereafter, CIRC is acting as a nodal institution to monitor, coordinate and support all research and development projects for cattle improvement. The Institute is also providing good quality male germplasm to stakeholders. So far institute has produced 56.42 lakhs of semen doses out of which 23.4 lakh doses of genetically superior bulls are available with institute for stalkholders. On an average, Institute adds 1.5 lakhs of semen doses from the bulls maintained at its farm. Besides these, semen productions also takes place at 3 germplasm units. Under AICRP, the increase to tune of 33, 44 and 24% in milk production have been achieved for Gir, Kankrej and Sahiwal cattle, respectively since inception of IBP programme, whereas, under FPT programme more than 50% increase in milk production has been achieved from Frieswal cattle. The institute is likely to include some more indigenous breeds viz Tharparkar and Rathi. The Institute also obtained ISO 9001:2015 certification and has well equipped semen freezing and molecular genetics laboratories besides feed testing facilities in animal nutrition laboratory. Besides institutional research programme on cattle genetics, nutrition, reproduction and management, sponsored research projects from DST, Government of India are also regularly handled by the institute scientists. Institute also have good linkage with other ICAR institutes and SAUs and executing collabrative research programme too.

VISION

The vision of ICAR-CIRC is "Improvement of cattle for high productivity and profitability."

MISSION

Germplasm improvement and technology development for realizing enhanced productivity and profitability.

MANDATE

- Basic and strategic research on productivity and production enhancement of cattle including indigenous cattle.
- Dissemination of scientific information and technology for cattle production management.

OBJECTIVES

1. To undertake research in the field of cattle breeding, feeding, management and reproduction to enhance productivity and profitability.
2. To plan, coordinate and monitor the research projects on cattle.
3. To serve as national data repository and provide consultancy for cattle production and reproduction.

AICRP on Cattle

The AICRP on Cattle was launched by the ICAR, Department of Agricultural Research & Education, Ministry of Agriculture, Government of India, in year 1968-69 at Indian Veterinary Research Institute, Izatnagar and Haryana Agriculture University, Hissar. The project was originally called AICRP for studying behavioural pattern of zebu cross bread cattle, but merged into AICRP on cattle in 1969. The project goal

was to develop new dairy breeds in tropical regions through cross breeding. In order to achieve the goal ICAR started the Frieswal project in collaboration with the Ministry of Defence to evolve a national milch breed "Frieswal" by crossing the Holstein Friesian and Sahiwal cattle and established Project Directorate on Cattle, at Meerut which was upgraded as Central Institute for Research on cattle in 2014. In the beginning, the programme was started as Frieswal project. Subsequently, keeping in view the importance of indigenous breeds, known for their adaptability and disease resistance qualities, Indigenous Breeds Project (IBP) was also started in collaboration with the State Veterinary/Agricultural Universities, State Government, Non-Government Organizations and Gaushalas. Similarly, FPT project was also initiated to bring out improvement in crossbred cattle at farmers` herd in collaboration with the SAUs, State Govt. and Non-Government organizations. The Project is currently operating at 17 centres covering 6 states and 6 agro-climatic zones of India.

Objectives of AICRP on Cattle

1 To develop a national milch breed of cattle 'Frieswal' using Holstein Friesian X Sahiwal base.

2 Conservation and genetic improvement of important indigenous cattle breeds.

3 Production of progeny tested crossbred bulls and genetic improvement of cattle under field conditions.

PRESENT THRUST AREAS

1 Genetic improvement of important indigenous breeds of cattle viz. Gir, Kankrej and Sahiwal, Tharparkar, Rathi, etc. using conventional and modern breeding techniques

2 Large scale production of quality cattle germplasm.

3 Development of optimum feeding schedules for Indigenous and crossbread catlle from diverse agroclimatic zones.

4 Development of management practices including designing of shelter to suit the local environment for enhancing cattle productivity.

5 Genomic selection of bulls and production of elite bulls avialbale for semen production

6 Faster multiplications of superior germplasm using advanced assisted reproductive technologies such as ovum pick up (OPU), invitro fertilization (IVF) and embryo transfer for elite bull production.

7 Comparative economics of productivity of Indian cattle breeds vis-à-vis crossbred cattle

FUTURE THRUST AREAS

1 Application of biotechnological tools viz: genome editing, transgenesis for biotic and abiotic stress management, disease control and productivity enhancement in cattle and creation of library for cell and gene clones of indigenous cattle.

2 Studies on draught animal power of important indigenous draught cattle breeds and biomechanical study for improved efficiency.

3 Sexing of male germplasm for production of calves of desired sex.

4 Validation of therapeutic importance of cow produces like milk, Panchgavaya, urine, dung etc.

INFRASTRUCTURE

Location

ICAR-Central Institute for Research on Cattle is located at Grass Farm Road, Meerut Cantt (UP). In proximity with national capital (70Km), it is well connected to major cities of India by air, rail and road. The nearby railway stations are Meerut Cantt (2.7 KM) and Meerut City Station (4.8 KM), while there are two bus depots *Sohrab Gate* and *Bhainsali* from where taxi, auto-rickshaws are readily available round the clock to reach the institute campus. https://maps.app.goo.gl/2tPfqMjY3RQXeg119

Germplasm Resources

The Institute has undertaken research programmes related to genetic improvement of indigenous and crossbred cattle by identifying germplasm (GP) and data recording (DR) units in various government and non-government organizations. Frieswal cattle resource is presently available at ICAR NDRI, Karnal with current inventory of 102 superior frieswal cows. The bull rearing unit is located at Meerut with 94 bulls belonging to elite class. Similarly, indigenous cattle genetic resources are available at GP and DR units of respective breeds. The germplasm unit of Sahiwal is located at NDRI, Karnal (Haryana) while that of Gir and Kankrej are located at Junagadh and Dantiwada (Gujarat) campuses of Kamdhenu University Gandhinagar, respectively.

Research Laboratories

The Institute has six well-equipped laboratories

to undertake basic and applied research works in the fields of animal genetics and breeding, animal nutrition, animal physiology, animal reproduction and molecular genetics. Semen Freezing Laboratory of the Institute has state of the art facilities for cryopreservation of bovine semen.

Semen Freezing Laboratory

Animal Physiology Laboratory

Semen Quality Control Laboratory

Molecular Biology Laboratory

Animal Nutrition Laboratory

CRP-Agrobiodiversity Laboratory

Male Germplasm Unit

The unit has a total of six animal sheds, four of which are for adult animals. The unit also includes a provision for one isolation shed. Additionally, there are two bull exercisers installed in the unit. The unit is equipped with a separate veterinary care center, a feed and fodder storage godown, and a chaffing section.

Sheds for adult bulls under collection

Computer Centre/ ARIS/IT Cell

The institute is having well equipted ARIS cell with 100 mbps internet connectivity from NKN, NIC, New Delhi. The Cell provides Internet connectivity through LAN along with Wi-Fi facility to all staff for smooth functioning of research works, FMS/ MIS, eoffice and other office works. The institute website developed by ARIS cell (https://circ.icar.gov.in) is being regularly updated to show case the information related to various activities conducted by the institute. This Cell helps in repairing and maintenance of Computers, Printers, Scanners and UPS etc. The Cell also looks after the central video conferencing facility and helps in conducting important meetings/ webinars through online mode. During the year new facilities like video conferencing, Central firewall, anti-virus and upgradation and renovation of server room were done.

Library

The library has a collection of 2,379 books

ICAR-CIRC Staff in institute library

covering diverse subjects. Readers have access to three Hindi newspapers namely Dainik Jagran, Amar Ujala and Danik Hindustan and one English daily namely Times of India along with 7 Hindi and 5 English literary magazines. Library facilities extend to sister organizations and students from Sardar Vallabh Bhai Patel University of Agriculture & Technology, Meerut. Additionally, CeRA online journals are also accessible.

Semen Distribution Centre

The semen distribution and sale counter operates at the main gate of the institute, where stakeholders, farmers, and paravets can purchase semen from Frieswal and indigenous cattle breeds including Sahiwal, Kankrej, and Gir. During 2023, the center sold 10,718 doses of Frieswal semen, along with 398, 2,168, and 1,187 doses of Kankrej, Gir, and Sahiwal semen respectively, generating revenue of Rs. 2,20,250. The SDC also serves as a single window system for selling other institute products such as milk from the experimental dairy farm, vermicompost, earthworms, and farmyard manure. The sale counter operates during office hours from 9:00 AM to 5:30 PM on any working day.

Frozen semen and other products sale counter

Experimental Dairy Farm

The Experimental Dairy Unit at ICAR-CIRC consisted of 20 Frieswal and 10 Sahiwal cows along with 2 Sahiwal heifers. Specific trials involving superovulation and embryo transfer technology (ETT) is being performed on this unit. Besides this, animals with the experimental unit are also used for research programme related to OPU-IVF.

Farm Section

The institute maintains a green fodder production farm spanning 10 acres, cultivating a variety of crops essential for livestock feed. These include Hybrid Napier, jai (oats), jowar (sorghum), bajra (pearl millet), and sarson (mustard). In the reported year, the section harvested 4680.8 quintals of fodder supporting the nutritional needs of the bulls and cows maintained in the Institute.

Fodder Farm

Amrit Vatika

Amrit Vatika was established at the institute under Meri maati Mera Desh initiative in Azadi ka Amrit Mahotsav programme on 10.8.2023. The plants having medicinal values like Arjun (*Terminalia arjuna*), Neem (*Azadirachta indica*), Peepal (*Ficus religiosa*), Shatawari (*Asparagus racemosus*), Patthar chatta (*Kalanchoe pinnata*), Chirchita (*Achyranthes aspera*), Aadu (*Prunus persica*), Turmeric (*Curcuma longa*), Sonth (*Zingiber officinale*), Aonla (*Phyllanthus emblica*), etc. were planted in this vatika.

Amrit Vatika

Vermicompost Unit

A large amount of dung biomass is produced every day at ICAR-CIRC from the animals at Male Germplasm Unit and Female Cattle herd. Processing of the dung biomass becomes essential otherwise, it may cause nuisance and pollution in the campus. On an average, about 1.5 quintal of dung biomass is produced every day. At vermi-compost unit, these biomass is being transformed to vermicompost utilizing vermiculture technique. The earthworm species *Perionyx ceylanesis* is being used. As it has the ability to adopt to a variable temperature (2-46°C) and yields higher number of hatchlings per cocoon. A greater number of cocoons per week and greater number of earthworm population in three months with a long-life span were observed. The institute presently has 7 vermibeds for production of vermi-compost.

In the year under report, the unit processed the available dung biomass to vermicompost and Farm yard manure (FYM). After utilization at institute level for mainitaining a geographical area of 30 acre, the unit sold out 303.10 qt of vermicompost, 2718 qt of farm yard manure and 27kg earth worms to farmers of nearby villages fetching a revenue of Rs 384658. Unit also prepared vermiwash and was utilized on institutional farm.

Vermicompost Unit of ICAR-CIRC

Guest House

Institute has guest house facility also. Type-IV quarters available with institute is currently being used as per council's directives. With total accommodation capacity of eight persons at a time, guest house also cater to officials and visitors coming to institute during office hours.

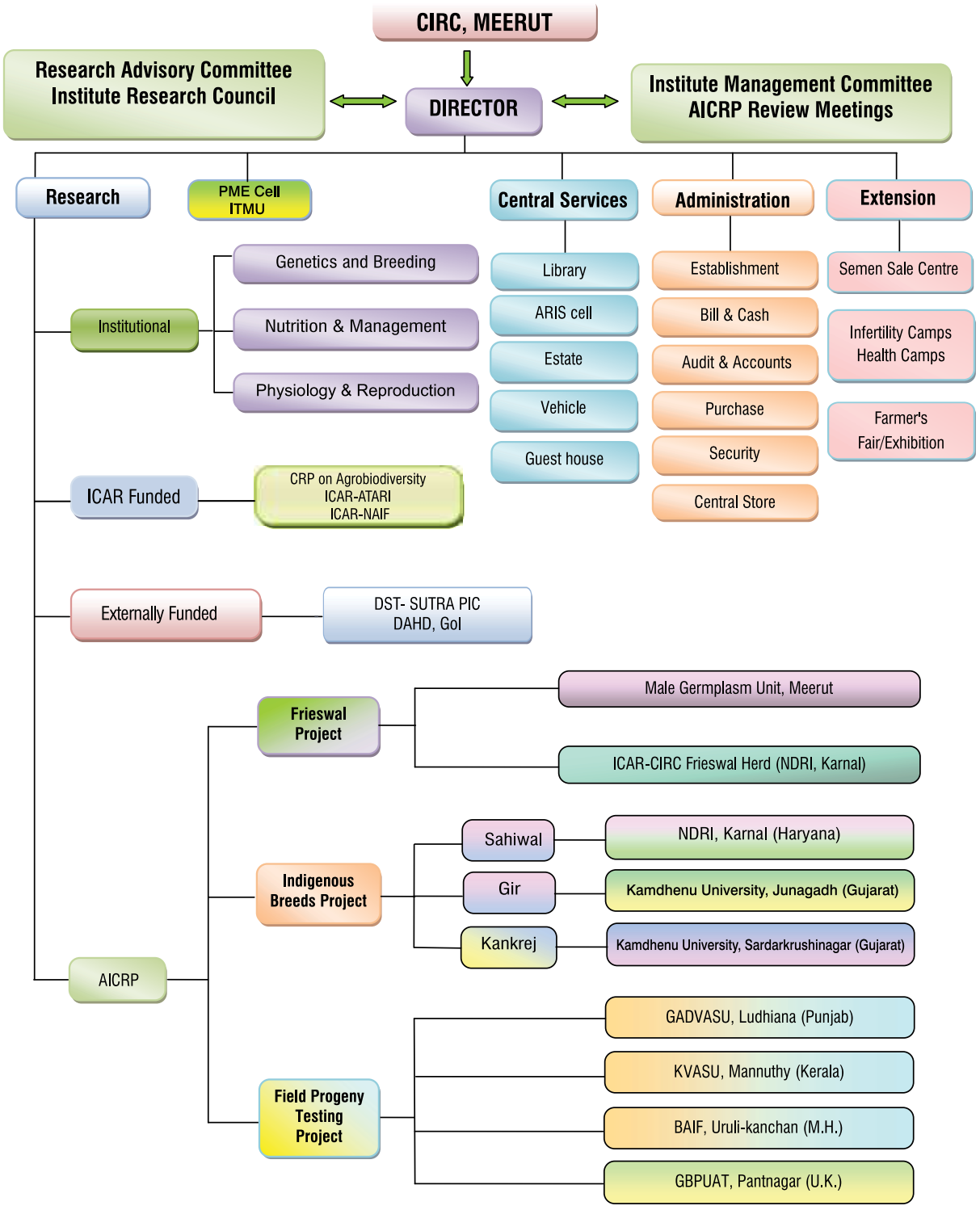
ICAR-CIRC Guest House

Residential Complex

Currently, institute has Type-V (01), Type IV (02), Type-III (04), Type-II (04) and Type-I (05) quarters. Type-IV quarters are being used as Guest House facility for the institute whereas one Type-I quarter is used as kisan hostel. Type-V quarter is being used as Director's residence.

ICAR-CIRC Residential Complex

ORGANOGRAM


CIRC, MEERUT
Research Advisory Committee
Institute Research Council
DIRECTOR
Institute Management Committee
AICRP Review Meetings
Research
PME Cell
ITMU
Central Services
Administration
Extension
Genetics and Breeding
Institutional
Nutrition & Management
Physiology & Reproduction
Library
ARIS cell
Estate
Vehicle
Guest house
Establishment
Bill & Cash
Audit & Accounts
Purchase
Security
Central Store
Semen Sale Centre
Infertility Camps
Health Camps
Farmer's
Fair/Exhibition
ICAR Funded
CRP on Agrobiodiversity
ICAR-ATARI
ICAR-NAIF
Externally Funded
DST- SUTRA PIC
DAHD, GoI
AICRP
Frieswal
Project
Male Germplasm Unit, Meerut
ICAR-CIRC Frieswal Herd (NDRI, Karnal)
Indigenous
Breeds Project
Sahiwal
NDRI, Karnal (Haryana)
Gir
Kamdhenu University, Junagadh (Gujarat)
Kankrej
Kamdhenu University, Sardarkrushinagar (Gujarat)
Field Progeny
Testing
Project
GADVASU, Ludhiana (Punjab)
KVASU, Mannuthy (Kerala)
BAIF, Uruli-kanchan (M.H.)
GBPUAT, Pantnagar (U.K.)

कार्यकारी सारांश

अखिल भारतीय समन्वित गोवंश परियोजना

संस्थान में अखिल भारतीय समन्वित गोवंश परियोजना (एआईसीआरपी ऑन कैटल) के अन्तर्गत अग्रलिखित तीन उप–परियोजनाओं पर कार्य निष्पादन किया गया।

(1) संतति परीक्षण के माध्यम से स्वदेशी गोवंशों का आनुवंशिक सुधार : स्वदेशी नस्ल परियोजना

(2) संकर नस्ल के गोवंश का क्षेत्रीय परिस्थितियों में आनुवंशिक सुधार–क्षेत्रीय संतति परीक्षण परियोजना

(3) गोवंश की 'फ्रीजवाल' संकर नस्ल का विकास (होलस्टीन X साहीवाल संकर का आनुवंशिकीय अध्ययन)–फ्रीजवाल परियोजना

संतति परीक्षण के माध्यम से स्वदेशी गोवंश की नस्लों का आनुवंशिक सुधारः स्वदेशी नस्ल परियोजना

- स्वदेशी नस्ल परियोजना (आईबीपी) में तीन नस्लें गिर, कांकरेज और साहीवाल शामिल हैं। जर्मप्लाज्म (जीपी) इकाई में रखे गए विशिष्ट गोवंश के चयन के माध्यम से और क्षेत्र में किसान समूहों सहित विभिन्न एजेंसियों द्वारा बनाए गए संबद्ध समूहों (एएच) में उपलब्ध उन्नत पशुओं के माध्यम से इन नस्ल के पशुओं की उत्पादकता में सुधार के लिए संचालित किया जा रहा है।
- गिर, कांकरेज और साहीवाल नस्लों की जीपी इकाइयाँ क्रमशः पशु प्रजनन फार्म, जूनागढ़, गुजरात, पशुधन अनुसंधान केंद्र, दांतीवाड़ा, गुजरात और राष्ट्रीय डेयरी अनुसंधान संस्थान, करनाल हरियाणा में स्थित हैं।

गिर नस्ल

- विगत वर्ष में, गुजरात के जूनागढ़ में स्थित पशु ब्रीडिंग फार्म में गिर पशुओं के जर्मप्लाज्म इकाई की पशु संख्या 188 थी, और डेटा रिकॉर्डिंग इकाई में 300 पशु थे, जिसमें कुल 109 प्रजनन योग्य मादाएं पंजीकृत थे।
- लगभग 40 सांडों से संग्रहित शुक्राणुओं को पांच सेटों में उपयोग किया गया।
- गिर पशुओं की जर्मप्लाज्म इकाई में 305 दिनों के औसत दूध उत्पादन, कुल उत्पादन, अधिकतम उत्पादन, और दुग्धकाल की अवधि की औसत क्रमशः 2,753.80 किलोग्राम, 3,753.20 किलोग्राम, 15.00 किलोग्राम, और 490.00 दिन थे। डेटा रिकॉर्डिंग इकाई में, ये मान क्रमशः 2,471.40 किलोग्राम, 3,714. 20 किलोग्राम, 12.90 किलोग्राम, और 531.70 दिन दर्ज किए गए।

कांकरेज नस्ल

- कांकरेज नस्ल सुधार हेतु जी पी ईकाई के अतिरिक्त नस्ल के मूल क्षेत्र के 64 गांवों के 5200 किसानों की 6500 कांकरेज गाये तथा 5 डीआर केंद्रों सहित क्षेत्र में कार्यरत 14 पशु कृत्रिम गर्भाधान फार्म ईकाइ कार्यक्रम के अंतर्गत सम्मिलित किये गये।
- वर्ष 2023 में कांकरेज सांडों से 12,050 वीर्य मात्रा प्राप्त हुआ जिनमे से 9130 का कृत्रिम गर्भाधान हेतु प्रयोग किया गया।
- कुल 1599 कृत्रिम गर्भाधान किये गये जिनसे 643 गर्भावस्था की पुष्टि की गई। परियोजना की शुरुआत से अब तक कुल 4579 बछियाओं का जन्म हुआ है।
- जनन द्रव्य इकाई में 305 दिनों का औसत दूध उत्पादन, कुल उत्पादन, अधिकतम उत्पादन, और दुग्धकाल की अवधि 2783.25 किलोग्राम, 3358.53 किलोग्राम, 12.60 किलोग्राम, और 433 दिन हैं जबकि डेटा रिकॉर्डिंग इकाई में, ये मान क्रमशः 1721.01 किलोग्राम, 1975.03 किलोग्राम, 9.4 किलोग्राम, और 342.70 दिन हैं।

साहीवाल नस्ल

- साहीवाल नस्ल की तीन डीआर इकाइयां i) क्षेत्रीय अनुसंधान और प्रशिक्षण केंद्र, कालझरानी, बठिंडा, GADVASU, लुधियाना, ii) GBPUAT, पंतनगर, उत्तराखंड और iii) पशुधन फार्म, LUVAS, हिसार में स्थित हैं।
- वर्ष के दौरान जर्मप्लाज्म यूनिट की कुल पशु संख्या 425 सहित सभी इकाइयों में कुल 688 प्रजनन योग्य गायें थीं और अब तक 45 साहीवाल सांडों को संतान परीक्षण के लिए शामिल किया गया था।
- इस वर्ष, 21920 हिमीकृत वीर्य खुराक का उत्पादन हुआ एवं 8937 का उपयोग कृत्रिम गर्भाधान हेतु किया गया। लगभग 825 कृत्रिम गर्भाधान किए गए, व 412 गायों में गर्भधारण की पुष्टि हुई। परियोजना की शुरुआत से अब तक कुल 1589 बछियां पैदा हो चुकी हैं।

- साहीवाल नस्ल की जर्मप्लाज्म इकाई में 305 दिनों में दूध की औसत उत्पादन 2167.44 किलोग्राम थी; कुल दुग्ध उत्पादन 2393.24 किलोग्राम थी; अधिकतम उत्पादन 10 किलोग्राम थी, और दुग्ध स्रवण काल की अवधि 267.36 दिन थी।
- डेटा रिकॉर्डिंग इकाइयों में, 305 दिनों में सबसे अधिक दूध उत्पादन औसत हिसार ईकाइ का (1953. 61 किलोग्राम) में था, जबकि सबसे कम लुधियाना (1447.41 किलोग्राम) ईकाइ में था। कुल दूध उत्पादन सर्वाधिक पंतनगर (2040.36 किग्रा) ईकाइ में था, और सबसे कम लुधियाना (1663.86 किग्रा) में था। लुधियाना में दुग्ध स्रवण काल की अवधि 342.92 दिन, हिसार में 271.30 दिन और पंतनगर में 290.14 दिन थी।

क्षेत्र परिस्थितियों में संकर गोवंश का आनुवंशिक सुधारः क्षेत्र संतति परीक्षण परियोजना

- क्षेत्र संतति परीक्षण परियोजना देश के विविध कृषि–जलवायु क्षेत्रों के चार इकाइयों में लागू किया गया है:

केरल पशु चिकित्सा और पशु विज्ञान विश्वविद्यालय त्रिशूर, केरल, (KVASU)

- अब तक कुल 363 सांडों को 18 अलग–अलग सेटों में सम्मिलित किया गया है और 1,50,243 कृ त्रिम गर्भाधान किए गए हैं, जिसमें 13,333 मादा संतानें पैदा हुईं, जिनमें से 3670 पहले ब्यांत को प्राप्त की।
- वर्ष 2023 के दौरान 4515 कृत्रिम गर्भाधान किए गए जिनसे समग्र गर्भधारण दर 46.90% हुई।
- रिपोर्टिंग अवधि में अपना पहला दुग्धकाल पूरा करने वाली बछड़ियों में प्रथम दुग्धकाल के 305 दिन का औसत दुग्ध उत्पादन 3,373.1 किलोग्राम था।
- बछड़ियों में प्रथम ब्यांत औसत आयु 1,018.2 दिन थी।
- बाद के सेटों में दूध का उत्पादन निरंतर बढ़ा, जो कि पहले सेट (1992) के 1,958.4 किलोग्राम से बढ़कर नवीनतम सेट में 3,278.24 किलोग्राम है। यह 1,319.84 किलोग्राम (67.4%) की उल्लेखनीय वृद्धि दर्शाता है।
- इसके अतिरिक्त, बाद के सांडों की संततियों में पहली बार ब्याने की उम्र कम हो गई, पहले सांड के सेट (1992) की संतान में 1,136.4 दिन से घटकर सबसे हाल के 16वें सेट में यह 930.8 दिन हो गई, जो 205. 6 दिनों (18.09%) की कमी को दर्शाता है।

गुरु अंगद देव पशु चिकित्सा एवं पशु विज्ञान विश्वविद्यालय, लुधियाना, पंजाब

- अब तक कुल 382 सांडों को 17 अलग–अलग सेटों में सम्मिलित किया गया है और 177,517 गर्भाधान किए गए हैं, जिनसे 26,126 मादा संतानें पैदा हुई, और 8,456 पहले ब्यांत के समय की उम्र तक पहुंच गई हैं।
- वर्ष के दौरान कुल 4,021 कृत्रिम गर्भाधान किए गए जिनसे 52.8% का समग्र गर्भधारण दर प्राप्त हुआ।
- रिपोर्टिंग अवधि में अपना पहला दुग्धकाल पूरा करने वाली बछड़ियों के प्रथम दुग्धकाल में 305 दिन का औसत दुग्ध उत्पादन 3,860.5 किलोग्राम था। बछड़ियों की प्रथम ब्यांत औसत आयु 1,021.1 दिन थी।
- सांडों के पहले 16 सेटों की लगभग 6,648 बछड़ियों ने अपने पहले दुग्धकाल के 305 दिन का दुग्ध उत्पादन पूरा कर लिया है।
- बछड़ियों के पहले दुग्धकाल में 305 दिनों के दुग्ध उत्पादन में सेटों की तुलना में वृद्धि देखी गई। सांडों के पहले सेट (1995) की संतति में यह 2697. 8 किलोग्राम था जो वर्तमान में रिकॉर्ड किए जा रहे सांडों के सेट के संततियों में दुग्ध का उत्पादन 1,382.4 किलोग्राम (51.24%) की वृद्धि के साथ बढ़कर 4,080.2 किलोग्राम हो गई है।
- प्रथम ब्यांत के समय की आयु में कमी देखी गई क्योंकि सांडों के पहले समूह (1995) की संतानों में यह 1192 दिन थी जो वर्तमान में रिकॉर्ड किए जा रहे सांडों के सेट के संततियों में 377.6 दिन (31.67%) की कमी के साथ घटकर 814.4 दिन हो गई है।

बैफ डेवलपमेंट रिसर्च फाउंडेशन, सेंट्रल रिसर्च में स्टेशन, उरुली-कंचन, पुणे

- अब तक कुल 359 सांडों को 16 अलग–अलग सेटों में सम्मिलित किया गया है और 1,50,830 कृत्रिम गर्भाधान किए गए हैं, जिससे 19,065 मादा संतानें पैदा हुईं। इनमें से 6387 पहले ब्यांत के समय को प्राप्त हो गईं।
- वर्ष 2023 के दौरान 5,819 कृत्रिम गर्भाधान किए गए जिनसे 45.08% की समग्र गर्भधारण दर प्राप्त की गई।
- रिपोर्टिंग अवधि में अपना पहला दुग्धकाल पूरा करने वाली बछड़ियों की प्रथम दुग्धकाल में 305 दिन का औसत दुग्ध उत्पादन 3,591.05 किलोग्राम था। बछड़ियों के प्रथम ब्यांत की औसत आयु 985.64 दिन दर्ज की गई।

- सभी सांडों के सेटों की संतानों में प्रति दुग्धकाल में उत्पादन में वृद्धि देखी गई, जो प्रारंभिक सेट (1995) से वर्तमान 15वें सेट तक 2,930.4 किलोग्राम से बढ़कर 3,514.82 किलोग्राम हो गई थी। यह 584.42 किलोग्राम (20.0%) की वृद्धि को दर्शाता है। पहले ब्यांत के समय की आयु में भी थोड़ी कमी देखी गई, पहले सेट (1995) में ब्यांत के समय की आयु 976.5 दिन से लेकर वर्तमान 15वें सेट में 972.9 दिन हो गई, जो बाद के सेट में 3.6 दिन (0.30%) की कमी का संकेत देती है।

जी बी पंत कृषि एवं प्रौद्योगिकी विश्वविद्यालय, पंतनगर, उत्तराखंड

- अब तक कुल 169 सांडों को 8 अलग–अलग सेटों में सम्मिलित किया गया है और कुल 54,025 कृत्रिम गर्भाधान किए गए हैं, जिनसे 10,447 मादा संतानें पैदा हुई, जिनमें से 2,179 पहली बार ब्याने की उम्र तक पहुंच चुकी हैं।
- वर्ष के दौरान, 5,220 कृत्रिम गर्भाधान किए गए और कुल गर्भधारण दर 53.58% थी। समीक्षाधीन अवधि में अपना प्रथम दुग्धकाल पूरा करने वाली बछड़ियों का औसत प्रथम दुग्धकाल के 305 दिन का दुग्ध उत्पादन 3,585.3 किलोग्राम था। बछड़ियों की प्रथम ब्यांत की औसत आयु 1,050.0 दिन थी।
- सांडों के बाद के सेटों के संतानों में, प्रति दुग्धकाल के 305 दिन का दुग्ध उत्पादन में एक बढ़ा हुआ रूझान देखा गया, जो पहले सेट (2010) में 2,494.8 किलोग्राम से बढ़कर वर्तमान 16वें सेट में 3,834.76 किलोग्राम हो गया, जो 1,339.96 किलोग्राम (53.71%) की महत्वपूर्ण वृद्धि दर्शाता है।
- संततियों में पहली बार ब्याने की उम्र में भी कमी देखी गई जो की पहले सेट (2010) में 1,149 दिन से लेकर वर्तमान 16वें सेट में 956.7 दिन हो गई, जो 192.3 दिन (16.73%) की कमी दर्शाता है।

फ्रीजियन X साहीवाल संकर (फ्रीजवाल) परियोजना के आनुवंशिक पहलू

- वर्ष 2023 में, करनाल में फ्रीजवाल समूह में 226 गोवंश थे। इस वर्ष, कुल 47 बच्चों का जन्म हुआ, जिनमें 24 मादा और 23 नर थे।
- युवा सांडों को विकसित करने के लिए एवं संभावित रूप से नर बछड़ों का चयन हेतु सभी गायों को रैंक वाले सांडों के वीर्य से गर्भाधान कराया गया।
- फ्रीजवाल समूह के लिए उत्पादन प्रदर्शन में औसत 300 दिन की दूध उत्पादन 2379.05 ± 170.41 किलोग्राम, अधिकतम उत्पादन 12.66 ± 4.05 किलोग्राम और दुग्धकाल की अवधि 336.21 ± 12.52 दिन दर्ज की गई।
- फ्रीजवाल गोवंश का औसत कुल दुग्ध उत्पादन 2131. 57± 113.31 किलोग्राम था।
- फ्रीजवाल गायों के लिए प्रजनन प्रदर्शन में 195.85± 8.42 दिनों की सेवा अवधि, 150.69± 17.55 दिनों की शुष्क अवधि, 470.70± 6.23 दिनों का ब्यांत अंतराल और पहले ब्यांत के समय औसत आयु 990.42 ± 38. 37 दिन दर्ज हुआ।
- गोवंश सुधार एवं क्षेत्र संतति परीक्षण परियोजना के लिए विभिन्न विकास एजेंसियों को बिक्री के लिए कुल 57,706 हिमीकृत वीर्य मात्रा उपलब्ध कराई गईं।

वीर्य उत्पादन

फ्रीजवाल सांडों का जनन द्रव्य उत्पादन एवं परीक्षण

- प्रतिवेदन अवधि में 69 फ्रीजवाल सांडों से 3475 वीर्य स्खलन एकत्रित किए गए। इन वीर्य स्खलनों की औसत वीर्य मात्रा (एमएल), शुक्राणु सांद्रता (मिलियन/एमएल), प्रारंभिक शुक्राणु प्रगतिशील गतिशीलता (%), और विगलन के पश्चात की गतिशीलता (%) क्रमशः 5.56±0.04, 1113.22±8.52, 57.89±0.24, और 41.73±0.18 थी।
- फ्रीजवाल सांडों (41) के वीर्य के नमूनों को सीएमयू दिशानिर्देशों के अनुसार हिमीकृत किया गया एवं विभिन्न परियोजनाओं/पशु विकास कार्यक्रमों में भविष्य के प्रजनन/उपयोग के लिए कुल 1,14,766 वीर्य स्ट्रॉ का उत्पादन हुआ।

साहिवाल सांडों का जनन द्रव्य उत्पादन एवं परीक्षण

- 2023 के दौरान 6 साहीवाल सांडों से कुल 231 स्खलन एकत्र किए गए। वीर्य की औसत मात्रा (एमएल), शुक्राणु सांद्रता (मिलियनध्एमएल), प्रारंभिक गतिशीलता (%), और विगलन के बाद की गतिशीलता (%) क्रमशः 4.40±0.93, 1233.57±28.29, 58.57±1.16, और 40.39±0.74 थी।
- चार साहीवाल सांडों से 11,175 हिमीकृत वीर्य स्ट्रा का उत्पादन किया गया।

फ्रीजवाल सांडों के वीर्य का गुणवत्ता परीक्षण

- फ्रीजवाल सांडों के 71 हिमीकृत वीर्य के नमूनों की जांच की गयी जिसमें 37°C तापमान पर 0, 60, एवं

120 मिनट के ऊष्मायन काल के बाद शुक्राणुओं की प्रगतिशील गतिशीलता क्रमशः 50.88±0.25, 32.86±0.47 एवं 21.93±0.39 प्रतिशत पायी गयी।

- प्लाज्मा झिल्ली एवं एक्रोजोम की अखंडता क्रमशः 46.71±0.45, 74.53±0.35 प्रतिशत थी।
- औसत शुक्राणु सांद्रता 21.85±0.11 मिलियन प्रति 0.25 मिली स्ट्रॉ पायी गयी।
- फ्रीजवाल सांडों के वीर्य में औसत जीवाणु संख्या 957.7±104.8 सी. एफ. यू. प्रति मिली था।
- वीर्य संग्रह में लाये गए 14 नए सांडों के वीर्य के नमूनों में जीवित शुक्राणु एवं सिर, मध्य भाग व पूंछ सम्बन्धी शुक्राणु असामान्यताएँ क्रमशः 64.45±2.51, 16.06±3.26, 6.55±1.12 एवं 2.8±0.35 प्रतिशत पाई गयी।
- छः समस्याग्रस्त सांडों के वीर्य के नमूनों में जीवित शुक्राणु का प्रतिशत 59.53±3.8 एवं सिर, मध्य भाग व पूंछ सम्बन्धी शुक्राणु असामान्यताएँ क्रमशः 15.81±5.1, 7.71±2.1 एवं 2.18±0.63 थीं।
- लेमिनार एयर फ्लो, पास बॉक्स, बफर, क्रत्रिम योनि, ग्लासवेयर, सीमन स्ट्रॉ एवं आसुत जल में जीवाणु नहीं पाये गये।

सहायक प्रजनन तकनीक एवं गोवंश के प्रजनन क्षमता में वृद्धि

- संस्थान की प्रायोगिक डेयरी इकाई में भ्रूण प्रत्यारोपण तकनीक द्वारा एक साहीवाल मादा बछड़े का जन्म हुआ और चार गायों में गर्भधारण की पुष्टि हुई।
- लिंग वर्गीकृत वीर्य का उपयोग करके, 29.50% (59/200) की गर्भाधान दर हासिल हुई जबकि पारंपरिक वीर्य के साथ यह 44.17% (106/240) दर्ज हुई।
- लिंग वर्गीकृत वीर्य का उपयोग करके उच्च गर्भधारण दर (37.66%, 29/77) तब देखी गई जब वीर्य को ऋतुकाल के शुरुआत के 34–42 घंटों के बाद डिपॉजिट किया गया।
- सांडों के वीर्य प्लाज्मा (SM) और शुक्राणु प्लाज्मा झिल्ली (SM) दोनों में अंतर्जात TIMP–2 के स्तरों को मापा गया। ताजे (फ्रेश) अवस्था में SP/SM TIMP–2 के स्तर ने शुक्राणु गतिशीलता के साथ सकारात्मक संबंध दिखाए हालांकि पोस्ट–थॉ स्टेज (विगलन के पश्चात) TIMP–2 स्तर शुक्राणु गतिशीलता के साथ सहसंबंधित नहीं पाए गए।
- pFSH (330 –µg) प्रेरित सुपरओवुलेशन के साथ अतिरिक्त 10 –µg GnRH देने से कांकरेज गायों (n=12) में सुपरओवुलेटरी प्रतिक्रिया और एम्ब्रियो रिकवरी (भ्रूण प्राप्ति) अधिक हुई।
- संस्थान ने उत्तराखंड पशुधन विकास बोर्ड (यूएलडीबी), कलसी, देहरादून की मदद से ओवम पिक–अप इन विट्रो फर्टिलाइजेशन–भ्रूण प्रत्यारोपण (ओपीयू–आईवीएफ–ईटी) को क्रियान्वित किया, जिससे एक स्वस्थ फ्रीजवाल बछिया पैदा हुई।

पोषण और प्रबंधन दृष्टिकोण के माध्यम से गोवंश की उत्पादकता में सुधार

- कैलिफोर्निया थनैला परीक्षण द्वारा जांच करने पर 49.5% गायें सब–क्लीनिकल थनैला से ग्रसित पायी गईं। सब–क्लीनिकल थनैला का आपतन मध्य से अंतः दुग्धकाल, अधिक दुधारू एवं उच्च ब्यांत की गायों में तथा अयन के दाहिने पिछले भाग में अधिक पाया गया।
- दैहिक कोशिकाएं, विद्युत चालकता एवं नमक की मात्रा थनैला ग्रसित थनों के दूध में अधिक पायी गयी जबकि प्रोटीन, लेक्टोज एवं एसएनएफ की मात्रा स्वस्थ थनों के दूध में अधिक थी।
- इन्फ्रारेड थर्मोग्राफिक कैमरा द्वारा गायों के अयन की तापीय छवि का आकलन करने पर थनैला ग्रसित अयन का तापमान स्वस्थ अयन की तुलना में अधिक पाया गया।
- ब्यांत अवस्था परिवर्तनकालिक गायें ऑक्सीडेटिव और प्रतिरक्षात्मक तनाव की स्थिति में पाई गईं, जिसमें एंटीऑक्सीडेंट एंजाइम (सीएटी और जीएसएच) की गतिविधि में उल्लेखनीय कमी और ब्याने के दिन एमडीए (वसा पेरोक्सीडेशन) के स्तर में वृद्धि दर्ज की गई, जो ब्याने के 21 दिनों के बाद भी ठीक नहीं हो पाई।
- ब्याने से 21 दिन पहले और ब्याने के दिन विटामिन–ई और सेलेनियम की खुराक अवस्थापरिवर्तनकालिक अवधि के दौरान गायों में चयापचय तनाव को कम करने में मददगार साबित हुआ। उपचार समूह में टीएनएफ–अल्फा और आईएफएन–गामा के स्तर में वृद्धि हुई एवं आईएल–10 के स्तर में कमी देखी गई।

पशुपालन का अर्थशास्त्र

- मुरादाबाद जिले के वाणिज्यिक डेयरी फार्मों में स्वदेशी बनाम संकर गोवंशों के तुलनात्मक प्रदर्शन पर अध्ययन से पता चला कि पशुपालकों की औसत भूमि का आकार, स्वदेशी गायों का औसत समूह आकार, संकर गायों का औसत समूह आकार, इन

फार्मों पर देशी गोवंश की औसत मानक पशु इकाइयां और संकर गोवंश की औसत मानक पशु इकाइयाँ क्रमशः 3.5 हेक्टेयर, 9.73, 18.87, 2.20 और 4.40 पशु थीं। इन डेयरी फार्मों पर निवेश 6.60–19.28 लाख के बीच था, जिसमें हरे चारे पर अधिकतम व्यय (27.70 प्रतिशत) था। देशी गोवंश के लिए दुग्ध उत्पादन की कुल लागत 45.82 रुपये प्रति लीटर थी और प्रति लीटर औसत बिक्री मूल्य 45.00 रुपये थी, जबकि संकर गाय के लिए उत्पादन की लागत 36.75 रुपये प्रति लीटर और प्रति लीटर बिक्री मूल्य 40.00 रुपये था।

- गोबर अपशिष्ट से बने बायोमास ब्रिकेट्स का प्रभावकारिता की अध्ययन कर यह पाया गया कि 10% गन्ने की खोई शामिल करने से ब्रिकेट्स की भौतिक–रासायनिक विशेषताएँ और दहन गुणस्तर में सुधार होता है।
- गाजर के पत्ते (CT) को मक्का आटा (MF) और दही (MC) का उपयोग करके साइलेज तैयार किया गया। इस साइलेज के शुष्क मात्रा (DM), NDF और OM में कमी आई, लेकिन CF और ADF में वृद्धि हुई, MF+MC उपचारित साइलेज में ADF सबसे अधिक था। MF और MF+MC उपचारित साइलेज में निम्न pH, अमोनिया नाइट्रोजन, और अधिक टोटल वोलेटाइल फैटी एसिड्स के साथ अच्छे साइलेज गुणवत्ता का संकेत मिला।
- पश्चिमी उत्तर प्रदेश के विभिन्न गावों में उगाई गई गन्ने की पत्ती से प्राप्त अवशेष, गन्ना कचरा (SCT) को विश्लेषित किया गया। इससे यह पता चला कि यह पशुओं के लिए एक वैकल्पिक सूखे चारे के रूप में काम में आ सकता है। हालाँकि इसमें नाइट्रोजन और घुलनशील कार्बोहाइड्रेट कम पाये गए परंतु इसका रासायनिक उपचार कर साइलेज बना कर इसके आहार मूल्य को बढ़ाया जा सकता है।

भाकृअनुप -वित्तपोषित योजनाएँ

किसान प्रथम कार्यक्रम

उपयुक्त तकनीको का उपयोग करके टिकाऊ डेयरी फार्मिंग के माध्यम से आजीविका में सुधार

- परियोजना के अंतर्गत 20 पशु स्वास्थ्य शिविरों का आयोजन हुआ एवं गावों में 48 बाह्य परिसर कार्यक्रम हुए। 960 पशुओं की पशु चिकित्सा देखभाल और स्वास्थ्य मूल्यांकन प्रदान किया गया, जिससे 746 किसानों के साथ–साथ 350 किसान परिवारों को लाभ हुआ।
- एफएफपी द्वितीय चरण– "स्थायी आजीविका के लिए डेयरी फार्मिंग हेतु प्रभावी रणनीति और हस्तक्षेप," की शुरुआत हुई जिसके तहत 6 नए गांवों क्रमशः कुशावली, दौलतपुर, अटेरना, कन्हैया, अटूटा और कुलंजन को गोद लिया गया।
- उष्णकटिबंधीय स्थितियों में संकर नस्ल की दूध देने वाली गायों के प्रजनन प्रदर्शन को बढ़ाने हेतु ऑगमेंटेड–ओवसिंक प्रोटोकॉल तकनीक का उपयोग किया गया एवं प्रभावी पाया गया।
- इस परियोजना के अंतर्गत कुल 4 महिला स्वयं सहायता समूह (एसएचजी), एवं 1 किसान उत्पादक संगठन (एफपीओ) की स्थापना की गई।

कृषि जैव-विविधता पर भागीदारी शोध परियोजना

- विभिन्न प्रजातियों की गायों की सोमाटिक कोशिकाओं के क्रायोबैंकिंग को संवर्धित करने हेतु संस्थान में एक नई परियोजना की शुरुआत हुई। इस परियोजना के अंतर्गत एक नई सेल कल्चर लैब स्थापित हुई एवं फाइब्रोब्लास्ट सेल कल्चर के लिए प्रोटोकॉल को मानकीकृत किया गया।

केंद्र सरकार का विशेष सहायता कार्यक्रम

अनुसूचित जाति उपयोजना (एससीएसपी)

- गरीबी रेखा से नीचे रहने वाले एससी परिवारों के आर्थिक विकास को बढ़ावा देने के लिए अनुसूचित जाति उपयोजना (एससीएसपी) के लिए 36 लाख रुपये का बजट निर्धारित किया गया। इस परियोजना के अंतर्गत कुल 17 प्रशिक्षण कार्यक्रम एवं इनपुट वितरण कार्यक्रम आयोजित किए गए, जिससे 2000 से अधिक कृषक परिवारों को लाभ मिला। पशु पोषण, स्वास्थ्य और प्रबंधन के क्षेत्र में जागरुकता एवम प्रशिक्षण के साथ–साथ एससी समुदाय के किसानों को कृषि उपकरण और पूरक आहार का वितरण भी किया गया।

जनजातीय उपयोजना (टीएसपी)

- जनजातीय उपयोजना (टीएसपी) के तहत जनजातीय आबादी के सामाजिक–आर्थिक विकास में तेजी लाने के उद्देश्य से 1 लाख रुपये आवंटित किए गए। भाकृअनुप – भारतीय मृदा एवं जल संरक्षण संस्थान, देहरादून के सहयोग से संस्थान ने उत्तराखंड के जनजातीय क्षेत्र में दो प्रशिक्षण सह इनपुट वितरण कार्यक्रम आयोजित किए, जिससे 200 से अधिक कृषक परिवारों को लाभ मिला।

उत्तर पूर्वी पहाड़ी क्षेत्र (एनईएचआर)

- संस्थान ने उत्तर पूर्वी पहाड़ी क्षेत्र की एजेंसियों के साथ मिलकर तीन प्रशिक्षण कार्यक्रम आयोजित किए गये, जिनमें पशुधन उत्पादन पर ध्यान केंद्रित किया गया और किसानों को इनपुट प्रदान किए गए। कार्यक्रमों में मणिपुर में प्रशिक्षण, नागालैंड में किसान उत्पादक संगठन जागरूकता कार्यक्रम और अरुणाचल प्रदेश में पशुधन आहार जैसे विषयों से संबन्धित कार्यक्रम आयोजित हुए, जिससे एनईएचआर के किसानों को लाभ हुआ।

बाह्य वित्तपोषित योजनाएँ

(I) DST प्रायोजित परियोजना

गोमूत्र (देशी गाय का मूत्र) से उपचारित धान के भूसे का पूर्ण चारा ब्लॉक के रूप में उपयोग

- देशी और संकर गायों के ताजा मूत्र के नमूनों का जैव रासायनिक गुणों के लिए विश्लेषण किया गया। यूरिया और यूरिक एसिड सांद्रता में नस्लों के बीच कोई महत्वपूर्ण अंतर नहीं दिखा, जबकि दुधारू देशी गायों में सूखी गायों की तुलना में कम क्रिएटिनिन स्तर ($p<0.05$) दिखा।
- धान के भूसे के विभिन्न समूहों को ताजा देशी गाय के मूत्र और वाणिज्यिक यूरिया के साथ उपचारित किया गया। उपचारित धान के भूसे के चारा ब्लॉक को सांद्र मिश्रण के समावेश के साथ तैयार किया गया। चारा ब्लॉकों का मानकीकरण प्रक्रियाधीन है।

(II) डीएएचडी प्रायोजित परियोजना

राष्ट्रीय गोकुल मिशन के तहत वीर्य केन्द्र का सुदृढ़ीकरण

- संस्थान के सीमन स्टेशन (वीर्य केन्द्र) की वर्तमान प्रयोगशाला अवसंरचना को बढ़ाने हेतु राष्ट्रीय गोकुल मिशन के अंतर्गत 57.86 लाख रुपये के उपकरण खरीदे गए, जिनमें प्लाज्मा स्टेरिलाइजर, बायो–सेफ्टी कैबिनेट, बीओडी इनक्यूबेटर, रेफ्रिजरेटेड और बेंच टॉप सेंट्रीफ्यूज, सेमी–ऑटोमैटिक बायोकेमिस्ट्री और मूत्र विश्लेषक इत्यादि शामिल हैं।

विस्तार गतिविधियाँ

- संस्थान द्वारा 6–7 अप्रैल 2023 को मुजफ्फरनगर में DAHD, भारत सरकार के सहयोग से पशु प्रदर्शनी और कृषि मेला–2023 का आयोजन हुआ। इस कार्यक्रम में 30,000 से अधिक आगंतुक आए और 32 श्रेणियों में पशु प्रदर्शनी प्रतियोगिताएँ आयोजित की गईं।
- संस्थान द्वारा 12 किसान मेलों में भाग लिया और FFP, SCSP, TSP और NEH कार्यक्रम के तहत प्रशिक्षण/इनपुट वितरण कार्यक्रम आयोजित किये गये।

अन्य

- प्रतिवेदन अवधि के दौरान संस्थान को एक पेटेंट मिला तथा संस्थान के लोगो (Logo) का सर्वाधिकार (कॉपीराइट) सुरक्षित कराया गया।
- विभिन्न संस्थानों के साथ तीन समझौता ज्ञापन (MoU) स्वीकार किए गये।

EXECUTIVE SUMMARY

All India Coordinated Research Project on Cattle

Genetic Improvement of Indigenous Cattle Breeds through Progeny Testing - Indigenous Breeds Project:

Improvement was achieved by selecting elite animals from the Gir, Kankrej, and Sahiwal breeds. These selections occurred at germplasm units and associated herds.

The germplasm units are located at Cattle Breeding Farm in Junagarh, Gujarat; Livestock Research Station in Dantiwada, Gujarat and National Dairy Research Institute (NDRI) in Karnal, Haryana. The associated herds are maintained by various agencies, including farmer herds in field areas.

Gir breed:

- The herd strength of the germplasm unit of Gir cattle located at Cattle Breeding Farm, Junagadh, Gujarat, was 188 animals, and the data recording unit had 300 animals, with a total of 109 breedable females identified and registered.
- A total of 40 bulls in five sets were used for semen collection, resulting in 19,895 semen doses production, of which 7,815 were used for insemination and 255,465 doses are available for future use.
- Thirty two inseminations were performed resulting in 10 confirmed pregnancies. Since project's inception, a total of 201 daughters had been born.
- The average milk yield over 305 days, total yield, peak yield, and lactation length at germplasm unit were 2,753.80 kg, 3,753.20 kg, 15.00 kg, and 490.00 days, respectively. In the data recording unit, these values were 2,471.40 kg, 3,714.20 kg, 12.90 kg, and 531.70 days, respectively.

Kankrej breed:

- The germplasm unit of Kankrej is located at the Livestock Research Station, Dantiwada, Kamdhenu University, Gandhinagar, Gujarat, with five data recording units and 14 AI centers covering 6500 Kankrej cows from 5200 farmers in 64 villages.
- The herd strength of the germplasm unit was 61 animals, with 43 Kankrej bulls being inducted in five sets.
- A total of 12050 semen doses were produced, 9130 utilized, and 131456 are available for future breeding. There were 1599 inseminations performed, resulting in 643 confirmed pregnancies. A total of 4579 daughters have been produced since the project's inception.
- The germplasm unit's average milk yield over 305 days, total yield, peak yield, and lactation length were 2783.25 kg, 3358.53 kg, 12.60 kg, and 433 days, respectively. In the data recording unit, these values were 1721.01 kg, 1975.03 kg, 9.4 kg, and 342.70 days, respectively.

Sahiwal breed:

- The Sahiwal cattle germplasm unit was situated at the NDRI, Karnal, and data recording units were established at Regional Research and Training Centre, Kaljharani, Bathinda; GADVASU, Ludhiana; G.B. Pant University of Agricultural and Technology, Pantnagar, Uttarakhand; and Livestock Farm, LUVAS, Hisar.
- The overall herd strength of the germplasm unit was 425, with a total of 688 breedable females in all units and 45 Sahiwal bulls inducted for progeny testing.
- During the reported period 21920 semen doses were produced and 8937 were utilized and a total of 151371 doses are available for future breeding. About 825 inseminations were performed, resulting in 412 confirmed pregnancies. A total of 1589 daughters have been produced since the project's inception.
- The milk yield average in the germplasm unit of the Sahiwal breed over 305 days was 2167.44 kg; total yield was 2393.24 kg; peak yield was 10 kg, and lactation length was 267.36 days.
- In the data recording units, the highest milk yield average over 305 days was at Hisar

(1953.61 kg), and the lowest was at Ludhiana (1447.41 kg). The highest total milk yield was at Pantnagar (2040.36 kg), and the lowest was at Ludhiana (1663.86 kg). The lactation length was 342.92 days at Ludhiana, 271.30 days at Hisar, and 290.14 days at Pantnagar.

Genetic improvement of crossbred cattle under field conditions- Field Progeny Testing Project

The Field Progeny Testing program was implemented in four units across diverse agro-climatic regions of the country: GADVASU in Ludhiana, Punjab; KVASU in Thrissur, Kerala; BAIF in Pune, Maharashtra; and GBPUAT in Pantnagar, Uttarakhand.

Kerala Veterinary and Animal Sciences University Thrissur, Kerala, (KVASU)

- About 363 bulls introduced in 18 sets resulted in 150,243 inseminations, yielding 13,333 daughters, with 3,670 reaching first calving age.
- A total of 4,515 artificial inseminations were conducted with a 46.90% conception rate. Daughters achieved an average milk yield of 3,373.1 kg in their first 305-day lactation, with an average age at first calving of 1,018.2 days. Among the first 16 bull sets, 2,919 daughters completed their first lactation with a 305-day yield.
- Milk yield per lactation consistently increased across subsequent sets, from 1,958.4 kg in the first set (1992) to 3,278.24 kg in the latest set, marking a significant increase of 1,319.84 kg (67.4%). Additionally, the age at first calving decreased across subsequent bull sets, from 1,136.4 days in the progeny of the first bull set (1992) to 930.8 days in the most recent 16th bull set, indicating a reduction of 205.6 days (18.09%).

Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana, Punjab. (GADVASU)

- Across the 17 sets, about 382 bulls were introduced, resulting in 177,517 inseminations with 26,126 daughters born, of which 8,456 daughters reached the age of first calving.
- A total of 4,021 artificial inseminations were conducted with a 52.8% conception rate. Approximately 6,648 daughters from the first 16 sets completed their first lactation with a 305-day yield.
- The average milk yield in their first 305-day lactation and the age at first calving of daughters were recorded as 3,860.5 kg and 1,021.1 days, respectively.
- A consistent increased pattern of milk yield per lactation was observed across bull sets, with a rise from 2,697.8 kg in the initial set (1995) to 4,080.2 kg in the 16th set (2023), marking a notable increase of 1,382.4 kg (51.24%). In contrast, a decreased pattern of age at first calving was seen from the initial set of 1,192 days (1995) to the 16th set of 814.4 days, indicating a significant decrease of 377.6 days (31.67%).

BAIF Development Research Foundation, Central Research Station, Uruli-Kanchan, Pune.

- About 150,830 inseminations were carried out using 359 bulls among the 16 sets, resulting in 19,065 female progenies born, among which 6,387 attained the age of first calving.
- In the current year, an overall conception rate of 45.08% was observed, with 5,819 artificial inseminations performed. About 4,693 daughters from the first 15 sets of bulls completed their first lactation with a 305-day yield.
- The performance of daughters in terms of their average milk yield over a 305-day lactation and age at first calving was found to be 3,591.05 kg and 985.64 days, respectively.
- An upward trend in milk yield per lactation was shown across the bull sets, increasing from 2,930.4 kg to 3,514.82 kg from the initial set (1995) to the current 15th set, marking a significant increase of 584.42 kg (20.0%). A slightly decreased trend in the age at first calving was also observed, from 976.5 days in the progeny of the first set (1995) to 972.9 days in the current 15th set, indicating a decrease of 3.6 days (0.30%) across subsequent sets of bulls.

GB Pant University of Agriculture & Technology, Pantnagar, Uttarakhand (GBPUA&T)

- Across the 8 sets, approximately 54,025 inseminations were conducted using 169 bulls, resulting in 10,447 female progenies, of which 2,179 reached the age of first calving.
- In the current year, about 5,220 artificial inseminations were performed with a 53.58% conception rate, resulting in 1,828 daughters born from the first 7 sets of bulls completing their first lactation with a 305-day yield.

- The daughters achieved an average milk yield of 3,585.3 kg in their first 305-day lactation, with an average age at first calving recorded at 1,050.0 days.
- Across subsequent sets of bulls, an increased pattern of milk yield per lactation was observed from 2,494.8 kg in the first set (2010) to 3,834.76 kg in the current 16th set, marking a significant increase of 1,339.96 kg (53.71%). There was also a decreased pattern in the age at first calving, from 1,149 days in the first set (2010) to 956.7 days in the current 16th set, indicating a decrease of 192.3 days (16.73%).

Genetic evaluation of Friesian X Sahiwal crossbred (Frieswal™) Project Frieswal herd at Karnal

- In the current year, the Frieswal herd at Karnal consisted of 226 cattle. A total of 47 calves were born, including 24 females and 23 males. All cows and heifers were inseminated with semen from ranked bulls to potentially select male calves for young bull selection.
- Production performance metrics for the Frieswal herd included an average 300-day milk yield of 2379.05 ± 170.41 kg, peak yield of 12.66 ± 4.05 kg, and lactation length of 336.21 ± 12.52 days. The average total lactation milk yield was 2131.57 ± 113.31 kg.
- Reproductive performance metrics for Frieswal cows included a service period of 195.85 ± 8.42 days, a dry period of 150.69 ± 17.55 days, calving interval of 470.70 ± 6.23 days, and an average age at first calving of 990.42 ± 38.37 days.

Semen Production and Distribution

Germplasm production and performance of Frieswal bulls:

- During 2023, 3475 ejaculates were collected from 69 Frieswal bulls. The overall average semen volume (ml), sperm concentration (million/ml), initial progressive motility (%), and post-thaw motility (%) were 5.56±0.04, 1113.22±8.52, 57.89±0.24, and 41.73±0.18, respectively, in these semen ejaculates.
- Semen samples from 41 Frieswal bulls were frozen as per the CMU guidelines, and a total of 1,14,766 semen doses were produced for future breeding/use in different projects/ cattle developmental programs.
- A total of 57,706 frozen semen doses were made available for the Field Progeny Testing Project and for sale to various developmental agencies for cattle improvement.

Germplasm production and performance of Sahiwal bulls:

- A total of 231 ejaculates were collected from 6 Sahiwal bulls during 2023. The overall average semen volume (ml), sperm concentration (million/ml), initial motility (%), and post-thaw motility (%) were 4.40±0.93, 1233.57±28.29, 58.57±1.16, and 40.39±0.74, respectively.
- A total of 11,175 frozen semen doses were produced from 4 Sahiwal bulls.

Quality assessment of Frieswal bull semen

- Frozen semen samples from 71 breeding bulls were evaluated for various semen quality parameters, including post-thaw motility at 0, 60, and 120 minutes of incubation (50.88%, 32.86%, and 21.93%, respectively).
- The plasma membrane integrity, assessed using the hypoosmotic swelling test (HOST), was found to be 46.71%, while acrosome integrity was 74.53%.
- The average sperm concentration per 0.25 ml straw was 21.85 million, with a mean bacterial load of 957.7 CFU per ml in the frozen semen samples.
- Neat semen from 14 newly introduced bulls were analyzed for viability and morphology, revealing average viability of 64.45%, and abnormalities in sperm head (16.06%), mid piece (6.55%), tail (2.8%). The acrosomal integrity was 71.05%.
- Additionally, neat semen from 6 problematic bulls, frequently rejected due to poor motility, showed an average live sperm percentage of 59.53%, with abnormalities in sperm head (15.81%), mid piece (7.71%), and tail (2.18%).

Augmentation of Reproductive Efficiency

- One Sahiwal female calf was born and four pregnancies were confirmed by ETT at ICAR-CIRC, Meerut.
- Using sex-sorted semen, an overall conception rate of 29.50% (59/200) was achieved, compared to 44.17% (106/240) with conventional semen.
- Higher conception rates were observed when

semen was deposited at 34-42 hours after the onset of oestrus (37.66%, 29/77), followed by insemination at 25-33 hours after the onset of oestrus (28.88%, 26/90).

- Endogenous TIMP-2 levels were quantified in both seminal plasma (SP) and sperm plasma membrane (SM) of bulls. The SP/SM TIMP-2 levels showed a positive correlation with spermatozoa motility at fresh stage. However, TIMP-2 levels did not correlate with sperm motility in bulls at post-thaw stage.
- Superovulatory response and embryo recovery in Kankrej cattle (n=12) were non-significantly higher in the group that received an additional 10 µg of GnRH alongside pFSH-induced (330 µg) superovulation.
- The ICAR-CIRC with help of Uttarakhand Livestock Development Board (ULDB), Kalsi, Dehradun, implemented Ovum Pick-Up In Vitro Fertilization-Embryo Transfer (OPU-IVF-ET) producing a healthy Frieswal female calf.

Improvement of Cattle productivity through Nutrition and Management Approaches

- Out of 95 animals examined, 47 cows were detected with subclinical mastitis in one or more teats. A higher prevalence of subclinical mastitis was observed in mid to late lactation, high parity animals, and high-yielding animals. Infrared thermography of the udder revealed higher udder surface temperatures in the mastitis quarters compared to healthy quarters.
- Transitional cows were found to be in a state of oxidative and immunological stress with a significant decrease in the activity of antioxidant enzymes (CAT and GSH) and an increase in the level of MDA (lipid peroxidation) on the day of calving, unable to recoup even after 21 days post-calving.
- Administration of Vitamin E and Se, 21 days pre-calving and on the day of calving helps ameliorate metabolic stress in cows during the transition period. This was depicted by a significant increase in the activity of CAT and GSH and a decrease in the level of MDA in the treatment group (treated with Vitamin E and Se) on the day of calving and 21 days post-calving. A significant increase in the levels of TNF-alpha and IFN-gamma, along with a decrease in the level of IL-10, was also noticed in the treatment group on the day of calving and 21 days post-calving.

Economics of cattle husbandry

- Study on the comparative performance of Indigenous vis-a-vis crossbred cattle at five commercial dairy farms in Moradabad district revealed that the average land holding size of livestock farmers, average herd size of indigenous cows, average herd size of crossbred cows, average standard animal units of indigenous cattle and average standard animal units of crossbred cattle on these farms were 3.5 hectares, 9.73, 18.87, 2.20 and 4.40 animals, respectively. Investment on these dairy farms ranged between 6.60 and 19.28 lakhs with maximum expenditure on green fodder (27.70%). Overall cost of production of milk for indigenous cattle was Rs. 45.82/ litre and the average sale price per litre was Rs 45.00 while for crossbred cow the cost of production was Rs. 36.75 per litre and the sale price per litre was Rs. 40.00.
- The efficacy of biomass briquettes from dung waste as a solid energy source was studied and it was found that incorporating 10% sugarcane bagasse improved the physico-chemical characteristics and combustion properties of briquettes.
- Carrot tops (CT) were ensiled using maize flour (MF) and curd (MC) as additives, resulting in reduced DM, NDF, and OM, but increased CF and ADF, with the highest ADF in the MF+MC treatment. Improved silage quality was indicated by lower pH, ammonia nitrogen, and higher total volatile fatty acids in the MF and MF+MC treatments.
- Sugarcane trash (SCT), a residue from sugarcane crops in western Uttar Pradesh was analyzed from various villages, showing it can serve as an alternative dry fodder for ruminants. Although low in nitrogen and soluble carbohydrates, its feeding value can be enhanced through ensiling, chemical treatments or proper supplementation.

ICAR-Funded Schemes

CRP on Agrobiodiversity-Cattle Unit

- A project was initiated aiming cryobanking of somatic cells of Indigenous cattle breeds. A new cell culture lab with advanced equipment has been established using Frieswal Cattle

tissues and protocols for fibroblast cell culture was standardized.

Farmer FIRST Programme (FFP)

Livelihood improvement through sustainable dairy farming using suitable interventions

- The FFP organized 20 Animal Health Camps and conducted 48 outreach visits, providing veterinary care and health assessments to 960 animals benefiting 746 farmers along with 350 farm families.
- Initiation of FFP Phase II, "Dairy Farming for Sustainable Livelihoods: Effective Strategies and Interventions," adopted 6 new villages under the ICAR-CIRC Farmer FIRST Programme: Kushwali, Daulatpur, Aterna, Kanhayia, Atuta, and Kulanjan.
- The Augmented-OvSynch protocol improved conception rates and could be promoted as a viable technique to enhance reproductive performance in postpartum zebu crossbred lactating cows under tropical conditions.
- A total of 4 Mahila Self Help Groups (SHGs), 2 at Jhitkari and 2 at Chandana, were formed, and 1 Farmer Producer Organization (FPO) was established at Kushwali under FFP.

Special Assistance Program of Central government

Scheduled Caste Sub-Plan (SCSP)

To promote economic development of SC families below the poverty line, a budget of Rs. 36 Lakh was earmarked for the Scheduled Caste Sub-Plan (SCSP). A total of 17 training programs-cum-input distribution programme were organized benefiting more than 2000 farm families. Interventions in the field of animal nutrition, health, and management, as well as distribution of farm equipment and supplements, were provided to farmers belonging to SC community.

Tribal Sub-Plan (TSP)

Under the Tribal Sub-Plan (TSP) aiming to accelerate the socio-economic development of tribal populations Rs. 1 Lakh, was allocated. Institute organized two training cum input distribution programme In collaboration with ICAR-IISWC, Dehradun in tribal belt of Uttrakhand benefiting more than 200 farm families.

North Eastern Hills Region (NEHR)

ICAR-CIRC conducted three training programs in collaboration with agencies in the North Eastern Hills Region, focusing on livestock production and providing inputs to farmers. Events included training in Manipur, a Farmer Producer Organisation awareness program in Nagaland, and a livestock feeding program in Arunachal Pradesh, benefiting NEHR farmers.

Externally Funded Schemes

DST Sponsored project

Utilization of paddy straw as complete fodder block by treating with Gomutra (Indigenous cow urine)

- Fresh urine samples from indigenous and crossbred cows were analyzed for biochemical properties. Urea and uric acid concentrations showed no significant differences between breeds, while milch indigenous cows exhibited lower creatinine levels compared to dry cows ($p<0.05$).
- The paddy straw was treated with fresh indigenous cow urine and commercial urea under different groups. The fodder blocks of treated paddy straw were prepared with inclusion of concentrate mixture. The standardization of fodder blocks is under process.

DAHD Sponsored Project

Strengthening of Semen Station under Rashtriya Gokul Mission

Equipments worth Rs. 57.86 lakh were procured for the Semen Station Project under RGM, including plasma sterilizer, bio-safety cabinets, BOD Incubator, Refrigerated and Bench Top Centrifuges, Semi-Automatic Biochemistry and Urine Analyzers to enhance the existing laboratory infrastructure of the semen.

Extension activities

- Organized *Pashu Pradarshani and Krishi Mela-2023* in collaboration with DAHD, GoI, at Muzzafarnagar from 6-7 April 2023. This event attracted over 30,000 visitors and featured animal show competitions across 32 categories.
- Institute participated in kisan melas, and provided trainings/input distribution under FFP, SCSP, TSP and NEH programme.

Others

- Institute added one patent and secured copyright for the institute logo.
- The ICAR-CIRC also signed three MoUs with various institutions.

STAFF POSITION (2023)

S. No.	Post	Sanctioned	In Position	Vacant
A.	**SCIENTIFIC**			
1.	Director	01	01	00
2.	HoD	03	03	00
3.	Principal Scientist	00	04*	00
4.	Sr. Scientist	06	03	03
5.	Scientist	24	06	14
	TOTAL	**34**	**17**	**17**
B.	**TECHNICAL**			
1.	T-6(Sr. Technical Officer)	01	00	01
2.	T-3 (Sr. Technical Asstt.)	02	00	02
3.	T-1 (Technician)	05	04	01
	TOTAL	**08**	**04**	**04**
C.	**ADMINISTRATIVE**			
1.	Administrative Officer	01	01	00
2.	Fin. & Acct. Officer	01	00	01
3.	Asstt. Adm. Officer	02	02	00
4.	Private Secretary	01	02	00
5.	Assistant	09	02	07
6.	Personal Assistant	02	01	01
7.	Steno. Gr.lll	00	00	00
8.	Upper Divisional Clerk	02	00	02
9.	Lower Divisional Clerk	02	01	01
	TOTAL	**20**	**10**	**10**
D.	**SUPPORTING**	09	07	02
	GRAND TOTAL	**71**	**37**	**34**

**These selected PS will remain there till their retirement/transfer/promotion, as the case\ may be.*

FINANCIAL STATEMENT & RESOURCE GENERATION

ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, MEERUT

Budget Information & Revenue Receipt for April,2023 to March,2024 for ICAR Schemes

ICAR-Central Institute for Research on Cattle, Meerut (Main Scheme)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	35000000	35000000
Grant in Aid-Capital (SCSP)	100000	100000
Grant in Aid-Salaries	85582000	85581993
Grant in Aid- General		
(i) Pension & Retirement Benefits	8049000	8049000
(ii) Other Contingency Expenditure	41900000	41900000
Total	**170631000**	**170630993**
SCSP Expenditure	3500000	3500000
NEH Expenditure	4000000	3999702
ICAR Non Scheme	2500000	2499900
Institute Corpus Fund	5647464	5647464
Grand Total	186278464	186278059
Revenue Generation		8305123

AICRP on Cattle Scheme

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	3000000	3000000
Grant in Aid-Capital (SCSP)	200000	200000
Grant in Aid-Salaries	11850000	11850000
Grant in Aid- General (Other Contingency Expenditure)	41000000	41000000
SCSP Expenditure	2500000	2500000
Total	**56050000**	**56050000**

ITMU Project (ICAR HQ)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital		
Grant in Aid- General(Operation Cost)	585000	584927
Total	**585000**	**584927**

Farmer's First Programme (FFP), ATARI, Zone-IV, Kanpur)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	300000	191967
Grant in Aid- General(Operation Cost)	960000	956087
Total	**1260000**	**1148054**

CRP on Agrobiodiversity (ICAR-NBAGR, Karnal)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	700000	700000
Grant in Aid- General(Operation Cost)	200000	161114
Total	**900000**	**861114**

DST Project (SUTRA PIC)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	743785	800000
Grant in Aid- General(Operation Cost)	1136001	716672
Total	**1879786**	**1516672**

DAHD Project (RGM)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital	68279408	5764499
Grant in Aid- General(Operation Cost)		
Total	**68279408**	**5764499**

DAHD Project (NLM)

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital		
Grant in Aid- General(Operation Cost)	9000000	5823990
Total	**9000000**	**5823990**

Advanta Enterprises Limited Hyderabad

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital		
Grant in Aid- General(Operation Cost)	98280	98280
Total	**98280**	**98280**

CST, Uttar Pradesh

Head	Budget (Rs) RE (2023-24)	Expenditure (Rs) w.e.f. 01.04.2023 to 31.03.2024
Grant in Aid-Capital		
Grant in Aid- General(Operation Cost)	80000	72139
Total	**80000**	**72139**

RESEARCH ACHIEVEMENTS

I. All INDIA COORDINATED RESEARCH PROJECT (AICRP) ON CATTLE

A. CONSERVATION AND GENETIC IMPROVEMENT OF INDIGENOUS CATTLE BREEDS – INDIGENOUS BREEDS PROJECT (IBP)

Genetic studies on performance of important indigenous breeds of cattle and their improvement through selection.

Under the project, three important indigenous cattle breeds viz., Gir, Kankrej and Sahiwal are covered for their improvement. The project is being implemented in the home tract of the breed in collaboration with various State Veterinary / Agricultural Universities, ICAR institutes, NGOs and Gaushalas. The technical programme of the project envisages the establishment of germplasm (GP) and data recording units (DR) for each breed by registering the animals maintained under farm and field conditions, respectively. The young bulls born out of the nominated mating of elite cows at the germplasm centre are progeny tested using animal and farm facilities existing at the Data Recording Units/ associated herds.

As per the technical programme of the project, for each breed of cattle about 75-100 elite breedable females are made available at the GP unit and about 750 breedable females are identified at about 5 DR units (herds). The elite females in the GP unit are mated with the genetically superior proven bulls of the breed for the production of superior young bulls. The young bulls born out of nominated mating in the germplasm unit are utilized for breeding the females registered in the DR units and around 60 to 70 females are mated by one young bull so as to get the first lactation milk production records of at least 20 daughters per bull. The information on growth, reproduction, milk production and survivability are recorded for performance evaluation, selection and genetic improvement of recommended indigenous cattle breeds.

a) Gir breed

The GP unit of Gir cattle is located at Cattle Breeding Farm, Junagadh of Kamdhenu University Gandhinagar, Gujarat. The DR units of the breed are located in 08 farmer herds and 03 associated herds and a total of 18721 breedable females are identified and registered so far under the project.

Herd strength

The herd strength of GP unit as on 31st December 2023 was 188 animals involving 133 females and 55 males. The numbers of female and male calves born during the year 2023 were 10 and 10, respectively. At the end of the year, the number of breedable females aged above 2.5 years was 109 which included 43 heifers, 33 milch and 33 dry cows. During the year, the GP unit maintained 18 young bulls of above 2 years of age.

The herd strength of the DR unit at CBF, Junagadh as on 31st December 2023 maintained 300 animals consisting of 225 female and 75 male animals. A total of 35 normal calvings resulting in 18 female and 17 male calves occurred during the year. The unit maintained 141 breedable females aged above 2.5 years and 48 young bulls above one year of age.

Bulls inducted and frozen semen doses produced

A total of 40 bulls in five sets (six in first set, nine in second set, nine in third set, nine in fourth set and seven in fifth set) have been put under semen collection. The balance of semen doses for future breeding as on 31st December 2023 was 255465 (18762 of first set, 73238 of second set, 78015 of third set, 58815 of fourth set and 26635 of fifth set). During the year 2023, a total of 19895 semen doses were produced from the second (1025), third (2040), fourth (2395) and fifth (14435) set of Gir bulls. A total of 7815 doses were utilized for insemination (5 of first, 10 of second, 2635 of third, 3625 of fourth and 1540 of fifth set (Table-1).

Insemination carried out, conception rate and daughters born

The details of insemination carried out, conception and daughters born are presented in Table-2. During the year 2023, a total of 32 inseminations were carried out and 10 pregnancies were confirmed resulting to an overall conception rate of 31.25 per cent which was lower than the overall conception rate of 50.38 per cent since inception of the project. The total number of inseminations carried out since inception for first four sets was 780 consisting of 186 for first, 130 for second, 320 for third and 144 for fourth set of bulls. During the year 2023, a total of 10 daughters were produced which resulted in to a total of 201 daughters since inception of the project.

Set wise performance

A total of 40 bulls in five sets (6+9+9+9+7 bulls) have been inducted so far in the program. The total number of semen doses frozen since inception was 341863 (40133, 99556, 99149, 74750 and 28275 for the first five sets, respectively) out of which 86398 (21371, 26318, 21134, 15935 and 1640 for the first five sets, respectively) were utilized resulting to a storage balance of 255465 frozen semen doses. The cows covered for insemination in different sets were 36740 comprising of 12289 in first set, 8341 in second, 6742 in third, 8405 in fourth and 963 in fifth set. A total of 7669 daughters have so far been produced from different sets (3149, 1648, 1171, 1696 and 5, respectively). A total of 1301 daughters reached AFC (540, 407, 266 and 88 of first four sets of bulls, respectively) of which 912 daughters (372, 384, 126 and 30 of first four sets of bulls, respectively) completed their first lactation.

Body weights

The averages for weight at birth, 3, 6, 12 months, maturity and calving of female animals were 20.50, 56.80, 95.30, 142.90, 280.00 and 356.00 kg, respectively. The average weights at birth, 3, 6, 12 months and maturity of male animals were 20.80, 57.40, 97.20, 151.10 and 290.00 kg, respectively.

Productive and reproductive performance

The details of productive and reproductive performance of Gir cattle maintained under GP and DR unit of CBF, Junagadh are as follows:

Germplasm unit

The average first lactation 305-days milk yield, first lactation total milk yield and first peak yield were 2753.80 ± 350.30, 3753.20 ± 753.60 and 15.00 ± 1.60 kg, respectively. The average first lactation length was 490.00 ± 64.60 days. The overall averages for age at first calving, first service period, first dry period and calving interval were 1413.60 days (46 months), 180.50, 269.00 and 472.00 days, respectively. The wet and herd averages were 7.40 and 4.00 kg, respectively.

Data recording unit

The average first lactation 305-days milk yield, first lactation total milk yield and peak yield were 2471.40 ± 207.90, 3714.20 ± 657.30 and 12.90 ± 0.80 kg, respectively. The average first lactation length was 531.07 ± 81.90 days. The average age at first calving, first service period, first dry period and first calving interval were 1187.90 ± 30.90 (39 months), 160.70 ± 50.50, 67.00 ± 3.20 and 445.30 ± 49.10 days, respectively. The wet and herd averages were 6.10 and 3.60 kg, respectively.

Other activities

During the reporting period, 38 registered scheduled caste farmers in the operational area were distributed with the kit consisting of mineral mixture, dewormer, calcium supplement and milk can of 5 litre capacity. In addition, the farmers were also enlightened on the scientific information regarding dairy husbandry, feeding of dairy animals and importance of Gir cattle. Meeting of AI workers were frequently conducted to review the progress of the project and necessary suggestions were given to improve the efficiency of the implementation of the project.

b) Kankrej breed

The GP unit of Kankrej cattle is located at Livestock Research Station, Dantiwada of Kamdhenu University Gandhinagar, Gujarat while 5 DR units with 14 AI centres covering 6500 Kankrej cows of 5200 farmers belonging to 64 villages in the native tract of Kankrej breed are included under the program.

Herd strength

The herd strength of Kankrej animals as on 31st December 2023 was 511 with 107 males and 404 females. The total number of breedable females above 2.5 years was 299 and the number of animals in milking was 105. During 2023, a total of 842 calves born of which 421 were females and 421 were males. As on 31st December, 2023, the GP unit maintained 44 elite cows and 17 breeding and 13 young bulls.

Bulls inducted and frozen semen doses produced

A total of 43 Kankrej bulls in five sets have been inducted so far. During the year, 12050 frozen semen doses were produced from 8 bulls of fifth set and a total of 9130 doses were utilized for insemination. Since inception of the project, a total of 216510 semen doses were produced, of which 83474 were utilized and 1580 doses were discarded resulting to a balance of 131456 doses of frozen semen consisting of 991 of first set, 44572 of second set, 29602 of third set, 43311 of fourth set and 12980 of fifth set of bulls for future breeding.

Insemination carried out, conception rate and daughters born

During the reporting period, 1599 animals were inseminated, 643 animals were confirmed for pregnancy and 406 daughters born. The conception rate during the year 2023 was 40.21 per cent against overall conception rate of 47.42 per cent since inception of the project. The total number of daughters produced since inception of the project was 4579 consisting of 407, 1257, 1062, 1413 and 440, respectively for the different five sets of bulls.

Set wise performance

A total of 45 bulls in five sets (8+9+9+9+10 bulls) have been inducted so far in the program. The total number of semen doses frozen was 216510 (8000, 65119, 45412, 69109 and 28870 for the first five sets, respectively) out of which 83474 (7009, 20547, 15410, 24618 and 15890) were utilized for insemination and 1580 doses were discarded due to poor quality resulting to a storage balance of 131456 frozen semen doses. The cows covered for insemination in different sets were 18005 comprising of 3000 in first set, 3500 in second, 3905 in third, 4100 in fourth and 3500 in fifth set. A total of 4545 daughters have so far been produced from first five sets (407, 1257, 1062, 1413 and 406, respectively). A total of 1092 daughters reached AFC (151, 400, 302 and 239 of first four sets of bulls, respectively) of which 1005 daughters (131, 370, 288 and 216 of first four sets of bulls, respectively) completed their first lactation.

Productive and reproductive performance

The details of productive and reproductive performance of Kankrej cattle maintained under GP and DR unit of LRS, Sardarkrushinagar are as follows:

Germplasm unit

The average first lactation 305-days milk yield, first lactation total milk yield and first peak yield of Kankrej cows maintained in the GP units were 2783.25 ± 93.72, 3358.53 ± 199.99 and 12.60 ± 0.62 kg, respectively. The average first lactation length was 433.00 ± 19.42 days. The overall averages for age at first calving, first service period, first dry period and calving interval were 1371.25 ± 100.92 (45 months), 436.50 ± 154.50, 146.25 ± 25.14 and 473.85 ± 30.41 days, respectively. The wet and herd averages were 8.12 and 3.83 kg, respectively.

Data recording unit

The average first lactation 305-days milk yield, first lactation total milk yield and peak yield of Kankrej cows maintained in the DR units were 1721.01 ± 138.62, 1975.03 ± 177.23 and 9.41 ± 0.43 kg, respectively. The average first lactation length was 342.70 ± 20.22 days. The average age at first calving, first service period, first dry period and first calving interval were 1276.52 ± 42.06 (42 months), 281.33 ± 34.27, 150.00 ± 4.72 and 526.33 ± 34.41days, respectively. The wet and herd averages were 7.32 and 3.39 kg, respectively.

Other activities

During the year a total of 3523 farmers/ visitors/ trainees/students have visited the unit. The scientist of the unit also participated in two TV talks on "*Pashupalan Vyavsay ma Navinikaran*" and two phone in live program on "*Balad: Samasya ke Samadhan"which were telecast on DD Girnar, Ahmedabad.* . Scientists and staff working at station have frequently visited farmers' herds and provided technical input regarding animal health, management and feeding.

c) Sahiwal breed

The GP unit of Sahiwal breed is located at the National Dairy Research Institute, Karnal and three DR units are located at i) Regional Research and Training Centre, Kaljharani, Bathinda, GADVASU, Ludhiana, ii) G.B. Pant University of Agricultural and Technology, Pantnagar, Uttarkhand and iii) Livestock Farm, LUVAS, Hisar.

Herd strength

Herd strength of GP unit at NDRI, Karnal as on 31st December 2023 was 425 with 347 females and 78 males. During the period, 68 female and 37 male calves were born, a total of 105 calves. A total of 240 breedable females of above 2 years of age were

available of which 69 were heifers, 97 were dry and 74 were in milking. The germplasm unit maintained 33 young bulls of above two years of age.

The numbers of breedable females above two years of age in GP and different DR units were 688 consisting of 240 in NDRI, Karnal, 125 in LUVAS, Hisar, 130 in GADVASU, Ludhiana and 193 in GBPUAT, Pantnagar. In Sahiwal DR unit GBPUAT, Pantnagar, 88 calving took place out of which 37 females and 51 males born, in LUVAS, Hisar, 41 calving took place of which 18 female and 23 males calves were born and in GADVASU, Ludhiana, 58 calving were taken place of which 24 females and 34 males born.

Bulls inducted and frozen semen doses produced

A total of 45 Sahiwal bulls in five sets (8 in first, 7 in second, 10 each in third, fourth & fifth sets) were inducted for progeny testing under the project. During the year, 21920 doses were frozen and 8937 doses were utilized for breeding (Table 1). At the end of year 2023, a total of 151371 (22744 in 1st set, 34306 in 2nd set, 31909 in 3rd set, 36451 in 4th set and 25961 in 5th set) semen doses were available for breeding. Since inception of the project, 317202 semen doses were frozen and 166488 doses were utilized/supplied/sold to the stakeholders and for the project for the genetic improvement of cattle, a total of 151371 doses were available for future use.

Insemination carried out, conception rate and daughters born

During the year 2023, a total of 825 inseminations (289 in NDRI, Karnal, 152 in LUVAS, Hisar, 128 in GADVASU, Ludhiana and 256 in Pantnagar) were carried out and 412 cows were conceived (138 in Karnal; 81 in Hisar; 63 Ludhiana and 130 in Pantnagar). The conception rate was 47.75% in Karnal, 53.29% in Hisar, 49.22% in Ludhiana, and 50.78% in Pantnagar. During the reporting year, 146 daughters (61 in NDRI Karnal, 18 in LUVAS, Hisar, 23 in GADVASU, Ludhiana and 44 in Pantnagar) were born.

Since inceptions of the project, a total of 3937 inseminations were carried out of which, 1697 cows conceived. The overall conception rate was 43.10 per cent. A total of 1589 daughters (751 in Karnal, 144 in Hisar, 222 in Ludhiana and 472 in Pantnagar) were born.

Set wise performance since inception

A total of 45 bulls in five sets (8+7+10+10+10 bulls) have so far been inducted in the program. The total number of semen doses frozen since inception was 317202 (54754 + 64365 + 56989 + 103654 + 37440 for the first sets, respectively) of which 166488 frozen semen doses were utilized/ supplied to the stakeholders/ Institutes. A total 151371 doses of frozen semen were available as on 31st December 2023 (Table 2). The total number of cows covered for inseminations in different sets was 1697 (511+300+394+303+189). A total of 751 daughters born with 516 daughters (133+94+141+128+20) having reached the age of first calving and 489 daughters (131+94+139+125) have completed their first lactation since inception.

Productive and reproductive performance

The details of productive and reproductive performance of Sahiwal cattle maintained under GP and different DR units are as follows:

Germplasm unit

The average first lactation 305-days milk yield, first lactation total milk yield and first peak yield were 2167.44 ± 75.38, 2393.24 ± 97.40 and 10.00 ± 0.24 kg, respectively. The average first lactation length was 267.36 ± 12.23 days. The average age at first calving, first service period, first dry period and first calving interval were 1285.15 ± 18.04 (41 months), 130.75 ± 17.34, 214.36 ± 29.45 and 422.63 ± 18.70 days, respectively. The wet and dry averages were 7.3 and 4.2 kg, respectively.

Data recording units

The 305 days lactation milk yield and first lactation total milk yield were 1920.91 ± 138.82 and 2040.36 ± 160.45 kg in GBPUAT, Pantnagar; 1953.61 ± 136.07 and 1970.78 ± 134.11 kg in LUVAS, Hisar and 1447.41 ± 106.25 and 1663.86 ± 179.65 kg in GADVASU, Ludhiana, respectively. The average first lactation length of Sahiwal cows at Ludhiana, Hisar and Pantnagar were 342.92 ± 32.53, 271.30 ± 10.31 and 290.14 ± 13.62 days, respectively. The lowest (1216.00 ± 19.93) and highest (1566.89 ± 56.11) days average age at first calving of (40 months) was observed at respective GBPUAT, Pantnagar and LUVAS, Hisar units. However, first service period was lowest (162.20 ± 15.09 days) in GBPUAT, Pantnagar and highest (228.90 ± 29.97 days) in GADVASU, Ludhiana. The respective average first dry period of Ludhiana, Hisar and Pantnagar were 170.6 ± 23.05, 231.17 ± 29.57 and 122.40 ± 11.92 days. The average first calving interval of Sahiwal in GADVASU, Ludhiana, LUVAS, Hisar and GBPUAT, Pantnagar were 505.80

± 30.33, 468.83 ± 48.96 and 451.48 ± 16.6 days, respectively. The wet averages in Hisar, Ludhiana and Pantnagar were 8.62, 5.69 and 7.33 kg, while, the herd averages were 4.33, 3.55 and 4.79 kg, respectively.

Table-1 Breed wise details of semen doses collected and utilized during the year 2023

Breed	Set No.	No. of bulls inducted	Semen doses produced		Total since inception	Semen doses utilized			Balance as on31-12-2023
			Up to 31st Dec 2022	Jan-Dec 2023		Up to 31st Dec 2022	Jan-Dec 2023	Total since inception	
Sahiwal	I	8	54754	0	54754	32061	51	32112	22642
	II	7	64365	0	64365	30059	0	30059	34306
	III	10	56989	0	56989	25800	0	25080	31909
	IV	10	103654	0	103654	67758	0	67758	35896
	V	10	15520	21920	37440	2593	8886	8937	28503
	Total	45	295282	21920	317202	158271	8937	163946	153256
Gir	I	6	40133	0	40133	21366	5	21371	18762
	II	9	98531	1025	99556	26308	10	26318	73238
	III	9	97109	2040	99149	18499	2635	21134	78015
	IV	9	72355	2395	74750	12310	3625	15935	58815
	V	7	13840	14435	28274	100	1540	1640	26635
	Total	40	321968	19895	341863	78583	7815	86398	255465
Kankrej	I	8	8000	0	8000	6879	130	7009	991
	II	9	65119	0	65119	17947	2600	20547	44572
	III	9	45412	0	45412	15410	0	15410	29602*
	IV	9	69109	0	69109	23993	625	24618	43311*
	V	8	16820	12050	28870	10115	5775	15890	12980
	Total	43	204460	12050	216510	74344	9130	83474	131456*

** Excluding semen discarded 400 doses in 3rd set and 1180 doses in 4 set of Kankrej bulls*

Table-2 Details of inseminations carried out, conception and daughters born

Breed	Set No.	No. of bulls inducted	AI done			Conception			Daughters born		
			Up to Dec 2022	During 2023	Total	Up to Dec 2022	During 2023	Total	Up to Dec 2022	During 2023	Total
Sahiwal	I	8	2266	24	2290	781	12	793	332	0	332
	II	7	1937	0	1937	733	0	733	159	136	295
	III	10	2092	0	2092	886	0	886	373	0	373
	IV	10	2204	1	2205	879	1	880	443	49	492
	V	10	342	648	990	160	400	560	0	97	97
	Overall	45	8841	673	9514	3439	413	3852	1307	282	1589
Gir	I	6	12278	11	12289	6258	4	6262	3143	6	3149
	II	9	8341	0	8341	4108	0	4108	1648	0	1648
	III	9	6724	18	6742	3027	8	3035	1165	6	1171
	IV	9	7598	807	8405	3533	591	4124	1302	394	1696
	V	1	0	963	963	0	347	347	0	5	5
	Overall	34	34941	1799	36740	16926	950	17876	7258	411	7669
Kankrej	I	8	2178	0	2178	1138	0	1138	407	0	407
	II	9	7681	0	7681	3855	0	3855	1257	0	1257
	III	9	6453	0	6453	3038	0	3038	1062	0	1062
	IV	9	7609	3	7612	3555	1	3556	1413	0	1413
	V	10	1582	1596	3178	625	642	1267	34	406	440
	Overall	45	25503	1599	27102	12211	643	12854	4173	406	4579

B. GENETIC IMPROVEMENT OF CROSSBRED CATTLE UNDER FIELD CONDITIONS- FIELD PROGENY TESTING PROJECT (FPT)

Evaluation of bulls through progeny testing and their extensive use has been a major source of genetic improvement in dairy animals. Total 383 young HF crossbred bulls (Frieswal Bull) have been put under the test mating in different sets at four units. Daughters born from 14th sets of bull have completed their 1st lactation milk yield and have evaluated. A total 278 bulls have been evaluated on the basis of their daughter's 1st lactation milk yield. Through the intervention of Field Progeny Testing programme of this Institute the average first lactation 305 days milk yield of the Frieswal progenies in the adopted villages of FPT project increased by 67.4 % in KVASU, 51.24 % in GADVASU, 20.0 % in BAIF and 53.71 % in GBPUA&T unit. Subsequently, average age at first calving (AFC) of the Frieswal progenies has been reduced by, 18.09 % in KVASU, 31.67 % in GADVASU, 0.30 % in BAIF and 16.73 % in GBPUA&T unit. The details on the comparative performance of crossbred cattle in four different FPT units during the year 2023 are summarized in Table-3.

Table-3. Comparative performance of 4 different units of FPT project during the reporting period (1.1.2023 to 31.12.2023)

Particulars	KVASU Thrissur	GADVASU Ludhiana	BAIF Pune	GBPUAT Pantnagar
Total Artificial inseminations	4514	4021	5819	5220
Pregnancies confirmed	1979	2381	1806	2608
Conception rate %	46.90	52.8	45.08	53.58
Total calving	1246	2353	1965	2143
Female calves born	605	1174	880	963
Female calves reached AFC	215	470	301	219
Female calves completed 1st lactation	200	445	217	216
Average 305 days milk yield (kg)	3373.1	3860.5	3591.05	3585.3
Average AFC (days)	1018.2	1021.1	985.64	1050
Total loss of data (%)	10.1	13.0	27.91	20.42

a) Kerala Veterinary and Animal Sciences University Thrissur, Kerala, (KVASU)

As crossbreeding of cattle is the accepted breeding policy in Kerala for genetic improvement of dairy animals as a result more than 95% of cattle of the state are crossbreds. Continued genetic improvement of the crossbred cattle of the state is attempted through the field progeny testing project. It opens up the availability of Frieswal bull semen to the farmers of the state. The progenies born under the project are normally producing 450 to 500 kg milk over and above their contemporaries and hence are in high demand. This increase of around 500 kg in a lactation is providing the farmers a benefit of Rs15000 to 20000 per year per animal. The increasing number of inseminations under the project is an indicator for increasing popularity of the scheme in Kerala. The first set of bull at KVASU was executed in January 1992. A total of 363 bulls in 18 different sets have so far been inducted in the program. A total 150243 artificial Inseminations have so far been done in which, 13333 female progenies were born and a total 3670 female progenies have reached age at first calving (Table-4).

Table- 4. Information regarding different sets of Bulls (KVASU)

Set No	Date of start	Total bulls used	Total inseminations	Total AI's followed	Pregnancies confirmed	Conception rate (%)	Followed for calving	Female calves	
								Born	Reached AFC
I	01/01/1992	12	23351	6722	2420	36	1902	956	319
II	01/04/1994	11	12817	4800	1680	35	1300	603	240
III	01/07/1995	11	9331	3942	1324	33.6	1065	757	89
IV	01/11/1998	15	11750	3753	1501	39.9	1489	676	178
V	01/07/2001	17	3437	3261	1136	34.8	847	401	139
VI	01/07/2003	20	8173	7683	2582	33.6	1689	746	216
VII	01/02/2005	24	5759	5211	2281	43.7	1298	597	180
VIII	01/09/2006	22	5703	5514	2472	44.8	1538	768	160
IX	01/02/2008	16	3393	3131	1181	37.7	801	394	81
X	01/07/2009	24	5781	5612	2124	37.8	1324	664	162
XI	01/04/2011	21	4820	4401	2006	45.6	1280	659	235
XII	01/08/2012	28	6045	5531	2357	42.6	1302	642	262
XIII	01/03/2014	14	5211	4850	2063	42.0	1114	545	257
XIV	01/07/2015	29	9682	9243	4147	44.9	2515	1229	495
XV	02/08/2017	26	10735	10191	4639	45.5	2733	1361	425
XVI	09/08/2019	25	14591	13242	5516	41.7	3159	1524	17
XVII	10/12/2021	24	9010	7679	3630	47.3	1658	811	0
XVIII	05/10/2023	24	654	0	0	0	0	0	0
Total		**363**	**150243**	**104766**	**43059**	**686.5**	**27014**	**13333**	**3670**

During the period of report, a total of 4514 artificial inseminations were carried out with the overall conception rate was 46.9 %. The average first lactation 305 days milk yield of daughters completed their first lactation in the reporting period (2023) was 3373.1 ± 38.80 kg. The average age at first calving of daughters was 1018.23 ±11.24 days during this reporting period. The loss of data in the project was 0.07 % in 15th set, 4.6 % in 16th set , 10.1 % in 17th set of bull till the end of report period. About 2919 daughters from first fifteen sets of bulls have completed their 1st lactation 305 days milk yield. There is a consistent trend of increase in 1st lactation 305 days milk yield of daughters in subsequent sets of bulls. In the 1st set of bulls (1992), it was recorded as 1958.4 kgs and in currently under recording set of bull (15th & 16th), it was recorded as 3278.24 kgs which indicates a sharp increase of 1319.84 kgs milk (67.4 %) in progenies of bulls under test. A trend of decrease in age at first calving was also observed in subsequent sets of bulls. It was recorded as 1136.4 days in progenies of first set of Bulls (1992) and which has reduced to 930.8 days in currently under recording set which indicate a sharp decrease of 205.6 days (18.09 %) in AFC (Fig.1).

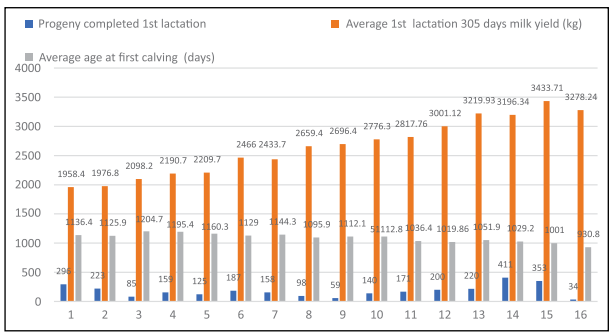


Figure-1: Set wise Progeny Performance at KVASU unit since inception.

Calving of 17th set of bulls has completed. Recording of first lactation milk yield of daughters of 13th set of bulls had completed and evaluated. 14th set of bulls is under final stage of recording till the end of reporting period. The age at first calving of progenies is continued to be significantly lower than that of contemporaries.

Socio-economic status of farmers under the Project

Socio- economic status of 475 dairy farmers in Thrissur district have been collected and analyzed. Socio-economic status of the farmers owning progeny calved during the period and the production performance of the progenies in different group are presented in the Table-5.

Majority of the farmers were classified as Agricultural Farmer and accounts for 74.1 % of the total registered farmers. This is clear indication that livestock is only a subsidiary enterprise for these farmers. Agricultural Labours accounts for 16.6 % and the other occupational groups of owners are negligible. Majority of the farmers (39.8 %) are having an educational level of matric. The proportion of

Table- 5. Production performance of the animals according to different categories of farmers

Category	No. of Observations	Percentage (%)	Average 1st lact.305 days milk yield (kg)	
			Average	No.
Overall mean	475	100	3431.53 ± 45.0	158
Feeding system				
1. With fodder	164	34.5	3543.80	50
2. Without fodder	311	65.5	3379.56	108
Education status of Owner				
1. Illiterate	8	1.7	2958.75	2
2. Primary	145	30.5	3367.39	45
3. Matric	189	39.8	3495.00	60
4. Secondary	81	17.1	3505.33	30
5. College	52	10.9	3327.26	21
Herd size				
1. ≤3	229	43.8	3555.12	64
2. 4 to 5	180	31.0	3373.43	54
3. 6 to 10	103	18.7	3396.72	29
4. >10	35	6.5	3089.55	11
Land holding				
1. Landless	0	0	3073.93	7
2. Below 10 cents	28	5.9	3382.94	51
3. 10 to 49 cents	159	33.5	3498.85	37
4. 50 to 99 cents	94	19.8	3445.43	29
5. 1 to 2 acres	95	20.0	3683.82	19
6. 2 to 3 acres	55	11.6	3463.75	6
7. 3 to 4 acres	23	4.8	3109.44	9
8. More than 4 acres	21	4.4	3073.93	7
Occupation of Owner				
1. Agric. Farmer	352	74.1	3587.08	24
2. Agric. Labour	79	16.6	3403.23	120
3. Government Job	5	1.1	2600.00	1
4. Private Job	27	5.7	3604.00	10
5. Business	12	2.5	3021.67	3

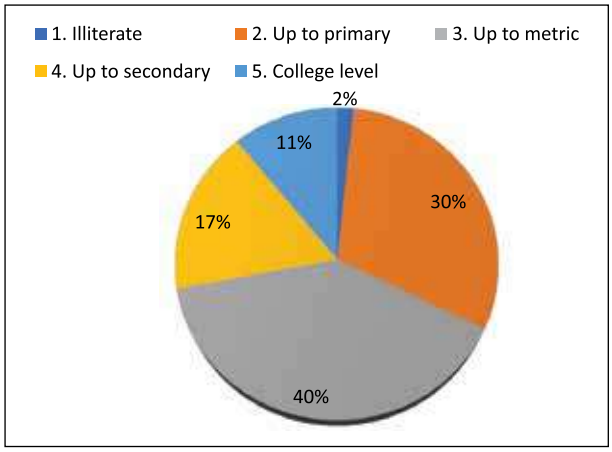


Fig. 2. Education level of Animal owners participating in the project

illiterate farmers are negligible (1.7 %). The farmers with primary level of education accounted for 30.5 % followed by those with secondary and college qualification. (Fig-2).

The land holding pattern showed that major part (33.5%) of the farmers had a land holding of 10-49 cents. Farmers with 50-99 cents and 1-2 acres of land holders were 19.8 and 20.0 % respectively. 11.6 % farmers having 2-3 acres of land. Only 4.4 % farmers having land holding of more than 4 acres whereas, farmers having 1-2 acres of land shows the highest milk production among the progenies of Frieswal cattle and recorded as 3683.82 kgs (Fig-3).

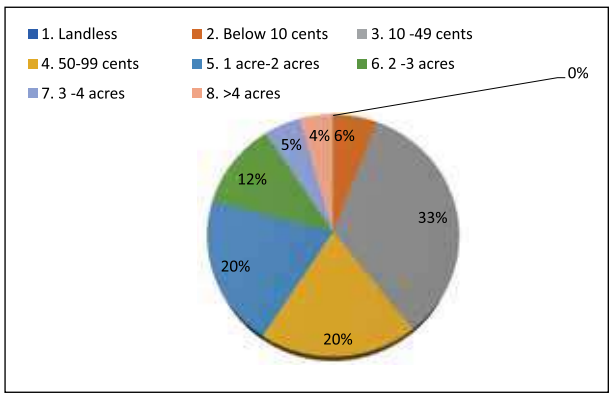


Fig. 3. Land Holding pattern of Animal Owners participating in the project

The farmers with three or less than three animals accounted for 43.8 % of the progeny owners. The farmers with more than 10 animals in their herd were low (6.5%) followed by 6-10 animals (18.7%) and 4-5 animals (31.0%), respectively

b) Guru Angad Dev Veterinary & Animal Sciences University (GADVASU), Ludhiana

The Artificial insemination work of the Field Progeny Testing project is undertaken through 33 Artificial Insemination centres covering 276 villages in Ludhiana district. Four of these AI centres are operated by Punjab State Department of Animal Husbandry and others by trained inseminators. A total of 23233 farmers have so far been registered and benefited through this project. During the year, a total of 4021 artificial inseminations were conducted with frozen semen of 24 bulls of 17th set and 24 bulls of 18th set with overall conception rate 52.8 %. The average first lactation 305 days milk yield of daughters completed their first lactation in the reporting period (2023) was found as 3860.5 kg. The average age at first calving for daughters was recorded as 1021.1 days in this reporting period 2023. 13.0 % of the data was lost due to different causes and the sale of the animals was the major cause of the loss of data. The set wise progeny performance, a total of 184, 154, 397, 361, 361,278, 351, 326, 647, 576, 690, 806, 768, 694 and 55 progenies of 2nd , 3rd ,4th ,5th , 6th , 7th , 8th , 9th , 10th , 11th ,12th , 13th ,14th 15th and 16th sets of test bulls completed their first lactation 305 days milk production and their average first lactation 305 days milk production were 2697.8±40.1, 2827.09±48.7, 2878.7±25.5,2896.1±26.0,2855.9±25.9,3051.8±24.5, 3305.4±28.9,3556.6±31.2,3714.7±22.9,3751.8±22.9, 3766.8±21.1,3793.4±17.7,3866.2±15.7, 3855.2±18.0 and 4080.2±60.4 kg, respectively. A total of 382 bulls has so far been introduced in 18 different sets and total 177517 inseminations done, in which 26126 female progenies were born, out of which 8456 has reached age at first calving (Table-6).

In first set of bulls (1995), the average 305-days milk yield of daughters was 2697.8 kg and in currently under recording set of bull (16th set) it was 4080.2 kg indicating a sharp increase of 1382.4 kg milk (51.24 %) in the daughters of bulls under test. The AFC of daughters in first set of bull (1995) was 1192 days which has reduced to 814.4 days in currently under recording set of bulls (16th) showing a sharp decrease of 377.6 days (31.67 %). (Fig. 4).

Field Progeny Testing Project has major contribution in changing the scenario of dairy farming in the adopted villages in Ludhiana district by providing technical know-how, germplasm and motivation to farmers. The supply semen of high genetic potential test bulls and progeny tested bulls to the farmers in the villages adopted under the Field Progeny Testing Project has helped in improving their economic level. With the result of supply of high-quality semen of test bulls the milk yield has increased to 3860.5±23.7 kg. in the year 2023. Some progressive dairy farmers after getting training and superior germplasm from the project have established

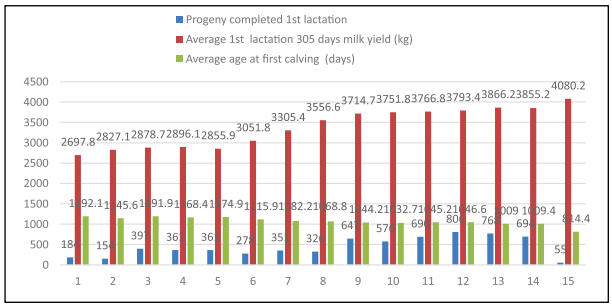


Fig.- 4. Set wise progeny performance at GADVASU unit since inception

outstanding crossbred herds with first lactation milk yield of more than 6400 kg and peak yield of more than 40 kg a day.

Socio economic status of farmers under the Project:

The production performance of the animals according to different categories of farmers (Table 7) showed that the farmers maintaining their cows with fodder production had higher milk yield of their crossbred cows than the cows maintained by farmers without fodder. Crossbred cows maintained by farmers having adequate fodder supply produced 3862.9±23.9 kg (n=438) during first lactation against 3703.2±198.4 kg (n=7) of milk by the farmers having little or no green fodder supply. Commercial farmers had high milk yield (3886.0±21.9kg) of their animals than the non-commercial farmers (2443.5±254.9 kg) with the availability of remunerative milk prices, the commercial farmers give more attention to feeding and management practices

Highest milk production (4094.8±51.0 kg) was recorded by owners having secondary level of education. Lower educated owners have more awareness and practiced dairying on scientific lines for getting higher productivity (Fig. 5). The farmers having herd size of 4 to 5 animals had the maximum lactation milk yield of their cows (3975.1±76.1 kg).

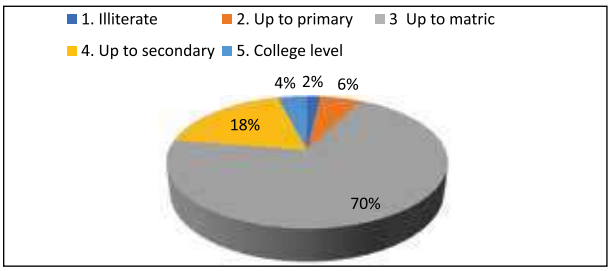


Fig. 5. Education Level of Animal Owners participating in the project

Table- 6. Information regarding different sets of Bulls (GADVASU)

Set No.	Date of start	Total bulls used	Total AI	Total A.I.'s followed	Pregnancies confirmed	CR %	Followed for calving	Females calves	
								Born	Reached AFC
II	1.04.95	18	7595	7355	3065	41.7	3000	855	227
III	1.01.97	10	5150	4865	2132	43.8	2000	789	210
IV	1.01.99	23	18006	17159	8258	48.1	8000	1844	562
V	16.12.01	30	12548	11504	5720	49.7	5720	1368	490
VI	1.04.03	22	10409	10154	4362	43.0	4362	1497	478
VII	1.2.05	25	8265	8105	3476	42.9	3476	1181	359
VIII	1.8.06	22	9710	9710	3999	41.1	3999	1120	448
IX	1.1.08	16	9611	9611	3898	40.6	3898	1186	461
X	1.7.09	24	14581	14581	5679	38.9	5679	1671	885
XI	1.3.11	20	12971	12971	5604	43.2	5604	2072	688
XII	1.8.12	28	15662	15662	7008	44.7	7008	2500	771
XIII	1.2.14	15	6662	6662	3039	45.6	3039	1321	861
XIV	1.8.15	30	8299	8299	3851	46.4	3851	1571	795
XV	1.6.17	26	10715	10715	5043	47.1	5043	2225	949
XVI	1-6-19	25	16514	16514	8311	50.3	8311	3406	272
XVII	22-11-21	24	9243	9243	4836	52.3	4836	1520	0
XVIII	29-09-23	24	1576	0	0	0	0	0	0
	Total	382	177517	173110	78281	44.1	77826	26126	8456

Table-7. Production performance of the animals according to different categories of farmers

Category	No.	Percentage	1st lact. 305-days milk yield (kg.)
Overall mean	**445**	**100**	**3860.46±23.7**
Feeding System			
1. With fodder	438	98.4	3862.9±23.9
2. Without fodder	7	1.57	3703.2±198.4
Type of farmer			
1. Commercial	437	98.2	3886.0±21.9
2. Non-commercial	8	1.8	2443.5±254.9
Education			
1. Illiterate	8	1.8	3556.7±114.6
2. Up to primary	25	5.6	3564.7±87.3
3 Up to matric	312	70.1	3831.8±28.5
4. Up to secondary	82	18.4	4094.8±51.0
5. College level	18	4.0	3834.8±83.5
Herd size			
1. ≤ 3	410	92.1	3859.9±25.1
2. 4 to 5	24	5.4	3975.1±76.1
3. 6 to 10	6	1.3	3687.3±184.5
4. > 10	5	1.1	3560.3±184.5
Land holding			
1. Landless	10	2.2	3680.5±186.8
2. Less than 1 acre	12	2.7	3620.1±143.1
3. 1 to 2 acres	49	11.0	3727.1±63.8
4. 2 to 5 acres	156	35.0	3889.2±36.9
5. 5 to 10 acres	179	40.2	3911.2±37.3
6. > 10 acres	39	8.8	3800.0±103.9
Occupation of owner :			
1. Agric. Farmer	383	86.1	3899.0±25.1
2. Agric. labour	21	4.7	3507.5±95.8
3. Service	5	1.1	3486.3±192.9
4. Business	5	1.1	3518.4±317.2
5. Dairying	29	6.5	3804.9±50.5
6. Others	2	0.4	2774.9±1329.4

It was also observed that animals of the farmers having 5-10 acres of land produced maximum milk as 3911.2±37.3 kg. Total 86.1% of the owners having Agriculture occupation as their whole-time occupation. The milk production of the cows reared by such farmers was 3899.0±25.1 kg which was significantly higher than the milk production of animals of owners having other than of these occupations (fig. 6). This could be due to the fact that the agricultural farmers are giving more attention towards dairy farming along with agriculture farming and providing good quality feed, fodder, health care and management to the animals.

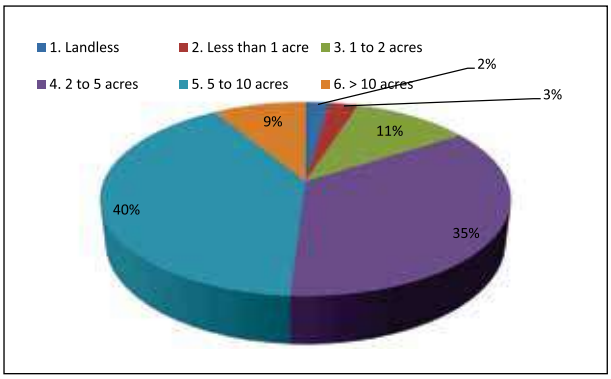


Fig. 6. Land holding pattern of Animal Owners participating in the project

c) BAIF Development Research Foundation, Uruli-Kanchan, Pune

Data generated over 29 years period from 1995 to 2023 on 6387 crossbred progeny reached to age at first calving (AFC) born out of 335 sires and owned by 1480 farmers spread over 143 village in 27 cattle developing centers from Ahmednagar, Pune and Satara district of Western Maharashtra. Out of these crossbred progeny born, 4693 completed their first lactation milk yield. A total of 359 bulls from 18 different sets have so far been used for insemination. A total 150830 Artificial Inseminations have so far been done, out of which 142590 AI followed and 64934 progenies were confirmed, leading to a conception rate of 45.54 %. A total 19065 female progenies were born and 6387 female progenies have reached the age of first calving through the use of semen of these test bulls (Table-8).

A total of 4693 daughters from first 15 sets of bulls have completed their first lactation records. The first lactation 305 days milk yield showed an increasing trend among the progenies of different sets. During the year 2023, a total of 5819 artificial inseminations were carried out with the overall conception rate 45.08 %. Average first lactation 305 days milk yield of daughters completed their first lactation in the reporting period (2023) was 3591.05 kg. The average age at first calving of daughters was recorded as 985.64 days in this reporting period 2023. The overall loss of data was recorded as 27.91 % till the end of this reporting period.

There is a trend of increase in 1st lactation 305 days milk yield of daughters in subsequent sets of bulls. In the 1st set of bull (1995), it was recorded as 2930.4 kg and in currently under recording set of bull (15th & 16th), it was recorded as 3514.82 kgs which indicates a sharp increase of 584.42 kg (20.0%) milk per lactation in progenies of bulls under test. A trend of decrease in age at first calving was also observed in subsequent sets of bulls. (Fig. 7).

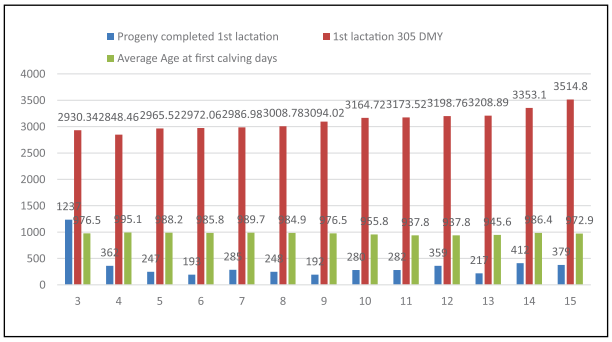


Fig. 7. Set wise Progeny Performance at BAIF unit since inception

Table-8: Information regarding different set of bulls in BAIF unit

Set No	Bull Batch Start date	Bulls used	A.I. done	A.I. followed	Pregnancies Confirmed	Conception rate	Followed for Calving	Female calves	
								Born	Reached AFC
III	Jul-95	20	16118	15063	7001	46.48%	4868	2344	1563
IV	Jul-98	19	21321	17239	7673	44.51%	3815	1756	514
V	Jul-01	20	7461	7380	3398	46.04%	2626	1201	364
VI	Jul-03	20	5249	5162	2162	41.88%	1493	731	289
VII	Feb-05	25	6806	6638	2989	45.03%	1969	856	394
VIII	Sep-06	22	6533	6327	2899	45.82%	1993	885	371
IX	Feb-08	16	4902	4902	2169	44.25%	1561	733	313
X	Aug-09	24	6893	6867	2987	43.50%	1997	878	391
XI	Apr-11	21	6364	6364	3109	48.85%	2270	1010	409
XII	Aug-12	28	9270	9030	4190	46.40%	2509	1182	504
XIII	Mar-14	15	7139	7139	3221	45.12%	2536	1163	305
XIV	Aug-15	30	14223	14189	6196	43.67%	4007	1783	578
XV*	Jul-17	26	12535	12301	5515	44.83%	3888	1840	379
XVI*	Jul-19	25	15265	14819	7220	48.72%	3971	1823	13
XVII**	Dec-21	24	10751	9170	4205	45.86%	1965	880	0
XVIII	Dec-23	24	0	0	0	0	0	0	0
Total		359	1,50,830	1,42,590	64,934	45.54%	41,468	19,065	6387

Table 9: Production performance of the animals according to different categories of farmers: BAIF

A. Education Status of farmers participating in the project.

Education Level	Illiterate	Primary	Secondary	Higher secondary	Graduate & above	Total
No. of cow Owner	139 (9.39)	598 (40.41)	549 (37.09)	126 (8.51)	68 (4.59)	1480 (100)

B. Landholding-wise frequency of farmers.

Frequency of farmers	Landholding (Acres)				Total
	0	Up to 5	5 To 10	Above 10	
According to total landholding	63 (4.26)	875 (59.12)	383 (25.88)	159 (10.74)	1480 (100)
According to land under fodder crop	451 (30.47)	955 (64.53)	61 (4.12)	13 (0.88)	1480 (100)

C. Main Occupation of farmers participating in the project.

Occupation Type	Agriculture	Dairy	Service	Other	Agriculture labor	Business	Total
No. of Cow Owners	1346 (90.95)	50 (3.38)	38 (2.57)	18 (1.22)	16 (1.08)	12 (0.81)	1480 (100)

D. Types of cattle housing in the project area.

Housing Type	Permanent	Semi-permanent	Temporary	Thatched	Total
No. of Herds	264 (17.84)	458 (30.95)	298 (20.13)	460 (31.08)	1480 (100)

Note. Figures in parenthesis indicate the percentage

The 14th bull set completed milk recording of their progenies and evaluated where 15th and 16th sets are under recording. The status of feeding and management of crossbred animals in field has favorably changed due to frequent visits of scientists and discussions with herd owners. Process of identification of quality sires based on their progeny is standardized and their use in development process for improving milk production in rural dairy animals demonstrated. The information generated through the project is used by the farmers for marketing animals and getting more price to their animals whenever they sale recorded animals.

Socio-economic status of farmers under the Project

Socio-economic status of the farmers owning progenies of the project during the reporting period and the performance of progenies in different groups is presented in the Table 9.

Out of total 1480 farmers, 40.41% farmers had education up to primary level. The percentage of farmers having secondary education was 37.09, whereas the proportion of illiterate cow owner was 9.39%. The percentage of farmers having education graduate and above was 4.59. The average herd size in the project operational area was found to be 6.04 (fig. 8).

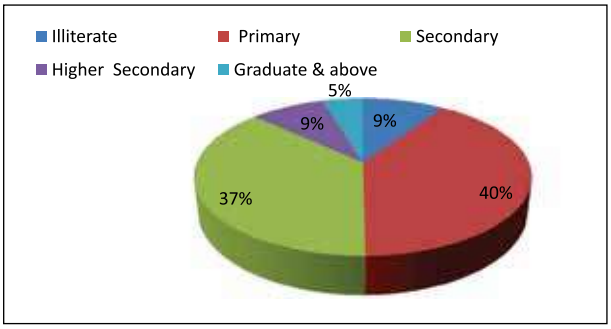


Fig. 8. Education status of Animal Owners participating in the project

Among landholders more than 2/3rd (69.53%) cattle owners were found cultivating different fodder crops. The proportion of landless and those who didn't have land under fodder crop was 4.26 and 30.47 respectively. The fodder crops generally grown are sorghum, bajra, sugarcane, lucerne and maize. The dry and green fodders, thus, available to animals are sorghum straw, bajra straw, sugarcane tops, lucerne and maize. In concentrate, farmers are found to feed ready-made feed purchased from market. The thumb rule of concentrate feeding is half kg for every litre of milk produced. Due to non-availability of sufficient land, grazing is not practiced and the animals are managed intensively. About 90.95 per cent of cattle owners were agriculturists and almost all (95.74%) owned land. Nearly, 60 per cent farmers had land up

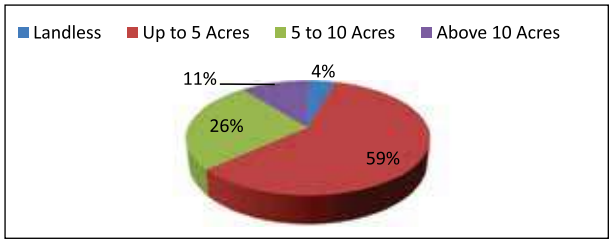


Fig. 9. Land Holding pattern of Animal Owners participating in the project

to 5 acres and the percentage of farmers having land more than 10 acres was 10.74 (Fig. 9)

The herd owners protect their animals from infectious diseases by preventive vaccinations against FMD, HS and BQ regularly. For external parasite control, insecticides were used. The use of internal parasiticides was found restricted to calf hood stage. Regarding veterinary aids whenever required, help from nearby Govt. Dispensaries is sought. Nearly half (48.79%) of herd owners had permanent or semi-permanent cattle sheds for their animals. The cattle sheds were found constructed from either bricks, stones using clay as a cementing material or re-in-force cement concrete. 20.13 per cent owners had temporary type and 31.08 per cent thatched type of housing to their animals, which was made by using wood, dried wheat straws or bajra stovers. None of the animal was kept without shelter.

d) G. B. Pant University of Agri. & Tech. (GBPUA & T) Pantnagar.

The project is being implemented presently through 8 A.I. centers of U.S.Nagar and Nainital districts of Uttarakhand. During the year 2023, a total of 5220 AI were carried out 2608 confirmed pregnancies leading to conception rate of 53.58%. A total of 10447 daughters took birth. A total 169 bulls has so far been introduced in 9 different sets and total 54025 AI were carried out, 29588 pregnancies were confirmed, 10447 female progenies were born of which 2179 has reached age at first calving (Table-10).

The average first lactation 305 days milk yield of daughters completed their first lactation during the reporting period (2023) was 3585.3 kg. The average age at first calving of daughters was 1050.0 days during the reporting period. The overall loss of data was 20.42 % till the end of this reporting period. About 1828 daughters from first 7 sets of bulls have completed their 1st lactation 305 days milk yield. There is a trend of increase in 1st lactation 305 days milk yield of daughters in subsequent sets of bulls. In the daughters of 1st set of bulls (2010), it was 2494.8 kgs and in daughters of currently under recording set of bull (15th & 16th), it was 3834.76 kg which indicates a sharp increase of 1339.96 kg (53.71%) milk in

Table-10: Information regarding different set of bulls in GBPAU & T, Pantnagar unit.

Set No.	Date (FSD received)	FSD received	Bulls used	Total A.I.	A.I. followed	Pregnancy confirmed	Total calving	Female calves	
								Born	Reached AFC
10	20.01.2010	3,000	10	1,784	1,750	1,030	782	340	201
11	16.03.2011	2,906	06	2,303	2,303	1,546	1,207	542	296
12	25.07.2012	3,150	09	2,473	2,473	1,405	1,215	573	224
	04.09.2013	1,260							
13	05.02.2014	7,350	15	5,205	5,205	2,944	2,433	1,058	308
14	22.07.2015 17.06.2016	13538	30	9787	9787	5414	4582	2126	511
15	15.06.2017 12.10.2018	12,989	26	9,886	9,871	5,664	4,587	2,160	458
16	25.06.2019 09.02.2021	15784	25	12568	12462	7107	5545	2492	180
17	30.11.2021	11859	24	9359	8271	4478	2575	1156	1
18	11.10.2023	11760	24	660	-	-	-	-	-
SUM	-	**83596**	**169**	**54025**	**52122**	**29588**	**22,926**	**10447**	**2179**

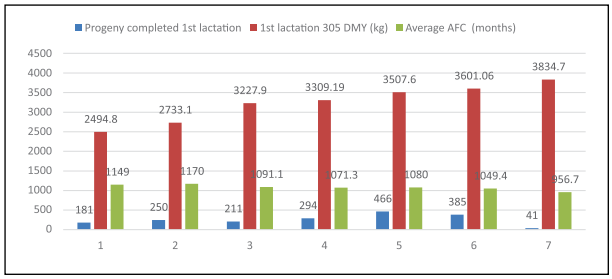


Fig. 10. Set wise progeny performance at GBPUA &T, Pantnagar unit since inception

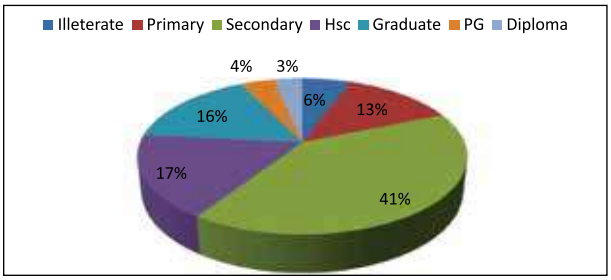


Fig. 11. Education status of Animal Owners participating in the project

progenies of bulls under test. A trend of decrease in age at first calving was also observed in subsequent sets of bulls. It was 1149 days in progenies of first set of Bulls (2010) and which has reduced to 956.7 days in currently under recording set of bull which indicate decrease of 192.3 days (16.73 %) in age at First Calving (Fig. 10).

Socio-economic status of farmers under the Project

Socio-economic status of the farmers owning progenies under the project during reporting period (2023) and their contribution in animal rearing in different groups are presented on table- 11.

The educational status of the owners of the progenies were analyzed. The owners of animals with an educational qualification of higher secondary were 17.3%. Illeterate owner were 5.7% and 40.5% of the owners were having an educational qualification of Matriculation whereas 16.1 % of the owners were having graduate/college qualification and 4.0% owners having post graduate qualification (Fig-11).

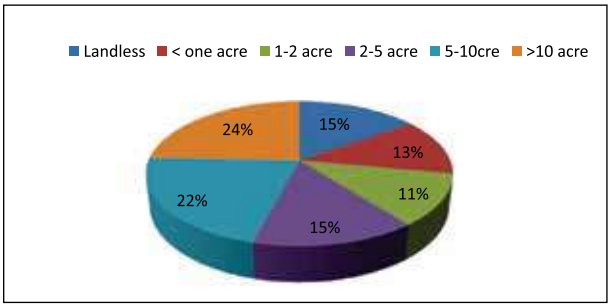


Fig. 12. Land Holding pattern of Animal Owners participating in the project

According to land holding patterns about 24.4% farmers were having more than 10 acres of land, 12.7% farmers having less than one acres and 15.2 farmers are landless whereas 21.5% farmers having 5-10 acres of land. About 25% farmers (11.5% up to 2 acres and 14.7%, up to 2-5 acres) (Fig-12).

A total of 16 Kisan-Chaupal were conducted in field where in 458 farmers took active part to understand the programme. The two success stories of farmers adopting Frieswal animals in the project is submitted.

Table. 11. Status of Farmers participating in the project according to different Category.

EDUCATION	ILLETERATE	PRIMARY	SECONDARY	HSC	GRADUATE	PG	DIPLOMA
	5.7	**13.1**	**40.5**	**17.3**	**16.1**	**4.0**	**3.3**
LAND HOLDING	LANDLESS	< 1 ACRE	1-2 ACRE	2-5 ACRE	5-10 ACRE	>10 ACRE	-
	15.2	12.7	11.5	14.7	21.5	24.4	-
OCCUPATION	FARMER	LABOUR	SERVICE	BUSINESS	DAIRY	OTHER	-
	65.8	18.8	10.1	1.2	3.2	0.9	-
HOUSING	ATTACHED	SEPARATE	-	PERM.	SEMI PERM.	TEMP.	THATCH
	52.8	47.2	-	64.2	20.4	13.8	1.6
FEEDING	STALL	GRAZING	BOTH	-	-	-	-
	97.7	1.3	1.0	-	-	-	-

C. Genetic aspects of Friesian X Sahiwal crossbred (Frieswal®) Project

Frieswal® herd at Karnal

Total herd strength of Frieswal cattle at Karnal was 238 (including 113 adult, 07 young male, 95 heifers and 23 calves) as on 01.01.2023 and 226 (including 102 adult cows, 13 young/adult males, 78 heifers and 33 calves) as on 31.12.2023. During the year a total of 12 male calves could be finally selected as young bulls and were shifted. A total of 10718 doses of Frieswal semen was sold to various stakeholders and a revenue of Rs. 1,40,790/- was generated. During 2023, a total of 47 calves were born (24 females and 23 males). All the cows and heifers were inseminated with the semen of ranked bulls so that male calves born from elite cows may be considered for selection of young bulls after fulfilling the other criteria. The 300 days milk yield, peak yield and lactation length were 2379.05 ± 170.41 kg, 12.66 ± 4.05 Kg and 336.21 ± 12.52 days, respectively. The average total lactation milk yield was 2131.57 ± 113.31 kg. The milk yield performance of Frieswal cows were much lower than the performance of Frieswal cows at Military Farm by the same cows. Reproductive performance of Frieswal cows in terms of service period, dry period and calving interval was also recorded and were 195.85 ± 8.42 days, 150.69 ± 17.55 days and 470.70 ± 6.23 days. The age at first calving was 990.42 ± 38.37 days (24).

Male Germplasm Unit (MGU), Meerut

The herd strength of Frieswal bulls and bull calves at MGU on 1st January, 2023 was 94. Eleven Frieswal bull calves were transferred from CIRC herd maintained at NDRI, Karnal to Male Germplasm Unit, CIRC, Meerut, however, one Sahiwal calf born through ETT at CIRC was introduced in MGU during the said period. Figure 13 indicates the number of semen ejaculates collected during different months in the reported period.

A total of 1,25,941 (1,14,766 Frieswal and 11,175 Sahiwal) frozen semen doses were produced from 45 bulls (41 Frieswal and 4 Sahiwal). Breeding soundness was assessed for the bull calves received at MGU and at the age of their first semen collection. Twelve culled bulls based on completion of semen quota & quality and health conditions were transferred to gaushala. The research experiments of scientists from the CGB, CNM, and CPR divisions were conducted on semen-donating Frieswal bulls.

The health assessment of the Breeding Bulls involved multiple tests conducted on various samples as per CMU guidlines. Serum samples from 87 bulls were examined for Infectious Bovine Rhinotracheitis (IBR), Tuberculosis, Johnes Disease and Brucellosis. Additionally, preputial wash samples from 77 bulls were tested for Trichomonosis and Vibriosis.

Health status of bulls were monitored daily both in the morning and evening. The clinical conditions like fever, inappetence, diarrhoea, abscess, foot wound, tick infestations, respiratory distress and lymphadenopathy etc were identified and treated. Bulls were vaccinated against Foot and Mouth disease (FMD), Hemorrhagic Septicaemia (HS), Black quarter (BQ) and Lumpy skin disease (LSD). Animals were dewormed regularly and ecto-parasiticide spray with amitraz and deltamethrin was done for control of ticks on animals and sheds as per CMU guidelines.

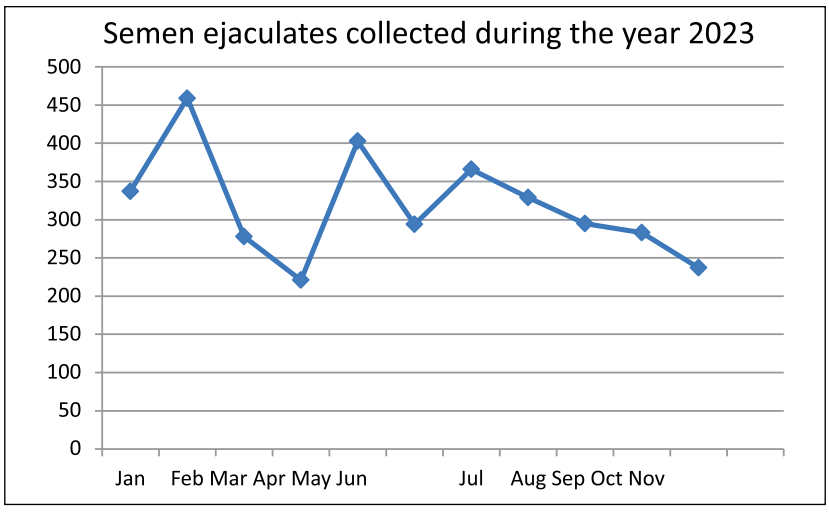


Fig. 13. Number of semen ejaculates collected during the reported year

II. INSTITUTIONAL PROGRAMMES

A. Expression and association of genes with production and reproduction traits

Transcriptome analysis of semen quality traits in Frieswal bulls

Keeping in view the importance of transcriptome profiling of bull spermatozoa between high and low fertile Frieswal bulls and their correlation with fertility, the proposed study was designed to generate the spermatozoal transcriptomics profiles of the high and low fertility Frieswal bulls. The study was carried out at ICAR - CIRC, Meerut Cantt (UP), India; a unit of ICAR-AICRP on Cattle. RNA isolation from the categorized bull spermatozoa samples was done using TRIzol (Invitrogen, USA) as per the manufacturer's instructions with minor modifications. The quality of RNA was checked by Qubit 4.0 and the yield and purity was assessed by Nanodrop 1000 spectrophotometer by measuring absorbance at 260 and 280 nm. Paired-end sequencing protocol from the sperm samples of twelve bulls was carried out to generate around 50 million reads of length 150 bp per sample using NOVASeq 6000 (Neuberg Supratech Research Laboratories (NSRL), Ahmdabad, Gujrat, India). The results from whole transcriptomic profiling revealed transcripts for 19,786 genes; of which 575 transcripts were significantly differed (log2FC±1, p-value < 0.05) between high and low fertile crossbred bull spermatozoa. Out of these 575 genes, 277 transcripts were significantly upregulated (fold change > 1) and 296 were significantly downregulated (fold change < 1) between these groups.

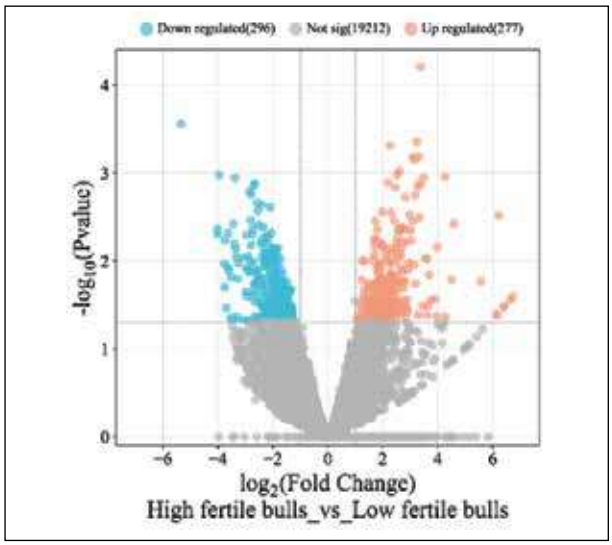


Fig. 14. The volcano plot showing significantly up and downregulated genes with p value <0.05 and log2foldchange ±1

Genetic evaluation of Frieswal cattle

Data on Frieswal cattle available were subjected to descriptive analysis of first to sixth lactation for heritability, genetic and phenotypic correlations between different lactation traits. Data were also utilized for construction of selection Index for improving the productivity of Frieswal cattle using first lactation. Expected response to selection in different traits included in the index (Dg i) were 78.155 kg , 87.43 kg, 0.407 kg and 1.532 days for first lactation total milk yield, first lactation 305 days milk yield, first lactation peak yield and first lactation length respectively (Figure 15,16&17).

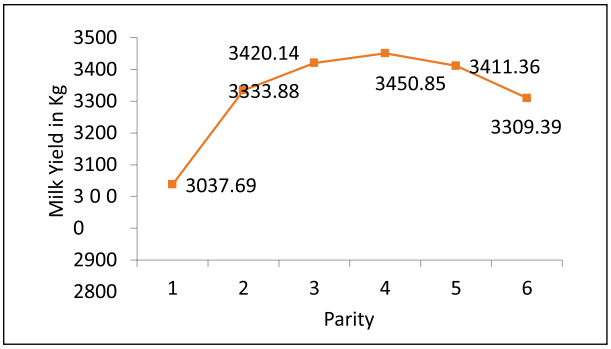


Fig. 15. Total lactation milk yield in Frieswal cattle

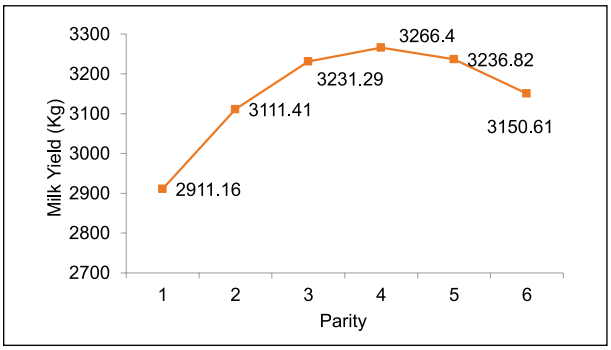


Fig 16 Milk yield (305-days) in Frieswal cattle

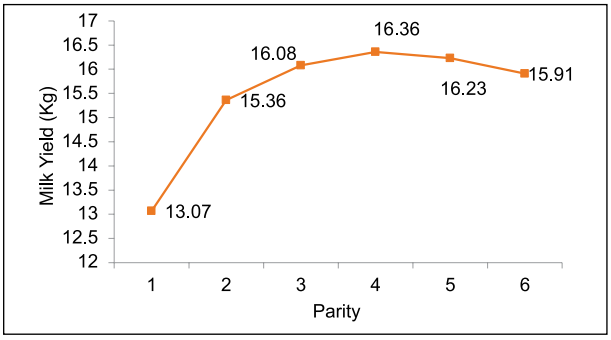


Fig. 1.7 Daily peak yield in Frieswal cattle

B. Semen Production Performance

Germplasm production and performance of Frieswal bulls

The overall average semen volume (ml), sperm concentration (million/ml), initial progressive motility (%) and post thaw motility (%) were 5.56±0.04, 1113.22±8.52, 57.89±0.24 and 41.73±0.18, respectively in 3475 ejaculates collected from 69 Frieswal bulls during 2023.

Semen samples from 41 bulls were frozen with more than 70% IPM as per CMU criteria of minimum semen volume (1.0 ml), sperm concentration (500 million/ml) and initial progressive motility (70%) and a total of 1,14,766 semen doses were produced for future breeding/ use in different projects/ cattle developmental programmes etc.

A total of 57,706 frozen semen doses for Field Progeny Testing Project and sale to various developmental agencies, para-vets and farmers for cattle improvement were made available to semen distribution centre of the institute.

Germplasm production and performance of Sahiwal bulls

The overall average semen volume (ml), sperm concentration (million/ml), initial motility (%) and post thaw motility (%) were 4.40±0.93, 1233.57±28.29, 58.57±1.16 and 40.39±0.74, respectively in 231 ejaculates collected from 6 Sahiwal bulls during 2023. A total of 11,175 semen doses were frozen from 4 bulls.

Quality assessment of Frieswal bull semen

Frozen semen samples from 71 breeding bulls were evaluated for semen quality parameters like post thaw motility, incubation test, acrosome integrity, hypoosmotic swelling test (HOST), sperm concentration and microbial load. Post thaw semen quality was evaluated in randomly selected two cryopreserved straws per bull (0.25 ml, French mini), thawed at 37°C for 30 seconds. The percent progressive motility following thawing at 0, 60, 120 minutes of incubation at 37°C were 50.88±0.25, 32.86±0.47 and 21.93±0.39, respectively. The plasma membrane integrity (%) as determined by HOST was 46.71±0.45 while acrosome integrity (%) was 74.53±0.35. The average sperm concentration per straw (0.25 ml) was 21.85±0.11 million. The mean bacterial load recorded in the frozen semen samples of the bulls was 957.7±104.8 CFU per ml. The neat semen of 14 newly introduced bulls was assessed for viability and morphology using eosin-nigrosin stain and acrosome integrity by Giemsa staining. The average percent live sperms and abnormalities of the head, mid piece and tail were 64.45±2.51, 16.06±3.26, 6.55±1.12 and 2.8±0.35, respectively and average percent of intact acrosome was 71.05±1.28. Neat semen from 6 problems bulls, whose semen was frequently rejected due to poor motility, was also assessed for viability and morphology. The average per cent live sperm was 59.53±3.8 and the abnormalities of sperm head, mid piece and tail were 15.81±5.1, 7.71±2.1 and 2.18±0.63 percent, respectively.

Table 12: Quality control parameters of frozen- thawed Frieswal bull semen.

Semen attributes (N=71)	Mean ± SEM
PTM (%)	50.88±0.25
Motility after incubation for 30 mins (%)	32.86±0.47
Motility after incubation for 60 mins (%)	21.93±0.39
HOST (%)	46.71±0.45
Acr-Int (%)	74.53±0.35
Concentration (million/straw)	21.85±0.11
CFU/ml	957.7±104.8

N: Number of samples ; PTM: Post-thaw motility; HOST: Hypoosmotic swelling test; Acr-Int: Acrosome integrity ; CFU: Colony forming unit.

Table 13: Quality control parameters for viability and morphology of Frieswal bull semen (neat semen)

Parameters	New bulls (n=42 samples)	Problem bulls (n=6)
Live (%)	64.45±2.51	59.53±3.8
Abnormal head (%)	16.06±3.26	15.81±5.1
Abnormal mid piece (%)	6.55±1.12	7.71±2.1
Abnormal tail (%)	2.8±0.35	2.18±0.63
Total abnormality (%)	25.9±4.1	25.7±6.2
Intact Acrosome (%)	71.05±1.28	69.4±1.8

C. Augmentation of reproductive efficiency

i) Level of Endogenous Tissue Inhibitor of Metalloproteinase-2 (TIMP-2) in semen and its effect on semen quality

Characteristics of fresh semen quality and TIMP-2 levels in bull semen samples

TIMP-2 was consistently detected in seminal plasma (30/30) and variably in sperm cells (25/30). The median TIMP-2 levels were 399.62 ng/L in seminal plasma (range: 100.27–535.99 ng/L) and 102.80 ng/L in sperm cells (range: 0–115.78 ng/10 million), as summarized along with semen quality parameters at the fresh stage in Table 14.

TIMP-2, Tissue inhibitor of metalloproteinases 2; SP, seminal plasma; SM, sperm membrane

Statistical analysis indicated that TIMP-2 levels in seminal plasma were significantly higher than those in sperm cells (p<0.001, Figure 18).

TIMP-2 levels in both seminal plasma and sperm cell membranes were significantly higher in Good ejaculates compared to poor ejaculates (p<0.01, Table 14). Furthermore, total TIMP-2 levels in the seminal plasma of fresh semen samples from Frieswal bulls showed a positive correlation with initial progressive motility (r=.652, p<0.01, Figure 19). TIMP-2 levels in the sperm plasma membrane also exhibited a positive correlation with initial progressive motility (r =.423, p<0.05).

Additionally, there was a significant negative correlation between abnormality at the neat stage and TIMP-2 levels in both seminal plasma (r=-.901, p<0.01) and sperm plasma membrane (r=-.537, p<0.01). A significant positive correlation was also observed between TIMP-2 levels in seminal plasma and sperm cell membranes (r=.552, p<0.001). However, there was no correlation observed between TIMP-2 levels in semen and sperm concentration or semen volume.

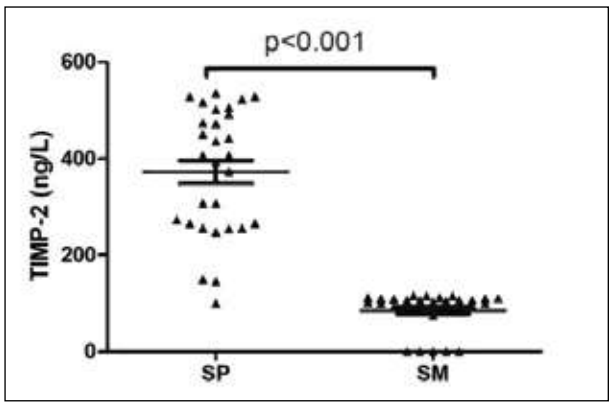


Figure 18 Comparison of TIMP-2 Levels in seminal plasma (SP) and Sperm membrane (SM) (p<0.001) in Bulls

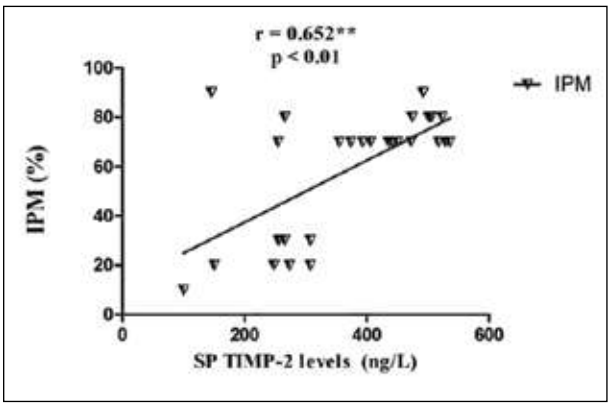


Figure 19 Correlation between TIMP-2 levels in seminal plasma (SP) and initial progressive motility (IPM), r=Pearson correlation; **Correlation is significant at the p<0.01 level (2-tailed).

Table 14 Tissue inhibitor of metalloproteinases-2 (TIMP-2) levels in semen and functional attributes of fresh ejaculates of crossbred bulls (Mean±SEM)

No. of ejaculates (n)	Volume (mL)	Concentration (million/mL)	Initial progressive motility (%)	Abnormality (%)	TIMP-2 in SP (ng/L)	TIMP-2 in SM (ng/10 million)
Good (n=21)	6.43±0.34	1040.24±64.21	74.29±1.48^{a}	7.91±0.49^{b}	428.86±22.68^{aA}	94.13±5.82^{aB}
Minimum	5	558.45	70	4.5	100.27	0
Maximum	11	1652.45	90	13.3	535.99	115.78
Poor (n=9)	6.63±0.60	988.57±73.79	23.33±2.36^{b}	19.54±1.30^{a}	240.35±23.27^{bA}	54.06±17.31^{bB}
Minimum	4.00	784.27	10	10.02	100.27	0
Maximum	9	1425.67	30	21.14	307.56	112.31

Values bearing different superscripts in a column (a:b, p<0.01) and row (A:B. p<0.001) differ significantly

Characteristics of post-thaw semen quality and TIMP-2 levels in bull semen samples

From the pool of good ejaculates (n=21) that were cryopreserved, 14 were classified as Freezable (PTM≥50%) and 7 as Non-Freezable (PTM<50%). Table 15 presents the post-thaw semen motility and the retrospectively traced TIMP-2 concentration in both the seminal plasma and sperm membrane for the Freezable and Non-Freezable groups.

Table 15 Comparison of post-thaw semen quality traits, kinetic parameters, and functional assays along with TIMP-2 levels between Freezable (PTM≥50%) and Non-Freezable (PTM<50%) semen samples (Mean±SEM)

	Freezable (*n*=14)	Non-Freezable (*n*=07)
PTM	53.93±1.40^{a}	35.71±7.87^{b}
Viability (%)	59.57±2.03^{a}	39.71**±3.34**^{b}
HOS test (%)	50.27**±1.12**^{a}	35.04**±2.25**^{b}
Intact acrosome (%)	75.14**±1.84**^{a}	59.00**±4.43**^{b}
TM (%)	76.50±1.70^{a}	52.42±4.81^{b}
PM (%)	48.43±1.05^{a}	25.71±3.51^{b}
Rapid sperm (%)	53.78±1.15^{a}	21.86±5.35^{b}
Slow sperm (%)	22.71±4.27^{b}	30.57±3.82^{a}
Static sperm (%)	23.50±0.87^{b}	47.58±4.81^{a}
VAP (µm/s)	124.03**±2.39**	115.92**±6.78**
VSL (µm/s)	87.78**±1.78**^{c}	78.33**±4.33**^{d}
VCL (µm/s)	210.66**±3.08**	218.58**±9.29**
ALH (µm)	7.57**±0.24**	7.78**±0.23**
BCF (Hz)	25.38**±0.72**	23.07**±0.43**
STR (%)	70.19**±1.80**	68.24**±1.78**
LIN (%)	41.49**±0.92**^{c}	36.36**±2.75**^{d}
Elongation (%)	41.64±0.82	39.57±1.78
Area (µm sq)	10.42±0.45	13.37± 0.65
DNA Integrity (%)	92.71±0.62^{a}	88.43±0.43^{b}
$\Delta\Psi_M$ (%)	39.28±1.17^{c}	34.13±2.17^{d}
ZB (no. of spermatozoa)	137.07±3.13	97.85±8.23
SP-TIMP-2 (ng/mL)	434.02±30.94	418.56±31.07
SM-TIMP-2 (ng/mL)	96.68±7.76	103.08±5.47

Values bearing different superscripts in the same row differ significantly (a:b, p<0.01; c:d, p<0.05); PTM, Post-thaw motility, subjectively analyzed; HOS, Hypo-osmotic swelling; TM, Total motile sperm; PM, progressively motile sperm; VAP, Average path velocity; VSL, Straight-line velocity; VCL, curvilinear velocity; ALH, amplitude of lateral head displacement; BCF, Beat cross frequency; STR, Straightness; LIN, Linearity (LIN); $\Delta\Psi_M$, Mitochondrial membrane potential; and ZB, Heterologous zona binding assay.

Correlation studies between seminal plasma and sperm membrane TIMP-2 levels, DNA Integrity, $\Delta\Psi_M$ and Zona binding assay

A strong positive correlation (r=.552, p < 0.01), between SP- and SM- TIMP-2 levels indicated that higher TIMP-2 levels in seminal plasma are associated with higher levels in sperm cells. Further a significant positive correlation (r=.530, p<0.05) between TIMP-2 levels in seminal plasma and DNA integrity suggested that higher TIMP-2 levels in semen are associated with better DNA integrity. A strong positive correlation (r=0.555, p<0.01), between DNA integrity and $\Delta\Psi_M$ indicated that better DNA integrity is associated with higher $\Delta\Psi_M$. Similarly, a strong positive correlation (r=.816, p<0.01), between DNA integrity and zona binding assay suggested that better DNA integrity is associated with improved zona binding capability.

ii) Effect of NIANP-BULLMIN supplementation on semen quality and haemato-biochemical profile of Frieswal crossbred bulls

A feeding trial to validate mineral mixture developed by ICAR-National Institute of Animal Nutrition and Physiology, Bengaluru, Karnataka, specifically for breeding bulls was conducted at Male Germplasm unit of the institute. A total of 24 breeding bulls were selected on the basis of semen quality parameters and were divided in two groups with 12 animals in each. Group 1 (Bulls graded as good on the basis of initial sperm motility and concentration) and Group 2 (Bulls graded as poor on the basis of initial sperm motility and low sperm concentration). The groups were further divided into 2 sub-groups having six animals in each A total of 213 blood and seminal plasma samples were collected on day 0, 15, 30, 60, 120, 180, 240, 300 & 360 and stored at -20°C C for further analysis. Semen samples were collected biweekly with AV method and were evaluated as per CMU guidelines. The blood and seminal plasma samples were analysed for various oxidative stress parameters like level of malondialdehyde, (MDA) Catalase (CAT), Superoxide dismutase (SOD) & Glutathione (GSH) and for important micro-minerals. Significant increase in semen volume and concentration were observed in Group 2 (A) (Bull graded as poor & fed with NIANP, mineral mixture) when compared with Gr2 (B) (Bull graded as poor & fed with conventional diet as per MGU, Meerut) on day 15, 120, 180, 240, 300 and 360 days. Similarly, significant increase in semen concentration was observed in Gr 1 (A) (Bull graded as good & fed with NIANP, mineral mixture) when compared with Gr 1 (B)

(bull graded as good and fed with conventional diet as per MGU) on day 30, 120, 180, day. Non-significant but consistent increase in initial progressive sperm motility were observed in both the groups feed with NIANP mineral mixture when compared with other respective control groups. Significant increase in the level of MDA with increased activity of Catalase were notice in the groups feed with NIANP, mineral mixture on day 30 and 60 days. Similarly, Significant increase in the activity of GSH were notice in the poor bulls feed with NIANP, on day 60. Significant increase in the level of Zn was seen 30 days' post feeding in blood and 60 days' post feeding in seminal plasma in poor bulls feed with NIANP Bullmin when compared with the control and day 0 values of the same group.

iii) Multiplication of superior indigenous cattle germ-plasm through multiple ovulation and embryo transfer (MOET)

During the period, a total of 21 superovulation trials were conducted, involving 12 Sahiwal, 4 Frieswal, 3 Gir, 1 Rathi, and 1 Tharparkar cows. Out of the 21 cows superovulated, 14 (9 Sahiwal, 2 Frieswal, 2 Gir, 1 Tharparkar) responded to the treatment, while 10 cows were successfully flushed, and 3 cows did not yield any transferable embryos. A total of 26 embryos were collected, out of which 17 were of transferable quality. Of these, 12 embryos were transferred, and 4 embryos were frozen. Five pregnancies have been confirmed from the 12 transfers in the year.

iv) Super ovulatory response and embryo recovery in Kankrej cattle

The experiment was conducted to investigate the superovulatory response and embryo recovery in twelve donor Kankrej cattle which were divided in to two groups (A and B) and synchronized with single dose of Cloprostenol (500 µg, IM). Superovulation was induced with pFSH (330 µg) in tapering dose started on 8th day of estrus for 4 days. Group-A cows (n=6) were given 10 µg GnRH while, Group-B cows (n=6) did not receive GnRH. Estrus following superovulation (53±2.15) took less time in hours than induced estrus after synchronization (61.2±5.01). Of the 12 cows, 8 (66.67%) were responding to the superovulation treatment (>2 CL), while 4 (33.33%) were not responding (≤ 2 CL). Using rectal palpation and ultrasonography, total mean CLs found in Group A were 4.33±1.27 and 5.67±1.62, and in Group B were 3.16±.94 and 4.17±.74. Furthermore, compared to the number of CLs in Group B, there was a substantial ($p<0.01$) decrease in embryo recovery. Superovulatory response and embryo recovery were non significantly higher using 330 µg pFSH in Group-A compared to Group-B.

Monitoring ovarian activity in cattle A) ultrasound, B) recto-vaginal method

Flushing of embryo under field condition

v) Effect of rheological properties of cervico vaginal mucus on conception rate in cattle

Twenty cows between the 3rd and 6th parity with similar body weights were selected for the present study. Estrus synchronization was performed

Embryo collection procedure of Embryo Transfer Technology (ETT) under field conditions

Searching of Embryos under microscope

Embryos retrieved via flushing from Sahiwal breed donor

in all the animals using the G-P-G protocol (0-7-9), and fixed-time artificial insemination was performed on the 10th day of the protocol (12 and 24 hours following the last dose of GnRH). The animals were properly restrained, and cervico-vaginal mucus samples were collected aseptically by aspiration and evaluated for rheological properties. Pregnancy diagnosis was performed 45 days after insemination, and the effect of various rheological parameters of cervico-vaginal mucus on the conception rate was studied.

The conception rate was significantly higher ($P<0.05$) in cattle with thin cervico-vaginal mucus discharge (41.66%) than those with thick cervico-vaginal mucus discharge (25%). A significantly higher percentage ($P<0.05$) of animals discharged transparent (65%) rather than cloudy (35%) cervico-vaginal mucus. The conception rate was also significantly higher ($P<0.05$) in animals with transparent (46.15%) compared to cloudy (14.28%) cervico-vaginal mucus. The percentage of cows showing a typical fern pattern in cervico-vaginal mucus samples was significantly higher ($P<0.01$) than those showing an atypical fern pattern. The conception rate in cattle with a typical fern pattern was significantly higher than in cattle with an atypical fern pattern. The pH of cervico-vaginal mucus in conceived cattle (8.36±0.47) during estrus was significantly higher ($P<0.05$) compared to that of non-conceived cattle (7.03±0.73). The average spinnbarkeit value (cm) during the preceding estrus was significantly higher ($P<0.01$) in conceived cows (11.95±1.57) compared to non-conceived cows (8.32±1.13).

Thus, it can be concluded that various rheological properties of cervico-vaginal mucus fertility and the conception rate in dairy cattle.

vi) Preliminary studies on conception rate with sex sorted semen in Cattle

In Indian dairy farming, sexed semen is mainly used to produce female offspring. Demand for this revolutionary technique is high, but the know-how is still in its infancy. The objective of the present study was to evaluate the conception rate with sex-sorted semen, validate the reproductive potential of calves born using sex-sorted semen, and formulate strategies for improving the conception rate with sex-sorted semen under Indian field conditions. The study was conducted in adopted villages near the ICAR-Central Institute for Research on Cattle, Meerut. The sexed semen was procured from government semen stations. A total of 196 inseminations were

performed with Indigenous sex-sorted semen of three Indigenous breeds: Gir (n = 85), Sahiwal (n = 85), and Red Sindhi (n = 30). The results were recorded.

The conception rate was higher in heifers (35.05%) compared to pluriparous cows (23.23%). Semen deposited in the uterine horn yielded better conception rates (30%) compared to inseminations done in the uterine body (27%). A higher conception rate was observed when the semen was deposited 34-42 hours after the onset of estrus [37.66% (29/77)] followed by insemination 25-33 hours after the onset of estrus [28.88% (26/90)]. The sex ratio of the calves born from sex-sorted semen was 58 females to 1 male [58:1 (98.30% female offspring)]. The overall conception rate with sex-sorted semen was recorded to be 29.50% (59/200), which was lower than the conventional semen rate of 44.17% (106/240).

The female calves (n=6) born using sex-sorted semen were followed until sexual maturity and inseminated using sex-sorted semen. They were further monitored until first calving, which again

Female calf born using sex-sorted semen under field conditions

produced female calves, confirming the normal reproduction of the calves born using sex-sorted semen. It was concluded that sex-sorted semen may be effectively used in Indian conditions to obtain female progeny. For achieving better conception rates from sex-sorted semen, insemination should preferably be done in heifers. Semen should be deposited in the ipsilateral uterine horn, and the timing of insemination should preferably be 34-42 hours following the onset of oestrus.

D. Improvement of cattle productivity through nutritional and managemental approaches

i) Assessment of subclinical mastitis and development of therapeutics for its management in cattle

The work was carried out at the organized dairy farm NDRI Karnal in Frieswal lactating dairy cattle. Farm management practices such as milking practices, age, breed, parity, milk yield, season and lactation stage of individual animals were recorded. Screening of cows for subclinical mastitis was done using California mastitis test. Thermal imaging of udder of cows were done with the help of infrared thermal imaging camera positioned at uniform distance from the udder. The temperature of mammary gland was measured at different locations of the udder quarters. About 20 ml of quarter foremilk sample was collected directly into the sterile test tube considering the aseptic procedures. The milk samples were analzsed for milk composition, somatic Cell count (SCC), electric conductivity and salt concentration.

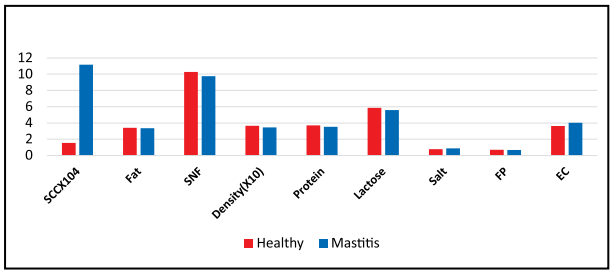
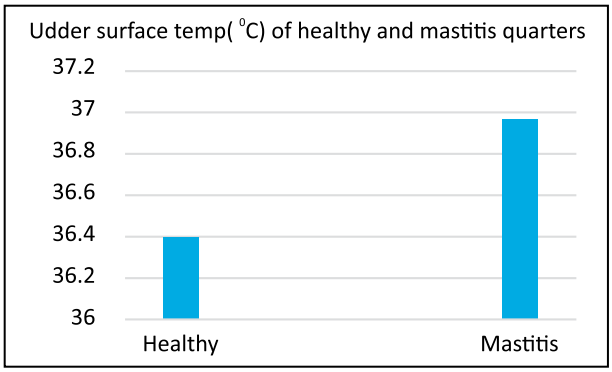


Fig. 20 Milk composition of healthy and mastitis udder

Out of 95 animals, 47 cows were detected SCM in one or more teats. Higher prevalence was observed in mid to late lactation, high parity animals and high yielder animals. 38.68% quarters were found to have SCM and higher occurrence was recorded in RH teats.

Higher somatic cell count, electrical conductivity and salt concentration were recorded in mastitis milk while higher protein, lactose and SNF was recorded in milk from healthy quarters



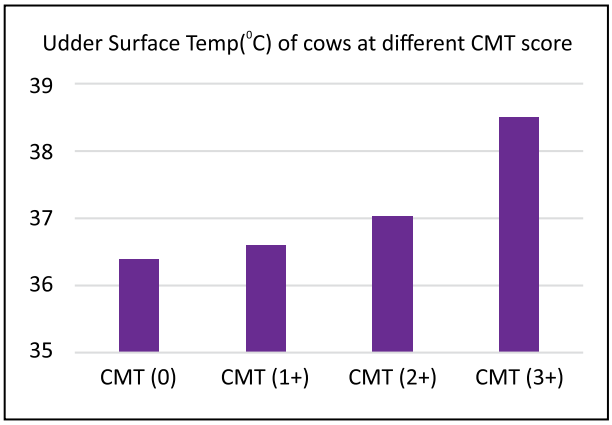
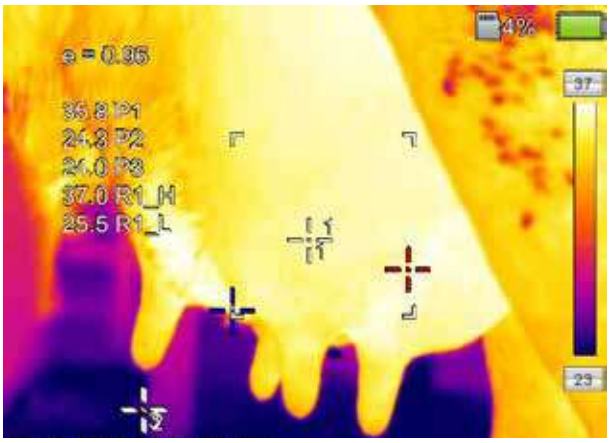


Fig. 21 Temperature variation of healthy and mastitis quarters using infrared thermography

Table. 16 Prevalence of subclinical mastitis in lactating cows based on age, parity, milk yield and pregnancy

Variables	No. of cows tested	No of cows in each group	No. of positive cows	Prevalence (%)
	95		47	49.47
Age/Parity	1-3	50	28	56
	>3	45	19	42.22
Lactation stage	Early	19	8	42.10
	Mid	32	16	50.0
	Late	44	23	52.27
Milk Yield	<5	5	-	-
	5-10	29	12	41.37
	>10	61	35	57.37
Pregnancy Status	Pregnant	49	27	55.10
	Non Pregnant	46	20	43.47



Infrared thermography of udder

Infrared thermography of the udder revealed higher udder surface temperature of the mastitic quarters as compared to healthy quarters. At CMT score 1, the mastitic quarters did not have significant variation in the udder surface temperature as compared to healthy quarters although somatic cell counts were increased significantly while at CMT score 2 and 3, udder surface temperature of mastitic quarters was markedly elevated

Thermal imaging of udder for screening of sub clinical mastitis

ii) Assessment of Immuno-metabolic and oxidative stress markers in cows during transition period

The study was conducted on multiparous elite Frieswal cows kept at ICAR-National Dairy Research Institute, Karnal. A total of 32 clinically healthy Frieswal cows were used in the present study. Animals were divided into two groups of 16 animals in each group. Group 1 animals were in the last trimester of pregnancy (60 to 90 days prior to calving) and Group 2 had 16 non-pregnant Frieswal cows in mid-lactation (>90 days of lactation). A total of 48 blood samples from group 1 were collected at -21 days pre-calving, on the day of calving (day 0), and +21 days post-calving. In view of the difficulty in predicting the exact date of calving, pre-calving samples at -21 days were taken with a standard deviation of ±3 days. Additionally, 16 blood samples from animals of group 2 were also obtained and were used as the standard base value for the analysis of data.

In the present study, at day 0 (day of calving) significantly ($P \leq 0.05$), lower levels of serum cholesterol, triglyceride, HDL-C, LDL-C, and VLDL were detected in Frieswal cows when compared with -21 days pre-calving values of the same group and standard base value of the controls group. Similarly, significant ($P \leq 0.05$) increase in the level of serum total cholesterol, triglyceride, HDL-C, LDL-C, and VLDL were noticed from day 0 to +21 days post-calving which reached to the pre-calving levels (-21 days) except for total cholesterol and triglyceride. Significantly ($P \leq 0.05$) lower levels of total protein and globulin were detected in parturient Frieswal cows on the day of the calving compared to the rest of the transitional period and standard base value in the control group. On the other hand, albumin concentration was similar throughout the transitional period with a non-significant small increase on the day of calving. Significant increase in A: G ratio was recorded on the day of calving when compared with the values of -21 days pre-calving, +21 days post-calving, and with the standard base value of the control group. Significant ($P \leq 0.05$) increase in the activity of liver enzymes like AST, ALT, and ALP was seen on the day of calving when compared with -21 pre-calving values of the same group and the standard base value of the control group. Significant ($P \leq 0.05$) increase in levels of nonesterified fatty acids (NEFA) and beta-hydroxybutyrate (BHBA) were noticed on the day of calving when compared with -21-day pre-calving, +21 days post calving values of the same group (Fig 22 & 23) The level of all pro-inflammatory cytokines were significantly ($P \leq 0.05$) decreased on the day of calving when compared with -21-day pre-calving, +21 days' post calving values of the same group. (Fig 24). Significant decrease in the activity of anti-oxidant enzymes (CAT & GSH) with increase in the level of MDA were noticed on the day of calving when compared with -21 day pre-calving, +21 days post calving values of the same group (Fig 4). On recommendation of the IRC (2022), 10 more animals were assessed for NEB markers on day + 42 & + 63 days post calving and animals were found to be in NEB up to 42 days post calving. Thus the study indicated that Frieswal dairy cows are in Negative energy balance (NEB) during the transitional period as depicted by significant decrease in the level of total cholesterol, its fractions, and increase in the level NEFA & BHBA on the day of calving and unable

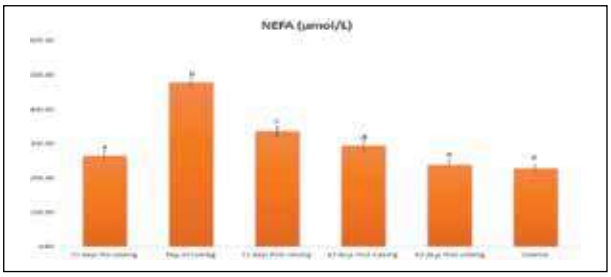


Fig. 22 NEFA levels of Cow during transitional period when compared with control animals (Non-pregnant Cows in Mid lactation). Values are represented as mean ± SE (n = 16). Means carrying different superscripts were significant at ($p < 0.05$)

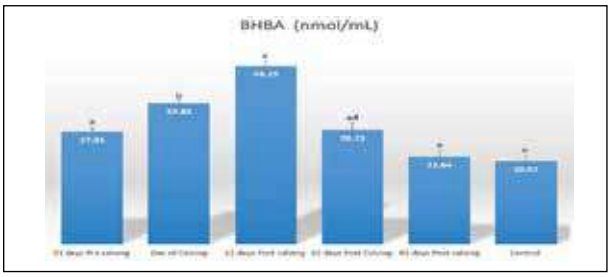


Fig. 23 BHBA levels of Cow during transitional period when compared with control animals (Non-pregnant Cows in Mid lactation). Values are represented as mean ± SE (n = 16). Means carrying different superscripts were significant at ($p < 0.05$)

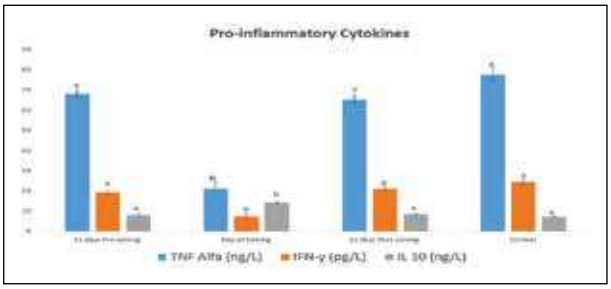


Fig. 24 Pro-inflammatory Cytokines levels of Cow during transitional period when compared with control animals (Non-pregnant Cows in Mid lactation). Values are represented as mean ± SE (n = 16). Means carrying different superscripts were significant at ($p < 0.05$)

Fig. 25 Oxidative stress markers of Cow during transitional period when compared with control animals (Non-pregnant Cows in Mid lactation). Values are represented as mean ± SE (n = 16). Means carrying different superscripts were significant at ($p < 0.05$)

to recoup the same after 21 days post-calving when compared with the control group.

Transitional Cows were found to be in state of oxidative & immunological stress as depicted by significant decrease in the activity of anti-oxidant enzymes (CAT & GSH) with increase in the level of MDA on day of calving and unable to recoup the same even after 21 days post-calving. Similarly, significant decrease in the levels of all pro-inflammatory cytokines were noticed on the day of calving when compared with -21 day pre-calving, +21 days post calving values of the same group (Fig 25).

iii) Role of Vit. E & Se in amelioration of metabolic stress in cows during transition period

The study was conducted on multiparous elite Frieswal cows kept at ICAR-National Dairy Research Institute, Karnal. A total of 32 clinically healthy Frieswal cows in the last trimester of pregnancy (60 to 90 days prior to calving) were divided into two groups of 16 animals each. Group I (treatment group) was administrated with Vit E in form of DL-alpha tocophenyl acetate @ 250 mg and Se @ 7.5 mg total dose IM, 21 days pre- calving and on day of calving. Group 2 served as control. had 16 non-pregnant Frieswal cows in mid-lactation (>90 days of lactation).

A total of 96 blood samples were collected at -21 days pre-calving, on the day of calving (day 0), and +21 days post-calving. In view of the difficulty in predicting the exact date of calving, pre-calving samples at -21 days were taken with a standard deviation of ±3 days. No-significant differences were noticed in the concentration of AST, ALT, ALP, TP, Albumin, Globulin, NEFA and BHBA between the treatment (treated with Vit. E and Se) and control group during the transition period. Significant increase in the activity of CATand GSH with decrease in the level of MDA were noticed in treatment group (treated with Vit. E & Se) on day of the calving and +21 days post calving when compared with control (Figure 26). Significant increase in the

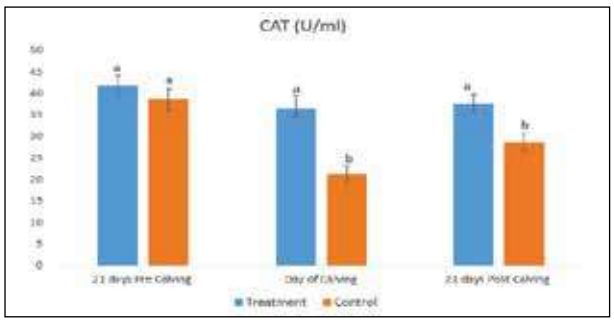


Fig. 26 Level of CAT (U/ml) in Cows treated with Vit E & Se when compared with control animals during transitional period. Values are represented as mean ± SE (n = 16). Means carrying different superscripts were significant at ($p < 0.05$)

level of TNF Alfa and IFN-γ with decrease in the level of IL-10 were noticed in treatment group on day of the calving and 21 days post calving when compared with control (Figure 8, 9 and 10). Study revealed that Vit E and Se administration 21 days pre calving and on the day of calving helps in amelioration of metabolic stress in cows during transition period as depicted by significant increase in the activity of CAT and GSH with decrease in the level of MDA in treatment group (treated with Vit. E and Se) on day of the calving and 21 days post calving. Significant increase in the level of TNF Alfa and IFN-γ with decrease in the level of IL-10 were noticed in treatment group (treated with Vit. E and Se) on day of the calving and 21 dayspost calving.

E. Economics of cattle husbandry

i) Economics of productivity of Indian cattle breeds vis-à-vis crossbred cattle

During the period, a survey was conducted to assess the socio-economic status of five commercial dairy farmers of Moradabad district. The occupation, land holding size, average herd size, availability of indigenous and crossbred cattle, average milk production from cattle reared and investment pattern were recorded. The average land holding size was 3.5 hectares of dairy farmers whereas the average herd size was as 9.73 and 18.87 animals of indigenous and crossbred cattle per farm respectively. The average standard animal units of milking animals per farm were 2.20 indigenous and 4.40 crossbred cows during the study. The investment it ranged from 6.60 to 19.28 lacs per herd on livestock. The highest total standard animal units was 41.82 at the dairy farm in Vill-Dehri (5) 17.73, 19.35, 19.39 and 39.55 units at farm at villages Shahpur, Sarkada, Amarpur Koshi, and Bhikampur, respectively. The lactating animal's percentage of total standard animal units (TSAU) of total indigenous cows was 56.40 at shahpur, 38.46 percent at farm Sarkanda, 31.42 and 4.78 percent at Vill-Dehri. The crossbred lactating cows' total standard animal units (TSAU) was 40.0 percent at the dairy farm Sarkanda, 76.7 percent at dairy farm in Amarpur Koshi, 32.11 percent at dairy farm in Bhikampur and 30.37 percent at Dairy Farm in Vill-Dehri. The overall expenditure was highest (27.70 percent) on green fodder followed by dry fodder (22.62 percent), concentrate (21.67 percent), labour exp.(12.82 percent), depreciation on milch animal (3.68 percent), depreciation on shed (2.43 percent), mineral mixture (1.27 percent), veterinary exp. (1.01 percent), insurance premium (0.29 percent), miscellaneous exp.(0.72 percent), interest on milch animal (2.12 percent), interest on shed/building (1.66 percent), interest on equipment's (1.16 percent) and depreciation on equipment's (1.59 percent). The study on cost and returns of lactating indigenous cow in Moradabad revealed that the overall per litre cost of production was Rs 45.82/litre and the average sale price per litre was Rs 45.00/litre. Therefore, the loss was Rs 0.82 per litre per day. On the other hand, lactating crossbred cow farm cost production and return was Rs . 36.75 per litre/day cost of production, Rs 40.00 per liter. The overall profit of Rs. 3.25 per liter per day on the crossbred dairy farms was found in Moradabad district.

ii) Economics of Dairy Cattle Farming in Uttar Pradesh

A survey was conducted in 3 selected district namely Ajamgarh, Bijnor and Saharanpur. The districts were selected on the basis of number of crossbred and indigenous breed of cattle in these districts which were comparatively higher in the selected districts. Further, in each district two blocks and in each block two villages were selected randomly. A pre designed proforma was used to interview the farmers from selected villages. A total of 200 farmers, 20 from each village namely Bandaheri, Kamhera, Kuwakhera, Kanshipur, Harganpur, Rampurdas, Kanaila, Daulatabad, Kajibhiti, Tengarpur were included in the survey. Data were collected with respect to socio economic profile of dairy farmers, livestock inventory, livestock farm inventory, recurring expenditure per months, production and utilization patter of milk, expenses on feed and fodder, labour involvement, milk production, marketing and processing of milk and milk products, consumption pattern of milk and

Collection of Data from village Harganpur and Rampurdas of Kotwali block of Bijnor Districts

milk products, production parametrs of dairy animals and income from sale of the milk or livestock. It was found that maximum number of farmers fall in small category with average 1.88 animal units, followed by medium and large category of farmer with animal units of 5.18 and 9.72, respectively. Total fixed cost for cross bred cattle were significantly higher than indigenous cattle, while total variable cost were almost similar. The production cost for milk per liter from crossbred animals was found higher than indigenous cattle, however as it yields higher amount of milk, overall gain from animal was higher in crossbred cattle as compared to indigenous cattle in surveyed area.

iii) Development of dung-based bio- briquettes as solid fuel source

The study was made with objective to optimize the preparation and to evaluate the efficacy of biomass briquettes made from dung waste as a solid energy source. For the preparation fresh dung biomass, dried, semidried and combinations were attempted. After addition of other biomass viz: tree leaves, straws, sugar cane baggage else additives viz: combustion promotor, smoke suppresent and desulpherizing agents, the bulk were placed in feed press machine. A fabricated iron frame was also placed on the top of filled up biomass and unit was operated at its maximum pressure capacity (200 kg/cm^2). As soon the pressing piston reached its maximum extension, the blocks were taken out and sun dried. The bio-briqueste blocks were evaluated for their physico-chemical characteristics and combustion properties. The preliminary screening of biomass viz: tree leaves, straws, sugar cane baggage and flower waste revealed that sugarcane baggage can be incorporated at the level of 10% for the preparation of dung log. Increase in incorporation level was associated with increase in drying time, increase in density, decrease in porosity and shatter resistance. Use of dried dung powder for preparation of dung waste was found to be cumbersome and pulverization was not economic. The chemical mixture for combustion promotor smoke suppressor and desulfurizing agent were identified and their level of incorporation for preparation of dung based bio-briquette was optimized. The physico-chemical characterization of prepared bio-briquette was made and treatment group was having significantly higher calorific value with almost negligible visible smoke.

In the currently practiced processing the removal of bio-briquette from fabricated iron frame after pressurization is difficult. Secondly some suitable binding agents are being explored based on economy to achieve higher densification.

Processing of Dung-biobriquetes at ICAR-CIRC

iv) Unconventional Feed resource for animal feeding

Preparation of silage (in vitro) from green Carrot Tops

Carrot tops (CT) are foliar leftover of root vegetable. These are rich source of nutrients and make good choice for ruminant feeding. However their use as feedstuff is often cumbersome owing to high moisture and perishability. Few attempts have been made to include CT in ruminant ration as densified feed block and silage. Some additives and lactic acid bacteria have been also used for preservation of CT as silage. The present study was made to prepare quality silage from CT using novel additives like maize flour (MF) and curd (MC). The fresh CT contained DM-13.95, CP-12.03, EE-1.93, CF-15.72, Ash-16.26, OM-83.74, NDF-40.72 and ADF-33.94 percent on dry matter basis. A 2.5 kg portion of CT was uniformly mixed with each of 50g DW (control; T-1), 50g MF+50g DW (T-2), 50g MC (T-3), and 50g MF+50g MC (T-4). A 500g portion of each treatment mixture was filled in tear-proof high density polythene bags in quadruples and kept under the dark for 30d ensiling.

A reduction in the contents of DM, NDF and OM, while increase in the CF, and ADF contents was observed during the development of silage. The contents of ADF were significantly higher in the T-4 where a combination of MF and MC additives was used.

The silage fermentation characteristics such as pH, total nitrogen (TN), ammonia nitrogen (Amm N), Amm N as % of TN (Amm N %) and total volatile fatty acid (TVFA) were estimated in the samples of silage across all the treatments (Table 17). In the silage the TN contents were similar across different treatments.

Chopped carrot top

Appearance of silage (CT+Dw)

Yet the lower levels (statistically) of pH and Amm N and Ammo N%, and higher levels of TVFA in T-2 and T-4 (Fig. 27), indicated improved silage quality on addition of MF (2% level) due to increased supply of fermentable carbohydrates and better microbial activity which further improved on combination of MF and MC.

Appearance of silage (CT+MF+Dw)

Nutrient composition of Sugarcane trash (SCT) as alternate animal feedstuff

Sugarcane is one of the important cash crops of western Uttar Pradesh. Sugarcane trash is the residue sugarcane crop and most of it usually destroyed in

Table 17 Nutrient composition of carrot tops (CT) used under different treatments and fermentation attributes of its silage prepared (in vitro).

Attributes	Silage Treatments				Significance
	T-1 (Control)	T-2 (2% MF)	T-3 (2% MC)	T-4 (2% MC & MF)	
Nutrient composition					
DM (% fresh matter)	12.34^{a}	14.35^{b}	12.53^{a}	13.41^{ab}	*
CP (% DM basis)	12.19	12.84	12.49	12.93	NS
CF (% DM basis)	17.52	18.52	17.95	18.76	NS
NDF (% DM basis)	39.93	39.71	39.93	39.87	NS
ADF (% DM basis)	36.24^{a}	37.22^{a}	36.01^{a}	39.51^{b}	*
OM (% DM basis)	80.88	80.38	80.44	80.52	NS
Silage fermentation parameters					
pH	5.50^{b}	5.06^{a}	5.31^{ab}	4.90^{a}	**
Total N (% DM basis)	1.95	2.05	2.00	2.07	NS
Ammonia N (% DM basis)	0.26^{b}	0.22^{ab}	0.24^{b}	0.18^{a}	*
Ammonia N (as % TN)	13.13^{b}	10.68^{a}	12.10^{ab}	8.81^{a}	*
TVFA (mM/dL)	2.33^{a}	2.87^{b}	2.50^{a}	3.30^{b}	*

*NB: Values bearing unlike superscripts in the row differ significantly *= (P<0.05) **= (P<0.01), NS = Non-significant.*

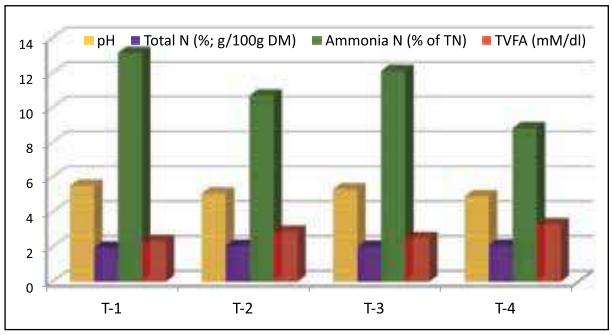


Fig 27 Fermentation characteristics of silage prepared (in vitro) from carrot tops (CT).

the field. According to an estimates approximately 1.5 tonnes of trash (SCT) can be collected from one acre of sugarcane crop. Twenty samples of SCT were collected from different villages viz., Phaphunda, Gogol, Aurangabad, Chhilora, Shipura, Dabka, Panchali khurd, Pooth khas, Dabathua, and Arnavali from Meerut district. The contents of different nutrients (%, average) of SCT viz: DM, CP, EE, CF, Ash, OM, NFE, NDF, ADF and ADL (Table 18) revealed that it can be used as alternate dry fodder for feeding of ruminant animals. Moreover, being low-density fibrous, low in nitrogen, soluble carbohydrates etc with varying amounts of lignin, its feeding value could be improved further by ensilage, use of other chemical treatments or proper supplementation.

Table 18 The contents of different nutrients (%, average) of Sugarcane trash in Meerut district.

Description	Nutrients parameter (%, average) of Sugarcane trash (n=20)									
	DM	CP	EE	CF	Ash	OM	NFE	NDF	ADF	ADL
Mean	90.58	3.22	1.70	35.57	10.76	89.24	49.65	79.99	50.56	20.83
SE	0.31	0.05	0.04	0.35	0.29	0.29	0.45	0.28	0.39	0.33
SD	1.39	0.24	0.19	1.55	1.29	1.28	1.97	1.26	1.73	1.47
Min	87.97	2.88	1.22	31.28	8.99	86.96	45.91	77.60	47.27	17.27
Max	92.70	3.86	2.04	37.47	13.04	91.01	52.85	82.32	52.92	24.11

III. ICAR-Funded Schemes

A) Agro-biodiversity conservation of cattle genetic resources

Consortium research platform on agro-biodiversity conservation of Animal Genetic Resources (CRP on Agrobiodiversity): Cattle Unit, ICAR-Central Institute for Research On Cattle, Meerut

The project was initiated this year with lead centre at NBAGR, Karnal and corroborating unit for cattle at ICAR-CIRC, Meerut. The objective of the project is cryobanking of somatic cells of Indigenous cattle breeds. Since, it was the newly implemented project, first of all the new cell culture lab was established. With procurement of new equipment viz: CO2 incubator, bio-safety cabinet, non-refrigerated centrifuge, LN2 Containers with cryorack, UV Cabinets and requisite chemicals, the laboratory has been made operational. A separate area has been identified for the said laboratory which can take up the activities of cryopreservation of fibroblast cell from different cattle breeds. Using the ear marginal tissues from Frieswal Cattle, the laboratory protocols for cryopreservation of fibroblast cells was standardized. The target breeds for the next year are Ponwar, Vechur, Pullikulam, Krishna Valley and Khariar. The work on earlier committed cattle breeds Vechur and Badri cattle are in progress.

Unde the said project Tharparkar, Purnea, Mewati (Vulnerable), Hariana, Shweta Kapila, Ladakhi, Siri (Vulnerable), Himachali Pahari, Gir, Sahiwal, Belahi (Endangered), Kankrej, Sanchori, Nari, Kasargod, Malvi, Nimari, Gangatiri, Poda Thurpu, Bachaur, Binjharpuri, Malnad Gidda, Deoni, Punganur (Vulnerable), Ongole, Red Sindhi, Hallikar have been already conserved at lead centre, NBAGR, Karnal.

a) Collection of ear notch sample b) Newly estbalished cell culture lab c) Activities under CRP on Agrobiodiversity

B) Farmer FIRST Programme

Livelihood improvement through sustainable dairy farming using suitable interventions"

Animal Health Camps, Demonstrations and Training

During the year 2023, ICAR-CIRC implemented several impactful initiatives under the Farmer FIRST Programme to enhance agricultural and livestock practices in adopted villages. The programme included 20 animal health camps and 48 outreach visits, providing veterinary care and health assessments to 960 animals and benefiting 746 farmers along with 350 farm families. Additionally, twelve demonstrations were conducted on integrated farming system (IFS) Models, and Extension activities, aiming to educate farmers on modern farming techniques and sustainable practices.

A pivotal event during this period was the Training Programme cum Farmer's Field Day held on 23rd December 2023, during Kisan Divas, which attracted participation from over 200 livestock farmers. This event included workshops and practical sessions focused on enhancing productivity and income generation in agriculture and livestock sectors. Moreover, the occasion served as a platform to recognize and felicitate six progressive livestock owners and six para-vets for their exemplary contributions to agriculture and livestock management. These initiatives highlighted our efforts to empower farming communities through

Training Programme cum Farmer's Field Day held on 23rd December 2023 during Kisan Divas

Table 19 Details of general transect walk of villages adopted under FFP

Criteria	Sugarcane fields	Residential area	Pond
Soil type	Sandy loam to loam with normal pH. *	Sandy loam	Clay loam
Topography	Plain	Plain/Upland	-
Crops	Sugarcane, Rice, Wheat, Brinjal, Bottleguard, Urad, Tuar, Masoor	Tomato, Coriander, Chilli, Maize, Ocra, Lauki, Turai, Pumpkin	Water chestnut
Livestock/ Fish	Cow, Buffalo, Goat, Poultry	Cow, Buffalo	--
Fruits and other trees	Mango, Banana, Guava, Jamun, Peach, Karonda, Citrus	Neem, Bargad, Jamun, Guava, Mango	-
Water resource	Borewell, Handpump, Canal	Borewell, Handpump	Pond
Disease and pest	Stem borer, Leaf folder, caterpillar, Anthracnose, Repeat breeding, ecto-parasitic infestation, diarrohea, endo parasites.	Foot and mouth disease, Mastitis, E.coli disease	-
Nursery	Mango, Guava, Citrus, Jamun,	Mango, Guava, Citrus, Jamun,	-
Weeds	Parthenium, Cyperus rotundus, Cynadon dactylon, Echinochola, Eleusina Indica, Ageratum conyzoides, Malva sylvestris, Eclipta alba,	Cyperus rotundus, Cynadon dactylon, Euphorbia hirta, Spergula arvensis and Vernonia anthelmintica	Eichnornia, Algae
Problems	Pest and diseases, fruit loss, stay animal, Livestock Health and Disease Management, Access to Quality Feed and Fodder, Breeding and Genetics, Lack of Knowledge and Training Market Access and Value Addition	Disease in Livestock and poultry	Weed

Reproductive health management delivered to farmers at their doorstep by the FFP team.

knowledge dissemination and skill enhancement in agriculture and livestock management.

Under the scheme 6 new villages namely Kushwali, Daulatpur, Aterna, Kanhayia, Atuta, and Kulanjan, were adopted. The adoption involved a holistic approach, encompassing the organization of animal health camps, demonstrations on integrated farming systems, and extension activities aimed at educating farmers on sustainable practices. By integrating these villages into the programme, ICAR-CIRC aims to foster rural development, empower local communities with enhanced agricultural knowledge, and improve overall livelihoods through effective implementation of modern farming techniques and skill-building opportunities.

A total of 04 Mahila Self Help Groups (SHGs), 02 at Jhitkari and 02 at Chandana, were formed under the Farmer FIRST Programme. The SHGs provide a platform for women to collaborate, share resources, and gain access to training and financial assistance, thereby enhancing their socio-economic status and promoting community development. These efforts were part of ICAR-CIRC's broader commitment to promote gender equality, empower women in agriculture, and create sustainable livelihood opportunities through collective action and community-based initiatives.

Additionally, 01 Farmer Producer Organization (FPO) was established at Kushwali. This initiative aimed to empower farmers in rural areas by fostering collective efforts in income-generating activities, including clean milk production, milk processing, and other agricultural ventures.

C) Special Assistance Programme of Central Government

(i) Scheduled Caste Sub Plan (SCSP)

The Scheduled Caste Sub-Plan (SCSP) is a program run by the Government of India to promote economic development for Scheduled Caste (SC) families living below the poverty line. The programme provides resources through family-oriented schemes. Government of India has made provision for expenditure of 8.37 percent of total budget of that Institution. During the year a budgetary provision of Rs. 36 lakh was made for this scheme.

Keeping the objectives of this mission in mind various training programmes were conducted for the benefit of farmers and livestock keepers belonging to scheduled caste community under SCSP. In addition to that, various interventions pertaining to animal nutrition, animal health, livestock management, field crop production, drudgery reduction of farmwomen, proper disposal of dairy farm waste and value addition of milk and dung etc were executed on the farms of the farmers. On field demonstration of various technologies/farm equipments developed by ICAR were made before distribution to the beneficiary farmers. The farmers were provided with small farm implements such as wheel barrow (developed by CIAE, Bopal), PUSA Wheel Hand Hoe, PUSA Power winnow, PUSA chaff cutter (developed by IARI, New Delhi), nutritional supplements such as Mineral Mixture (developed by CIRC); and various medicines to treat ecto and endo-parasites were distributed to the farmers. Farmers were provided CMT kits for detection of sub-clinical mastitis and teat dip cup, milking pail and animal rubber matt for clean milk production.

Details of the programmes conducted under SCSP:

S. No.	Name of the training/ meeting	Venue & Date	No. of Farmers participated
1.	Training cum input distribution programme on Proper utilization of farm and animal wastes with special reference to paddy straw treatment and its utilization in animal feeding	Village Gagol (Meerut) 11 Jan 2023	52
2.	Meeting of stakeholders of village Buggawala and Lalwala Khalsa (Distt. Haridwar) regarding implementation of SCSP activities in the villages	Village Lalwala Khalsa (Haridwar) 17 Jan 2023	50
3.	Training cum input distribution programme on Proper housing management and clean milk production	ICAR-CIRC, Meerut 28 Jan 2023	69
4.	Training cum input distribution programme on Healthy animals and clean milk production	Village Manduwala (Saharanpur) 13 Feb 2023	70
5.	Training cum input distribution programme on Augmentation of Milk Production by Proper Housing Management	Village Lalwala Khalsa (Haridwar) 22 Feb 2023	107
6.	Dairy Training Camp in collaboration with Surya Foundation, New Delhi	Village Jhinjholi (Sonipat) 23 Feb – 1 Mar 2023	120
7.	Training programme on Value Addition of Dairy Farm Waste	ICAR-CIRC, Meerut 20 – 21 Mar 2023	97
8.	Field Day Programme on "Pashu Utpadakta Vriddhi Ki Aadhunuktam Taknike"	Village Jatpura (Meerut) 22 Jun 2023	42
9.	Scientist Farmer Interaction on Health Management of Dairy Animals during Summer	ICAR-CIRC, Meerut 30 Jun 2023	130
10.	Value Added Milk Products for Sustainable Dairy Farm Economy	Village Manduwala (Saharanpur) 5 Sep 2023	39
11.	Scientific Interventions for Improvement of Livestock Productivity	Village Phaphunda (Meerut) 7 Oct 2023	160
12.	Natural Resource Management and Livestock Development In Collaboration with ICAR-IISWC, Dehradun	Village Manduwala (Saharanpur) 15 Oct 2023	98

S. No.	Name of the training/ meeting	Venue & Date	No. of Farmers participated
13.	Cow beyond Milk and Waste to Wealth	ICAR-CIRC, Meerut 3 Nov 2023	271
14.	Distribution of Improved Wheat Seed and Minor Farm Implements In Collaboration with ICAR-IARI, New Delhi	Village Charthawal (Muzaffarnagar) 6 Nov 2023	500
15.	Ensuring Household Nutritional Security and Livestock Productivity	Village Rori (Modinagar) 17 Nov 2023	15
16.	Ensuring Household Nutritional Security and Livestock Productivity	Village Phaphunda (Meerut) 20 Nov 2023	46
17.	Strategies for Accelerating Dairy Entrepreneurship in Western Uttar Pradesh In collaboration with Indian Dairy Association, Northern Zone, Western UP Chapter	ICAR-CIRC, Meerut 27 Dec 2023	145

DDG (NRM) addressing the gathering on 15.10.2023 at Village Manduwala (Saharanpur)

Distribution of inputs to the farmers by Shri Somendra Tomar, State Minister (Energy, Additional Sources of Energy), UP Government on 7.10.2023 at village Phaphunda (Meerut)

(ii) Training Programmes organized under TSP

The Tribal Sub-Plan (TSP) is a planning strategy in India that aims to accelerate the socio-economic development of tribal populations. The TSP's goal is to bridge the gap between the Schedule Tribes (STs) and the general population in terms of socio-economic development indicators within a set timeframe. For the welfare of tribal farmers, an outlay of 4.30 % of total budget of the Institute has been provided. During the financial year (2022-2023) a fund of Rs. 1 lakh was allocated. The following programmes were organised during 2023 in collaboration with ICAR-IISWC, Dehradun.

S. No.	Name of the training/ meeting	Venue & Date	No. of Farmers participated
1.	Training cum input distribution programme	Badripur (Dehradun) 14 Mar 2023	95
2.	Training cum input distribution programme	Shahpur Kalyanpur (Dehradun) 15 Mar 2023	125

Training cum input distribution at village Badripur (Dehradun) on 14.03.2023 in collaboration with ICAR-IISWC, Dehradun

Training cum input distribution at village Shahpur Kalyanpur (Dehradun) on 15.03.2023 in collaboration with ICAR-IISWC, Dehradun

(iii) NEHR Activities

ICAR-CIRC is committed for overall development of farmers and livestock owners belonging to North Eastern Hilly Region by imparting training to them on various aspects of livestock production and providing them inputs for use either at their agricultural farm or livestock farm. Keeping this in view, various programmes were conducted in collaboration with various agencies working in North Eastern Hilly Region.

Seven days training programme at Imphal (Manipur)

A seven days training programme on "Vyavaharik Govansh Prabandhan Dwara Swarojgar Ke Avsar" was organized at Sanatan Sanskrit Vidyalay, Charhajare, Motbung, Imphal (Manipur) in collaboration with Surya Foundation, New Delhi under NEH Component for the benefit of farmers of North Eastern Hilly Region during 14th – 20th Feb 2023. The programme was inaugurated by the Director, ICAR-CIRC, Meerut. In this programme lectures on various topics of Livestock Management were delivered by the experts from ICAR-CIRC, Meerut and ICAR-NEHR, Imphal Centre. In this programme more than 120 farmers from various districts of Manipur participated.

Awareness Programme on "Farmer Producer Organisation (FPO) for Mithun Farmers Prosperity" cum input distribution programme at Medziphema (Nagaland)

Awareness Programme on "Farmer Producer Organisation (FPO) for Mithun Farmers Prosperity" cum input distribution programme was organised under NEH Component on 16th May 2023 at Village Porba, District Phek (Nagaland) in collaboration with ICAR-NRC on Mithun, Medziphema (Nagaland). In this programme lectures on "Technologies for enhancing productivity in cattle" was delivered by the Dr. SK Verma. In this programme more than 100 farmers from various districts of Phek District of Nagaland participated.

S. No.	Name of the training/ meeting	Venue & Date	No. of Farmers participated
1	*Vyavaharik Govansh Prabandhan Dwara Swarojgar Ke Avsar*	Sanatan Sanskrit Vidyalay, Charhajare, Motbung, Imphal (Manipur) 14 – 20 Feb 2023	120
2	Farmer Producer Organisation (FPO) for Mithun Farmers Prosperity" cum input distribution programme in Collaboration with ICAR-NRC on Mithun, Medziphema	Medziphema (Nagaland) 16 May 2023	100
3	Awareness cum Training Programme on Balanced Feeding of Livestock for Productivity Enhancement cum Distribution of Inputs for livestock farmers of West Kameng District (Arunachal Pradesh under NEH Component)	ICAR-NRC on Yak, Dirang (Arunachal Pradesh) 8 Jun 2023	200

Inauguration of seven days training programme at Motbung, Imphal

Lecture by the Director CIRC to the Farmers of Manipur

Awareness programme on FPO at Nagaland

Distribution of inputs to farmers of Nagaland

Awareness cum Training Programme at Dirang (Arunachal Pradesh)

One day awareness cum training programme on Balanced feeding of livestock for productivity enhancement cum distribution of inputs for livestock farmers of West Kameng District of Arunachal Pradesh was organised under NEH component on 8th Jun 2023 at ICAR NRC on Yak campus at Dirang (Arunachal Pradesh). The programme was attended by more than 200 livestock farmers belonging to West Kameng District.

The inaugural programme was graced by Dr. Mihir Sarkar, Director, ICAR-NRCY as chief guest and Dr. Sanjeev Kumar Verma, Principal Scientist and Nodal Officer, NEH Component, ICAR-CIRC, Meerut and Dr. ND Singh, Incharge KVK, Dirang as guests of honour. During his presidential address, Dr. Sarkar appreciated the efforts of ICAR-CIRC, Meerut for organising such huge programme at distant location. He applauded the farmers for their participation from the remote locations of Dirang Valley.

During the technical session lectures were delivered by Dr. Mokhtar Hussain, ACTO, ICAR-NRCY, Dirang on scientific breeding and health management of the highland animals and Dr. Sanjeev Kumar Verma, Nodal Officer, NEH Component delivered a lecture on Balanced feeding and management of livestock for enhancement of production. The experts addressed the queries raised by the participating farmers.

Inauguration of awareness cum training programme at Dirang

A Group photo with Arunachali Cattle Framers at Dirang

IV. Externally Funded Schemes

(i) DST Sponsored project

Utilization of paddy straw as complete fodder block by treating with Gomutra (Indigenous cow urine)

Processing of indigenous cow urine treated paddy straw complete fodder blocks

Chief guest Dr Somendra Tomar, Hon'ble MLA and State Minister, UP during field day

The present study was conducted to examine biochemical properties of fresh cow urine and preparation of fodder blocks. A total of 98 fresh urine samples from apparently healthy indigenous (Sahiwal) and crossbred (Holstein Friesian X Sahiwal) cows maintained under organized farming system were collected aseptically in sterile vials. No significant difference was observed for urea concentration between indigenous and crossbred cows; however, it ranged from 250 to 3460 mg/dl in indigenous and 480 to 1420 mg/dl in crossbred cows. Urea concentration was not affected by lactation in both types of animals. No difference was observed for uric acid concentration between indigenous and crossbred cows. The average creatinine concentration was higher ($p>0.05$) in crossbred than in indigenous cows. Milch indigenous cows had significantly ($p<0.05$) lower creatinine concentration than in the dry cows.

The fresh urine samples were collected from the cows belonging to Indigenous breeds maintained at organized herd in Meerut district. The paddy straw was treated with fresh cow urine and commercial urea under different groups. The fodder blocks of treated paddy straw were prepared with inclusion of concentrate mixture. The standardization of fodder blocks is under process.

One-day training programme/ field day for the dairy farmers under this DST sponsored project on "Indigenous cow urine" at Fafunda village, Meerut on 11.01.2023. Field demonstration of urea treatment of wheat and paddy straw were made to the farmers. On the occasion, a folder on indigenous cattle breeds and their utility was also released by Chief guest Dr Somendra Tomar, Hon'ble MLA and State Minister, UP Apart from this farmer were provided with inputs like animal first aid kit and mineral mixture.

(ii) DAHD Sponsored Project: Strengthening of Semen Station under Rashtriya Gokul Mission (DAHD)

As of the 2023 update, equipment totaling Rs. 57.86 lakh had been successfully procured for the strengthening of semen station under RGM. This included essential items such as plasma sterilizer, veterinary analyzers (including the hemato analyzer), and bio-safety cabinets, all crucial for the efficient operation of semen station facilities. Additionally, other acquired equipment included pH meters, Shower clean room, Refrigerators, Photometer with accessories, BOD Incubator, Refrigerated and Bench Top Centrifuges, Semi-Automatic Biochemistry and Urine Analyzers. Further equipment necessary for the project's laboratory operations, such as automated semen analyzers, osmometers, and ultrasound machines, are in the process of procurement through GeM. This project aims to significantly enhance the existing laboratory infrastructure of the semen station to ensure robust capabilities in the production of high-quality bull germplasm.

NEW INITIATIVE

Designing of cattle and mice sgRNA constructs and testing in mice embryonic stem cells and embryo

A sgRNA targeting the CD46 gene was created to confer resistance to Bovine viral diarrhoea virus. For mice, sgRNAs was designed to target the Tcstv1 and Tcstv3 genes to understand their functions during development, as these genes are primarily involved in the maintenance and regulation of telomere length in mouse embryonic stem cells. The CRISPR-edited plasmids were constructed using these sgRNAs and were transfected into mice embryonic stem cells and embryos using the pro-nuclear micro-injection method. Genotyping of the edited cells in mice embryonic stem cells (Fig. 28) showed successful editing by the Cas9 protein, revealing Tcstv1 (first fragment): Wild-type 626 bp; knock-out 626 and 337 bp (clones SVE1 to SVE4); Tcstv3: Wild-type 676 bp; knock-out 676 and 246 bp (clones SVE9 to SVE12); Tcstv1 (second fragment): Wild-type 1540 bp; knock-out 1540 and 508 bp (clones SVE5 to SVE8). These targeted cell lines also displayed fluorescence after nucleofection, indicating successful transfection.

Further genotyping of embryos from pro-nuclear micro-injection (Fig. 29) revealed successful editing at the blastocyst stage for the Tcstv3 gene only at an 8 ng concentration, showing wild-type 676 bp and knock-out 676 and 246 bp. Thus, the CRISPR gene-editing constructs were successfully tested in mice embryonic stem cells and embryos, thereby potentially comprehending the functionality of each gene at different developmental stages.

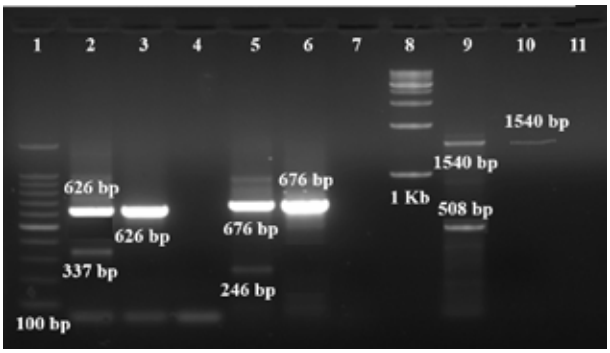


Fig 28 Genotyping of mice embryonic cell culture samples of Tcstv genes.

Lane 1: 100 bp ladder, 2: Tcstv1 (first fragment) gene knock-out, 3: Tcstv1 (first fragment) gene wild type, 4: Tcstv1 (first fragment) gene NTC (non-template control), 5: Tcstv3 gene knock-out, 6: Tcstv3 gene wild type, 7: Tcstv3 gene NTC (non-template control), 8: 1 Kb ladder, 9: Tcstv1 (second fragment) gene knock-out, 10: Tcstv1 (second fragment) gene wild type and 8: Tcstv1 (second fragment) gene NTC (non-template control).

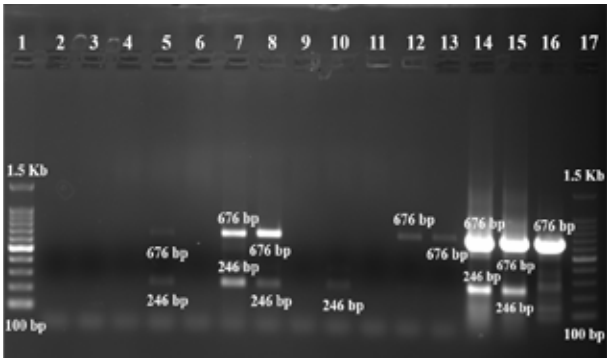


Fig 29 Genotyping of pronuclei micro-injection samples of Tcstv3 gene.

Lane 1: 100 bp ladder; 2: negative control, 3-11; 14-15: embryo injected amplified products; 12,13: embryo un-injected control samples; 16: Wild genomic DNA E14Tg2a as a positive control and 17: 100 bp ladder

Ovum Pick Up-In Vitro Fertilization-Embryo Transfer (OPU-IVF-ET) technique

ICAR-CIRC scientists along with scientists of Uttarakhand Livestock Development Board (ULDB), Kalsi, Dehradun have inititated OPU-IVF-ET technique for production of elite germplasm of frieswal cattle. The efforts had resulted in production of one female Frieswal calf from Sahiwal cow (recipient). Future plans include increasing the number of donor and recipient animals to strengthen the programe.

Frieswal Female Calf Born through OPU-IVF-ET by ICAR-CIRC, Meerut in Collaboration with ULDB, Kalsi, Dehradun

INSTITUTE FUNCTIONARIES

A) Priority Setting, Monitoring And Evaluation (PME) Cell

Priority setting, monitoring and evaluation (PME) cell assists Director of the Institute for priority focused research, resource allocations, relevance, monitoring and evaluation of research projects. and accountability in the Institute. The Cell coordinate and synthesize the recommendations of QRT, RAC, IRC, vision documents of institute and ICAR to recommend research priorities of the institution for shortlisting priority researchable problems. It also performs annual updating and presents the report to the Director of the institution for assigning research projects and coordinate and arrange for annual monitoring of each on-going project and evaluation of completed projects through internal and external experts Besides this it also arrange technology validation and/or impact assessment of successful technology claimed by scientist(s) through internal and external experts, regularly sensitize and capacity building of scientists through training programs (with HRD) and maintains a' database on all publications, technologies developed, IPRs (with ITMU), consultancies, projects undertaken in the past and on-going projects.

RESEARCH PROJECTS

The following research projects were in operation during the year 2023

AICRP on Cattle

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
1	Studies on genetic aspects of Holstein Sahiwal crossbreds (Frieswal Project)	IXX04334	1/1/1987 to 31/3/2024	Dr Sushil Kumar	Dr A.S. Sirohi Dr N. Chand Dr Sumit Mahajan Dr. Megha Pande	Ongoing
2	Genetic studies on the performance of important indigenous breeds and their improvement through selection (IBP)	IXX04335	4/1/2011 to 30/3/2026	Dr Umesh Singh (up to 27/10/2023) Dr Sushil Kumar	Dr T.V. Raja (up to 26/12/ 2023) Dr S K Dabas	Ongoing
3	Field recording of performance data for undertaking large scale progeny testing(FPT)	IXX04379	1/7/1992 to 31/3/2026	Dr Achintya Kumar Das	Dr R. Kumar	Ongoing

Institutional

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
1.	Prelimanry studies on conception rate with sex sorted semen in cattle	IXX408	1/10/2020 to 30/9/2023	Dr S. K. Dabas	Dr S. Saha Dr M. Pande	Completed
2.	Evaluation of Immuno-metabolic and oxidative stress and their amelioration in transitional cows	IXX15415	1/4/2020 to 31/3/2024	Dr S. Mahajan	Dr S. K. Verma Dr S. K. Dabas Dr N. Chand	Ongoing

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
3.	Detection of humanin like mitochondrial derived peptide in testes/semen of bulls and effect of supplementation of humanin analogue on spermatozoa functions	IXX15409	1/10/2020 to 30/9/2023	Dr M. Pande		Completed
4.	Genome wide identification of single nucleotide polymorphism and selective sweeps for performance traits in dairy cattle using reduced representation approach	IXX15411	1/10/2020 to 30/09/2023	Dr T. V. Raja	Dr U. Singh Dr Sushil Kumar	Completed
5.	Multiplication of superior indigenous cattle germplasm through multiplt ovulation and transfer (MOET)	IXX15407	1/10/2020 to 30/9/2024	Dr S. K. Dabas	Dr U. Singh (up to (28/10/2023) Dr R. Kumar Dr S. Saha Dr M. Pande Dr Sushil Kumar	Ongoing
6.	Biochemical constituents of blood and semen in relation to fertility attributes of Frieswal bulls	IXX17456	01/07/2021 to 31/03/2024	Dr. S. Saha	Dr J K Singh (up to 28/02/2023) Dr Pramod Singh Dr Megha Pande	Ongoing
7.	Assessment of subclinical mastitis and development of therapeutics for its management in cattle	IXX16094	01/04/2021 to 31/03/2024	Dr. NAIMI CHAND	Dr A.S. Sirohi, Dr Sumit Mahajan	Ongoing
8.	Genetic Evaluation of Frieswal cattle	IXX19089	01/07/2022 to 30/06/2024	Dr. Sushil Kumar	Dr T V Raja (up to 26/12/2023)	Ongoing
9.	Effect of Soy Lecithin on semen quality parameters and semen production in Frieswal bulls		01/10/2022 to 31/03/2024	Dr. S.K. Verma	Dr Sumit Mahajan and Dr S Saha	Abeyance
10.	Development of dung-based bio-briquettes as a solid fuel source	IXX19941	01/10/2022 to 30/09/2024	Dr. Rajiv Ranjan Kumar	Dr S K Verma	Ongoing
11.	Comparative performance of Indigenous vis-à-vis crossbred cattle at commercial dairy farms	IXX15406	1/10/2020 to 31/03/2024	Dr R. Kumar	Dr A. K. Das Dr H. L. Singh (SVPUAT)	Ongoing
12.	Economics of dairy cattle farming in Meerut district of Uttar Pradesh	IXX15410	1/10/2020 to 31/03/2024	Dr N. Prasad	Dr S. K. Verma Dr Ajmer Singh (NDRI)	Ongoing
13.	Effect of NIANP-BULLMIN supplementation on semen quality and haematobiochemical profile of Frieswal crossbred bulls	IXX15416	1/8/2020 to 31/7/2024	Dr S. Mahajan	Dr S. K. Verma Dr A. S. Sirohi Dr N. Chand Dr M. Pande Dr D. T. Pal (NIANP) Dr N. K. S Gouda (NIANP)	Ongoing

Service Project

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
1.	Quality assessment of Frieswal bull semen	IXX10465	1/6/2013 onwards	Dr Naimi Chand	Dr M. Pande	Ongoing
2.	Value addition in dung waste through Vermi culture	IXX13473	06/07/2015 onwards	Dr Rajiv Ranjan Kumar	Dr S K Verma Dr A S Sirohi	Ongoing

Externally funded

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
1.	DST SUTRA-PIC project: Utilization of paddy straw as complete fodder block by treating with Gomutra (Indigenous cow urine)	OXX5660	01/01/2022 to 31/12/ 2024	Dr. A.S. Sirohi	Dr Naimi Chand Dr S K Verma, Dr S Mahajan CCPI: Dr Nitin Tyagi, NDRI, Karnal, CCCoPI: Dr Sachin Kumar, NDRI; CCPI: Dr Faheem Ahmad, SVPUAT, Modipuram)	Ongoing
2.	Strengthening of Semen Station under Rashtriya Gokul Mission		01/01/2022	Dr. Megha Pande (Nodal Officer)	Dr Suresh Kumar Dr A.S. Sirohi Dr Naimi Chand Dr S. Saha Dr Sumit Mahajan	Ongoing

ICAR Funded

S. No	Project Title	Project ID	Period	PI	Co-PIs	Status
1.	Livelihood Improvement through Sustainable Dairy Farming using Suitable Interventions (Farmer FIRST Programme)	OXX03793	05/04/2017 to 31/03/2025	Dr Suresh Kumar D. S.	Dr S. Saha Dr Naresh Prasad Dr Naimi Chand Dr Megha Pande Dr JP Dabas	Ongoing
2.	National Agriculture Innovation Fund (NAIF)	IXX19090	01/06/2009 onwards	Dr. Sumit Mahajan	Dr Sushil Kumar	Ongoing
3.	Special Assistance Program of Central government SCSP/ TS/NEHR		Ongoing activities	Nodal officer: Dr S K Verma	All the Scientist of Institute	Ongoing
4.	CRP on Agro-biodiversity	10/CI/ IFX/10/CI/ IFX/CRPAB	23/08/2023 to 01/03/2025	CCPI: Dr T V Raja	Dr Rajiv Ranjan Kumar	Ongoing

PUBLICATIONS

Research Papers:

ICAR-CIRC as lead Centre for place of work

International:

National:

1. Das, A.K., Mitra, A., Kumar, R. Singh, U., Kumar, S., Raja, T.V., Rani, A., Kumar, K.A., Sirohi, A.S. and Saha S. (2023) Genetic evaluation of Frieswal cattle for first lactation milk yield from smallholder dairy production systems in Kerala, India. *Indian Journal of Animal Sciences*. **93**(2):176-81.
2. Devi, I., Mahajan, S., Singh, U., Dudi, K., Pande, M. and Kumar, A. (2023). Effect of Restricted Suckling on Shortened Lactation Length and Performance of Sahiwal Cattle. *Indian Journal of Animal Research*, doi:10.18805/IJAR.B-5034
3. Mahajan, S., Indu Devi, N. Chand, S. Kumar, M. Pande, A.S. Sirohi and S. Tyagi. (2023). Dynamics of lipid mobilization and other serum metabolites during transitional period in frieswal dairy cattle. *Haryana Veterinarian*, **62**(2), 123-127.
4. Pande, M., Ghosh, S.K., Kumar, S., Tyagi, S., Srivastava, N., Sirohi, A.S., Chand, N., Sarika, Katiyar, R., Kumar, A. and Mahajan, S. (2023). Correlations of mitochondrial membrane potential and oxidative stress levels with post-thaw semen quality in bulls. *Haryana Veterinarian*, **62**(2), 129-132.
5. Raja, T. V., Alex, R., Singh, U., Kumar, S., Das, A. K., Sengar, G., & Singh, A. K. (2023). Genome wide mining of SNPs and INDELs through ddRAD sequencing in Sahiwal cattle. *Animal Biotechnology*, **34**(9), 4885-4899.
6. Raja, T. V., Alex, R., Singh, U., Kumar, S., Das, A. K., Sengar, G. and Mitra, A. (2023). Genome-wide identification and annotation of SNPs for economically important traits in Frieswal™, newly evolved crossbred cattle of India. *3 Biotech*, 13(9), 310.
7. Tyagi, S., Raja, T. V., Sirohi, A. S., Chand, N., Kumar, S., Pande, M., Mahajan, S. and Kumar, S. (2023). Effect of age, season and sire on semen quality traits in Frieswal breeding bulls. *Indian Journal of Animal Sciences*, **93**(10): 979-984.

Research Papers where ICAR-CIRC Scientist contributed as Co-author (Other than Institute)

1. Jamwal, S., Jena, M. K., Tyagi, N., Kancharla, S., Kolli, P., Mandadapu, G. and Mohanty, A. K. (2023). Proteomic Approaches to Unravel the Molecular Dynamics of Early Pregnancy in Farm Animals: An In-Depth Review. *Journal of Developmental Biology*, **12**(1), 2.
2. Jawla, J., Kumar, R. R., Mendiratta, S. K., Agarwal, R. K., Singh, P., Saxena, V. and Kumar, D. (2023). A novel paper based loop mediated isothermal amplification and lateral flow assay (LAMP-LFA) for point-of-care detection of buffalo tissue origin in diverse foods. *Journal of Food Safety*, **43**(3), e13038.
3. Jena, M. K., Khan, F. B., Ali, S. A., Abdullah, A., Sharma, A. K., Yadav, V., Mohanty, A. K. and Ardianto, C. (2023). Molecular complexity of mammary glands development: a review of lactogenic differentiation in epithelial cells. *Artificial cells, nanomedicine, and biotechnology*, **51**(1), 491-508.
4. Sarma D.K., Verma, S.K., Shantanu, T., Pande, Megha, Champak, B., Borpujari, D., and Mahanta, N. (2023). Exploring the Role of Iodine and Thyroid Hormone in Abnormal Metestrus Bleeding Associated Repeat Breeding and Silent Estrus in Cows of the North Eastern State of Assam in India. *Indian Journal of Animal Research*. **57**(3): 298-302. doi: 10.18805/IJAR.B-5018.
5. Shambhavi, Verma A.K., Tripathi, A., Shukla, M.K., Kumar, S., Ranjan, K., Verma, H. and Kapoor, N. (2023). Effect of rheological properties of cervico vaginal mucus on conception rate in cattle. *Ruminant Science*, **12** (1): 121-126
6. Singh, P., Ali, S. A., Kumar, S., and Mohanty, A. K. (2023). CRISPR-Cas9 based knockout of S100A8 in mammary epithelial cells enhances cell proliferation and triggers oncogenic transformation via the PI3K-Akt pathway: Insights from a deep proteomic analysis. *Journal of Proteomics*, **288**, 104981.
7. Talukder, S., Mendiratta, S. K., Biswas, A. K.,

Kumar, R. R., Aggrawal, R., Soni, A. and Chand, S. (2023). Monitoring of chicken meat quality by plant dye based sensor. *Food and Bioprocess Technology*, **16**(10), 2217-2230.

Folders

1. सुमित महाजन, अजयवीर सिंह सिरोही, सुशील कुमार, मेघा पांडे, चंद नेमी और सुरेश कुमार (2023) पशु स्वास्थ्य एवं उत्पादन पत्रक। भा.कृ.अनु.प.–केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ.प्र.
2. चन्द नेमी, सिरोही ए. एस., वर्मा एस के, अहमद फहीम, सिंह उमेश एवं महाजन सुमित (2023). भारतीय देशी गोवंश की प्रमुख नस्लें एवं गौ अपशिष्ट मूल्य संवर्धन. भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र.

Training Manual/ Technical Bulletin/Magazine for which ISBN was obtained during 2023

1. प्रमोद सिंह, मेघा पाण्डे एवं इन्दु देवी (2023). सुरभि, राजभाषा पत्रिका (चतुर्थ अंक), केन्द्रीय गोवंश अनुसंधान संस्थान, मेरठ छावनी (उ.प्र.)– 250 001। पृष्ठ 1–104. ISBN : 978–81–955938–0–4
2. Pande M, Chand N, Sirohi AS, Verma SK, Mahajan S and Tyagi S. (2023). Improved Cattle Husbandry Practices for Better Economic Returns, Published by ICAR-Central Institute for Research on Cattle, Meerut Cantt. (UP)-250 001, pp 206 ISBN No: 978-81-955938-3-5
3. कुमार सुरेश डी एस, चंद नेमी, पाण्डे मेघा, साहा एस, प्रसाद नरेश व आर्य शुभम (2023). उन्नत पशु–पालन द्वारा कृषक स्वावलंबन, भाकृ अनुपदृ केंद्रीय गोवंश अनुसंधान संस्थान, ग्रास फार्म रोड, मेरठ छावनी – 250 001 (उ.प्र.) ISBN No. 978–81–955938–2–8

Book Chapter

1. A K Das, R Kumar and T V Raja (2023) Field progeny testing for increasing milk productivity in India. E-book on Diversification of Cattle Production System for Self-sufficiency of Farming Community page no. 44- 53. ISBN No: 978-81-955938-1-1 2
2. R Kumar and A K Das (2023) Efficient judging techniques for selection of elite dairy animals. E-book on Diversification of Cattle Production System for Self-sufficiency of Farming Community page no. 90-99. ISBN No: 978-81-955938-1-1
3. Kumar, R. R., Rahman, F., Bora, B., & Shameeh, M. (2023). Importance and nutritive value of animal proteins in human diet. In Processing Technologies and Food Protein Digestion (pp. 1-25). Academic Press. https://doi.org/10.1016/B978-0-323-95052-7.00007-8
4. Shweta Anand, Rajesh Mandil, Rachna Varma and Rajiv Ranjan Kumar (2023). Nanotechnology in Medicine: Designing Nanoparticles for Targeted Diagnosis and Therapy. Advances in Nanotechnology and its Application in Animal Health. Ed By : Vibha Yadav, R K Joshi, D Niyogi, S V Singh & Rajesh Kumar .ISBN : 978-81-19708-62-8

Technical / Popular articles:

1. A.S. Sirohi, N. Chand, M. Pande, U. Singh, S. Kumar and S. Mahajan. 2023. Starting a dairy farm. *Kriti Kalp*. 10(4): 31-34.
2. Tarun Pal Singh, V. Raj Kumar, Arun Verma, Rajiv Ranjan Kumar and Manish Kumar Chatli. Overview of innovative technologies in processing of wastes from animal source food. Fleishwirtschaft International, 3:117-122.
3. चन्द नेमी, सिरोही ए. एस., महाजन सुमित, त्यागी श्रीकांत एवं कुमार सुरेश (2022) गोपशुओं में विषाक्तता संबंधी रोगः लक्षण, उपचार एवं बचाव. सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 65–70
4. प्रमोद सिंह, आँचल शर्मा, जितेन्द्र कुमार सिंह एवं राजेन्द्र प्रसाद . (2022). बदलती जलवायु में हरे चारे का उत्पादन। सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 4–10
5. आँचल शर्मा, प्रमोद सिंह, जितेन्द्र कुमार सिंह, राजेन्द्र प्रसाद, नरेश प्रसाद एवं सिद्धार्थ साहा (2022). एजोलाः पशुओं के लिए वैकल्पिक पोषक हरा चारा। सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 10–16
6. प्रमोद सिंह, आँचल शर्मा, जितेन्द्र कुमार सिंह, राजेन्द्र प्रसाद, ए.एस. सिरोही एवं नरेश प्रसाद (2022). डेयरी पालन में नवजात बच्चों की कॉलस्ट्रम फीडिंग। सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 20–25
7. नरेश प्रसाद, जितेंद्र कुमार सिंह एवं प्रमोद सिंह. (2022). डेयरी उद्यम के स्थापना में संलिप्त आर्थिक कारकों का विवरण। सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 89–95.
8. जितेन्द्र कुमार सिंह, प्रमोद सिंह, आँचल शर्मा, सिद्धार्थ साहा एवं नरेश प्रसाद. (2022). गोबर–धनः स्वरोजगार का वैल्पिक साधन! सुरभि राजभाषा पत्रिका, चतुर्थ अंक, भा. कृ. अनु. प.– केंद्रीय गोवंश अनुसंधान संस्थान, मेरठ कैंट–250001, उ. प्र. पृष्ठ 102–104

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1. Sirohi, A. S., Fahim, A., Katoch, S., Chand, N., Verma, S. K., Tomar, K., Singh, R. and Trivedi, A. K. 2023. Biochemical and microbiological characteristics of fresh indigenous and crossbred cow urine. In International Conference on Feeding the Future through Sustainable Eco-friendly Innovations in Rangeland, Forages and Animal Sciences. December 2-4, University of Agricultural Sciences, Bangalore, pp 13.
2. Pramod Singh, Aanchal Sharma, S.K. Verma, A.S. Sirohi, and Rajendra Prasad. 2023. Fermentation characteristics of silage prepared (in vitro) from vegetable waste. In: Proceedings (Abstract Papers) of Animal Nutrition Association XII Biennial Conference on 'New Horizons of Animal Nutrition Research: Com bating the Challenges of Productivity, Health and Welfare of Animals' 16-18 February 2023 at DUVASU, Mathura. NRG-19, pp 165.
3. Das A.K. and Kumar R. 2023. Genetic Evaluation of Frieswal Cattle under marginal production system. XVI Agri. Science Congress. Page 225
4. Ravinder Kumar 2023. Field Progeny Testing of Frieswal bulls- An Important tool for genetic improvement of cattle in the existing scenario. XVI Agri. Science Congress, pp 225
5. Pande M, Kumar S, Chand N, Prasad N, Saha S, Arya S, Singh U. 2023. Impact of capacity development on the socio-economic perspective of cattle farmers. "Agro Ecology based Agri-Food Transformation Systems" organized by Farming Systems Research and Development Association and ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut dated 27-28, January, 2023, pp 335-336.
6. Kumar Suresh, Pande M, Saha S, Chand N, Prasad N, Singh U. 2023. Application and validation of sex-sorted semen technology in cattle under Indian field conditions. "Agro Ecology based Agri-Food Transformation Systems" organized by Farming Systems Research and Development Association and ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut dated 27-28, January, 2023, pp 333-334.
7. Prasad N, Kumar S, Pande M, Chand N, Saha S, Kumar R, Singh U. 2023. Attitude of cattle owners towards improved cattle husbandry practices in Western UP. "Agro Ecology based Agri-Food Transformation Systems" organized by Farming Systems Research and Development Association and ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut dated 27-28, January, 2023, pp 341-342.
8. Chand N, Kumar S, Pande M, Prasad N, Saha S, Singh U. 2023. Therapeutic management of clinical mastitis in dairy cattle under field conditions. "Agro Ecology based Agri-Food Transformation Systems" organized by Farming Systems Research and Development Association and ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut dated 27-28, January, 2023, pp 332-333.

IMPORTANT COMMITTEES AND MEETINGS

QUINNEQUENIAL REVIEW TEAM (QRT) (Period 2017-22)

S.No.	Name	Designation	Chairman /Member
1.	Dr. C. Balachandran	Former Vice-Chancellor, TANUVAS, Chennai	Chairman
2.	Prof. B.K. Joshi	Former Director, ICAR-NBAGR, Karnal	Member
3.	Prof. G.D. Singh	Former Dean, College of Veterinary Science and A.H. DUVASU, Mathura	Member
4.	Dr. B.S. Prakash	Former ADG (ANP), ICAR HQ, New Delhi	Member
5.	Dr. A. Anand Kumar	Professor and Head Department of Veterinary Pathology, College of Veterinary Sciences SVVU, Tirupathi	Member
6.	Dr. P.S. Birthal	Director, ICAR-NIAP, New Delhi	Member
7.	Dr. Sushil Kumar	I/C PME	Member Secretary

The first meeting of the QRT to review the progress of the research work of ICAR-Central Institute for Research on Cattle, Meerut, for the period April 2017 to March 2022 was held at ICAR-CIRC in Meerut on May 30-31, 2023. Dr. C. Balachandran, former Vice Chancellor of TANUVAS, Chaired the meeting The other members of the QRT who attended the meeting were Prof. B. K. Joshi, Former Director, ICAR-NBAGR, Karnal, Dr. B. S. Prakash, Former Assistant Director General (ANP), ICAR, New Delhi, Dr. A. Anand Kumar, Professor and Head, Department of Veterinary Pathology, College of Veterinary Science, SVVU, Tirupathi, Dr. P.S. Brithal, Director, NIAP, New Delhi, and Dr. Sushil Kumar, Principal Scientist and I/C PME, ICAR-CIRC as Member Secretary.

At the beginning of the event, the QRT chairman highlighted the importance of cattle breeds in the country and the need for sustainable development to achieve self-reliance of farmers. He also shared his experience on the scientific analysis of the various components of cattle breeding. He pointed out the various problems and challenges in cattle farming and emphasized the need to work on new challenges that need to be linked to national priorities, such as development and conservation of indigenous breeds, natural farming, disease management through ethano-veterinary practices, precision techniques for oestrus management and application of ARTs, etc.

In his address, Dr. Umesh Singh, Director of ICAR-CIRC, briefed the QRT Chairman and members on the progress made in developing the Institute's infrastructure, key action areas in research and capacity building, and ongoing research activities. He also pointed out the significant contributions of the Institute in terms of patents, copyrights, software development, publications, and extension activities for farmers, etc. He also informed the house about the future plans and programmes of the Institute.

Dr. Sushil Kumar, Member Secretary, QRT, briefed the house in detail about the action taken report of the last QRT. The project reports, research achievements and highlights of the institute were presented by the respective heads of the divisions. The QRT also visited the laboratories and animal house of the Institute. The meeting ended after a thorough review. The QRT made several recommendations to improve the quality of overall research on cattle. All the members of QRT appreciated the efforts of institute's achievements and exhorted everyone to do better work. The team urged upon in-depth scientific analysis of different components of cattle farming.

The Second QRT meeting was held on October 6-7, 2023 at ICAR-CIRC, Meerut and discussed the issues and chairman directed for further meeting and expressed need to visit AICRP centres to study the working arrangement.

QRT Meeting at ICAR-CIRC, Meerut,

RESEARCH ADVISORY COMMITTEE (RAC) (Period 2020-23)

Rule Position	Designation	Name with Address
71A(a)1	Chairman	Dr. V.K. Taneja, Former Vice Chancellor and DDG (AS), H.No.B-202, Chinar CGHS Ltd. Plot No. 3, Sector 18A, Dwarka, New Delhi 1100 78
71A(a)2	Member	Dr. Arjava Sharma, Former Director, NBAGR, Karnal 849 Sector 29 alpha City, Karnal 132 001
		Dr. J.R. Rao, Retd. PS & Head (Vety. Parasitology), 302 Emerald, My Home Jewel, Madinaguda, Hyderabad 500 049
		Dr. Kripal Singh Former Director, ICAR-CIRC, Meerut H.No. 403/3, Mangal Pandey Nagar, Meerut
		Dr. Dhinakar Raj, Director, Centre for Animal Health Studies, TANUVAS
71A(a)3	Member	Dr. Abhijit Mitra Director, ICAR-CIRC, Meerut
71A(a)4	Member	Dr. Vishesh Saxena ADG(AP&B), ICAR, New Delhi
71A(a)5	Member	Dr. Dharmendra Singh, Member, IMC and Farmers'Representative
71A(a)6	Member Secretary	Dr. Sushil Kumar, PS and Incharge, PME, ICAR-CIRC, Meerut

23rd RAC Meeting

The third meeting of XXIII Research Advisory Committee of ICAR-Central Institute for Research on Cattle, Meerut was held on 2nd Aug 2023. The meeting was chaired by Dr. V. K. Taneja, former VC, GADVASU & former DDG (Animal Science), ICAR, New Delhi. The members of the RAC committee included eminent scientists from different parts of the country like Dr. Arjav Sharma, Dr J R Rao, Dr Kirpal Singh, Dr Harish Verma, Dr Dhinakar Raj Gopal and Dr Dharmenra Singh Ballia (Progressive farmer).

The RAC reviewed the outcome of the research projects. Numerous topics were discussed, including advancements in cattle genetics, reproduction, nutrition, disease management, and sustainable farming practices. During the meeting, Dr. V K Taneja, Chairman of RAC, emphasized the importance of advancing cattle research to address various issues related to livestock management, breeding, and healthcare. He commended the ICAR-CIRC for its significant contributions to the field and encouraged the scientists and researchers to continue their pursuit of excellence.

Dr. Umesh Singh, Director, CIRC expressed his gratitude to Dr. V K Tanjeja and the esteemed members of the RAC for their insightful contributions during the meeting. He also reaffirmed the institute's commitment to advancing research and innovation in cattle husbandry and allied domains.

The meeting concluded on a positive note with a sense of optimism and determination to further strengthen research collaborations and implement evidence-based solutions for the betterment of cattle farming practices. As the meeting concluded, it was evident that such meetings play a pivotal role in fostering innovation and knowledge dissemination, ultimately contributing to the growth and sustainability of the cattle farming sector in the country.

RAC Meeting in progress at ICAR-CIRC, Meerut

Institute Research Council (IRC), ICAR-CIRC, Meerut

The annual IRC meeting for the year 2023-24 was conducted on 26th and 27th September 2023 under the chairmanship of Dr. A. K. Mohanty, Director ICAR-CIRC, Meerut. The meeting started with the

welcome address by Member Secretary, IRC. Dr. S. P. Singh former Director, PD on Cattle, Meerut and Dr A. K. Samanta , Head, Animal Nutrition, ICAR-NDRI, Karnal were the invited experts for the meeting. A total of 33 projects consisting of 3 AICRP sub projects, 9 institutional, 6 inter-institutional, 4 externally funded, 3 service and 8 new projects were included for discussion.

Dr. A.K. Mohanty, Chairman IRC during his opening remarks informed that the ICAR-CIRC is a unique research institute of its own as it deals exclusively on cattle, an important livestock species of the country. He urged the scientists to take up stakeholder oriented research problems well covered within the mandated areas of the Institute. The research problems should be unique, well defined and holistic in nature without any overlapping with other institutions like IVRI and NDRI. He further stressed on 3 P's namely publications, patents and products to fulfill the requirement of one scientist one product concept proposed by the Hon'ble DG, ICAR and Secretary DARE.

He also informed that the semen station of the Institute will be strengthened with the State of the art facilities utilizing the DAHD, GoI fund and along with that a sanctuary covering the 53 recognized indigenous cattle breeds can also be established at the new campus of the Institute. He further urged for the necessity of developing the coffee book on cattle genetic resources of Indigenous and other important exotic cattle breeds. He also insisted to explore collaborations for undertaking modern research covering biotechnology, genomics, and nutritional techniques.

Dr. S. P. Singh former Director, PD on Cattle, Meerut and the external expert of IRC discussed on the issues of IBR infection in bulls, FMD vaccination, stray cattle menace and scrub bulls. and provided valuable suggestions for improving the project and project to be taken in future. Dr A. K. Samanta , Head, Animal Nutrition, ICAR-National Dairy Research Institute, Karnal also participated as an expert and provided valuable suggestion and critical input.

Dr. Sushil Kumar, I/C PME coordinated the presentation by different scientists about the ongoing research and development activities carried out under respective research projects, All the research projects

Institute Research council meeting in progress at ICAR-CIRC,

INSTITUTE MANAGEMENT COMMITTEE (IMC)

S.N.	Nominated Officers/Persons	Desnation
1	Director, Central Institute for Research on Cattle, Meerut (UP)	Chairman
2	The Asstt. Director General (AP&B), Indian Council of Agricultural Research, Krishi Bhavan, New Delhi-110001	Member
3	Dr. Dharmendra singh S/O Sh. Vidya Prakash Singh, Sundram Colony, Near Kali J i Mandir, Bahadurpur, Distt.-Balia	Member
4	Dr. A. K. Patel, PS (LPM), ICAR-CAZRI, Jodhpur-342003 (Rajasthan)	Member
5	Dr. Rakesh Ranjan, PS (Vety.Med.), ICAR-NRC on Camel, Jorbeer, Bikaner-334001 (Rajasthan)	Member
6	Dr. Raghvendra Singh, PS & HoD, Division of Physiology & Biochemistry, ICAR-CSWRI, Avikanagar (Raj.)	Member
7	Dr. T.K. Dutta, PS (Animal Nutrition) & Head, Eastern Regional Station of NDRI, Nadia, Kalyani-741235 (West Bangal)	Member
8	The Managing Director, Uttar Pradesh Livestock Development Board, Animal Husbandry Directorate Campus, Gokaran Nath Road, Near Veterinary Polyclinic, Badshahbagh, Lucknow-226007	Member
9	The Managing Director, Uttarakhand Livestock Development Board, First Floor, Pashudhan Bhawan, Motharowala, Dehradun-248001 (UK)	Member
10	The Dean, College of Agriculture Science, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur-208002 (UP)	Member
11	Finance & Accounts Officer, ICAR-National Bureau of Plant Genetic Resources, Pusa, New Delhi-110012	Member
12	Administrative Officer, ICAR-Central Institute for Research on Cattle, Grass Farm Road, Meerut Cantt.-250001 (UP)	Member Secretary

were discussed in detail, scientists were urged to comeout with tangible output and simultaneously refinement in technical program as per constraints under each project were suggested.

A total of new six research proposal were approved, and four institute funded projects were declared complete with note of submission of RPP-III.

31st Institute Management Committee (IMC)

The Meeting was held in hybrid mode on 10th February, 2023 in hybrid mode. The meeting was chaired by Dr. Umesh Singh, Director (Acting) & Chairman, IMC. The meeting was attended in online mode by the IMC members Dr. Rakesh Negi, CEO, UKLDB, Dehradun, Prof. Dhram Raj Singh, Dean Agriculture, CSAUA&T, Kanpur, Dr. Dharmendra Singh, Farmer representative, Balia, Dr. A.K. Patel, PS(LPM), CAZRI, Jodhpur, Dr. Rakesh Ranjan, PS, NRCC, Bikaner, Dr. T.K. Dutta, PS(AN) & Head, ERS Kalyani. The other members Shri Shashank Bhatia, Farmer representative, Bareilly, Dr. Pramod Singh, Head, CN&M Division, Dr. AS Sirohi, I/C Head, CP&R Division, Dr. Sushil Kumar, PS & I/C PME Cell, Dr. A.K. Das, PS(AG&B), Dr. S.K. Verma, PS& Nodal Officer SCSP/NEH/TSP, Dr. Sumit Mahajan, Scientist & I/C ARIS, Shri D.S. Verma, FAO, Shri A.K. Sharma, SAO & Member Secretary IMC, Shri N.S. Saini, AAO & Coordinator IMC and Shri Manoj Nehra, AAO, ICAR-CIRC were present physically in the meeting. The meeting started with the welcome address by Shri N.S Saini, AAO & Coordinator IMC. The Chairman, IMC Dr. Umesh Singh, Director also welcomed the

Institute Management Committee Meeting in progress at ICAR-CIRC, Meerut (online)

members and made a general presentation on the research achievements and other developmental activities of ICAR-CIRC, Meerut. This was followed by the presentation on action taken report of the last IMC held on 23.03.2022. Discussions on progress on annual budget expenditure, works, stores purchase etc., were also done. The new agenda items for the IMC meeting was also presented by Shri N.S. Saini for discussion and which were unanimously approved by the members of the IMC. In the concluding remarks, all members appreciated the progress of ICAR-CIRC, Meerut in the field of research and development activities. Dr. Sumit Mahajan coordinate the online arrangement of the meeting. The meeting came to an end with the vote of thanks by the Chairman to all the members for their valuable suggestions and active participation.

BIO-SAFETY COMMITTEE (IBSC)

Dr. A K Das, Principal Scientist, ICAR-CIRC, Meerut	Chairman
Dr. Pallab Chaudhuri, Joint Director, ICAR-IVRI, Bangaluru	DBT Nominee
Dr. Naimi Chand, Principal Scientist, ICAR-CIRC, Meerut	Member Secretary
Dr. Indrajit Ganguly, Principal Scientist ICAR-NBAGR, Karnal	Outside expert
Dr. Monica Sharma, Professor and Head Pharmacology, LLRM Medical College, Meerut	Biosafety Officer
Dr. A S Sirohi, Principal Scientist, ICAR-CIRC, Meerut	Internal Expert
Dr. Rajiv Ranjan Kumar, Principal Scientist, ICAR-CIRC, Meerut	Internal Expert
Dr Sumit Mahajan, Scientist, ICAR-CIRC, Meerut	Internal Expert

Institutional Bio Safety Committee Meeting

The IBSC meeting was held on 22.12.2023 at ICAR-CIRC, Meerut. Three research projects were discussed for any biosafety issues by the committee and approval accordingly. The medical surveillance report submitted by the scientists and technical officers involved in the laboratory work were also evaluated by Biosafety officer and found satisfactory. Proceedings of the meeting and medical surveillance report were uploaded on the website of the Department of Biotechnology, GOI, New Delhi.

Institutional Bio safety Committee Meeting in progress at ICAR-CIRC, Meerut

The meeting of the IAEC at the ICAR-Central Institute for Research on Cattle, Meerut, was held on October 19, 2023. The IAEC discussed various aspects of three new research proposals and recommended them for approval according to the Committee for the Purpose of Control and Supervision of Experiments on Animals (CCSEA) guidelines. Dr. Bal Gangadhar Roy, the main nominee of CCSEA, outlined the rules and regulations of PCA, CCSEA, and IAEC, emphasizing the latest animal welfare measures, SOPs for large animals, and the importance of maintaining comprehensive records. Subsequently, the Member Secretary presented Form-B of the three new project proposals, and an in-depth discussion of various aspects of these new proposals took place. The committee also inspected the animal house and various laboratories of the institute, ensuring that the animals were being managed according to CCSEA guidelines. The IAEC found the animal house facilities of the institute to be very good and in compliance with CCSEA guidelines..

Institutional Animal Ethics Committee (IAEC) Meeting in progress at ICAR-CIRC, Meerut

Institutional Animal Ethics Committee (IAEC) Meeting

Dr. A K Das, Principal Scientist, ICAR-CIRC, Meerut	Chairman
Dr. Bal Gangadhar Roy, Scientist G, DRDO, New Delhi	Main Nominee, CCSEA
Dr. Harshit Verma, Asstt Professor, SVPUA&T, Meerut	CCSEA, Member outside institute
Smt. Deepa Saini, Social Worker, Meerut	Socially aware Nominee, CCSEA
Dr K B Patel, Veterinary Officer ILBS, New Delhi	Link Nominee, CCSEA
Dr. A S Sirohi, Principal Scientist, ICAR-CIRC, Meerut	Internal Expert
Dr. Rajiv Ranjan Kumar, Principal Scientist, ICAR-CIRC, Meerut	Scientist from different biological discipline
Dr. Naimi Chand, Principal Scientist, ICAR-CIRC, Meerut	Veterinarian
Dr. Sumit Mahajan, Scientist, ICAR-CIRC, Meerut	Internal Expert
Dr. Sushil Kumar, Pr Scientist and HoD, CGB, Meerut	Scientist from different biological discipline
Dr. Megha Pande, Scientist, ICAR-CIRC, Meerut	Member Secretary

Common Events / Meetings organized / arranged at ICAR-CIRC Meerut

S.No.	Name of the Event	Duration
1.	National Workshop on Awareness on Intellectual Property Rights (IPRs) and Its Management	17 Jan 2023
2.	Institute Management Committee Meeting	10 Feb 2023
3.	World Intellectual Property Day "Women and IP: Accelerating innovation and Creativity	26 Apr 2023
4.	PM Award winning initiatives	27 Apr 2023
5.	May Day Workshop	1 May 2023
6.	QRT Meeting	30 – 31 May 2023
7.	SPARROW Meeting	1 Jun 2023
8.	World Yoga Day	21 Jun 2023
9.	SPARROW Meeting	1 Jun 2023
10.	Presentation by Dr Ravindra Kumar on MDP on leadership development – A pre – RMP programme	5 Jul 2023
11.	Presentation by Sh. NS Saini on Good Governance for effectiveness of welfare and development measures	6 Jul 2023
12.	Presentation by Vikas Kumar on Good Governance for effectiveness of welfare and development measures	7 Jul 2023
13.	World Population Day & Cow Prashansha Day	11 Jul 2023
14.	Address by Sunil Mansinka ji, Coordinator, Govigyan Anusanbhan Kendre, Nagpur	18 Jul 2023
15.	Corpus Fund Meeting	25 Aug 2023
16.	Orientation seminar by Dr Anjali and Dr Divya D	25 Aug 2023
17.	IRC Meeting	26 – 27 Sep 2023
18.	QRT Meeting	6 Oct 2023
19.	Brainstorming session on a way forward ICAR-CIRC	4 Nov 2023
20.	Brainstorming session on a way forward ICAR-CIRC	27 Dec 2023

INSTITUTE TECHNOLOGY MANAGEMENT UNIT (ITMU)

The Institute Technology Management Unit (ITMU) was established in 2008 under ICAR plan scheme entitled "Intellectual Property Management and Transfer/Commercialization of Agricultural Technology Scheme (Up-scaling of existing component i.e. Intellectual Property Rights (IPR) under ICAR Headquarters Scheme on Management and Information Services)" funded by ICAR. The ITMU project was renamed as "National Agricultural Innovation Fund (NAIF)" ITMU acts as a facilitating and supporting unit to identify the emerging technologies and to manage the Intellectual Property (IP) portfolios of the institute. The unit scrutinizes and process the cases brought before it for filing of patent applications and address the issues under IP regime and technology transfer and governed by the Institute Technology Management Committee (ITMC) following ICAR policy guidelines.

Objectives:

- To pursue all IP protection, maintenance and transfer / commercialization related matters at the institute level following ICAR guidelines and any other administrative or policy decisions taken in ICAR from time to time.
- To seek any specific case-to-case basis advice/ assistance from the Zonal Agro-Technology Management Centres (ZTMCs) at the zonal level at the ICAR headquarters to pursue objective 1.
- At the institute level, Institute Technology Management Unit (ITMU) is constituted to process all IPR related issues which include:
    - Patenting of the Institute Technology
    - Technology Commercialization
    - Consultancy related issues
    - Training Programmes conducted by the Institute
    - Copyright of Research and technical publications
    - Germplasm Registration
    - All other IP issues

The Institute Technology Management Committee at ICAR-CIRC was constituted as for the guidelines of ICAR to facilitate the process of all Intellectual Property (IP) developed by the Institute Scientists.

1. Dr. A. K. Mohanty, Director ICAR-CIRC as Chairman
2. Dr. Suresh Kumar, PS, Animal Reproduction & Head CP&R Division (Senior most Head of Division) as Member
3. Dr. Sushil Kumar, PS, Animal Genetics & Breeding & Head CG&B (Technical Expert from Institute) as Member
4. Dr. Ajayvir Singh Sirohi, PS, Livestock Production & Management (Technical Expert from Institute) as Member
5. Dr. Ravinder Kumar, PS, Animal Genetics & Breeding (Technical Expert from Institute) as Member
6. Mrs Vidisha Garg, Attorney, Anand and Anand, Partner/ Patents Protection and Contentious (IPO & IPAB) IPR Expert (outside ICAR) as Member
7. Dr. Rajiv Ranjan Kumar, PS (LP&T) and In charge PME Cell as Member
8. Dr. Sumit Mahajan, PI NAIF Project & I/C ITMU as Member Secretary

During the period 3 ITMC meeting were organized to discuss the technology submitted by scientists of the institute, inter institution and field validation, of technology and submission of report and technologies to ICAR head quarter for certification and to Agrinnovate Ltd for transfer to commercial houses.

A total of 12 technologies were submitted to ICAR head quarter. During the period one copy right for Official Logo of ICAR-CIRC and one patent for Development of an in-house built LAMP assay for rapid detection of cow components adulterated in buffalo milk/meat was granted to the Institute. Apart from this unit perused the cases related to various IPR issues and attended the hearing against the patent application. Four agreement for obtaining IPR (Form-III) application under Section 6 of the Biological Diversity Act, 2002 read with Rule 18 of the Biological Diversity Rules, 2004 were executed with National Biodiversity Authority of India to obtain IPR.

MOUs Signed by ICAR-CIRC during 2023

Agency	Purpose	Commencement Date
ICAR- Central Sheep and Wool Research Institute, Avikanagar, Rajasthan	For Inclusion of CSWRI, Avikanagar Gir herd of adopted villages of under All India Coordinated Research Programme on Cattle, ICAR-CIRC, Meerut	28/01/2023
Annasaheb Shinde Foundation for Agro and Social Development, Mumbai, Maharashtra	For Gaolao cattle breed improvement in their native tract	23/03/2023
Kamdhenu University, Gandhinagar, Gujarat	AICRP on Cattle	22/06/2023
Surya Foundation, New Delhi	For Dissemination of Scientific Information and Technology for Cattle Improvement and Management	23/10/2023

The unit also helped in providing support for linkage with various SAUs, SVUs and ICAR Institutions across the country. During the year a total of 4 MoUs were signed

Patent Granted: LAMP Assay based rapid detection of cow components in Buffalo Milk/meat

Inventors: *Rajib Deb, Umesh Singh, Sushil Kumar, A.K Das, T V Raja, Rafeeque Rahman Alyethodi Gyanendra, , Rani Alex*

Benefits: The test can detect up to 5% level of cow milk /meat mixed in buffalo counterparts. Due to the simplicity and specificity, the developed LAMP test can be easily adapted in any laboratory for rapid detection of species identification in animal products.

Potential Applications: Rapidity, User friendliness, economical and specificity- because the technique involved targeting multi regions of a target gene of cow genome.

A one-day National workshop on "Awareness on Intellectual Property Rights (IPRs) and its Management" was organized on 17th January 2023 to sensitize scientists, researchers and other dealing with IPR issues and rights. The workshop was held under the chairmanship of Dr Umesh Singh, Director, ICAR-CIRC, Meerut. Dr. Umesh Singh emphasized the importance of IPR and its protection, highlighting the various elements that provide ways to protect technologies for optimal use. He also particularised and listed the patented technologies developed by the Institute.

The two invited lectures were organised on the emerging issues of IPR management. Mrs Vidisha Garg Attorney, Anand and Anand, Partner/ Patents Protection and Contentious (IPO & IPAB) Noida briefed about Patent System in India. She introduced the house to the commercialization of technologies and how to leverage them at the grassroots level. Mr. Ashish Prabhat, Examiner of Patents and Designs Indian Patent office, Govt. of India, New Delhi briefed on the patent system with special reference to agricultural research. On this occasion, more than 90 participants from various organizations attended the workshop.

National workshop on "Awareness on Intellectual Property Rights (IPRs)

INTELLECTUAL PROPERTY INDIA

क्रम सं/SL No :011180953

सत्यमेव जयते

पेटेंट कार्यालय,भारत सरकार
The Patent Office, Government Of India

पेटेंट प्रमाण पत्र | Patent Certificate

(पेटेंट नियमावली का नियम 74) | (Rule 74 of The Patents Rules)

पेटेंट सं. / Patent No.	:	474562
आवेदन सं. / Application No.	:	3870/DEL/2015
फाइल करने की तारीख / Date of Filing	:	27/11/2015
पेटेंटी / Patentee	:	INDIAN COUNCIL OF AGRICULTURAL RESEARCH

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित *DEVELOPMENT OF AN IN-HOUSE BUILT LAMP ASSAY FOR RAPID DETECTION OF COW COMPONENTS ADULTERATED IN BUFFALO MILI/MEAT* नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख नवम्बर 2015 के सत्ताईसवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled *DEVELOPMENT OF AN IN-HOUSE BUILT LAMP ASSAY FOR RAPID DETECTION OF COW COMPONENTS ADULTERATED IN BUFFALO MILI/MEAT* as disclosed in the above mentioned application for the term of 20 years from the 27th day of November 2015 in accordance with the provisions of the Patents Act,1970.

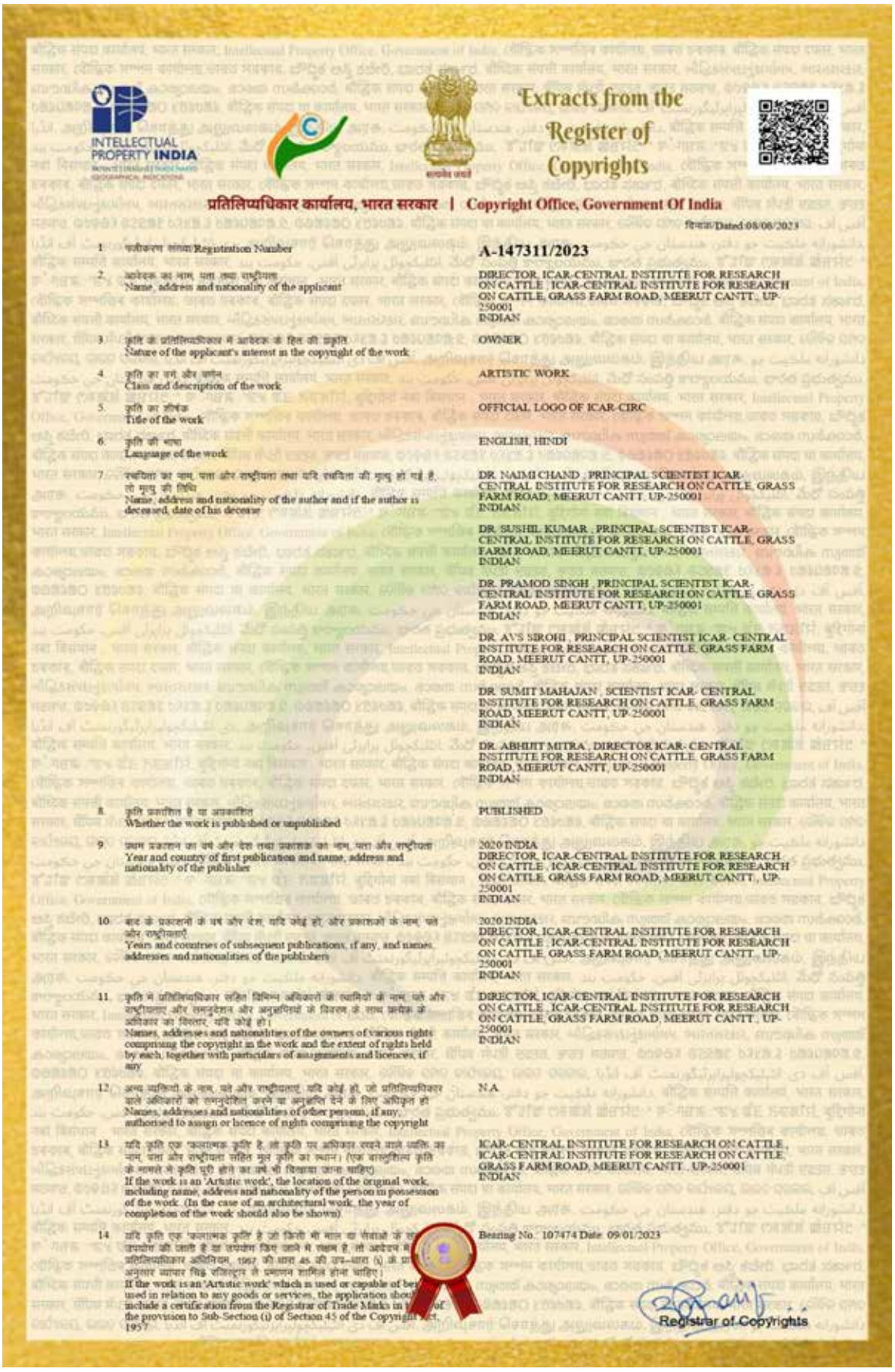
अनुदान की तारीख : 29/11/2023
Date of Grant :

पेटेंट नियंत्रक
Controller of Patents

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, नवम्बर 2017 के सत्ताईसवें दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी।

Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 27th day of November 2017 and on the same day in every year thereafter.

Fig: Certificate of the Patent granted to the institute for "Development of an in-house built LAMP assay for rapid detection of cow components adulterated in buffalo milk/meat



INTELLECTUAL PROPERTY INDIA

Extracts from the Register of Copyrights

प्रतिलिप्यधिकार कार्यालय, भारत सरकार | Copyright Office, Government Of India

दिनांक/Dated 08/08/2023

1	पंजीकरण संख्या/Registration Number	**A-147311/2023**
2	आवेदक का नाम, पता तथा राष्ट्रीयता Name, address and nationality of the applicant	DIRECTOR, ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE , ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT., UP-250001 INDIAN
3	कृति के प्रतिलिप्यधिकार में आवेदक के हित की प्रकृति Nature of the applicant's interest in the copyright of the work	OWNER
4	कृति का वर्ग और वर्णन Class and description of the work	ARTISTIC WORK
5	कृति का शीर्षक Title of the work	OFFICIAL LOGO OF ICAR-CIRC
6	कृति की भाषा Language of the work	ENGLISH, HINDI
7	रचयिता का नाम, पता और राष्ट्रीयता तथा यदि रचयिता की मृत्यु हो गई है, तो मृत्यु की तिथि Name, address and nationality of the author and if the author is deceased, date of his decease	DR. NAIMI CHAND , PRINCIPAL SCIENTIST ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN DR. SUSHIL KUMAR , PRINCIPAL SCIENTIST ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN DR. PRAMOD SINGH , PRINCIPAL SCIENTIST ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN DR. AVS SIROHI , PRINCIPAL SCIENTIST ICAR- CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN DR. SUMIT MAHAJAN , SCIENTIST ICAR- CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN DR. ABHIJIT MITRA , DIRECTOR ICAR- CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT, UP-250001 INDIAN
8	कृति प्रकाशित है या अप्रकाशित Whether the work is published or unpublished	PUBLISHED
9	प्रथम प्रकाशन का वर्ष और देश तथा प्रकाशक का नाम, पता और राष्ट्रीयता Year and country of first publication and name, address and nationality of the publisher	2020 INDIA DIRECTOR, ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE , ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT., UP-250001 INDIAN
10	बाद के प्रकाशनों के वर्ष और देश, यदि कोई हो, और प्रकाशकों के नाम, पते और राष्ट्रीयताएँ Years and countries of subsequent publications, if any, and names, addresses and nationalities of the publishers	2020 INDIA DIRECTOR, ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE , ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT., UP-250001 INDIAN
11	कृति में प्रतिलिप्यधिकार सहित विभिन्न अधिकारों के स्वामियों के नाम, पते और राष्ट्रीयताएं और समनुदेशन और अनुज्ञप्तियों के विवरण के साथ प्रत्येक के अधिकार का विस्तार, यदि कोई हो। Names, addresses and nationalities of the owners of various rights comprising the copyright in the work and the extent of rights held by each, together with particulars of assignments and licences, if any	DIRECTOR, ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE , ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT., UP-250001 INDIAN
12	अन्य व्यक्तियों के नाम, पते और राष्ट्रीयताएं, यदि कोई हो, जो प्रतिलिप्यधिकार वाले अधिकारों को समनुदेशित करने या अनुज्ञप्ति देने के लिए अधिकृत हो Names, addresses and nationalities of other persons, if any, authorised to assign or licence of rights comprising the copyright	N.A.
13	यदि कृति एक 'कलात्मक कृति' है, तो कृति पर अधिकार रखने वाले व्यक्ति का नाम, पता और राष्ट्रीयता सहित मूल कृति का स्थान। (एक वास्तुशिल्प कृति के मामले में कृति पूरी होने का वर्ष भी दिखाया जाना चाहिए) If the work is an 'Artistic work', the location of the original work, including name, address and nationality of the person in possession of the work. (In the case of an architectural work, the year of completion of the work should also be shown)	ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE , ICAR-CENTRAL INSTITUTE FOR RESEARCH ON CATTLE, GRASS FARM ROAD, MEERUT CANTT., UP-250001 INDIAN
14	यदि कृति एक 'कलात्मक कृति' है जो किसी भी माल या सेवाओं के [illegible] उपयोग की जाती है या उपयोग किए जाने में सक्षम है, तो आवेदन में [illegible] प्रतिलिप्यधिकार अधिनियम, 1957 की धारा 45 की उप-धारा (i) के प्रा[illegible] अनुसार व्यापार चिह्न रजिस्ट्रार से प्रमाणन शामिल होना चाहिए। If the work is an 'Artistic work' which is used or capable of be[illegible] used in relation to any goods or services, the application shou[illegible] include a certification from the Registrar of Trade Marks in [illegible] of the provision to Sub-Section (i) of Section 45 of the Copyright Act, 1957	Bearing No. 107474 Date 09/01/2023

Registrar of Copyrights

Fig: Certificate of the copy right granted to the institute for Official Logo of ICAR-CIRC

An interactive session cum workshop to celebrate "World Intellectual Property Day 2023" was organised on April 26, 2023, on the theme "Women and IP: Accelerating Innovation and Creativity ". The aim of the program was to encourage women to use the intellectual property system to protect and value their work; motivate for development of better technologies that benefit everyone, create more thriving women-led businesses, and suggest means for support economic recovery and reconstruction. A lecture on intellectual property rights discussing how patents, copyrights, trademarks and designs impact daily life and leading women innovators/ scientists in India and around the world. The impact of diversity, accessibility and inclusion on the intellectual property field was also discussed. It was suggested that as women bring new perspectives and talents, more women should be involved in the business of innovation and creativity. Speakers also shared personal experience in filing patents and congratulated everyone on World Intellectual Property Day. All Institute scientists participated in this interactive session and workshop.

Renewal of the ISO9001:2015 certification of the institute: Annual surveillance audit of the Annual surveillance audit of the ISO9001:2015 certificate of the institute was carried out by ISO consultant M/S quality consultant with his team on 14-15th November 2023. ISO consultant had the meeting with all heads of

Dr Megha Pandey delivering a talk during workshop on Women and IP: Accelerating Innovation and Creativity " on April 26, 2023

division and section incharges of the institute on 14th November 2023 and discussed about compliance of ISO standards by the institute. The team also visited all the division/sections/laboratories of the institute. The ISO9001:2015 certificate of the institute was renewed and certificate was issued on 26/12/2023.

Technology Validation: The technology of Augmented-OvSynch protocol for improvement in oestrus resumption and conception rate in postpartum lactating cows was assessed in adopted villages. Oestrus induction showed significant improvement in the treatment group (83.94%) compared to the control group (37.80%). The overall conception rates were also significantly higher in the treatment groups (68.61% versus 29.27%) animals under study

HUMAN RESOURCE DEVELOPMENT AND CAPACITY BUILDING

The employees of ICAR-CIRC attended various training programmes / seminars / conferences / workshops / symposia / meetings organized by different organizations to update their knowledge and strengthen skills on different aspects including science & technology, administration and financial management. Moreover, the institute organized different training programmes / conference / meetings / workshops for various stakeholders.

i) The details of the training programmes attended by institute staff are given below:

S. No.	Name of the Participant	Particulars	Duration	Venue
1.	Dr Ravinder Kumar	Management Development Programme on Leadership Development (A Pre RMP) Programme	Jun 12-23, 2023	ICAR-NAARM, Hyderabad
2.	Dr Sumit Mahajan	NABL Assessor Training Program	Aug 21-25, 2023	ICAR-IVRI, Izatnagar
3.	Dr Anjali	Professional attachment training- FOCARS for ARS Probationers	Aug 30 to Nov 29, 2023	ICAR-CIRB, Hisar
4.	Dr Devara Divya	Professional attachment training- - FOCARS for ARS Probationers	Sep 01,2023 to Jan 02, 2024	CSIR-CCMB, Habsiguda, Hyderabad
5.	Shri N.S. Saini	Good Governance for Effectiveness of Welfare and Development Measures	Jun 19-23, 2023	V.V. Giri National Labour Institute, NOIDA
6.	Shri N.S. Saini	Vigilance Awareness	Oct 18-20, 2023	NAARM, Hyderabad
7.	Shri Vikas Kumar	Good Governance for Effectiveness of Welfare and Development Measures	Jun 19-23, 2023	V.V. Giri National Labour Institute, NOIDA

ii) Trainings / Seminars / conference / workshop / organized by the ICAR-CIRC Meerut

S. No.	Name of the seminar / conference / training	Date & Venue	Organizing secretary
1.	Training Programme on Nutritional and Basic Health Management of Dairy Cattle for the forage experts of Advanta Enterprises Limited, Hyderabad	17 – 18 Aug 2023 ICAR-CIRC, Meerut	Course Director: Dr Umesh Singh Course Coordinator:Dr. SK Verma Co-coordinators: Dr Rajiv Ranjan Kumar Dr. Sumit Mahajan
2.	One-day Seminar on *'Strategies for Accelerating Dairy Entrepreneurship in Western Uttar Pradesh'* jointly organized by Indian Dairy Association (North Zone, Western UP Chapter) & ICAR-CIRC, Meerut Cantt.	27 Dec 2023	Dr S K Verma Dr Rajiv Ranjan Kumar
3.	BVSc Internship for students from SVPUA&T, Meerut	23rd Nov to 23rd Dec 2023	Dr Abishek Biswa Dr Sushil Kumar Dr Suresh Kumar Dabas

A two days sponsored training program on "Nutritional and Basic Health Management of Dairy Cattle" was organized for the staffs of Advanta Enterprises Limited, Hyderabad on request, on 17-18 Aug 2023 where in 40 staff members participated. Customized lectures were delivered on different aspects of Livestock and fodder production like Cattle Genetic Resource and their nutritional requirement, Feeding standard for different categories of cattle, balancing of ration, feeding regime, Assessing the nutritional requirement of animals, feed formulation, combination and practices for optimal digestibility of nutrients in dairy cattle, Nutrition and Milk quality, Role of nutrition in reproductive health management of dairy cattle, Digestive disorders in cattle and remedial measures and Poisoning of feed and fodder origin in cattle and management of gut health. In addition to expert lectures, practical sessions were also conducted.

Trainees from Advanta Enterprises Limited, Hyderabad on 17-18 Aug 2023

One-day Seminar On "Strategies for Accelerating Dairy Entrepreneurship in Western Uttar Pradesh" was jointly organized by Indian Dairy Association (North Zone, Western UP Chapter) & ICAR-CIRC, Meerut Cantt. on 27th Dec 2023 at ICAR_CIRC, Meerut. The programme consist of two technical sessions, one interactive session with dairy entrepreneurs followed by valedictory session. Dr. GS Rajorhia, Ex-President IDA & Ex-Eminent Professor, NDRI, Karnal, Dr. GK Gaur, ADG (APB), ICAR, New Delhi were the noted lead speakers in technical session. About 14

Dignitaries on the dais during One-day Seminar On "Strategies for Accelerating Dairy Entrepreneurship in Western Uttar Pradesh" was jointly organized by Indian Dairy Association (North Zone, Western UP Chapter) & ICAR-CIRC, Meerut Cantt. on 27th Dec 2023

persons belonging industry, dairy entrepreneurs, Start-ups and faculty from ICAR-CIRC, registered for the conference. On this occasion stall exhibits were also arranged where more than 20 company put their stalls.

The institute hosted internship programme for the BVSc &AH students of SVPUAT, Meerut scheduled during November, 2023 to January, 2024. The students were trained with the functioning of cattle nutrition, molecular genetics & breeding and semen freezing laboratories at the institute. They were exposed to advanced reproductive technologies, semen processing & freezing, breeding techniques, least-cost feed formulations, dairy cattle and bull management practices, etc. involving hand-on training demonstrations. A total of 69 students attended the internship programme which was coordinated by Dr Avishek Biswas, Head, CNM division.

BVSc & AH students for undergoing their internship training at MGU, ICAR-CIRC, Meerut

iii) Professional Award/ recognitions of ICAR-CIRC Scientists at different forum

S. No	Name	Event/Institute/Society/Org.	Awards/ Recognition
1.	Dr Ajayvir Singh Sirohi	National Livestock Conference and 29th Annual Convention of Indian Society of Animal Production & Management during 18-20 January, 2023	National Fellow of Animal Production Management (FNAPM)
2.	Dr Pramod Singh, Aanchal Sharma, Dr SK Verma, Dr AS Sirohi, and Dr Rajendra Prasad	XII Biennial Conference on 'New Horizons of Animal Nutrition Research: Combating the Challenges of Productivity, Health and Welfare of Animals' February 16-18, 2023 at DUVASU, Mathura (UP).	Best Paper Award for research paper " Fermentation characteristics of silage prepared (*in vitro*) from vegetable waste

S. No	Name	Event/Institute/Society/Org.	Awards/ Recognition
3.	Dr M. Pande, Dr S. Kumar, Dr N. Chand, Dr N. Prasad, Dr S. Saha, Dr U. Singh	National Conference on "Agro Ecology based Agri-Food Transformation Systems" organized by IIFSR Modipuram, Meerut dated 27-28, January, 2023,	Best Oral Presentation
4.	Pranav Chauhan, R R Kumar et al.,	National Symposium on " Recent Biotechnological advances in health and management of livestock, poultry and companion animals" organized by NDVSU, Jabalpur during 5-7 Oct 2023	Best Paper oral presentation award
5.	Dr Ajayvir Singh Sirohi	National Livestock Conference "Futuristic Approach to Viable Animal Production vis à vis Climate and Calamity Challenges" during 18-20 January, 2023	Judge in poster session
6.	Dr Rajiv Ranjan Kumar	Indian Meat Scientist Association	Joint secretary
7.	Dr Rajiv Ranjan Kumar	FVAS, IAS, RGSC-BHU- Barkachha	Member Board of studies
8	Dr Megha Pande	Agriculture Letters https://agletters.in ISSN: 2582-6522, Karnataka	Member of the Editorial Board
9	Dr Sumit Mahajan	Lab2Land" Magazine Science digital Publication, Nagpur, Maharashtra	Editor
10	Dr Sumit Mahajan	Animal and Veterinary Sciences, Science Publishing Group , New York, USA	Editorial Board Member
11	Dr Avishek Biswas	Current Indian Science, Bentham Sciences, UAE	Section Editor
12	Dr Avishek Biswas	Frontier in Animal Sciences by Frontiers Media Limited, United Kingdom (UK)	Review Editor
13	Dr Avishek Biswas	The Agricultural Sciences, by Canadian Agricultural Association (CAA).	Editor
14	Dr Avishek Biswas	ICAR-Indian Veterinary Research Institute for the tenure of two years i.e., 2022-24	Member, Academic Council (PG Faculty)
15	Dr Pramod Singh	XII Biennial Conference on 'New Horizons of Animal Nutrition Research: Combating the Challenges of Productivity, Health and Welfare of Animals' February 16-18, 2023 at DUVASU, Mathura (UP).	Chairman of technical session 'Modern Feed Additives and Supplements' on February 17, 2023.
16	Dr Pramod Singh	Wildlife Institute of India Dehradun (UK) on June 26-30, 2023.	Guest Faculty
17	Dr SK Verma	National Seminar on Impact/ Role of New Education Policy in Building of New India,. Shri Venkateshwara University & Venkateshwara group of Institution, VGI Campus, Meerut. 25 Feb 2023	Guest of Honor
18	Dr Rajiv Ranjan Kumar	Under Institutional Development Plant, NAHEP at GADVASU, Ludhiana, 19.05.2023-22.05.2023	Guest Faculty
19	Dr Rajiv Ranjan Kumar	Brain Storming session on "Prospects of Dairy Farming in India" at SVPUA&T, Meerut on 13.09.2023.	Co-Chairman
20	Dr Sumit Mahajan	Journal Of Veterinary and Marine Sciences (ISSN:2689-7830)	Editorial Board Member
21	Dr Megha Pande	Animal Reproduction Up date	Editorial Board Member
22	Dr Suresh Kumar	Brain-storming session on prospects of dairy farming in India at SVPUA&T, Meerut on 13-09-2023	Session Chairman
23	Dr Megha Pande	Brain-storming session on prospects of dairy farming in India at SVPUA&T, Meerut on 13-09-2023	Rapporteur
24	Dr Naimi Chand Dr Ajayvir Singh Sirohi	Seminar on Strategies for accelerating dairy enterpreneurship in western Uttar Pradesh by IDA on 27th Dec 2023 at ICAR-CIRC Meerut	Panelist

Dr Ajayvir Singh Sirohi receiving National Fellow of Animal Production Management at OUAT, Bhubneshwar on 18.01.2023

Dr Pramod Singh, receiving Best Paper Award for research paper "Fermentation characteristics of silage prepared (in vitro) from vegetable waste". during the XII Biennial Conference of Animal Nutrition Association on February 16-18, 2023 at DUVASU, Mathura (UP)

Invited Lecture/Lead paper presented by ICAR-CIRC Scientists

S No.	Topic of Lecture	Forum where presented/delivered	Date	Pr esenting Scientist
1.	*Biomarker potential of urinary proteins for early pregnancy diagnosis in Bovine: An in-depth proteomic analysis*	*Key note address in "15th Annual Meeting of Proteomic Society, India & International Conference on "Integrated Proteomics: Application in Food, Nutrition and Health", Nov. 22-22, 2023*	*22.11.2023*	*Dr A K Mohanty*
2.	*The role of Indian native cattle breeds in Sustainable Livestock Production.*	*DST-SERB sponsored High-end workshop "Climate-smart livestock farming for sustainable production" held from 18th 27th September 2023 at ICAR-IVRI.*	*27.09.2023*	*Dr A K Mohanty*
3.	*Entrepreneurial opportunities and maximizing the economic returns from dairy business*	*One-day Seminar on 'Strategies for Accelerating Dairy Entrepreneurship in Western Uttar Pradesh' jointly organized by Indian Dairy Association & ICAR-CIRC, Meerut Cantt*	*27.12.2023*	*Dr Rajiv Ranjan Kumar*
4.	*Sensory Evaluation and Consumer Research for Development of Livestock Products*	*One week training entitled "Recent advances in quality assurance of production and processing of animal origin foods" under ICAR-NAHEP-CAAST project by MAFSU, Nagpur*	*28.12.2023*	*Dr Rajiv Ranjan Kumar*
5.	*Present scenario and prospects of dairy cattle production in India*	*One day workshop on "Prospects of dairy farming in India" held at SVPUAT, Modipuram*	*13.9.2023.*	*Ajayvir Singh Sirohi*
6.	*On-farm record keeping and accounting procedures*	*In capacity building and skill upgradation programme for technical staff at IIFSR, Modipuram*	*25.02.2023*	*Ajayvir Singh Sirohi*
7.	*Govansh nasl sudhar evam prabandhan*	*Pt Deen Dayal Upadhyay Vrihad Pashu Arogya shivir organized by Deptt of AH UP at village Rasoolpur, Meerut*	*25.03.2023*	*Ajayvir Singh Sirohi*
8	*Digestive disorders in cattle and remedial measures*	*Nutritional and Basic Health Management of Dairy Cattle" for the Fodder Experts of M/S Advanta Enterprises Limited, Hyderabad at ICAR-CIRC, Meerut Cantt*	*17. 08. 2023 to 18. 08. 2023*	*Dr Naimi Chand*
9	*Diagnostic importance of hemato-biochemistry and urinalysis in health and disease*	*Swachchhta Pakhwara for the staff of ICAR-CIRC*	*26.12.2023*	*Dr Naimi Chand*
10	*Govansh ki mahatwapurn beemariyon ke karan, upchar evam bachav*	*Field day on "Pashu utpadakta vridhi ki adhunik takneeken" organized by ICAR-CIRC at village Jatpura*	*22.06.2023*	*Dr Naimi Chand*

S No.	Topic of Lecture	Forum where presented/delivered	Date	Pr esenting Scientist
11	*Prevention and control of mastitis in lactating dairy cattle*	*Kisan Diwas organized at Kushawali village by ICAR-CIRC*	*23.12.2023*	*Dr Naimi Chand*
12	*Therapeutic management of clinical mastitis in dairy cattle under field conditions*	*National conference on "Agro-ecology based Agri-food transformation systems" organized by FSRDA and ICAR-IIFSR in collaboration with CIMMYT and ICRISAT at ICAR-IIFSR, Modipuram Meerut*	*27. 01. 2023 to 28. 01. 2023*	*Dr Naimi Chand*
13	*Balanced Nutrition for Better Livestock Productivity*	*Training & Visit Programme on Watershed Concept and Participatory Resource Management organized by ICAR-IISWC, Dehradun on 15 – 17 Mar 2023*	*15. 03. 2023*	*Dr S K Verma*
14	*Balanced Nutrition of Livestock for Better Productivity*	*Officer Trainees of 125th Regular Batch organized by ICAR-IISWC, Dehradun*	*22. 07. 2023*	*Dr S K Verma*
15	*Balanced Nutrition for Better Livestock Productivity*	*NCOF, Ghaziabad*	*14. 10. 2023*	*Dr S K Verma*
16	*Nutritional Requirements of Dairy Animals and Feed Formulation*	*NCOF, Ghaziabad*	*04. 12. 2023*	*Dr S K Verma*
17	*Balanced Nutrition for Better Livestock Productivity*	*NCOF, Ghaziabad*	*07. 12. 2023*	*Dr S K Verma*
18	*Balanced Nutrition of Livestock for Better Productivity*	*Officer trainees of 126th Batch of Regular Training Programme organized by ICAR-IISWC, Dehradun.*	*29. 12. 2023*	*Dr S K Verma*
19	*Feeding and Nutritional Management in Dairy Farm*	*Capacity Building and Skill Upgradation Programme for Technical Staff on "Farm Management", Feb 22-28, 2023 at ICAR-IIFSR, Modipuram Meerut.*	*05.02.2023*	*Dr Pramod Singh*
20	*Significance of Fodder Quality and Dairy Animal Feeding*	*Training programme on 'Basic and Nutritional Health Management. ICAR-Central Institute for Research on Cattle, Meerut Cantt. (UP)-250 001.*	*17. 08. 2023*	*Dr Pramod Singh*
21	अपशिष्ट (कचरा) खतरे और प्रबन्धन।	*Swachchhta Pakhwara, at ICAR-Central Institute for Research on Cattle, Meerut Cantt. (UP)-250 001*	*22. 12. 2023*	*Dr Pramod Singh*
22	*Biotechnology in service of Mankind*	*Inter-Institute Annual Science Fest 'BIOME-2023' Meerut Institute of Engineering and Technology, Meerut*	*20.10.2023*	*Dr Rajiv Ranjan Kumar*
23	*Milk beyond nutrition*	*Webinar on "The milk and beyond Milk" by National Institute of Agriculture and Management (MANAGE)*	*30.01.2023*	*Dr Rajiv Ranjan Kumar*

iv) Important Scientific events/ meetings attended by Scientists of ICAR-CIRC, Meerut

S.No.	Scientific Events/Important meetings	Host Institute/ organization and Place	Period	Nominated Scientists	Role of Scientist
1	One day workshop entitled ' Atlas on Climate Change Adaptation in South Asian Agriculture	ICAR-National dairy Research Institute (NDRI), Karnal	*21. 11. 2023*	Dr Avishek Biswas	Lead speaker
2	Animal Nutrition Association XII Biennial Conference on 'New Horizons of Animal Nutrition Research: Com bating the Challenges of Productivity, Health and Welfare of Animals'	DUVASU, Mathura	*16. 02. 2023 to 18. 02. 2023*	Dr. Pramod Singh	Chairman of a session and poster presentation

S.No.	Scientific Events/Important meetings	Host Institute/ organization and Place	Period	Nominated Scientists	Role of Scientist
3	National Livestock Conference and 29th Annual Convention of Indian Society of Animal Production & Management 2023	OUAT, Bhubaneswar	*18. 01. 2023 to 20. 01. 2023*	Dr Ajayvir Singh Sirohi	Oral prsentation
4	National conference on "Agro-ecology based Agri-food transformation systems" organized by FSRDA and ICAR-IIFSR in collaboration with CIMMYT and ICRISAT	ICAR-IIFSR, Modipuram, Meerut	*27. 01. 2023 to 28. 01. 2023*	Dr Naimi Chand Dr S K Dabas Dr Naresh Prasad Dr Megha Pande	Oral Presentations and Stall exhibition
5	Workshop on "Multi-stakeholders consultation work shop to develop the state action plan for the prevention and control of zoonotic diseases for the state of Rajasthan organized by the center of one health of NCDC and DMHS, Rajasthan in technical collaboration with US center for disease control and	Hotel The Lalit at Jaipur	*12. 10. 2023 to 13. 10. 2023*	Dr Naimi Chand	As Panel member
6	Slaughter house and Meat Industry Sectional Committee, FAD 18, Bureau of Indian Standards, Ministry of Consumer Affairs, Food and Public Distribution Government of India	Online mode	16th, 17th and 18th Meeting	Dr Rajiv Ranjan Kumar	As Panel member
7	Scientific Panel on Genetically Modified organisms and Foods	Food Safety and Standard Authority of India, New Delhi	27th, 28th and 29th meeting	Dr Rajiv Ranjan Kumar	As NetSCOFAN representative
8	XVI Agricultural Science Congress & ASC EXPO on the theme "Transformation of Agri-food Systems for achieving sustainable development Goals"	ICAR-CMFRI, Kochi.	*10. 10. 2023 to 13. 10. 2023*	Dr A K Mohanty Dr T V Raja Dr Naresh Prasad	Oral presentation and Stall exhibits
9	XVII Annual Convention of ISAGB and national conference on "Advances in genetics and genomics for sustainable livestock transformation"	ICAR-NBAGR, Karnal	*16. 11. 2023 to 17. 11. 2023*	Dr A K Mohanty	Chairman of Session
10	15th Annual Meeting of Proteomics Society, India (PSI) and International conference on "Integrated proteomics: applications in Food, Nutrition and Health" from 20-22 November, 2023	NIPGR, New Delhi	20.11.2023 to 22.11.2023	Dr A K Mohanty	Keynote speaker
11	Kisan Divas and Breed Conservation 2023 Award Ceremony	ICAR-NBAGR, Karnal	23.12.2023	Dr A K Mohanty	Guest of Honour
12	XVII Annual Convention of ISAGB and national conference on "Advances in genetics and genomics for sustainable livestock transformation"	ICAR-NBAGR, Karnal	*16. 11. 2023 to 17. 11. 2023*	Dr Susil Kumar	Chairman Poster Session

EXTENSION ACTIVITIES

During the report period, ICAR-CIRC, Meerut participated in 13 Kisan Melas/exhibitions organized by different State and Central Government Institutions in which research activities and technologies developed by the Institute were showcased. More than 8000 farmers and stakeholders visited the ICAR-CIRC stall during different melas. Various animal health cum infertility camps were organized by the institute to address different animal health related problems faced by farmers. The institute also organized training and visits programmes for farmers and stakeholders under various ongoing schemes such as FFP, SCSP, TSP and NEHR scheme and trained more than 1470 participants on various aspects of cattle husbandry practices. In addition, scientists of the institute regularly visited the farmer's units of adopted villages and advices were given to tackle the problems faced by the farmers in cattle rearing.

Participation in Kisan Melas and Exhibitions

S. No.	Name of the Exhibition	Organized by	Venue	Duration	No. of farmers registered
1	Agri Exhibition	ICAR-IIFSR, Modipuram, Meerut	ICAR-IIFS, Modipuram	January 27-28, 2023	94
2	Agri Exhibition cum Goshthi	SVPUAT, Modipuram, Meerut	SVPUAT, Modipuram	February 15, 2023	67
3	Pashu Sanrakshan, Udyan Pradarshani evam Atmanirbhar Krishi Mahotsav	KVK (under RPCAU) Piprakothi, East Champaran, Bihar	KVK Piprakothi, East Champaran, Bihar	February 18-20, 2023	200
4	Exhibition	Bhartiya Kisan Sangh, Hastinapur, Meerut,	Hastinapur, Meerut,	March 17- 19, 2023	137
5	Maha-Pashudhan Expo	Deptt. of Animal Husbandry, Govt. of Maharashtra	Shirdi, Ahmednagar, Maharashtra	March 24- 26, 2023	502
7	Pashu Pardarshni evam Krishi Mela	Deptt of AH and Dairying, MFAHD, GoI, New Delhi and ICAR-CIRC, Meerut	Numaish Ground, Muzaffarnagar (UP)	April 06- 07, 2023	329
8	National Dairy Mela	ICAR-NDRI, Karnal, Haryana	ICAR-NDRI, Karnal, Haryana	April 08- 10, 2023	63
9	All India Farmers Fair and Agro-Industrial Exhibition-2023	SVPUAT, Modipuram, Meerut	SVPUAT, Modipuram, Meerut	October 17-19, 2023	192
10	Agril. Exhibition during ICAR-CIRC Foundation Day	ICAR-CIRC Meerut	ICAR-CIRC Meerut	November 3, 2023	310
11	Exhibition during Veteran Rally	RVC Meerut Cantt	RVC Meerut Cantt	December 16, 2023	30
12	Agril. Exhibition during Seminar	ICAR-CIRC Meerut in collaboration with IDA North Zone UP	ICAR-CIRC Meerut	December 27, 2023	150
13	ASC Agri Expo-2023	NAAS and ICAR, New Delhi and Hosted by ICAR-CMFRI, Kochi	Hotel Le Meridien, Kochi, Kerala	October 10-13, 2023	110

Institute also bagged "Best stall award" in the National Conference on Agro Ecology based Agri-Food Transformation Systems organized by Farming Systems Research and Development Association and ICAR-Indian Institute of Farming Systems Research, Modipuram, Meerut dated 27-28, January, 2023,

A field day was organized at Jatpura village Meerut on June 22.2023 with the aim to enhance the acquaintance of participating farmer about modern techniques for increased animal productivity. On this occasion a series of lecture were also organized before the showcasing of institute technologies. The farmers were briefed about balanced ration formulation for cattle, importance of green fodder in cattle nutrition, causes and prevention of infertility and repeat breading and its management, advances in artificial insemination by the subject matter experts. Subsequently, field demonstration for Institute technologies was made. About 100 farmers participated in this programme. Participating farmers and belonging to SC community were also given agri-inputs from SCSP scheme.

Field day at Village Jatpura, Meerut on 22 June 2023

ICAR-CIRC participated in Maha-Pashudhan Expo at Sirdih, Ahmednagar, Maharashtra on 24-26 March, 2023

Interaction with Ex-Agriculture Mininster GOI, during exhibition at KVK Piprakothi, East Champaran, Bihar on 18-20 February, 2023

ICAR-CIRC Exhibition Stall at Kochi during ASC Expo on 10-13 October, 2023

Exhibition stall at Hastinapur, Meerut during Bhartiya Kisan Sangh Sammelan on 17-19 March, 2023

Exhibition stall at Pashu Pardarshni evam Krishi Mela, Muzaffarnagar (UP) on 6-7 April, 2023 organized by DAHD, GOI, New Delhi and ICAR-CIRC Meerut

Pashu Pradharshini and Krishi Mela organized at Numaish Ground, Muzaffarnagar, Uttar Pradesh

The two days Pashu Pradharshini and Krishi Mela organized on 6th and 7th April 2023 by Department of Animal Husbandry and Dairying, GoI in cooperation with ICAR-Central Institute for Research on Cattle, Meerut at Numaish Ground, Muzaffar Nagar Uttar Pradesh. The mela was inaugurated on 6th April 2023 by the Sri. Nitin Jairam Gadkari, Hon'ble Cabinet Minister of Road Transport and Highways, GoI in the presence of Sri. Parshottam Rupala, Hon'ble Union Cabinet Minister of Fisheries, Animal Husbandry and Dairying GoI, Sri. Dharmpal Singh, Hon'ble Cabinet Minister of Animal Husbandry, Government of Uttar Pradesh and Dr. Sanjeev Kumar Balyan, Hon'ble Minister of State for Fisheries, Animal Husbandry and Dairying GoI. In the mela, 180 exhibition stalls comprising of 28 from machinery and tools, 35 from Agricultural startups, 17 from Ministry of Agriculture 40 from Department of Animal Husbandry and Dairying, 15 from fisheries sector and 45 from ICAR, SAU, common service centres and veterinary pharmaceuticals were arranged to display the activities performed by these agencies. On the second day, around 20000 participants including the school and college students attended the mela.

On the second day of Mela (7th April 2023), the animal show and judging were conducted for different categories of cattle, buffaloes, sheep goat and horses. The judging committee consisted of the animal science / Veterinary experts from various Institutions like ICAR, State Animal Husbandry Department, State Agricultural / Veterinary Universities. During the Mela, cultural programs were also arranged. Lottery scheme sponsored by different manufacturers of agricultural equipment for visiting farmers was also arranged. The Mela was organized by the Dept of Animal Husbandry and Dairying, GoI in coordination with ICAR-Central Institute for Research on Cattle, Meerut. The Department of Animal Husbandry, Government of Uttar Pradesh also played an important role in organizing the Mela. On the second day, show and judging of various categories of buffaloes, sheep, goat and horses were conducted. The valedictory function of the mela held on 07th Apr 2023 at 02:30 PM which was graced by Sri. Giriraj Singh, Hon'ble Minister of Rural Development & Panchayati Raj along with Dr. Sanjeev Kumar Balyan, Hon'ble Minister of State for Fisheries, Animal Husbandry and Dairying, GoI. During his address Sri. Giriraj Singh stressed the importance of indigenous animals on the livelihood of the rural livestock farmers of the country. He urged to adopt the advanced technologies for improving the economy of livestock farming. Dr. Sanjeev Kumar Balyan Hon'ble Minister of State for Fisheries, Animal Husbandry and Dairying GoI during his address appreciated the interest shown by the farming community of the region in making the mela a grand success.

During the valedictory program, the winners of the lottery scheme sponsored by different manufacturers of agricultural equipment were presented with the prizes. The winners of the various categories of animal shows were distributed with the certificates, medals along with the cash prizes. The Murrah male owned by Sri Arjun Singh from Sonaria, Haryana was adjudged as the champion animal of the mela. In the valedictory session Shri Vijay Pal singh Tomar, Hon'ble Member of Parliament Rajyasabha, Shri Pankaj Singh, Hon'ble MLA and other dignitaries were also present.

The Pashu Pradharshini and Krishi Mela came to an end on the evening of 7th April 2023.

Dr. Sanjeev Kumar Balyan, Hon'ble Minister of State for Fisheries, Animal Husbandry and Dairying, GoI distributing awards to the winners during Pashu Pradharshini and Krishi Mela

Sri. Giriraj Singh, Hon'ble Minister of Rural Development & Panchayati Raj, GoI addressing the farmers during Pashu Pradharshini and Krishi Mela

Days and week Celebrations

Republic Day

ICAR-Central Institute for Research on Cattle, Meerut celebrated Republic Day on January 26, 2023 with great splendour and pride under the theme "Jan-Bhagidari" "People's Participation". Dr. Umesh Singh, Director of ICAR-CIRC, unfurled the Tiranga and addressed the staffs. He acknowledged the role of farmers, workers, scientists, soldiers and all Indians whose combined efforts have enabled our country to live up to the spirit of 'Jai Jawan, Jai Kisan, Jai Vigyan and Jai Anusandhan'. He appreciated every citizen who has contributed to the progress of the nation. He narrated that the contribution of agricultural and animal scientists has played an important role in transforming India into a country free of hunger and

Director's address during Republic Day

malnutrition. He urged all to work continuously for improving the living standards of citizens, especially the poorest. He enumerated the achievements and progress made at institute and motivated everyone to do better work. All the employees pledged to further strengthen their efforts for sustainability in livestock sector and thereby prosperity of the nation.

World Population Day and Cow Appreciation Day 2023

ICAR-Central Institute for Research on Cattle Meerut celebrated World Population Day and Cow Appreciation Day on 11th July 2023. Dr. Umesh Singh, Director of ICAR-CIRC Meerut delivered a lecture on the occasion. In his address he highlighted the contemporary challenges such as resource scarcity, climate changes and social inequality and urged the audience to develop a thinking, practical lifestyle and need of family planning for better future of human kind. While commemorating the contribution of cows in Indian economy, he also stressed upon value addition of milk products for profitability and sustainability. Dr. Suresh Kumar, HOD Cattle Physiology and Reproduction, Dr. Sushil Kumar,

Celebrated of World Population Day and Cow Appreciation Day

In-charge HOD, Cattle Genetics and Breeding and Dr. Sanjeev Kumar Verma, Principal Scientist also expressed their views during celebration. Staffs of the institute attended the celebration of World Population Day and Cow Appreciation Day. This programme was organized by Dr. Naresh Prasad, In-charge Extension Section.

International Day of Yoga

ICAR-Central Institute for Research on Cattle Meerut celebrated 9thInternational Day of Yoga on 21stJune 2023. Dr. Umesh Singh, Director of ICAR-CIRC Meerut welcomed the gathering and emphasized the importance of practicing yoga for healthy lifestyle. On the occasion, Shri Anil Pandey Ji, yoga expert from Patanjali Yogpeeth, Meerut explained the benefits of different Pranayamas and Asanas. He also demonstrated various pranayamas and asanas and also informed the common precautions to be followed while performing yoga. Staffs of the institute attended the celebration of International Day of Yoga. This programme was conducted by Dr. Naresh Prasad, Nodal Officer, Yoga Day.

Celebration of Internation Yoga day

Independence Day

ICAR-Central Institute for Research on Cattle, Meerut, resonated with the spirit of patriotism and unity as it wholeheartedly embraced the "Har Ghar Tiranga" campaign from August 13th to 15th, 2023. This initiative was part of the grand commemoration of 77 years of India's independence, known as the Azadi ka Amrit Mahotsav. The institute's esteemed Director, Dr. A K Mohanty, unfurled the Indian tricolor, a symbol of our nation's sovereignty, and in his eloquent address, he emphasized the profound significance of independence, reverently remembering the valiant sacrifices made by our freedom fighters.

Dr. Mohanty's words resonated with a call to action for every citizen to recognize their responsibilities towards our country. Amidst his thoughtful discourse, he shed light on the institute's remarkable achievements, a testament to its unwavering dedication to the cause of research and advancement in the realm of cattle. He presented a visionary strategy for the future, one that holds the promise of serving not only the ICAR but also the broader farming community. Dr. Mohanty's commendation of the institute's accomplishments served as both recognition and inspiration, fostering an environment of motivation and determination among all.

Celebration of Independence of India at ICAR-CIRC Meerut

Prior to this momentous occasion, the institute had distributed the Indian Flag to each member of its staff, encouraging them to unfurl this emblem of unity and pride in their homes. In this manner, ICAR-Central Institute for Research on Cattle, celebrated Azadi ka Amrit Mahotsav, symbolizing not only the journey of 77 years of independence but also the enduring spirit that propels India and its citizens toward new horizons of achievement.

Foundation Day

The 37th Foundation Day was celebrated at ICAR-Central Institute for Research on Cattle, Meerut on 03 November 2023. Since its establishment as Project Directorate on Cattle on 03 November 1987, the Institute has been working for improving animal productivity. Chief guest of the program was Dr. KML Pathak, former Vice Chancellor, Pandit Deen Dayal Upadhyaya Veterinary Science University and Cow Research Institute, Mathura, UP and special guest Mr. Amit Agarwal, MLA, Meerut Cantonment, Dr. K.K. Singh, Vice Chancellor, Sardar Vallabhbhai Patel University of Agriculture and Technology, Dr. Ashok Kumar, Assistant Director General (Animal Health), Dr. B.P. Mohanty, Assistant Director General (Inland Fisheries), Dr. A.K. Rawat, Former Advisor, DBT, Government of India, Dr. Sachinandan Dey, National Professor, Center for Animal Biotechnology, National Dairy Research Institute, Karnal, Dr. Sunil Kumar, Director, Indian Institute of Systems Research, Modipuram, Meerut, Dr. Girish Patil, Director, National Research Centre on Mithun, Medziphema, Nagaland etc. Dr. A. K. Mohanty, Director, ICAR-Central Institute for Research on Cattle, Meerut welcomed the dignitaries. In his welcome address he highlighted the important achievements made by the Institute over the years such as availability of land in Babugarh, Hapur for the Institute, various ongoing research projects by the Institute for the development of indigenous cows, development of Frieswal Cow, etc. On this occasion, Hindi magazine Surbhi was released by the chief guest and special guests. Under the Scheduled Caste sub-scheme of the institute, to make animal husbandry advanced and profitable, electric churners, tarpaulins, pans, buckets, pipes, mineral salts and medicine kits etc. were distributed to the farmers. The chief guest inspired the scientists of the institute to work in new research areas for the development of cattle. The special guests appreciated

ICAR-CIRC Foundation Day celebration

the work of the institute in cattle development and urged the cattle farmers to use the new research being done by the institute in cattle rearing. More than 500 participants including farmers, students, institute members participated in the program. Stalls of various institutions were the center of attraction in the program. The program was conducted by Dr. Megha Pandey. Dr. Sushil Kumar, Head of the Department of Cattle Genetics and Breeding, passed the vote of thanks.

Farmers/Students visits organized at ICAR-CIRC Meerut

S. No.	Name of the training	Venue and date	Coordinating scientists
1	Pradesh Ke Andar Krishak Bhraman for the farmers of Sadar and Jansath blocks of District Muzaffarnagar	9 Jan 2023 ICAR-CIRC, Meerut	Dr. SK Verma Dr. Sumit Mahajan Dr. Naresh Prasad
2	Pradesh Ke Andar Krishak Bhraman for the farmers of Morna block of District Muzaffarnagar	10 Jan 2023 ICAR-CIRC, Meerut	Dr. SK Verma Dr. Naresh Prasad
3	Pradesh Ke Andar Krishak Bhraman for the farmers of Purkaji and Khatauli block of District Muzaffarnagar	11 Jan 2023 ICAR-CIRC, Meerut	Dr JK Singh, Dr Naresh Prasad
4	Pradesh Ke Andar Krishak Bhraman for the farmers of Shahpur, Budhana and Baghra blocks of District Muzaffarnagar	12 Jan 2023 ICAR-CIRC, Meerut	Dr. SK Verma Dr. Sumit Mahajan
5	Visited 28 B.Sc. (Ag. Hons.) Students and 2 faculty members of College of Forestry, Ranichauri, Uttarakhand	23 Feb 2023 ICAR-CIRC, Meerut	Dr. Naresh Prasad
6	Visited 35 students of B.Sc. Microbiology and B.Tech. Biotechnology and one faculty of MIET, Meerut and	20 Jan 2023 ICAR-CIRC, Meerut	Dr Naresh Prasad

STAFF POSITIONS AND UPDATES

List of officers / employees of the institute (2023)

S. No	Name of officer /employee	Designation
Scientific staff		
1.	Dr Ashok Kumar Mohanty	Director (from 03.08.2023)
2.	Dr Umesh Singh	Director (Acting) (up to 02.08.2023)
Cattle Genetics and Breeding Division		
3.	Dr Sushil Kumar	HOD, CG&B (from 27.10.2023)
4.	Dr Achintya Kumar Das	Principal Scientist
5.	Dr Ravinder Kumar	Principal Scientist
6.	Dr T.V. Raja	Principal Scientist (up to 26.12.2023)
7.	Dr Rajiv Ranjan Kumar	Principal Scientist
8.	Dr Naresh Parsad	Senior Scientist
9.	Dr Devara Divya	Scientist (from 20.07.2023)
Cattle Nutrition and Management Division		
10.	Dr Avishek Biswas	HOD, CNM (from 30.10.2023)
11.	Dr Pramod Singh	Principal Scientist
12.	Dr Sanjeev Kumar Verma	Principal Scientist
Cattle physiology and Reproduction Division		
13.	Dr Suresh Kumar Dhoop Singh	HOD, CP&R (from 27.10.2023)
14.	Dr Ajayvir Singh Sirohi	Principal Scientist
15.	Dr Naimi Chand	Principal Scientist
16.	Dr Siddhartha Saha	Principal Scientist
17.	Dr Sumit Mahajan	Scientist (SS)
18.	Dr Megha Pande	Scientist (SS)
19.	Dr Anjali	Scientist (from 18.07.2023)
Administrative staff		
1.	Shri Shyam Sunder	Administrative Officer
2.	Shri Dharmender Singh Verma	Finance & Accounts Officer
3.	Shri Niranjan Singh Saini	Assistant Administrative Officer
4.	Shri Manoj Nehra	Assistant Administrative Officer
5.	Smt Anita Jain	Private Secretary
6.	Smt Pushpa	Private Secretary
7.	Shri Shankar Kashyap	Assistant
8.	Smt Nivedita Dubey	Assistant
9.	Shri Vikas Kumar	Assistant
10.	Smt Neerja Joshi	Lower Division Clerk

S. No	Name of officer /employee	Designation
Technical Officers / Technicians		
1.	Shri Sunil Kumar Sharma	Senior Technical Officer
2.	Shri Suresh Chand	Senior Technical Officer
3.	Shri Chhote Singh	Technical Officer
4.	Shri Mohan Chandra	T-1
Skilled Supporting Staff		
1.	Shri Veer Mahendra	Supporting Skilled Staff
2.	Shri Kailash	Supporting Skilled Staff
3.	Shri Dungar Singh	Supporting Skilled Staff
4.	Shri Jitender Giri	Supporting Skilled Staff
5.	Shri Umesh Kaushik	Supporting Skilled Staff
6.	Shri Veerpal Singh	Supporting Skilled Staff
7.	Shri Sunil Kumar	Supporting Skilled Staff

NEW JOININGS

1. Dr Anjali joined the institute as Scientist (Animal Physiology) on 18.07.2023.
2. Dr Devara Divya joined the institute as Scientist (Animal Genetics & Breeding) on 20.07.2023.
3. Dr Ashok Kumar Mohanty joined as Director on 03.08.2023.
4. Dr Suresh Kumar Dhoop Singh, Principal Scientist joined as HOD, CP&R Division on 27.10.2023.
5. Dr Sushil Kumar, Principal Scientist joined as HOD, CG&B Division on 27.10.2023.
6. Dr Avishek Biswas, Principal Scientist joined as HOD, CNM Division on 30.10.2023.

TRANSFER

1. Dr Umesh Singh, Principal Scientist (AG&B) relieved on 27.10.2023 to join the post of Head, Division of Animal Genetics & Breeding at ICAR-CIRB, Hisar (Haryana).
2. Dr T.V. Raja, Principal Scientist (CG&B) relieved on 26.12.2023 to join the post of Principal Scientist ICAR-NDRI, Karnal Haryana.

PROMOTIONS

1. Dr Rajiv Ranjan Kumar Sr. Scientist promoted to the post of Principal Scientist on 15.05.2023 w.e.f. 01.09.2021.
2. Smt. Pushpa, Personal Assistant promoted to the post of Private Secretary on 10.11.2023.
3. Shri Vikas Kumar, UDC promoted to Assistant on 12.05.2023.

RETIREMENTS

1. Dr J.K. Singh, Sr. Scientist upon attaining the age of superannuation, retired from Council's service and was relieved in the afternoon of 28.02.2023.
2. Shri O.P. Agarwal, Assistant upon attaining the age of superannuation, retired from Council's service and was relieved in the afternoon of 31.07.2023.

INSTITUTIONAL COMMITTEES / IN-CHARGES AND NODAL OFFICERS

Institutional Committees

PME Cell

1. Dr Sushil Kumar, Principal Scientist	Incharge
2. Dr A. S. Sirohi, Principal Scientist	Member
3. Dr T.V. Raja, Principal Scientist	Member
4. Dr Naimi Chand, Principal Scientist	Member
5. Dr Sumit Mahajan, Scientist	Member Secretary

Institute Technology Management Unit (ITMU)

1. Director	Chairman
2. Dr Sushil Kumar, Principal Scientist & Incharge, PME	Member
3. Dr Sumit Mahajan, Scientist & Incharge, ITMU	Member Secretary

HRD Cell

1. Dr Pramod Singh, Principal Scientist	Chairman & Incharge
3. Dr Naimi Chand, Principal Scientist	Member
4. Dr Megha Pande, Scientist	Member Secretary

Works Committee

1. Dr S. K. Dhoop Singh, Principal Scientist	Chairman
2. Shri Krishan Kumar, STO, IIFSR, Modipuram, Meerut	Member
3. I/C Estate	Member
4. SFAO/FAO/ I/C A&A	Member
5. Administrative Officer	Member
6. Shri Suresh Chand, STO	Member Secretary

Printing and Publication Committee:

I- Annual Report

1. Dr Sushil Kumar, Principal Scientist & Incharge, PME	Chairman
2. Dr Sanjeev Kumar Verma, Principal Scientist	Member
3. Dr A.S. Sirohi, Principal Scientist	Member
4. Dr T.V. Raja, Principal Scientist	Member
5. Dr Sumit Mahajan, Scientist	Member Secretary

II- News letter

1. Dr Ravinder Kumar, Principal Scientist	Chairman/Chief Editor
2. Dr T.V. Raja, Principal Scientist	Member/Editor
3. Dr Sumit Mahajan, Scientist	Member Secretary/Editor

III- Surbhi / सुरभि

1. Dr Umesh Singh, Director	Chief Editor

2. Dr Pramod Singh, Principal Scientist — Editor
3. Dr Megha Pande, Scientist — Editor

Farm Advisory Committee

1. HOD, Cattle Physiology & Reproduction Division
2. HOD, Cattle Genetics & Breeding Division
3. HOD, Cattle Nutrition & Management Division
4. (Senior most HoD/Incharge will act as Chairman)

Tender Opening & Financial Evaluation Committee

1. Dr A.K. Das, Principal Scientist — Chairman
2. Dr S. Saha, Principal Scientist — Member
3. SFAO/FAO/ I/C A&A — Member
4. Administrative Officer — Member Secretary

Local Purchase Committee

1. Dr A.K. Das, Principal Scientist — Chairman
2. Indenting Officer — Member
3. SFAO/FAO/ I/C A&A or his nominee — Member
4. Administrative Officer (Incharge Purchase) or his nominee — Member Secretary

Technical (Bid) Evaluation Committee

1. Dr Pramod Singh, Principal Scientist — Chairman
2. Dr T. V. Raja, Principal Scientist — Member
3. Dr Naimi Chand, Principal Scientist — Member
4. Indenting Officer — Member

Internal Complaint Committee

1. Dr Megha Pande, Scientist (SS) — Chairperson
2. Dr Shweta Anand, Asstt. Prof. SVPUAT, Meerut — Member
3. Ms Ritu Diwan, Principal, DMA, Modipuram — Member (Outside)
4. Ms Anita Jain, Private Secretary — Member
5. Administrative Officer — Member Secretary

Library Advisory Committee

1. Director — Chairman
2. Dr S.K. Dhoop Singh, Principal Scientist — Member
3. Dr A.K. Das, Principal Scientist I/C Library — Member
4. Dr Pramod Singh, Principal Scientist — Member
5. Dr S. K. Verma, Principal Scientist — Member
6. Dr Megha Pande, Scientist — Member
7. SFAO/FAO/ I/C A&A — Member
8. Administrative Officer — Member
9. Sh. Suresh Chand, STO — Member Secretary

Rajbhasha Committee

1. Director — Chairman
2. Dr A.K. Das, Principal Scientist — Member

3. Dr Pramod Singh, Principal Scientist	Member
4. Dr A.S. Sirohi, Principal Scientist	Member
5. Dr T.V. Raja, Principal Scientist	Member
6. Asstt. Administrative Officer	Member Secretary

Staff Welfare Committee

1. Dr S.K. Dhoop Singh, Principal Scientist	Chairman
2. Dr A.S.Sirohi, Principal Scientist	Member
3. Administrative Officer	Member
4. SFAO/FAO/ I/C A&A	Member
5. Smt. Anita Jain, Private Secretary	Member
6. Smt. Neera Joshi, Jr. Clerk (Staff Side), IJSC	Member
7. Sh. Dungar Singh, Skilled Supp. Staff	Member
8. Sh. N.S. Saini, Asstt. Administrative Officer	Member Secretary

Price Fixation Committee

1. Dr A.K. Das, Principal Scientist	Chairman
2. Dr A.S. Sirohi, Principal Scientist	Member
3. Incharge Estate	Member
4. Shri Suresh Chand, STO	Member
5. SFAO/FAO/ I/C A&A	Member
6. Administrative officer	Member Secretary

Reviewing of Semen Rate Committee

1. Dr S.K. Dhoop Singh, Principal Scientist	Chairman
2. Dr Pramod Singh, Principal Scientist	Member
3. Dr Sushil Kumar, Principal Scientist	Member
4. SFAO/FAO/ I/C A&A	Member
5. Administrative Officer	Member Secretary

Press and Media Committee

1. Dr T.V. Raja, Principal Scientist	Chairman
2. Dr Naresh Prasad, Scientist (SS)	Member
3. Dr Megha Pande, Scientist	Member Secretary

Physical Verification Committee (above Rs. 2,50,000/-)

1. Dr Naimi Chand, Principal Scientist	Chairman
2. Dr Rajiv Ranjan Kumar, Scientist	Member
3. Indentor	Member
4. Incharge, Store & Purchase	Member Secretary

Data Cell

1. PI, Frieswal Project	Chairman
2. PI, Indigenous Breeds Project	Member
3. PI, Field Progeny Testing Project	Member
4. HOD, CP& R Division	Member
5. Incharge, ITMU	Member Secretary

In-charges of Different Section/Unit/Facilities

S. No.	In-charge	Section/Unit/Facility
1.	Dr A.K. Das, Principal Scientist	Library
2.	Dr Sumit Mahajan, Scientist (SS)	ARIS Cell, ITMU
3.	Dr Ajayvir Singh Sirohi, Principal Scientist	Male Germplasm Unit
4.	Dr Rajiv Ranjan Kumar, Principal Scientist	Vermicompost Unit
5.	Dr S. Saha, Principal Scientist	Semen Freezing Laboratory
6.	Dr Naimi Chand, Principal Scientist	Quality Control Laboratory
7.	Dr Ravinder Kumar, Principal Scientist	Semen Sales centre
8.	Dr Naresh Prasad, Scientist (SS)	Extension & Fair/camp
9.	Dr S.K. Verma, Principal Scientist	Feed Technology Unit
10.	Shri Suresh Chand, STO	Farm Section
11.	Shri Sunil Kumar Sharma, STO	Estate Section
12.	Administrative Officer	Vehicle section
13.	Shri Vikas Kumar, Assistant	Guest House
14.	Shri Manoj Nehra, AAO	Security

NODAL OFFICERS

S. No.	Activity	Nodal Officer
1.	Vigilance Officer	Dr Sushil Kumar, Principal Scientist
2.	Right to Information Act-2005.	Dr Rajiv Ranjan Kumar, Principal Scientist
3.	HRD (Training)	Dr Pramod Singh, Principal Scientist
4.	SCSP/TSP.NEHR Scheme- Govt. of India	Dr S.K. Verma, Principal Scientist
5.	Sending advisory to the farmers.	Dr R. Kumar, Principal Scientist
6.	INFLIBNET and CeRA.	Dr S. Saha, Principal Scientist
7.	CPGRAMS	Dr Sushil Kumar, Principal Scientist
8.	Swachha Bharat Abhiyan	Dr Naresh Prasad, Sr. Scientist
9.	IMS/FMS	Dr Sumit Mahajan, Scientist
10.	E-office	Dr Sumit Mahajan, Scientist
11.	Monthly Cabinet Report to ICAR, HQ	Dr Sumit Mahajan, Scientist
12.	PERMISNET-IRS-FMS, PMIS Database, Aadhar Based Biometric System	Shri Suresh Chand, STO
13.	EHRMS	Dr Pramod Singh, Principal Scientist
14.	ISO/RFD	Dr Naimi Chand, Principal Scientist
15.	Press & Media	Dr Megha Pande, Scientist (SS)

राजभाषा अनुभाग के वार्षिक कार्यक्रम एवं रिपोर्ट

संस्थान की राजभाषा कार्यान्वयन समिति का गठन

1. निदेशक – अध्यक्ष
2. डॉ. ए. के. दास, प्रधान वैज्ञानिक – सदस्य
3. डॉ. प्रमोद सिंह, प्रधान वैज्ञानिक – सदस्य
4. डॉ. ए. स. सिरोही, प्रधान वैज्ञानिक – सदस्य
5. डॉ. टी. वी. राजा, प्रधान वैज्ञानिक – सदस्य
6. श्री एन.एस. सैनी, स.प्र.अ. – सदस्य सचिव/राजभाषा अधिकारी

संस्थान की राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन

1. माह दिसम्बर, 2022 को समाप्त तिमाही बैठक दिनॉक 07.03.2023 को।
2. माह मार्च, 2023 को समाप्त तिमाही बैठक दिनॉक 18.05.2023 को।
3. माह जून, 2023 को समाप्त तिमाही बैठक दिनॉक 26.07.2023 को।
4. माह सितम्बर, 2023 को समाप्त तिमाही बैठक (हिंदी सप्ताह) दिनांक 25.08.2023 को।

- नगर राजभाषा कार्यान्वयन समिति, मेरठ की बैठकों का आयोजन एवं समीक्षा
- नगर राजभाषा कार्यान्वयन समिति, मेरठ के स्थानीय सदस्य केन्द्रीय/उपक्रम/निगम/बैंक/बीमा कार्यालयों की दिनॉक 01.10.2022 से 31.03.2023 तक की कोविड–19 के कारण छमाही ऑनलाईन (Virtual Mode) समीक्षा बैठक दिनांक 24.05.2023 को आयोजित हुई जिसमें संस्थान की ओर से श्री एन.एस. सैनी, सहायक प्रशासनिक अधिकारी/प्रभारी अधिकारी, राजभाषा हिंदी ने भाग लिया।
- नगर राजभाषा कार्यान्वयन समिति, मेरठ के स्थानीय 80 सदस्य केन्द्रीय/उपक्रम/निगम/बैंक/बीमा कार्यालयों की दिनांक 01.04.2023 से 30.09.2023 तक की कोविड–19 के कारण छमाही ऑनलाईन (Virtual Mode) समीक्षा बैठक दिनांक 25–10–2023 को आयोजित हुई जिसमें संस्थान की ओर से श्री एन.एस. सैनी, सहायक प्रशासनिक अधिकारी/प्रभारी अधिकारी, राजभाषा हिंदी ने भाग लिया।

हिन्दी सप्ताह का आयोजन (दिनांक 14.09.2023 से 20.09.2023 तक)

1. संस्थान में दिनांक 14.09.2023 से 20.09.2023 तक हिंदी सप्ताह का आयोजन किया गया जिसके अंतर्गत विभिन्न हिंदी प्रतियोगिताओं का आयोजन किया गया जिसमें सभी अधिकारियों/कर्मचारियों ने हर्ष के साथ बढ़–चढ़कर प्रतिभाग किया जिसका विवरण आगे दिया जा रहा है एवं इस दौरान हिन्दी सप्ताह के अंतर्गत दिनांक 20.09.2023 को समापन समारोह में हिन्दी कार्यशाला का आयोजन किया गया जिसमें वक्ता डॉ. ईश्वर चंद गभीर एवं डॉ. प्रमोद कुमार त्यागी रहे।

हिन्दी सप्ताह के दौरान आयोजित प्रतियोगिताओं के विजेता प्रतिभागियों की सूची का विवरणः

क्र.सं.	प्रतियोगिता का नाम	दिनांक	परिणाम	विजेता
1.	हिन्दी शब्दावली	14.09.2023	प्रथम	डा. संजीव वर्मा
	कुल प्रतियोगी–24		द्वितीय	डा. सुरेश कुमार डी. एस.
			तृतीय	श्रीमती आंचल शर्मा
			सांत्वना	डा. नेमी चन्द
			सांत्वना	डा. मेघा पाण्डे
			सांत्वना	श्री डी.एस. वर्मा
2.	हिन्दी निबंध	15.09.2023	प्रथम	कु. गुंजन वत्स
	कुल प्रतियोगी–13		द्वितीय	श्रीमती नीरजा जोशी
			तृतीय	डा. मेघा पाण्डे
			सांत्वना	श्रीमती पुष्पा
			सांत्वना	श्रीमती सर्मेश आर्या
			सांत्वना	श्रीमती पूनम शर्मा
3.	श्रुतिलेखन	18.09.2023	प्रथम	डा. नेमी चन्द
	कुल प्रतियोगी–21		द्वितीय	श्रीमती आंचल शर्मा
			तृतीय	श्रीमती नीरजा जोशी
			सांत्वना	श्रीमती पूनम शर्मा
			सांत्वना	श्रीमती पुष्पा
			सांत्वना	श्रीमती सर्मेश आर्या
4.	टिप्पण एवं प्रारूप	19.09.2023	प्रथम	श्रीमती पुष्पा
	कुल प्रतियागी–13		द्वितीय	श्रीमती निवेदिता दूबे
			तृतीय	श्री शुभम मित्तल
			सांत्वना	डा. मेघा पाण्डे
			सांत्वना	डा. राजीव रंजन कुमार
			सांत्वना	श्री सोनू कुमार
5.	प्रतिदिन आज का शब्द लेखन विशेष पुरस्कार			श्री वीरपाल सिंह

सूचना का अधिकार अधिनियम

दिनांक 01.01.2023 से 31.12.2023 तक की अवधि की जनसूचना अधिकार अधिनियम –2023 के अंतर्गत ऑनलाइन / ऑफलाइन मांगी गयी सूचना का वितरणः–

क्र. सं.	कुल प्राप्त ऑनलाइन/ ऑफलाइन मॉगी गई आर. टी.आई. सूचना	कॉलम 2 में से कुल प्राप्त ऑफलाइन मॉगी गई आर.टी.आई. सूचना	भा.कृ.अ.प.,नई दिल्ली के माध्यम से मॉगी गई कुल प्राप्त ऑनलाईन आर.टी. आई. सूचना	कितनों के जवाब दिए गए/निपटान किया गया	भाकृअनुप, नई दिल्ली के खाते में ऑनलाईन लमा कराई गई राशि	कुल प्राप्त भा.कृ.अ.प., नई दिल्ली को भेजी गई ऑनलाइन/ऑफलाइन मॉगी गई आर.टी.आई. सूचना की फीस
1	18	0	1	18	130/–	0

SWACHHATA ABHIYAAN 2023

Swachhta Hi Seva campaign was organized at ICAR-Central Institute for Research on Cattle, Meerut from 15th September to 2nd October 2023. A special campaign was conducted under the Swachhata Abhiyaan during 02nd to 31st October. Swachhata Pakhwada was organized from 16th to 31st December 2023. The following activities were performed during Swachhata Pakhwada.

S.No.	Date	Activities performed	Place of execution
1.	16-12-2023	Taking Swachhata pledge, briefing of the activities to be organized during the Pakhwada and plantation of trees	ICAR-CIRC Campus
2.	17-12-2023	Stock taking on digitization of office records/ e-office implementation. Cleanliness drive including cleaning of offices, corridors and premises.	ICAR-CIRC Offices, Corridors and Premises
3.	19-12-2023	Cleanliness and sanitation drive in the residential quarters of ICAR-CIRC	ICAR-CIRC residential quarters
4.	20-12-2023	Cleanliness and sanitation drive	New Campus Site of ICAR-CIRC and Babugarh Railway station
5.	21-12-2023	Talk on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/horticulture application/ kitchen gardens in residential colony	ICAR-CIRC Campus
6.	22-12-2023	Lecture on hazard from waste and its management	ICAR-CIRC Campus
7.	23-12-2023	Celebration of Kisan Diwas, inviting farmers. Experience sharing on Swachhata initiatives by farmers. Felicitating farmers for exemplary initiatives on Swachhata.	Kushawali village, Sardhana block
8.	26-12-2023	Lecture on human health and disease diagnosis	ICAR-CIRC
9.	27-12-2023	Cleaning at farm and vermicompost unit	ICAR-CIRC Campus
10.	28-12-2023	Awareness on waste management & Campaign on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/ horticulture application/ kitchen gardens in residential colonies. Outside campus with the involvement of local communities.	ICAR-CIRC and outside campus in Fazalpur colony
11.	29-12-2023	Visit at waste disposal sites/ compost pits, cleaning and creating awareness on treatment & safe disposal of bio-degradable/ non-bio-degradable wastes.	ICAR-CIRC Campus
12.	31-12-2023	News Media	ICAR-CIRC Campus

Swachhata Pakhwada started with taking Swachhata Pledge

Plantation of trees during Swachhata Pakhwada

Cleaning of office record by Dr A. K. Mohanty, Director during Swachhata Pakhwada

Digitization of office records during Swachhata Pakhwada

Cleaniness drive at office library during Swachhata Pakhwada

Cleaniness and Sanitation drive at Babugarh Railway Station near New Campus Land of ICAR-CIRC during Swachhata Pakhwada

Talk on cleaning of sewerage & water lines, awareness on recycling of waste water, water harvesting for agriculture/horticulture application/ kitchen gardens in residential colony by Dr A. S. Sirohi, Principal Scientist during Swachhata Pakhwada

Lecture on Human Health and Disease Diagnosis by Dr Naimi Chand, Principal Scientist during Swachhata Pakhwada

VISITOR'S WALL AND ICAR-CIRC IN NEWS

Visits of Dignitaries to the Institute

Dr B. N. Tripathi, Deputy Director General (Animal Science), ICAR, New Delhi

Dr B. N. Tripathi, Deputy Director General (Animal Science), ICAR, New Delhi, visited the ICAR-Central Institute for Research on Cattle, Meerut, on 28.01. 2023. The Deputy Director General was accompanied by Dr Amrish Kumar Tyagi, ADG (Animal Nutrition & Physiology, Dr Arun Kumar, Director, ICAR- Central Sheep and Wool Research Institute, Avikanagar and Dr Arjava Sharma, Ex-Director, ICAR-CIRC & ICAR-NBAGR. They also addressed the farmers undergoing training in SCSP schemes and distributed inputs.

Dr B. N. Tripathi, Deputy Director General (Animal Science), ICAR, New Delhi, visited the ICAR-Central Institute for Research on Cattle, Meerut, on 28 January, 2023.

Shri Sunil Mansinghka, Coordinator of Go-Vigyaan Anusandhan Kendra Deolapar, Nagpur

Shri Sunil Mansinghka, Coordinator of Go-Vigyaan Anusandhan Kendra Deolapar, Nagpur, India, visited the ICAR-Central Institute for Research on Cattle (ICAR-CIRC) on 18.07.2023. He was accompanied by Shri Saket Mani Trivedi, coordinator, MIsson Bharat and Shri Rajendra Agnihotri, *Gau Seva Gatividhi Prant Parshikshan Pramukh* and Shri Devdatta Sharma. During his visit, a series of insightful discussions with eminent scientists at the forefront of cattle research and animal welfare happened. He primary focused to explore potential avenues for enhancing cow welfare measures, optimizing cattle research methodologies, and strengthening the existing framework for ethical treatment of cows involved in various research and developmental activities. The

Meeting with Shri Sunil Mansinghka Coordinator of Go-Vigyaan Anusandhan Kendra Deolapar, Nagpur, eminent scientist and ICAR-CIRC scientists on 18-07-2023

esteemed member expressed his keen interest in understanding the ongoing cattle welfare initiatives at ICAR-CIRC. He lauded the institute's commitment to promoting the cattle wealth through advanced research and sustainable practices. The visit also laid the groundwork for potential collaborations between the Animal Welfare Board of India and ICAR-CIRC.

Director General, UPCAR, Lucknow

Director General of Uttar Pradesh Agricultural Research Council (UPCAR), Lucknow, Hon'ble Dr Sanjay Singh visited ICAR-Central Institute for Research on Cattle, Meerut on 30.06.2023. Also Dr Arun Kumar, Director, ICAR-Central Sheep and Wool Research Institute, Avikanagar and Dr Vineet Bhashin, former Principal Scientist, Headquarters ICAR, New Delhi were also present. He also addressed the farmers and Scientists during his visit. He urged

Visits of Hon'ble Dr Sanjay Singh Director General UPCAR, Lucknow handing over the agriculture and livestock inputs to farmers at ICAR-CIRC, Meerut on 30-06-2023

all the scientists to put up research proposals to UPCAR, Lucknow in collaboration with SAUs. He also updated about *Shodh Nidhi* scheme and revolving fund scheme.

Dr KML Pathak, former DDG(AS), ICAR and VC, DUVASU, Mathura

Dr KML Pathak, former DDG(AS), ICAR and former VC, DUVASU, Mathura, along with Dr Ashok Kumar, Assistant Director General (Animal Health), Dr B.P. Mohanty, Assistant Director General (Inland Fisheries), Dr A.K. Rawat, Former Advisor, DBT, Government of India were present at ICAR-CIRC, Meerut on auspicious occasion of 37th foundation day of the Institute. Besides these, Dr Sachinandan De, National Professor, Center for Animal Biotechnology, National Dairy Research Institute, Karnal, Dr Girish Patil, Director, National Research Centre on Mithun, Medziphema, Nagaland, Associate Professor Dr Srinivas Kiran Ambatipudi, Department of Bioscience and Bioengineering, IIT Roorkee, Dr A.P.S. Aswal, Veterinary Officer, Project Coordinator, ET/NDP, Animal Breeding Farm, ULDB, Kalsi, Dehradun and Dr Shrikant Tyagi, former Head of Division, Cattle Physiology and Reproduction also graced the event.

Professor Dr K.M.L. Pathak, former DDG (AS) and VC DUVASU, Mathura visited ICAR-CIRC Meerut on 3rd November, 2023 for 37th Foundation Day of ICAR-CIRC as Chief Guest and Chairman of the brainstorming session on "The Way Forward for ICAR-CIRC"

Dr Pathak also chaired a brainstorming session where identified issues were discussed and necessary suggestions were obtained on the modalities to be adopted for setting up the cattle research institute in the new campus. He also suggested to develop a blue print for development of infrastructure facilities in Babugarh with necessary facilities, provision of future expension and of international standard keeping in mind vision for the next 50 years so that advanced research at par with international standards could be conducted. He also advised for organizing theme specific 4-5 brainstorming sessions to clearly define the infrastructure and research facilities.

Dr Trilochan Mohapatra, former DG, ICAR and Chairman PPVFRA, Government of India, New Delhi and Dr A.K. Mishra and former Chairman, ASRB and VC, MAFSU, Nagpur, Maharashtra

Dr Trilochan Mohapatra, former Director General, Indian Council of Agricultural Research and Chairman PPVFRA, Government of India, New Delhi and the special guest was Dr A.K. Mishra and former Chairman, ASRB and former Vice Chancellor, MAFSU, Nagpur, Maharashtra visited the institute on 27.12.2023. During their visit they address the participants of one-day seminar on "Strategies to increase the pace of dairy entrepreneurship in Western Uttar Pradesh" was organized jointly by the Indian Dairy Association (IDA) - North Zone Western Uttar Pradesh in collaboration with ICAR-Central Institute for Research on Cattle, Meerut. Dr Mohapatra, discussed the importance and prospects of dairy development in India, especially in Western Uttar Pradesh. In his address, he stressed over the need to reduce the rising prices of milk and solve business inefficiencies by proper management in dairy. He also advocated for by paying proper attention to the processing of products. Special guest Dr Mishra in his address highlighted the need of assured market for milk in dairy business and designated farmers as the most important link in transforming the dairy business in country from importer to exporter of milk products.

Dr Trilochan Mahapatra, former DG, ICAR and Chairman PPVFRA, Government of India, New Delhi and Dr A.K. Mishra and former Chairman, ASRB and VC, MAFSU, Nagpur, Maharashtra for IDA Seminar

ICAR-CIRC IN NEWS


हिंदुस्तान, मेरठ, बुधवार, 28-12-2023

दूध के औषधीय गुणों की करें मार्के

प्रदर्शनी-स्टॉल रहे आकर्षण का केंद्र


डेयरी उद्योग से किसान स
तो देश होगा उन्नत : डा. त्रि

डेयरी उद्यमिता पर आइसीएआर के पूर्व महानिदेशक क


अनुष केंद्रीय गोवंश अनुसंधान संस्थान मेरठ में
की गति बढ़ाने हेतु रणनीतियों विषय पर आइ


मेरठ मंडल

केंद्रीय गोवंश अनुसंधान
स्थान ने किया सेमिनार

मिता की गति बढ़ाने को लेकर हुई चर्चा


A mega two-day Pashu Pardarshani & Krishi Mela begins in Muzaffarnagar, Uttar Pradesh

पशु प्रदर्शनी एवं कृषि मेला 2023


कृषि में गोवंश की महत्वपूर्ण भूमिका


अमर उजाला, मेरठ,


अमर उजाला

अशोक कुमार बने निदेशक


जी राज्य मंत्री ने किसानों का

Narendra Modi
@narendramodi · Follow

बेहतरीन प्रयास! इस तरह के किसान मेलों से जहां हमारे ज्यादा से ज्यादा अन्नदाता भाई-बहन आधुनिक टेक्नोलॉजी अपनाने के लिए प्रेरित होंगे, वहीं उनकी आय के साधन भी बढ़ेंगे।

Dr. Sanjeev Balyan @drsanjeevbalyan

माननीय प्रधानमंत्री श्री @narendramodi जी हमेशा किसानों को सशक्त बनाने, आधुनिक तकनीक से खेती के लिए किसानों को प्रेरित करने तथा उत्तम नस्ल के पशुओं व बीजों को बढ़ावा देने के पक्षधर रहे है। इसी उद्देश्य के साथ कृषि मंत्रालय एवं मत्स्य, पशुपालन एवं डेयरी मंत्रालय के संयुक्त प्रयास.

'दुग्ध उत्पादन में पहले स्थान पर है भारत'

केंद्रीय गोवंश अनुसंधान संस्थान ने किसान दिवस एवं फील्ड डे का किया आयोजन

हापुड़ में स्थापित होगा गोवंश अनुसंधान संस्थान

4 दैनिक जागरण मेरठ, 12 जनवरी, 2023

विविध

उन्नत देशी गोवंशी एवं गौअपशिष्ट प्रबंधन पर विचार-विमर्श

संवाद सूत्र, सरधना : केंद्रीय गोवंशी अनुसन्धान संस्थान के तत्वावधान में बुधवार को गमोल तीर्थ पर देशी गोवंशी उत्पादन एवं गौअपशिष्ट प्रबंधन पर एक दिवसीय कार्यशाला का आयोजन किया गया। जिसका शुभारम्भ मुख्य अतिथि ऊर्जा राज्यमंत्री डा. सोमेन्द्र तोमर ने किया। कार्यक्रम अध्यक्ष संस्थान के निदेशक डा. उमेश सिंह ने मुख्य अतिथि का स्वागत किया। निदेशक ने गोवंश के विकास एवं किसानों के हित में चल रही संस्थान की गतिविधियों के बारे में जानकारी दी। मंत्री सोमेन्द्र तोमर ने किसानों के हित में चल रहे गोवंश संस्थान के प्रयासों की सराहना की। विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार की परियोजना के अंतर्गत पशुपालकों की जानकारी हेतु "भारतीय देशी गोवंश की उन्नत नस्ले एवं गौअपशिष्ट मूल्य संवर्धन" शीर्षक पर एक फोल्डर का विमोचन

दैनिक जागरण

युवा जागरण

भ्रूण प्रत्यारोपण तकनीक से फ्रीजवाल गाय ने साहीवाल बछिया को दिया जन्म

गाय से एक साल में पैदा होंगे 12 बच्चे

मेरठ · सिटी

हिन्दुस्तान

मंजूरी मिली : बाबूगढ़ में स्थापित होगा गोवंश अनुसंधान संस्थान

प्रदेश सरकार ने बाबूगढ़ में 150 एकड़ जमीन केंद्रीय गोवंश अनुसंधान संस्थान को देने का आदेश किया है। - डॉ. राजीव प्रतिहार

उन्नत पशुपालन और प्रबंधन की जानकारी दी

NOTES

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हर कदम, हर डगर
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